FINAL
REMEDIAL INVESTIGATION REPORT AND BASELINE HUMAN HEALTH RISK ASSESSMENT FOR AREA II OF THE FORMER FRANKFORD ARSENAL PHILADELPHIA, PENNSYLVANIA FUDS PROPERTY NO: C03PA0042

Prepared for:

U.S. Army Corps of Engineers–Baltimore District
City Crescent Building, Room 10200
10 South Howard Street
Baltimore, Maryland 21201

Prepared by:

EA Engineering, Science, and Technology, Inc.
225 Schilling Circle
Hunt Valley, Maryland 21031
(410) 584-7000



Denise Wilt, P.G.
Project Geologist

December 29, 2014
Date

Michael O'Neill, PMP
Project Manager

December 29, 2014
Date

December 2014

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COMPLETION OF SENIOR TECHNICAL REVIEW

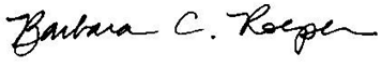
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December 29, 2014

Kevin Sharpe, P.G. Date
Senior Technical Reviewer

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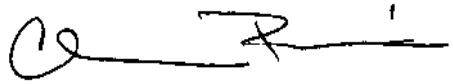


December 29, 2014

Barbara Roeper (EA) Date
Senior Technical Reviewer

COMPLETION OF SENIOR TECHNICAL REVIEW – HUMAN HEALTH RISK ASSESSEMENT AND SCREENING LEVEL ECOLOGICAL RISK ASSESSMENT

In compliance with EA's Senior Technical Review Program and quality procedures for review of deliverables outlined in the appropriate Quality Assurance Plan for this contract, I hereby certify that I reviewed this final deliverable as the Senior Technical Reviewer for this project. I consequently conclude that the information presented in this report was prepared in accordance with the approved procedures for the applicable Contract No. W912DR-09-D-0018 and reflects a proper presentation of the data and the conclusions drawn during the conduct of the work. This statement is based upon the standards identified in the contract/task order and/or the standard of care existing at the time of preparation.



March 29, 2014

Christine Papageorgis (EA) Date
Senior Technical Reviewer

In compliance with EA's Senior Technical Review Program and quality procedures for review of deliverables outlined in the appropriate Quality Assurance Plan for this contract, I hereby certify that I reviewed this final deliverable as the Senior Technical Reviewer for this project. I consequently conclude that the information presented in this report was prepared in accordance with the approved procedures for the applicable Contract No. W912DR-09-D-0018 and reflects a proper presentation of the data and the conclusions drawn during the conduct of the work. This statement is based upon the standards identified in the contract/task order and/or the standard of care existing at the time of preparation.



December 29, 2014

Daniel Hinckley, PhD (EA) Date
Senior Technical Reviewer

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LIST OF ACRONYMS AND ABBREVIATIONS

^{60}Co	Cobalt-60
^{137}Cs	Cesium-137
^{3}H	Tritium
^{40}K	Potassium-40
^{226}Ra	Radium-226
95%UCL	95th Percentile Upper Confidence Limit of the Mean
°F	Degrees Fahrenheit
%C	Percent Completeness
%R	Percent Recovery
µ/cm^2	Microgram(s) Per Square Centimeter
µg	Microgram(s)
µg/dL	Microgram(s) Per Deciliter
µg/kg	Microgram(s) Per Kilogram
µg/L	Microgram(s) Per Liter
ABC	Arsenal Business Center
ABCA	Arsenal Business Center Associates
Act 2	Pennsylvania Land Recycling and Environmental Remediation Standards Act
ADI	Average Daily Intake
AEC	Atomic Energy Commission
amsl	Above Mean Sea Level
AOC	Area of Concern
AOI	Area of Interest
APP	Accident Prevention Plan
AT	Averaging Time
ATSDR	Agency for Toxic Substances and Disease Registry
BAF	Bioaccumulation Factor
BAP	Benzo(a)pyrene
Batelle	Battelle Laboratories
bgs	Below Ground Surface
CAA	Clean Air Act
Cabrera	Cabrera Services, Inc.
CalEPA	California Environmental Protection Agency
CDC	Centers for Disease Control
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
Chemtech	Chemtech Consulting Group, Inc.
cm²	Square Centimeter(s)
COC	Constituent of Concern

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

CON/HTRW	Containerized HTRW
COPC	Constituent of Potential Concern
COPIAC	Compound of Potential Indoor Air Concern
CSM	Conceptual Site Model
DA	Department of the Army
DERP	Defense Environmental Restoration Program
dL	Deciliter
DNT	Dinitrotoluene
DoD	Department of Defense
dpm	Disintegration(s) Per Minute
DPT	Direct-Push Technology
DQI	Data Quality Indicator
DQO	Data Quality Objective
DU	Depleted Uranium
E&E	Ecology and Environment
EA	EA Engineering, Science, and Technology, Inc.
EcoSSLs	Ecological Soil Screening Levels
EDD	Electronic Data Deliverables
EDS	Environmental Data Services
EM	Electromagnetic
EPC	Exposure Point Concentration
ERA	Ecological Risk Assessment
ESA	Environmental Site Assessment
FFA	Former Frankford Arsenal
FS	Feasibility Study
FSP	Field Sampling Plan
ft	Foot or Feet
ft/ft	Feet Per Feet
ft^2	Square Foot or Square Feet
FUDS	Formerly Used Defense Sites
g/g/day	Gram per gram of body weight per day
gpm	Gallon(s) Per Minute
GSA	General Services Administration
GWS	Gamma Walkover Survey
HEAST	Health Effects Assessment Summary Tables
HHRA	Human Health Risk Assessment
HPAH	High Molecular Weight Polycyclic Aromatic Hydrocarbon
HQ	Hazard Quotient
HSA	Historical Site Assessment
HTRW	Hazardous, Toxic, and Radioactive Waste

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

I-95	Interstate 95
IAQ	Indoor Air Quality
IDW	Investigative-Derived Waste
IEUBK	Integrated Exposure Uptake Biokinetic
in.	Inch(es)
JMA	John Milner Associates, Inc.
kg	Kilogram(s)
K_{oc}	Organic Carbon Coefficient
LADI	Lifetime Average Daily Intake
Langan	Langan Environmental & Engineering Services
LCS	Laboratory Control Spike
LCSD	Laboratory Control Spike Duplicate
LNAPL	Light Non-Aqueous Phase Liquid
LOAEL	Lowest Observed Adverse Effect Level
LOD	Limit of Detection
LPAH	Low Molecular Weight Polycyclic Aromatic Hydrocarbon
MCL	Maximum Contaminant Level
MDA	Minimum Detectable Activity
MEC	Munitions and Explosives of Concern
mg	Milligram(s)
mg/kg	Milligram(s) Per Kilogram
MOA	Memorandum of Agreement
mrem	Millirem(s)
MRL	Minimal Risk Levels
MS	Matrix Spike
MSC	Medium-Specific Concentration
MSD	Matrix Spike Duplicate
MTBE	Methyl Tert-Butyl Ether
MW	Molecular Weight
NA	Not Applicable
NCEA	National Center for Environmental Assessment
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NIR	Notice of Intent to Remediate
NPS	National Park Service
NOAEL	No Observed Adverse Effect Level
NRC	Nuclear Regulatory Commission
NSV	No Screening Value
NTU	Nephelometric Turbidity Unit

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

OEHHA	Office of Environmental Health Hazard Assessment
ORP	Oxidation-Reduction Potential
OU	Operable Unit
PA	Pennsylvania
PADEP	Pennsylvania Department of Environmental Protection
PAH	Polycyclic Aromatic Hydrocarbon
PAID	Philadelphia Authority for Industrial Development
PARCS	Precision, Accuracy, Representativeness, Completeness, Comparability, and Sensitivity
PCB	Polychlorinated Biphenyl
PCE	Tetrachloroethene
pCi/g	Picocuries Per Gram
pCi/L	Picocuries Per Liter
Pcrit	Critical Dose
PETN	Pentaerythritol Tetranitrate
PFBC	State of Pennsylvania Fish and Boat Commission
PID	Photoionization Detector
PNDI	Pennsylvania Natural Diversity Inventory
PPE	Personal Protective Equipment
ppm	Parts per Million
PPRTV	Provisional Peer Reviewed Toxicity Value
PRAP	Proposed Remedial Action Plan
PSI	Property Solutions, Inc.
PVC	Polyvinyl Chloride
Q	Quantile
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
QSM	Quality Systems Manual
RCOPC	Radiological Contaminant of Potential Concern
RCRA	Resource Conservation and Recovery Act
RDC	Residential Direct Contact
RAGS	Risk Assessment Guidance for Superfund
RI	Remedial Investigation
RME	Reasonable Maximum Exposure
ROC	Receptor of Concern
ROD	Record of Decision
Rockwell	Rockwell International
RPD	Relative Percent Difference
RSL	Regional Screening Level

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

SARA	Superfund Amendments and Reauthorization Act
SDG	Sample Delivery Group
SGW	Soil-to-GroundwaterSHS Statewide Health Standards
SLERA	Screening Level Ecological Risk Assessment
SMDP	Scientific Management Decision Point
SOP	Standard Operating Procedure
SPL	Separate Phase Liquid
SQL	Structured Query Language
SSI	Supplemental Site Investigation
STR	Senior Technical Review
SVOC	Semivolatile Organic Compound
TAL	Target Analyte List
TCE	Trichloroethene
TCL	Target Compound List
TGM	Technical Guidance Manual
TRV	Toxicity Reference Value
TRW	Technical Review Workgroup
TSCA	Toxic Substances Control Act
U.S.	United States
U.S.C.	United States Code
UCLM	Upper Confidence Limit of the Mean
USNRC NUREG/CR-5512	United States Nuclear Regulatory Commission Residual Radioactive Contamination From Decommissioning Parameter Analysis
USACE	United States Army Corps of Engineers
USATHAMA	United States Army Toxic and Hazardous Materials Agency
USC	United States Code
USDHHS	United States Department of Health and Human Services
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UST	Underground Storage Tank
UTL	Upper Threshold Limit
UXO	Unexploded Ordnance
VCP	Voluntary Cleanup Program
VOC	Volatile Organic Compound
WMP	Work Management Plan
WMW	Wilcoxon-Mann-Whitney
ww	Wet Weight
yd^3	Cubic Yard(s)

EXECUTIVE SUMMARY

The former Frankford Arsenal (FFA) encompasses approximately 109.4 acres located in an urban, mixed-use area of northeast Philadelphia, Pennsylvania. The FFA was acquired by the U.S. Government between 1816 and 1951, and was used by the Army for research and development activities, as well as ammunition manufacturing and storage/depot operations, from initial activation until its closure and disposal by the Army in 1981. The property was subsequently sold to the State of Pennsylvania Fish and Boat Commission (PFBC) and the Philadelphia Authority for Industrial Development (PAID). PAID subsequently sold their property to Arsenal Associates Inc. in 1983.

The U.S. Army Corps of Engineers (USACE) has identified the FFA as a Formerly Used Defense Site (FUDS) eligible for restoration under the Defense Environmental Restoration Program (DERP). USACE–Baltimore District is actively completing investigations on several portions of the FFA identified as Area I, Area III, and Area IV. EA Engineering, Science, and Technology, Inc. (EA) was contracted by USACE–Baltimore District to conduct a remedial investigation (RI) for soils located on a 36.9-acre portion of the FFA designated as FFA Area II (the site). Area II is located to the west of Baird Street, east of Bridge Street, south of Tacony Street, and north of Frankford Creek.

As part of the RI process, Area II was divided into three zones associated with past historical use in order to assess past Department of Defense (DoD) use to include: Zone 1 – a mostly residential area which occupies the northwest corner of Area II; Zone 2 – a mostly industrial use area located in the northeast corner of Area II which housed research and support operations; and Zone 3 − a mostly industrial use area which housed former ammunition production operations in the southern portion of Area II adjacent to Frankford Creek.

A total of 445 soil samples consisting of biased, unbiased, and delineation surface and subsurface soil samples were collected in Zones 1, 2, and 3 as part of the RI. A total of 27 temporary monitoring wells (TW-1 through TW-27) and 11 permanent wells (MW-21 to MW-31) were installed, and a total of 38 groundwater samples were collected as part of the RI. Soil samples were analyzed for Target Compound List (TCL) volatile organic compounds (VOCs), TCL semivolatile organic compounds (SVOCs), and metals, with a subset of samples submitted for the analysis of explosives, radionuclides, and pesticides. Samples collected near the substations were evaluated for polychlorinated biphenyls (PCBs).

Laboratory sample results for soil were compared to the Pennsylvania Department of Environmental Protection (PADEP) Statewide Health Standards (SHS) to evaluate whether concentrations exceed identified screening criteria. In addition, radionuclide soil data were compared to Nuclear Regulatory Commission (NRC) Residual Radioactive Contamination from Decommissioning Parameter Analysis (USNRC NUREG/CR-5512) screening criteria since there are no SHS for radionuclides. Constituents that exceed either the RDC MSC, SGW MSC, Indoor Air Quality (IAQ) MSC, or NRC NUREG were considered Constituents of Potential Concern (COPC) for further evaluation.

Soil

The RI identified 23 areas of interest (AOIs) associated with COPC exceedances of statewide MSCs which required further evaluation in order to support a future demonstration of attainment of a Site-Specific Standard for soil. Therefore, an evaluation of site-specific standards was completed through performance of human health assessment for soil. The results indicate there are no exceedances of the carcinogenic or non-carcinogenic risk thresholds for any of the receptors evaluated. It was noted that using each zone as an exposure area may represent a potentially large exposure area for some potential site receptors. Therefore, each zone was also evaluated to identify any localized areas containing "elevated" COPC concentrations that may be a concern for human health. Elevated COPC concentrations were identified as sample locations with COPCs that potentially represent a carcinogenic risk level of 10^{-4} or a non-carcinogenic hazard quotient of 10. The carcinogenic risk level represents the upper-bound of the acceptable risk range of 10^{-6} to 10^{-4} (USEPA 1990 and PADEP 1997). No potential concerns were identified within Zones 1 and 2. A potential concern for exposure to benzo(a)pyrene (BAP) was identified within the southwestern corner of Zone 3. This area would be a concern only for potential residential use of this area and is not a concern for industrial receptors (i.e., construction workers, office workers, etc.). A potential concern was also identified for one of the transformer areas. The sample location of the maximum detected concentration, T1101, was in the surface soil adjacent to transformer T-1101 west of Building 28 in Zone 2. Surfaces in this area are bare/vegetated and pervious. Therefore, there are potential concerns for exposure to a future resident in this area.

Potential concerns for future residential, child, and daycare student exposure to lead in soils were evaluated using United States Environmental Protection Agency's (USEPA) Integrated Exposure Uptake Biokinetic (IEUBK) Lead Model (USEPA 2012b). For the current and future industrial scenarios as well as the school students onsite, potential concerns for lead exposure were modeled using *Recommendations of the Technical Review Workgroup (TRW) for Lead, An Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil* (USEPA 2003b and 2009b). Based upon the evaluation of the entire zone as an exposure area, the IEUBK model identified potential concerns for two potential future use scenarios to include resident children exposure to soil within Zone 1 and future daycare students (modeled age range of an infant to 5 years) exposure to the southeastern portion of Zone 3. There were no concerns for workers or school student's exposure to soil within any of the zones. However, under Pennsylvania's *Land Recycling and Environmental Remediation Standards Act* (Act 2 of 1995) a school child is considered the equivalent of a residential child; therefore, using this interpretation there are potential concerns for current students exposure to soil within Zone 1.

Each zone was also evaluated to identify areas containing "elevated" lead concentrations that may be a concern for human health in accordance with USEPA Risk Assessment Guidance for Superfund (RAGs) guidance. Localized small exposure areas of "elevated" lead were identified as sample locations with lead concentrations greater than 1,000 milligrams per kilogram (mg/kg). This concentration is adequately protective to the current use receptors (e.g., school students and office/commercial workers). There are 16 sample locations within Zone 1 with lead detected at greater than 1,000 mg/kg. All of these sample locations are within exposed grassy areas. Within Zone 2, there are two

sample locations with lead detected at greater than 1,000 mg/kg. These sample locations are within exposed grassy areas in surface soil. There are five sample locations within Zone 3 with lead detected at greater than 1,000 mg/kg. Four of these locations are currently in an area that was slated for redevelopment that was to reportedly include a daycare facility (based on information obtained during the start of the RI process).

TABLE ES-1 SAMPLE LOCATIONS IDENTIFIED AS LOCALIZED AREAS OF "ELEVATED" CONCENTRATIONS

Analyte	Sample Location	Result (mg/kg)	Sample Depth (feet)	USEPA Residential Soil RSL (mg/kg)	Carcinogenic Risk Level[2]
Zone 1					
Lead[1]	Z1D7	8,860	0.5 to 1	400	NA[3]
Lead[1]	Z1D7	2,670	1 to 2	400	NA[3]
Lead[1]	UBZ1-SO-32	1,200	0 to 0.5	400	NA[3]
Lead[1]	UBZ1-SO-41	4,390	0 to 0.5	400	NA[3]
Lead[1]	UBZ1-SO-39	3,330	0 to 0.5	400	NA[3]
Lead[1]	UBZ1-SO-49	3,130	0 to 0.5	400	NA[3]
Lead[1]	UBZ1-SO-10	2,930	0 to 0.5	400	NA[3]
Lead[1]	BZ1-SO-02	2,760	0 to 0.5	400	NA[3]
Lead[1]	UBZ1-SO-7	1,930	0 to 0.5	400	NA[3]
Lead[1]	UBZ1-SO-31	1,540	0 to 0.5	400	NA[3]
Lead[1]	UBZ1-SO-17	1,390	0 to 0.5	400	NA[3]
Lead[1]	UBZ1-SO-16	1,260	0 to 0.5	400	NA[3]
Lead[1]	UBZ1-SO-38	1,230	0 to 0.5	400	NA[3]
Lead[1]	UBZ1-SO-52	1,140	0 to 0.5	400	NA[3]
Lead[1]	UBZ1-SO-24	1,120	0 to 0.5	400	NA[3]
Lead[1]	UBZ1-SO-23	1,080	0 to 0.5	400	NA[3]
Zone 2					
Benzo(a)pyrene	BZ2-07	2.5	0 to 2	0.015	1.7.E-04
Aroclor 1260	T1101-SO-1	38	0 to 0.5	0.22	1.7.E-04
Lead[1]	UBZ2-SO-45	15,600	1 to 2	400	NA[3]
Lead[1]	UBZ2-SO-26	1,980	0 to 1	400	NA[3]

TABLE ES-1 SAMPLE LOCATIONS IDENTIFIED AS LOCALIZED AREAS OF "ELEVATED" CONCENTRATIONS (CONTINUED)

Analyte	Sample Location	Result (mg/kg)	Sample Depth (feet)	USEPA Residential Soil RSL (mg/kg)	Carcinogenic Risk Level[2]
Zone 3					
Arsenic	UBZ3-SO-63	52.5	5 to 7	0.39	1.3.E-04
Arsenic	UBZ3-SO-24	47.7	12 to 13	0.39	1.2.E-04
Benzo(a)pyrene	UBZ3-SO-55	8.9	0.5 to 3	0.015	5.9.E-04
Benzo(a)pyrene	UBZ3-SO-18	5.8	4 to 5	0.015	3.9.E-04
Benzo(a)pyrene	UBZ3-SO-54	2.4	3 to 5	0.015	1.6.E-04
Benzo(a)pyrene	UBZ3-SO-39	2.2	0 to 2	0.015	1.5.E-04
Benzo(a)pyrene	UBZ3-SO-23	1.5	3 to 5	0.015	1.0.E-04
Lead[1]	UBZ3-SO-19	12,700	0 to 2	400	NA[3]
Lead[1]	UBZ3-SO-57	11,600	0 to 2	400	NA[3]
Lead[1]	UBZ3-SO-49	8,500	4 to 5	400	NA[3]
Lead[1]	UBZ3-SO-58	1,910	0 to 2	400	NA[3]
Lead[1]	UBZ3-SO-63	1,570	5 to 7	400	NA[3]

Notes:

1) Lead localized areas of "elevated" concentrations were identified as location where the concentration of lead exceeded 1,000 mg/kg. Please see Section 5.5.5 of the HHRA (Appendix F) for explanation of this level.
2) Carcinogenic risk level is determined by the following equation: (Analyte detected concentration/USEPA RSL)*0.000001
3) Toxicity values are not available for lead to determine a carcinogenic risk level. Risks associated with lead are determined through blood-lead modeling.

A screening level ecological risk assessment (SLERA) was performed for Zone 1 (Zones 2 and 3 consist primarily of buildings and parking lots, with sparse areas of grass, and do not represent substantial habitat for natural communities). Risks were characterized for terrestrial plants and invertebrates and terrestrial birds and mammals. Lead is the primary constituent of concern (COC) in Zone 1 that could cause negative effects to ecological organisms in soil. No threatened, endangered, or listed species have been identified in Area II of the FFA. The assessment of exposed surface soil samples in Zone 1 suggests that high lead concentrations do not represent an unacceptable risk to populations of lower trophic organisms (plants and soil invertebrates), but may represent risk to the robin and shrew due to food web exposure. No complete pathways (lack of viable habitat) were identified in Zones 2 and 3 of Area II. Based on results of the SLERA, potential risk to specific ecological receptors (robin and shrew) was identified in Zone 1.

Groundwater

Laboratory sample results for groundwater were compared to the PADEP residential medium-specific concentrations (MSCs) for used aquifers to assess direct contact and to PADEP residential groundwater screening values for protection of indoor air to assess inhalation. Radionuclide water data were compared to the applicable U.S. Environmental Protection Agency (USEPA) maximum contaminant levels (MCLs). Constituents that exceed either the MSC or MCLs were considered COPC for further evaluation.

The RI identified a total of nine AOIs for groundwater associated with COPC exceedances of statewide MSCs. Chlorinated solvent impact to groundwater was observed in the eastern portion of Area II along the Area I boundary. Impacted groundwater containing acetone, cumene, phenol, benzene, arsenic, and other chemical degradation products was identified along the western and central portion of Area II. This impact is from parties other than DoD[1]. Smaller AOIs with observed impact to groundwater from COPC including VOCs, polycyclic aromatic hydrocarbons (PAHs), and metals occur throughout Area II. A complete investigation of groundwater (nature and extent, complete fate and transport analysis, and assessment of risk for human health) was not completed as part of this effort. Groundwater for the entire FUDS (identified by USACE as FFA Area IV) will be more fully characterized by USACE as part of a separate investigation.

Indoor Air

An evaluation of the potential for soil and groundwater VOCs to impact indoor air quality was also performed. Concentrations of VOCs were noted as exceeding indoor air screening criteria in soil and groundwater, and the presence of preferential pathways (such as underground utilities and tunnels) were noted in the subsurface. Further evaluation is necessary to determine if indoor air quality is being impacted by VOC COCs present in soil in Area II. Groundwater VI exceedances will be addressed in the separate GW RI Report being prepared by USACE.

Recommendations

A summary of the soil AOCs requiring further evaluation in the feasibility study (FS) is presented in Table ES-2. Further action is recommended for six (of the 23 identified) soil areas of concern (AOCs) where localized areas of "elevated" concentrations were identified, mainly due to risk from exposure to lead.

The widespread nature of exceedances and limited vertical impact of lead in Zone 1 indicates that the source is most likely historical deposition onto undisturbed soils. Potential sources for deposition include airborne dust particles and paint chips. Buildings in the areas with the observed highest concentration of lead in soil (Buildings 1 through 5 and 14) are among the

[1] Compounds were detected in soils and groundwater (including phenol, acetone, cumene, benzene, etc.) that are associated with processes at the adjacent Honeywell Frankford Facility. While these chemicals were analyzed for contribution to risk and impact to receptors via vapor intrusion, DoD is not claiming responsibility for this impact.

oldest buildings at the FFA. These buildings have been historically painted (JMA 1979) and these buildings were observed to be flaking during the RI fieldwork.

TABLE ES-2 SUMMARY OF RECOMMENDATIONS FOR SOIL

AOC	Zone	Constituent(s) of Concern	Recommendation for Act 2 Resolution
1	1	Lead	Unacceptable risk identified for future resident child receptor; 16 localized areas of "elevated" concentration of lead (refer to Table ES-1 for locations) identified in HHRA. Further action to be evaluated in FS.
6	2	PCB (Aroclor 1260)	Unacceptable risk identified for future residential receptor in HHRA, one localized area of "elevated" concentration of Aroclor 1260 identified (T-1101-1). Further action to be evaluated in FS.
10	2	Lead	Unacceptable risk identified for future resident child receptor; one localized area of "elevated" concentration of lead (UBZ2-45) identified in HHRA. Further action to be evaluated in FS.
13	3	Benzo(a)pyrene	Unacceptable risk for future resident receptor, one localized area of "elevated" concentration identified at one location (UBZ3-55) for BAP. Further action to be evaluated in FS.
20	3	Lead	Unacceptable risk for resident child receptor; one localized area of "elevated" concentration of lead (UBZ3-19) identified. Further action to be evaluated in FS.
21	3	Lead	Unacceptable risk for future daycare students; Four localized areas of "elevated" concentrations of lead (UBZ3-49, -57, -58, and -63) identified. Further action to be evaluated in FS.
AOC – Area of Concern		HHRA – Human Health Risk Assessment	





Legend

Soil Sample Locations

- Soil Sample Location
- Elevated Concentrations of Lead
- Elevated Concentrations of Benzo(a)pyrene
- Elevated Concentrations of PCB
- Area I Boundary
- Area II Boundary

Soil Area of Interest

- Recommended for Further Action
- No Risk Demonstration of Site Specific Standards

Zones

- Zone 1, 2 and 3
- Area used by schools for recreation or readily assessible to students
- School Buildling

Label Key

UBZ- Unbiased Soil Sample
BZ- Biased Soil Sample
D- Delineation Soil Sample
Z1- Zone 1
Z2- Zone 2
Z3- Zone 3

Sources
ESRI (Imagery), 2011
Cabrera, 2011
USACE, 2009

Figure ES-1
Area II Summary of Soil Areas of Interest

Frankford Arsenal
Philadelphia, Pennsylvania

Project: 6233017

December 2014

0 75 150 300
Feet
1 inch = 175 feet

Path: \\lovetonfederal\GISData\Northeast\Pennsylvania\FrankfordArsenal\MXD\March_2013\Figure ES-1 Soil Areas of Concern and Associated Hot Spots.mxd

1. INTRODUCTION

EA Engineering, Science, and Technology, Inc. (EA) has been contracted by the United States Army Corps of Engineers (USACE)–Baltimore District (Contract No. W912DR-09-D-0018, Delivery Order 0017) for the completion of a hazardous, toxic, and radioactive waste (HTRW) project at the former Frankford Arsenal (FFA) located in Philadelphia, Pennsylvania. The main part of the FFA known as the Arsenal Business Center (ABC) was divided into two areas of investigation by USACE including Area I (47.4 acres consisting of the portion of the site east of Baird Street) and Area II (36.9 acres consisting of the portion of the site west of Baird Street) (Figure 1-1). EA was tasked with conducting a remedial investigation (RI) in Area II and the focus of this RI Report is to present the findings of the site characterization and nature and extent delineation activities conducted by EA in Area II (the site). Ongoing work is being performed in Area I and in a third area of the FFA, a 22-acre area owned by Pennsylvania Fish and Wildlife Service and known as Area III. Activities and findings associated with investigations of Area I and Area III are discussed briefly in this report as they relate to Area II findings; however, those investigations are considered separate and reporting is separate for all three areas.

1.1 PURPOSE OF THE REMEDIAL INVESTIGATION

The purpose of this RI is to assess potential environmental impacts to FFA Area II resulting from former Department of Defense (DoD) use of the property. Area II has not been investigated in depth since the transfer from DoD ownership. As such, the primary goals of this RI are to (1) assess if any environmental impacts from past DoD use are present in soil and groundwater, (2) determine the nature and extent of those impacts, and (3) determine if there are risks to human health and the environment from any impacts in Area II which require further action by USACE. In order to accomplish these goals, surface soil samples, subsurface soil samples, and groundwater samples were collected from areas of historical DoD use and analyzed to determine impacts/risk. This report provides the results for both the soil and groundwater sampling; however, in accordance with the Scope of Work, this report focuses only on risks associated with soils in Area II. Results of the groundwater sampling are presented in this report; however, there is no assessment of risk or recommendations for further action as USACE is still conducting an ongoing investigation of the groundwater across the entirety of the FFA (evaluated as a separate operable unit designated as Area IV by USACE).

1.2 FIELD SAMPLING TASKS

Site characterization and delineation conducted in Area II as part of the RI included the following activities:

- Below grade investigation using historical information and geophysics/utility mark-out to determine utility locations and underground obstructions;
- Surface and subsurface soil sampling using direct-push technology (DPT) or manual hand-augers;
- Installation and sampling of temporary groundwater monitoring wells;

- Installation, development, and sampling of permanent groundwater monitoring wells;
- Clearance for munitions and explosives of concern (MEC) by an MEC Safety Specialist for intrusive activities;
- Screening for volatile constituents and monitoring for radiological constituents; and
- Characterization of investigative-derived waste (IDW) and IDW disposal.

RI Work was conducted in accordance with the USACE-approved Accident Prevention Plan (APP) (EA 2011a), Field Sampling Plan (FSP) (EA 2011b), Quality Assurance Project Plan (QAPP) (EA 2011c), and the Work Management Plan (WMP) (EA 2011d).

1.3 REGULATORY CONSIDERATIONS

Environmental restoration is being conducted at the FFA under the Defense Environmental Restoration Program for Formerly Used Defense Sites (DERP-FUDS) administered by USACE. The 1986 Superfund Amendments and Reauthorization Act (SARA) §211 established the DERP through amendment of Title 10 United States Code (U.S.C.) which added Chapter 160 – Environmental Restoration (§§2701 – 2707 and §2810). Chapter 160 authorized the Secretary of Defense to carry out the DERP and response actions at FUDS. SARA expanded the provisions of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 (42 U.S.C. § 9601 et seq.) and added major new authorities, including Section 120, Federal Facilities. SARA Section 120 requires departments and agencies of the federal government to comply with the provisions of CERCLA as amended by SARA. Executive Order 12580 (EO 12580, January 23, 1987), Superfund Implementation, delegated to DoD the response authority for releases or threatened releases, subject to SARA Section 120. The FUDS component of DERP is managed and executed by USACE under authority delegated by the DoD, through Department of the Army (DA). Remedial activities must comply with the DERP statute (10 U.S.C. 2701 et seq.), CERCLA, SARA, the Resource Conservation and Recovery Act of 1976 (RCRA), National Oil and Hazardous Substances Pollution Contingency Plan (NCP), Executive Order 12580 ("Superfund Implementation"), and applicable USACE and DoD policies.

Sampling activities associated with this RI have been developed to provide site assessment and characterization data, in accordance with Pennsylvania's *Land Recycling and Environmental Remediation Standards Act* (Act 2 of 1995) and its implementing regulations at 25 PA Code Chapter 250 to support and obtain a release of liability to be pursued by the property owner under the approved Pennsylvania Act 2 Program Cleanup Standards. Accordingly, the RI Report summarizes the site characterization results for soil and groundwater relative to specific remedial alternatives available under Act 2.

Applicable Act 2 standards for FFA Area II consist of the Statewide Health Standard and its published Medium Specific Concentrations (MSCs, compound-specific standards), and the Site Specific Standard, which permits evaluation of site conditions and risk variables to propose risk-based, site-specific MSCs. A Risk Assessment is incorporated herein to assist in future

definition of remedial approaches for soils at FFA Area II. In the context of PA Act 2, this RI Report inventories the specific compounds which require further attention under Act 2 (those that were detected in excess of residential, Statewide Health Standard MSCs), and it outlines regulatory processes through which exceedances of Act 2 criteria can be addressed toward attaining a given Act 2 standard and receiving a waiver of liability for those documented conditions.

PADEP medium-specific concentrations (MSCs) do not include radionuclides; therefore, surface soil screening values in Table 6.91 of the Residual Radioactive Contamination From Decommissioning, Nuclear Regulation (NUREG/CR 5512, Volume 3) were selected as the site-specific soil screening values for radionuclides (Nuclear Regulatory Commission [NRC] 1999). Specifically, the lowest critical dose (Pcrit) values (0.10 confidence level) were used, which results in the most conservative (i.e., lowest) concentration that is associated with 25 millirems (mrem). Additionally, for polychlorinated biphenyls (PCBs), soils were also screened to the Toxic Substances Control Act (TSCA) site-specific soil screening limit for the level for high-occupancy areas with unrestricted future use. This value is more conservative than Act 2 standards.

1.4 SITE DESCRIPTION

The FFA is a 109.4-acre FUDS located in northeast Philadelphia, Pennsylvania (Figure 1-1). As previously discussed, this RI specifically focuses on Area II of the FFA FUDS. Area II is located to the west of Baird Street, east of Bridge Street, south of Tacony Street, and north of Frankford Creek, and encompasses approximately 36.9 acres. The portion of the FUDS identified as Area II currently consists of a total of 48 buildings of various sizes, ages, and conditions, as shown in Figure 1-1.[2] An additional 34 buildings that were historically located in this area have been demolished over the years, creating some open spaces between buildings. Additionally, a network of utility tunnels exists on the FFA FUDS, as discussed in greater detail in Section 3.6. Since its decommissioning from military use in 1977, Area II is now utilized primarily as a commercial business park with space also leased to a charter school. The future uses for Area II have been determined to be industrial, commercial, institutional, and residential.

The FFA is located in an urban, mixed-use area of northeast Philadelphia. The FFA is bound to the north by Tacony Street and Interstate 95 (I-95), to the east by industrial properties including Dietz and Watson Inc., to the south by Frankford Creek and the Delaware River, and to the west by Bridge Street beyond which is the Honeywell (former Sunoco Chemicals Frankford Plant). Further south of Frankford Creek is the former Rohm and Haas Refinery. Further north of I-95 are more industrial properties and a residential area (Figure 1-1).

1.5 SITE HISTORY

In 1816, the FFA was commissioned for military use. Prior to military use, the FUDS was utilized as farm land and undeveloped wetlands. Between 1816 and the decommissioning of the FFA in 1977, the FFA was utilized for a variety of military activities as its mission was

[2] The number of buildings represented does not include less permanent structures such as car ports, buildings that have collapsed, or tunnel entrances.

adjusted to fit the military's changing needs. Activities at the FFA during its years of operation between 1816 and 1977 included military ordnance production, testing and storage, and munitions research. Specific historical usage of Area II, and potential sources of environmental impact from DoD operations, are discussed in the Conceptual Site Model (CSM) in Chapter 3. Figure 1-2 identifies a timeline of historical events that occurred at the FFA FUDS between 1816 and 1983.

The U.S. government acquired a total of 109.36 acres between 1816 and 1951. The 109.36 acres acquired by the U.S. government included five separate parcels. The FFA consisted of four component areas, including: a small arms division, an artillery ammunition division, a stock section area, and an ordnance depot.

In 1976, the FFA was reported excess to the General Services Administration (GSA), and in 1981 the GSA assigned 21.36 acres to the State of Pennsylvania Fish and Boat Commission (PFBC). In 1983, the GSA assigned the remaining 87.37 acres to the Philadelphia Authority for Industrial Development (PAID), who subsequently sold the property to Arsenal Associates, Inc. in 1983. The property, now identified as Arsenal Business Center (ABC), is operated by Hankin Management. During the past 24 years, Hankin Management Company has leased buildings on behalf of Arsenal Associates, Inc. to various tenants. The landowners adjacent to the FFA are Simonds Abrasive Co., Dietz and Watson Inc., Rohm & Haas Co., Allied Chemical Corp, and PFBC.

After the property was transferred to the GSA, the U.S. Army Toxic and Hazardous Materials Agency (USATHAMA) developed plans to decontaminate and clean up the property for unrestricted use release. The contract for the decontamination and clean-up was awarded to Rockwell International (Rockwell) in September 1979, and the decontamination and clean-up program was completed in 1980. The work included clean-up of radiological contamination, explosive residues, and heavy metal residues; however, normal operations at the FFA included the use of solvents, fuels, acids, hydraulic fluids, paints, exotic metals, and other materials.

Several investigations have been conducted at the FFA by USACE, the current owner, and USEPA. These investigations in relation to Area II are further summarized in Chapter 2. Currently USACE is completing an investigation of the Area I portion of the FFA (located to the east of Area II). Review of the background information and the results from previous site-wide investigations as well as specific investigations of Area I led USACE to the conclusion that additional investigation was necessary in Area II.

1.6 REPORT ORGANIZATION

This RI has been organized into the following chapters:

- Chapter 1. Introduction – Includes a discussion of the project purpose, project scope, and report organization.

- Chapter 2. Previous Investigations –Includes a discussion of the previous investigations conducted at the site between 1973 and present day.

- Chapter 3. Physical Characteristics of the Study Area – Includes a discussion of the site location, site background, and an environmental description of the site.

- Chapter 4. Sampling Rationale and Methodologies – Includes a discussion on the investigational activities, requirements, and rationale.

- Chapter 5. Data Quality Assessment – Includes a discussion on screening criteria per media type sampled at the site.

- Chapter 6. Nature and Extent – Includes a discussion on sampling results per media type sampled at the site.

- Chapter 7. Fate and Transport – Includes a discussion on constituent fate and transport including potential routes of migration, constituent persistence, and constituent migration as well as an evaluation of background concentrations.

- Chapter 8. Baseline Human Health Risk Assessment – Includes a discussion on the results of the human health risk assessment conducted for the site.

- Chapter 9. Screening Level Ecological Risk Assessment – Includes a discussion on the results of the screening level ecological risk assessment conducted for the site.

- Chapter 10. Summary and Conclusions – Presents a summary of the RI results and risk assessments, and provides conclusions and recommendations for the site.

- Chapter 11. Recommendations – Presents recommendations going forward.

- Chapter 12. References – Identifies all references included within this RI.

The following supporting documents are included in the appendices:

- Conceptual Site Model Summary of Use and Potential Impacts (Appendix A)

- Field Forms − Calibration Forms and Daily Reports (Appendix B)

- Soil Boring Logs (Appendix C)

- Monitoring Well Data including Well Construction Diagrams, Well Development Records, and Water Purge Logs (Appendix D)

- Analytical Laboratory Data Summary and Reporting (Appendix E)

- Human Health Risk Assessment (Appendix F)

- Screening Level Ecological Risk Assessment Site Survey (Appendix G)

- Investigative-Derived Waste Disposal Manifests (Appendix H)
- Site-Specific Soil Background Data Evaluation Supporting Documentation (Appendix I)





Legend

- Area I Boundary
- Area II Boundary
- Dietz & Watson
- PA Fish & Boat Commission (Area III Boundary)

Buildings

- Demolished
- Existing

NOTE: Area IV represents groundwater beneath Areas I, II, & III

Sources
ESRI (Imagery) 2011
Cabrera, 2011
USACE, 2009

Frankford Arsenal
Philadelphia, Pennsylvania

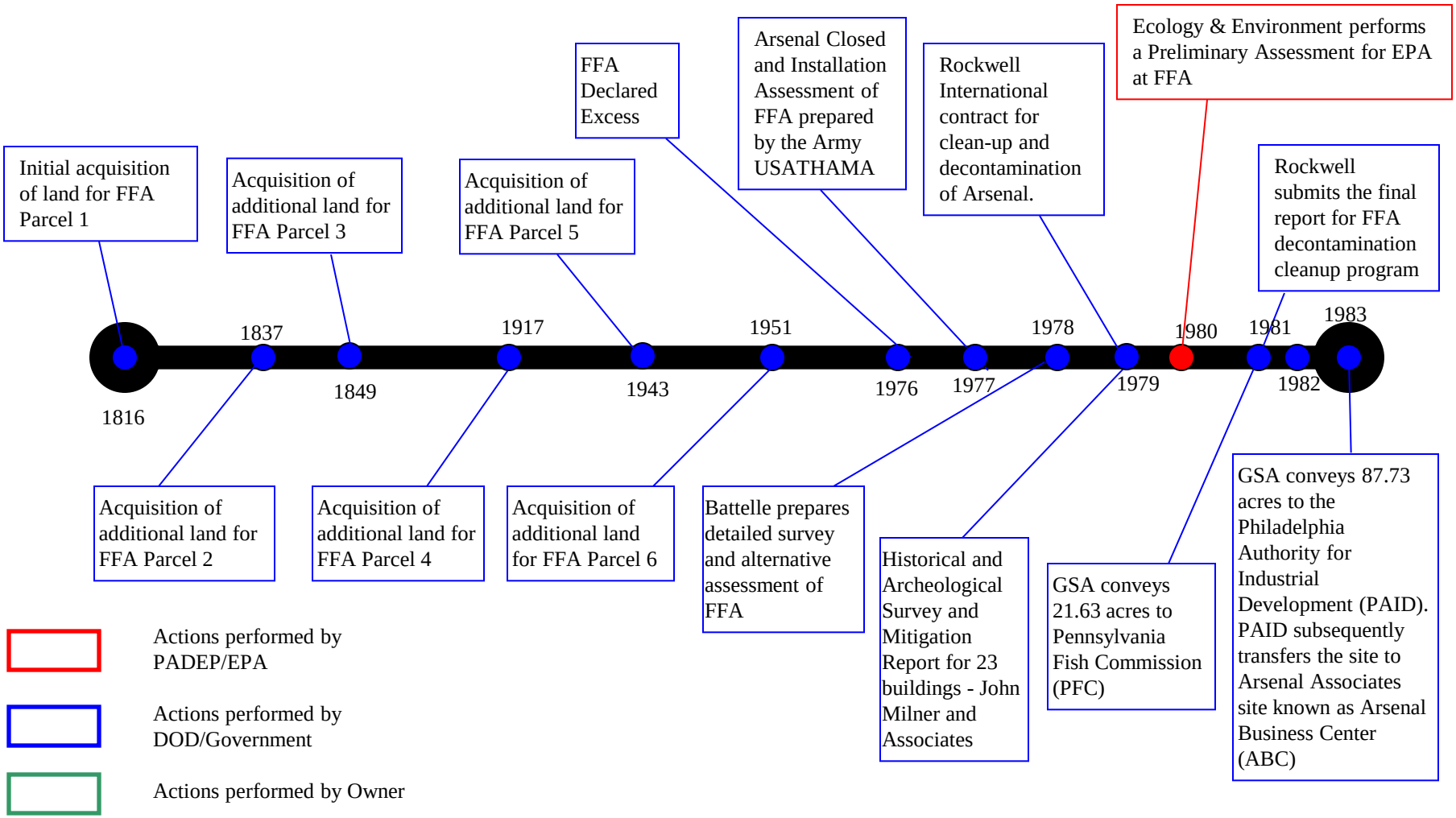
Project: 6233017

Date: November 2013

0 75 150 300
Feet
1 inch = 325 feet

Figure 1-1
Site Location

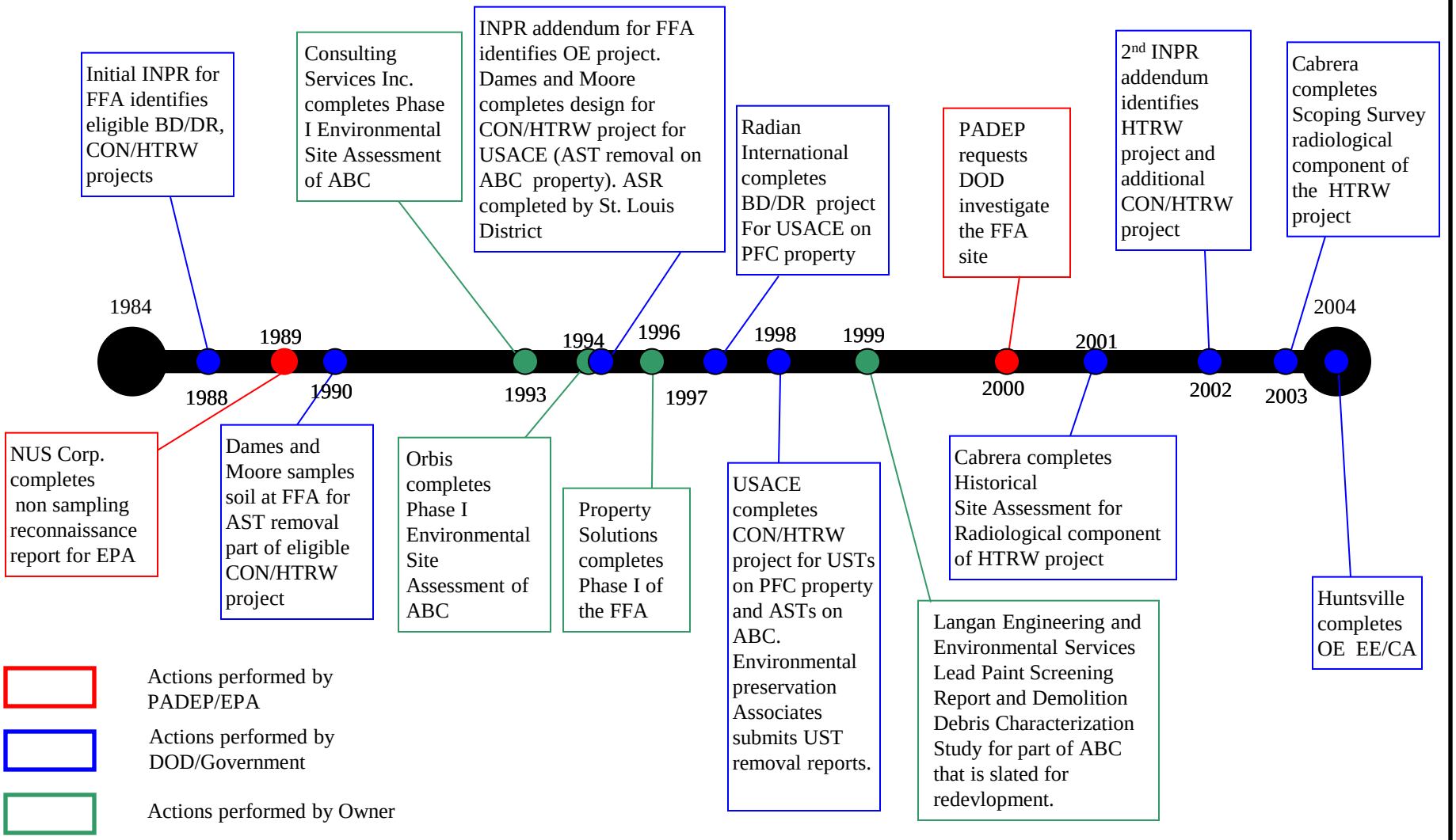
Path: L:\GISData\Northeast\Pennsylvania\FrankfordArsenal\MXD\March_2013\Figure 1-1 Site Location.mxd



Source: Cabrera, 2005. Site-Wide Investigation Work Management Plan.

Figure 1-2:
Historical Timeline of Events 1816-1983

EA Engineering, Science, and Technology, Inc.



Source: Cabrera, 2005. Site-Wide Investigation Work Management Plan.

Figure 1-2:
Historical Timeline of Events 1984-2004

EA Engineering, Science, and Technology, Inc.

2. PREVIOUS INVESTIGATIONS

The documents discussed in the following subsections were reviewed specifically to determine potential sources of HTRW impact and identify specific constituents of concern from the former DoD operations. Documents were also reviewed to identify current owner/tenant operations in Area II of the FFA that may have impacted Area II. Appendix A summarizes documented chemical and radiological uses and historically identified impacts for buildings located in Area II. This section also include the results of Area I environmental investigations as similar DoD processes were conducted in both areas and similar constituents may be encountered in both areas.

2.1 INVENTORY AND HAZMAT REMOVAL, U.S. ARMY, 1973 TO 1976

The Army inventoried and removed hazardous materials from the site, starting in 1973, and concluding shortly after the FFA was decommissioned in 1976 (USATHAMA 1977). The Army removed materials (acids, bases, solvents, paints, metals) from buildings in Area II to the Pitman-Dunn Laboratory (Building 64 in Area I) prior to removal from the FFA. As part of this effort, approximately 1 ton of mercury and 6 tons of depleted uranium (DU) were removed from the entire site, as well as other radionuclides in smaller quantities.

2.2 INSTALLATION ASSESSMENT, USATHAMA 1977

USATHAMA conducted a records and historical data search of the FFA during summer and early fall 1977. The purpose of this assessment was to "…uncover indications of possible contamination at the Installation (the FFA) by chemical, biological, and radiological materials resulting from past manufacturing, testing, storage, and disposal operations; and to assess the possibility of contaminant migration beyond the installation boundaries" (USATHAMA 1977). A list of potential constituents of concern based on the past industrial and manufacturing operations at the entire site was developed by USATHAMA (provided as Table 3-1). After the records search, interviews with former managers and employees, and a review of routine manufacturing and handling practices at the FFA, USATHAMA determined that several areas/buildings on the FFA were potentially contaminated with explosives, pyrotechnics, propellants, or propellant wastes. Contaminated areas as documented by USATHAMA are noted by building in Appendix A.

Based on the factors outlined above, USATHAMA concluded that areas of potential explosive/pyrotechnic, radiological, chemical, and unexploded ordnance (UXO) contamination exist. USATHAMA recommended further review of available records by personnel responsible for the decontamination program at the FFA and, where applicable, areas were to be incorporated into the clean-up program (USATHAMA 1977).

2.3 DETAILED SURVEY AND ALTERNATIVES ASSESSMENT FOR FFA, BATTELLE, 1978

In response to the findings of the 1977 assessment, Battelle Laboratories (Battelle) conducted a survey in 1978 that included the property, buildings, vents, sewers, sumps, surface water, sediments, groundwater, soil, ambient air, and biota of the FFA. Four separate sub-studies were conducted, including:

- A safety examination for physical, radiological, and explosive/toxic gas hazards;
- A soil-sampling investigation of the real property of the FFA;
- A sampling of biota (pigeon feces and mice) for metals analysis;
- A survey of the areas in which radiological contamination was found; and
- A series of tests to determine the effectiveness of various methods of decontamination.

Soil samples from across the entire site were collected and analyzed for metals, explosives, and radionuclides. A total of 6 deep borings and 11 shallow soil samples were located in Area II as illustrated on Figure 2-1. Shallow soil samples were collected from 0 to 6 inches (in.) and from 6 to 12 in. Subsurface samples were collected at select locations from 12–in. intervals at 1, 5, 10, 15, and 20 feet (ft) below ground surface (bgs) for analysis of metals.

Elevated concentrations of antimony, chromium, lead, mercury, strontium, and zirconium were reported in soil borings from Area II when compared to concentrations of metals reported at control (background) locations. One deep boring located at the southwest corner of Building 202 was reported to have average concentrations of antimony and lead exceeding the current PADEP residential direct contact MSCs. Antimony was not detected above the laboratory reporting limit in the any of the control samples, and lead was detected at an average concentration of less than one-fifth of the residential direct contact MSC in the control samples. The subsurface soil sample results for the sampled intervals were averaged for presentation in the report, and individual interval results were not available; therefore, it was concluded that the potential exists that individual intervals may exceed the current PADEP MSCs. Higher concentrations of metals were reported to be associated with samples that contained cinders. No clean-up of elevated metals concentrations in soils was proposed.

One shallow surface soil sample was collected in the vicinity of Building 227B for the analysis of radionuclides. The samples were reported to have elevated levels of DU (which was stored in Building 227B). Specifically the radioactivity was associated with yellowish particles on the surface. Cleanup of radioactivity in soil was proposed and was completed by Rockwell (1981) as discussed in Section 2.5.

Battelle installed a total of 16 wells at Frankford Arsenal; 4 of those wells were located within Area II (GW-1 to GW-4). The locations of the former wells are illustrated on Figure 2-2. GW-1 (subsurface soil location 41), which is located upgradient, was intended to provide baseline groundwater and soil data. Wells were drilled to 20 ft bgs, unless refusal was encountered. Samples collected from each well were analyzed for select heavy metals and radionuclides. Specific results for GW-1 to GW-4 were not provided in the available portions of the report. It should be noted that the wells have since been abandoned by USACE in 1997/1998.

The general Battelle survey results were summarized as follows:

- The exposures from radiological contaminants were minimal, in limited areas, and tended to be in low areas such as sumps and cracks.

- Four areas were identified as spill areas, including the area of elevated DU adjacent to Building 227B in Area II.

- There were a small number of sites where exposure to vapors and/or explosives was also a concern. These areas were identified to the FFA staff.

- Heavy metal contamination, principally lead, was common on many building surfaces. It ranged from 40 to 30,000 micrograms per square centimeter (μ/cm^2). The major source of the lead was lead-based paint. However, additional areas had cadmium, chromium, and mercury. No clean-up of metals (lead and mercury) impacted soils was proposed because the pathway (ingestion) was perceived to pose no hazard.

- Concentrations of heavy metals and radionuclides in groundwater did not exceed the tentative standards developed by Battelle.

A summary of results for Area II is noted in Appendix A (arranged by building or area):

- Results for wipe sample screening of metals and explosives on building surfaces;
- Sump samples that exceed PADEP residential direct contact MSCs for metals;
- Noxious/explosive gas readings; and
- Biota sample results.

The survey results constituted the basis for the design and execution of the FFA decontamination conducted by USATHAMA in 1980 and 1981 (Rockwell 1981).

2.4 HISTORICAL AND ARCHEOLOGICAL SURVEY, JOHN MILNER ASSOCIATES, INC., 1979

In May 1979, the Department of the Army awarded a contract to John Milner Associates, Inc. (JMA) to conduct a historical and archeological survey of the FFA, as the FFA was listed in the National Register of Historic Places. The focus of the survey was the future use of site buildings and other facilities and whether or not future plans could be combined with national preservation objectives. In addition to documenting the historical evolution of the FFA from its inception in 1816 to its role as a principal depot, the report discussed the archeological, architectural, and industrial significance of the FFA, and the preservation guidelines to be used in future planning and development (JMA 1979). The year built and historical use for each building as determined during the survey is noted in Appendix A.

2.5 PRELIMINARY ASSESSMENT OF FRANKFORD ARSENAL, ECOLOGY AND ENVIRONMENT, 1981

Ecology and Environment (E&E) conducted a preliminary assessment of the FFA on behalf of USEPA in May 1981. E&E recommended that a PCB compliance inspection be conducted for identification, storage, and spill containment procedures. They recommended no further actions based upon USATHAMA's clearance of the FFA.

2.6 FRANKFORD ARSENAL DECONTAMINATION/CLEANUP REPORT, ROCKWELL, 1981

The 1981 Rockwell survey for USATHAMA concluded that numerous buildings with their associated sumps, sewers, and vents were contaminated with low levels of heavy metal, explosive, and radiological residues and would require clean-up (Rockwell 1981). The major elements of this clean-up are discussed below and summarized by building in Appendix A.

Heavy metal residues (lead, cadmium, chromium, and mercury) were primarily associated with the use of lead-based paints used on interior surfaces of buildings, as well as the operation of electroplating and metallurgical laboratories. Based on the contamination survey, the surfaces of 135 buildings and associated sumps and vents were determined to be contaminated with heavy metal residues (Figure 2-3). Twenty-three buildings contained sumps and 32 had vents.

Remediation of building surfaces included the removal of loose and flaking paint from walls, preparation of the surfaces, and repainting of the buildings to meet the Surgeon General's bioavailability requirements. This work was completed in November 1980 (Rockwell 1981). The sumps were decontaminated by pumping out any liquids (mostly water), analyzing the liquids, and arranging for appropriate disposal of hazardous material; or discharging the liquids to the sanitary sewer if determined to be non-hazardous. Similarly, any sludge (mostly soil) present in the sumps was removed, analyzed to determine whether it was hazardous, and disposed appropriately. The sumps were then flushed out using high pressure water. Post-cleaning sampling of the sumps indicated that sumps associated with Building 119 (three sumps) and Building 219 (one sump) were still contaminated with remaining residues. These sumps were taken out of service by filling them in place with concrete, rendering them inoperable.

Thirty-two buildings throughout the FFA were identified as containing vents with heavy metal residues by Battelle in 1978. Surface testing of the walls of these buildings showed very low levels of contamination, which prompted the surface sampling of the vents. Results of the vent sampling indicated no heavy metal residue contamination (Rockwell 1981).

Explosives residues were a result of the manufacturing of small arms munitions; the storage, supplying, and maintenance of munitions; and the use of the FFA as the National Center for the Development of Cartridges and Propellants Devices.

Explosives residue decontamination was accomplished by high-temperature flaming. This process involved the use of charcoal and supplied air to generate high-temperature flames that caused the explosives to burn off the surfaces. The surfaces and/or sumps were covered with

charcoal, and aerators were installed to supply compressed air to the ensuing fire. This caused the fire to generate temperatures in excess of 2,000 degrees Fahrenheit (ºF), which in turn caused the explosives to burn (Rockwell 1981).

Four buildings in Area II (Buildings 201, 214, 214A, and 222) were identified as having explosive residues on the floor and wall surfaces (Figure 2-3). Remote and hand-flaming were used to destroy these residues. Remote flaming was used to clean the easily accessible surfaces, and hand-flaming was used to clean hard-to-reach surfaces.

The sumps associated with Building 213 contained explosive residues. These sumps were cleaned by installing aerator lines to each sump, filling the sump with charcoal, and igniting the coal using a remote detonator. As the coal burned, the fire was supplied with compressed air, causing the explosive residues to burn off.

Radiological contamination resulted from the use of DU in the development of armor-piercing projectiles, and the use of other radioactive materials (e.g., radium) for fire control instruments. Radiological contamination was detected in 12 buildings including the following in Area II: Buildings 108, 201, 210, and 227B, as shown in Figure 2-3 (Rockwell 1981). The decontamination of these buildings consisted of the removal of contaminated building surfaces, drains, and vents. The wastes generated were packaged and transported to Barnwell, South Carolina, and Beatty, Nevada, for proper disposal. Post-decontamination sampling was conducted to verify and document clean-up.

Forty-two buildings throughout the entire FFA contained sumps. Radiological surveys indicated none of the sumps contained radiological contamination at levels requiring clean-up; therefore, no radiological decontamination of the sewers was necessary.

Vents in Building 201 were contaminated with radiological wastes. Since they were also contaminated with explosives residues, these vents were treated by flaming to remove explosive residues prior to their removal, transport, and disposal at the Barnwell burial facility in South Carolina. In addition, contaminated soil from outside of Building 227B was excavated and disposed at the Barnwell South Carolina burial facility.

The FFA decontamination was conducted using Army-approved standard operating procedures, and post-clean-up data indicated that the approved release criteria for the identified contaminants were satisfied. Decontamination and clean-up activities were completed by November 1980 (Rockwell 1981). USATHAMA issued a statement of clearance for the unrestricted use of the FFA as discussed in Section 2.7.

2.7 REMEDIAL ACTION DECISION DOCUMENT, USATHAMA, 1988

USATHAMA conducted an analysis of completed remedial alternatives for the removal of radiological and munitions wastes from the FFA (USATHAMA 1988). This analysis was based on two previous reports entitled *Detailed Survey and Alternatives Assessment for FFA* (Battelle 1978), and the *Final Report for the FFA Decontamination/Clean-Up Program* (Rockwell 1981).

After review of these reports, USATHAMA conducted a remedial action in Area II which included:

- Removal of radiological wastes for offsite disposal; and
- Flaming of explosive residues on building surfaces and sumps, and repainting building surfaces with low lead paints.

The FFA Decontamination/Clean-Up Report was a summary of the decontamination effort undertaken by Rockwell International on behalf of the Army. Investigators used Army specifications and demonstrated that Army clean-up criteria were achieved.

2.8 PHASE I SITE ASSESSMENT, CONSULTING SERVICES, INC., 1993

In September 1993, a Phase I Site Assessment of the FFA was conducted by Consulting Services, Inc. for Mellon Bank (Consulting Services 1993). The report recommended that ABC seal all floor drains located on the entire FUDS site and berms be installed around all transformer substations pads.

2.9 PHASE I SITE ASSESSMENT, CONSULTING SERVICES, INC., 1996

In March 1996, a Phase I Site Assessment of the FFA was conducted by Property Solutions, Inc. (PSI) for Arsenal Associates (PSI 1996). This study involved the review of several environmental assessment reports previously prepared by various consultants including a 1993 report by Consulting Services, Inc. of Exton, Pennsylvania; an October 1994 update of the 1993 report by ORBIS Environmental Group, Inc.; and a January 1981 report by Rockwell (Rockwell 1981). Information reviewed under the Phase I Site Assessment included historical ownership records, aerial photographs, and U.S. Geological Survey (USGS) topographic maps. The review was supplemented by a historical records search, site visit, and interviews of current and former employees.

PSI summarized these multiple environmental assessment reports, and available post-DOD tenant use for each building is summarized in Appendix A.

2.10 SITE INSPECTION AND EVALUATION, USEPA, 1996

USEPA organized a team of scientists from its Toxic Substances Control Act (TSCA), RCRA, and Clean Air Act (CAA) divisions to inspect and evaluate the general environmental conditions at the FFA, and to identify potential issues of non-compliance at the FFA. The inspection identified non-compliance issues in Area I.

2.11 FRANKFORD ARSENAL HISTORICAL PHOTOGRAPHIC ANALYSIS, U.S. ARMY TOPOGRAPHIC ENGINEERING CENTER, 2001

The U.S. Army Topographic Engineering Center completed a historical photographic analysis of Frankford Arsenal in 2001. The majority of their effort focused on Area I; however, an analysis of Building 217, located in Area II (the site), was also provided. The Parkerizing process occurred in this building circa 1942. The Parkerizing process is the application of an electrochemical phosphate conversion coating intended to protect a steel surface from corrosion and increase its resistance to wear. Building 217 was demolished, presumably by the current owner, sometime after 1990. No information regarding demolition of the building and disposal of wastes has been found.

2.12 RADIOLOGICAL HISTORICAL SITE ASSESSMENT, CABRERA SERVICES, 2001

In 1989, the U.S. General Accounting Office raised concerns about the decommissioning of sites formerly licensed by the Atomic Energy Commission (AEC) and the NRC. NRC agreed to re-examine the files of the terminated license sites to verify that the sites had been properly decommissioned. Sites were identified for additional review based on file information indicating that, while licensed material may have been used, no adequate final survey records existed. The FFA was among those sites identified.

Cabrera Services, Inc. (Cabrera) was contracted by USACE to perform a Radiological Historical Site Assessment (HSA). More than 150 documents were reviewed with an emphasis on radiological material use and storage, and building release survey documentation. A database was developed that contained a master building list, along with supporting references associated with each building, to assist in the investigation. Based on the document review, 106 buildings throughout the entire site were selected and evaluated to determine if they were potentially affected by radiological operations at the FFA. Fifty-six of the buildings were determined to be impacted, indicating that final radiological surveys would have been necessary to ensure that the buildings had been properly released. Of the 56 buildings, 14 had survey documentation showing verification and release granted by the NRC. Verification of final release surveys could not be located for the remaining 42 buildings. The report noted that 19 of these buildings had been demolished and 23 remained.

During the HSA, the use of radioactive material at the FFA was researched. The various radioactive material licenses granted to the Army (during both operational and decontamination activities) were reviewed, taking into consideration material form and radioactive decay through 1 January 2002. The Radiological Contaminants of Potential Concern (RCOPCs) were then identified from constituents listed on the various licenses. DU was identified as the primary radionuclide of concern at the FFA. In addition to DU, radium was used in research and development and production of watch dials, fire control system dials, and other applications. Radium laboratory and production work was spread out over a number of buildings, with activities and storage first documented in Building 23 (Cabrera 2001). Radium was also utilized in Buildings 109, 112, 201, and 202, and in smoke detectors located in the Building 109 computer area in Area II. Additional RCOPCs included Tritium (^{3}H), Cesium-137 (^{137}Cs), and

Cobalt-60 (^{60}Co) for FFA based review of material licenses. Based on this evaluation recommendations were made for additional radiological surveys as discussed in the following section.

2.13 RADIOLOGICAL SCOPING SURVEY, CABRERA SERVICES, JULY 2003

The objective of the radiological scoping survey was to determine if residual concentrations of the RCOPCs in buildings and land areas at the FFA supported the prior license termination action to release the FUDS for unrestricted use. The data produced by the radiological scoping surveys were combined with the information obtained from the 2001 HSA to determine whether current residual concentrations of RCOPCs exceed designated NRC criteria for residual radioactive contamination on building surfaces or in surface soils.

Cabrera identified 8 areas of "High Priority," 4 areas of "Medium Priority," and 29 areas of "Low Priority," for a total of 41 buildings and land areas throughout the entire site. Area II individual building priorities are noted in Appendix A. The survey coverage varied depending on the classification and media type with more coverage on higher priority buildings.

Cabrera collected a combination of beta-gamma scans of building surfaces and systems, swipes for removable alpha-beta contamination, fixed contamination measurements at selected locations, gamma walkover scans of land areas, and samples of surface soils. Samples were analyzed for gross alpha, gross beta, and gamma radiation, removable alpha and beta particles, ^{3}H, isotopic uranium (^{238}U, ^{235}U, ^{234}U), ^{137}Cs, and ^{60}Co.

A total (fixed plus removable) DU screening value of 100 disintegrations per minute (dpm) per 100 square centimeters (cm²) and a removable screening value of 10 dpm/100 cm² were used for comparison of results. The DU screening value selected was the most conservative limit for the site alpha-emitting RCOPCs.

A total of 342 fixed-point measurements were performed on building surfaces. Of these measurements, one exceeded the 100 dpm/100cm² alpha and no measurements exceeded the 7.0E+3 dpm/100cm² beta screening values. There was no significant difference between High Priority, Medium Priority, or Reference building results. The four highest fixed-point measurement results were in buildings that were classified as Low Priority.

Soil samples were collected at locations with the highest gamma walkover survey (GWS) results, and submitted for offsite laboratory analysis for gamma spectroscopy and isotopic uranium. Results of GWS were within 20 percent of those from the background reference area. All results were less than the surface soil screening values, even without correcting for the background concentrations of naturally occurring radionuclides.

Of the 385 removable contamination measurements collected from building surfaces, only five were greater than 10 dpm/100cm² alpha and no measurements exceeded the 700 dpm/100cm² beta removable screening values. The maximum removable alpha and beta values were 11 and 127 dpm/100 cm², respectively. Results for removable ^{3}H contamination were less than the

laboratory detection limit of 115 dpm/100 cm². The levels were considerably less than 10 percent of the screening value for ^{3}H.

With the exception of five results for removable alpha contamination from building surfaces, the results were below the screening criteria. Furthermore, all results, including the five cited above, were below the regulatory limits for unrestricted release.

Cabrera determined that there were no RCOPCs present above the screening criteria. Based on these results, it was concluded that there was no indication of residual radioactive contamination at concentrations of concern at the FFA. NRC concurred and, thus, released the FFA for unrestricted use (with respect to radioactivity) in 2003 (NRC 2003).

2.14 FINAL ENGINEERING EVALUATION/COST ANALYSIS REPORT, USA ENVIRONMENTAL, 2005

USA Environmental, Inc. prepared an Engineering Evaluation/Cost Analysis of the FFA in 2005 to evaluate potential MEC risks and to develop appropriate response alternatives to reduce public safety risks. It was determined that the most probable MEC risk was munitions burial pits since there had been no reports of UXO at the FFA. Areas throughout the FFA were evaluated for the potential of MEC; of those areas, the parade ground, "Area B," and portions of the seawall were located in Area II. The parade ground was historically used to store cannonballs and ammunition during World Wars I and II. The potential for MEC in these areas was determined to be low. The recommended remedy for these areas was institutional controls with construction support.

2.15 ARCHIVE SEARCH REPORT SUPPLEMENTAL, USACE, 2005

A supplement to the Archive Search Report summarized two burial pits, three artillery ranges, two small arms ranges, and one explosives incinerator. None of these features were located within Area II.

2.16 FINAL CLOSEOUT REPORT FOR THE UNDERGROUND STORAGE TANK REMOVAL, BATTERY DISPOSAL, AND WELL ABANDONMENT CON/HTRW PROJECT, EA, 2008

EA was tasked with completion of a containerized HTRW (CON/HTRW) project at the FFA in 2008. The project goal consisted of the removal of remaining CON/HTRW hazards that had been identified by USACE. These hazards included ten (10) underground storage tanks (USTs), approximately 1,748 batteries located throughout FFA, and abandonment of approximately 16 groundwater monitoring wells. The CON/HTRW project focused on source removal of these hazards, and determining the presence or absence of soil and/or groundwater contamination encountered during the removal processes.

Ten USTs of various sizes and contents were anticipated to be present in six locations on the FFA including two USTs in Area II. However, only seven USTs in four locations were found, none of which were located in Area II. Prior to UST removal or closure-in-place work, geophysical surveys were performed to confirm the presence or absence of buried metallic USTs

in areas where above-grade evidence was not sufficient to verify with certainty that underground storage tank(s) remained, specifically in areas around Buildings 112/116 (Area II). Confirmation by excavation test pit was completed at Buildings 112/116 to a depth between 7 and 7.5 ft bgs on 4 April 2008. No USTs were encountered and the area was restored in-kind with similar surface paving (concrete). No soil sampling was conducted at Buildings 112/116 as part of this effort. These USTs, which show up on historical drawings, were presumed to have been previously removed.

2.17 ONGOING GROUNDWATER MONITORING, CABRERA SERVICES, 2010

Cabrera has installed and sampled 22 shallow wells and 4 deep wells located in FFA Area I; well locations are illustrated on Figure 2-2. Shallow wells are 15 to 20 ft bgs and deep wells range from 38 to 60 ft bgs. The deep well along the boundary of Area II (MW-17D) does not appear to be advanced into the bedrock. To date a total of four sampling events have occurred in August 2007, March and September 2008, and February 2009. In general, groundwater has been encountered from 4 to 12 ft bgs and flows towards Frankford Creek. Chlorinated solvents including carbon tetrachloride, trichloroethene (TCE), and tetrachloroethene (PCE) have been detected above their respective PADEP MSCs along the western boundary of Area I (Cabrera 2010).

2.18 AREA I SOIL INVESTIGATIONS

A remedial investigation is being conducted in Area I of FFA by USACE. Activities and findings associated with investigations of Area I are considered separate and the reader is referred to reports pertaining to Area I for information related to those findings.

A remedial investigation and subsequent removal actions in Area I of FFA are ongoing. Contaminants in these areas include metals, PCBs, SVOCs, and VOCs.



Sources
ESRI (Imagery) 2011
Cabrera, 2011
USACE, 2009

Frankford Arsenal
Philadelphia, Pennsylvania

Project: 6233017

Date: November 2013

0 75 150 300
Feet
1 inch = 185 feet

Figure 2-1
1978 Battelle Soil Sample Locations

Path: L:\GISData\Northeast\Pennsylvania\FrankfordArsenal\MXD\March_2013\Figure 2-1 Battelle Soil Sample Locations.mxd





Legend

- MW-22 — EA Monitoring Well
- GW 3 — Former Monitoring Well
- MW22 — Cabrera Monitoring Well
- Area I Boundary
- Area II Boundary
- Dietz & Watson
- PA Fish & Boat Commission (Area III Boundary)

Buildings

- Demolished
- Existing

Sources
ESRI (Imagery) 2011
Cabrera, 2011
USACE, 2009

EA	**Frankford Arsenal** **Philadelphia, Pennsylvania**	Project: 6233017 November 2013	0 75 150 300 Feet 1 inch = 325 feet

Figure 2-2
Current and Historic Monitoring Well Locations

Path: L:\GISData\Northeast\Pennsylvania\FrankfordArsenal\MXD\March_2013\Figure 2-2 Current and Historic Monitoring Well.mxd





Legend

- Area I Boundary
- Area II Boundary

Buildings

- Demolished
- Existing
- Explosives Decontamination
- Radiological Decontamination
- Area Outside Building Decontaminated

Sources
ESRI (Imagery) 2011
Cabrera, 2011
USACE, 2009

Figure 2-3
Rockwell 1981 Areas Decontaminated

Frankford Arsenal
Philadelphia, Pennsylvania

Project: 6233017

November 2013

0 75 150 300
Feet
1 inch = 185 feet

Path: L:\GIS\Data\Northeast\Pennsylvania\FrankfordArsenal\MXD\March_2013\Figure 2-3 Rockwell 1981 Decon Areas.mxd

3. PHYSICAL CHARACTERISTICS OF THE STUDY AREA

The elements discussed in the following subsections were evaluated as part of the RI effort to refine the conceptual site model (CSM) discussed in Section 9.2 for the FFA Area II (the site). Some discussions of pathway completeness are presented below with evaluation of human health and ecological risk from pathways presented in later sections of the RI report (Chapters 8 and 9, respectively).

3.1 CLIMATE

The local climate is classified as a humid-continental type and is influenced by the Appalachian Mountains to the west and the Atlantic Ocean to the east. The climate is characterized by a large temperature range with cold winters dominated by low-humidity air masses, and hot summers dominated by medium to high humidity air masses. Precipitation is ample with an annual average of 42.05 in. of rainfall (Pennsylvania State Climatologist 2011). The majority of precipitation at the site is runoff (vs. recharge), with flow into the site storm sewer system.

3.2 TOPOGRAPHY

The topography is relatively flat at the FFA. A slight slope exists from the northern portion of the FFA to the southern portion towards the Frankford Inlet and the Delaware River. The elevation ranges from 10 to 20 ft above mean sea level (amsl). The northern portion of the FFA along Tacony Street is approximately 20 ft amsl, and the southern portion along the Frankford Inlet and the Delaware River is approximately 10 ft amsl.

3.3 GEOLOGY

The FFA is underlain by unconsolidated sediments of the Coastal Plain province. These unconsolidated materials sit on older crystalline rocks of the Piedmont. The FFA is located about 1/2 mile southeast of the fall line between the Coastal Plain and the Piedmont provinces.

Surface deposits in reworked areas of Area II have been observed to be fill materials. Fill material is underlain by the Trenton gravel, a Pleistocene unit of Wisconsin-age, described as a pale or reddish-brown, gravelly sand with a wide range of grain sizes, inter-bedded with cross-bedded sands and gravel and clayey-silt layers (USGS 1991). Coarse sediments are composed of oblate pebbles and cobbles derived from Triassic red and gray shales, sandstones, and conglomerate and other bedrock derived up valley. Local clay and silty clay are present in the Trenton gravel (USGS 2000). Locally, this gravel layer has areas of Holocene alluvium and swamp deposits with small amounts of clay. The average thickness of this unit on the entire site is about 40 ft, but can be as great as 80 ft (Langan 2005).

The bedrock beneath the unconsolidated deposits is comprised of crystalline rocks of the Wissahickon Formation, believed to be of early Paleozoic-age, and is mapped in the Philadelphia area as an oligoclase-mica schist with some gneissic, quartz-rich, and feldspar-rich members. The sediments of the Trenton gravel and the Wissahickon Formation are significant aquifers in

the Philadelphia area (USGS 1991). A description of lithology observed during this RI is detailed in Section 6.6.

3.4 HYDROGEOLOGY

The saturated sediment underlying the FFA is the Quaternary-aged Trenton gravel. The hydraulic properties of the Trenton gravel vary due to a variation of sediment sizes from sands to cobbles, sorting of sediments, and thickness of deposits. Median well yield from the Trenton gravel is 90 gallons per minute (gpm) (USGS 1991). Most of the gravel and sands of the Coastal Plain yield large supplies of water that are used for industrial and other non-domestic purposes. These sediments form the principal aquifers in the Philadelphia area (USGS 1991). Recharge occurs in Area II in the area surrounding the parade ground; it is assumed very limited recharge occurs in the remainder of Area II due to the prevalence of impervious surfaces. In general, in Area II groundwater flow is towards Frankford Creek. A description of groundwater flow and gradient observed during this RI is detailed in Section 6.7.

3.5 SURFACE WATER

There are no wetlands, streams, or other surface watercourses located on the FFA Area II property proper. Regional drainage surrounding the FFA is controlled by the Frankford Creek and the Delaware River, which border the FFA to the south/southeast. Surface water at the FFA (derived from rain events) is controlled by a system of catch basins and stormwater pipes. Information as of 2010 indicates that stormwater is conveyed by this system to a pumping, or "lift station" located adjacent to the creek and is discharged to Frankford Creek at this point. Current status of this operation is unknown.

Frankford Creek is located to the south of FFA Area II and it forms the boundary to the south/southwest of the FFA and acts as an inlet from the Delaware River. The original creek was cut off from the remaining current redirected flow of Frankford Creek by engineering efforts in the 1950s; therefore, there is no natural stream flow feeding the creek except for discharge from runoff and outfalls. Flow characteristics are predominated by the tidal influence of the Delaware River, which has a tidal range of approximately 5.5 ft at Philadelphia (USGS 1991).

3.6 UNDERGROUND UTILITIES

The FFA has a network of underground utilities including tunnels formerly used for passage between certain buildings as well as for steam transmission, electrical, natural gas, and storm/sanitary sewer systems. These underground structures likely provide preferential pathways for subsurface impact and potentially influence groundwater flow directions locally. Only the storm/sanitary sewers have connections and/or outfalls outside of the boundaries of the FFA as shown on Figure 3-1. A brief analysis of the site-wide utility system indicates that:

- A network of tunnels is used to distribute steam, telephone, compressed air, fire protection alarm system, and power cables to buildings in Area II. These features previously extended to Area I, but they are being abandoned as part of the redevelopment process. According to FFA facility records, there are about 15,592 linear feet of tunnels

throughout the entire site (Area I and Area II), ranging from 3 to 6.5 ft in diameter, and constructed of reinforced concrete. Numerous access points via manholes, located at regular intervals along the tunnels, are visible at the surface (Langan 2005). Sealed as well as accessible tunnel entrances are present in certain areas of the site.

- Electrical power is delivered via conduit constructed of asbestos-cement and encased in a reinforced, watertight concrete envelope. Numerous substations and secondary distribution systems are located in Area II at critical points to provide the required transformations needed. Substations in Area I have been removed as part of the redevelopment process. Transformers containing PCBs were located in many of the substations, but the current owner has appeared to have replaced the transformers site-wide.

- Natural gas is provided to the FFA by the Philadelphia Gas Works Co. through a network of about 13,000 ft of seamless steel pipes throughout the entire site, with the primary supply connection a 20-in. main tapped into the main supply line on Tacony Street. The main supply line to Area II runs along Mellow Street.

- In Area II, the smaller diameter storm and sanitary sewer lines (separate) that run throughout the site connect into two main storm and sanitary sewer lines that converge southeast of the intersection of Hanger Road and Baird Street. Storm sewers discharge to the pump house (Building 218) where flow is conveyed to Frankford Creek. The sanitary sewer main flows to the east paralleling Frankford Creek, where it combines with the larger (10 by 11 ft) Delaware Connector via an interceptor chamber east of Building 307. A sewer line then continues south, under Frankford Creek, to the city publicly owned treatment works. In the event of heavy rains, excess sanitary sewer flow can bypass the interceptor into the lower segment of the Sanger Street sewer and discharge to the Delaware River.

3.7 CONCEPTUAL SITE MODEL

As part of the planning documents a concept site model (CSM) was prepared to evaluate pathways between sources and receptors in Area II of the FFA. A more refined human receptor CSM is presented in Section 9.2 as part of the human health risk assessment. This CSM (Figure 3-2) was presented in the planning document and used as the basis for developing the data quality objectives and field sampling plan. Discussion of potential sources and pathways are presented in the following sections.

3.7.1 Potential Sources

Available historical data and previous investigations were evaluated to determine potential sources of chemical, explosive, and radiological materials as presented in Chapter 2 and summarized in Appendix A. DoD constituents of potential concern (COPCs) are listed in Appendix A by building. Explosives, metals, VOCs, SVOCs, pesticides, and PCBs have been identified as general groups of COPCs that encompass historically used compounds.

General use types that are indicative of use of HTRW materials include:

- Ordnance manufacturing facilities − metals, VOCs, SVOCs, explosives, and radionuclides (where historical use of radionuclides is known)
- Laboratories − metals, VOCs, SVOCs, explosives, and radionuclides (where historical use of radionuclides is known)
- Inflammable material storehouses – VOCs, SVOCs, and lead
- Oil storage areas – VOCs, SVOCs, and lead (leaded gasoline)
- Housing garages – VOCs, SVOCs, and lead (leaded gasoline)
- Paint storage – VOCs, SVOCs, and metals
- Machine shops – VOCs, SVOCs, and metals
- Optical shops – VOCs, SVOCs, and metals
- Storage of radioactive materials − radionuclides
- Former greenhouse – Pesticides
- Substations – PCBs

In general the above facilities (with the exception of the garages associated with the housing) are located along the eastern and southern portions of Area II (Figure 3-3). Figure 3-3 shows buildings located in Area II that historically had the potential to handle/store HTRW. Historically barracks and associated facilities and administrative offices have been located in the northeastern portion of Area II. Known owner/tenant activities were also evaluated as presented in Appendix A. Owner/tenant COPCs are also listed based on an evaluation of current or post-DoD transfer uses.

Based on the review of the investigations and reports discussed in Chapter 2, it appears that there have been no reported large-scale releases, such as spills or leaks, nor any documented disposal operations in Area II. There is documented evidence of quantities of HTRW materials for use in ordnance manufacturing facilities and in laboratories associated with research and development operations. As documented in the previous investigations summarized in Chapter 2 (Langan 1999 and 2005; Cabrera 2007, 2008, and 2010), small-scale releases occurring over years of daily operation at these facilities is a potential source of impact to the subsurface in Area II.

3.7.2 Pathways

The following sections evaluation pathways to potential receptors (human and ecological). A pathway is considered complete when there is the potential for exposure of the media to a receptor.

3.7.2.1 Soil

Soil is the primary pathway in Area II because it is the most likely medium to be impacted first from a release. The majority of the site is paved or covered with improvements; areas of exposed surface soil are illustrated on Figure 3-4. In areas where receptors have access/exposure to surface soil, the pathway is currently potentially complete due to potential for direct contact of COPCs in soils. Releases could potentially have occurred to the subsurface along preferential pathways such as underground utilities, drains, etc. impacting subsurface soils as well. Human receptor contact with COPCs in soils in Area II can potentially occur via ingestion, inhalation, and dermal contact. Ecological receptor contact with COPCs in soils in Area II can potentially occur via ingestion and direct contact.

3.7.2.2 Groundwater

As discussed in Section 3.7.2.1, the soil pathway is considered potentially complete. If surface or subsurface soils were impacted by past operations, the potential exists that groundwater may also have been impacted from COPCs leaching from soil into the groundwater. Currently, potable water is obtained from the public supply system and no potable wells are located onsite. There is no ordinance banning the installation of public wells in the City of Philadelphia. Potable wells are permitted by the City of Philadelphia Environmental Health Services Department and there are no institutional controls such as an environmental covenant under Act 2 on the use of groundwater at FFA Area II; therefore, the groundwater pathway is considered potentially complete. Receptor contact to groundwater in Area II can potentially occur via ingestion, inhalation, and dermal contact. There are no springs present on the site and the majority of site is covered by impervious surfaces; therefore, there is no pathway for ecological receptors to encounter groundwater in FFA Area II.

3.7.2.3 Air

Indoor air quality could potentially be impacted from volatilization of VOCs in impacted soil and groundwater; therefore, the air pathway is potentially complete. Potential volatilization to indoor air will be assessed through the evaluation of soil and groundwater data. Impact to outdoor air quality from the volatilization of VOCs in impacted soil and groundwater is possible, but not likely to affect receptors due to dilution.

3.7.2.4 Surface Water and Sediment

No bodies of water are present within the boundaries of Area II; therefore, direct contact with surface water and sediment onsite is not a complete pathway. Frankford Creek, located between

the FFA and a former chemical plant, is adjacent to the south of Area II. The creek is located in a highly industrialized area and it may be impacted by multiple sources surrounding the creek to include the FFA. The creek does not appear to be used recreationally and there are no known plans to utilize the creek for recreation; however, ingestion of surface water and sediment by site receptors (human and ecological) is possible; therefore, surface water and sediment is noted as a potentially complete pathway. This RI did not include sampling of surface water and sediments in Frankford Creek. Frankford Creek will be assessed through the modeling of groundwater data to determine any impacts to Frankford Creek as part of a separate USACE investigation of groundwater under all of the FFA (Area IV).

3.7.3 Receptors

3.7.3.1 Human

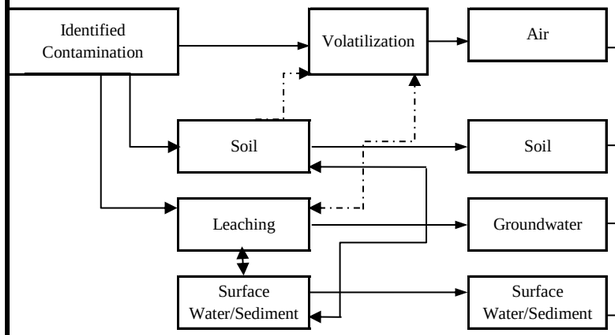
Currently human receptors in Area II include office workers, construction workers, visitors, and school children in grades 4 through 12 (ages 9 to 18). The current owner has indicated that future residential use is a possibility. Future receptors include onsite construction workers, school children, visitors, and residents based on discussions with the current owner.

3.7.3.2 Ecological

Current ecological receptors include terrestrial plants, terrestrial invertebrates (e.g., earthworms), and animals including avian species (e.g., American robin and short-tailed hawk), mammals (e.g., short-tailed shrew and meadow vole), amphibians (e.g., bullfrog), and reptiles (e.g., black snake) that are found within typical urban environments like the FFA. The northwestern portion of Area II includes manicured lawns and mature trees. No bodies of water are located within Area II; therefore, there are no onsite aquatic receptors.


Tacony St
Bridge St
WHARF
Frankford Creek
Trenton
Philadelphia
Site
Delaware River
Legend
Electric Line
Sanitary Sewer
Storm Drain
Water Line
Tunnel
Substations
Area I Boundary
Area II Boundary
PA Fish & Boat Commission (Area III Boundary)
Buildings
Demolished
Existing
Sources
Cabrera, 2011
USACE, 2009
Frankford Arsenal
Philadelphia, Pennsylvania
Project: 6233017
November 2013
0 75 150 300
Feet
1 inch = 200 feet
Figure 3-1
Area I and Area II
Underground Utilities
Path: L:\GIS\Data\Northeast\Pennsylvania\FrankfordArsenal\MXD\March_2013\Figure 3-1 Site Utilities.mxd

FIGURE 3-2
CONCEPTUAL SITE MODEL
SOURCE TO RECEPTORS RELATIONSHIPS



PRIMARY SOURCE	INTERACTION	EXPOSURE ROUTE	CURRENT HUMAN RECEPTORS				FUTURE HUMAN RECEPTORS					CURRENT ECOLOGICAL RECEPTORS		FUTURE ECOLOGICAL RECEPTORS	
			Onsite Office Worker	Onsite Student	Onsite Construction Worker	Visitor	Onsite Office Worker	Onsite Student	Onsite Construction Worker	Onsite Resident	Visitor	Terrestrial	Aquatic	Terrestrial	Aquatic
Identified Contamination	Volatilization → Air	Inhalation	◑	◑	◑	◑	◑	◑	◑	◑	◑	◑	○	◑	○
Soil	Soil	Ingestion	◑	◑	◑	◑	◑	◑	◑	◑	◑	◑	○	◑	○
		Dermal Contact	◑	◑	◑	◑	◑	◑	◑	◑	◑	◑	○	◑	○
		Inhalation	◑	◑	◑	◑	◑	◑	◑	◑	◑	◑	○	◑	○
Leaching	Groundwater	Ingestion	○	○	○	○	◑	◑	◑	◑	◑	○	○	○	○
		Dermal Contact	○	○	○	○	◑	◑	◑	◑	◑	○	○	○	○
		Inhalation	○	○	○	○	◑	◑	◑	◑	◑	○	○	○	○
Surface Water/Sediment	Surface Water/Sediment	Ingestion	◑	◑	◑	◑	◑	◑	◑	◑	◑	◑	○	◑	○
		Dermal Contact	◑	◑	◑	◑	◑	◑	◑	◑	◑	◑	○	◑	○

LEGEND

○ Incomplete Pathway

◑ Potentially Complete Pathway



Legend

- Area I Boundary
- Area II Boundary
- Building Footprint

Historical Building Use

- Housing Garage
- Inflammable Storehouse
- Laboratory
- Oil
- Ordnance Facility (Plant) or Fire Control
- Storehouse
- Sump

Sources
ESRI (Imagery) 2011
Cabrera, 2011
USACE, 2009

Figure 3-3
Historical Building Use
Former Frankford Arsenal
Area II

Frankford Arsenal
Philadelphia, Pennsylvania

Project: 6233017

Date: November 2013

0 75 150 300
Feet
1 inch = 185 feet

Path: L:\GISData\Northeast\Pennsylvania\FrankfordArsenal\MXD\March_2013\Figure 3-3 Historic Building Use.mxd



Legend

- Area I Boundary
- Area II Boundary
- Pervious/Vegetated Area

Buildings

- Demolished
- Existing

Note:
All areas not shaded as pervious are considered to be impervious.

Sources
ESRI (Imagery) 2011
Cabrera, 2011
USACE, 2009

EA	**Frankford Arsenal** **Philadelphia, Pennsylvania**	Project: 6233017 November 2013	0 75 150 300 Feet 1 inch = 185 feet

Figure 3-4
Impervious/Pervious Surfaces

Path: L:\GIS\Data\Northeast\Pennsylvania\FrankfordArsenal\MXD\March_2013\Figure 3-4 Impervious_Pervious_Surfaces.mxd

Table 3-1 - 1977 USATHAMA Installation Assessment Constituents of Potential Concern

Compound Group
Carcinogens (circa 1977)
Benzene
tris(2,3-dibromopropyl) phosphate
Benzidine
PAHs
Heavy Metals and Heavy Metal Salts
Lead and salts
Cadmium and salts
Arsenic oxide and salts
Platinum group metals and salts
Silver and salts
Gold and salts
Barium salts
Copper and salts
Antimony and salts
Chromium salts
Depleted uranium
Mercury (large quantities) and salts
Bismuth salts
Selenium
Cerium oxide (sic)
Strontium salts
Nickel carbonyl
Unique Toxic Gases and Chemical Agent Intermediates
Carbonyl chlorite (phosgene)
methane diphlor phophine oxide (difloro)
Explosives, Pyrotechnics, etc.
Nitroglycerine
Live ammunition
Experimental tetrazoles
Organic peroxide
Nitrocellulose
Zirconium powder
Lead styphante (sic)
Black powder and ammunition propellants
PETN
Denitrotolune (sic)
RDX
Tetracene

Table 3-1 - 1977 USATHAMA Installation Assessment Constituents of Potential Concern

Compound Group
Explosives, Pyrotechnics, etc.
Barium nitrate
Aluminum/magnesium powders
Unidentified experimental propellant, flam, and incendiary mixes
Thermite mix
Red phosphorus
Nitrate salts
Trinitrorescorcinal
Inorganic peroxide, persulfates, and perchlorates
Teflon based pyrotechnics
Corrosives - Alkaline
Sodium hydroxide
Soda ash (sodium carbonate)
Sodium hypochorite
Lime
Cyanide salts
Ammonium hydroxide
Corrosives - Acid
Hydrofluroic
Hydrobromic
Nitric
Sulfric
Sodium dichromate
Hydrochloric
Chromic
Phosphoric
Acetic
Formic
Solvents
Acetone
Methyl ethyl, etc. alcohol
Ketones
Toluene
Benzyl alcohol
Chlorinated hydrocarbons (carbon tetrachloride, etc.)
Cellosolves
Ether
Xylene
Paint thinners and strippers

Table 3-1 - 1977 USATHAMA Installation Assessment Constituents of Potential Concern

Compound Group
Solvents
Petroleum ether
Dioxane
Proprietary metal degreasers
Napthalene
Enamel thinners
Other Materials
Metal treating and plating materials (e.g., zinc phosphate)
Paints and lacquers
Chlorinated napthalene
Epoxy components and "potting" components
Hydrogen gas cylinders
Chlorine gas cylinders
Ethylene glycol
Acetylene tanks
Powdered beryllium
Diflоromethane cylinder
Anhydrous ammonium cylinder
Vast quantities of laboratory and experimental organic and inorganic chemicals

Note: This list is for the entire Site Areas I, II, and III.

4. SAMPLING RATIONALE AND METHODOLOGIES

In order to accomplish the RI scope and objectives, several activities were performed in FFA Area II including the following:

- Below grade investigation of sampling locations using historical information and geophysics to determine utility locations and underground obstructions;
- Surface and subsurface soil sampling using DPT and hand-augers;
- Installation and sampling of temporary groundwater;
- Installation, development, and sampling of permanent groundwater monitoring wells;
- Clearance for MEC by an MEC Safety Specialist for intrusive activities; and
- Waste characterization and disposal.

The purpose of this RI is to assess potential environmental impacts to FFA Area II resulting from former DoD use of the property. The primary goals of this RI are (1) assessing environmental impacts in soil and groundwater, (2) determining the nature and extent of those impacts, and (3) determining if there are risks to human health and the environment. Field work was conducted in accordance with the USACE-approved APP (EA 2011 a), FSP (EA 2011b), and QAPP (EA 2011c).

During the evaluation of historical use in Area II, the following general assumptions regarding general sampling rationale were made:

- Historical housing use does not pose the risk of environmental impacts from past DoD use unless noted in previous observations.
- Samples were not collected from the interior of the tunnels, sumps, pits, and/or drains.
- The primary emphasis of this RI was to fully evaluate potential releases by sampling over a wide area of former DoD use with a fixed number of soil borings, and then further vertically and/or horizontally delineating impacts.
- All soil samples were screened for radioactivity and volatiles using hand-held instrumentation.
- Lead was not identified as a constituent of concern for post-transfer owner/tenant use of activities involving gasoline use due to the phasing out of lead in gasoline prior to the property transfer.

Laboratory analytes for this RI included the following based on a review of historical DoD use (also summarized by analytical method and matrix on Table 4-1):

- VOCs based on the past use of solvents within historical DoD processes;
- SVOCs based on the use of petroleum, oils, and lubricants within historical DoD processes;
- Metals (Target Analyte List [TAL]) plus mercury, uranium, and cyanide) based on historical DoD processes (e.g., manufacturing of ammunition, support shops for building maintenance);
- Pesticides in storage areas due to improper handling within specific storage areas at the FFA;
- PCBs in areas adjacent to substations;
- Radionuclides (gross alpha, gross beta, gamma spectroscopy, and isotopic uranium and thorium) sampled within a limited number of locations associated with historical DoD radioactive material use, or from a location identified during field screening (i.e., where radioactivity was detected above background levels). The goal of sampling is to determine if any radiological contaminants of potential concern, as identified by the 2001 Radiological HSA, are present;
- Waste characteristic sampling for containerized soil; and
- Soil sampling during permanent monitoring well installation for analysis of soil properties including grain size, moisture content, specific gravity, liquid and plastic limits, and pH.

4.1 GEOPHYSICAL SURVEY

Roads and thoroughfares at the FFA are not in the public domain (City of Philadelphia). In consideration of this fact, in areas where the surface was penetrated for the purpose of meeting project objectives (i.e., soil borings and well installation), subsurface utilities were located onsite by three methods prior to the initiation of all intrusive activities:

- Discussion of active versus inactive utilities with the Arsenal Business Center onsite contact;
- Public utility notification and mark-out via the Pennsylvania One Call system; and
- Engagement of subcontracted private utility locating firm to field-identify and mark-out onsite utilities.

EA submitted requests for utility clearance to Pennsylvania One Call System, Inc. (www.paonecall.org, 1-800-222-6470) before work began onsite. EA utilized the services of Delta Geophysics, Inc. to complete subsurface utility surveys at all areas targeted for subsurface

disturbances. EA oversaw the completion of geophysical techniques by Delta Geophysics, Inc. including electromagnetic (EM) scanning and ground penetrating radar.
The EM survey was completed using a Geonics EM-61 instrument. The EM-61 data collected were rough-processed in the field by Delta Geophysics, Inc. personnel. EM survey anomalies identified during the rough processing were scanned by ground penetrating radar to an approximate depth of 3 to5 ft bgs, using a Sir-3000 ground penetrating radar system with a 400Mhz and 270Mhz antenna to further characterize the targets and determine the footprint outline of each identified EM survey anomaly. In addition, an "energized cable locator" was employed during the utility survey for the purpose of finding working power cables and conduits. After evaluating subsurface conditions using the aforementioned methods, the horizontal location of subsurface utilities was marked on the ground surface with paint and flags.

4.2 FIELD SCREENING

4.2.1 Munitions and Explosives of Concern Field Screening

As previously discussed, a surface geophysical survey was conducted using surface geophysical methods to identify anomalies and utilities. In accordance with the scope of work, field screening was also conducted during intrusive activities for the purposes of MEC avoidance. A UXO Technician (Tech II) used a Subsurface Instrument model ML-1 (iron and steel metal detector) to conduct surveys in locations where test borings or wells were installed. As necessary, downhole magnetometry was also conducted using subsurface Instruments (BHG-1) until one of the following conditions was met: (1) native soil was encountered, (2) a depth of 6 ft bgs was reached, or (3) the water table was encountered. Protocol for the MEC field screening is provided in the APP (EA 2011a).

4.2.2 Photoionization Detector Field Screening

Soil samples were initially screened for organic vapors in the field using a photoionization detector (PID). During DPT sampling, cores were screened every foot, and during well installation drilling cuttings were screened in 5-ft increments. PID measurements followed EA Standard Operating Procedure (SOP) No. 11 protocol, which was submitted in Appendix B of the approved FSP. PIDs were calibrated on a daily basis and calibration logs are included as Appendix B. Screening results were recorded on individual boring logs which are included in Appendix C.

4.2.3 Radiological Field Screening

Soil samples were initially screened for radioactivity in the field using a Victoreen meter (Model 190) with Geiger-Mueller pancake probe (Model 489-1100). During DPT sampling, cores were screened the length of each core, and during well installation, drilling cuttings were screened every 5 ft. Measurements followed the EA SOP protocol, which was submitted in Appendix B of the approved FSP. A background level of radioactivity was recorded daily; calibration logs are included as Appendix B. Screening results were recorded on individual boring logs (Appendix C).

4.3 SOIL

4.3.1 Soil Sampling Rationale

Area II was divided into three zones based on past historical use as illustrated on Figure 4-1 and as follows:

- **Zone 1** occupies the northwest corner of Area II; historically this area had limited industrial use. This area was used mainly for housing with some associated garages and two historical storehouses.

- **Zone 2** occupies the northeast corner of Area II, and boundaries of this zone were drawn based on historical industrial use including a fire control laboratory, paint shop, blacksmith shop, garage, and other support facilities.

- **Zone 3** occupies the southern portion of Area II adjacent to Frankford Creek and is also divided on past industrial usage including buildings that housed former ammunition production operations.

Soil sampling consisted of non-biased sampling locations, a smaller number of biased locations, and additional delineation samples in order to delineate identified hotspots vertically and horizontally (placed in consultation with USACE after review of the initial sampling results). Soil samples are summarized on Table 4-2.

Unbiased samples were placed using Visual Sample Plan (Version 6.1b). The program yielded a triangular grid spacing of 96.60 ft in order to have a 95 percent probability of detecting a hot spot 100 ft in diameter. Biased sample locations were placed as a result of a review of site history and review of the CSM. Delineation samples were placed in the vicinity of those biased and unbiased sample locations with COPC concentrations exceeding PADEP MSCs. These delineation samples were placed to delineate the vertical and/or horizontal extent of the PADEP MSC exceedances. Horizontal delineation samples were placed between unbiased sample locations (approximately 48 ft) and 30-40 ft from biased soil sample locations. The sampling rationale, targeted intervals, and laboratory analyses are presented in Table 4-3. Sample locations are illustrated on Figure 4-1.

The following summarized the number of samples locations within Zones 1, 2, and 3:

- Zone 1

    - 61 unbiased surface soil sample locations
    - 6 biased surface and subsurface sample locations
    - 11 delineation subsurface sample locations

- Zone 2
    - 7 biased surface and subsurface sample locations
    - 47 unbiased surface and subsurface sample locations
    - 11 delineation surface and subsurface sample locations
- Zone 3
    - 14 biased surface and subsurface sample locations
    - 63 unbiased surface and subsurface sample locations
    - 6 delineation surface and subsurface sample locations
- Transformers
    - 13 biased surface soil samples and1 subsurface soil sample

Soil samples, associated type and location (zone), and analysis are summarized on Table 4-2.

4.3.2 Sampling Intervals

Surface soil sampling (0- to 6-in. bgs interval) was conducted at 61 locations in Zone 1. Hand tools were used to collect surface soil samples to a maximum depth of 6 in. bgs at the unbiased locations. Subsurface soil sampling (near surface and subsurface) was conducted during the installation of 178 soil borings in Zones 1 (biased and delineation samples), 2, and 3. Two soil samples were collected per boring location where impact was observed (visually, odor, PID response). Soil samples from borings were collected using the following rationale:

- If no obvious impact was observed, a sample was collected from the 0- to 2-ft-bgs interval;
- If obvious impact was observed, a sample was collected from the most impacted interval; and
- An additional sample was collected from the borings with obvious impact at the interval from below the impacted interval, but above the groundwater interface.

Visual indications of impact included soil discoloration from the observed native conditions, staining, or the presence of contaminant product (i.e., oils). Olfactory indicators of impact included odors associated with petroleum or chemicals, i.e., solvents. Soils exhibiting PID responses that were above the observed background values were noted/documented, and the interval with the highest reading was targeted for sampling.

4.3.3 Soil Sampling Procedures

Upon arrival at each boring location, the EA geologist thoroughly inspected the immediate area. Site conditions and unusual observations were noted, with particular attention given to

presence of site hazards, including overhead and underground utilities. The Site Safety and Health Officer ensured the appropriate personal protective equipment was donned by site personnel prior to commencing fieldwork activities. DPT services were provided by Eichelbergers, Inc. of Mechanicsburg, Pennsylvania.

Surface soil samples were collected via a hand auger where surface soil was exposed with no underlying impervious impediments. Hand augers were decontaminated between locations to prevent cross contamination.

Soil borings were advanced through grass, concrete, and/or asphalt down to 15 ft bgs, with two samples collected per boring. Select borings (UBZ2-4, UBZ2-16, UBZ2-28, UBZ2-38, BZ3-2, BZ3-4, BZ3-6, BZ3-14, UBZ3-8, UBZ3-10, UBZ3-12, UBZ3-34, UBZ3-41, AND UBZ3-48) spaced throughout Area II were extended to refusal to determine depth to bedrock in order to gather data for geologic cross sections and general aquifer thickness data obtained from boring logs for permanent and temporary monitoring well placement. These borings were located along Craig Road and Mellow Street (Figure 4-1). Soil boring sampling was conducted according to the approved FSP.

Soil cores (associated with soil borings) were collected using a track-mounted DPT unit (e.g., Geoprobe®). Each boring was advanced by a hydraulically driven, 5-ft-long, stainless-steel barrel sampler (2-in. interior-diameter) lined with a new, dedicated clean plastic liner for each 5-ft interval. Soil cores were collected continuously from grade to provide site lithology and characterization information. Continuous VOC monitoring was conducted with a PID and continuous gamma scanning was conducted with a handheld Geiger meter radiation detector for all soil borings for safety and health purposes. The PID was calibrated according to manufacturer's specifications daily, and background radiation measurements were made each morning. The results of the field screening were recorded on boring logs along with soil lithology characterization using the Unified Soil Classification System. Soil samples were selected using the rationale outlined in Section 4.3.2. Soil logs that include lithology and field screening measurements for all soil borings are presented in Appendix C.

Upon retrieval from the sampler, the acetate liner was cut to expose the entire length of the core. Aliquots for VOC analysis were collected first using a Terracore sampler via USEPA Method SW5035 prior to homogenization for further sample collection. Soil samples were placed into a dedicated disposable Ziploc™ baggie and thoroughly homogenized. To prevent cross contamination, a new Ziploc™ clean baggie was used to mix the soils at each sample interval, and field personnel wore clean nitrile gloves when handling soils during the sample collection process. Samples were placed in the appropriate bottle ware and placed in an iced cooler.

All surface and subsurface soil samples were submitted to Chemtech for laboratory analysis as indicated on Table 4-1. Additionally during well installation, three samples were collected for analysis of soil properties (grain size, moisture content, specific gravity, liquid and plastic limits, and pH) from select locations. Samples representative of varying observed lithology were chosen for analysis of soil properties. Data quality discussions are presented in Chapter 5 and sampling results are presented in Chapter 6.

It should be noted that strong chemical odors were observed in saturated soil associated with several borings north of Buildings 208/209 (UBZ3-4 and UBZ3-5), east of Building 209 (UBZ3-28), northwest of Building 208 (UBZ3-10), east of Building 210 (UBZ3-17), and north of Building 201 (UBZ3-8). Per sampling protocol, taking PID response into consideration, these intervals were targeted for sampling. During installation of temporary wells, the soils cores were screened and strong chemical odors were observed in saturated soils associated with several borings southwest and northeast of Building 101 (TW-27 and TW-26), southwest and northwest of Building 208 (TW-16 and TW-21), and south of Building 209 (TW-15). The odor was identical to the odor emitted by the adjacent chemical plant. Soil boring logs are included in Appendix C and Figures 4-1 and 4-2 represent boring/temporary well locations.

Surface conditions in sampling locations were restored to pre-sampling conditions. When necessary, boreholes were abandoned following sample collection by tremie grouting from the bottom of the hole with bentonite and performing surface restoration using asphalt and/or concrete patches or topsoil and grass seed.

4.4 GROUNDWATER

4.4.1 Well Placement Rationale

Temporary monitoring well locations were based upon analytical results from soil sampling in Area II and from groundwater data from Area I. Temporary well locations were placed based on the following rationale:

- At soil sample locations that exceeded the PADEP soil to groundwater MSC or in areas of concern based on general soil results and observations of the saturated subsurface;

- Along the eastern boundary of Area II downgradient and crossgradient of wells in Area I (MW-5, MW-16, MW-17, and MW-17D) which have elevated concentrations of chlorinated solvents based on past investigations; and

- At locations placed to provide spatial coverage of Area II, including upgradient locations.

A total of 27 temporary wells were installed and sampled. Temporary well locations are illustrated on Figure 4-2 and Table 4-4 summarizes placement rationale, observed water level, and well depths.

Permanent monitoring well locations were selected based upon sample results from temporary monitoring well results in Area II and groundwater data from Area I. A total of 11 permanent wells (numbered MW-21 through MW-31) were placed in areas with observed impact to groundwater (i.e., adjacent to temporary well locations that exceeded PADEP MSCs). The total number of temporary wells exceeding PADEP MSCs exceeded the number of allotted permanent wells; therefore, the 11 permanent wells were placed to provide spatial coverage of impacts observed in temporary wells. Locations, depths, and screened intervals were approved by USACE prior to mobilization and installation. Permanent monitoring well locations are illustrated on Figure 4-2.

4.4.2 Well Installation

4.4.2.1 Temporary Wells

The 27 DPT temporary groundwater wells were installed according to the approved FSP to depths ranging from 15 to 48 ft bgs. DPT services were provided by Eichelbergers, Inc. of Mechanicsburg, Pennsylvania.

The temporary well points were installed across the water table to characterize groundwater at the site. At each location, 1-1.5 in. inside diameter temporary wells were installed, using 5-ft-long sections of Schedule 40 polyvinyl chloride (PVC) and 10-ft-long No. 10 slot size well screens. Groundwater was encountered from 4 to 16 ft bgs across the site. Depth to groundwater, well depth, and screened intervals are presented on Table 4-4. A total of 27 groundwater samples and 3 duplicate groundwater samples were collected from temporary wells. Samples were analyzed for Target Compound List (TCL) VOCs and SVOCs, TAL metals plus mercury, uranium, cyanide, explosives, gross alpha/beta, and radium 226/228. Table 4-4 summarizes the temporary groundwater wells and lists those analytes that had exceedances in one or more of the temporary wells. The methodology for temporary well sampling is further discussed in Section 4.4.4.

4.4.2.2 Permanent Monitoring Wells

Permanent monitoring wells were installed into the overburden at a maximum well depth of 44 ft bgs using DPT and hollow stem auger drilling methods. During drilling of the monitoring wells, subsurface soil samples were screened with a PID every 5 ft. A total of 11 subsurface soil samples, 1 from each well, were collected for this task. Analysis of soil samples was for TCL VOCs and SVOCs, and metals including cyanide, mercury, and uranium (via USEPA Method 6020). Three samples were submitted for analysis of radionuclides and explosives. Sample depths were targeted to provide additional characterization information, and no saturated soil samples were collected in accordance with the FSP. Additionally, three samples were collected for analysis of soil properties (grain size, moisture content, specific gravity, liquid and plastic limits, and pH). Samples representative of varying observed lithology were chosen for analysis of geotechnical soil properties. Soil sample intervals for each well are presented on Table 4-6.

Monitoring wells were constructed following the approved FSP for installation and construction. Monitoring wells were constructed of 2-in.-diameter, Schedule 40 PVC well casing and 0.010-in., machine-slotted PVC well screen. Clean medium sand was used to construct the filter pack from 1 ft below the bottom of the well to 2-3 ft above the top of the screened interval. The sand was tremied into the well, and the depth to the top of the filter pack was measured frequently with a weighted measuring tape. A 2-ft-thick bentonite seal was installed after the filter pack. Bentonite seals were composed of commercially available 100 percent sodium bentonite chips or powder.

The annular grout seal was placed above the bentonite seal, after the bentonite seal had at least 2 hours to hydrate. The annular seal consisted of cement-bentonite grout, composed by weight

of 10 parts cement (Portland cement, any of Types I to V) to one-half part bentonite with a maximum of 6 gallons of approved potable water per 94-pound bag of cement (equating to approximately 5 pounds of bentonite clay to one 94-pound bag of cement). Bentonite was added after the required amount of cement was mixed with water. The grout was tremied into the annular space to within 3 ft of the surface (below the frost line).

One well was finished with a stick-up steel casing and 10 wells were finished as flush mount in accordance with USACE direction. The top of the stick-up casing extended a minimum of 2 ft above ground surface on stick-up wells. Discrete concrete pads were installed flush with the ground surface. Locks were placed on each well once construction was complete. Well completion data were recorded on the Record of Monitoring Well Construction forms provided in Appendix D.

4.4.3 Permanent Monitoring Well Development

Monitoring wells were developed in accordance with USACE EM 1110-1-4000. During development, purge water was monitored for turbidity. Development continued until the purged water was less than 10 nephelometric turbidity units (NTUs) for turbidity. If the turbidity did not drop below 10 NTUs, the Project Manager was notified and a decision as to whether to continue or terminate development was made. For three wells, the turbidity did not drop below 10 NTUs even after additional pumping/developing efforts were completed; however, USACE authorized EA to terminate development activities and record final turbidity readings. At the conclusion of well development, a 0.5-liter sample of the last water to be removed during development was placed in a clear glass jar and labeled with the well number and date. Each jar was agitated and photographed to demonstrate water clarity. Information was recorded on the Record of Well Development for each well and photographs of groundwater post-development are provided in Appendix D.

4.4.4 Groundwater Sampling

4.4.4.1 Water Level Measurements

Water level measurements were collected at each monitoring well using a water level indicator prior to purging any wells. The depth to water was measured to an accuracy of 0.01 ft and was recorded from the top of the well casing. The data gathered from the water level measurements were used to assess the direction of groundwater flow during the sampling event.

4.4.4.2 Monitoring Well Sampling Procedures

Groundwater samples from both temporary and permanent wells were obtained using low-flow sampling protocol in accordance with the approved FSP. Groundwater samples were collected using dedicated pump systems. The procedure is designed to permit the collection of groundwater samples with minimum turbidity by keeping the rate of flow of purged water less than 0.5 liter per minute.

After installation of each temporary well, the well was given time to equilibrate. After waiting about an hour or two, each well was checked with a PID and readings were recorded. Each well was purged with a peristaltic pump prior to sampling using standard low-flow techniques (submersible pumps were not used for the temporary wells because the diameter of the pump was greater than the diameter of the well). The pump intake was placed in the center of the screened interval of each well. The pumps were equipped with 3/8-in. inside-diameter dedicated polyethylene tubing. Procedures in the APP were followed when high concentrations of organic vapors and/or explosive gases were detected in the breathing zone. The temporary wells were pumped until they equilibrated (water quality parameters stabilized) or if equilibration was not reached they were pumped until three well volumes were removed in accordance with the FSP. Discharge from the flow-through cell (used to monitor groundwater quality) was collected in 55-gallon drums. Data quality discussions are presented in Chapter 5 and sampling results are presented in Chapter 6.

For sampling of monitoring wells, a variable speed submersible pump and new, dedicated, polyethylene tubing was used to purge monitoring wells. The pump was lowered into the well such that the intake was placed in the center of screened interval. The well was pumped at a rate such that drawdown did not exceed 0.3 ft.

Data, including depth to groundwater and water quality, were recorded at regular minute-scale intervals until the water quality parameters stabilized over three consecutive readings. Stabilization is defined as:

- ±0.1 pH units
- ±3 percent for temperature
- ±3 percent for conductivity
- ±10 percent for dissolved oxygen
- ±10 millivolts for oxidation reduction potential
- ±10 percent for turbidity
- Steady or rising water level

Water quality data were collected via a flow-through cell attached in-line with the pump. Purging was terminated and sampling commenced after parameters stabilized, if three well volumes had been purged, or if 2 hours of purging had occurred, whichever occurred first. In those cases where the 2-hour mark was reached, USACE approval was requested prior to stopping. Discharge from the flow-through cell was collected in 55-gallon drums. Data quality discussions are presented in Chapter 5 and sampling results are presented in Chapter 6.

One temporary well, TW-19, was sampled using a hand-bailer because the peristaltic pump could not achieve enough lift to remove water from the temporary well. This was likely due to a combination of the high turbidity and depth (water table was observed at 10 ft bgs, total well depth of 32.3 ft bgs). For this well, data were recorded at the beginning and end of purging. A dedicated, Teflon hand-bailer was used to perform the purging and sampling and a clean, dedicated string was tied to the hand-bailer, which was then lowered into the well until it was filled with water. The bailer was pulled back out, and the groundwater was discarded into a 55-

gallon drum. Three well volumes were purged with the hand-bailer to ensure sufficient recharge, and samples were collected by pouring the groundwater from the bailer into the bottles.

Dissolved metal samples from temporary and permanent wells were field filtered using a peristaltic pump and filter to fill a preserved laboratory bottle. The impact of this sampling method upon the data collected is discussed in Section 5.2.2.

It should be noted that during purging of temporary wells TW-16 and TW-21, there was a chemical odor from the purge water that was identical to the odor emitted from the adjacent chemical plant. Well purge logs are located in Appendix D.

4.5 INVESTIGATIVE-DERIVED WASTE CHARACTERIZATION SAMPLING AND DISPOSAL

A total of 74, 55-gallon drums of IDW were generated during this investigation including 22 drums containing soil, 48 drums containing groundwater and decontamination water, 2 drums containing personal protective equipment (PPE), and 2 drums containing concrete/asphalt. Drums were temporarily stored inside Building 39 in an area designated for drum staging.

Waste characterization samples were collected and data evaluated prior to disposal of IDW. Soil IDW, i.e., rock and soil cuttings, was sampled for waste characteristics as summarized on Table 4-1. A composite sample was collected as required by the waste disposal facility where the drums are to be disposed, and results of this sampling are presented in Section 6.5. Temporary and permanent well sampling results were used for characterization of purge water. A portion of drums were classified as hazardous waste based on the presence of acetone sourced in the adjacent manufacturing facility in soil and groundwater at substantially elevated levels.

All drums were removed from Building 39 on 29 November 2012 for transportation to disposal facilities. Manifests are provided in Appendix H. Hazardous waste was transported to Ross Incineration Services, Inc. of Grafton, Ohio for disposal as follows:

- 2, 55-gallon drums of debris/PPE
- 15, 55-gallon drums of soil
- 33, 55-gallon drums of groundwater/decontamination water

Non-hazardous waste was transported to Vector Technology, Inc. of Ravenna, Ohio for disposal as follows:

- 2, 55-gallon drums of concrete/asphalt
- 7, 55-gallon drums of soil
- 15, 55-gallon drums of groundwater/decontamination water

4.6 LOCATION SURVEYING

Sampling locations associated with soil sampling and temporary well locations were surveyed using a Trimble ProXRS differential global positioning system capable of less than 1-ft

horizontal resolution. Sample locations were referenced to Pennsylvania State Plane North America Datum 1983. Elevations were referenced to North America Vertical Datum 1988 mean sea level. Sample location coordinates are presented in Appendix C.

A survey of the newly installed wells was conducted by a Pennsylvania-licensed survey, Site Design Concepts of York, Pennsylvania, to determine State Plane coordinates and elevations of sampling locations. Coordinates were referenced to Pennsylvania State Plane North America Datum 1983. Elevations were referenced to North America Vertical Datum 1988 mean sea level. Elevations were measured to the top of the stick-up casing and to the ground surface. The survey was performed to an accuracy of ±0.01 ft for vertical data and ±3 ft for horizontal data. Well surveying data are included in Appendix D.

4.7 EQUIPMENT DECONTAMINATION

Non-dedicated equipment (water level indicators, pumps) was decontaminated in accordance with the FSP. A total of 13 equipment rinse blanks were collected following the decontamination of non-dedicated equipment. Results of equipment blanks are discussed in Section 6.4.2. Decontamination fluids were containerized and addressed as IDW.





Legend

Soil Sample Locations

- Delineation Soil Sample
- Biased Soil Sample
- Unbiased Soil Sample
- Transformer Sample
- Location Not Sampled

Zones

- Zone 1, 2 and 3
- Area I Boundary
- Area II Boundary
- Boring Included in Geologic Cross-Section

Label Key

UBZ-	Unbiased Soil Sample
BZ-	Biased Soil Sample
D-	Delineation Soil Sample
Z1-	Zone 1
Z2-	Zone 2
Z3-	Zone 3
SO-	Soil Sample
mg/kg	Milligrams per Kilogram

Sources
ESRI (Imagery) 2011
Cabrera, 2011
USACE, 2009

Figure 4-1
Soil Characterization and Delineation Sample Locations

Frankford Arsenal
Philadelphia, Pennsylvania

Project: 6233017

Date: November 2013

0 75 150 300
Feet
1 inch = 175 feet

Path: L:\GISData\Northeast\Pennsylvania\FrankfordArsenal\MXD\March_2013\Figure 4-1 Soil Char and Delin Sample Loc.mxd





Legend

MW-22 Permanent Well

TW-07 Temporary Well

Zones

- Zones
- Area I Boundary
- Area II Boundary
- Existing Building

Sources
ESRI (Imagery), 2011
Cabrera, 2011
USACE, 2009

Figure 4-2
Area II Temporary and Permanent Well Locations

EA	**Frankford Arsenal** **Philadelphia, Pennsylvania**	Project: 6233017 November 2013	0 75 150 300 Feet 1 inch = 180 feet

Path: L:\GIS\Data\Northeast\Pennsylvania\FrankfordArsenal\MXD\March_2013\Figure 4-2 Area II Permanent and Temporary Well Locations.mxd

Table 4-1 - Analytical Methods

Matrix/Analyte	Methods
Soil	
TAL Metals	SW 846 3050/6010B & 7471A (a)
Total Cyanide	SW 846 9012
TCL SVOCs	SW 846 3541 and 3550/ 8270C & SW8270D (a)
TCL VOCs	SW 846 5035/ 8260B (a)
Explosives	SW 846 3550B/ 8310 & 8330 (a)
Pesticides	SW 846 3550B/ 8081A (a)
TCL Polychlorinated Biphenyls	SW 846 3550B/ 8082 (a)
Gamma Spectroscopy	739R10/ 713R12 (a)
Gross Alpha and Beta	702R20 & 739R10/ 724R11 (a)
Uranium	SW 846 3050/ SW6020 (a)
4972-01 Grain Size	ASTM D422
Moisture Content	ASTM D2216
Specific Gravity	ASTM D854
Plasticity	ASTM D2488
pH	SW9045C
Groundwater	
TAL Metals	SW 846 3050/ 6010B&7470 +6020 ICP/MS(b) as needed for specified metals per matrix (a)
Mercury	SW7470A
Total Cyanide	SW 846 9012
TCL SVOCs	SW 846 3550/ 8270D (a)
TCL VOCs	SW 846 5035/ 8260B (a)
Explosives	SW 846 3550B/ 8330 (a)
Radium 226/228	746R10 & 746R9 & 783R9/ 724R11 & 783R9 (a)
Gross Alpha and Beta	702R20/ 724R11 (a)
Soil Disposal	
Ignitibility	SW1030
Corrosivity as pH	SW 846 9045
Reactivity – Sulfide and Cyanide	SW 846 9034 & 9012B
TCL Polychlorinated Biphenyls	SW 846 3550B/ 8082 (a)
TCLP Metals	SW 846 3050/ 6010B&7470A (a)
TCLP VOCs	SW 846 5035/ 8260C (a)
TCLP SVOCs	SW 846 3550/ 8270D (a)
TCLP Pesticides	SW 846 3550B/ 8081A (a)
TCLP Chlorinated Herbicides	SW 846 8151A
TCLP Polychlorinated Biphenyls	SW 846 8082
TCLP pH	SW 846 1311/ 9045C (a)

Notes:
Refer to Tables 3-2 to 3-5 for matrix sample specific analyses.
TAL = Target Analyte List.
TCL = Target Compound List.
PPL = Priority Pollutant Metals.
CFR = Code of Federal Regulations.
TCLP = Toxicity Characteristic Leaching Procedure.
ASTM = American Society for Testing and Materials.
(a) Preparatory method is listed before the / (e.g., SW-846 3060A), determinative method is listed after the "/."
(b) Aqueous samples will be analyzed using inductively coupled plasma (ICP)/mass spectrometry (MS) for specified metals.

Table 4-2 - Summary of Soil Samples Collected

Analysis	Sample Locations	TCL VOC	TCL SVOC	TAL Metals and Hg	Explosives	PCBs	Pesticides	Uranium	Gross Alpha/Beta	Gamma Spec.	Cyanide
Zone 1 - Unbiased	61			61							
Zone 1 - Biased	6	12	12	14	1		2		1	1	
Zone 1 - Delineation	12			36							
Zone 2 - Unbiased	47	90	90	90	2				6	6	
Zone 2 - Biased	7	14	14	14	2				1	1	
Zone 2 - Delineation	6		6	5	1				1	1	
Zone 3 - Unbiased	63	133	132	132	20			23	20	20	13
Zone 3 - Biased	14	31	31	31	3			4			5
Zone 3 - Delineation	6		5	11							
Transformer Substations	15					17					
Drum Composite						1					1
Total	**237**	**280**	**290**	**394**	**29**	**18**	**2**	**27**	**29**	**29**	**19**

Notes:

VOCs - Volatile Organic Compounds.

SVOC - Semivolatile Organic Compounds.

PCBs - Polychlorinated Biphenyls.

TCL - Target Compound List.

TAL - Target Analyte List.

Hg - Mercury.

Blank cell indicates no sample collected for that parameter.

Table 4-3 - Soil Delineation Sample Summary

Number	Zone	Hot Spot	Analyte(s) Detected Above MSC	MSC Exceedance Type	Vertical	Horizontal	Impacted Interval	Target Depth	Laboratory Analysis	Sampling Intervals*
D1	1	UBZ1-1	As	RDC	X		0-0.5	0-5	As, Cd, Pb	0.5-1, 1-2, 3-4
D2	1	UBZ1-12	As	RDC	X		0-0.5	0-5	As, Cd, Pb	0.5-1, 1-2, 3-4
D3	1	UBZ1-14	As	RDC	X		0-0.5	0-5	As, Cd, Pb	0.5-1, 1-2, 3-4
D4	1	UBZ1-23	As and Pb	RDC	X		0-0.5	0-5	As, Cd, Pb	0.5-1, 1-2, 3-4
D5	1	UBZ1-32	As and Pb	RDC	X		0-0.5	0-5	As, Cd, Pb	0.5-1, 1-2, 3-4
D6	1	UBZ1-33	As	RDC	X		0-0.5	0-5	As, Cd, Pb	0.5-1, 1-2, 3-4
D7	1	UBZ1-28	Pb	RDC	X		0-0.5	0-5	As, Cd, Pb	0.5-1, 1-2, 3-4
D8	1	UBZ1-37	As and Pb	RDC	X		0-0.5	0-5	As, Cd, Pb	0.5-1, 1-2, 3-4
D9	1	UBZ1-38	As and Pb	RDC	X		0-0.5	0-5	As, Cd, Pb	0.5-1, 1-2, 3-4
D10	1	UBZ1-43	As	RDC	X		0-0.5	0-5	As, Cd, Pb	0.5-1, 1-2, 3-4
D11	1	UBZ1-60	Pb	RDC	X		0-0.5	0-5	As, Cd, Pb	0.5-1, 1-2, 3-4
D12	2	UBZ2-1	BAP	RDC	X	X	0-2	0-5	SVOC	0-2, 3-5
D13	2	UBZ2-1	BAP	RDC	X	X	0-2	0-5	SVOC	0-2, 3-5
D14	2	UBZ2-1	BAP	RDC	X	X	0-2	0-5	SVOC	0-2, 3-5
D15	2	UBZ2-45	Pb	RDC	X	X	1-2	0-5	Metals	1-2, 3-5
D16	2	UBZ2-45	Pb	RDC	X	X	1-2	0-5	Metals	1-2, 3-5
D17	2	UBZ2-45	Pb	RDC	X	X	1-2	0-5	Metals	1-2, 3-5
D18	3	UBZ3-7	As	RDC	X	X	5-6 and 11-12	15	Metals	0-2, 5-7, 14-15
D19	3	UBZ3-7	As	RDC	X		5-6 and 11-12	15	Metals	0-2[1] , 14-15
D20	3	UBZ3-23	BAP and As	RDC	X	X	0-2/4-5	0-10	Metals and SVOC	0-2, 4-5, 5-7
D21	3	UBZ3-23	BAP and As	RDC	X		0-2/4-5	0-10	Metals and SVOC	5-7
D22	3	UBZ3-23	BAP and As	RDC	X	X	0-2/4-5	0-10	Metals and SVOC	0-2, 4-5, 5-7
D23	1	UBZ1-54	As	RDC	X		0-0.5	0-5	As, Cd, Pb	0.5-1, 1-2, 3-4

Notes:

As - Arsenic.

Pb - Lead.

BAP - Benzo(a)pyrene.

RDC - Residential Direct Contact.

* Unless visual or field screening indicates otherwise.

[1]- 0-2 added to evaluate surface conditons, 5-7 initally collected based on visual observations.

Table 4-4 - Temporary Well Rationale and Summary

Number	Zone	Date	Water Level (ft bgs)	Sounded Depth (ft bgs)	End Depth (ft bgs)	Associated Soil Boring Location	Analyte(s) Detected above MSC in soil	MSC Exceedance Type	Other Rationale
1	1	1/31/2012	14	19.35	20	UBZ1-2	Lead/Arsenic	Direct Contact	0-0.5 ft interval /expected to be shallow based on nearby sample results; Consider as Upgradient/Background
2	1	1/31/2012	16	29.5	30	BZ1-3/UBZ1-13	Lead	Direct Contact	0-0.5 ft interval /expected to be shallow based on nearby sample results - no exceedenace in deeper results from BZ1-3; Consider as Upgradient/Background
3	1	2/20/2012	15.2	21.14	21	UBZ1-41	Lead/Arsenic	Direct Contact	0-0.5 ft interval /expected to be shallow based on nearby sample results - no exceedenace in deeper results from BZ1-4; Consider as Midgradient/Background
4	2	1/26/2012	15.55	24.55	25	UBZ2-4	TCE	SGW	No exceedances of nearby samples at sampled intervals
5	2	1/31/2012	12.85	44.1	44	UBZ2-14	None	None	No exceedances of nearby samples at sampled intervals; Downgradient of MW-5
6	2	2/20/2012	14.91	47.76	48	UBZ2-31	None	None	No exceedances of nearby samples at sampled intervals; Crossgradient of MW-16
7	2	1/31/2012	13.17	43.5	44	BZ2-5	BAP/Arsenic	Direct Contact	3-4 ft interval /expected to be shallow based on deeper sampling results - no exceedenace; Down/crossgradient of MW-16
8	3	1/30/2012	10.9	38.4	38.75	UBZ3-15	None	None	No exceedances of nearby samples at sampled intervals; Downgradient of MW-17
9	2	1/25/2012	5.35	13.8	15	UBZ3-34	None	None	No exceedances of nearby samples at sampled intervals; Midgradient background
10	2	2/20/2012	14.91	20.95	21	UBZ2-40	None	None	No exceedances of nearby samples at sampled intervals; Midgradient background
11	3	1/30/2012	4.7	32.8	33	UBZ3-36	None	None	No exceedances of nearby samples at sampled intervals; Downgradient of MW-17
12	3	1/24/2012	6.8	20.71	20	UBZ3-47	Arsenic	Direct Contact	Adjacent sample has 5-7 ft interval /expected to be shallow based on nearby results; Downgradient of Building 215/216/217
13	3	1/24/2012	4.7	17.8	18	UBZ3-45	Arsenic	Direct Contact	adjacent sample has 5-7 ft interval /expected to be shallow based on nearby results
14	3	1/24/2012	7.6	14.5	15	BZ3-10	None	None	No exceedances of nearby samples at sampled intervals; however in Benzene, ethylbenzene, cumene plume
15	3	1/27/2012	4.98	32.7	33	UBZ3-42	Benzene	SGW	Adjacent sample has arsenic at 0.5-3 ft interval /expected to be shallow based on nearby results; Downgradient location
16	3	1/26/2012	8.3	36.3	35	UBZ3-41	Hg	SGW	1-3 ft interval, vertically delineated; Downgradient location
17	3	1/26/2012	5.9	33.9	35	Between UBZ3-54 and -55	TCE/Carbon tet/Arsenic	Direct Contact	adjacent samples has 0-2 ft interval /expected to be shallow based on nearby results, Downgradient of identified VOCs
18	3	1/23/2012	4	14.5	17	UBZ3-23	Arsenic and BAP	Direct Contact	3-5 ft interval /expected to be shallow based on nearby results; Western point of compliance (POC)/upgradient of identfied volatile organic compounds (VOCs)

Table 4-4 - Temporary Well Rationale and Summary

Number	Zone	Date	Water Level (ft bgs)	Sounded Depth (ft bgs)	End Depth (ft bgs)	Associated Soil Boring Location	Analyte(s) Detected above MSC in soil	MSC Exceedance Type	Other Rationale
19	3	1/23/2012	7.5	29.8	35	UBZ3-25	None	None	No exceedances of nearby samples at sampled intervals; Benzene, ethylbenzene, cumene plume
20	3	1/27/2012	7.7	18.7	19	UBZ3-8	Benzene	SGW	39-40 ft interval /expected to be deep based on shallow/nearby results; Benzene, ethylbenzene, cumene plume
21	3	1/23/2012	7.1	14.3	17	UBZ3-10	None	None	No exceedances of nearby samples at sampled intervals; Benzene, ethylbenzene, cumene plume
22	3	1/25/2012	8.6	14.2	15	UBZ3-5	None	None	No exceedances of nearby samples at sampled intervals; Benzene, ethylbenzene, cumene plume
23	2	2/20/2012	4.3	21.3	21	UBZ2-28	None	None	No exceedances of nearby samples at sampled intervals
24	3	1/24/2012	6.3	14.6	17	BZ3-8	None	None	No exceedances of nearby samples at sampled intervals; however in Benzene, ethylbenzene, cumene plume
25		4/20/2012	5.45	15	15	UBZ3-59	None	None	Downgradient of Area I
26		4/20/2012	11.75	15	15	North of Ramsay Road gate	NA	NA	POC location to determine source of acetone, phenol, benzene plume
27		4/20/2012	9.35	15	15	West of Building 101	NA	NA	POC location to determine source of acetone, phenol, benzene plume

Notes:
NA - Not Applicable.
ft bgs - Feet below ground surface.
MSC - Medium Specific Concentratration.
POC - Point of compliance

Table 4-5 - Summary of Groundwater Samples Collected

Analysis	TCL VOC	TCL SVOC	TAL Metals and Hg	Explosives	Gross Alpha/Beta	Ra 226/228	Cyanide
Temporary Wells	27	27	27	7	7	7	4
Permanent Wells	11	11	11	11	13	13	10
Total Water Samples	38	38	38	18	20	20	14

Notes:

VOCs = Volatile Organic Compounds.

SVOC = Semivolatile Organic Compounds.

PCBs = Polychlorinated Biphenyls.

TCL = Target Compound List.

TAL = Target Analyte List.

Blank cell indicates no sample collected for that parameter.

Table 4-6 - Summary of Monitoring Wells Construction and Associated Samples

Permanent Well	Associated Temporary Well	Depth (ft bgs)	Screen (ft bgs)	Analytical Soil Sample Depth (ft bgs)	Geotechnical Sample Depth (ft bgs)
MW-21	TW-5	44	34-44	10-12	30-35
MW-22	TW-7	44	34-44	0-2	NA
MW-23	TW-11	33	23-33	0-2	NA
MW-24	TW-12	20	5-20	10-12	NA
MW-25	TW-13	20	5-20	0-2	NA
MW-26	TW-14	20	5-20	0-2	15-20
MW-27	TW-16	35	25-35	4-6	NA
MW-28	TW-26	20	5-20	0-2	15-20
MW-29	TW-22	20	5-20	15-20	NA
MW-30	TW-3	25	10-25	5-7	NA
MW-31	TW-1	25	10-25	10-12	NA

Notes:

ft bgs - feet below ground surface.

NA - Not applicable.

5. DATA QUALITY ASSESSMENT

Soil and groundwater samples were collected and analyzed at Area II of the FFA (the site). Samples were collected from December 2011 through May 2012. Samples were collected in accordance with the FSP (EA 2011b), and the WMP (EA 2011d). A QAPP was also prepared to supplement and guide the WMP (EA 2011d). Laboratory analyses of soil and groundwater samples were conducted in accordance with the QAPP (EA 2011c). A data quality review of laboratory analytical data was conducted to provide an independent assessment of analytical results, and to evaluate their usability with respect to the DoD Quality Systems Manual (DoD QSM), version 4.2 guidelines.

The purpose of the section is to evaluate the soil and groundwater for inclusion in the RI Report and Risk Assessments. The data set evaluation will include:

- Defining the data sets (Section 5.1)
- Identifying alterations from sampling plans (Section 5.2)
- Evaluating data quality (Section 5.3)
- Managing data (Section 5.4)

The results of this section will be incorporated into the fate and transport evaluation of the RI Report (Chapter 7), the human health risk assessments (Chapter 8), and ecological risk screening (Chapter 9).

5.1 DATA SETS

Data for the RI Report were generated from soil and groundwater samples. The samples were collected to delineate the nature and extent of impact in site soil and groundwater and to provide input for the risk assessments. The following subsections summarize, by media, the data sets used for the Area II RI Report. Table 5-1 presents a list of all the samples included in this RI Report.

5.1.1 Soil

Soil samples were collected at the site from soil borings installed with a hand auger or DPT. Sample collection procedures are detailed in the FSP (EA 2011b) and the QAPP (EA2011c) and summarized in Section 4.3.3. A total of 483 soil samples were collected, including field duplicates. Soil samples were collected at various depths ranging from 0 to 40 ft bgs between December 2011 and May 2012.

The analytical reporting provided by the laboratory and the data validation reports are included in Appendix E.

5.1.2 Groundwater

Data from 45 groundwater samples, including field duplicates, collected from 38 locations were included in the RI Report. The groundwater well locations are comprised of 27 temporary well

locations and 11 permanent monitoring well locations. Samples were collected between January 2012 and May 2012. The analytical reports provided by the laboratory and the data validation reports are included in Appendix E.

5.2 DEVIATIONS FROM SAMPLING PLAN

5.2.1 Soil

Multiple soil boring locations were offset due to underground utilities or poor recovery as noted in Appendix B. If a location was classified as biased, then the location was offset and considered negligible, since it was typically less than 5 ft from the original location and there was no deviation from the FSP. If a location was unbiased and could not be offset adjacent to the original location, then either the sample was not collected or authorized approval was given to offset the location. As noted in Appendix B there were two instances where samples could not be collected. The first, BZ3-05 could not be advanced due to underground utilities. The second, Z3D20, a sample was not obtained due to poor recovery. The completeness goal for field activities was still met as detailed in Section 5.3.4.

The following deviations were noted during the soil sampling effort:

- Radiological screening not completed on 18 soil borings because of equipment malfunction due to moisture between the last boring of the day on 27 December and when a replacement was received the morning of 30 December. Field personnel calibrated equipment daily, and recognized that equipment did not properly calibrate on 27 December. A service call was placed to try to fix the equipment in the field; however, when it was determined equipment was still not properly working, a replacement meter was shipped out.

- In Zone 1 two surface soil samples from two locations (BZ1-3 and UBZ1-14) were proposed for pesticide analysis; one surface and one subsurface sample were collected and submitted for analysis from one location (BZ1-3).

- Unbiased samples along Hanger Road in Zone 3 were offset north due to the presence of underground utilities.

- Proposed sample BZ3-5 was not collected due to the presence of underground utilities.

- Buildings 202 and 209 had interior transformers; therefore, the proposed samples were redistributed after discussions with USACE.

- Soil location UBZ2-SO-44 encountered refusal at 2.5 ft bgs. Upon further ground penetrating radar investigation, it appeared that there was a thick layer of concrete at this depth in the vicinity of this soil location (possibly an underground tunnel), and, since this was an unbiased sample and areas immediately surrounding the area had been sampled, a representative offset location could not be obtained. Therefore, no subsurface samples were collected for this soil location.

- Soil location UBZ2-SO-39 encountered refusal at 0.5 ft bgs, bending the drilling rod. This location had a thick layer of concrete at the surface which extended to an unknown depth, and, since this was an unbiased sample and areas immediately surrounding the area had been sampled, a representative offset location could not be obtained. Therefore, no samples were collected for this soil location.

- Soil location Z3D18 had to be offset approximately 10 ft to the northwest due to elevated PID readings at the top of the soil boring. One sample from the 0 to 2 ft bgs interval was collected from the recovered 0-5 ft bgs interval. The offset location, Z3D18B, was advanced to the target depth and samples were collected from the 0 to 2 and 14 to 15 ft bgs intervals.

- Soil location Z3D20 had to be offset multiple times due to the fact that the location was in the vicinity of a concrete footer associated with a former building ramp and west of the location was a gas line. After multiple offsets, there was no recovery in the 0-5 ft bgs interval. Lack of a sample from this interval does not affect representativeness of the data because there was no soil media present in the 0 to 5 ft bgs interval.

- Soil location UBZ3-SO-52 was offset due to no recovery of the 5 to 15 ft bgs interval. A sample was collected from recoverable soil in the 0 to 2 ft bgs interval at UBZ3-SO-52. The offset location (UBZ3-SO-52a) had full recovery and was also sampled at the 0 to 2 ft bgs and 5 to 7 ft bgs intervals.

- Soil samples collected from the courtyard area (UBZ3-SO-19, UBZ3-SO-32, UBZ-SO-33, and BZ3-SO-13) were collected with hand augers due to access conditions (as discussed with USACE). Samples were collected to a maximum depth of 3 ft bgs due to underlying rocky conditions including building rubble which prevented hand augering to a greater depth could not penetrate.

5.2.2 Groundwater

The following deviations were noted during the temporary and permanent well installation and sampling effort:

- Well development of permanent monitoring wells consisted of purging the well until turbidity dropped to less than 10 NTUs. During development of the monitoring wells it was noted that three wells (MW-25, MW-27, and MW-29) had turbidity levels greater than 10 NTUs even after additional pumping/development efforts were completed (minimum of 2 hours). USACE was consulted, and EA was authorized to terminate development activities and record final turbidity readings.

- During the development of MW-27 the well went dry after 2 hours of development. The well was allowed to recharge until the following day and well development was completed.

- One temporary well, TW-19, was sampled using a hand-bailer because the peristaltic pump would not pump the groundwater due to a combination of the high turbidity and depth (30 ft bgs). This sampling protocol was a deviation of the FSP due to insufficient purging with the peristaltic pump. According to USEPA's Groundwater Sampling Guidelines for Superfund and RCRA Project Managers published in May 2002, the use of hand-bailers can increase volatilization (affecting VOCs) and turbidity (affecting heavy metals). Care was taken during sample collection for minimal disturbance of the groundwater; however, minimal volatilization may have occurred. Samples analyzed for heavy metals were filtered and therefore higher turbidity did not affect the samples.

- A truck-mounted rig was used in place of the Geoprobe for installation of MW-24 and MW-25 because the Geoprobe had broken down. Procedures with the truck-mounted rig were similar to those discussed in Section 4.3.3, with the exception that split-spoons (2 ft length) were used in place of acetate liners (5-ft length). The split-spoons allowed for accurate interval recovery due to the smaller length; however, decontamination of each spoon was required after each use to ensure there was no cross contamination.

- Temporary wells TW-7, TW-1, and TW-2 were advanced to the target depth with no logging due to the presence of a hard gravel layer. Dual core rod sampling could not be completed due to the presence large gravel and cobbles associated with this layer.

- YSI calibration logs from 25, 26, 27, 30, and 31 January 2012 were noted as "not accepted" due to an "out of range" calibration error for conductivity. These dates are associated with temporary well sampling events. Work was completed in accordance with the FSP and the temporary well sampling protocol, as 3 well volumes were removed for these wells (protocol calls for stabilization of field parameters or the removal of three well volumes). It is noted that stabilization in the temporary wells was difficult as they were not developed and they have no sand pack surrounding the screen; therefore, the majority of temporary wells were sampled after the removal of three well volumes. The out of range calibration of the YSI in this case affects the quality of field screening readings. However, there is no issue with the quality of the analytical data and, therefore, no issues with data usability (i.e., conclusions drawn from the data).

- YSI readings for dissolved oxygen field readings for samples collected from MW-21, MW-23, and MW-25 were reported at levels above the saturation level of oxygen in water.

5.3 DATA QUALITY EVALUATION

This section presents the data quality assessment for the analytical data included in the RI Report. Data were generated by ChemTech Laboratories and ALS Environmental and validated by Environmental Data Services (EDS). Data validation was completed in accordance with the USEPA Region 3 data validation guidelines and USACE Radionuclide guidelines as follows:

- USEPA Region II Modifications to the National Functional Guidelines for Organic Data Review, September 1994.

- USEPA Region II Modification to the National Function Guidelines for Evaluation Inorganic Analysis, April 2003.

- USACE Radionuclide Data Quality Evaluation Guidance for Alpha and Gamma Spectroscopy.

Tables 5-2 through 5-5 present the specific results of the data quality evaluation as reported by the data validator. The laboratory and validation reports are contained in Appendix E. The following text discusses each of the Data Quality Indicators (DQIs) identified in the project QAPP (EA 2011c): precision, accuracy, representativeness, completeness, comparability, and sensitivity (PARCS).

5.3.1 Precision

Precision measures the reproducibility of the measurements. It is strictly defined as the degree of mutual agreement among independent measurements as the result of the repeated application of the same process under similar conditions. Analytical precision is the measurement of the variability associated with duplicate (two) or replicate (more than two) analysis. The duplicate sample is used to determine the precision of the analytical method. If the recoveries of analytes in the duplicate samples are within established control limits, then the precision is within limits. Precision is the measurement of the variability associated with split samples or collocated samples . Field precision is measured by the comparison of field duplicate samples with the parent samples. Precision is determined by analysis of duplicate or replicate field samples and measures variability introduced by both the laboratory and field operations.

Matrix spike duplicate (MSD) samples and field duplicate samples are analyzed to assess analytical and field precision, respectively. The precision measurement is determined using the relative percent difference (RPD) between the parent and duplicate sample results. RPD is calculated using the following equation, where X1 and X2 are the duplicate values:

$$RPD = \frac{|X1 - X2|}{(X1 + X2)/2} \times 100$$

Tables 5-2 and 5-3 present the specific results where RPD values between matrix spike (MS)/MSD samples and parent/field duplicate samples were outside of quality control criteria. As presented in Table 5-2, the RPD values that were outside criteria were generally within twice the criteria value. Exceptions are:

1,2,4-Trichlorobenzene in D1062	Fluoranthene in D2338
3-Nitroaniline in C4989	Iron in D2470
3,3-Dichlorobenzidine in C5160, D1062, D2549	Lead in C4930, D2370, D2549
4-Chloroaniline in C4989, C5086, D2338, D2734	Magnesium in D2470
Atrazine in C4989, C5032, C5066	Manganese in D2470
Barium in D2295, D2305	Mercury in D2549
Benzaldehyde in C4968, C4989	Methyl Acetate in C5135

Butylbenzylphtlate in D1032	n-Nitroso-di-n-propylamine in C1032
Calcium in D1172, D2470	Pentachlorophenol in D2336, D2338
Chloroethane in C5160, D1032	Sodium in D1090, D2305, D2549
Copper in D2549	Zinc in D2470
Di-n-Butylphthalate in D2338	

There were nine RPD values for the MS/MSD samples that resulted in the rejection of the data. The majority of the RPD values were sufficiently precise for use.

The RPD values for parent and field duplicate samples were within criteria for most analyte groups. As presented in Table 5-3, the RPD values that were outside criteria were generally within twice the criteria value. Exceptions are:

Acetone in D2338	Gross Alpha in 1201304
Aluminum in C4968	Gross Beta in 1201304
Antimony in D1045	Lead in C4968, D1045, D1173, D1177, D1352
Bi-214 in 1204354	Magnesium in C4968, D2305
Cadmium in C4930	Manganese in D2549
Calcium in D1352, D2305	Mercury in D1045, D1177, D2305
Carbon disulfide in D2305	Nickel in C4968
Chromium in D1352	Thallium in D1352 Thallium in D1352
Copper in C4968	Zinc in D1352,

None of the RPD values for the field duplicate samples resulted in rejection of the data; all data were sufficiently precise for use.

Overall, the precision evaluation for the data included in the RI Report show a low proportion, approximately 0.4 percent of qualified data due to RPD issues in the MS/MSD and parent/field duplicate samples, which is within acceptable limits.

5.3.2 Accuracy

Accuracy is a statistical measurement of the correctness and includes components of random error (variability due to imprecision) and systemic error. Therefore, it reflects the total error associated with a measurement. A measurement is accurate when the value reported does not differ from the true value or known concentration of the spike or standard. To determine accuracy, a sample that has been spiked with a known concentration is analyzed by the laboratory as the MS, MSD, Laboratory Control Spike (LCS), or Laboratory Control Spike Duplicate (LCSD). Both accuracy and precision are calculated for each analytical batch, and the associated sample results are interpreted by considering these specific measurements.

Accuracy is expressed as percent recovery (%R), and was evaluated by the data validator via the following equation where X is the found concentration, B is the background concentration, and T is the true or assumed concentration.

$$\%R = \frac{X - B}{T} \times 100$$

Tables 5-4 and 5-5 present the specific %R results that were outside criteria for the MS/MSD and LCS samples. Many of the compounds with %Rs outside of criteria were not detected. All of the analyte groups sporadically had either high or low %Rs outside criteria across numerous sample delivery groups (SDGs). There were 231 %R values for the MS/MSD and LCS samples that resulted in the rejection of the data. The majority of the %R values were sufficiently accurate for use.

Overall, the accuracy evaluation for these data shows that approximately 2.1 percent was qualified due to %R issues in the MS, MSD, and LCS samples.

The field aspects of accuracy can be measured by the results of the trip and rinse blank samples. When an analyte is detected in these types of samples, the results can be less precise and are qualified by third party data validators to reflect this. The results of the trip and rinse blanks are shown in Tables 6-16 and 6-17 and discussed in detail in Section 6.4.

5.3.3 Representativeness

Representativeness expresses the degree to which data accurately and precisely represent site conditions, a characteristic of a population, or parameter variations at a sampling point. Representativeness is achieved through proper development of the field sampling program and use of standard and accepted SOPs. All samples were collected and analyzed following appropriate and accepted SOPs and methods in order to generate sufficiently precise and accurate data. Samples were collected as outlined in the work and sampling plans, with the exceptions detailed in Section 5.2 (Deviations from the Sampling Plans). Deviations from the sampling plan such as offsetting borings to avoid utilities or moving a location due to refusal were considered as possibilities during development of the DQOs. The sampling design employed during the planning process allows for such movement without compromising the DQOs (i.e., the data are deemed to be representative of site conditions). Daily Quality Control Reports presented in Appendix B provided information to support that data were collected in accordance with the FSP. It should be noted that a combination of biased and random sampling was conducted. Biased sampling likely affected the representativeness of sampling to some degree by introducing a positive bias.

As discussed above, the wide majority of the data met the data quality objectives for precision and accuracy. Therefore, the data generated for the project are considered representative of conditions where these samples were collected. Data that may not be representative of the sample locations (R qualified data) were not used. The percentage of rejected data was low, about 2 %. This was within our criterion of 90% useable laboratory data. Since the goal was achieved with 98% useable laboratory data for this project, the representativeness of the data was not affected.

5.3.4 Completeness

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under normal conditions. Percent completeness (%C) of the data set is determined by the following equation, where N is the number of valid data and S is the total number of results.

$$C = \frac{N}{S} \times 100$$

For completeness requirements, valid results are all results not qualified as unusable (not R qualified). For any instances of samples that could not be analyzed for any reason (holding time violations in which re-sampling and analysis were not possible, samples spilled or broken, etc.), the numerator of this calculation becomes the number of valid results minus the number of possible results not reported. The goal for completeness was 90 percent (EA 2011c). There were a total of 51,337 analyte results included in the RI Report and 621values were rejected; therefore, the completeness indicator is 98.9 percent and the completeness measurement quality objective was met. The completeness goal for laboratory measurements (90 percent) was obtained. Completeness was also calculated for each matrix and analyte group, and all indicators met the measurement quality objective.

Analyte Group: Soil	**Percent Complete Soil**	**Analyte Group: Groundwater**	**Percent Complete Groundwater**
Gamma Spectroscopy	100	Gamma Spectroscopy	100
Gross Alpha/Beta	100	Gross Alpha/Beta	100
Inorganics	99.9	Inorganics	99.9
Pesticides	100	VOCs	99.1
VOCs	99.1	SVOCs	97.2
SVOCs	98	Explosives	100
Explosives	100		
PCBs	100		

The completeness goal for field sampling was to attain 85 percent completeness during field activities. Sampling was completed at 234 of 235 proposed sample locations (99.6 percent).

5.3.5 Comparability

Comparability is the confidence with which one data set can be compared to another data set. Comparability is achieved by using standard methods for sampling and analysis, reporting data in standard units, normalizing results to standard conditions, and using standard and comprehensive reporting formats. For this RI Report, standard methods for sampling and analyses were followed, as documented in the QAPP, work plans, and sampling plans, and are shown in the field notes and quality assurance/quality control (QA/QC) audits. This provides a

technically sound basis for data comparisons in the future should additional information become available.

5.3.6 Sensitivity

Sensitivity is a measure of the screening criteria as they compare to detection limits. There are some laboratory Limits of Detection (LODs) that are not low enough to meet the project-required LODs due to limitations of the analytical methods. The laboratory and prime contractor worked together to try to meet the LODs for as many compounds as possible through accepted and published analytical methods.

Tables 5-6 and 5-7 present a comparison of the LODs of all the analytes to the selected screening criteria. In general a low percentage of the compounds analyzed for in soil and groundwater had at least one maximum LOD that was greater than screening criteria: 37 analytes in soil (18 percent) and 67 analytes in groundwater 38 percent.

The Screening Levels that were used in the RI Report are as follows:

- Pennsylvania Act 1995-2, known as "Act 2," established a program for recycling existing industrial and commercial sites. Values are from Chapter 250 of the Pennsylvania Code, "Administration of Land Recycling Program," Subchapter C, "Statewide Health Standards," Appendix A, "Medium-Specific Concentrations" tables, revisions effective 8 January 2011.

- Pennsylvania Residential Volatilization to Indoor Air Criteria-Pennsylvania soil screening values for protection of indoor air.

- USEPA Ecological Soil Screening Levels (EcoSSLs), values shown for polycyclic aromatic hydrocarbons (PAHs) are the EcoSSLs for Total High Molecular Weight PAHs (HPAHs) (1.1 mg/kg) or Total Low Molecular Weight PAHs (LPAHs) (29 mg/kg), as appropriate.

- USNRC NUREG/CR-5512- U.S. Nuclear Regulatory Commission, Residual Radioactive Contamination from Decommissioning Parameter Analysis. Volume 3 Table 6.1, Pcrit=0.10

- USEPA Maximum Contaminant Level for Radionuclides

- USEPA Regional Screening Levels (RSLs)

The result of this analysis indicated that it was not anticipated that the overall conclusions of the RI would change due to the LODs exceeding risk-based criteria. It should be noted that LODs greater than screening criteria can partially be attributed to high concentrations of specific compounds which required dilution to be quantified, which in turn raised the detection limits for other compounds. The uncertainties associated with the usability of the data due to LODS being

greater than screening criteria are discussed in detail in Section 6.4 of Appendix F. During the planning stage the following compounds were identified as not meeting the LODs:

- VOCs in groundwater - 1,1,2,2-tetrachloroethane in groundwater is slightly higher than the residential MSC and 1,2-dibromoethane in soil exceeds the residential soil-to-groundwater MSC. These constituents are not known DoD constituents of concern at the site.

- SVOCs in groundwater - LOQs are higher than the residential MSCs for n-nitroso-di-n-propylamine, hexachloroethane, dibenz(a,h)anthracene, atrazine, 4-chloroaniline, 4,6-dinitro-2-methylphenol, 3,3-dichorobenzidine, ans 2,4-dinitrotoluene).

- SVOCs in soil - LOQs exceed the residential soil-to-groundwater MSCs for seven compounds in soil (i.e., n-nitroso-di-n-propylamine, hexachloroethane, dibenz(a,h)anthracene, atrazine, 4,6-dinitro-2-methylphenol, 3-nitroaniline, 3,3-dichorobenzidine, and 2,4-dinitrotoluene). Most of these constituents are not known DOD constituents of concern at the site, and the LOQs shown in the comparison represent the lowest limits achievable by standard laboratory methods.

- Metals in soil - LOQs for analysis of antimony and selenium in soil by Method 6010B are above the EcoSSLs. These metals are not expected to be constituents of concern at the site and the LOQ for the more sensitive Method 6020 are also above the EcoSSLs.

5.4 DATA MANAGEMENT

Project field and laboratory data are stored using the EQuIS Environmental Data Management System, which is a Structured Query Language (SQL) database management system. EQuIS allows automatic import of electronic data deliverables (EDDs). This minimizes human error in transcribing analytical data. Only the database managers have writing permission to the database. This database is read-only to all other data users to avoid errors. Custom queries of analytical chemistry data can be written by all data users and tied into various data analysis tools to create various tables and figures as needed.

5.4.1 Analytical Chemical Data

Chemical data are submitted electronically via CD to the data manager by the laboratory. The EDD is generated automatically by direct instrument download of data into the laboratory's data management system, which assists in the elimination of data transcription errors. The EDD file format is compatible with the project database.

EDD entries go through multiple QA checks by the QA manager/data manager. The following EDD entries are compared to hardcopy laboratory data reports: sample identifications, sample matrix, sample collection date/time, sample beginning and ending depth, laboratory project reference, analytical method reference, analyte name, sample concentration, laboratory reporting limit, unit measurement, analytical fraction code, dilution fraction, and wet/dry reporting status.

The sample identifications, collection dates/times, and matrices are crosschecked against the corresponding chain-of-custody records. Sample condition notes, sampling period reference, and field duplicate identifications, are added to the EDD file by the data manager.

Data collected as part of the RI Report were validated in accordance with criteria specified in the QAPP and flagged with data qualifiers consistent with those defined in the USEPA Region 3 Guideline SOPs. After data validation is completed, the data qualifiers are entered into the EDD file. Site identifications are added by the data manager and compared 100 percent to site identifications listed in the project database. Only after completing these checks is the EDD file prepared for import into the project database by the data manager. During the import process, the new data are checked against existing data to maintain database integrity.

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Table 5-1 - Samples Included in the Frankford Arsenal Area II Remedial Investigation

Sample Count	Location Group	Location	Sample Name	Sample Date	Sample Depth	Field Duplicate Sample ID
Soil						
1	Delineation	Z1D01	Z1D1-SO-0.5-1	1/26/2012	0.5-1 ft	
2	Delineation	Z1D01	Z1D1-SO-1-2	1/26/2012	1-2 ft	
3	Delineation	Z1D01	Z1D1-SO-3-4	1/26/2012	3-4 ft	
4	Delineation	Z1D02	Z1D2-SO-0.5-1	1/26/2012	0.5-1 ft	
5	Delineation	Z1D02	Z1D2-SO-1-2	1/26/2012	1-2 ft	
6	Delineation	Z1D02	Z1D2-SO-3-4	1/26/2012	3-4 ft	
7	Delineation	Z1D03	Z1D3-SO-0.5-1	1/17/2012	0.5-1 ft	
8	Delineation	Z1D03	Z1D3-SO-1-2	1/17/2012	1-2 ft	
9	Delineation	Z1D03	Z1D3-SO-3-4	1/17/2012	3-4 ft	
10	Delineation	Z1D04	Z1D4-SO-0.5-1	1/26/2012	0.5-1 ft	
11	Delineation	Z1D04	Z1D4-SO-1-2	1/26/2012	1-2 ft	
12	Delineation	Z1D04	Z1D4-SO-3-4	1/26/2012	3-4 ft	
13	Delineation	Z1D05	Z1D5-SO-0.5-1	1/16/2012	0.5-1 ft	
14	Delineation	Z1D05	Z1D5-SO-1-2	1/16/2012	1-2 ft	
15	Delineation	Z1D05	Z1D5-SO-3-4	1/16/2012	3-4 ft	
16	Delineation	Z1D06	Z1D6-SO-0.5-1	1/16/2012	0.5-1 ft	
17	Delineation	Z1D06	Z1D6-SO-1-2	1/16/2012	1-2 ft	
18	Delineation	Z1D06	Z1D6-SO-3-4	1/16/2012	3-4 ft	
19	Delineation	Z1D07	Z1-SO-Dup17	1/16/2012	1-2 ft	Z1D7-SO-1-2
20	Delineation	Z1D07	Z1D7-SO-0.5-1	1/16/2012	0.5-1 ft	
21	Delineation	Z1D07	Z1D7-SO-1-2	1/16/2012	1-2 ft	
22	Delineation	Z1D07	Z1D7-SO-3-4	1/16/2012	3-4 ft	
23	Delineation	Z1D08	Z1D8-SO-0.5-1	1/16/2012	0.5-1 ft	
24	Delineation	Z1D08	Z1D8-SO-1-2	1/16/2012	1-2 ft	
25	Delineation	Z1D08	Z1D8-SO-3-4	1/16/2012	3-4 ft	
26	Delineation	Z1D09	Z1-D9-SO-0.5-1	1/31/2012	0.5-1 ft	
27	Delineation	Z1D09	Z1-D9-SO-1-2	1/31/2012	1-2 ft	
28	Delineation	Z1D09	Z1-D9-SO-3-4	1/31/2012	3-4 ft	
29	Delineation	Z1D09	Z1-SO-DUP-4	1/31/2012	3-4 ft	Z1-D9-3-4
30	Delineation	Z1D10	Z1D10-SO-0.5-1	1/16/2012	0.5-1 ft	
31	Delineation	Z1D10	Z1D10-SO-1-2	1/16/2012	1-2 ft	
32	Delineation	Z1D10	Z1D10-SO-3-4	1/16/2012	3-4 ft	
33	Delineation	Z1D11	Z1D-SO-Dup16	1/16/2012	3-4 ft	Z1D11-SO-3-4

Table 5-1 - Samples Included in the Frankford Arsenal Area II Remedial Investigation

Sample Count	Location Group	Location	Sample Name	Sample Date	Sample Depth	Field Duplicate Sample ID
34	Delineation	Z1D11	Z1D11-SO-0.5-1	1/16/2012	0.5-1 ft	
35	Delineation	Z1D11	Z1D11-SO-1-2	1/16/2012	1-2 ft	
36	Delineation	Z1D11	Z1D11-SO-3-4	1/16/2012	3-4 ft	
37	Delineation	Z1D23	Z1D23-SO-0.5-1	1/17/2012	0.5-1 ft	
38	Delineation	Z1D23	Z1D23-SO-1-2	1/17/2012	1-2 ft	
39	Delineation	Z1D23	Z1D23-SO-3-4	1/17/2012	3-4 ft	
40	Delineation	Z2D12	Z2D12-SO-0-2	1/17/2012	0-2 ft	
41	Delineation	Z2D12	Z2D12-SO-3-5	1/17/2012	3-5 ft	
42	Delineation	Z2D13	Z2D13-SO-0-2	1/17/2012	0-2 ft	
43	Delineation	Z2D13	Z2D13-SO-3-5	1/17/2012	3-5 ft	
44	Delineation	Z2D13	Z2D13-SO-3-5	1/17/2012	3-5 ft	
45	Delineation	Z2D14	Z2D14-S0-0-2	1/17/2012	0-2 ft	
46	Delineation	Z2D14	Z2D14-SO-0-2	1/17/2012	0-2 ft	
47	Delineation	Z2D14	Z2D14-SO-3-5	1/17/2012	3-5 ft	
48	Delineation	Z2D15	Z2-SO-Dup18	1/16/2012	3-5 ft	Z2D15-SO-3-5
49	Delineation	Z2D15	Z2D15-SO-1-2	1/16/2012	1-2 ft	
50	Delineation	Z2D15	Z2D15-SO-3-5	1/16/2012	3-5 ft	
51	Delineation	Z2D16	Z2D16-SO-1-2	1/16/2012	1-2 ft	
52	Delineation	Z2D16	Z2D16-SO-3-5	1/16/2012	3-5 ft	
53	Delineation	Z2D17	Z2D17-SO-1-2	1/16/2012	1-2 ft	
54	Delineation	Z2D17	Z2D17-SO-3-5	1/16/2012	3-5 ft	
55	Delineation	Z3D18	Z3-D18-SO-0-2	1/31/2012	0-2 ft	
56	Delineation	Z3D18	Z3-D18-SO-14-15	1/31/2012	14-15 ft	
57	Delineation	Z3D18	Z3-D18-SO-5-7	1/31/2012	5-7 ft	
58	Delineation	Z3D18	Z3-SO-DUP3	1/31/2012	5-7 ft	Z3-D18-SO-5-7
59	Delineation	Z3D18	Z3D18-SO-0-2	1/17/2012	0-2 ft	
60	Delineation	Z3D19	Z3D19-SO-0-2	1/17/2012	0-2 ft	
61	Delineation	Z3D19	Z3D19-SO-14-15	1/17/2012	14-15 ft	
62	Delineation	Z3D20	Z3-SO-Dup20	1/17/2012	5-7 ft	Z3D20-SO-5-7
63	Delineation	Z3D20	Z3D20-SO-5-7	1/17/2012	5-7 ft	
64	Delineation	Z3D21	Z3D21-SO-5-7	1/17/2012	5-7 ft	
65	Delineation	Z3D22	Z3D22-SO-0-2	1/17/2012	0-2 ft	
66	Delineation	Z3D22	Z3D22-SO-4-5	1/17/2012	4-5 ft	
67	Delineation	Z3D22	Z3D22-SO-5-7	1/17/2012	5-7 ft	

Table 5-1 - Samples Included in the Frankford Arsenal Area II Remedial Investigation

Sample Count	Location Group	Location	Sample Name	Sample Date	Sample Depth	Field Duplicate Sample ID
1	Monitoring Well	MW-21	MW-21-SO-10-12	4/30/2012	10-12 ft	
2	Monitoring Well	MW-21	MW-21-SO-30-35	4/30/2012	30-35 ft	
3	Monitoring Well	MW-22	MW-22-SO-0-2	5/4/2012	0-2 ft	
4	Monitoring Well	MW-23	MW-23-SO-0-2	5/4/2012	0-2 ft	
5	Monitoring Well	MW-24	MW-24-SO-10-12	5/2/2012	10-12 ft	
6	Monitoring Well	MW-25	MW-25-SO-0-2	5/2/2012	0-2 ft	
7	Monitoring Well	MW-26	MW-26-SO-0-2	5/3/2012	0-2 ft	
8	Monitoring Well	MW-26	MW-26-SO-15-20	5/3/2012	15-20 ft	
9	Monitoring Well	MW-27	MW-27-SO-4-6	5/3/2012	4-6 ft	
10	Monitoring Well	MW-27	MW-SO-DUP1	5/3/2012	4-6 ft	MW-27-SO-4-6
11	Monitoring Well	MW-28	MW-28-SO-0-2	5/3/2012	0-2 ft	
12	Monitoring Well	MW-28	MW-28-SO-15-20	5/3/2012	15-20 ft	
13	Monitoring Well	MW-29	MW-29-SO-5-7	5/3/2012	5-7 ft	
14	Monitoring Well	MW-29	MW-29-SO-8-9	5/3/2012	8-9 ft	
15	Monitoring Well	MW-31	MW-31-SO-10-12	5/3/2012	10-12 ft	
1	Transformer Area	T-01	T1-SO-1-0-0.5	12/27/2011	0-0.5 ft	
2	Transformer Area	T-11	T-11	1/16/2012	0-0.5 ft	
3	Transformer Area	T-11	T-Dup15	1/16/2012	0-0.5 ft	T-11
4	Transformer Area	T-1101	T-1101-SO-0-1	4/19/2012	0-1 ft	
5	Transformer Area	T-1101	T-1101-SO-3-5	4/19/2012	3-5 ft	
6	Transformer Area	T-1101	T1101-SO-1-0-0.5	12/9/2011	0-0.5 ft	
7	Transformer Area	T-12	T12-SO-1-0-0.5	12/9/2011	0-0.5 ft	
8	Transformer Area	T-201	T-201	1/16/2012	0-0.5 ft	
9	Transformer Area	T-22	T22-SO-1-0-0.5	12/9/2011	0-0.5 ft	
10	Transformer Area	T-22	T22-SO-2-0-0.5	12/9/2011	0-0.5 ft	
11	Transformer Area	T-23	T-23	1/10/2012	0-0.5 ft	
12	Transformer Area	T-2321	T-2321	1/10/2012	0-0.5 ft	
13	Transformer Area	T-24	T-24	1/16/2012	0-0.5 ft	
14	Transformer Area	T-2411	T-2411	1/16/2012	0-0.5 ft	
1	Zone 1	BZ1-SO-01	BZ1-SO-01-0-2	1/4/2012	0-2 ft	
2	Zone 1	BZ1-SO-01	BZ1-SO-01-5-7	1/4/2012	5-7 ft	
3	Zone 1	BZ1-SO-02	BZ1-SO-02-0-0.5	1/4/2012	0-0.5 ft	
4	Zone 1	BZ1-SO-02	BZ1-SO-02-1-2	1/4/2012	1-2 ft	
5	Zone 1	BZ1-SO-02	BZ1-SO-02-3-5	1/4/2012	3-5 ft	

Table 5-1 - Samples Included in the Frankford Arsenal Area II Remedial Investigation

Sample Count	Location Group	Location	Sample Name	Sample Date	Sample Depth	Field Duplicate Sample ID
6	Zone 1	BZ1-SO-02	BZ1-SO-02-5-7	1/4/2012	5-7 ft	
7	Zone 1	BZ1-SO-03	BZ1-SO-03-1-3	1/4/2012	1-3 ft	
8	Zone 1	BZ1-SO-03	BZ1-SO-03-7-8	1/4/2012	7-8 ft	
9	Zone 1	BZ1-SO-04	BZ1-SO-04-0-2	1/4/2012	0-2 ft	
10	Zone 1	BZ1-SO-04	BZ1-SO-04-5-7	1/4/2012	5-7 ft	
11	Zone 1	BZ1-SO-05	BZ1-SO-5-0-1	12/29/2011	0-1 ft	
12	Zone 1	BZ1-SO-05	BZ1-SO-5-6-7	12/29/2011	6-7 ft	
13	Zone 1	BZ1-SO-06	BZ1-SO-6-0.5-1.5	12/29/2011	0.5-1.5 ft	
14	Zone 1	BZ1-SO-06	BZ1-SO-6-8-9	12/29/2011	8-9 ft	
15	Zone 1	BZ1-SO-06	BZ1-SO-DUP7	12/29/2011	8-9 ft	BZ1-SO-6-8-9
16	Zone 1	UBZ1-SO-01	UBZ1-SO-1-0-0.5	12/8/2011	0-0.5 ft	
17	Zone 1	UBZ1-SO-02	UBZ1-SO-2-0-0.5	12/8/2011	0-0.5 ft	
18	Zone 1	UBZ1-SO-03	UBZ1-SO-3-0-0.5	12/8/2011	0-0.5 ft	
19	Zone 1	UBZ1-SO-04	UBZ1-SO-4-0-0.5	12/8/2011	0-0.5 ft	
20	Zone 1	UBZ1-SO-05	UBZ1-SO-5-0-0.5	12/8/2011	0-0.5 ft	
21	Zone 1	UBZ1-SO-06	UBZ1-SO-6-0-0.5	12/8/2011	0-0.5 ft	
22	Zone 1	UBZ1-SO-07	UBZ1-SO-7-0-0.5	12/8/2011	0-0.5 ft	
23	Zone 1	UBZ1-SO-08	UBZ1-SO-8-0-0.5	12/8/2011	0-0.5 ft	
24	Zone 1	UBZ1-SO-09	UBZ1-SO-9-0-0.5	12/8/2011	0-0.5 ft	
25	Zone 1	UBZ1-SO-10	UBZ1-SO-10-0-0.5	12/8/2011	0-0.5 ft	
26	Zone 1	UBZ1-SO-11	UBZ1-SO-11-0-0.5	12/8/2011	0-0.5 ft	
27	Zone 1	UBZ1-SO-12	UBZ1-SO-12-0-0.5	12/8/2011	0-0.5 ft	
28	Zone 1	UBZ1-SO-13	UBZ1-SO-13-0-0.5	12/8/2011	0-0.5 ft	
29	Zone 1	UBZ1-SO-14	UBZ1-SO-14-0-0.5	12/8/2011	0-0.5 ft	
30	Zone 1	UBZ1-SO-15	UBZ1-SO-15-0-0.5	12/8/2011	0-0.5 ft	
31	Zone 1	UBZ1-SO-16	UBZ1-SO-16-0-0.5	12/8/2011	0-0.5 ft	
32	Zone 1	UBZ1-SO-16	UBZ1-SO-DUP2	12/9/2011	0-0.5 ft	UBZ1-SO-16-0-0.5
33	Zone 1	UBZ1-SO-17	UBZ1-SO-17-0-0.5	12/27/2011	0-0.5 ft	
34	Zone 1	UBZ1-SO-18	UBZ1-SO-18-0-0.5	12/27/2011	0-0.5 ft	
35	Zone 1	UBZ1-SO-19	UBZ1-SO-19-0-0.5	12/27/2011	0-0.5 ft	
36	Zone 1	UBZ1-SO-20	UBZ1-SO-20-0-0.5	12/27/2011	0-0.5 ft	
37	Zone 1	UBZ1-SO-21	UBZ1-SO-21-0-0.5	12/27/2011	0-0.5 ft	
38	Zone 1	UBZ1-SO-21	UBZ1-SO-DUP3	12/27/2011	0-0.5 ft	UBZ1-SO-21-0-0.5
39	Zone 1	UBZ1-SO-22	UBZ1-SO-22-0-0.5	12/8/2011	0-0.5 ft	

Table 5-1 - Samples Included in the Frankford Arsenal Area II Remedial Investigation

Sample Count	Location Group	Location	Sample Name	Sample Date	Sample Depth	Field Duplicate Sample ID
40	Zone 1	UBZ1-SO-23	UBZ1-SO-23-0-0.5	12/8/2011	0-0.5 ft	
41	Zone 1	UBZ1-SO-24	UBZ1-SO-24-0-0.5	12/8/2011	0-0.5 ft	
42	Zone 1	UBZ1-SO-25	UBZ1-SO-25-0-0.5	12/27/2011	0-0.5 ft	
43	Zone 1	UBZ1-SO-26	UBZ1-SO-26-0-0.5	12/27/2011	0-0.5 ft	
44	Zone 1	UBZ1-SO-27	UBZ1-SO-27-0-0.5	12/27/2011	0-0.5 ft	
45	Zone 1	UBZ1-SO-28	UBZ1-SO-28-0-0.5	12/27/2011	0-0.5 ft	
46	Zone 1	UBZ1-SO-29	UBZ1-SO-29-0-0.5	12/27/2011	0-0.5 ft	
47	Zone 1	UBZ1-SO-30	UBZ1-SO-30-0-0.5	12/8/2011	0-0.5 ft	
48	Zone 1	UBZ1-SO-31	UBZ1-SO-31-0-0.5	12/8/2011	0-0.5 ft	
49	Zone 1	UBZ1-SO-32	UBZ1-SO-32-0-0.5	12/27/2011	0-0.5 ft	
50	Zone 1	UBZ1-SO-33	UBZ1-SO-33-0-0.5	12/27/2011	0-0.5 ft	
51	Zone 1	UBZ1-SO-34	UBZ1-SO-34-0-0.5	12/27/2011	0-0.5 ft	
52	Zone 1	UBZ1-SO-35	UBZ1-SO-35-0-0.5	12/27/2011	0-0.5 ft	
53	Zone 1	UBZ1-SO-36	UBZ1-SO-36-0-0.5	12/27/2011	0-0.5 ft	
54	Zone 1	UBZ1-SO-37	UBZ1-SO-37-0-0.5	12/27/2011	0-0.5 ft	
55	Zone 1	UBZ1-SO-38	UBZ1-SO-38-0-0.5	12/8/2011	0-0.5 ft	
56	Zone 1	UBZ1-SO-39	UBZ1-SO-39-0-0.5	12/8/2011	0-0.5 ft	
57	Zone 1	UBZ1-SO-40	UBZ1-SO-40-0-0.5	12/8/2011	0-0.5 ft	
58	Zone 1	UBZ1-SO-41	UBZ1-SO-41-0-0.5	12/8/2011	0-0.5 ft	
59	Zone 1	UBZ1-SO-42	UBZ1-SO-42-0-0.5	12/27/2011	0-0.5 ft	
60	Zone 1	UBZ1-SO-43	UBZ1-SO-43-0-0.5	12/27/2011	0-0.5 ft	
61	Zone 1	UBZ1-SO-44	UBZ1-SO-44-0-0.5	12/27/2011	0-0.5 ft	
62	Zone 1	UBZ1-SO-45	UBZ1-SO-45-0-0.5	12/27/2011	0-0.5 ft	
63	Zone 1	UBZ1-SO-46	UBZ1-SO-46-0-0.5	12/8/2011	0-0.5 ft	
64	Zone 1	UBZ1-SO-47	UBZ1-SO-47-0-0.5	12/8/2011	0-0.5 ft	
65	Zone 1	UBZ1-SO-48	UBZ1-SO-48-0-0.5	12/8/2011	0-0.5 ft	
66	Zone 1	UBZ1-SO-49	UBZ1-SO-49-0-0.5	12/27/2011	0-0.5 ft	
67	Zone 1	UBZ1-SO-50	UBZ1-SO-50-0-0.5	12/27/2011	0-0.5 ft	
68	Zone 1	UBZ1-SO-51	UBZ1-SO-51-0-0.5	12/27/2011	0-0.5 ft	
69	Zone 1	UBZ1-SO-52	UBZ1-SO-52-0-0.5	12/9/2011	0-0.5 ft	
70	Zone 1	UBZ1-SO-52	UBZ1-SO-DUP1	12/9/2011	0-0.5 ft	UBZ1-SO-52-0-0.5
71	Zone 1	UBZ1-SO-53	UBZ1-SO-53-0-0.5	12/9/2011	0-0.5 ft	
72	Zone 1	UBZ1-SO-54	UBZ1-SO-54-0-0.5	12/9/2011	0-0.5 ft	
73	Zone 1	UBZ1-SO-55	UBZ1-SO-55-0-0.5	12/9/2011	0-0.5 ft	

Table 5-1 - Samples Included in the Frankford Arsenal Area II Remedial Investigation

Sample Count	Location Group	Location	Sample Name	Sample Date	Sample Depth	Field Duplicate Sample ID
74	Zone 1	UBZ1-SO-56	UBZ1-SO-56-0-0.5	12/9/2011	0-0.5 ft	
75	Zone 1	UBZ1-SO-57	UBZ1-SO-57-0-0.5	12/9/2011	0-0.5 ft	
76	Zone 1	UBZ1-SO-58	UBZ1-SO-58-0-0.5	12/9/2011	0-0.5 ft	
77	Zone 1	UBZ1-SO-59	UBZ1-SO-59-0-0.5	12/27/2011	0-0.5 ft	
78	Zone 1	UBZ1-SO-59	UBZ1-SO-DUP4	12/27/2011	0-0.5 ft	UBZ1-SO-59-0-0.5
79	Zone 1	UBZ1-SO-60	UBZ1-SO-60-0-0.5	12/27/2011	0-0.5 ft	
80	Zone 1	UBZ1-SO-61	UBZ1-SO-61-0-0.5	12/27/2011	0-0.5 ft	
1	Zone 2	BZ2-SO-01	BZ2-SO-1-1-2	1/9/2012	1-2 ft	
2	Zone 2	BZ2-SO-01	BZ2-SO-1-11-12	1/9/2012	11-12 ft	
3	Zone 2	BZ2-SO-02	BZ2-SO-2-1-2	12/30/2011	1-2 ft	
4	Zone 2	BZ2-SO-02	BZ2-SO-2-6-8	12/30/2011	6-8 ft	
5	Zone 2	BZ2-SO-03	BZ2-SO-3-1-3	12/30/2011	1-3 ft	
6	Zone 2	BZ2-SO-03	BZ2-SO-3-10-11	12/30/2011	10-11 ft	
7	Zone 2	BZ2-SO-04	BZ2-SO-4-0.5-1.5	12/30/2011	0.5-1.5 ft	
8	Zone 2	BZ2-SO-04	BZ2-SO-4-8-9	12/30/2011	8-9 ft	
9	Zone 2	BZ2-SO-05	BZ2-SO-5-11-12	12/22/2011	11-12 ft	
10	Zone 2	BZ2-SO-05	BZ2-SO-5-3-4	12/22/2011	3-4 ft	
11	Zone 2	BZ2-SO-06	BZ2-SO-6-13-14	12/21/2011	13-14 ft	
12	Zone 2	BZ2-SO-06	BZ2-SO-6-3-4	12/21/2011	3-4 ft	
13	Zone 2	BZ2-SO-07	BZ2-SO-07-0-2	1/6/2012	0-2 ft	
14	Zone 2	BZ2-SO-07	BZ2-SO-07-11-12	1/6/2012	11-12 ft	
15	Zone 2	BZ2-SO-46	BZ2-SO-46-0-1	12/22/2011	0-1 ft	
16	Zone 2	UBZ2-SO-01	UBZ2-SO-01-0-2	1/4/2012	0-2 ft	
17	Zone 2	UBZ2-SO-01	UBZ2-SO-01-5-7	1/4/2012	5-7 ft	
18	Zone 2	UBZ2-SO-02	UBZ2-SO-02-0-2	1/4/2012	0-2 ft	
19	Zone 2	UBZ2-SO-02	UBZ2-SO-02-5-7	1/4/2012	5-7 ft	
20	Zone 2	UBZ2-SO-03	UBZ2-SO-03-0-2	1/4/2012	0-2 ft	
21	Zone 2	UBZ2-SO-03	UBZ2-SO-03-8-10	1/4/2012	8-10 ft	
22	Zone 2	UBZ2-SO-04	UBZ2-SO-04-27-28	1/9/2012	27-28 ft	
23	Zone 2	UBZ2-SO-04	UBZ2-SO-04-5-7	1/9/2012	5-7 ft	
24	Zone 2	UBZ2-SO-04	UBZ2-SO-DUP13	1/9/2012	5-7 ft	UBZ2-SO-04-5-7
25	Zone 2	UBZ2-SO-05	UBZ2-SO-05-1-3	1/6/2012	1-3 ft	
26	Zone 2	UBZ2-SO-05	UBZ2-SO-05-10-12	1/6/2012	10-12 ft	
27	Zone 2	UBZ2-SO-06	UBZ2-SO-06-0-2	1/6/2012	0-2 ft	

Table 5-1 - Samples Included in the Frankford Arsenal Area II Remedial Investigation

Sample Count	Location Group	Location	Sample Name	Sample Date	Sample Depth	Field Duplicate Sample ID
28	Zone 2	UBZ2-SO-06	UBZ2-SO-06-6-8	1/6/2012	6-8 ft	
29	Zone 2	UBZ2-SO-07	UBZ2-SO-07-0-2	1/6/2012	0-2 ft	
30	Zone 2	UBZ2-SO-07	UBZ2-SO-07-5-7	1/6/2012	5-7 ft	
31	Zone 2	UBZ2-SO-08	UBZ2-SO-08-0-2	1/4/2012	0-2 ft	
32	Zone 2	UBZ2-SO-08	UBZ2-SO-08-5-7	1/4/2012	5-7 ft	
33	Zone 2	UBZ2-SO-09	UBZ2-SO-09-0-3	1/4/2012	0-3 ft	
34	Zone 2	UBZ2-SO-09	UBZ2-SO-09-5-7	1/4/2012	5-7 ft	
35	Zone 2	UBZ2-SO-10	UBZ2-SO-10-0-2	1/5/2012	0-2 ft	
36	Zone 2	UBZ2-SO-10	UBZ2-SO-10-5-7	1/5/2012	5-7 ft	
37	Zone 2	UBZ2-SO-11	UBZ2-SO-11-1-3	1/6/2012	1-3 ft	
38	Zone 2	UBZ2-SO-11	UBZ2-SO-11-10-12	1/6/2012	11-12 ft	
39	Zone 2	UBZ2-SO-12	UBZ2-SO-12-1-3	1/6/2012	1-3 ft	
40	Zone 2	UBZ2-SO-12	UBZ2-SO-12-5-7	1/6/2012	5-7 ft	
41	Zone 2	UBZ2-SO-13	UBZ2-SO-13-0.5-2	1/6/2012	0.5-2 ft	
42	Zone 2	UBZ2-SO-13	UBZ2-SO-13-5-7	1/6/2012	5-7 ft	
43	Zone 2	UBZ2-SO-13	UBZ2-SO-DUP11	1/6/2012	0.5-2 ft	UBZ2-SO-13-0.5-2
44	Zone 2	UBZ2-SO-14	UBZ2-SO-14-0.5-2	1/6/2012	0.5-2 ft	
45	Zone 2	UBZ2-SO-14	UBZ2-SO-14-5-7	1/6/2012	5-7 ft	
46	Zone 2	UBZ2-SO-14	UBZ2-SO-DUP12	1/6/2012	0.5-2 ft	UBZ2-SO-14-0.5-2
47	Zone 2	UBZ2-SO-15	UBZ2-SO-15-5-6	12/29/2011	5-6 ft	
48	Zone 2	UBZ2-SO-15	UBZ2-SO-15-7-8	12/29/2011	7-8 ft	
49	Zone 2	UBZ2-SO-15	UBZ2-SO-DUP08	12/29/2011	7-8 ft	UBZ2-SO-15-7-8
50	Zone 2	UBZ2-SO-16	UBZ2-SO-16-1-2	1/9/2012	1-2 ft	
51	Zone 2	UBZ2-SO-16	UBZ2-SO-16-5-7	1/9/2012	5-7 ft	
52	Zone 2	UBZ2-SO-17	UBZ2-SO-17-0-2	1/5/2012	0-2 ft	
53	Zone 2	UBZ2-SO-17	UBZ2-SO-17-5-7	1/5/2012	5-7 ft	
54	Zone 2	UBZ2-SO-18	UBZ2-SO-18-10-11	12/30/2011	10-11 ft	
55	Zone 2	UBZ2-SO-18	UBZ2-SO-18-5-6	12/30/2011	5-6 ft	
56	Zone 2	UBZ2-SO-18	UBZ2-SO-DUP9	12/30/2011	10-11 ft	UBZ2-SO-18-10-11
57	Zone 2	UBZ2-SO-19	UBZ2-SO-19-0.5-1.5	12/30/2011	0.5-1.5 ft	
58	Zone 2	UBZ2-SO-19	UBZ2-SO-19-7-8	12/30/2011	7-8 ft	
59	Zone 2	UBZ2-SO-20	UBZ2-SO-20-1-2	12/28/2011	1-2 ft	
60	Zone 2	UBZ2-SO-20	UBZ2-SO-20-5.5-6.5	12/28/2011	5.5-6.5 ft	
61	Zone 2	UBZ2-SO-21	UBZ2-SO-21-10-11	12/28/2011	10-11 ft	

Table 5-1 - Samples Included in the Frankford Arsenal Area II Remedial Investigation

Sample Count	Location Group	Location	Sample Name	Sample Date	Sample Depth	Field Duplicate Sample ID
62	Zone 2	UBZ2-SO-21	UBZ2-SO-21-5-6	12/28/2011	5-6 ft	
63	Zone 2	UBZ2-SO-22	UBZ2-SO-22-1-2	1/9/2012	1-2 ft	
64	Zone 2	UBZ2-SO-22	UBZ2-SO-22-8-9	1/9/2012	8-9 ft	
65	Zone 2	UBZ2-SO-22	UBZ2-SO-22-8-9	1/10/2012	8-9 ft	
66	Zone 2	UBZ2-SO-23	UBZ2-SO-23-1-2	12/30/2011	1-2 ft	
67	Zone 2	UBZ2-SO-23	UBZ2-SO-23-5-7	12/30/2011	5-7 ft	
68	Zone 2	UBZ2-SO-24	UBZ2-SO-24-11-12	12/30/2011	11-12 ft	
69	Zone 2	UBZ2-SO-24	UBZ2-SO-24-6-7	12/30/2011	6-7 ft	
70	Zone 2	UBZ2-SO-25	UBZ2-SO-25-0-1	12/30/2011	0-1 ft	
71	Zone 2	UBZ2-SO-25	UBZ2-SO-25-1-2	12/30/2011	1-2 ft	
72	Zone 2	UBZ2-SO-26	UBZ2-SO-26-0-1	12/28/2011	0-1 ft	
73	Zone 2	UBZ2-SO-26	UBZ2-SO-26-6-7	12/28/2011	6-7 ft	
74	Zone 2	UBZ2-SO-27	UBZ2-SO-27-0.5-1.5	12/28/2011	0.5-1.5 ft	
75	Zone 2	UBZ2-SO-27	UBZ2-SO-27-12.5-13.5	12/28/2011	12.5-13.5	
76	Zone 2	UBZ2-SO-28	UBZ2-SO-28-0-1	12/28/2011	0-1 ft	
77	Zone 2	UBZ2-SO-28	UBZ2-SO-28-11-12	12/28/2011	11-12 ft	
78	Zone 2	UBZ2-SO-29	UBZ2-SO-29-0.5-1.5	1/16/2012	0.5-1.5 ft	
79	Zone 2	UBZ2-SO-29	UBZ2-SO-29-6.5-8.5	1/16/2012	6.5-8.5 ft	
80	Zone 2	UBZ2-SO-29	UBZ2-SO-Dup14	1/16/2012	6.5-8.5 ft	UBZ2-SO-29-6.5-8.5
81	Zone 2	UBZ2-SO-30	UBZ2-SO-30-2-3	1/16/2012	2-3 ft	
82	Zone 2	UBZ2-SO-30	UBZ2-SO-30-7-8	1/16/2012	7-8 ft	
83	Zone 2	UBZ2-SO-31	UBZ2-SO-31-1-2	12/29/2011	1-2 ft	
84	Zone 2	UBZ2-SO-31	UBZ2-SO-31-3-4	12/29/2011	3-4 ft	
85	Zone 2	UBZ2-SO-32	UBZ2-SO-32-0-1	12/30/2011	0-1 ft	
86	Zone 2	UBZ2-SO-32	UBZ2-SO-32-6-7	12/30/2011	6-7 ft	
87	Zone 2	UBZ2-SO-33	UBZ2-SO-33-0-2	12/30/2011	0-2 ft	
88	Zone 2	UBZ2-SO-33	UBZ2-SO-33-3-4	12/30/2011	3-4 ft	
89	Zone 2	UBZ2-SO-34	UBZ2-SO-34-11-12	12/28/2011	11-12 ft	
90	Zone 2	UBZ2-SO-34	UBZ2-SO-34-5-6	12/28/2011	5-6 ft	
91	Zone 2	UBZ2-SO-35	UBZ2-SO-35-0-2	1/5/2012	0-2 ft	
92	Zone 2	UBZ2-SO-35	UBZ2-SO-35-5-7	1/5/2012	5-7 ft	
93	Zone 2	UBZ2-SO-36	UBZ2-SO-36-11-12	12/30/2011	11-12 ft	
94	Zone 2	UBZ2-SO-36	UBZ2-SO-36-5-6	12/30/2011	5-6 ft	
95	Zone 2	UBZ2-SO-37	UBZ2-SO-37-1-2	12/30/2011	1-2 ft	

Table 5-1 - Samples Included in the Frankford Arsenal Area II Remedial Investigation

Sample Count	Location Group	Location	Sample Name	Sample Date	Sample Depth	Field Duplicate Sample ID
96	Zone 2	UBZ2-SO-37	UBZ2-SO-37-11-12	12/30/2011	11-12 ft	
97	Zone 2	UBZ2-SO-37	UBZ2-SO-37-2-2.5	12/30/2011	2-2.5 ft	
98	Zone 2	UBZ2-SO-38	UBZ2-SO-38-0-2	12/27/2011	0-2 ft	
99	Zone 2	UBZ2-SO-38	UBZ2-SO-38-5-7	12/27/2011	5-7 ft	
100	Zone 2	UBZ2-SO-40	UBZ2-SO-40-0.5-1.5	12/27/2011	0.5-1.5 ft	
101	Zone 2	UBZ2-SO-40	UBZ2-SO-40-11-12	12/27/2011	11-12 ft	
102	Zone 2	UBZ2-SO-41	UBZ2-SO-41-4-5	12/27/2011	4-5 ft	
103	Zone 2	UBZ2-SO-41	UBZ2-SO-41-5-7	12/27/2011	5-7 ft	
104	Zone 2	UBZ2-SO-41	UBZ2-SO-DUP6	12/27/2011	5-7 ft	UBZ2-SO-41-5-7
105	Zone 2	UBZ2-SO-42	UBZ2-SO-42-5-6	12/21/2011	5-6 ft	
106	Zone 2	UBZ2-SO-42	UBZ2-SO-42-7-8	12/21/2011	7-8 ft	
107	Zone 2	UBZ2-SO-43	UBZ2-SO-43-13-14	12/21/2011	13-14 ft	
108	Zone 2	UBZ2-SO-43	UBZ2-SO-43-9-10	12/21/2011	9-10 ft	
109	Zone 2	UBZ2-SO-43	UBZ2-SO-DUP5	12/21/2011	9-10 ft	UBZ2-SO-43-9-10
110	Zone 2	UBZ2-SO-44	UBZ2-SO-44-0-2	1/5/2012	0-2 ft	
111	Zone 2	UBZ2-SO-45	UBZ2-SO-45-1-2	12/22/2011	1-2 ft	
112	Zone 2	UBZ2-SO-45	UBZ2-SO-45-5-6	12/22/2011	5-6 ft	
113	Zone 2	UBZ2-SO-46	UBZ2-SO-46-0-1	12/22/2011	0-1 ft	
114	Zone 2	UBZ2-SO-46	UBZ2-SO-46-7-8	12/22/2011	7-8 ft	
115	Zone 2	UBZ2-SO-47	UBZ2-SO-47-0-1	12/22/2011	0-1 ft	
116	Zone 2	UBZ2-SO-47	UBZ2-SO-47-11-12	12/22/2011	11-12 ft	
1	Zone 3	BZ3-SO-01	BZ3-SO-1-1-2	12/29/2011	1-2 ft	
2	Zone 3	BZ3-SO-01	BZ3-SO-1-6-7	12/29/2011	6-7 ft	
3	Zone 3	BZ3-SO-01	BZ3-SO-13-0-1	4/18/2012	0-1 ft	
4	Zone 3	BZ3-SO-02	BZ3-SO-2	12/22/2011	1-2 ft	
5	Zone 3	BZ3-SO-02	BZ3-SO-2-5-6	12/22/2011	5-6 ft	
6	Zone 3	BZ3-SO-03A	BZ3-SO-3A-1-2	12/22/2011	1-2 ft	
7	Zone 3	BZ3-SO-03A	BZ3-SO-3A-10-11	12/22/2011	10-11 ft	
8	Zone 3	BZ3-SO-03B	BZ3-SO-3B-1-2	12/22/2011	1-2 ft	
9	Zone 3	BZ3-SO-03B	BZ3-SO-3B-5.5-6.5	12/22/2011	5.5-6.5 ft	
10	Zone 3	BZ3-SO-04	BZ3-SO-04-0-2	1/5/2012	0-2 ft	
11	Zone 3	BZ3-SO-04	BZ3-SO-04-5-7	1/5/2012	5-7 ft	
12	Zone 3	BZ3-SO-04	BZ3-SO-DUP10	1/5/2012	0-2 ft	BZ3-SO-04-0-2
13	Zone 3	BZ3-SO-06	BZ3-SO-6-0.5-1.5	12/21/2011	0.5-1.5 ft	

Table 5-1 - Samples Included in the Frankford Arsenal Area II Remedial Investigation

Sample Count	Location Group	Location	Sample Name	Sample Date	Sample Depth	Field Duplicate Sample ID
14	Zone 3	BZ3-SO-06	BZ3-SO-6-7-8	12/21/2011	7-8 ft	
15	Zone 3	BZ3-SO-07	BZ3-SO-07-0-2	12/16/2011	0-2 ft	
16	Zone 3	BZ3-SO-07	BZ3-SO-07-3-5	12/16/2011	3-5 ft	
17	Zone 3	BZ3-SO-08	BZ3-SO-08-0-2	12/16/2011	0-2 ft	
18	Zone 3	BZ3-SO-08	BZ3-SO-08-13-15	12/16/2011	13-15 ft	
19	Zone 3	BZ3-SO-08	UBZ3-SO-DUP3	12/16/2011	13-15 ft	BZ3-SO-08-13-15
20	Zone 3	BZ3-SO-09	BZ3-SO-09-13-15	12/16/2011	13-15 ft	
21	Zone 3	BZ3-SO-09	BZ3-SO-09-5-7	12/16/2011	5-7 ft	
22	Zone 3	BZ3-SO-10	BZ3-SO-10-12-14	12/14/2011	12-14 ft	
23	Zone 3	BZ3-SO-10	BZ3-SO-10-2-4	12/14/2011	2-4 ft	
24	Zone 3	BZ3-SO-10	BZ3-SO-10-5-8	12/14/2011	5-8 ft	
25	Zone 3	BZ3-SO-11	BZ3-SO-11-10-11	12/22/2011	10-11 ft	
26	Zone 3	BZ3-SO-11	BZ3-SO-11-5-6	12/22/2011	5-6 ft	
27	Zone 3	BZ3-SO-12	BZ3-SO-12-11-12	12/13/2011	11-12 ft	
28	Zone 3	BZ3-SO-12	BZ3-SO-12-5-7	12/13/2011	5-7 ft	
29	Zone 3	BZ3-SO-13	BZ3-SO-13-1-2	4/18/2012	1-2 ft	
30	Zone 3	BZ3-SO-13	BZ3-SO-13-2-3	4/20/2012	2-3 ft	
31	Zone 3	BZ3-SO-14	BZ3-SO-14-4-5	12/21/2011	4-5 ft	
32	Zone 3	BZ3-SO-15	BZ3-SO-15-0-2	4/19/2012	0-2 ft	
33	Zone 3	BZ3-SO-15	BZ3-SO-15-5-7	4/19/2012	5-7 ft	
34	Zone 3	UBZ3-SO-01	UBZ3-SO-1-1-2	12/19/2011	1-2 ft	
35	Zone 3	UBZ3-SO-01	UBZ3-SO-1-8-9	12/19/2011	8-9 ft	
36	Zone 3	UBZ3-SO-01	UBZ3-SO-DUP4	12/19/2011	8-9 ft	UBZ3-SO-1-8-9
37	Zone 3	UBZ3-SO-02	UBZ3-SO-2-14-15	12/19/2011	14-15 ft	
38	Zone 3	UBZ3-SO-02	UBZ3-SO-2-6-7	12/19/2011	6-7 ft	
39	Zone 3	UBZ3-SO-03	UBZ3-SO-3-1-2	12/19/2011	1-2 ft	
40	Zone 3	UBZ3-SO-03	UBZ3-SO-3-14-15	12/19/2011	14-15 ft	
41	Zone 3	UBZ3-SO-04	UBZ3-SO-4-13-14	12/29/2011	13-14 ft	
42	Zone 3	UBZ3-SO-04	UBZ3-SO-4-3-4	12/29/2011	3-4 ft	
43	Zone 3	UBZ3-SO-05	UBZ3-SO-5-12-13	12/29/2011	12-13 ft	
44	Zone 3	UBZ3-SO-05	UBZ3-SO-5-2-3	12/29/2011	2-3 ft	
45	Zone 3	UBZ3-SO-06	UBZ3-SO-6-0.5-2	12/29/2011	0.5-2 ft	
46	Zone 3	UBZ3-SO-06	UBZ3-SO-6-6-7	12/29/2011	6-7 ft	
47	Zone 3	UBZ3-SO-07	UBZ3-SO-7-11-12	12/19/2011	11-11 ft	

Table 5-1 - Samples Included in the Frankford Arsenal Area II Remedial Investigation

Sample Count	Location Group	Location	Sample Name	Sample Date	Sample Depth	Field Duplicate Sample ID
48	Zone 3	UBZ3-SO-07	UBZ3-SO-7-5-6	12/19/2011	5-6 ft	
49	Zone 3	UBZ3-SO-08	UBZ3-SO-8-0.5-2	12/19/2011	0.5-2 ft	
50	Zone 3	UBZ3-SO-08	UBZ3-SO-8-39-40	12/19/2011	39-40 ft	
51	Zone 3	UBZ3-SO-09	UBZ3-SO-09-0-2	12/16/2011	0-2 ft	
52	Zone 3	UBZ3-SO-09	UBZ3-SO-09-5-7	12/16/2011	5-7 ft	
53	Zone 3	UBZ3-SO-10	UBZ3-SO-10-0-2	12/16/2011	0-2 ft	
54	Zone 3	UBZ3-SO-10	UBZ3-SO-10-13-14	12/16/2011	13-14 ft	
55	Zone 3	UBZ3-SO-10	UBZ3-SO-10-34.5-35	12/16/2011	34.5-35 ft	
56	Zone 3	UBZ3-SO-11	UBZ3-SO-11-13-15	12/16/2011	13-15 ft	
57	Zone 3	UBZ3-SO-11	UBZ3-SO-11-2-4	12/16/2011	2-4 ft	
58	Zone 3	UBZ3-SO-12	UBZ3-SO-12-1-2	12/19/2011	1-2 ft	
59	Zone 3	UBZ3-SO-12	UBZ3-SO-12-14-15	12/19/2011	14-15 ft	
60	Zone 3	UBZ3-SO-12	UBZ3-SO-12-24-25	12/19/2011	24-25 ft	
61	Zone 3	UBZ3-SO-13	UBZ3-SO-13-0-1	4/18/2012	0-2 ft	
62	Zone 3	UBZ3-SO-13	UBZ3-SO-13-0-2	1/10/2012	0-2 ft	
63	Zone 3	UBZ3-SO-13	UBZ3-SO-13-5-7	1/10/2012	5-7 ft	
64	Zone 3	UBZ3-SO-14	UBZ3-SO-14-0.5-1.5	12/29/2011	0.5-1.5 ft	
65	Zone 3	UBZ3-SO-14	UBZ3-SO-14-10-11	12/29/2011	10-11 ft	
66	Zone 3	UBZ3-SO-14	UBZ3-SO-14-38-39	12/21/2011	38-38 ft	
67	Zone 3	UBZ3-SO-15	UBZ3-SO-15-12-13	12/20/2011	12-13 ft	
68	Zone 3	UBZ3-SO-15	UBZ3-SO-15-8-9	12/20/2011	8-8 ft	
69	Zone 3	UBZ3-SO-16	UBZ3-SO-16-2.5-3.5	1/10/2012	2.5-3.5 ft	
70	Zone 3	UBZ3-SO-16	UBZ3-SO-16-6-7	1/10/2012	6-7 ft	
71	Zone 3	UBZ3-SO-17	UBZ3-SO-17-12-14	12/14/2011	12-14 ft	
72	Zone 3	UBZ3-SO-17	UBZ3-SO-17-2-4	12/14/2011	2-4 ft	
73	Zone 3	UBZ3-SO-18	UBZ3-SO-18-4-5	12/14/2011	4-5 ft	
74	Zone 3	UBZ3-SO-18	UBZ3-SO-18-9-10	12/14/2011	9-10 ft	
75	Zone 3	UBZ3-SO-19	UBZ3-SO-19-0-2	4/20/2012	0-2 ft	
76	Zone 3	UBZ3-SO-19	UBZ3-SO-19-2-3	4/20/2012	2-3 ft	
77	Zone 3	UBZ3-SO-20	UBZ3-SO-20-0.5-2	12/12/2011	0.5-2 ft	
78	Zone 3	UBZ3-SO-20	UBZ3-SO-20-5-6	12/12/2011	5-6 ft	
79	Zone 3	UBZ3-SO-21	UBZ3-SO-21-0-0.5	12/12/2011	0-0.5 ft	
80	Zone 3	UBZ3-SO-21	UBZ3-SO-21-5-6	12/12/2011	5-6 ft	
81	Zone 3	UBZ3-SO-22	UBZ3-SO-22-2-3	12/20/2011	2-3 ft	

Table 5-1 - Samples Included in the Frankford Arsenal Area II Remedial Investigation

Sample Count	Location Group	Location	Sample Name	Sample Date	Sample Depth	Field Duplicate Sample ID
82	Zone 3	UBZ3-SO-22	UBZ3-SO-22-2-3	12/27/2011	2-3 ft	
83	Zone 3	UBZ3-SO-22	UBZ3-SO-22-4-5	12/20/2011	4-5 ft	
84	Zone 3	UBZ3-SO-23	UBZ3-SO-23-0-2	12/16/2011	0-2 ft	
85	Zone 3	UBZ3-SO-23	UBZ3-SO-23-3-5	12/16/2011	3-5 ft	
86	Zone 3	UBZ3-SO-24	UBZ3-SO-24-0-2	12/15/2011	0-2 ft	
87	Zone 3	UBZ3-SO-24	UBZ3-SO-24-12-13	12/15/2011	12-13 ft	
88	Zone 3	UBZ3-SO-25	UBZ3-SO-25-0.5-2	12/15/2011	0.5-2 ft	
89	Zone 3	UBZ3-SO-25	UBZ3-SO-25-5-7	12/15/2011	5-7 ft	
90	Zone 3	UBZ3-SO-26	UBZ3-SO-26-0-3	12/15/2011	0-3 ft	
91	Zone 3	UBZ3-SO-26	UBZ3-SO-26-8-10	12/15/2011	8-10 ft	
92	Zone 3	UBZ3-SO-27	UBZ3-SO-27-13-15	12/14/2011	13-15 ft	
93	Zone 3	UBZ3-SO-27	UBZ3-SO-27-4.5-6.5	12/14/2011	4.5-6.5 ft	
94	Zone 3	UBZ3-SO-28	UBZ3-SO-28-3-5	12/14/2011	3-5 ft	
95	Zone 3	UBZ3-SO-28	UBZ3-SO-28-5.5-7.5	12/14/2011	5.5-7.5 ft	
96	Zone 3	UBZ3-SO-29	UBZ3-SO-29-3-5	12/13/2011	3-5 ft	
97	Zone 3	UBZ3-SO-29	UBZ3-SO-29-8-10	12/13/2011	8-10 ft	
98	Zone 3	UBZ3-SO-30	UBZ3-SO-30-0.5-3	12/14/2011	0.5-3 ft	
99	Zone 3	UBZ3-SO-30	UBZ3-SO-30-13-14	12/14/2011	13-14 ft	
100	Zone 3	UBZ3-SO-31	UBZ3-SO-31-0-3	12/13/2011	0-3 ft	
101	Zone 3	UBZ3-SO-31	UBZ3-SO-31-5-7	12/13/2011	5-7 ft	
102	Zone 3	UBZ3-SO-32	UBZ3-SO-32-0-2	4/20/2012	0-2 ft	
103	Zone 3	UBZ3-SO-32	UBZ3-SO-32-2-3	4/20/2012	2-3 ft	
104	Zone 3	UBZ3-SO-33	UBZ3-SO-33-0-2	4/20/2012	0-2 ft	
105	Zone 3	UBZ3-SO-33	UBZ3-SO-33-2-3	4/20/2012	2-3 ft	
106	Zone 3	UBZ3-SO-34	UBZ3-SO-34-34-35	12/20/2011	34-35 ft	
107	Zone 3	UBZ3-SO-34	UBZ3-SO-34-6-7	12/20/2011	6-7 ft	
108	Zone 3	UBZ3-SO-35	UBZ3-SO-35-13-14	12/20/2011	13-14 ft	
109	Zone 3	UBZ3-SO-35	UBZ3-SO-35-2-3	12/20/2011	2-3 ft	
110	Zone 3	UBZ3-SO-36	UBZ3-SO-36-14-15	12/20/2011	14-14 ft	
111	Zone 3	UBZ3-SO-36	UBZ3-SO-36-8-9	12/20/2011	8-8 ft	
112	Zone 3	UBZ3-SO-37	UBZ3-SO-37-12-13	12/20/2011	12-12 ft	
113	Zone 3	UBZ3-SO-37	UBZ3-SO-37-3-4	12/20/2011	3-3 ft	
114	Zone 3	UBZ3-SO-38	UBZ3-SO-38-0-2	12/15/2011	0-2 ft	
115	Zone 3	UBZ3-SO-38	UBZ3-SO-38-10-12	12/15/2011	10-12 ft	

Table 5-1 - Samples Included in the Frankford Arsenal Area II Remedial Investigation

Sample Count	Location Group	Location	Sample Name	Sample Date	Sample Depth	Field Duplicate Sample ID
116	Zone 3	UBZ3-SO-39	UBZ3-SO-39-0-2	1/5/2012	0-2 ft	
117	Zone 3	UBZ3-SO-39	UBZ3-SO-39-0.5-2.5	12/15/2011	0.5-2.5 ft	
118	Zone 3	UBZ3-SO-39	UBZ3-SO-39-6-8	12/15/2011	6-8 ft	
119	Zone 3	UBZ3-SO-39	UBZ3-SO-39-7-8	1/5/2012	7-8 ft	
120	Zone 3	UBZ3-SO-40	UBZ3-SO-40-14-15	12/15/2011	14-15 ft	
121	Zone 3	UBZ3-SO-40	UBZ3-SO-40-3-5	12/15/2011	3-5 ft	
122	Zone 3	UBZ3-SO-41	UBZ3-SO-41-1-3	12/15/2011	1-3 ft	
123	Zone 3	UBZ3-SO-41	UBZ3-SO-41-7-8	12/15/2011	7-8 ft	
124	Zone 3	UBZ3-SO-42	UBZ3-SO-42-11.5-13.5	12/14/2011	11.5-13.5	
125	Zone 3	UBZ3-SO-42	UBZ3-SO-42-3-5	12/14/2011	3-5 ft	
126	Zone 3	UBZ3-SO-42	UBZ3-SO-DUP2	12/14/2011	11.5-13.5	UBZ3-SO-42-11.5-13.5
127	Zone 3	UBZ3-SO-43	UBZ3-SO-43-0.5-3	12/14/2011	0.5-3 ft	
128	Zone 3	UBZ3-SO-43	UBZ3-SO-43-13-14	12/14/2011	13-14 ft	
129	Zone 3	UBZ3-SO-44	UBZ3-SO-44-0-2	12/13/2011	0-2 ft	
130	Zone 3	UBZ3-SO-44	UBZ3-SO-44-0-2	1/5/2012	0-2 ft	
131	Zone 3	UBZ3-SO-44	UBZ3-SO-44-8-10	12/13/2011	8-10 ft	
132	Zone 3	UBZ3-SO-45	UBZ3-SO-45-2-3	12/13/2011	2-3 ft	
133	Zone 3	UBZ3-SO-45	UBZ3-SO-45-8-9	12/13/2011	8-9 ft	
134	Zone 3	UBZ3-SO-46	UBZ3-SO-46-4-5	12/13/2011	4-5 ft	
135	Zone 3	UBZ3-SO-46	UBZ3-SO-46-5-7	12/13/2011	5-7 ft	
136	Zone 3	UBZ3-SO-47	UBZ3-SO-47-0-2	12/13/2011	0-2 ft	
137	Zone 3	UBZ3-SO-47	UBZ3-SO-47-7-8	12/13/2011	7-8 ft	
138	Zone 3	UBZ3-SO-47	UBZ3-SO-DUP1	12/13/2011	7-8 ft	UBZ3-SO-47-7-8
139	Zone 3	UBZ3-SO-48	UBZ3-SO-48-2-4	12/12/2011	2-4 ft	
140	Zone 3	UBZ3-SO-48	UBZ3-SO-48-5-6	12/12/2011	5-6 ft	
141	Zone 3	UBZ3-SO-48	UBZ3-SO-48-7-8	12/13/2011	7-8 ft	
142	Zone 3	UBZ3-SO-49	UBZ3-SO-49-14-15	12/20/2011	14-15 ft	
143	Zone 3	UBZ3-SO-49	UBZ3-SO-49-4-5	12/20/2011	4-5 ft	
144	Zone 3	UBZ3-SO-50	UBZ3-SO-50-0-2	4/19/2012	0-2 ft	
145	Zone 3	UBZ3-SO-50	UBZ3-SO-50-5-7	4/19/2012	5-7 ft	
146	Zone 3	UBZ3-SO-51	UBZ-SO-51-0-2	4/19/2012	0-2 ft	
147	Zone 3	UBZ3-SO-51	UBZ3-SO-51-0-2	4/19/2012	0-2 ft	
148	Zone 3	UBZ3-SO-51	UBZ3-SO-51-5-7	4/19/2012	5-7 ft	
149	Zone 3	UBZ3-SO-52	UBZ3-SO-52-0-2	4/18/2012	0-2 ft	

Table 5-1 - Samples Included in the Frankford Arsenal Area II Remedial Investigation

Sample Count	Location Group	Location	Sample Name	Sample Date	Sample Depth	Field Duplicate Sample ID
150	Zone 3	UBZ3-SO-52A	UBZ3-SO-52a-0-2	4/18/2012	0-2 ft	
151	Zone 3	UBZ3-SO-52A	UBZ3-SO-52a-5-7	4/18/2012	5-7 ft	
152	Zone 3	UBZ3-SO-53	UBZ3-SO-53-0-2	4/18/2012	0-2 ft	
153	Zone 3	UBZ3-SO-53	UBZ3-SO-53-4-5	4/18/2012	4-5 ft	
154	Zone 3	UBZ3-SO-54	UBZ3-SO-54-3-5	12/15/2011	3-5 ft	
155	Zone 3	UBZ3-SO-54	UBZ3-SO-54-5-7	12/15/2011	5-7 ft	
156	Zone 3	UBZ3-SO-55	UBZ3-SO-55-0.5-3	12/15/2011	0.5-3 ft	
157	Zone 3	UBZ3-SO-55	UBZ3-SO-55-5-8	12/15/2011	5-8 ft	
158	Zone 3	UBZ3-SO-56	UBZ3-SO-56-6-7	12/20/2011	6-7 ft	
159	Zone 3	UBZ3-SO-56	UBZ3-SO-56-9-10	12/20/2011	9-10 ft	
160	Zone 3	UBZ3-SO-57	UBZ3-SO-57-0-2	4/19/2012	0-2 ft	
161	Zone 3	UBZ3-SO-57	UBZ3-SO-57-5-7	4/19/2012	5-7 ft	
162	Zone 3	UBZ3-SO-58	UBZ3-SO-58-0-2	4/19/2012	0-2 ft	
163	Zone 3	UBZ3-SO-58	UBZ3-SO-58-5-7	4/19/2012	5-7 ft	
164	Zone 3	UBZ3-SO-58	UBZ3-SO-58-SO-0-2	4/19/2012	0-2 ft	
165	Zone 3	UBZ3-SO-58	UBZ3-SO-DUP-22	4/19/2012	0-2 ft	UBZ3-SO-58-SO-0-2
166	Zone 3	UBZ3-SO-59	UBZ3-SO-59-0-2	4/19/2012	0-2 ft	
167	Zone 3	UBZ3-SO-59	UBZ3-SO-59-4-6	4/19/2012	4-6 ft	
168	Zone 3	UBZ3-SO-60	UBZ3-SO-60-0-2	4/18/2012	2-2 ft	
169	Zone 3	UBZ3-SO-60	UBZ3-SO-60-4-5	4/18/2012	4-5 ft	
170	Zone 3	UBZ3-SO-61	UBZ3-SO-61-0-2	4/18/2012	0-2 ft	
171	Zone 3	UBZ3-SO-61	UBZ3-SO-61-5-7	4/18/2012	5-7 ft	
172	Zone 3	UBZ3-SO-62	UBZ3-SO-62-0-2	4/19/2012	0-2 ft	
173	Zone 3	UBZ3-SO-62	UBZ3-SO-62-5-7	4/19/2012	5-7 ft	
174	Zone 3	UBZ3-SO-63	UBZ3-SO-63-0-2	4/19/2012	0-2 ft	
175	Zone 3	UBZ3-SO-63	UBZ3-SO-63-5-7	4/19/2012	5-7 ft	
176	Zone 3	UBZ3-SO-63	UBZ3-SO-DUP-21	4/19/2012	0-2 ft	UBZ3-SO-63-0-2

Table 5-1 - Samples Included in the Frankford Arsenal Area II Remedial Investigation

Sample Count	Location Group	Location	Sample Name	Sample Date	Sample Depth	Field Duplicate Sample ID
Groundwater						
1	Monitoring Well	MW-21	MW-21	5/16/2012		
2	Monitoring Well	MW-21	MW-21DISSOLVED	5/16/2012		
3	Monitoring Well	MW-22	MW-22	5/16/2012		
4	Monitoring Well	MW-23	MW-23	5/16/2012		
5	Monitoring Well	MW-24	MW-24	5/16/2012		
6	Monitoring Well	MW-24	MW-24 DISSOLVED	5/16/2012		
7	Monitoring Well	MW-25	MW-25	5/16/2012		
8	Monitoring Well	MW-25	MW-25 DISSOLVED	5/16/2012		
9	Monitoring Well	MW-26	MW-26	5/16/2012		
10	Monitoring Well	MW-27	MW-27	5/17/2012		
11	Monitoring Well	MW-27	MW-DUP-1	5/17/2012		MW-27 5/17/2012
12	Monitoring Well	MW-28	MW-28	5/17/2012		
13	Monitoring Well	MW-29	MW-29	5/17/2012		
14	Monitoring Well	MW-30	MW-30	5/17/2012		
15	Monitoring Well	MW-31	MW-31	5/17/2012		
1	Temp Well	TW-01	TW-1	1/31/2012		
2	Temp Well	TW-02	TW-2	1/31/2012		
3	Temp Well	TW-03	TW-3	2/20/2012		
4	Temp Well	TW-04	TW-4	1/26/2012		
5	Temp Well	TW-05	TW-5	1/31/2012		
6	Temp Well	TW-06	TW-6	2/20/2012		
7	Temp Well	TW-07	TW-7	1/31/2012		
8	Temp Well	TW-07	TW-DUP3	1/31/2012		TW-7
9	Temp Well	TW-08	TW-8	1/30/2012		
10	Temp Well	TW-09	TW-9	1/25/2012		
11	Temp Well	TW-10	TW-10	2/20/2012		
12	Temp Well	TW-11	TW-11	1/30/2012		
13	Temp Well	TW-12	TW-12	1/27/2012		
14	Temp Well	TW-13	TW-13	1/24/2012		
15	Temp Well	TW-14	TW-14	1/24/2012		
16	Temp Well	TW-15	TW-15	1/26/2012		
17	Temp Well	TW-16	TW-16	1/26/2012		
18	Temp Well	TW-17	TW-17	1/26/2012		

Table 5-1 - Samples Included in the Frankford Arsenal Area II Remedial Investigation

Sample Count	Location Group	Location	Sample Name	Sample Date	Sample Depth	Field Duplicate Sample ID
19	Temp Well	TW-18	TW-18	1/23/2012		
20	Temp Well	TW-19	TW-19	1/23/2012		
21	Temp Well	TW-20	TW-20	1/26/2012		
22	Temp Well	TW-21	TW-21	1/23/2012		
23	Temp Well	TW-21	TW-DUP01	1/23/2012		TW-21
24	Temp Well	TW-22	TW-22	1/25/2012		
25	Temp Well	TW-23	TW-23	2/20/2012		
26	Temp Well	TW-24	TW-24	1/24/2012		
27	Temp Well	TW-25	TW-25	4/20/2012		
28	Temp Well	TW-26	TW-26	4/20/2012		
29	Temp Well	TW-27	TW-27	4/20/2012		
30	Temp Well	TW-27	TW-DUP4	4/20/2012		TW-27

Table 5-2 - Compounds with Relative Percent Difference Values Outside of Quality Control Limits
Matrix Spike and Matrix Spike Duplicate Samples

QC Sample ID	Compound	MS Result	MSD Result	Result Units	RPD	RPD Criteria	Affected Samples	Validator's Action
SDG C4930								
C4950-06/07	Lead	5794.187	6668.217	mg/kg	48	20	None	None- 4X Rule Applies
SDG C4968								
C4968-06/07	Benzaldehyde	100	160	ug/kg	46	20	5	L/R
C4968-02S/03D	Mercury	0.4007	0.4028	mg/kg	36.1	20	All Samples unless (J) due to FD	J
SDG C4989								
C4989-01MS/02MSD	Benzaldehyde	3.1	31	ug/kg	200	20	1-6	None
	4-Chloroaniline	820	620	ug/kg	26	20	None for RPD alone	
C4989-08MS/08MSD	Benzaldehyde	0	10	ug/kg	200	20	7-22, 12RE	None
	Atrazine	2800	0	ug/kg	200	20	8	L/R
	4-Chloroaniline	450	210	ug/kg	74	20	None for RPD alone	None
	3-Nitroaniline	970	630	ug/kg	43	20		
SDG 5016								
C5016-12/13	2-Methylphenol	2000	1600	ug/kg	22	20	None for RPD alone	None
	Benzaldehyde	1900	1500	ug/kg	23	20		
	Atrazine	3000	2400	ug/kg	23	20	ND	
	Hexachlorocyclopentadiene	2400	1800	ug/kg	30	20	None for RPD alone	
	3-Nitroaniline	1100	830	ug/kg	27	20		
	Fluoranthene	3200	8600	ug/kg	20	20	Dilution Result Used	
	Pyrene	8100	7100	ug/kg	35	20		
	Benzo(a)anthracene	5700	5100	ug/kg	23	20	11	K
	Chrysene	5500	4800	ug/kg	28	20		
	Benzo(b)fluoranthene	5700	5100	ug/kg	23	20		
	Benzo(a)pyrene	5400	4700	ug/kg	27	20		
	Indeno(1,2,3-cd)pyrene	4400	3900	ug/kg	18	20		
	Dibenz(a,h)anthracene	2900	2300	ug/kg	28	20		

Table 5-2 - Compounds with Relative Percent Difference Values Outside of Quality Control Limits
Matrix Spike and Matrix Spike Duplicate Samples

QC Sample ID	Compound	MS Result	MSD Result	Result Units	RPD	RPD Criteria	Affected Samples	Validator's Action
SDG C5032								
C5032-04/05	Methyl Acetate	43	31	ug/kg	32	20	None for RPD alone	None
	Acetone	110	86	ug/kg	24	20	3	L/UL
	2-Butanone	140	110	ug/kg	24	20		
	2-Hexanone	140	110	ug/kg	24	20		
	1,2-Dibromo-3-chloropropane	57	45	ug/kg	24	20	None for RPD alone	None
	Atrazine	0	1800	ug/kg	200	20	3	L/R
	Benzaldehyde	1500	1100	ug/kg	31	20	None for RPD alone	None
	Hexachloroethane	1800	1400	ug/kg	25	20		
	2,4-Dichlorophenol	1800	1400	ug/kg	25	20		
	Caprolactam	1700	1300	ug/kg	27	20		
	4-Chloro-3-methylphenol	1800	1400	ug/kg	25	20		
	4-Nitroaniline	1600	1300	ug/kg	21	20		
	Phenanthrene	1800	1500	ug/kg	21	20		
	Fluoranthene	1800	1500	ug/kg	21	20		
	Benzo(k)fluoranthene	1600	1300	ug/kg	21	20		
	Mercury	0.5417	0.544	mg/kg	54	20	All Samples	L/R
SDG C5038								
C5038-13/14	Carbon disulfide	43	33	ug/kg	27	20	None for RPD alone	None
	4-Chloroaniline	32	36	ug/kg	32	20		
	Hexachlorocyclopentadiene	84	81	ug/kg	21	20		
	Fluoranthene	46	47	ug/kg	22	20		
SDG C5066								
C5066-01 MS/MSD	Dibenz(a,h)anthracene	1600	1300	ug/kg	21	20	1	None for RPD Alone
	3,3'-Dichlorobenzidine	1400	1100	ug/kg	24	20		
	4-Nitroaniline	1500	1200	ug/kg	21	20		
	Atrazine	0	1900	ug/kg	200	20		L/R
	4-Chloroaniline	1100	720	ug/kg	42	20		None for RPD Alone
	3-Nitroaniline	1300	1000	ug/kg	25	20		

Table 5-2 - Compounds with Relative Percent Difference Values Outside of Quality Control Limits
Matrix Spike and Matrix Spike Duplicate Samples

QC Sample ID	Compound	MS Result	MSD Result	Result Units	RPD	RPD Criteria	Affected Samples	Validator's Action
SDG C5093								
C5093-07/08	Benzaldehyde	27	34	ug/kg	21	20	None for RPD alone	None
	3,3'-Dichlorobenzidine	19	28	ug/kg	33	20		
SDG C5110								
C5110-02MS/02MSD	4-Chloroaniline	520	380	ug/kg	32	20	None for RPD alone	None
SDG C5135								
C5135-17/18	Methyl Acetate	83	44	ug/kg	62	20	None for RPD alone	None
	Methylene Chloride	59	45	ug/kg	27	20		
C5138-12/13	Acetone	220	280	ug/kg	25	20		None
	Methyl Acetate	59	80	ug/kg	30	20		
	2-Butanone	210	270	ug/kg	25	20		
	2-Hexanone	200	260	ug/kg	26	20		
	di-n-Butylphthalate	2000	1600	ug/kg	22	20	Sample ND	
	4-Chloroaniline	510	360	ug/kg	33	20	None for RPD alone	
	Caprolactam	1700	1300	ug/kg	27	20		
	Butylbenzylphtalate	2000	1600	ug/kg	22	20		
SDG C5160								
C5160-13/14	Bromomethane	47	46	ug/kg	22	20	None for RPD alone	None
	Chloroethane	55	35	ug/kg	43	20		
	Trichlorofluoromethane	53	42	ug/kg	24	20		
	Benzaldehyde	1400	1900	ug/kg	30	20		
	n-Nitroso-di-n-propylamine	1400	1800	ug/kg	25	20		
	4-Chloroaniline	160	200	ug/kg	32	20	1-8,11,15-	L/R
	3-Nitroaniline	490	650	ug/kg	27	20	None for RPD alone	None
	2,4-Dinitrophenol	2500	3100	ug/kg	21	20		
	3,3'-Dichlorobenzidine	250	450	ug/kg	59	20		
SDG C5161								
C5161-01 MS/MSD	4-Chloro-3-methylphenol	1300	1600	ug/kg	21	20	None for RPD alone	None
	2,4,6-Trichlorophenol	1300	1600	ug/kg	21	20		
	2,4,5-Trichlorophenol	1300	1600	ug/kg	21	20		
	1,1-Biphenyl	1300	1600	ug/kg	21	20		
	2-Chloronaphthalene	1300	1600	ug/kg	21	20		
	Dibenzofuran	1300	1600	ug/kg	21	20		
	4,6-Dinitro-2-methylphenol	1300	1600	ug/kg	21	20		
	Benzo(g,h,i)perylene	1400	1800	ug/kg	25	20		

Table 5-2 - Compounds with Relative Percent Difference Values Outside of Quality Control Limits
Matrix Spike and Matrix Spike Duplicate Samples

QC Sample ID	Compound	MS Result	MSD Result	Result Units	RPD	RPD Criteria	Affected Samples	Validator's Action
SDG D1001								
D1001-08-09 MS/MSD	Chloromethane	40	51	ug/kg	24	20	None	None for RPD alone
	Vinyl Chloride	42	52	ug/kg	21	20		
	4,6-Dinitro-2-methylphenol	1200	1500	ug/kg	21	20		
SDG D1032								
D1032-09-10 MS/MSD	Chloroethane	41	64	ug/kg	44	20	None	None for RPD alone
	Acetone	180	130	ug/kg	32	20		
	n-Nitroso-di-n-propylamine	1500	1300	ug/kg	69	20	8	L/UL
	Butylbenzylphtalate	1500	910	ug/kg	48	20		L/UL
	15 other SVOC compounds	High RPDs					None	None for RPD alone
SDG D1045								
D1045-07-08 MS/MSD	Chloroethane	52	63	ug/kg	21	20	6	None for RPD alone
	Benzaldehyde	580	460	ug/kg	21	20		
	Hexachloroethane	1300	1000	ug/kg	25	20		
SDG D1062								
D1062-06-07 MS/MSD	Benzene	58	42	ug/kg	32	20	5	L/UL
	Trichloroethene	59	42	ug/kg	34	20		
	1,1,2-Trichloroethane	53	37	ug/kg	35	20		
	Chlorobenzene	59	42	ug/kg	34	20		
	m,p-Xylenes	120	88	ug/kg	31	20		
	1,2-Dichlorobenzene	58	41	ug/kg	34	20		
	1,2,4-Trichlorobenzene	49	31	ug/kg	46	20		
	41 other VOC compounds	High RPDs						None for RPD alone
	3,3'-Dichlorobenzidine	390	640	ug/kg	47	20		
SDG D1077								
D1077-08-09 MS/MSD	Chloroethane	65	46	ug/kg	34	20	7	None for RPD alone
	Phenol	1500	1200	ug/kg	21	20		
	4-Chloroaniline	780	610	ug/kg	23	20		
	Caprolactam	880	680	ug/kg	25	20		
	2-Methylnaphthalene	1600	1300	ug/kg	21	20		
	Di-n-octylphthalate	1500	1200	ug/kg	21	20		
	Mercury	0.0731	0.0495	mg/kg	38.5	20	4,6,7,10 thru 12	J

Table 5-2 - Compounds with Relative Percent Difference Values Outside of Quality Control Limits
Matrix Spike and Matrix Spike Duplicate Samples

QC Sample ID	Compound	MS Result	MSD Result	Result Units	RPD	RPD Criteria	Affected Samples	Validator's Action
SDG D1090								
D1090-01 MS/MSD	2-Methylphenol	1600	1300	ug/kg	21	20	1	None for RPD alone
	3&4- Methylphenols	1600	1300	ug/kg	21	20		
	Caprolactam	1500	1200	ug/kg	22	20		
	4-Chloro-3-methylphenol	1600	1300	ug/kg	21	20		
	4-Nitrophenol	3700	3000	ug/kg	21	20		
	4-Nitroaniline	1600	1300	ug/kg	21	20		
	3,3'-Dichlorobenzidine	460	600	ug/kg	26	20		
D1090-05 MS/MSD	Aroclor-1206	180	200	ug/kg	9	20	5	None- 4X Rule Applies
D1077-07D MS/MSD	Sodium	103.52	45.18	mg/kg	78.5	20	All Samples	None
SDG D1172								
D1172-02-03 MS/MSD	4-Chloroaniline	700	880	ug/kg	23	20	1	None for RPD alone
	Calcium	21.27	8.88	ug/kg	106	20		L/R
D1172-05 MS/MSD	Aroclor-1206	80	60	ug/kg	25	20	5	None for RPD alone
SDG D1177								
D1177-21-22 MS/MSD	4-Chloroaniline	560	740	ug/kg	26	20	20	None for RPD alone
	3-Nitroaniline	910	1200	ug/kg	28	20		
	3,3'-Dichlorobenzidine	630	880	ug/kg	33	20		
SDG D1330								
D1330-04-05 MS/MSD	4-Chloroaniline	51	33	ug/kg	22	20	3	None for RPD alone
	3-Nitroaniline	56	37	ug/kg	22	20		
	Thallium	0.244	0.167	ug/kg	37.5	20	1,2,6,9,10	J
SDG D1352								
D1352-11-12 MS/MSD	Carbon disulfide	34	46	ug/l	30	20	10	None for RPD alone
D1352-03 MS/MSD	Copper	4.97	3.79	ug/l	26.9	20	9,10,13,16	J
	Iron	38.04	26.36	ug/l	36.3	20	9,10,13,17	
SDG D1569								
D1569-02-03 MS/MSD	4-Chloroaniline	13	8.9	ug/l	36	20	1,4,5,6	None for RPD alone
	3-Nitroaniline	21	14	ug/l	40	20		
	2,4-Dimethylphenol	5.8	8.3	ug/l	35	20		
SDG D2295								
D2295-02 MS/MSD	Hexachlorocyclopentadiene	2100	2600	ug/kg	21	20	2	None for RPD alone
	Dimethylphthalate	590	2100	ug/kg	23	20		
	Diethylphthalate	1300	1600	ug/kg	21	20		
	Bis(2-ethylhexyl)phthalate	1200	1500	ug/kg	21	20		
	Indeno(1,2,3-cd)pyrene	1300	1600	ug/kg	21	20		
	Benzo(g,h,i)perylene	1300	1600	ug/kg	21	20		
D2295-01 MS/MSD	Barium	207.55	58.4	mg/kg	112.2	20	1 thru 10,12	J

Table 5-2 - Compounds with Relative Percent Difference Values Outside of Quality Control Limits
Matrix Spike and Matrix Spike Duplicate Samples

QC Sample ID	Compound	MS Result	MSD Result	Result Units	RPD	RPD Criteria	Affected Samples	Validator's Action
SDG D2305								
D2305-04-05 MS/MSD	Isopropylbenzene	81	69	ug/kg	145	20	3	None-All ND
	55 SOVC Compounds				>20	20		None for RPD alone
	Barium	59.2	106.78	mg/kg	57	20	All Samples	J
	Beryllium	0.7	0.46	mg/kg	40	20		J
	Sodium	127.67	219.18	mg/kg	53	20		L/UL
SDG D2336								
D2336-03 MS/MSD	4-Nitrophenol	400	300	ug/kg	32	20	3	R
	Pentachlorophenol	0	170	ug/kg	200	20		
	Dimethylphthalate	2100	1700	ug/kg	38	20		L/UL
	34 other SVOC Compounds				>20	20		None for RPD alone
D2336-01 MS/MSD	Lead	12749.38	8591.43	mg/kg	39	20	1	J
SDG D2338								
D2338-04-05 MS/MSD	Acenaphthylene	62	48	ug/l	25	20	3	None-Sample ND
	Di-n-Butylphthalate	83	45	ug/l	59	20		
	Fluoranthene	100	55	ug/l	58	20		
	4-Chloroaniline	32	13	ug/l	84	20		None for RPD alone
	3-Nitroaniline	28	22	ug/l	24	20		
	Atrazine	56	42	ug/l	29	20		
	2,4-Dimethylphenol	7.2	11	ug/l	42	20		None for RPD alone
	2,4-Dichlorophenol	13	16	ug/l	21	20		
	Acenaphthene	20	24	ug/l	22	20		
	Pentachlorophenol	8.7	31	ug/l	112	20		L/UL
SDG D2470								
D2549-01D	Lead	128	74.72	ug/L	53	20	5,6	J/UJ
	Magnesium	11799.81	5391.89	ug/L	75	20		J
	Zinc	93.27	149	ug/L	46	20		
D2466-03D	Calcium	3545.83	6029.5	ug/L	52	20	1	J
	Iron	20608.6	36668.4	ug/L	56	20		
	Manganese	496.66	972.97	ug/L	65	20		

Table 5-2 - Compounds with Relative Percent Difference Values Outside of Quality Control Limits
Matrix Spike and Matrix Spike Duplicate Samples

QC Sample ID	Compound	MS Result	MSD Result	Result Units	RPD	RPD Criteria	Affected Samples	Validator's Action
SDG D2549								
D2549-02 MS-MSD	Bromomethane	160	130	ug/kg	21	20	1	None for RPD alone
	Acetone	440	340	ug/kg	25	20		
	Methyl Acetate	87	69	ug/kg	23	20		
	Methylene Chloride	82	66	ug/kg	22	20		
	2-Butanone	380	300	ug/kg	23	20		
	4-Methyl-2-pentanone	410	330	ug/kg	22	20		
	1,2,4-Trichlorobenzene	121	51	ug/kg	30	20		
	Benzaldehyde	980	1200	ug/kg	21	20		
	Phenol	3100	3800	ug/kg	21	20		
	bis(2-Chloroethyl)ether	3500	4300	ug/kg	21	20		
	n-Nitroso-di-n-propylamine	3300	4200	ug/kg	24	20		
	Hexachloroethane	3200	4000	ug/kg	22	20		
	Isophorone	3600	4500	ug/kg	23	20		
	2-Nitrophenol	3200	4100	ug/kg	25	20		
	2,4-Dimethylphenol	3200	4000	ug/kg	22	20		
	2,4-Dichlorophenol	3200	4000	ug/kg	22	20		
	4-Chloroaniline	1600	2000	ug/kg	22	20		
	Hexachlorobutadiene	3300	4200	ug/kg	24	20		
	Caprolactam	4000	5000	ug/kg	23	20		
	4-Chloro-3-methylphenol	3200	4000	ug/kg	22	20		
	2,4,6-Trichlorophenol	3100	3800	ug/kg	21	20		
	2,4,5-Trichlorophenol	3300	4100	ug/kg	22	20		
	2-Nitroaniline	3300	4100	ug/kg	22	20		
	Dimethylphthalate	3400	4100	ug/kg	24	20		L/UL
	2,6-Dinitrotoluene	3500	4300	ug/kg	21	20		None for RPD alone
	2,4-Dinitrophenol	3300	4400	ug/kg	28	20		
	4-Nitrophenol	6100	7500	ug/kg	21	20		
	2,4-Dinitrotoluene	3500	4300	ug/kg	21	20		
	4-Nitroaniline	3100	3800	ug/kg	21	20		
	4,6-Dinitro-2-methylphenol	2700	3400	ug/kg	24	20		
	n-Nitroso-di-n-propylamine	3400	4200	ug/kg	21	20		
	Atrazine	3500	4400	ug/kg	23	20		
	Pentachlorophenol	5500	7400	ug/kg	30	20		None-Sample ND
	Phenathrene	3900	4600	ug/kg	21	20		None for RPD alone
	Carbazole	3300	4100	ug/kg	22	20		
	Di-n-Butylphthalate	3100	3800	ug/kg	21	20		L/UL
	Fluoranthene	4400	5200	ug/kg	29	20		

Table 5-2 - Compounds with Relative Percent Difference Values Outside of Quality Control Limits
Matrix Spike and Matrix Spike Duplicate Samples

QC Sample ID	Compound	MS Result	MSD Result	Result Units	RPD	RPD Criteria	Affected Samples	Validator's Action
D2549-02 MS-MSD	Pyrene	4100	5000	ug/kg	32	20	1	L/UL
	Butylbenzylphtalate	3000	3800	ug/kg	23	20		None for RPD alone
	3,3-Dichlorobenzidine	1500	2700	ug/kg	58	20		
	Benzo(a)anthracene	1000	4800	ug/kg	23	20		
	Chrysene	1100	4700	ug/kg	21	20		L/UL
	Bis(2-ethylhexyl)phthalate	3100	3900	ug/kg	23	20		None for RPD alone
	Di-n-octylphthalate	3400	4300	ug/kg	22	20		
	Benzo(b)fluoranthene	3900	4800	ug/kg	28	20		
	Benzo(k)fluoranthene	3700	4600	ug/kg	26	20		
	Benzo(a)pyrene	4000	4900	ug/kg	25	20		
	Copper	54.82	44.98	mg/kg	67	20	1,4,5,7,8,10	J/UL
	Lead	170.85	141.25	mg/kg	100	20		
	Mercury	0.372	0.4762	mg/kg	114	20		
	Sodium	1389.35	1050.22	mg/kg	103	20		
SDG D2734								
D2734-02MS-03MSD	4-Chloroaniline	15	29	ug/l	64	20	1	None for RPD alone
	3-Nitroaniline	22	33	ug/l	40	20		
	3,3'-Dichlorobenzidine	24	31	ug/l	25	20		

Notes
ND = Not Detected.
MS = Matrix Spike.
MSD = Matrix Spike Duplicate.
RPD = Relative Percent Difference.
SDG = Sample Delivery Group.
J - Value is estimated.
L - Analyte present. Reported value may be biased low. Acutal value is expected higher.
K - Estimated, biased high.
R - Rejected result. Analyte may or may not be present in the sample. Supporting data necessary to confirm result.
U - Not Detected

Table 5-3 - Compounds with Relative Percent Difference Values Outside of Quality Control Limits
Parent and Field Duplicate Samples

Parent Sample/ Duplicate Sample	Compound	Parent Sample Result	Duplicate Sample Result	Result Units	RPD	Validator Action
SDG 1201304						
1201304-2/1201304-3	Gross Alpha	5.1 ±1.9	2.5 ±1.5	pCi/L	68	J
	Gross Beta	14.9 ±3.7	7.1 ±2.9	pCi/L	71	
SDG C4930						
C4930-11/C4930-18	Cadmium	1.86	0.31	mg/kg	143	J
C4922-16/C4930-19	Cadmium	0.23	2.05	mg/kg	160	
SDG C4968						
C4968-05/C4968-15	Aluminum	3630	11400	mg/kg	103	J
	Copper	246	13.2	mg/kg	182	
	Lead	94.3	22.5	mg/kg	123	
	Magnesium	520	2790	mg/kg	137	
	Nickel	154	13.4	mg/kg	168	
SDG D1045						
D1045-05/D1045-12	Antimony	6.84	0.913	mg/kg	153	J
	Lead	181	39.6	mg/kg	128	
	Mercury	0.039	0.379	mg/kg	163	
SDG C5066						
C5066-04/C5066-05	Manganese	125	87	mg/kg	36	None
	Potassium	334	227	mg/kg	38	
SDG D1077						
D1077-04/D1077-12	Lead	8	4.81	mg/kg	50	None
	Manganese	467	258	mg/kg	58	
SDG D1172						
D1172-06/D1172-10	Aluminum	3320	4960	mg/kg	40	None
	Barium	16.9	28.7	mg/kg	52	
	Beryllium	0.25	0.36	mg/kg	36	
	Manganese	241	366	mg/kg	41	
	Vanadium	13.8	19.9	mg/kg	36	

Table 5-3 - Compounds with Relative Percent Difference Values Outside of Quality Control Limits
Parent and Field Duplicate Samples

SDG D1173						
D1172-02/D1172-01	Cadmium	0.17	0.27	mg/kg	45	None
	Lead	692	256	mg/kg	92	
D1172-16/D1172-14	Lead	1810	2670	mg/kg	39	
SDG D1177						
D1177-03/D1177-05	Aluminum	8590	6000	mg/kg	36	None
	Beryllium	0.249	0.171	mg/kg	37	
	Copper	9.73	19.3	mg/kg	66	
	Lead	14.2	38.5	mg/kg	92	
	Mercury	0.039	0.124	mg/kg	104	J
D1177-10/D1177-11	Arsenic	3.45	5.58	mg/kg	47	None
	Barium	30.7	45.6	mg/kg	39	
	Beryllium	0.245	0.416	mg/kg	52	
	Copper	26.6	41.9	mg/kg	45	
	Lead	30.5	300	mg/kg	163	

Table 5-3 - Compounds with Relative Percent Difference Values Outside of Quality Control Limits
Parent and Field Duplicate Samples

SDG D1251						
D1251-02/D1251-03	Selenium	6.64	9.3	ug/l	33	None
	Zinc	8.02	11.6	ug/l	36	
	Thallium	0.66	0.45	ug/l	38	
SDG D1352						
D1352-03/D1352-04	Lead	4.98	9.16	ug/l	59	None
D1352-06/D1352-08	Calcium	903	2830	mg/kg	103	J
	Magnesium	1810	2950	mg/kg	48	None
	Mercury	0.057	0.035	mg/kg	48	
D1352-10/D1352-13	Chromium	1.68	3.3	ug/l	65	J
	Coppper	2.56	3.63	ug/l	35	None
	Zinc	9.3	15.1	ug/l	48	
	Thallium	0.41	1.9	ug/l	129	J
SDG D2305						
D2305-14RE/D2305-12	Acetone	47	91	ug/kg	64	None
D2305-18RE/D2305-13	Carbon disulfide	11	4.4	ug/kg	86	
D2305-14/D2305-12	Arsenic	9.89	16.4	mg/kg	50	
	Beryllium	0.43	0.622	mg/kg	37	
	Calcium	100000	38500	mg/kg	89	
	Cobalt	40.1	7.15	mg/kg	36	
	Magnesium	34200	8070	mg/kg	124	J
	Mercury	0.077	0.549	mg/kg	151	K
	Potassium	1040	1740	mg/kg	50	None
	Vanadium	17.1	30.8	mg/kg	57	
D2305-18/D2305-13	Mercury	0.505	1.07	mg/kg	72	None
SDG D2338						
D2338-02/D2338-06	Acetone	9.8	15	ug/l	42	None
	Phenol	59	73	ug/l	21	
	Iron	1450	1920	ug/l	28	
SDG 1201304						
1201304-2/1201304-3	Gross Alpha	5.1 ± 1.9	2.5 ± 1.5	pCi/L	68	J
	Gross Beta	14.9 ± 3.7	7.1 ± 2.9	pCi/L	71	J

Table 5-3 - Compounds with Relative Percent Difference Values Outside of Quality Control Limits
Parent and Field Duplicate Samples

SDG 1204354						
1204354-1/1204354-7	Bi-214	0.98 ± 0.40	3.2 ± 2.0	pCi/g	106	J
SDG 1205350						
1205350-1/1205350-6	Ra-228	2.05 ± 0.55	1.54 ± 0.43	pCi/L	28	None
SDG D2549						
D2549-04/D2549-05	Barium	37.9	66.1	mg/kg	54	None
	Calcium	3280	2240	mg/kg	38	
	Manganese	700	229	mg/kg	101	J
	Mercury	0.161	0.312	mg/kg	65	None
SDG D2734						
D2734-06/D2734-07	Phenol	74000	57000	ug/l	26	None

Notes

RPD Criteria ± 35% for solid matrix (measured in kg), ± 20% for aqueous matrix (measured in L).

RPD = Relative Percent Difference.

SDG = Sample Delivery Group.

J - Value is estimated.

L - Analyte present. Reported value may be biased low. Acutal value is expected higher.

K - Estimated, biased high.

R - Rejected result. Analyte may or may not be present in the sample. Supporting data necessary to confirm result.

U - Not Detected

Table 5-4 - Compounds with Percent Recoveries Outside of Quality Control Limits
Matrix Spike and Matrix Spike Duplicate Samples

QC Sample ID	Compound	MS %R	MSD %R	%R Criteria	Affected Samples	Validator's Action
SDG C4922						
C4922-19/20	Lead	255.5	310.9	66-125	None	None- 4X Rule
SDG C4930						
C4950-06/07	Lead	1083.2	1759.7	66-125	None	None- 4X Rule
SDG C4949						
C4949-01MS/01MSD	Benzaldehyde	9	8	10-105	1,2	L/R
SDG C4968						
C4968-06/07	Chloroethane	0	0	55-158	5	L/R
	Benzaldehyde	5	8	10-161		
	Magnesium	74.6	72.5	80-120	All samples unless (J) due to FD	L/UL
	Nickel	68.5	67.8	85-118		
SDG C4989						
C4989-01MS/02MSD	Benzaldehyde	0	2	10-161	1-6	None
	Atrazine	ok	137	38-135	Sample ND	
C4989-08MS/08MSD	Dimethylphthalate	ok	111	51-110	Sample ND	None
SDG C5016						
C5016-12/13	Phenol	105	ok	43-100	Sample ND	None
	Naphthalene	131	115	40-105	11	K
	2-Methylnaphthalene	108	ok	45-105		
	Acenaphthene	137	121	45-105		
	Dibenzofuron	119	108	50-105		
	Atrazine	158	ok	38-135	Sample ND	None
	Phenanthrene	221	189	50-110	Dilution Result	
	Anthracene	142	126	55-105	11	K
	Fluoranthene	200	163	55-115	Dilution Result Used	None
	Pyrene	179	126	45-125		
	Benzo(a)anthracene	158	126	50-110	11	K
	Chrysene	153	116	55-110		
	Benzo(b)fluoranthene	153	121	45-115		
	Benzo(k)fluoranthene	128	ok	45-125		
	Benzo(a)pyrene	158	121	50-110		
	Indeo(1,2,3-cd)pyrene	158	132	40-120		
	Dibenzo(a,h)anthracene	131	ok	40-125		
	Benzo(g,h,i)perylene	142	ok	40-125		

Table 5-4 - Compounds with Percent Recoveries Outside of Quality Control Limits
Matrix Spike and Matrix Spike Duplicate Samples

QC Sample ID	Compound	MS %R	MSD %R	%R Criteria	Affected Samples	Validator's Action
SDG C5032						
C5032-04/05	Acetone	37	29	41-145	3	L/UL
	2-Butanone	47	37	54-137		
	Trichloroethene	-73	-83	54-149	Dilution Result	None
	4-Methyl-2-pentanone	57	47	59-137	3	L/UL
	t-1,3-Dichloropropene	52	45	64-129		
	2-Hexanone	47	37	58-133		
	1,2-Dibromoethane	55	48	65-136		
	Isopropylbenzene	150	152	64-139	ND	None
C5032-04/05	Carbon tetrachloride	ok	65	66-137	3	L/UL
	cis-1,2-Dichloroethene	ok	59	65-132		
	1,2-Dichloroethane	ok	63	68-130		
	cis-1,3-Dichloropropene	ok	58	65-129		
	1,1,2-Trichloroethane	ok	60	66-131		
	Dibromochloromethane	ok	60	67-131		
	Stryene	ok	58	66-127		
	Bromoform	ok	60	68-131		
	Atrazine	0	ok	38-135		L/R
	Barium	41.2	40.9	80-120	All Samples	J
	Mercury	-16.8	-15.9	34-153		L/R
SDG C5038						
C5038-13/14	1,2-Dibromoethane	65	65	70-125	ND	L/UL
	1,2,4-Trichlorobenzene	48	48	65-130		
	Trichloroethene	ok	72	75-125		
	Atrazine	138	ok	25-169		None
	Barium	42.6	41.3	80-120	All Detects	J
	Zinc	68.1	71.2	80-120	All Samples	L/UL
SDG C5066						
C5066-01 MS/MSD	Atrazine	0	106	38-135	1	L/R
SDG C5067						
C5067-02MS/02MSD	PETN	120	ok	48-117	All ND	None
SDG C5093						
C5093-19/20	Trichloroethene	74	74	75-125	18	L/UL
	Dibromochloromethane	64	ok	65-130		
	1,2-Dibromoethane	62	62	70-125		
	Bromoform	60	ok	62-135		
	1,1,2-Trichloroethane	ok	66	67-125		
C5093-07/08	Atrazine	0	0	25-169		L/R
C5093-19/20	Calcium	52	61.7	80-120	All Samples	None

Table 5-4 - Compounds with Percent Recoveries Outside of Quality Control Limits
Matrix Spike and Matrix Spike Duplicate Samples

QC Sample ID	Compound	MS %R	MSD %R	%R Criteria	Affected Samples	Validator's Action
SDG C5135						
C5138-12/13	2-Methylnaphthalene	106	ok	45-105	All ND	None
	Acenaphthene	106	ok	45-110		
	Anthracene	106	ok	55-105		
	di-n-Butylphthalate	111	ok	55-110		
	Barium	70	ok	80-120	4-7,11,14,15	L/UL
	Calcium	48.4	ok	80-120	4-7,11,14,16	
	Zinc	67.7	ok	80-120	4-7,11,14,17	
C5135-17/18	Barium	73	71.4	80-120	1-3,16	
	Calcium	19.9	14	80-120		
	Zinc	68.1	63.7	80-120		None
SDG C5136						
C5136-05/06	Lead	74.4	ok	80-120	1-4,7-10,12-18	None
SDG C5160						
C5160-13/14	4-Chloroaniline	8	11	10-160	1-8,15-21,18DL	L/R
	Calcium	59.5	63	80-120	1-8,11,12,15-	L/UL
SDG D1001						
D1001-08-09 MS/MSD	Tetrachloroethene	63	ok	65-140	7	L/UL
	m,p-Xylenes	79	ok	80-125		
	o-Xylene	72	ok	75-125		
	Styrene	70	ok	75-125		
	Isopropylbenzene	72	ok	75-130		
	Calcium	67.1	58.2	80-120	1-5	None for %R alone
	Zinc	ok	72.4	80-120	1-7, 10-13, 18-21	
SDG D1032						
D1032-09-10 MS/MSD	m,p-Xylenes	77	ok	80-125	8	L/UL
	n-Nitroso-di-n-propylamine	ok	34	41-115		
	Butylbenzylphthalate	ok	46	50-125		
D1032-12 MS/MSD	Endosulfan sulfae	23	25	60-135	12	
	Methoxychlor	30	33	55-145		
	Endrin ketone	54	55	65-135		
	Endrin aldehyde	19	20	35-145		
SDG D1045						
D1045-07-08 MS/MSD	Zinc	71.7	76.6	80-120	All Samples	L/UL

Table 5-4 - Compounds with Percent Recoveries Outside of Quality Control Limits
Matrix Spike and Matrix Spike Duplicate Samples

QC Sample ID	Compound	MS %R	MSD %R	%R Criteria	Affected Samples	Validator's Action
SDG D1062						
D1062-06-07 MS/MSD	Benzene	ok	74	75-125	5	L/UL
	Trichloroethene	ok	74	75-125		
	1,1,2-Trichloroethane	ok	65	67-125		
	Chlorobenzene	ok	74	75-125		
	m,p-Xylenes	ok	77	80-125		
	1,2-Dichlorobenzene	ok	72	75-120		
	1,2,4-Trichlorobenzene	ok	54	65-130		
SDG D1077						
D1077-08-09 MS/MSD	Barium	122.8	ok	80-120	All soil Samples	K
	Calcium	0	0	80-120	7,11	L/R
	Silver	74.8	71.7	75-120	All soil Samples	L/UL
	Sodium	71.7	72.7	80-120	4,6,7, 10 thru 12	None
SDG D1090						
D1090-05 MS/MSD	Aroclor-12060	-301	-274	30-130	5	None- 4X Rule Applies
D1077-08S-09SD MS/MSD	Barium	123	147	80-120	2-6	K
	Calcium	0	0	80-120	All Samples	None
	Silver	74.8	71.7	75-120		L/UL
	Sodium	71.7	72.7	80-120		None
SDG D1172						
D1172-02-03 MS/MSD	2,4-Dimethylphenol	ok	106	35-105	1	None-Sample ND
	Calcium	26.7	8.2	80-120	1	L/R
SDG D1177						
D1177-01 MS/MSD	Barium	74.8	74.2	80-120	1 thru 14	L/UL
	Calcium	38.3	32.9	80-120	10,11,14	
	Zinc	71.9	63.9	80-120	2,4,7,8,14	None
SDG D1330						
D1330-04-05 MS/MSD	bis(2-Chloroethoxy)methane	106	106	45-105	3	None-Sample ND
	Naphthalene	102	12	40-100		
	2-Methylnaphthalene	ok	106	45-105		
	2-Chloronaphthalene	106	108	50-105		
	Acenaphthylene	110	110	50-105		
	Acenaphthene	112	114	45-110		
	Dibenzofuran	108	110	55-105		

Table 5-4 - Compounds with Percent Recoveries Outside of Quality Control Limits
Matrix Spike and Matrix Spike Duplicate Samples

QC Sample ID	Compound	MS %R	MSD %R	%R Criteria	Affected Samples	Validator's Action
SDG D1352						
D1352-11-12 MS/MSD	Methyl tert-butyl ether	ok	126	65-125	10	None-Sample ND
	Chloromethane	ok	128	40-125		
	2-Hexanone	132	ok	55-130		
	1,2-Dibromoethane	126	ok	80-120		
SDG D1569						
D1569-02-03 MS/MSD	Carbon tetrachloride	64	62	65-140	1,4,5,6	L/UL
	1,2-Dichloroethane	68	72	70-130		
	Bromoform	ok	66	70-130		
	1,2-Dibromoethane	70	ok	80-120		
	3,3'-Dichlorobenzidine	ok	18	20-110		L/R
	Uranium	0	0	75-125	All Samples	L/R
SDG D1570						
D1570-02-03 MS/MSD	HMX	ok	123	80-115	1	None- Sample ND
	3-Nitrotoluene	ok	132	50-130		
	4-Nitrotoluene	ok	132	50-130		
	PETN	ok	153	46-143		
SDG D2295						
D2295-02 MS/MSD	3&4 Methylphenols	ok	106	40-105	2	None- Sample ND
	Anthracene	ok	106	55-105		
D2295-01 MS/MSD	Antimony	47	50	80-120	All Samples	L/UL
	Arsenic	74	76	80-120		
	Beryllium	69	71	80-120		
	Chromium	66	70	80-120		
	Cobalt	69	68	80-120		
	Copper	74	77	80-120		
	Nickel	67	65	80-120		
	Selenium	75	76	80-120		
	Sodium	68	70	80-120		
	Vanadium	70	75	80-120		
	Potassium	ok	74	80-120		
	Zinc	ok	-14.8	80-120		None

Table 5-4 - Compounds with Percent Recoveries Outside of Quality Control Limits
Matrix Spike and Matrix Spike Duplicate Samples

QC Sample ID	Compound	MS %R	MSD %R	%R Criteria	Affected Samples	Validator's Action
SDG D2305						
D2305-04-05 MS/MSD	2-Chlorophenol	42	37	45-105	3	R
	2-Nitrophenol	16	15	40-110		
	2,4-Dichlorophenol	28	26	45-110		
	4-Chloroaniline	ok	18	25-115		
	4-Chloro-3-methylphenol	ok	44	45-115		
	2-Methylnaphthalene	116	ok	45-105		None- Sample ND
	2,4,6-Trichlorophenol	6	7	45-110		R
	2,4,5-Trichlorophenol	13	14	50-110		
	Dimethylphthalate	ok	33	50-110		L/UL
	2,4-Dinitrophenol	0	0	15-130		R
	4-Nitrophenol	5	5	15-140		
	4,6-Dinitro-2-methylphenol	16	16	30-135		
	Pentachlorophenol	1	1	25-120		
	Chrysene	111	ok	55-110		None- Sample ND
	Benzo(a)pyrene	111	ok	50-110		
	Antimony	74.3	ok	80-120	All Samples	L/UL
	Barium	132	ok	80-120		J
	Mercury	153	153	80-120		K
	Potassium	34.6	28.8	80-120		L/UL
	Sodium	ok	70.8	80-120		J/UL
	Vanadium	72.3	ok	80-120		L/UL
SDG D2336						
D2336-03 MS/MSD	2-Nitrophenol	30	34	40-110	3	R
	2-Methylnaphthalene	121	11	45-105		None- Sample ND
	2,4,6-Trichlorophenol	10	11	45-110		R
	2,4,5-Trichlorophenol	24	28	50-110		
	2,4-Dinitrophenol	10	10	15-130		
	4-Nitrophenol	11	8	15-140		
	4,6-Dinitro-2-methylphenol	17	17	30-135		
	Pentachlorophenol	0	5	25-120		
	Dimethylphthalate	ok	45	50-110		L/UL
D2336-01 MS/MSD	Antimony	151.4	196.5	80-120	All Samples	J
	Barium	72.3	145.4	80-120		
	Selenium	74.5	ok	80-120		L/UL

Table 5-4 - Compounds with Percent Recoveries Outside of Quality Control Limits
Matrix Spike and Matrix Spike Duplicate Samples

QC Sample ID	Compound	MS %R	MSD %R	%R Criteria	Affected Samples	Validator's Action
SDG D2338						
D2338-04-05 MS/MSD	Nitrobenzene	112	ok	45-110	3	None-Sample ND
	Isophorone	112	ok	50-110		
	bis(2-Chloroethoxy)methane	106	108	45-105		
	Acenaphthylene	124	ok	50-105		
	Dibenzofuran	106	ok	55-105		
	Di-n-Butylphthalate	166	ok	55-115		
	Fluoranthene	200	ok	55-115		
	Fluorene	ok	111	50-110		K
	Pentachlorophenol	22	ok	40-115		L/UL
SDG D2470						
D2549-04S-04SD	Antimony	41.6	42.2	80-120	5,6	L/UL
	Copper	58.1	28.9	80-120		
	Lead	41.8	14.3	80-120		J/UL
	Potassium	128	ok	80-120		K
	Sodium	155	49.8	80-120		L/UL
D2466-03S-03SD	Antimony	65.6	71.6	80-120	1	L/UL
	Chromium	342	ok	80-120		K

Table 5-4 - Compounds with Percent Recoveries Outside of Quality Control Limits
Matrix Spike and Matrix Spike Duplicate Samples

QC Sample ID	Compound	MS %R	MSD %R	%R Criteria	Affected Samples	Validator's Action
SDG D2549						
D2549-02 MS-MSD	Chloromethane	147	ok	50-130	1	None- All ND
	Vinyl Chloride	263	228	60-125		
	Bromomethane	281	228	30-160		
	Chloroethane	316	263	40-155		
	Methyl tert-butyl ether	151	ok	76-123		
	1,1-Dichloroethene	139	ok	65-135		
	cis-1,2-Dichloroethene	128	ok	65-125		
	Chloroform	132	ok	70-125		
	Benzene	132	ok	75-125		
	Trichloroethene	128	ok	75-125		
	1,2-Dichloropropane	130	ok	70-120		
	Bromodichloromethane	133	ok	70-130		
	Toluene	126	ok	70-125		
	t-1,3-Dichloropropene	128	ok	65-125		
	cis-1,3-Dichloropropene	126	ok	70-125		
	1,1,2-Trichloroethane	139	ok	60-125		
	Dibromochloromethane	133	ok	65-130		
	1,2-Dibromoethane	133	ok	70-125		
	Chlorobenzene	126	ok	75-125		
	1,1,2,2-Tetrachloroethane	133	ok	55-130		
	1,3-Dichlorobenzene	128	ok	70-125		
	1,4-Dichlorobenzene	126	ok	70-125		
	1,2-Dichlorobenzene	133	ok	75-120		
	1,2-Dibromo-3-chloropropane	139	ok	40-135		
	Dimethylphthalate	44	ok	50-110		L/UL
	Di-n-Butylphthalate	54	ok	55-110		
	Fluoranthene	42	ok	55-115		
	Pyrene	42	ok	45-125		
	Chrysene	51	ok	55-110		
	Dimethylphthalate	44	ok	50-110		
	Pentachlorophenol	ok	130	25-120		None- All ND
	Di-n-Butylphthalate	54	ok	55-110		L/UL
	Fluoranthene	42	ok	55-115		
	Pyrene	42	ok	45-125		
	Chrysene	51	ok	55-110		
	Barium	ok	130	80-120	13,14	K
	Antimony	41.6	42.2	80-120	1,4,5,7,8,10	L/UL
	Copper	58.1	28.9	80-120		J/UL
	Lead	41.8	14.3	80-120		
	Mercury	17	63.1	80-120		
	Potassium	127	ok	80-120		K
	Sodium	155	49.8	80-120		J/UL

Table 5-4 - Compounds with Percent Recoveries Outside of Quality Control Limits
Matrix Spike and Matrix Spike Duplicate Samples

QC Sample ID	Compound	MS %R	MSD %R	%R Criteria	Affected Samples	Validator's Action
SDG D2734						
D2734-02MS-03MSD	Nitrobenzene	160	150	45-110	1	None- All ND
	Napthalene	220	190	40-100		J
	Mercury	132	127	80-120		Sample ND
	Selenium	59.3	61.2	80-120		L/UL
SDG D2735						
D2735-02MS-03MSD	Nitroglycerin	156	ok	57-145	1	None

Notes
% R = Percent Recovery.
MS = Matrix Spike.
MSD = Matrix Spike Duplicate.
ND = Not Detected.
SDG = Sample Delivery Group.
J - Value is estimated.
L - Analyte present. Reported value may be biased low. Acutal value is expected higher.
K - Estimated, biased high.
R - Rejected result. Analyte may or may not be present in the sample. Supporting data necessary to confirm result.
U - Not Detected

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Table 5-5 - Compounds with Percent Recoveries Outside of Quality Control Limits
Lab Control Samples

QC Sample ID	Compound	LCS %R	%R Criteria	Affected Samples	Validator's Action
SDG C4949					
BSG1214W1	Carbon tetrachloride	145	65-138	All ND	None
PB59866BS	Benzaldehyde	6	10-95	2	L/R
SDG C4968					
BSG1214W1	Carbon tetrachloride	145	65-138	All ND	None
PB59883BS	4-Chloroaniline	21	25-115	1-5, 8-15	L/UL
SDG C4989					
BSG1216W3	Chloromethane	130	40-125	All ND	None
	Acteone	150	50-140		
BSH1219M	Chloromethane	155	40-125		
	Vinyl chloride	145	50-144		
	Methylene chloride	140	61-138		
PB59934BS	Benzaldehyde	0	10-161	1-6	L/R
PB59933BS	Benzaldehyde	2	10-161	7-22,12RE	
	4-Chloroaniline	22	25-115	7-11, 13-22	L/UL
	Atrazine	129	40-127	All ND	None
SDG C4993					
PB60063BS1	PETN	129	48-117	All ND	None
SDG C5016					
BSH1222M1	Chloromethane	135	56-130	All ND	None
	Vinyl chloride	130	60-125		
	Acteone	160	57-148		
PB59968BS	3,3'-Dichlorobenzidine	8	10-157	1-11,14-18	L/R
SDG C5032					
BSF1219S2	Trichlorofluoromethane	135	72-134	All ND	None
BSH1221M2	Chloromethane	145	58-139		
PB60021BS	4-Chloroaniline	17	25-115	All Samples	L/UL

Table 5-5 - Compounds with Percent Recoveries Outside of Quality Control Limits
Lab Control Samples

QC Sample ID	Compound	LCS %R	%R Criteria	Affected Samples	Validator's Action
SDG C5038					
BSH1222W1	Dichlorodifluoromethane	125	35-124	All ND	None
	Chloromethane	150	40-125		
	Chloroethane	160	60-135		
	Trichlorofluoromethane	150	60-137		
	1,1-Dichloroethane	135	70-130		
	Acetone	180	50-140		
	Methyl tert-butyl Ether	140	65-125		
	cis-1,2-Dichloroethene	130	70-125		
	1,2-Dichloropropane	135	75-125		
	4-Methyl-2-Pentanone	160	63-135		
	2-Hexanone	160	56-130		
	1,1,2,2-Tetrachloroethane	145	65-130		
BSH1227M1	1,2-Dichloropropane	130	76-120		
	2-Hexanone	150	55-145		
PB60039BS	4-Chloroaniline	14	15-110	5,6	L/UL
	4-Nitroaniline	60	66-120		
	3,3'-Dichlorobenzidine	19	20-110		
PB60043BS	4-Chloroaniline	10	25-115	1-4,7-	
	Hexachlorocyclopentadien	115	43-112	All ND	None
	3-Nitroaniline	21	25-110	1-4,7-	L/UL
	Atrazine	135	40-127	All ND	None
SDG C5066					
PB60087BS	4-Chloroaniline	6	25-115	All Samples	L/R
	3-Nitroaniline	11	25-110		L/UL
	3,3'-Dichlorobenzidine	9	10-157		L/R
SDG C5067					
PB60220BS1	PETN	118	48-117	All ND	None

Table 5-5 - Compounds with Percent Recoveries Outside of Quality Control Limits
Lab Control Samples

QC Sample ID	Compound	LCS %R	%R Criteria	Affected Samples	Validator's Action
SDG C5093					
BSF1229S2	Vinyl chloride	135	60-125	All ND	None
	Carbon disulfide	140	60-138		
	Methylene chloride	165	63-140	12RE,13RE,14RE,16RE	K
	trans-1,2-Dichloroethene	135	73-130	All ND	None
	1,1-Dichloroethane	145	75-125		
	Chloroform	130	75-125		
PB60152BS	4-Chloroaniline	11	25-115	1-8,12-18,21-24	L/UL
	3-Nitroaniline	22	25-110		
PB60157BS	4-Chloroaniline	14	15-110	9,11	
SDG C5110					
BSH1227W2	Chloromethane	130	40-125	All ND	None
	4-Methyl-2-Pentanone	138	63-135		
	2-Hexanone	138	56-130		
BSH1227W3	Chloromethane	160	40-125		
	Acetone	150	50-140		
	4-Methyl-2-pentanone	140	63-135		
	2-Hexanone	140	56-130		
PB60193BS	4-Chloroaniline	15	25-115	1-6,7-16	L/UL
SDG C5135					
BSF0103S4	Chloroethane	160	42-155	All ND	None
PB60240BS	4-Chloroaniline	14	25-115	1,2,3	L/UL
PB60289BS	4-Chloroaniline	21	25-115	4-7,11,14-16	
	2-Methylnaphthalene	106	54-105	All ND	None
	Hexachlorocyclopentadien	121	43-112		
	Acenaphthylene	106	54-105		
	Acenaphthene	112	54-110		
	Anthracene	106	56-105		
PB60310BS	Zinc	87.7	89-120	8,9	L/UL
SDG C5145					
PB60220BS1	PETN	118	48-117	All ND	None

Table 5-5 - Compounds with Percent Recoveries Outside of Quality Control Limits
Lab Control Samples

QC Sample ID	Compound	LCS %R	%R Criteria	Affected Samples	Validator's Action
SDG C5160					
PB60322BS	4-Chloroaniline	12	25-115	1-8,15-21,18DL	L/UL
SDG C5161					
BSF0103S4	Chloroethane	160	42-155	All ND	None
PB60339BS	4-Chloroaniline	0	25-115	1-6	L/R
	3-Nitroaniline	13	25-110		L/UL
SDG D1001					
BSG0105W4	Dichlorodifluoromethane	125	35-124	All ND	None
	Isopropylbenzene	130	75-125		
PB60369BS	4-Chloroaniline	11	25-115	1-7, 10-13, 18, 19-21	L/UL
	3,3'-Dichlorobenzidine	9	10-157		L/R
SDG D1002					
PB60361BS	4-Chloroaniline	14	25-115	All Samples	L/UL
SDG D1032					
BSG0105W4	Dichlorodifluoromethane	125	35-124	All ND	None
	Isopropylbenzene	130	75-125		
PB60405BS	4-Chloroaniline	13	25-115	All Samples	L/UL
SDG D1045					
PB60417BS	4-Chloraniline	12	25-115	All Samples	L/UL
	Dibenzofuran	56	59-105		
SDG D1062					
PB60467BS	4-Chloroaniline	6	25-115	3-22	L/R
	Phenol	49	51-100		L/UL
	2-Chlorophenol	51	53-105		
	2-Methylphenol	49	52-105		
	3&4 Methylphenol	48	54-105		
	n-Nitroso-di-n-	48	51-114		
	Isophorone	51	52-110		
	2-Nitrophenol	49	51-110		
	2,4-Dichlorophenol	50	53-110		
	Caprolactam	42	45-115		
	4-Chloro-3-methylphenol	46	56-111		
	2,4,6-Trichlorophenol	52	53-110		
	2,4,5-Trichlorophenol	50	53-110		
	2-Nitroanline	49	53-118		

Table 5-5 - Compounds with Percent Recoveries Outside of Quality Control Limits
Lab Control Samples

QC Sample ID	Compound	LCS %R	%R Criteria	Affected Samples	Validator's Action
PB60467BS	Dimethylphthalate	52	57-110	3-22	L/UL
	2,6-Dinitrotoluene	51	55-110		
	3-Nitroaniline	16	25-110		
	Dibenzofuran	52	59-105		
	2,4-Dinitrotoluene	50	55-115		
	Diethylphthalate	51	56-111		
	Fluorene	53	56-110		
	4-Nitroaniline	42	46-113		
	Phenanthrene	54	56-110		
	Anthracene	54	56-105		
	Carbazole	51	54-117		
	Di-n-butylphthalate	51	58-110		
	Fluoranthene	49	55-115		
	Pyrene	57	58-117		
	Butylbenzylphthalate	52	57-122		
	Benzo(a)anthracene	53	57-110		
	Chrysene	54	59-110		
	bis(2-Ethylhexyl)phthalate	49	60-119		
	Di-n-octyl phthalate	47	56-122		
	Benzo(b)fluoranthene	51	53-115		
	Benzo(k)fluoranthene	53	56-117		
	Benzo(a)pyrene	52	56-110		
SDG D1077					
BSF0111S2	Methylene chloride	155	63-140	All Associated ND	None
	1,1-Dichloroethane	135	65-135		

Table 5-5 - Compounds with Percent Recoveries Outside of Quality Control Limits
Lab Control Samples

QC Sample ID	Compound	LCS %R	%R Criteria	Affected Samples	Validator's Action
SDG D1090					
BSH0111W1	Acetone	160	50-140	All Associated ND	None
	2-Hexanone	140	56-130		
BSF0111S2	Methylene chloride	155	63-140		
	1,1-Dichloroethane	135	65-135		
PB60520BS	4-Chloroaniline	23	25-115	All Samples	L/UL
SDG D1179					
BSH0120W1	Dichlorodifluoromethane	135	35-124	All ND	None
	Methyl tert-butyl Ether	130	65-125		
	1,1,1-Trichloroethane	135	65-130		
	1,2-Dichloroethane	140	70-130		
	Bromodichloromethane	135	75-120		
	Toluene	125	75-120		
	1,2-Dibromoethane	125	80-120		
	Chlorobenzene	130	80-120		
PB60647BS	4-Chloroaniline	11	15-110	All Samples	L/UL
	2,6-Dinitrotoluene	64	65-115		
	2,4-Dinitrotoluene	64	68-120		
	4-Nitroaniline	54	66-120		
	4,6-Dinitro-2-methylphenol	36	40-130		
	Pentachlorophenol	38	40-115		
	Carbazole	66	70-115		
	Di-n-butylphthalate	66	72-115		
	bis(2-Ethylhexyl)phthalate	66	69-125		
	Di-n-octyl phthalate	62	66-131		
SDG D1180					
PB60737BS1	PETN	146	48-177	All Associated ND	None
SDG D1251					
PB60790BS	4-Nitroaniline	31	66-120	hru 3, 2DL, 2DL2, 3DL, 3D	L/UL
PB60886BS	4-Chloroaniline	5	15-110	5,7,8,9,7DL,9DL,9DL2,9DL3	L/R
	3-Nitroaniline	17	20-120		
	2,4-Dinitrophenol	160	15-136	All Associated ND	None
	3,3'-Dichlorobenzidine	15	20-110	,7,8,9,7DL,9DL,9DL2,9DL	L/UL
SDG D1252					
PB6092BS1	HMX	78	80-115	All Samples	L/UL

Table 5-5 - Compounds with Percent Recoveries Outside of Quality Control Limits
Lab Control Samples

QC Sample ID	Compound	LCS %R	%R Criteria	Affected Samples	Validator's Action
SDG D1312					
PB60954BS1	HMX	78	80-115	1	L/UL
SDG D1330					
BSR0201W1	Methyl acetate	180	51-158	All Associated ND	None
PB60950BS	Acenaphthylene	106	52-105		
	Acenaphthene	112	51-110		
	Dibenzofuran	106	61-105		
SDG D1352					
PB60971BS	3,3'-Dichlorobenzidine	16	20-110	9,10,13,15,16,17	L/UL
SDG D1569					
PB61307BS	4-Chloroaniline	7	15-110	1,4,5,6	L/R
	3-Nitroaniline	16	20-120		L/UL
	4-Nitroaniline	54	66-120		
	3,3'-Dichlorobenzidine	5	20-110		L/R
PB61306BS	bis(2-Ethylhexyl)phthalate	67	69-130	All Samples	L/UL
SDG D2295					
BSR0419W1	Chloromethane	140	40-125	All Associated ND	None
PB62493BS	4-Chloroaniline	7	25-115	All Samples	L/R
	Hexachlorocyclopentadiene	133	43-112	All Associated ND	None
	3-Nitroaniline	19	25-110	All Samples	L/UL
	Anthracene	106	55-105	9	K
SDG D2305					
PB62527BS	4-Chloroaniline	6	25-115	All Samples	L/R
	3-Nitroaniline	12	25-110		L/UL
SDG D2336					
PB62571BS	4-Chloroaniline	12	25-115	All Samples	L/UL
	3-Nitroaniline	21	25-110		

Table 5-5 - Compounds with Percent Recoveries Outside of Quality Control Limits
Lab Control Samples

QC Sample ID	Compound	LCS %R	%R Criteria	Affected Samples	Validator's Action
SDG D2338					
BSH0427W1	Chloromethane	135	40-125	All ND	None
	Chloroethane	150	60-135		
PB62565BS	4-Chloroaniline	6	15-110	All Samples	L/R
	3-Nitroaniline	14	20-125		L/UL
	Atrazine	58	61-132		
	3,3'-Dichlorobenzidine	11	20-110		
	1,2,4,5-Tetrachlorobenzene	65	70-130		
	2,3,4,6-Tetrachlorophenol	58	70-130		
SDG D2470					
PB62840BS	4-Chloroaniline	12	15-110	3	L/UL
	3-Nitroaniline	16	20-125		
	3,3'-Dichlorobenzidine	10	20-110		
PB62899BS	4-Chloroaniline	24	25-115	5,6	
PB62812BS	4-Chloroaniline	16	25-115	1	
	3-Nitroaniline	24	25-110		
SDG 1205350					
RA120528-1LCS	Ra-228	67.8	70-130	All Samples unless alreay (J	L/UL
SDG D2549					
BSF0516S1	Chloromethane	145	50-130	All Associated ND	None
	Vinyl chloride	215	60-125		
	Bromomethane	210	30-160		
	Chloroethane	175	40-155		
	Methyl tert-butyl Ether	125	76-123		
BSF0517S1	Vinyl chloride	195	60-125		
	Bromomethane	205	30-160		
	Chloroethane	180	40-155		
PB62899BS	4-Chloroaniline	24	25-115	1,4,5,7,8,10	
PB63024BS	4-Chloroaniline	15	25-115	13,14	L/UL
	3-Nitroaniline	17	25-110		

Table 5-5 - Compounds with Percent Recoveries Outside of Quality Control Limits
Lab Control Samples

QC Sample ID	Compound	LCS %R	%R Criteria	Affected Samples	Validator's Action
SDG D2734					
BSH0521W1	Bromochloromethane	250	65-130	All ND	None
	1,4-Dioxane	40	50-150	All Samples	L/R
PB63222BS	2,3,4,6-Tetrachlorophenol	56	70-130	1	L/UL
PB63287BS	4-Chloroaniline	9	15-110	6 thru 13, 15 thru 19	L/R
	3-Nitroaniline	15	20-125		L/UL
	3,3'-Dichlorobenzidine	11	20-110		
	2,3,4,6-Tetrachlorophenol	66	70-130		L/UL-Unless R
PB63288BS	Naphthalene	110	40-100	6,7,11,12,13,18,19	K

Notes
% R = Percent Recovery.
LCS = Lab Control Sample.
ND = Not Detected.
J - Value is estimated.
L - Analyte present. Reported value may be biased low. Acutal value is expected higher.
K - Estimated, biased high.
R - Rejected result. Analyte may or may not be present in the sample. Supporting data necessary to confirm result.
U - Not Detected

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Table 5-6 - Limit of Detections of Compounds Compared to Screening Levels - Soil

Compound	Min LOD	Max LOD	Unit	US NRC NUREG/CR-5512	PA Act 2 MSCs (Residential) Residential Direct Contact (0-15 ft bgs) [1]	PA Act 2 MSCs (Residential)Soil to Groundwater [1]	PA Residential Volatilization to Indoor Air Criteria	US EPA Ecological Soil Screening Levels (EcoSSLs)	USEPA RSL's for Residential Soil
Gamma Spectroscopy									
Actinium-228	0.54	1.4	pCi/g	3.54	NSA	NSA	NSA	NSA	NSA
Aluminum-26	0.048	0.51	pCi/g	NSA	NSA	NSA	NSA	NSA	NSA
Americium-241	0.2	**3.9**	pCi/g	1.52	NSA	NSA	NSA	NSA	NSA
Antimony-124	0.175	0.42	pCi/g	NSA	NSA	NSA	NSA	NSA	NSA
Antimony-125	0.27	0.97	pCi/g	25.5	NSA	NSA	NSA	NSA	NSA
Beryllium-7	1.03	3.2	pCi/g	NSA	NSA	NSA	NSA	NSA	NSA
Bismuth-212	1.9	**5.5**	pCi/g	4.61	NSA	NSA	NSA	NSA	NSA
Bismuth-214	0.23	0.88	pCi/g	5.16	NSA	NSA	NSA	NSA	NSA
Cerium-139	0.091	0.23	pCi/g	NSA	NSA	NSA	NSA	NSA	NSA
Cerium-144	0.56	1.66	pCi/g	174	NSA	NSA	NSA	NSA	NSA
Cesium-134	0.156	0.54	pCi/g	5.36	NSA	NSA	NSA	NSA	NSA
Cesium-137	0.115	0.38	pCi/g	9.83	NSA	NSA	NSA	NSA	NSA
Chromium-51	1.24	3.5	pCi/g	NSA	NSA	NSA	NSA	NSA	NSA
Cobalt-56	0.21	1.02	pCi/g	NSA	NSA	NSA	NSA	NSA	NSA
Cobalt-57	0.08	0.19	pCi/g	144	NSA	NSA	NSA	NSA	NSA
Cobalt-58	0.14	0.39	pCi/g	34.5	NSA	NSA	NSA	NSA	NSA
Cobalt-60	0.133	0.35	pCi/g	3.68	NSA	NSA	NSA	NSA	NSA
Europium-152	0.77	2.9	pCi/g	8.66	NSA	NSA	NSA	NSA	NSA
Europium-154	0.61	2.7	pCi/g	8.0	NSA	NSA	NSA	NSA	NSA
Europium-155	0.28	0.78	pCi/g	282	NSA	NSA	NSA	NSA	NSA
Iodine-131	0.25	2.4	pCi/g	NSA	NSA	NSA	NSA	NSA	NSA
Iron-59	0.31	0.86	pCi/g	NSA	NSA	NSA	NSA	NSA	NSA
Lead-212	0.19	0.6	pCi/g	4.61	NSA	NSA	NSA	NSA	NSA
Lead-214	0.24	0.64	pCi/g	5.16	NSA	NSA	NSA	NSA	NSA
Manganese-54	0.139	0.44	pCi/g	13.9	NSA	NSA	NSA	NSA	NSA
Niobium-94	0.152	0.5	pCi/g	5.76	NSA	NSA	NSA	NSA	NSA
Niobium-95	0.16	0.55	pCi/g	NSA	NSA	NSA	NSA	NSA	NSA
Potassium-40	**1.9**	**7**	pCi/g	1.69	NSA	NSA	NSA	NSA	NSA
Protactinium-234	17	64	pCi/g	NSA	NSA	NSA	NSA	NSA	NSA
Radium-226	0.3	0.56	pCi/g	0.648	NSA	NSA	NSA	NSA	NSA
Ruthenium-106	1.38	3.3	pCi/g	4.83	NSA	NSA	NSA	NSA	NSA
Scandium-46	0.151	0.39	pCi/g	14.7	NSA	NSA	NSA	NSA	NSA
Silver-110m	0.089	0.4	pCi/g	4.78	NSA	NSA	NSA	NSA	NSA
Sodium-22	0.124	0.38	pCi/g	3.65	NSA	NSA	NSA	NSA	NSA

Table 5-6 - Limit of Detections of Compounds Compared to Screening Levels - Soil

Compound	Min LOD	Max LOD	Unit	US NRC NUREG/CR-5512	PA Act 2 MSCs (Residential) Residential Direct Contact (0-15 ft bgs) [1]	PA Act 2 MSCs (Residential)Soil to Groundwater [1]	PA Residential Volatilization to Indoor Air Criteria	US EPA Ecological Soil Screening Levels (EcoSSLs)	USEPA RSL's for Residential Soil
Thallium-208	0.13	0.39	pCi/g	NSA	NSA	NSA	NSA	NSA	NSA
Thorium-227	0.51	25	pCi/g	NSA	NSA	NSA	NSA	NSA	NSA
Thorium-234	1.35	**5.1**	pCi/g	3.95	NSA	NSA	NSA	NSA	NSA
Uranium-235	0.5	1.44	pCi/g	3.35	NSA	NSA	NSA	NSA	NSA
Zinc-65	0.27	1.17	pCi/g	8.93	NSA	NSA	NSA	NSA	NSA
Gross Alpha/Beta									
Alpha	0.33	2.3	pCi/g	NSA	NSA	NSA	NSA	NSA	NSA
Beta	0.57	2.9	pCi/g	NSA	NSA	NSA	NSA	NSA	NSA
Inorganics									
Aluminum	1.62	4.92	mg/kg	NSA	190000	NSA	NSA	NSA	77000
Antimony	*0.81*	*2.46*	mg/kg	NSA	88	27	NSA	0.27	31
Arsenic	0.3245	0.985	mg/kg	NSA	12	29	NSA	18	0.39
Barium	1.62	4.92	mg/kg	NSA	44000	8200	NSA	330	15000
Beryllium	0.0975	0.2955	mg/kg	NSA	440	320	NSA	21	160
Cadmium	0.0975	0.2955	mg/kg	NSA	110	38	NSA	0.36	70
Calcium	32.45	2100	mg/kg	NSA	NSA	NSA	NSA	NSA	NSA
Chromium	0.162	0.492	mg/kg	NSA	NSA	NSA	NSA	26	0.29
Cobalt	0.4865	1.475	mg/kg	NSA	66	50	NSA	13	23
Copper	0.3245	0.985	mg/kg	NSA	8100	43000	NSA	28	3100
Iron	1.62	4.92	mg/kg	NSA	150000	NSA	NSA	NSA	55000
Lead	0.1945	*15.4*	mg/kg	NSA	500	450	NSA	11	400
Magnesium	32.45	98.5	mg/kg	NSA	NSA	NSA	NSA	NSA	NSA
Manganese	0.3245	0.985	mg/kg	NSA	10000	2000	NSA	220	1800
Nickel	0.65	1.97	mg/kg	NSA	4400	650	NSA	38	1500
Potassium	32.45	98.5	mg/kg	NSA	NSA	NSA	NSA	NSA	NSA
Selenium	0.3245	*0.985*	mg/kg	NSA	1100	26	NSA	0.52	390
Silver	0.162	0.492	mg/kg	NSA	1100	84	NSA	4.2	390
Sodium	32.45	98.5	mg/kg	NSA	NSA	NSA	NSA	NSA	NSA
Thallium	0.65	1.97	mg/kg	NSA	15	14	NSA	NSA	0.78
Vanadium	0.65	1.97	mg/kg	NSA	1500	26000	NSA	7.8	390
Zinc	0.65	*51.5*	mg/kg	NSA	66000	12000	NSA	46	23000
Uranium-238	0.0385	0.07	mg/kg	NSA	NSA	NSA	NSA	NSA	NSA
Mercury	0.0045	0.2775	mg/kg	NSA	35	10	NSA	NSA	7.8
Pesticides									
4,4-DDD	0.95	1	ug/kg	NSA	75000	31000	NSA	NSA	2000

Table 5-6 - Limit of Detections of Compounds Compared to Screening Levels - Soil

Compound	Min LOD	Max LOD	Unit	US NRC NUREG/CR-5512	PA Act 2 MSCs (Residential) Residential Direct Contact (0-15 ft bgs) [1]	PA Act 2 MSCs (Residential)Soil to Groundwater [1]	PA Residential Volatilization to Indoor Air Criteria	US EPA Ecological Soil Screening Levels (EcoSSLs)	USEPA RSL's for Residential Soil
4,4-DDE	0.95	1	ug/kg	NSA	53000	41000	NSA	NSA	1400
4,4-DDT	0.95	1	ug/kg	NSA	53000	110000	NSA	21	1700
Aldrin	0.95	1	ug/kg	NSA	1100	470	NSA	NSA	29
alpha-BHC	0.95	1	ug/kg	NSA	2800	46	NSA	NSA	77
alpha-Chlordane	0.95	1	ug/kg	NSA	NSA	NSA	NSA	NSA	1600
Beta-BHC	0.95	1	ug/kg	NSA	9900	220	NSA	NSA	270
delta-BHC	0.95	1	ug/kg	NSA	NSA	NSA	NSA	NSA	77
Dieldrin	0.95	1	ug/kg	NSA	1100	110	NSA	4.9	30
Endosulfan I	0.95	1	ug/kg	NSA	1300000	110000	NSA	NSA	370000
Endosulfan II	0.95	1	ug/kg	NSA	1300000	130000	NSA	NSA	370000
Endosulfan sulfate	0.95	1	ug/kg	NSA	1300000	70000	NSA	NSA	370000
Endrin	0.95	1	ug/kg	NSA	66000	5500	NSA	NSA	18000
Endrin aldehyde	0.95	1	ug/kg	NSA	NSA	NSA	NSA	NSA	18000
Endrin ketone	0.95	1	ug/kg	NSA	NSA	NSA	NSA	NSA	18000
Gamma-BHC (Lindane)	0.95	1	ug/kg	NSA	16000	72	NSA	NSA	520
Heptachlor	0.95	1	ug/kg	NSA	4000	680	NSA	NSA	110
Heptachlor epoxide	0.95	1	ug/kg	NSA	2000	1100	NSA	NSA	53
Methoxychlor	0.95	1	ug/kg	NSA	1100000	630000	NSA	NSA	310000
Toxaphene	9.5	10	ug/kg	NSA	16000	1200	NSA	NSA	440
trans-Chlordane	0.95	1	ug/kg	NSA	NSA	NSA	NSA	NSA	1600
PCBS									
Aroclor 1016	9	30	ug/kg	NSA	15000	72000	NSA	NSA	3900
Aroclor 1221	9	30	ug/kg	NSA	9000	160	NSA	NSA	140
Aroclor 1232	9	30	ug/kg	NSA	9000	130	NSA	NSA	140
Aroclor 1242	9	30	ug/kg	NSA	9000	4000	NSA	NSA	220
Aroclor 1248	9	30	ug/kg	NSA	9000	16000	NSA	NSA	220
Aroclor 1254	9	30	ug/kg	NSA	4400	67000	NSA	NSA	220
Aroclor 1260	9.5	1100	ug/kg	NSA	9000	150000	NSA	NSA	220
VOCS									
1,1,1-trichloroethane	1.65	280	ug/kg	NSA	10000000	20000	120000	NSA	8700000
1,1,2,2-tetrachloroethane	1.65	280	ug/kg	NSA	7700	84	1200	NSA	560
1,1,2-Trichloro-1,2,2-trifluoroethane	1.65	280	ug/kg	NSA	10000000	10000000	670000	NSA	43000000
1,1,2-trichloroethane	1.65	280	ug/kg	NSA	28000	500	1400	NSA	1100
1,1-dichloroethane	1.65	280	ug/kg	NSA	280000	3100	1600	NSA	3300

Table 5-6 - Limit of Detections of Compounds Compared to Screening Levels - Soil

Compound	Min LOD	Max LOD	Unit	US NRC NUREG/CR-5512	PA Act 2 MSCs (Residential) Residential Direct Contact (0-15 ft bgs) [1]	PA Act 2 MSCs (Residential)Soil to Groundwater [1]	PA Residential Volatilization to Indoor Air Criteria	US EPA Ecological Soil Screening Levels (EcoSSLs)	USEPA RSL's for Residential Soil
1,1-dichloroethene	1.65	280	ug/kg	NSA	3800000	700	5500	NSA	240000
1,2,4-trichlorobenzene	1.65	280	ug/kg	NSA	2200000	27000	NSA	NSA	22000
1,2-Dibromo-3-chloropropane	1.65	**280**	ug/kg	NSA	29	20	2300	NSA	5.4
1,2-dibromoethane	1.65	*280*	ug/kg	NSA	740	5	170	NSA	34
1,2-dichlorobenzene	1.65	280	ug/kg	NSA	3800000	60000	150000	NSA	1900000
1,2-dichloroethane	1.65	280	ug/kg	NSA	17000	500	490	NSA	430
1,2-dichloropropane	1.65	280	ug/kg	NSA	45000	500	520	NSA	940
1,3-dichlorobenzene	1.65	280	ug/kg	NSA	660000	61000	NSA	NSA	2400
1,4-dichlorobenzene	1.65	280	ug/kg	NSA	40000	10000	7500	NSA	2400
2-butanone	8.5	1400	ug/kg	NSA	10000000	400000	10000000	NSA	28000000
2-hexanone	8.5	1400	ug/kg	NSA	96000	1100	NSA	NSA	210000
4-methyl-2-pentanone	8.5	1400	ug/kg	NSA	10000000	290000	84000	NSA	5300000
Acetone	8.5	2800	ug/kg	NSA	10000000	3300000	110000000	NSA	61000000
Benzene	1.65	*440*	ug/kg	NSA	57000	500	370	NSA	1100
Bromodichloromethane	1.65	280	ug/kg	NSA	12000	8000	510	NSA	270
Bromoform	1.65	280	ug/kg	NSA	410000	8000	94000	NSA	62000
Bromomethane	1.65	280	ug/kg	NSA	96000	1000	950	NSA	7300
Carbon disulfide	1.65	280	ug/kg	NSA	10000000	150000	47000	NSA	820000
Carbon tetrachloride	1.65	*280*	ug/kg	NSA	30000	500	74	NSA	610
Chlorobenzene	1.65	280	ug/kg	NSA	960000	10000	9000	NSA	290000
Chloroethane	1.65	280	ug/kg	NSA	6200000	23000	1100	NSA	15000000
Chloroform	1.65	*280*	ug/kg	NSA	19000	8000	53	NSA	290
Chloromethane	1.65	280	ug/kg	NSA	250000	3000	380	NSA	120000
Cis-1,2-dichloroethene	1.65	280	ug/kg	NSA	2200000	7000	5400	NSA	160000
Cis-1,3-dichloropropene	1.65	280	ug/kg	NSA	NSA	NSA	NSA	NSA	1700
Cyclohexane	1.65	280	ug/kg	NSA	10000000	1700000	NSA	NSA	7000000
Dibromochloromethane	1.65	280	ug/kg	NSA	17000	8000	1300	NSA	680
Dichlorodifluoromethane	1.65	280	ug/kg	NSA	3900000	100000	1900	NSA	94000
Ethylbenzene	1.65	440	ug/kg	NSA	10000000	70000	5700	NSA	5400
Isopropylbenzene	1.65	9000	ug/kg	NSA	7700000	600000	360000	NSA	2100000
M,P-Xylene	3.35	550	ug/kg	NSA	NSA	NSA	NSA	NSA	NSA
Methyl acetate	1.65	280	ug/kg	NSA	10000000	3700000	14000000	NSA	78000000
Methyl tert-butyl ether	1.65	280	ug/kg	NSA	620000	2000	51000	NSA	43000
Methylcyclohexane	1.65	280	ug/kg	NSA	NSA	NSA	NSA	NSA	7000000
Methylene Chloride	1.65	280	ug/kg	NSA	950000	500	8100	NSA	56000

Table 5-6 - Limit of Detections of Compounds Compared to Screening Levels - Soil

Compound	Min LOD	Max LOD	Unit	US NRC NUREG/CR-5512	PA Act 2 MSCs (Residential) Residential Direct Contact (0-15 ft bgs) [1]	PA Act 2 MSCs (Residential)Soil to Groundwater [1]	PA Residential Volatilization to Indoor Air Criteria	US EPA Ecological Soil Screening Levels (EcoSSLs)	USEPA RSL's for Residential Soil
o-Xylene	1.65	280	ug/kg	NSA	NSA	NSA	55000	NSA	690000
Styrene	1.65	280	ug/kg	NSA	10000000	24000	720000	NSA	6300000
Tetrachloroethene	1.65	280	ug/kg	NSA	340000	500	5900	NSA	22000
Toluene	1.65	280	ug/kg	NSA	10000000	100000	76000	NSA	5000000
trans-1,2-dichloroethene	1.65	280	ug/kg	NSA	1100000	10000	4600	NSA	150000
trans-1,3-dichloropropene	1.65	280	ug/kg	NSA	NSA	NSA	NSA	NSA	1700
Trichloroethene	1.65	*3050*	ug/kg	NSA	260000	500	1300	NSA	910
Trichlorofluoromethane	1.65	280	ug/kg	NSA	10000000	200000	9600	NSA	790000
Vinyl chloride	1.65	*280*	ug/kg	NSA	1900	200	37	NSA	60
SVOCS									
1,1-biphenyl	165	3700	ug/kg	NSA	11000000	790000	NSA	NSA	51000
2,2-oxybis(1-chloropropane)	165	3700	ug/kg	NSA	44000	30000	NSA	NSA	4600
2,4,5-trichlorophenol	165	3700	ug/kg	NSA	22000000	2300000	NSA	NSA	6100000
2,4,6-trichlorophenol	165	3700	ug/kg	NSA	220000	11000	NSA	NSA	44000
2,4-dichlorophenol	165	3700	ug/kg	NSA	660000	2000	NSA	NSA	180000
2,4-dimethylphenol	165	3700	ug/kg	NSA	4400000	73000	NSA	NSA	1200000
2,4-dinitrophenol	165	3700	ug/kg	NSA	440000	7300	NSA	NSA	120000
2,4-dinitrotoluene	165	3700	ug/kg	NSA	58000	210	NSA	NSA	1600
2,6-dinitrotoluene	165	3700	ug/kg	NSA	220000	3700	NSA	NSA	61000
2-chloronaphthalene	165	3700	ug/kg	NSA	18000000	6200000	NSA	NSA	6300000
2-chlorophenol	165	3700	ug/kg	NSA	1100000	4400	NSA	NSA	390000
2-Methyl-4,6-dinitrophenol	165	3700	ug/kg	NSA	22000	370	NSA	NSA	4900
2-methylnaphthalene	165	3700	ug/kg	NSA	880000	600000	NSA	NSA	230000
2-methylphenol	165	3700	ug/kg	NSA	11000000	180000	NSA	NSA	3100000
2-nitroaniline	165	3700	ug/kg	NSA	660000	11000	NSA	NSA	610000
2-nitrophenol	165	3700	ug/kg	NSA	1800000	29000	NSA	NSA	2900
3&4-methylphenol	165	3700	ug/kg	NSA	NSA	NSA	NSA	NSA	6100000
3,3-dichlorobenzidine	165	3700	ug/kg	NSA	40000	8300	NSA	NSA	1100
3-nitroaniline	165	3700	ug/kg	NSA	66000	1100	NSA	NSA	6100
4-bromophenyl phenyl ether	165	3700	ug/kg	NSA	NSA	NSA	NSA	NSA	NSA
4-chloro-3-methylphenol	165	3700	ug/kg	NSA	1100000	37000	NSA	NSA	6100000
4-chloroaniline	165	3700	ug/kg	NSA	90000	420	NSA	NSA	2400
4-nitroaniline	165	3700	ug/kg	NSA	880000	3300	NSA	NSA	24000
4-nitrophenol	165	3700	ug/kg	NSA	1800000	6000	NSA	NSA	30000
Acenaphthene	165	3700	ug/kg	NSA	13000000	2700000	NSA	29000	3400000

Table 5-6 - Limit of Detections of Compounds Compared to Screening Levels - Soil

Compound	Min LOD	Max LOD	Unit	US NRC NUREG/CR-5512	PA Act 2 MSCs (Residential) Residential Direct Contact (0-15 ft bgs) [1]	PA Act 2 MSCs (Residential)Soil to Groundwater [1]	PA Residential Volatilization to Indoor Air Criteria	US EPA Ecological Soil Screening Levels (EcoSSLs)	USEPA RSL's for Residential Soil
Acenaphthylene	165	3700	ug/kg	NSA	13000000	2500000	NSA	29000	3400000
Acetophenone	165	3700	ug/kg	NSA	10000000	370000	NSA	NSA	7800000
Anthracene	165	3700	ug/kg	NSA	66000000	350000	NSA	29000	17000000
Atrazine	165	3700	ug/kg	NSA	78000	300	NSA	NSA	2100
Benzaldehyde	165	3700	ug/kg	NSA	NSA	NSA	NSA	NSA	7800000
Benzo[a]anthracene	165	*3700*	ug/kg	NSA	5700	25000	NSA	1100	150
Benzo[a]pyrene	165	***3700***	ug/kg	NSA	570	46000	NSA	1100	15
Benzo[b]fluoranthene	165	*3700*	ug/kg	NSA	5700	40000	NSA	1100	150
Benzo[g,h,i]perylene	165	*3700*	ug/kg	NSA	13000000	180000	NSA	1100	1700000
Benzo[k]fluoranthene	165	*3700*	ug/kg	NSA	57000	610000	NSA	1100	1500
Benzyl butyl phthalate	165	3700	ug/kg	NSA	9400000	3000000	NSA	NSA	260000
Bis(2-chloroethoxy) methane	165	3700	ug/kg	NSA	660000	11000	NSA	NSA	180000
Bis(2-chloroethyl) ether	165	**3700**	ug/kg	NSA	1300	15	NSA	NSA	210
Bis(2-ethylhexyl) phthalate	165	3700	ug/kg	NSA	1300000	130000	NSA	NSA	35000
Caprolactam	165	3700	ug/kg	NSA	NSA	NSA	NSA	NSA	31000000
Carbazole	165	3700	ug/kg	NSA	900000	21000	NSA	NSA	NSA
Chrysene	165	*3700*	ug/kg	NSA	570000	230000	NSA	1100	15000
Dibenz[a,h]anthracene	165	***3700***	ug/kg	NSA	570	13000	NSA	1100	15
Dibenzofuran	165	3700	ug/kg	NSA	220000	95000	NSA	NSA	78000
Diethyl phthalate	165	3700	ug/kg	NSA	10000000	2900000	NSA	NSA	49000000
Dimethyl phthalate	165	3700	ug/kg	NSA	NSA	NSA	NSA	NSA	NSA
Di-n-butyl phthalate	165	3700	ug/kg	NSA	10000000	1500000	NSA	NSA	6100000
Di-n-octyl phthalate	165	3700	ug/kg	NSA	8800000	10000000	NSA	NSA	6100000
Fluoranthene	165	3700	ug/kg	NSA	8800000	3200000	NSA	29000	2300000
Fluorene	165	3700	ug/kg	NSA	8800000	3000000	NSA	29000	2300000
Hexachloro-1,3-butadiene	165	3700	ug/kg	NSA	220000	10000	NSA	NSA	6200
Hexachlorocyclopentadiene	165	3700	ug/kg	NSA	1300000	91000	NSA	NSA	370000
Hexachloroethane	165	3700	ug/kg	NSA	110000	560	NSA	NSA	12000
Indeno[1,2,3-c,d]pyrene	165	*3700*	ug/kg	NSA	5700	2200000	NSA	1100	150
Isophorone	165	3700	ug/kg	NSA	10000000	10000	NSA	NSA	510000
Naphthalene	165	3700	ug/kg	NSA	4400000	25000	NSA	29000	3600
Nitrobenzene	165	3700	ug/kg	NSA	440000	7300	NSA	NSA	4800
N-nitrosodi-n-propylamine	165	**3700**	ug/kg	NSA	2600	9.4	NSA	NSA	69
N-nitrosodiphenylamine	165	3700	ug/kg	NSA	3700000	20000	NSA	NSA	99000
Pentachlorophenol	165	*3700*	ug/kg	NSA	150000	5000	NSA	2100	890

Table 5-6 - Limit of Detections of Compounds Compared to Screening Levels - Soil

Compound	Min LOD	Max LOD	Unit	US NRC NUREG/CR-5512	PA Act 2 MSCs (Residential) Residential Direct Contact (0-15 ft bgs) [1]	PA Act 2 MSCs (Residential)Soil to Groundwater [1]	PA Residential Volatilization to Indoor Air Criteria	US EPA Ecological Soil Screening Levels (EcoSSLs)	USEPA RSL's for Residential Soil
Phenanthrene	165	3700	ug/kg	NSA	66000000	10000000	NSA	29000	17000000
Phenol	165	10000	ug/kg	NSA	66000000	200000	NSA	NSA	18000000
Pyrene	165	*3700*	ug/kg	NSA	6600000	2200000	NSA	1100	1700000
Explosives									
Nitroglycerin	950	12000	ug/kg	NSA	22000	500	NSA	NSA	6100
Pentaerythritol tetranitrate	95	1200	ug/kg	NSA	NSA	NSA	NSA	NSA	120000
Cyanide									
Cyanide	0.133	0.166	mg/kg	NSA	4400	200	NSA	NSA	47

(1) Pennsylvania Act 1995-2, known as "Act 2", established a program for recycling existing industrial and commercial sites. Values are from Chapter 250 of the Pennsylvania Code, "Administration of Land Recycling Program", Subchapter C, "Statewide Health Standards", Appendix A, "Medium-Specific Concentrations" tables, revisions effective 1/8/2011.

Notes:

PA Residential Volatilization to Indoor Air Criteria-Pennsylvania soil screening values for protection of indoor air.

US EPA Ecological Soil Screening Levels (EcoSSLs), Values shown for PAHs are the EcoSSLs for Total HMW PAHs (1.1 mg/kg) or Total LMW PAHs (29 mg/kg), as appropriate.

US EPA Regional Screening Level for Residential Soil, May 2012.

NSA- No Screening Level Available.

LOD - Limit of Detection.

Bolded values exceed US NRC NUREG/CR-5512 for Gamma Spectroscopy samples only.

Bolded values exceed Residential Direct Contact (0-15 ft bgs).

Gray shaded values exceed Soil to Groundwater.

Values that are *Italicized* exceed US EPA Ecological Soil Screening Levels (EcoSSLs).

Values that are *Italicized* exceed PA Residential Volatilization to indoor air for VOCS only.

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Table 5-7 - Limit of Detections of Compounds Compared to Screening Levels - Groundwater

Compound	Min LOD	Max LOD	Unit	US EPA MCL for Radionuclides	Act 2 MSC (Residential, Used Aquifer)[1]	PA Residential Volatilization to Indoor Air Criteria
Gross Alpha/Beta						
Alpha	0.5	**22**	pCi/l	15	NSA	NSA
Beta	2.6	44	pCi/l	50	NSA	NSA
Gamma Spectroscopy						
Radium-228	0.15	1.8	pCi/l	5	NSA	NSA
Radium-226	0.05	0.6	pCi/l	5	NSA	NSA
Inorganics						
Aluminum	25	25	ug/l	NSA	NSA	NSA
Antimony	12.5	12.5	ug/l	NSA	6	NSA
Arsenic	5	5	ug/l	NSA	10	NSA
Barium	25	25	ug/l	NSA	2000	NSA
Beryllium	1.5	1.5	ug/l	NSA	4	NSA
Cadmium	1.5	1.5	ug/l	NSA	5	NSA
Calcium	500	500	ug/l	NSA	NSA	NSA
Chromium	2.5	2.5	ug/l	NSA	100	NSA
Cobalt	7.5	7.5	ug/l	NSA	11	NSA
Copper	5	5	ug/l	NSA	1000	NSA
Iron	25	25	ug/l	NSA	NSA	NSA
Lead	3	3	ug/l	NSA	5	NSA
Magnesium	500	500	ug/l	NSA	NSA	NSA
Manganese	5	5	ug/l	NSA	300	NSA
Nickel	10	10	ug/l	NSA	100	NSA
Potassium	500	500	ug/l	NSA	NSA	NSA
Selenium	5	5	ug/l	NSA	50	NSA
Silver	2.5	2.5	ug/l	NSA	100	NSA
Sodium	500	500	ug/l	NSA	NSA	NSA
Thallium	10	10	ug/l	NSA	2	NSA
Vanadium	10	10	ug/l	NSA	260	NSA
Zinc	10	10	ug/l	NSA	2000	NSA
Antimony	1	1	ug/l	NSA	6	NSA
Thallium	0.5	0.5	ug/l	NSA	2	NSA
Uranium-238	0.5	0.5	ug/l	30	NSA	NSA

Table 5-7 - Limit of Detections of Compounds Compared to Screening Levels - Groundwater

Compound	Min LOD	Max LOD	Unit	US EPA MCL for Radionuclides	Act 2 MSC (Residential, Used Aquifer)[1]	PA Residential Volatilization to Indoor Air Criteria
Mercury	0.1	0.1	ug/l	NSA	2	NSA
VOCS						
1,1,1-trichloroethane	0.5	1250	ug/l	NSA	200	NSA
1,1,2,2-tetrachloroethane	0.5	1250	ug/l	NSA	0.84	3700
1,1,2-Trichloro-1,2,2-trifluoroeth	0.5	1250	ug/l	NSA	63000	NSA
1,1,2-trichloroethane	0.5	1250	ug/l	NSA	5	5400
1,1-dichloroethane	0.5	1250	ug/l	NSA	31	160000
1,1-dichloroethene	0.5	1250	ug/l	NSA	7	160000
1,2,3-trichlorobenzene	2.5	2.5	ug/l	NSA	NSA	NSA
1,2,4-trichlorobenzene	0.5	1250	ug/l	NSA	70	NSA
1,2-Dibromo-3-chloropropane	0.5	1250	ug/l	NSA	0.2	4300
1,2-dibromoethane	0.5	*1250*	ug/l	NSA	0.05	620
1,2-dichlorobenzene	0.5	1250	ug/l	NSA	600	NSA
1,2-dichloroethane	0.5	1250	ug/l	NSA	5	2800
1,2-dichloropropane	0.5	1250	ug/l	NSA	5	3900
1,3-dichlorobenzene	0.5	1250	ug/l	NSA	600	NSA
1,4-dichlorobenzene	0.5	1250	ug/l	NSA	75	8100
1,4-dioxane	50	50	ug/l	NSA	6.4	NSA
2-butanone	2.5	6000	ug/l	NSA	4000	49000000
2-hexanone	2.5	6000	ug/l	NSA	11	NSA
4-methyl-2-pentanone	2.5	6000	ug/l	NSA	2900	540000
Acetone	2.5	12500	ug/l	NSA	33000	NSA
Benzene	0.5	2500	ug/l	NSA	5	3500
Bromochloromethane	2.5	2.5	ug/l	NSA	90	84000
Bromodichloromethane	0.5	1250	ug/l	NSA	80	1600
Bromoform	0.5	1250	ug/l	NSA	80	180000
Bromomethane	0.5	1250	ug/l	NSA	10	4500
Carbon disulfide	0.5	1250	ug/l	NSA	1500	550000
Carbon tetrachloride	0.5	1250	ug/l	NSA	5	1400
Chlorobenzene	0.5	1250	ug/l	NSA	100	27000
Chloroethane	0.5	1250	ug/l	NSA	230	22000
Chloroform	0.5	*1250*	ug/l	NSA	80	410

Table 5-7 - Limit of Detections of Compounds Compared to Screening Levels - Groundwater

Compound	Min LOD	Max LOD	Unit	US EPA MCL for Radionuclides	Act 2 MSC (Residential, Used Aquifer)[1]	PA Residential Volatilization to Indoor Air Criteria
Chloromethane	0.5	1250	ug/l	NSA	30	17000
Cis-1,2-dichloroethene	0.5	1250	ug/l	NSA	70	42000
Cis-1,3-dichloropropene	0.5	1250	ug/l	NSA	NSA	NSA
Cyclohexane	0.5	1250	ug/l	NSA	13000	NSA
Dibromochloromethane	0.5	1250	ug/l	NSA	80	3800
Dichlorodifluoromethane	0.5	1250	ug/l	NSA	1000	110000
Ethylbenzene	0.5	2500	ug/l	NSA	700	27000
Isopropylbenzene	0.5	2500	ug/l	NSA	840	NSA
M,P-Xylene	1	2500	ug/l	NSA	NSA	NSA
Methyl acetate	0.5	1250	ug/l	NSA	37000	68000000
Methyl tert-butyl ether	0.5	1250	ug/l	NSA	20	380000
Methylcyclohexane	0.5	1250	ug/l	NSA	NSA	NSA
Methylene Chloride	0.5	1250	ug/l	NSA	5	77000
o-Xylene	0.5	1250	ug/l	NSA	NSA	130000
Styrene	0.5	1250	ug/l	NSA	100	NSA
Tetrachloroethene	0.5	1250	ug/l	NSA	5	42000
Toluene	0.5	1250	ug/l	NSA	1000	490000
trans-1,2-dichloroethene	0.5	1250	ug/l	NSA	100	59000
trans-1,3-dichloropropene	0.5	1250	ug/l	NSA	NSA	NSA
Trichloroethene	0.5	1250	ug/l	NSA	5	14000
Trichlorofluoromethane	0.5	1250	ug/l	NSA	2000	520000
Vinyl chloride	0.5	1250	ug/l	NSA	2	1800
SVOCS						
1,1-biphenyl	5	26.5	ug/l	NSA	1800	NSA
1,2,4,5-tetrachlorobenzene	5	26.5	ug/l	NSA	11	NSA
2,2-oxybis(1-chloropropane)	5	26.5	ug/l	NSA	300	NSA
2,3,4,6-tetrachlorophenol	5	26.5	ug/l	NSA	1100	NSA
2,4,5-trichlorophenol	5	26.5	ug/l	NSA	3700	NSA
2,4,6-trichlorophenol	5	26.5	ug/l	NSA	37	NSA
2,4-dichlorophenol	0.05	26.5	ug/l	NSA	20	NSA
2,4-dimethylphenol	0.05	26.5	ug/l	NSA	730	NSA
2,4-dinitrophenol	5	26.5	ug/l	NSA	73	NSA

Table 5-7 - Limit of Detections of Compounds Compared to Screening Levels - Groundwater

Compound	Min LOD	Max LOD	Unit	US EPA MCL for Radionuclides	Act 2 MSC (Residential, Used Aquifer)[1]	PA Residential Volatilization to Indoor Air Criteria
2,4-dinitrotoluene	5	26.5	ug/l	NSA	2.1	NSA
2,6-dinitrotoluene	5	26.5	ug/l	NSA	37	NSA
2-chloronaphthalene	5	26.5	ug/l	NSA	2900	NSA
2-chlorophenol	5	26.5	ug/l	NSA	40	NSA
2-Methyl-4,6-dinitrophenol	5	26.5	ug/l	NSA	3.7	NSA
2-methylnaphthalene	5	26.5	ug/l	NSA	150	NSA
2-methylphenol	5	26.5	ug/l	NSA	1800	NSA
2-nitroaniline	5	26.5	ug/l	NSA	110	NSA
2-nitrophenol	5	26.5	ug/l	NSA	290	NSA
3&4-methylphenol	5	50	ug/l	NSA	NSA	NSA
3,3-dichlorobenzidine	5	26.5	ug/l	NSA	1.5	NSA
3-nitroaniline	5	26.5	ug/l	NSA	11	NSA
4-bromophenyl phenyl ether	5	26.5	ug/l	NSA	NSA	NSA
4-chloro-3-methylphenol	5	26.5	ug/l	NSA	180	NSA
4-chloroaniline	5	26.5	ug/l	NSA	3.3	NSA
4-chlorophenyl phenyl ether	5	26.5	ug/l	NSA	NSA	NSA
4-nitroaniline	5	26.5	ug/l	NSA	33	NSA
4-nitrophenol	5	26.5	ug/l	NSA	60	NSA
Acenaphthene	0.05	26.5	ug/l	NSA	2200	NSA
Acenaphthylene	0.05	26.5	ug/l	NSA	2200	NSA
Acetophenone	5	2600	ug/l	NSA	3700	NSA
Anthracene	0.05	26.5	ug/l	NSA	66	NSA
Atrazine	5	26.5	ug/l	NSA	3	NSA
Benzaldehyde	5	26.5	ug/l	NSA	NSA	NSA
Benzo[a]anthracene	0.05	26.5	ug/l	NSA	0.29	NSA
Benzo[a]pyrene	0.05	26.5	ug/l	NSA	0.2	NSA
Benzo[b]fluoranthene	0.05	26.5	ug/l	NSA	0.29	NSA
Benzo[g,h,i]perylene	0.05	26.5	ug/l	NSA	0.26	NSA
Benzo[k]fluoranthene	0.05	26.5	ug/l	NSA	0.55	NSA
Benzyl butyl phthalate	5	26.5	ug/l	NSA	350	NSA
Bis(2-chloroethoxy) methane	5	26.5	ug/l	NSA	110	NSA
Bis(2-chloroethyl) ether	0.05	26.5	ug/l	NSA	0.15	NSA

Table 5-7 - Limit of Detections of Compounds Compared to Screening Levels - Groundwater

Compound	Min LOD	Max LOD	Unit	US EPA MCL for Radionuclides	Act 2 MSC (Residential, Used Aquifer)[1]	PA Residential Volatilization to Indoor Air Criteria
Bis(2-ethylhexyl) phthalate	0.05	26.5	ug/l	NSA	6	NSA
Caprolactam	5	26.5	ug/l	NSA	NSA	NSA
Carbazole	5	26.5	ug/l	NSA	33	NSA
Chrysene	0.05	26.5	ug/l	NSA	1.9	NSA
Dibenz[a,h]anthracene	0.05	26.5	ug/l	NSA	0.029	NSA
Dibenzofuran	5	26.5	ug/l	NSA	37	NSA
Diethyl phthalate	5	26.5	ug/l	NSA	29000	NSA
Dimethyl phthalate	5	26.5	ug/l	NSA	NSA	NSA
Di-n-butyl phthalate	5	26.5	ug/l	NSA	3700	NSA
Di-n-octyl phthalate	5	26.5	ug/l	NSA	1500	NSA
Fluoranthene	0.05	26.5	ug/l	NSA	260	NSA
Fluorene	0.05	26.5	ug/l	NSA	1500	NSA
Hexachloro-1,3-butadiene	0.05	26.5	ug/l	NSA	8.5	NSA
Hexachlorobenzene	0.05	26.5	ug/l	NSA	1	NSA
Hexachlorocyclopentadiene	5	26.5	ug/l	NSA	50	NSA
Hexachloroethane	5	26.5	ug/l	NSA	1	NSA
Indeno[1,2,3-c,d]pyrene	0.05	26.5	ug/l	NSA	0.29	NSA
Isophorone	0.055	26.5	ug/l	NSA	100	NSA
Naphthalene	0.05	26.5	ug/l	NSA	100	NSA
Nitrobenzene	0.05	26.5	ug/l	NSA	73	NSA
N-nitrosodi-n-propylamine	5	26.5	ug/l	NSA	0.094	NSA
N-nitrosodiphenylamine	5	26.5	ug/l	NSA	130	NSA
Pentachlorophenol	0.05	26.5	ug/l	NSA	1	NSA
Phenanthrene	0.05	26.5	ug/l	NSA	1100	NSA
Phenol	0.05	13000	ug/l	NSA	2000	NSA
Pyrene	0.05	26.5	ug/l	NSA	130	NSA

Table 5-7 - Limit of Detections of Compounds Compared to Screening Levels - Groundwater

Compound	Min LOD	Max LOD	Unit	US EPA MCL for Radionuclides	Act 2 MSC (Residential, Used Aquifer)[1]	PA Residential Volatilization to Indoor Air Criteria
Explosives						
1,3,5-Trinitrobenzene	0.1	0.135	ug/l	NSA	NSA	NSA
1,3-Dinitrobenzene	0.1	0.135	ug/l	NSA	1	NSA
2,4,6-trinitrotoluene	0.1	0.135	ug/l	NSA	2	NSA
2,4-dinitrotoluene	0.1	0.135	ug/l	NSA	2.1	NSA
2,6-dinitrotoluene	0.1	0.135	ug/l	NSA	37	NSA
2-amino-4,6-dinitrotoluene	0.1	0.135	ug/l	NSA	NSA	NSA
2-nitrotoluene	0.2	0.265	ug/l	NSA	NSA	NSA
3,5-Dinitroaniline	0.2	0.235	ug/l	NSA	NSA	NSA
3-nitrotoluene	0.2	0.265	ug/l	NSA	NSA	NSA
4-amino-2,6-dinitrotoluene	0.1	0.135	ug/l	NSA	NSA	NSA
4-Nitrotoluene	0.2	0.265	ug/l	NSA	NSA	NSA
HMX	0.2	0.265	ug/l	NSA	400	NSA
Nitrobenzene	0.1	0.135	ug/l	NSA	73	NSA
Nitroglycerin	10	13.5	ug/l	NSA	5	NSA
Pentaerythritol tetranitrate	0.5	0.65	ug/l	NSA	NSA	NSA
RDX	0.2	0.265	ug/l	NSA	2	NSA
Tetryl	0.2	0.265	ug/l	NSA	NSA	NSA
Cyanide						
Cyanide	0.0025	0.0025	mg/l	NSA	0.2	NSA

(1) Pennsylvania Act 1995-2, known as "Act 2", established a program for recycling existing industrial and commercial sites. Values are from Chapter 250 of the Pennsylvania Code, "Administration of Land Recycling Program", Subchapter C, "Statewide Health Standards", Appendix A, "Medium-Specific Concentrations" tables, revisions effective 1/8/2011

Notes:

PA Residential Volatilization to Indoor Air Criteria-Pennsylvania groundwater screening values for protection of indoor air.

NSA- No Screening Level Available.

LOD- Limit of Detection.

Bolded values exceed the US EPA MCL for Gross Alpha/Beta and Gamma Spectroscopy only.

Gray Shaded Values exceed the Act 2 MSC.

Values that are *Italicized* exceed the Volatilization to Indoor Air Criteria.

6. NATURE AND EXTENT

The primary goal of this RI is to assess potential environmental impacts to the FFA resulting from former DoD use of the property. Surface and subsurface soil samples were collected and a groundwater investigation was initiated in Area II to accomplish this goal. Groundwater investigations as part of this RI are intended to address soil driven impacts; groundwater will be evaluated as a separate operable unit (OU) investigation (Area IV).

6.1 SCREENING CRITERIA

The primary use of analytical laboratory data is to assess the concentration of targeted analytes to evaluate whether concentrations exceed identified screening criteria in support of the demonstration of attainment of an Act 2 Standard. For this evaluation, laboratory sample results will be compared to the PADEP SHS. Radionuclide soil data were compared to NRC Residual Radioactive Contamination from Decommissioning Parameter Analysis (USNRC NUREG/CR-5512) screening criteria since there are no SHS for radionuclides. Radionuclide water data were compared to the applicable USEPA maximum contaminant level (MCL).

For soil, the applicable screening criteria are:

- PADEP residential direct contact (RDC) soil MSCs to assess for direct contact
- PADEP residential soil screening values for protection of indoor air to assess inhalation
- PADEP soil-to-groundwater (SGW) MSCs to assess potential impact to groundwater
- USNRC NUREG/CR-5512 to assess direct contact for radionuclides
- TSCA site-specific soil screening limit for the level for high-occupancy areas with unrestricted future use for PCBs.

For groundwater, the applicable screening criteria are:

- PADEP residential MSCs for used aquifers to assess direct contact
- PADEP residential groundwater screening values for protection of indoor air to assess inhalation
- USEPA MCLs to assess radionuclide direct contact

6.2 SOIL ANALYTICAL RESULTS

A total of 410 soil samples were collected between December 2011 and May 2012 at the FFA. Soil samples collected at the FFA included characterization soil samples (surface, biased, and unbiased), delineation soil samples (based on the identified impact from the initial

characterization samples), and samples collected adjacent to transformer substations. All soil samples are summarized within Sections 6.2.1 through 6.2.8 below based on the type of analysis.

6.2.1 Metals

A total of 321 soil samples from unbiased, biased, and delineation locations were submitted for analysis of TAL metals and mercury, and a total of 73 soil samples from unbiased, biased, and delineation locations were submitted for analysis of arsenic, lead, and cadmium. Metals detected above the laboratory reporting limits for all soil samples are summarized on Table 6-1. Sample locations and results above screening criteria are depicted on Figure 6-1 for Zone 1, Figure 6-2 for Zone 2, and Figure 6-3 for Zone 3. Sample results are discussed by zone as follows.

6.2.1.1 Zone 1 − Surface Soil Samples

A total of 66 surface soil samples (including 4 field duplicates) were collected from 61 unbiased locations (UBZ1-1 to UBZ1-61) and 1 biased location (BZ1-1) in Zone 1 and submitted for laboratory analysis of arsenic, lead, and cadmium. Individual descriptions of the exceedances for arsenic and lead are summarized below.

- **Arsenic** was detected above the RDC MSC of 12 mg/kg in 29 surface soil samples, with the highest concentration of 38.7 mg/kg detected within sample UBZ1-SO-01 (located within the northwestern portion of Zone 1).

- **Arsenic** was detected above the SGW MSC of 29 mg/kg within three surface soil samples, ranging from 33.1 mg/kg within sample UBZ1-SO-11 (located within the north-central portion of Zone 1) to 38.7 mg/kg within sample UBZ1-SO-01.

- **Lead** was detected above the RDC MSC of 500 mg/kg within 28 surface soil samples, with the highest concentration of 4,390 mg/kg (J-qualified estimated concentration) detected within sample UBZ1-SO-41 (located within the southwestern portion of Zone 1).

- **Lead** was detected above the SGW MSC of 450 mg/kg in 31 surface soil samples, ranging from 456 mg/kg in two sample locations (UBZ1-SO-08 and UBZ1-SO-50) to 4,390 mg/kg (J-qualified estimated concentration) detected at sample location UBZ1-SO-41.

Both arsenic and lead were co-located and reported in concentrations exceeding the RDC MSC at 14 surface soil sample locations in Zone 1, with the majority of RDC MSC exceedances being located within the western to southwestern portion of Zone 1. Cadmium was not detected above either the RDC MSC (110 mg/kg) or SGW MSC (38 mg/kg) in any of the 61 surface soil sample locations.

6.2.1.2 Zone 1 − Subsurface Soil Samples

A total of 15 biased subsurface soil samples (including 1 field duplicate) were collected from 6 soil boring locations in Zone 1 and submitted to the laboratory for analysis of TAL metals and mercury. Two TAL metals, arsenic and lead, exceeded RDC MSC and SGW MSC criteria in 2 of the 15 subsurface soil samples collected within Zone 1. Individual descriptions of the exceedances for lead and arsenic metals are summarized below.

- **Arsenic** exceeded the RDC MSC (12 mg/kg) in one sample located within the north-central portion of Zone 1 (BZ1-SO-02) with a detection of 22.6 mg/kg.

- **Lead** exceeded both RDC and SGW MSCs in two subsurface soil samples (BZ1-SO-02 and BZ1-SO-05) with detections of 2,760 and 913 mg/kg (J-qualified estimated concentration), respectively.

No other metals were detected above their respective MSCs.

6.2.1.3 Zone 1 – Delineation Samples

A total of 39 delineation soil samples (including three field duplicates) were collected from 12 sample locations in Zone 1 and submitted for laboratory analysis of arsenic, lead, and cadmium. The purpose of these samples was to further delineate the general horizontal and vertical extent of arsenic and lead impact in Zone 1 surface soils. Delineation samples were collected at the following intervals: 0.5-1 ft bgs, 1-2ft bgs, and 3-4 ft bgs. Individual descriptions of the exceedances for arsenic and lead are summarized below.

- **Arsenic** was detected above the RDC MSC (12 mg/kg) in 10 delineation samples, ranging in depth between 6 in. and 4 ft bgs, with the highest concentration being 32.1 mg/kg (Z1D01) collected between 0.5 and 1 ft bgs.

- **Arsenic** was detected above the SGW MSC of 29 mg/kg within two samples (Z1D01 at 32.1 mg/kg [J-qualified estimated concentration] and Z1D08 at 31.4 mg/kg) collected between 0.5 and 1 ft bgs.

- **Lead** was detected above the RDC MSC of 500 mg/kg within four delineation samples, ranging in depth between 0 and 4 ft bgs, with the highest concentration being 8,860 mg/kg (Z1D07) collected between 0.5 and 1 ft bgs.

- **Lead** was detected above the SGW MSC of 450 mg/kg in six delineation samples, ranging in depth between 0 and 4 ft bgs, between 485 and 8,860 mg/kg.

Both arsenic and lead were detected above the RDC MSC at one delineation location (Z1D07), collected between 0.5 and 1 ft bgs, within the central portion of Zone 1 (west of Building 15) at 26.4 mg/kg (arsenic) and 8,860 mg/kg (lead), respectively. Cadmium was not detected above either the RDC MSC (110 mg/kg) or SGW MSC (38 mg/kg) in any of the samples.

6.2.1.4 Zone 2 – Unbiased Soil Samples

A total of 95 unbiased soil samples (including 5 field duplicates) were collected from 47 soil boring locations in Zone 2, between depths of 0 ft (surface) and 28 ft bgs, and submitted to the laboratory for analysis of TAL metals and mercury analysis. One metal, lead, was detected in exceedance of the RDC MSC within three samples. Two metals, lead and manganese, were detected in exceedance of the SGW MSC within four samples. Individual descriptions of the exceedances for lead and manganese are summarized below.

- **Lead** was detected in exceedance of the Act 2 MSC of 500 mg/kg and the SGW MSC of 450 mg/kg within three samples including 522 mg/kg (UBZ2-SO-17, J-qualified estimated concentration), 1,980 mg/kg (UBZ2-SO-26, J-qualified estimated concentration), and 15,600 mg/kg (UBZ2-SO-45, J-qualified estimated concentration). All three samples were collected between 0 and 2 ft bgs. The two samples with the highest exceedances of lead (UBZ2-SO-26 and UBZ2-SO-45) were both located on the western to southwestern portion of Zone 2.

- **Manganese** was detected in exceedance of the SGW MSC of 2,000 mg/kg within one sample (UBZ2-SO-32) at 2,560 mg/kg. This sample was also located on the western portion of Zone 2 and was collected between 0 and 1 ft bgs.

No other metals were detected above their respective MSCs.

6.2.1.5 Zone 2 – Biased Soil Samples

A total of 14 biased soil samples were collected from 8 soil boring locations from Zone 2, between depths of 0 and 12 ft bgs, and submitted to the laboratory for analysis of TAL metals and mercury analysis. One metal, **arsenic**, was detected in exceedance of the RDC MSC in four samples and the SGW MSC in one sample. Arsenic was detected in exceedance of the RDC MSC (12 mg/kg) and SGW MSC (29 mg/kg) within sample BZ2-SO-06 at 29.4 mg/kg collected at a depth between 13 and 14 ft bgs. Arsenic was detected in exceedance of the RDC MSC (12 mg/kg) within four samples (including BZ2-SO-06 at 29.4 mg/kg):

- Sample BZ2-SO-06 at 14.3 mg/kg (collected at a depth between 3 and 4 ft bgs);
- Sample BZ2-SO-06 at 29.4 mg/kg (collected at a depth between 13 and 14 ft bgs);
- Sample BZ2-SO-05 at 17 mg/kg (collected at a depth between 3 and 4 ft bgs); and
- Sample UBZ2-SO-26 at 16.5 mg/kg (collected at a depth between 0 and 1 ft bgs).

No other metals were detected above their respective MSCs.

6.2.1.6 Zone 2 – Delineation Samples

A total of seven delineation soil samples (including one field duplicate) were collected from six locations in Zone 2 and submitted to the laboratory for TAL metals and mercury analysis (Figure 6-2). Delineation samples were collected at depths between 1 and 5 ft bgs. None of the

delineation soil samples exceeded either RDC or SGW MSC criteria for TAL metals or mercury analysis.

6.2.1.7 Zone 3 – Unbiased Soil Samples

A total of 137 unbiased soil samples (including 5 field duplicates) were collected from 63 unbiased locations in Zone 3, between depths of 0 and 40 ft bgs, and submitted for laboratory analysis of TAL metals and mercury analysis. Two metals, arsenic and lead, were detected in exceedance of the RDC MSC within 26 samples. Four metals, antimony, arsenic, lead, and mercury, were detected in exceedance of the SGW MSC within 19 samples. Individual descriptions of the exceedances for antimony, arsenic, lead, and mercury are summarized below.

- **Antimony** was detected above the SGW MSC of 27 mg/kg in four unbiased soil samples, ranging in depth between 0 and 7 ft bgs, with the highest concentration being 230 mg/kg (J-qualified estimated concentration; UBZ3-SO-19) collected between 0 and 2 ft bgs.

- **Antimony** was detected above the RDC MSC of 88 mg/kg in one unbiased soil sample (UBZ3-SO-19 at 230 mg/kg [J-qualified estimated concentration]) collected between 0 and 2 ft bgs.

- **Arsenic** was detected above the RDC MSC (12 mg/kg) in 15 unbiased soil samples, ranging in depth between 0 and 40 ft bgs, with the highest concentration being 52.5 mg/kg (UBZ3-SO-63) collected between 5 and 7 ft bgs.

- **Arsenic** was detected above the SGW MSC of 29 mg/kg within four samples (UBZ3-SO-07; UBZ3-SO-24; UBZ3-SO-39; UBZ3-SO-63), with the highest concentration being 52.5 mg/kg collected between 0.5 and 13 ft bgs.

- **Lead** was detected above the RDC MSC of 500 mg/kg and above the SGW MSC of 450 mg/kg within 10 unbiased soil samples, ranging in depth between 0 and 7 ft bgs, with the highest concentration being 12,700 mg/kg (J-qualified estimated concentration; UBZ3-SO-19) collected between 0 and 2 ft bgs.

- **Mercury** was detected above the SGW MSC of 10 mg/kg within one unbiased soil sample, UBZ3-SO-41, at a concentration of 10.8 mg/kg (J-qualified estimated concentration) at a depth of 1 to 3 ft bgs.

No other metals were detected above their respective MSCs.

6.2.1.8 Zone 3 – Biased Soil Samples

A total of 33 biased soil samples (including 2 field duplicates) were collected from 14 biased locations in Zone 3, between depths of 0 and 15 ft bgs, and submitted for laboratory analysis of TAL metals and mercury analysis. Only one metal, **antimony**, exceeded the SGW MSC within one sample within Zone 3. Antimony was detected above the SGW MSC of 27 mg/kg within one biased soil sample, BZ3-SO-01, at a concentration of 28.4 mg/kg (L-qualified low bias

concentration) at a depth of 0 to 1 ft bgs. No other metals were detected above their respective MSCs.

6.2.1.9 Zone 3 – Delineation Samples

A total of 13 delineation soil samples (including 2 field duplicates) were collected from 5 soil boring locations in Zone 3 and submitted to the laboratory for TAL metals and mercury analysis. Delineation samples were collected at depths between 0 and 15 ft bgs. One metal, **arsenic**, was detected in exceedance of the RDC MSC within two samples. Arsenic was detected in exceedance of the RDC MSC (12 mg/kg) within sample Z3D18 at 20.8 mg/kg, collected at a depth between 0 and 2 ft bgs, and Z3D19 at 26.4 mg/kg, collected at a depth between 0 and 2 ft bgs. Neither sample Z3D18 or Z3D19 exceeded the SGW MSC of 29 mg/kg for arsenic. No other metals were detected above their respective MSCs.

6.2.1.10 Permanent Monitoring Well Borings

A total of 12 permanent well soil boring samples (including 1 field duplicate) were collected from 11 permanent well locations, between depths of 0 and 12 ft bgs, and submitted for laboratory analysis of TAL metals and mercury. Only one metal, arsenic, exceeded the RDC MSC within two samples collected. **Arsenic** was detected in exceedance of the RDC (12 mg/kg) within sample MW-23 at 13.7 mg/kg, collected at a depth between 0 and 2 ft bgs, and MW-25 at 16.4 mg/kg, collected at a depth between 0 and 2 ft bgs. Both wells MW-23 and MW-25 are located within Zone 3 (Figure 6-3). No other metals were detected above their respective MSCs. Mercury was not detected above its respective RDC (35 mg/kg) and SGW MSC (10 mg/kg).

6.2.2 Volatile Organic Compounds

A total of 280 samples were collected from unbiased, biased, delineation, and monitoring well locations and analyzed for TCL VOCs. VOCs detected above the laboratory reporting limits for all soil samples are summarized on Table 6-2. Sample locations and results above screening criteria are depicted on Figure 6-1 for Zone 1, Figure 6-2 for Zone 2, and Figure 6-3 for Zone 3. Sample results are discussed by zone as follows.

6.2.2.1 Zone 1 - Biased Soil Samples

A total of 13 biased soil samples (including 1 field duplicate) were collected from 6 soil boring locations in Zone 1 and submitted to the laboratory for analysis of TCL VOCs. Biased soil samples were collected between 0 and 9 ft bgs. None of the biased soil samples exceeded either the RDC MSC or the SGW MSC for TCL VOCs.

6.2.2.2 Zone 2 – Unbiased Soil Samples

A total of 98 unbiased soil samples (including 8 field duplicates) were collected from 47 soil boring locations in Zone 2, between depths of 0 and 28 ft bgs, and submitted to the laboratory for analysis of TCL VOCs. One VOC, **TCE**, was detected in exceedance of the SGW MSC within

one sample collected. TCE was detected in exceedance of the SGW MSC of 500 micrograms per kilogram (µg/kg) within one sample (UBZ2-SO-04) at 520 µg/kg at a depth between 27 and 28 ft bgs. No other VOCs were detected above their respective MSCs.

6.2.2.3 Zone 2 – Biased Soil Samples

A total of 14 biased soil samples were collected from 7 soil boring locations from Zone 2 and submitted to the laboratory for analysis of TCL VOCs. Biased soil samples were collected between 0 and 14 ft bgs. None of the biased soil samples exceeded either the RDC MSC or the SGW MSC for TCL VOCs.

6.2.2.4 Zone 3 – Unbiased Soil Samples

A total of 137 unbiased soil samples (including 5 field duplicates) were collected from 63 soil boring locations in Zone 3, between depths of 0 and 40 ft bgs, and submitted to the laboratory for analysis of TCL VOCs. Three VOCs, benzene, carbon tetrachloride, and TCE, were detected in exceedance of the SGW MSC's within four samples. Individual descriptions of the exceedances are summarized below.

- **Benzene** was detected above the SGW MSC of 500 µg/kg within three unbiased soil samples, ranging in depth between 11.5 and 40 ft bgs, with the highest concentration being 1,200 µg/kg (J-qualified estimated concentration; UBZ3-SO-42) collected between 11.5 and 13.5 ft bgs.

- **Carbon tetrachloride** was detected above the SGW MSC of 500 µg/kg within one unbiased soil sample, UBZ3-SO-38, at a concentration of 1,300 µg/kg (dilution) collected between 0 and 2 ft bgs.

- **TCE** was detected above the SGW MSC of 500 µg/kg within one unbiased soil sample, UBZ3-SO-38, at a concentration of 41,000 µg/kg (J-qualified estimated concentration) collected between 0 and 2 ft bgs.

No other VOCs were detected above their respective MSCs.

6.2.2.5 Zone 3 – Biased Soil Samples

A total of 33 biased soil samples (including 2 field duplicates) were collected from 14 soil boring locations in Zone 3 and submitted to the laboratory for analysis of TCL VOCs. Biased soil samples were collected between 0 and 15 ft bgs. None of the biased soil samples exceeded either the RDC MSC or the SGW MSC for TCL VOCs.

6.2.2.6 Permanent Well Borings

A total of 11 permanent well soil boring samples (including 1 field duplicate) were collected from 11 permanent well locations and submitted for laboratory analysis of TCL VOCs.

Permanent well soil boring samples were collected between 0 and 12 ft bgs. None of the permanent well soil boring samples exceeded either the RDC MSC or the SGW MSC for TCL VOCs.

6.2.3 Semivolatile Organic Compounds

A total of 290 samples were collected from unbiased, biased, delineation, and monitoring well locations and analyzed for TCL SVOCs. SVOCs detected above the laboratory reporting limits for all soil samples are summarized on Table 6-3. Sample locations and results above screening criteria are depicted on Figure 6-1 for Zone 1, Figure 6-2 for Zone 2, and Figure 6-3 for Zone 3. Sample results are discussed by zone as follows.

6.2.3.1 Zone 1 − Biased Soil Samples

A total of 13 biased soil samples (including 1 field duplicate) were collected from 6 soil boring locations in Zone 1 and submitted to the laboratory for analysis of TCL SVOCs. Biased soil samples were collected between 0 and 9 ft bgs. None of the biased soil samples exceeded either the RDC MSC or the SGW MSC for TCL SVOCs.

6.2.3.2 Zone 2 – Unbiased Soil Samples

A total of 98 unbiased soil samples (including 8 field duplicates) were collected from 47 soil boring locations in Zone 2, between depths of 0 and 28 ft bgs, and submitted to the laboratory for analysis of TCL SVOCs. One SVOC, **benzo[a]pyrene**, was detected in exceedance of the RDC MSC within two samples collected. Benzo[a]pyrene was detected in exceedance of the RDC MSC of 570 µg/kg in sample UBZ2-SO-01 at a depth between 0 and 2 ft bgs at 600 µg/kg and in sample UBZ2-SO-09 at a depth between 0 and 3 ft bgs at 880 µg/kg (J-qualified estimated concentration). No other SVOCs were detected above their respective MSCs.

6.2.3.3 Zone 2 – Biased Soil Samples

A total of 14 biased soil samples were collected from 7 soil boring locations from Zone 2 and submitted to the laboratory for analysis of TCL SVOCs. Biased soil samples were collected between 0 and 14 ft bgs. One SVOC, **benzo[a]pyrene**, was detected in exceedance of the RDC MSC within two samples collected. Benzo[a]pyrene was detected in exceedance of the RDC MSC of 570 µg/kg in sample BZ2-SO-05 at a depth between 3 and 4 ft bgs at 880 µg/kg and in sample BZ2-SO-07 at a depth between 0 and 2 ft bgs at 2,500 µg/kg (L-qualified low bias concentration). No other SVOCs were detected above their respective MSCs.

6.2.3.4 Zone 3 – Unbiased Soil Samples

A total of 132 unbiased soil samples (including 5 field duplicates) were collected from 63 soil boring locations in Zone 3, between depths of 0 and 40 ft bgs, and submitted to the laboratory for analysis of TCL SVOCs. Four SVOCs, benzo[a]anthracene, benzo[a]pyrene,

benzo[b]fluoranthene, and dibenz[a,h]anthracene, were detected in exceedance of the RDC MSC within 10 samples collected. Individual descriptions of the exceedances are summarized below.

- **Benzo[a]anthracene** was detected above the RDC of 5,700 µg/kg within two unbiased soil samples, UBZ3-SO-18 between 4 and 5 ft bgs and UBZ3-SO-55 between 0.5 and 3 ft bgs at concentrations of 8,700 and 10,000 µg/kg (L-qualified low bias concentration), respectively.

- **Benzo[a]pyrene** was detected above the RDC of 570 µg/kg within 10 unbiased soil samples ranging in depth between 0 and 5 ft bgs, with the highest concentration being 8,900 µg/kg (L-qualified low bias concentration) at UBZ3-SO-55 collected between 0.5 and 3 ft bgs.

- **Benzo[b]fluoranthene** was detected above the RDC of 5,700 µg/kg within two unbiased soil samples, UBZ3-SO-18 between 4 and 5 ft bgs and UBZ3-SO-55 between 0.5 and 3 ft bgs, at concentrations of 8,300 and 10,000 µg/kg (L-qualified low bias concentration), respectively.

- **Dibenz[a,h]anthracene** was detected above the RDC of 570 µg/kg within one unbiased soil sample, UBZ3-SO-18, at a concentration of 890 µg/kg (J-qualified estimated concentration) at a depth of 4-5 ft bgs.

No other SVOCs were detected above their respective MSCs.

6.2.3.5 Zone 3 – Biased Soil Samples

A total of 33 biased soil samples (including 2 field duplicates) were collected from 14 soil boring locations in Zone 3, between depths of 0 and 15 ft bgs, and submitted to the laboratory for analysis of TCL SVOCs. One SVOC, **benzo[a]pyrene**, was detected in exceedance of the RDC MSC within two samples collected. Benzo[a]pyrene was detected above the RDC of 570 µg/kg within two biased soil samples, BZ3-SO-09 and BZ3-SO-15, at concentrations of 680 and 690 µg/kg (J-qualified estimated concentration), respectively. No other SVOCs were detected above their respective MSCs.

6.2.3.6 Permanent Well Borings

A total of 12 soil samples (including 1 field duplicate) were collected from the borings associated with the 11 permanent well locations and submitted for laboratory analysis of TCL SVOCs. Permanent well soil boring samples were collected between 0 and 12 ft bgs. One SVOC, **benzo[a]pyrene**, was detected in exceedance of the RDC MSC within one sample collected. Benzo[a]pyrene was detected above the RDC of 570 µg/kg within sample MW-26 at 880 µg/kg (J-qualified estimated concentration). No other SVOCs were detected above their respective MSCs.

6.2.4 Pesticides

A total of two biased soil samples were collected from one soil boring location in Zone 1 (the former greenhouse) and submitted to the laboratory for analysis of TCL pesticides. Biased soil samples were collected from the 1- to 3-ft and 7- to 8-ft intervals bgs. Neither of the biased soil samples exceeded either the RDC MSC or the SGW MSC for TCL pesticides. Soil sample results are summarized on Table 6-4 and sample locations are depicted on Figure 6-1 for Zone 1.

6.2.5 PCBs

A total of 14 samples (including one field duplicate) were collected from 11 locations and submitted to the laboratory for PCB analysis. PCBs detected above the laboratory reporting limits for all soil samples are summarized on Table 6-5. Sample locations and results above screening criteria are depicted on Figure 6-1 for Zone 1, Figure 6-2 for Zone 2, and Figure 6-3 for Zone 3. Buildings 202 and 209 had interior transformers; therefore, the proposed samples were redistributed after discussions with USACE.

One PCB, Aroclor 1260, was detected in exceedance of the RDC MSC and TSCA screening criterion (1,000 µg/kg) within one sample collected. Aroclor 1260 was detected in exceedance of the RDC MSC of 9,000 µg/kg within one sample (T-1101) at 38,000 µg/kg. No other PCBs were detected above their respective RDC MSC or the SGW MSC. Two samples exceeded only the TSCA screening criteria, T-01 from the 0 to 6 in. interval and T-1101-2 from the 0 to 1 ft bgs interval with respective concentrations of 2,600 and 1,100 µg/kg.

6.2.6 Cyanide

A total of 30 samples were analyzed for Cyanide (including 2 field duplicates). Cyanide detections above the laboratory reporting limits for all soil samples are summarized on Table 6-6. Sample locations and results above screening criteria are depicted on Figure 6-3 for Zone 3. Sample results are discussed by zone below.

6.2.6.1 Zone 3 – Biased and Unbiased Soil Samples

A total of 5 biased and 13 unbiased samples (including 1 field duplicate) were collected from Zone 3 and submitted to the laboratory to be analyzed for cyanide. Zone 3 soil samples were collected between 0 and 15 ft bgs. None of the Zone 3 soil samples exceeded either the RDC MSC or the SGW MSC for cyanide.

6.2.6.2 Permanent Well Borings

A total of 12 samples (including 1 field duplicate) were collected from 11 permanent well locations and submitted to the laboratory to be analyzed for cyanide. The permanent well soil samples were collected between 0 and 12 ft bgs. None of the permanent well soil samples exceeded either the RDC MSC or the SGW MSC for cyanide.

6.2.7 Explosives

A total of 32 samples (including three field duplicates) were analyzed for explosives (nitroglycerin and pentaerythritol tetranitrate [PETN] only). Explosives results for all soil samples are summarized on Table 6-7. Neither nitroglycerin nor PETN were detected above the laboratory reporting limit or MSCs in any of the samples collected. It should also be noted that 2,4-dinitrotoluene (DNT) was not detected above the laboratory reporting limit in any of the samples submitted for SVOC analysis.

6.2.8 Radionuclides

A total of 31 samples (including 2 field duplicates) were analyzed for radionuclides (gross alpha/gross beta, uranium, and Radium 226+228). Radionuclides detected above the laboratory reporting limits for all soil samples are summarized on Table 6-8. Sample locations and results above screening criteria are depicted on Figure 6-1 for Zone 1, Figure 6-2 for Zone 2, and Figure 6-3 for Zone 3. Sample results are discussed by zone as follows.

6.2.8.1 Zone 1 – Biased Soil Samples

One biased soil sample was collected from one location in Zone 1 and submitted to the laboratory for analysis of radionuclides (gross alpha/gross beta and Radium 226+228). Sample BZ1-SO-01 was collected at a depth of 5 to 7 ft bgs. Two radionuclides in the gamma spectroscopy were detected in exceedance of the United States Nuclear Regulatory Commission (USNRC) Regulation (NUREG)/CR-1552 within sample BZ1-SO-01. **Potassium-40** exceeded the USNRC NUREG/CR-5512 of 1.69 average picocuries per gram (pCi/g) with a detection of 8.9 pCi/g. **Radium-226** exceeded the USNRC NUREG/CR-5512 of 0.648 pCi/g with a detection of 1.64 pCi/g. No other radionuclides were detected above their respective USNRC NUREG/CR-5512 criteria within sample BZ1-SO-01.

6.2.8.2 Zone 2 – Unbiased Soil Samples

A total of six unbiased soil samples were collected from six soil boring locations in Zone 2 and submitted to the laboratory for analysis of radionuclides (gross alpha/gross beta and Radium 226+228). Samples were collected at depths between 0 and 12 ft bgs. Two radionuclides were detected in exceedance of screening criteria within all six samples. **Potassium-40** exceeded the USNRC NUREG/CR-5512 of 1.69 pCi/g within all six samples, ranging in detection between 4.5 pCi/g (UBZ2-SO-37) to 9.5 pCi/g (UBZ2-SO-19). **Radium-226** exceeded the USNRC NUREG/CR-5512 of 0.648 pCi/g within four samples, ranging in detection between 1.78 pCi/g (UBZ2-SO-19) and 1.89 pCi/g (UBZ2-SO-22). No other radionuclides were detected above their respective screening criteria within the samples.

6.2.8.3 Zone 2 – Biased Soil Samples

One biased soil sample was collected from one location in Zone 2 and submitted to the laboratory for analysis of radionuclides (gross alpha/gross beta and Radium 226+228). Sample BZ2-SO-03 was collected at a depth of 1 to 3 ft bgs. Two radionuclides in the gamma

spectroscopy were detected in exceedance of the USNRC NUREG/CR-1552 within sample BZ2-SO-03. **Potassium-40** exceeded the USNRC NUREG/CR-5512 of 1.69 pCi/g with a detection of 6.6 pCi/g (J-qualified estimated concentration). **Radium-226** exceeded the USNRC NUREG/CR-5512 of 0.648 pCi/g with a detection of 1.21 pCi/g (J-qualified estimated concentration). No other radionuclides were detected above their respective screening criteria within sample BZ2-SO-03.

6.2.8.4 Zone 2 – Delineation Samples

One delineation soil sample was collected from one location in Zone 2 and submitted to the laboratory for analysis of radionuclides (gross alpha/gross beta and Radium 226+228). Sample Z2D13 was collected at a depth of 3 to 5 ft bgs. Two radionuclides were detected in exceedance of screening criteria within sample Z2D13. **Potassium-40** exceeded the USNRC NUREG/CR-5512 of 1.69 pCi/g with a detection of 12.7 pCi/g. **Radium-226** exceeded the USNRC NUREG/CR-5512 of 0.648 pCi/g with a detection of 1.3 pCi/g. No other radionuclides were detected above their respective USNRC NUREG/CR-5512 within sample Z2D13.

6.2.8.5 Zone 3 – Unbiased Soil Samples

A total of 22 unbiased soil samples (including 2 field duplicates) were collected from 20 soil boring locations in Zone 3 and submitted to the laboratory for analysis of radionuclides (gross alpha/gross beta and Radium 226+228). Samples were collected at depths between 0 and 12 ft bgs. Two radionuclides in the gamma spectroscopy were detected in exceedance of the USNRC NUREG/CR-1552 within all 22 samples. **Potassium-40** exceeded the USNRC NUREG/CR-5512 of 1.69 pCi/g within all 22 samples, ranging in detection between 4.8 pCi/g (J-qualified estimated concentration; UBZ3-SO-53) and 18.9 pCi/g (UBZ3-SO-59). **Radium-226** exceeded the USNRC NUREG/CR-5512 of 0.648 pCi/g within two samples, UBZ3-SO-02 and UBZ3-SO-22, at concentrations of 1.25 and 1.84pCi/g (J-qualified estimated concentration), respectively. No other radionuclides were detected above their respective screening criteria within the samples.

6.2.8.6 Permanent Well Borings

A total of three samples were collected from three permanent well locations and submitted to the laboratory for analysis of radionuclides (gross alpha/gross beta and Radium 226+228). Samples were collected at depths between 0 and 12 ft bgs. One radionuclide was detected in exceedance of the USNRC NUREG/CR-1552 within all three samples. **Potassium-40** exceeded the USNRC NUREG/CR-5512 of 1.69 pCi/g within samples MW-23, MW-24, and MW-29 at 3.8 pCi/g (J-qualified estimated concentration), 5 pCi/g, and 5.3 pCi/g, respectively. No other radionuclides were detected above their respective screening criteria within the samples.

6.2.9 Geotechnical Analysis

A total of three samples were analyzed for geotechnical parameters as summarized on Table 6-9. Samples from the screened interval of three monitoring wells were analyzed for grain size, Unified Soil Classification System classification, specific gravity, and moisture content. Non-

plastic soils were submitted; therefore, plasticity analysis was not conducted. The sample from the 30 to 35 ft bgs interval of MW-21 was classified as a silty sand, the sample from the 15 to 20 ft bgs interval of MW-26 was classified as a well graded sand to silty sand, and the sample from the 15 to 20 ft bgs interval of MW-26 was classified as a poorly graded sand. Additional results are summarized on Table 6-9.

6.3 GROUNDWATER

6.3.1 Temporary Wells Analytical Results

A total of 27 temporary groundwater wells were installed at the FFA in January, February, and April 2012. Four temporary groundwater wells were installed within Zone 1, 6 temporary groundwater wells were installed within Zone 2, and 17 temporary groundwater wells were installed within Zone 3. Temporary groundwater wells were sampled for VOCs, SVOCs, metals, cyanide, explosives, and radionuclides. All groundwater samples are summarized within Sections 6.3.1.1 through 6.3.1.6 below.

6.3.1.1 Metals

A total of 30 groundwater samples (including 3 field duplicate samples) from 27 temporary well locations within Zones 1, 2, and 3 were submitted to the laboratory for analysis of TAL metals and mercury. All samples were field filtered prior to preservation. Dissolved metals detected above the laboratory reporting limits for all groundwater samples are summarized on Table 6-10. Sample locations and results above screening criteria are depicted on Figure 6-4.

Six metals were detected in exceedance of the residential MSC for used aquifers within 25 samples collected. Individual descriptions of the exceedances for each of the six metals are summarized below.

- **Antimony** was detected in exceedance of the residential MSC of 6 micrograms per liter (µg/L) within one sample (TW-01) at 9.17 µg/L (J-qualified estimated concentration).
- **Arsenic** was detected in exceedance of the residential MSC of 10 µg/L within nine samples, ranging from 17.4 µg/L (TW-26) to 159 µg/L (TW-15).
- **Cobalt** was detected in exceedance of the residential MSC of 11 µg/L within two samples at 13.6 µg/L (TW-15) and 34.2 µg/L (TW-08).
- **Lead** was detected in exceedance of the residential MSC of 5 µg/L within one sample (TW-01) at 6.38 µg/L.
- **Manganese** was detected in exceedance of the residential MSC of 300 µg/L within 25 samples, ranging from 303 µg/L (TW-27) to 7,210 µg/L (TW-17).

- **Thallium** was detected in exceedance of the residential MSC of 2 µg/L within three samples, ranging from 3.6 µg/L (TW-10; J-qualified estimated concentration) to 7.69 µg/L[3] (TW-01).

The majority of metals concentrations that exceed residential MSC occurred within the temporary wells located in the southwestern portion of the site. Manganese exceedances were observed throughout the entire site. No other metals were detected above their respective MSCs.

6.3.1.2 Volatiles

A total of 30 groundwater samples (including three field duplicate samples) were collected from 27 temporary well locations within Zones 1, 2, and 3 and submitted to the laboratory for analysis of TCL VOCs. VOCs detected above the laboratory reporting limits for all groundwater samples are summarized on Table 6-11.

Eleven VOCs were detected in exceedance of the residential MSC for used aquifers (used to assess for direct contact including ingestion) within the samples collected. Individual descriptions of the exceedances for each of the 11 VOCs are summarized below.

- **2-hexanone** was detected in exceedance of the residential MSC of 11 µg/L within three samples ranging from 27 µg/L (TW-13) to 80 µg/L (TW-21; J-qualified estimated concentration).

- **Acetone** was detected in exceedance of the residential MSC of 33,000 µg/L within five samples ranging from 72,000 µg/L (TW-13) to 190,000 µg/L (TW-21; J-qualified estimated concentration).

- **Benzene** was detected in exceedance of the residential MSC of 5 µg/L within nine samples ranging from 62 µg/L (TW-14) to 1,700 µg/L (TW-16).

- **Carbon tetrachloride** was detected in exceedance of the residential MSC of 5 µg/L within one sample, TW-11, at 6.9 µg/L.

- **Cis-1,2-dichloroethene** was detected at the residential MSC of 70 µg/L within two samples, 70 µg/L within TW-08 and 1,400 µg/L within TW-06.

- **Ethylbenzene** was detected in exceedance of the residential MSC of 700 µg/L within seven samples ranging from 2,300 µg/L (TW-14) to 11,000 µg/L (TW-13).

- **Isopropylbenzene** (cumene) was detected in exceedance of the residential MSC of 840 µg/L within nine samples ranging from 1,100 µg/L (TW-26) to 39,000 µg/L (TW-21).

[3] Not detected substantially above the level reported in the laboratory or field blanks.

- **Methylene chloride** was detected in exceedance of the residential MSC of 5 µg/L within one sample, TW-22, at 1,200 µg/L (J-qualified estimated concentration).

- **Tetrachloroethene** was detected in exceedance of the residential MSC of 5 µg/L within six samples ranging from 27 µg/L (TW-11) to 240 µg/L (TW-05).

- **Trichloroethene** was detected in exceedance of the residential MSC of 5 µg/L within four samples ranging from 7.8 µg/L (TW-03) to 3,600 µg/L (TW-11).

- **Vinyl chloride** was detected in exceedance of the residential MSC of 2 µg/L within three samples ranging from 4.5 µg/L (TW-11; J-qualified estimated concentration) to 8.1 µg/L (TW-08).

The majority of residential MSC exceedances for VOCs occurred within the temporary wells located within Zone 3. No VOCs were detected in any of the temporary groundwater samples in exceedance of the residential groundwater screening values for protection of indoor air to assess inhalation. No other VOCs were detected above their respective MSCs. It should be noted that acetone, benzene, isopropylbenzene, and ethylbenzene appear to be from a non-DoD source as discussed in Section 7.2.2.2.

6.3.1.3 Semivolatiles

A total of 30 groundwater samples (including three field duplicate samples) from 27 temporary well locations within Zones 1, 2, and 3 were submitted to the laboratory for analysis of TCL SVOCs. SVOCs detected above the laboratory reporting limits for all groundwater samples are summarized on Table 6-12.

Eight SVOCs were detected in exceedance of the residential MSC for used aquifers (used to assess for direct contact including ingestion) within the 12 samples collected. Individual descriptions of the exceedances for each of the eight SVOCs are summarized below.

- **Acetophenone** was detected in exceedance of the residential MSC of 3,700 µg/L within four samples ranging from 6,400 µg/L (TW-24) to 12,000 µg/L (TW-21; J-qualified estimated concentration).

- **Benzo[a]pyrene** was detected in exceedance of the residential MSC of 0.2 µg/L within three samples ranging from 0.46 µg/L (TW-26) to 0.47 µg/L (TW-27).

- **Benzo[b]fluoranthene** was detected in exceedance of the residential MSC of 0.29 µg/L within four samples ranging from 0.61 µg/L (TW-26) to 0.66 µg/L (TW-25).

- **Benzo[g,h,i]perylene** was detected in exceedance of the residential MSC of 0.26 µg/L within one sample, TW-15, at 0.45 µg/L.

- **Dibenz[a,h]anthracene** was detected in exceedance of the residential MSC of 0.029 µg/L within one sample, TW-15, at 0.11 µg/L.

- **Naphthalene** was detected in exceedance of the residential MSC of 100 µg/L within two samples, TW-13 at 110 µg/L and TW-15 at 160 µg/L.

- **Pentachlorophenol** was detected in exceedance of the residential MSC of 1 µg/L within one sample, TW-01, at 1.1 µg/L[4].

- **Phenol** was detected in exceedance of the residential MSC of 2,000 µg/L within six samples ranging from 2,100 µg/L (TW-16) to 90,000 µg/L (TW-21).

The majority of SVOC residential MSC exceedances occur within the temporary wells located within Zone 3. No other SVOCs were detected above their respective MSCs.

6.3.1.4 Cyanide

Four groundwater samples (TW-03, TW-19, TW-21, and TW-24) within Zones 1 and 3 were submitted to the laboratory for cyanide analysis. Cyanide was not detected in exceedance of the laboratory reporting limit or the residential MSC for used aquifers (criteria used to assess for direct contact including ingestion) within the four groundwater samples collected. Cyanide results are summarized on Table 6-13.

6.3.1.5 Explosives

Nine groundwater samples (including two field duplicate samples) collected from seven temporary well locations within Zones 1 and 3 were submitted to the laboratory for explosives analysis. No explosives were detected above their respective laboratory reporting limit nor in exceedance of the residential MSC for used aquifers in any of the samples collected. Explosives results are summarized on Table 6-14.

6.3.1.6 Radionuclides

A total of five groundwater samples (including one field duplicate sample) collected from four temporary well locations within Zones 1, 2, and 3 were submitted to the laboratory for analysis of radionuclides (gross alpha/gross beta and Radium 226+228). Radionuclides detected above the laboratory reporting limits for all groundwater samples are summarized on Table 6-15.

Three radionuclides were detected in exceedance of the USEPA MCL for radionuclides within one sample collected. Gross alpha was detected in exceedance of the USEPA MCL of 15 picocuries per liter (pCi/L) within one sample, TW-12 at 264 pCi/l (picocuries per liter) (J-qualified estimated concentration). Gross beta was detected in exceedance of the USEPA screening level MCL of 50 pCi/L within one sample, TW-12 at 417 pCi/l (J-qualified estimated concentration). Radium-228 was detected in exceedance of the USEPA MCL for Radium-228 of 5 pCi/L within one location, TW-12 at 5.6 pCi/l (J-qualified estimated concentration). TW-12 is

[4] Not detected substantially above the level reported in the laboratory or field blanks.

located within Zone 3 adjacent to Buildings 215 (Figure 6-4). No other radionuclides were detected above their respective USEPA MCL for radionuclides.

6.3.2 Permanent Wells Analytical Results

A total of 11 permanent groundwater wells were installed at the FFA in May and June 2012 and sampled in June 2012. Permanent groundwater wells were sampled for VOCs, SVOCs, metals, cyanide, explosives, and radionuclides. All groundwater samples are summarized within Sections 6.3.2.1 through 6.3.2.6 below based on the type of analysis.

6.3.2.1 Metals

A total of 12 groundwater samples (including one field duplicate sample) from 11 locations within Zones 1, 2, and 3 were submitted to the laboratory to be analyzed for TAL metals and mercury. Dissolved metals detected above the laboratory reporting limits for all groundwater samples are summarized on Table 6-10. Sample locations and results above screening criteria are depicted on Figure 6-4.

Four metals were detected in exceedance of the residential MSC for used aquifers to assess for direct contact (including ingestion) within nine samples collected. Individual descriptions of the exceedances for each of the four metals are summarized below.

- **Arsenic** was detected in exceedance of the residential MSC of 10 µg/L within three samples, ranging from 23.1 µg/L (MW-26) to 48.6 µg/L (MW-29).

- **Cobalt** was detected in exceedance of the residential MSC of 11 µg/L within one sample at 15.9 µg/L (MW-31).

- **Lead** was detected in exceedance of the residential MSC of 5 µg/L within one sample (MW-25) at 15 µg/L.

- **Manganese** was detected in exceedance of the residential MSC of 300 µg/L within nine samples, ranging from 460 µg/L (MW-28) to 5,240 µg/L (MW-23).

No other metals, including mercury, were detected above their respective MSCs.

6.3.2.2 Volatiles

A total of 12 groundwater samples (including 1 field duplicate sample) collected from 11 locations within Zones 1, 2, and 3 were submitted to the laboratory to be analyzed for TCL VOCs. VOCs detected above the laboratory reporting limits for all groundwater samples are summarized on Table 6-11.

Ten VOCs were detected in exceedance of the residential MSC for used aquifers within 11 samples collected. One VOC, benzene, also exceeded the Pennsylvania Residential

Volatilization to Indoor Air Criteria within two samples collected. Individual descriptions of the exceedances for each of the 10 VOCs are summarized below.

- **2-hexanone** was detected in exceedance of the residential MSC of 11 µg/L within five samples ranging from 16 µg/L (MW-25; J-qualified estimated concentration) to 39 µg/L (MW-29).

- **Acetone** was detected in exceedance of the residential MSC of 33,000 µg/L within five samples ranging from 45,000 µg/L (MW-25; J-qualified estimated concentration) to 260,000 µg/L (MW-27; J-qualified estimated concentration).

- **Benzene** was detected in exceedance of the residential MSC of 5 µg/L within seven samples. Benzene was detected in exceedance of the Pennsylvania Residential Volatilization to Indoor Air Criteria of 35 µg/L within two samples collected. Samples in exceedance ranged from 22 µg/L (MW-28) to 4,000 µg/L (MW-27).

- **Cis-1,2-dichloroethene** was detected in exceedance of the residential MSC of 70 µg/L within two samples, 200 µg/L (J-qualified estimated concentration) within MW-22 and 650 µg/L within MW-23.

- **Ethylbenzene** was detected in exceedance of the residential MSC of 700 µg/L within three samples ranging from 2,400 µg/L (MW-29) to 8,800 µg/L (MW-26).

- **Isopropylbenzene** was detected in exceedance of the residential MSC of 840 µg/L within six samples ranging from 4,100 µg/L (MW-28) to 20,000 µg/L (MW-25).

- **Methyl tert-butyl ether (MTBE)** was detected in exceedance of the residential MSC of 20 µg/L within one sample, MW-23, at 21 µg/L.

- **Tetrachloroethene** was detected in exceedance of the residential MSC of 5 µg/L within three samples ranging from 12 µg/L (MW-21) to 170 µg/L (MW-22).

- **Trichloroethene** was detected in exceedance of the residential MSC of 5 µg/L within four samples ranging from 5.7 µg/L (MW-31) to 290 µg/L (MW-23).

- **Vinyl chloride** was detected in exceedance of the residential MSC of 2 µg/L within one sample, MW-23, at 5.2 µg/L.

No other VOCs were detected above their respective MSCs.

6.3.2.3 Semivolatiles

A total of 12 groundwater samples (including 3 field duplicate samples) from 11 locations within Zones 1, 2, and 3 were submitted to the laboratory to be analyzed for TCL SVOCs. SVOCs detected above the laboratory reporting limits for all groundwater samples are summarized on Table 6-12.

Six SVOCs were detected in exceedance of the residential MSC for used aquifers within the samples collected. Individual descriptions of the exceedances for each of the six SVOCs are summarized below.

- **Acetophenone** was detected in exceedance of the residential MSC of 3,700 µg/L within three samples ranging from 4,100 µg/L (MW-27) to 4,900 µg/L (MW-29).

- **Benzo[a]pyrene** was detected in exceedance of the residential MSC of 0.2 µg/L within one sample collected, MW-21, at 0.71 µg/L.

- **Benzo[b]fluoranthene** was detected in exceedance of the residential MSC of 0.29 µg/L within one sample collected, MW-21, at 0.61 µg/L.

- **Benzo[g,h,i]perylene** was detected in exceedance of the residential MSC of 0.26 µg/L within one sample collected, MW-21, at 0.62 µg/L.

- **Indeno[1,2,3-c,d]pyrene** was detected in exceedance of the residential MSC of 0.29 µg/L within one sample collected, MW-21, at 0.67 µg/L.

- **Phenol** was detected in exceedance of the residential MSC of 2,000 µg/L within five samples ranging from 4,200 µg/L (MW-26) to 74,000 µg/L (MW-27).

No other SVOCs were detected above their respective MSCs.

6.3.2.4 Cyanide

A total of 12 groundwater samples (including 3 field duplicate samples) from 10 locations were submitted to the laboratory to be analyzed for cyanide. A cyanide sample was not collected from MW-22 due to field error. Cyanide results for the groundwater samples are summarized on Table 6-13. Cyanide was not detected in exceedance of the residential MSC for used aquifers within the 10 groundwater samples collected.

6.3.2.5 Explosives

Twelve groundwater samples (including one field duplicate) were submitted to the laboratory to be analyzed for explosives. Explosives results for all groundwater samples are summarized on Table 6-14. No explosives were detected in exceedance of their respective laboratory reporting limits or the residential MSC for used aquifers within any of the samples collected.

6.3.2.6 Radionuclides

A total of 14 groundwater samples from 11 locations within Zones 1, 2, and 3 were submitted to the laboratory to be analyzed for radionuclides (gross alpha/gross beta and Radium 226+228). Radionuclides detected for all groundwater samples are summarized on Table 6-15. No

radionuclides were detected above their respective screening criteria, USNRC NUREG/CR-5512, within the 12 samples collected.

6.4 QUALITY CONTROL SAMPLES ANALYTICAL RESULTS

6.4.1 Trip Blanks

A total of 36 trip blank samples accompanied coolers to and from the laboratory during December 2011, January 2012, April 2012, and May 2012. The trip blank samples were analyzed for TCL VOCs. Detected VOCs are summarized on Table 6-16. Only two samples contained VOCs detected above their respective laboratory reporting limits. Acetone was reported at a J-qualified estimated concentration of 6.2 µg/L in the trip blank from 30 January 2012 and methylene chloride was reported at a J-qualified estimated concentration of 0.51µg/L from the trip blank on 24 December 2011. Both acetone and methylene chloride are common laboratory contaminants.

6.4.2 Equipment Rinse Blanks

A total of 14 rinsate blank samples were collected at the FFA during December 2011, January 2012, and May 2012. The rinsate blank samples were analyzed for gross alpha/gross beta, gamma spectroscopy, radium-226 and -228, metals, mercury, VOCs, SVOCs, and explosives. All rinsate blank samples are summarized below based on the type of analysis and detected analytes are summarized on Table 6-17.

6.4.2.1 Metals

A total of 13 rinsate blank samples were submitted to the laboratory to be analyzed for TAL metals (via both method SW6010B and method SW6020) and mercury. A total of 16 metals were detected within all 13 of the rinsate blank samples collected. Individual descriptions of the detections for each of 16 metals are summarized below.

- **Aluminum** was detected within eight rinsate blank samples ranging from 7.3 µg/L (RB-12-20-11; not detected substantially above the level reported in the laboratory or field blanks) to 60.9 µg/L (RB-1-17-12).

- **Antimony** was detected within four rinsate blank samples ranging from 0.17 µg/L (RB-1-25-12; J-qualified estimated concentration) to 145 µg/L (RB-12-20-11).

- **Arsenic** was detected within three rinsate blank samples ranging from 4.67 µg/L (RB-1-9-12; J-qualified estimated concentration) to 6.26 µg/L (RB-12-30-11; J-qualified estimated concentration).

- **Barium** was detected within eight rinsate blank samples ranging from 0.85 µg/L (RB-1-31-12; J-qualified estimated concentration) to 31 µg/L (RB-1-17-12; J-qualified estimated concentration).

- **Calcium** was detected within 13 rinsate blank samples ranging from 284 µg/L (RB-1-31-12; J-qualified estimated concentration) to 8,720 µg/L (RB-1-17-12; J-qualified estimated concentration).

- **Chromium** was detected within four rinsate blank samples ranging from 2.92 µg/L (RB-1-16-12; J-qualified estimated concentration) to 5.07 µg/L (RB-1-17-12).

- **Copper** was detected within six rinsate blank samples ranging from 0.69 µg/L (RB-1-31-12; J-qualified estimated concentration) to 33.3 µg/L (RB-12-20-11).

- **Iron** was detected within 11 rinsate blank samples ranging from 26.4 µg/L (RB-1-31-12; J-qualified estimated concentration) to 656 µg/L (RB-1-17-12).

- **Lead** was detected within two rinsate blank samples ranging from 0.32 µg/L (RB-1-31-12; J-qualified estimated concentration) to 2.7 µg/L (RB-1-16-12; J-qualified estimated concentration).

- **Magnesium** was detected within 13 rinsate blank samples ranging from 52.9 µg/L (MW-RB-1; J-qualified estimated concentration) to 1,800 µg/L (RB-1-17-12).

- **Manganese** was detected within eight rinsate blank samples ranging from 2.2 µg/L (RB-1-31-12) to 7.82 µg/L (RB-1-17-12; J-qualified estimated concentration).

- **Nickel** was detected within one rinsate blank sample at 0.81 µg/L (RB-1-31-12; J-qualified estimated concentration).

- **Potassium** was detected within six rinsate blank samples ranging from 81 µg/L (RB-1-5-2012; J-qualified estimated concentration) to 369 µg/L (RB-1-17-12; J-qualified estimated concentration).

- **Sodium** was detected within 13 rinsate blank samples ranging from 77.2 µg/L (RB-1-31-12; J-qualified estimated concentration) to 6,460 µg/L (RB-1-17-12).

- **Thallium** was detected within eight rinsate blank samples ranging from 0.11 µg/L (RB-1-25-12; J-qualified estimated concentration) to 126 µg/L (RB-12-20-11).

- **Zinc** was detected within 11 rinsate blank samples ranging from 7.6 µg/L (RB-1-31-12) to 17.1 µg/L (MW-RB-1; J-qualified estimated concentration).

No other metals, including mercury, were detected within the rinsate blanks.

6.4.2.2 Volatiles

A total of 13 rinsate blank samples were submitted to the laboratory to be analyzed for TCL VOCs. Two VOCs, acetone and methylene chloride, were detected within 5 of the 13 rinsate

blank samples collected. Individual descriptions of the detections for the two VOCs detected are summarized below.

- **Acetone** was detected within three rinsate blank samples ranging from 12 µg/L (RB-12-29-11; J-qualified estimated concentration) to 40 µg/L (RB-12-27-11; J-qualified estimated concentration).

- **Methylene Chloride** was detected within three rinsate blank samples ranging from 0.53 µg/L (RB-12-20-11; J-qualified estimated concentration) to 0.88 µg/L (RB-12-30-11; J-qualified estimated concentration).

Acetone and methylene chloride are common laboratory contaminants. No other VOCs were detected within the rinsate blanks.

6.4.2.3 Semivolatiles

A total of 13 rinsate blank samples were submitted to the laboratory to be analyzed for TCL SVOCs. A total of two SVOCs, bis(2-ethylhexyl) phthalate and chrysene, were detected within 1 of the 13 rinsate blank samples collected. Bis(2-ethylhexyl) phthalate was detected within sample MW-RB-1 at 0.094 µg/L (J-qualified estimated concentration). Chrysene was detected within sample MW-RB-1 at 0.042 µg/L (J-qualified estimated concentration). No other SVOCs were detected within the rinsate blanks.

6.4.2.4 Explosives

A total of two rinsate blank samples (MW-RB-1 and RB-1-5-2012) were submitted to the laboratory to be analyzed for explosives. No explosives were detected within either sample MW-RB-1 or sample RB-1-5-2012.

6.4.2.5 Radionuclides

A total of three rinsate blank samples were submitted to the laboratory for gross alpha/gross beta and radium-226 and -228 analysis. A total of two rinsate blank samples were submitted to the laboratory for gamma spectroscopy analysis. No radionuclides were detected within any of the five rinsate blank samples collected.

6.5 INVESTIGATION-DERIVED WASTE

One composite sample was collected from the 24 drums containing soil from soil boring advancement and well installation. Analytical results are provided on Table 6-18. TCLP screening criteria were not exceeded. Results (from the groundwater samples collected) were used to complete profiles and dispose of the 50 water drums. All 74 drums were manifested and removed from the site on November 29, 2012 (Appendix H). Certificates of disposal are included in Appendix H.

6.6 AREA II GEOLOGY

A total of 142 characterization and delineation soil borings were advanced in Area II, with 13 soil borings advanced to refusal to determine depth to bedrock. The remainder (majority) of the borings were advanced to 15 ft bgs. Overburden lithology is depicted in cross section from west to east on Figure 6-5 and from south to north on Figure 6-6. Soil boring logs are presented in Appendix C.

The majority of the surface area of Area II is covered with impervious surfaces to include asphalt, concrete, and various improvements. Pervious surfaces including manicured lawns are present in the northwestern portion of Area II, which was formerly a housing area and parade ground during DoD use of the site. In addition, pervious landscaped areas separating the sidewalks from the buildings are located adjacent to buildings in the housing area and other parts of Area II. Much of the site is underlain with fill material consisting of cinders, silt, bricks, concrete, wood, sand, silt, and gravel, which is present to depths of 13 ft bgs, but more typically present to depths of less than 5 ft bgs in the developed areas of Area II. Fill material deposits are thicker in the west and more common in areas surrounding buildings and underground utilities. Fill material is absent or thin (less than 1 ft) in areas where manicured lawn is present, such as the parade ground.

Overall a general fining upward alluvial sequence is present in the native sediment deposits overlying the bedrock. Silts are present to depths of 10 ft bgs in areas where fill is not present. Observed silts were yellowish brown to strong brown with subordinate amounts of clay, silt, and well-rounded gravel. As illustrated in cross-sectional view in Figures 6-5 and 6-6, silt is present throughout Area II where fill materials are not present.

Coarser grained sediments composed mostly of poorly sorted sands underlie the silt. Light to dark yellowish brown to strong brown, fine to coarse poorly-sorted sands with subordinate gravel to cobbles and silt are present from approximately 10 ft bgs to depths of 40 ft bgs. Silty sands occur overlying poorly sorted sands in the eastern portion of Area II. Well-sorted sands are less common and typically occur in lenses. Large, dense gravel and cobble deposits occur within discrete beds and are more prominent in the northern portion of the site parallel to Tacony Street.

Clays with peat were observed in the southwest portion of Area II in the vicinity of Buildings 201 and 202 to depths of at least 15 ft bgs. Peat content decreases to the east. Along the southwest corner of Building 208 these clays are present to approximately 35 ft bgs, overlying sands. These sediments are interpreted to be the above described Holocene swamp deposits. Clays were also observed in the southeast corner of Area II immediately south of Area I to depths of 15 ft bgs. Throughout the remainder of Area II rare small-scale clay lenses/beds were observed, and where borings were advanced to bedrock, clays were observed overlying the bedrock.

Bedrock composed of weathered schist was observed from 34 to 44 ft bgs where borings were advanced to refusal.

6.7 AREA II HYDROGEOLOGY

Based on the results of soil sampling, 27 temporary wells were installed and sampled to determine potential impacts to groundwater. As part of this investigation, a total of 11 permanent monitoring wells were installed in Area II in areas where impact was indicated in temporary wells. Of the 11 wells, 7 are screened in the shallow overburden from 5 or 10 ft bgs to 20 or 25 ft bgs, and 4 are screened in the deep overburden from 25 to 34 ft bgs to 35 to 44 ft bgs. During the May 2012 groundwater sampling event, groundwater was observed in Area II at depths ranging from 4 ft bgs along the Frankford Creek to 14 ft bgs in the parade ground area parallel to Tacony Street. Table 6-19 summarizes field screening parameters for temporary wells and Table 6-20 summarizes parameters for permanent monitoring wells.

Groundwater flow in shallow overburden wells is generally to the south towards Frankford Creek, as illustrated on Figure 6-7. An area of slightly elevated groundwater was observed in MW-28; this is likely due to a ponding effect due to less permeable clays being present to the south between MW-28 and Frankford Creek. The hydraulic gradient in the shallow overburden ranges from 0.0006 to 0.0009 feet per feet (ft/ft), with 0.0009 ft/ft being more representative of the shallow overburden.

Groundwater flow in deep overburden wells is generally to the south-southwest towards Frankford Creek, as illustrated on Figure 6-8. The hydraulic gradient in the deep overburden ranges from 0.0003 to 0.0006 ft/ft, with 0.0005 ft/ft being the average value. In both the shallow and deep overburden wells, the hydraulic gradient increases in wells closer to Frankford Creek. This is likely attributable to the observed increase in depth of the bedrock proximal to Frankford Creek, which affects the overburden gradient.

6.8 EXTENT OF IDENTIFIED IMPACT

6.8.1 Constituents of Potential Concern

All constituents analyzed in soil were evaluated to determine COPCs as presented in Table 6-21. Constituents that exceed either the RDC MSC, SGW MSC, Indoor Air Quality (IAQ) MSC, or NRC NUREG are considered COPCs for further fate and transport evaluation. Identified soil COPCs are listed below. None of these constituents were present in laboratory blanks or equipment rinse blanks at concentrations that would preclude them as COPCs.

All constituents analyzed in groundwater were evaluated to determine COPCs as presented in Table 6-22. Constituents that exceed residential MSC, IAQ MSC, or MCL (for radionuclides) are considered COPCs for further fate and transport evaluation. Human health and ecological risk for groundwater will be evaluated as part of the OU 4 RI. Identified groundwater COPCs are listed below.

Methylene chloride (a common laboratory contaminant) was detected above the residential MSC in temporary wells, but was not detected in permanent monitoring wells. Given that soil sampling does not indicate a source and permanent well sampling does not confirm the presence of methylene chloride, it has been excluded as a COPC. Although 2-hexanone and acetone are

common laboratory contaminants, they are present at elevated concentrations and are known to be associated with a chemical manufacturing at the adjacent property; therefore, they were not excluded on this basis. Pentachlorophenol was reported above its screening criteria in one well sample, but was also detected in the laboratory blank. Naphthalene was reported at concentrations exceeding the residential MSC in two temporary wells, but not in subsequent permanent wells. These compounds are included as COPCs, but can likely be eliminated after additional sampling of permanent wells. Gross alpha/beta and radium-226 were reported above their respective screening criteria in one temporary well sample that had high turbidity (sediment present in sample). Subsequent sampling of a permanent well placed in the immediate vicinity of the temporary well indicates no radionuclides present above screening criteria. Therefore, gross alpha/beta and radium-226 are not considered COPCs in groundwater.

Additionally, Potassium-40 (^{40}K) has been detected across Area II in soil at concentrations exceeding the USNRC NUREG screening criterion with a maximum detection of 18.9 pCi/g and average detection of 7.9 pCi/g. Detections of ^{40}K in native soils varies from 1.6 to 22 pCi/g and averages 11 pCi/g (Zikovsky and Blagoeva 1994). Reported concentrations in Area II are within naturally occurring background; therefore, ^{40}K is not a constituent of potential concern in soil. Radium-226 (^{226}Ra) has been detected above the USNRC NUREG screening criterion with a maximum detection of 1.89 pCi/g and average detection of 1.36 pCi/g.

Radium was historically used at the FFA in research and development and production of watch dials, fire control system dials, and other applications. Research and production work involving radium was spread throughout the FFA. In Area II, Building 23 was used for activities and storage, as were Buildings 109, 201, and 202. Previous investigations (as discussed in Section 2) have indicated that radionuclides were removed and the site cleaned up to acceptable levels for unrestricted use. The site-specific cleanup criterion for ^{226}Ra was set at 3 pCi/g (Rockwell 1981). Reported concentrations of radium are consistent with naturally occurring background concentrations in soil, and they do not exceed the site-specific surface soil cleanup criterion of 3pCi/g; therefore, it is not a constituent of potential concern.

Soil COPCs	Groundwater COPCs
Metals	**Metals**
Antimony	Antimony
Arsenic	Arsenic
Lead	Cobalt
Manganese	Lead
Mercury	Manganese
VOCs	**VOCs**
Benzene	2-hexanone
Carbon tetrachloride	Acetone
Chloroform	Benzene
Ethylbenzene	Carbon tetrachloride
TCE	Cis-1,2-dichloroethene
	Ethylbenzene
	Isopropylbenzene (cumene)
	MTBE
	PCE
	TCE
	Vinyl chloride
SVOCs	**SVOCs**
Benzo(a)anthracene	Acetophenone
Benzo(a)pyrene	Benzo(a)anthracene
Benzo(b)fluoranthene	Benzo(a)pyrene
Dibenzo[a,h]anthracene	Benzo(b)fluoranthene
	Benzo[g,h,i]perylene
	Dibenzo[a,h]anthracene
	Indeno[1,2,3-c,d]pyrene
	Naphthalene
	Pentachlorophenol
	Phenol
PCBs	
Aroclor-1260	

6.8.2 Soil Areas of Interest

Based on a review of soil data in respect to the applicable screening data (excluding indoor air quality criteria which are evaluated in Section 7.6.2) a total of 23 areas of interest (AOIs) have been identified. AOIs are illustrated on Figure 6-10 and summarized on Table 6-23. Pathways to potential receptors are further discussed in Section 3.7.2. Areas currently covered by an impervious surface (concrete, asphalt) are assumed to remain in place in the future. The pathway to these soils would only be complete to construction workers and it is assumed that institutional controls would be placed to protect future receptors (i.e., construction workers). Aerial extent of

AOIs was determined by calculating the area encompassing sample locations with concentrations exceeding screening criteria[5] and adding a buffer, which assumes the impact extends to the midpoint between the impacted sample and the next closest sample with concentrations less than screening criteria. Identified AOIs are as follows.

- **AOI 1** – Lead and arsenic exceedances of the RDC and SGW MSCs in areas surrounding the parade ground in Zones 1 and 2 and PCB exceedances limited to one location. The majority of exceedances are in shallow surface soil (0-1 ft bgs) with limited subsurface exceedances to 4 ft bgs. Surfaces in the area of exceedances are vegetated and pervious; therefore, the direct contact pathway is complete. Shallow surface soil lead exceedances are illustrated in Figure 6-10. Lead concentrations exceeding the MSCs are concentrated around Buildings 1, 4, 5, 14, and 15. Shallow arsenic surface soil exceedances are illustrated on Figure 6-11. The distribution of arsenic exceedances do not appear to be associated with buildings, but are rather more widespread in distribution with several distinct areas of high concentration. The majority of exceedances are limited to 1 ft bgs with areas of high concentration of deeper exceedances in limited locations. Total estimated area of potential impact is 458,116 square feet (ft^2) with a volume of 16,967 cubic yards (yd^3) assuming potential impact to 1 ft bgs.

- **AOI 2** − Benzo(a)pyrene (BAP) exceedance of the RDC MSC in surface soil in northwest corner of Zone 2 at sample location UBZ2-1. Surfaces in the area of exceedance are vegetated and pervious; therefore, the direct contact pathway is complete. Exceedance is limited to 2 ft bgs. Total estimated area of potential impact is 978 ft^2 with a volume of 72 yd^3 assuming potential impact to 2 ft bgs.

- **AOI 3** − TCE exceedance of the SGW MSC in saturated subsurface soil at sample location UBZ2-4. SGW pathway investigated by placement of temporary well, TCE concentration observed below groundwater MSC. This soil exceedance is indicative of potential groundwater impact associated a source in Area I to the east (as summarized in Section 2.17) versus a soil source in Area II.

- **AOI 4** − BAP exceedances of the RDC MSC in surface and subsurface soil at southwest corner of Building 23 in Zone 2 at sample location UBZ2-9. Surfaces in the area of exceedances are covered with concrete and asphalt; therefore, the direct contact pathway is incomplete. Exceedances are limited to 3 ft bgs. Total estimated area of potential impact is 13,544 ft^2 with a volume of 1,505 yd^3 assuming potential impact to 3 ft bgs.

- **AOI 5** – Lead exceedance of the RDC/SGW MSC in surface soil between Buildings 38 and 40 at sample location UBZ2-17. Surfaces in the area of exceedance are vegetated and pervious; therefore, the direct contact pathway is complete. Exceedance is limited to

[5] Soil to groundwater (SGW) MSCs are intended as a criterion to evaluate if leaching of contaminants from soil to groundwater is occurring. Soil concentrations above the SGW MSC indicate the potential for leaching. If a sample is already saturated (below the water table) concentrations of the compound present in the water of the saturated soil sample may not necessarily be representative of soil conditions (i.e., you may not be able to confirm the source of the exceedance). Therefore, groundwater sampling is conducted to help evaluate the source.

2 ft bgs. Total estimated area of potential impact is 13,743 ft^2 with a volume of 1,018 yd^3 assuming potential impact to 2 ft bgs.

- **AOI 6** – Aroclor 1260 exceedance of the RDC MSC in surface soil adjacent to transformer T-1101 west of Building 28 in Zone 2. Surfaces in the area of exceedance are bare/vegetated and pervious; therefore, the direct contact pathway is complete. Exceedance is limited to 2 ft bgs. Total estimated area of potential impact is 767 ft^2 with a volume of 57 yd^3 assuming potential impact to 2 ft bgs.

- **AOI 7** – Arsenic and BAP exceedances of the RDC MSC in subsurface soil (3-4 ft bgs) between Buildings 112 and 116 at sample location BZ2-5. Surfaces in the area of exceedances are covered with concrete and asphalt; therefore, the direct contact pathway is incomplete. Total estimated area of potential impact is 13,129 ft^2 with a volume of 486 yd^3 assuming potential impact of a 1 ft thick interval of subsurface soil.

- **AOI 8** – Arsenic exceedance of the RDC MSC in subsurface soil east of Building 111 at sample location BZ2-6. Surfaces in the area of exceedance are gravel covered and pervious; therefore, the direct contact pathway is complete. Total estimated area of potential impact is 5,944 ft^2 with a volume of 2,422 yd^3 assuming potential impact to n 14-ft-thick interval of impacted soil.

- **AOI 9** – BAP exceedance of the RDC MSC in surface soil at the southwest corner of Building 11 in Zone 2 at sample location BZ2-7. Surfaces in the area of exceedance are covered with concrete and asphalt; therefore, the direct contact pathway is incomplete. Exceedance is limited to 2 ft bgs. Total estimated area of potential impact is 5,565 ft^2 with a volume of 412 cubic yards yd^3 assuming potential impact to 2 ft bgs.

- **AOI 10** – Lead exceedance of the RDC and SGW MSC in surface soil west of Building 110 at sample location UBZ2-45. Surfaces in the area of exceedance are vegetated and pervious; therefore, the direct contact pathway is complete. Exceedance is limited to 2 ft bgs. Total estimated area of potential impact is 6,285 ft^2 with a volume of 466 yd^3 assuming potential impact to 2 ft bgs.

- **AOI 11** –BAP exceedance in surface soil (0-2 ft bgs) of the RDC MSC and benzene exceedance of the SGW MSC in saturated subsurface soil (39-40 ft bgs) north of Building 201 at location UBZ3-8 in Zone 3. Surfaces in the area of exceedances are covered with mulch and they are pervious; therefore, the direct contact pathway is complete for surface soils. The deeper saturated exceedance from 39-40 ft is indicative of impacted groundwater that is migrating onsite. Total estimated area of potential impact is 8,455 ft^2 with a volume of 626 yd^3 assuming potential impact from BAP to 2 ft bgs (0-2 ft bgs interval).

- **AOI 12** − Arsenic exceedances in surface and subsurface soil of the RDC MSC to depths of 12 ft bgs northwest of Building 201 at locations UBZ3-7, Z3D18, and Z3D19 in Zone 3. Surfaces in the area of exceedances are covered with concrete and asphalt; therefore,

the direct contact pathway is incomplete. Total estimated area of potential impact is 6,249 ft^2 with a volume of 2,777 yd^3 assuming potential impact to 12 ft bgs.

- **AOI 13 –** Arsenic and PAH exceedances of the RDC MSC in surface and subsurface soils (0-13 ft bgs) in the southern portion surrounding Building 201 at locations UBZ3-23, -24, -38, 39, -54, and -55 in Zone 3. Surfaces in the area of exceedances are covered with concrete/asphalt except for one location (UBZ3-24) which is covered by grass; therefore, the direct contact pathway is partially complete. Total estimated area of potential impact is 39,560 ft^2 with a volume of 19,047 yd^3 assuming potential impact to 13 ft bgs[6].

- **AOI 14** − Arsenic and BAP exceedances in surface/subsurface soil (1-3 ft bgs) of the RDC MSC and mercury exceedances of the SGW MSC in an unsaturated surface/subsurface soil (1-3 ft bgs) southwest of Building 208 at location UBZ3-41 in Zone 3. Surfaces in the area of exceedances are covered with concrete and asphalt; therefore, the direct contact pathway is incomplete. Total estimated area of potential impact is 8,984 ft^2 with a volume of 4,326 yd^3 assuming potential impact to 3 ft bgs.

- **AOI 15** − Benzene exceedance of the SGW MSC in saturated subsurface soil at sample location UBZ3-42 (11.5-13.5 ft bgs). SGW pathway investigated by placement of temporary well (TW-15), and benzene concentration observed to exceed the groundwater MSC. This soil exceedance is indicative of potential groundwater impact associated with an offsite sourced groundwater plume associated with the Honeywell Frankford Facility (as discussed in Section 7.2.2.2) versus a soil source in Area II.

- **AOI 16** − BAP exceedance in subsurface soil (5-7 ft bgs) of the RDC MSC between Buildings 209 and 210 at location BZ3-9 in Zone 3. Surfaces in the area of exceedance are covered with concrete and asphalt; therefore, the direct contact pathway is incomplete. Total estimated area of potential impact is 915 ft^2 with a volume of 68 yd^3 assuming potential impact of a 2 ft thick interval.

- **AOI 17** − Arsenic exceedances in surface/subsurface soil (0-3 ft bgs) of the RDC MSC south of Building 210 at locations UBZ3-43and UBZ3-44 in Zone 3. Surfaces in the area of exceedances are covered with concrete and asphalt; therefore, the direct contact pathway is incomplete. Total estimated area of potential impact is 11,257 ft^2 with a volume of 1,251 yd^3 assuming potential impact to 3 ft bgs.

- **AOI 18** − PAH exceedances in subsurface soil (4-5 ft bgs) of the RDC MSC south of Building 212 at location UBZ3-18 in Zone 3. Surfaces in the area of exceedances are covered with concrete and asphalt; therefore, the direct contact pathway is incomplete. Total estimated area of potential impact is 1,232 ft^2 with a volume of 46 yd^3 assuming potential impact of a 1-ft-thick interval.

[6] A depth of 13 ft bgs was based on the deepest observed exceedance (i.e., a sample was collected below the 12 ft interval and no exceedances were detected).

- **AOI 19** − Arsenic exceedance in subsurface soil (5-7 ft bgs) of the RDC MSC southwest of Building 215 at location UBZ3-46 in Zone 3. Surfaces in the area of exceedance are covered with concrete and asphalt; therefore, the direct contact pathway is incomplete. Total estimated area of potential impact is 1,057 ft^2 with a volume of 78 yd^3 assuming potential impact to a 2-ft interval.

- **AOI 20** – Arsenic, antimony, lead, and BAP exceedances in surface/subsurface soil (0-3 ft bgs) of the RDC MSC (lead and antimony above the SGW MSC) in the courtyard area of Building 215 at locations UBZ3-13, -32, and -33 and BZ3-13 in Zone 3. Surfaces in the area of exceedances are covered with bare soil and vegetation; therefore, the direct contact pathway is complete. Total estimated area of potential impact is 14,991 ft^2 with a volume of 1,666 yd^3 assuming potential impact to 3 ft bgs.

- **AOI 21** – Arsenic and lead exceedances in surface/subsurface soil (0-5 ft bgs) above the RDC MSC (lead above the SGW MSC) in linear area south of Building 222 at locations UBZ3-49, -57 , -58 and -63 in Zone 3. Surfaces in the area of exceedances are covered with concrete and asphalt; therefore, the direct contact pathway is incomplete. Total estimated area of potential impact is 33,500 ft^2 with a volume of 6,204 yd^3 assuming potential impact to 5 ft bgs.

- **AOI 22** − Arsenic and PAH exceedances in surface/subsurface soil (0-7 ft bgs) of the RDC MSCs in the area east of Building 218 at locations UBZ3-62 and BZ3-15 in Zone 3. Surfaces in the area of exceedances are covered with concrete and asphalt; therefore, the direct contact pathway is incomplete. Total estimated area of potential impact is 2,933 ft^2 with a volume of 760 yd^3 assuming potential impact to 7 ft bgs.

- **AOI 23** − Arsenic exceedance in surface soil (0-2 ft bgs) of the RDC MSC in area east of Building 222 at location UBZ3-52 in Zone 3. Surfaces in the area of exceedance are covered with concrete and asphalt; therefore, the direct contact pathway is incomplete. Total estimated area of potential impact is 1,084 ft^2 with a volume of 80 yd^3 assuming potential impact to 2 ft bgs.

6.8.3 Groundwater Areas of Concern

Based on a review of groundwater data from temporary and permanent wells with respect to the applicable screening data (excluding indoor air quality criteria which are evaluated in Section 7.6.2), a total of nine AOIs have been identified. Groundwater impacts will be further characterized by USACE in the upcoming investigations of OU4 (site wide groundwater investigation). AOIs are illustrated on Figure 6-13 and summarized on Table 6-24. Identified AOIs are as follows.

- **AOI 1** – Dissolved lead detected in TW-01 at concentrations exceeding the residential MSC. MW-31 placed in area of TW-01 and sampled in June 2012, and results indicate lead not reported above laboratory reporting limit or residential MSC. Per PADEP Act 2, groundwater characterization for monitoring wells includes two sampling events. One

additional sampling event is required to determine that lead is indeed not present in groundwater at this location.

- **AOI 2** – TCE detected in MW-30 and MW-31 at concentrations exceeding the residential MSC. Concentrations were relatively lower to those detected to the east in Area II and Area I. Lower levels indicate no obvious source area in soil. TCE possibly transported from plume to the east via preferential pathways (underground tunnels and utilities).

- **AOI 3** – Isopropylbenzene (cumene), acetone, phenol, arsenic, and lesser VOCs/SVOCs detected above residential MSCs in TW-13, TW-14, TW-15, TW-16, TW-21, TW-22, TW-24, TW-26, TW-27, and MW-25 through MW-29. Apparent source area located offsite at Honeywell facility to the west as evidence in file research. The source of these compounds is discussed in Section 7.3.2.2.

- **AOI 4** – Arsenic detected in TW-20 above residential MSC.

- **AOI 5** – Radionuclides detected above screening criteria in TW-12. MW-24 placed in area of TW-12 and sampled in June 2012, and results indicate radionuclides not reported above screening criteria.

- **AOI 6** – Benzo(b)fluoranthene detected above residential MSC in TW-25.

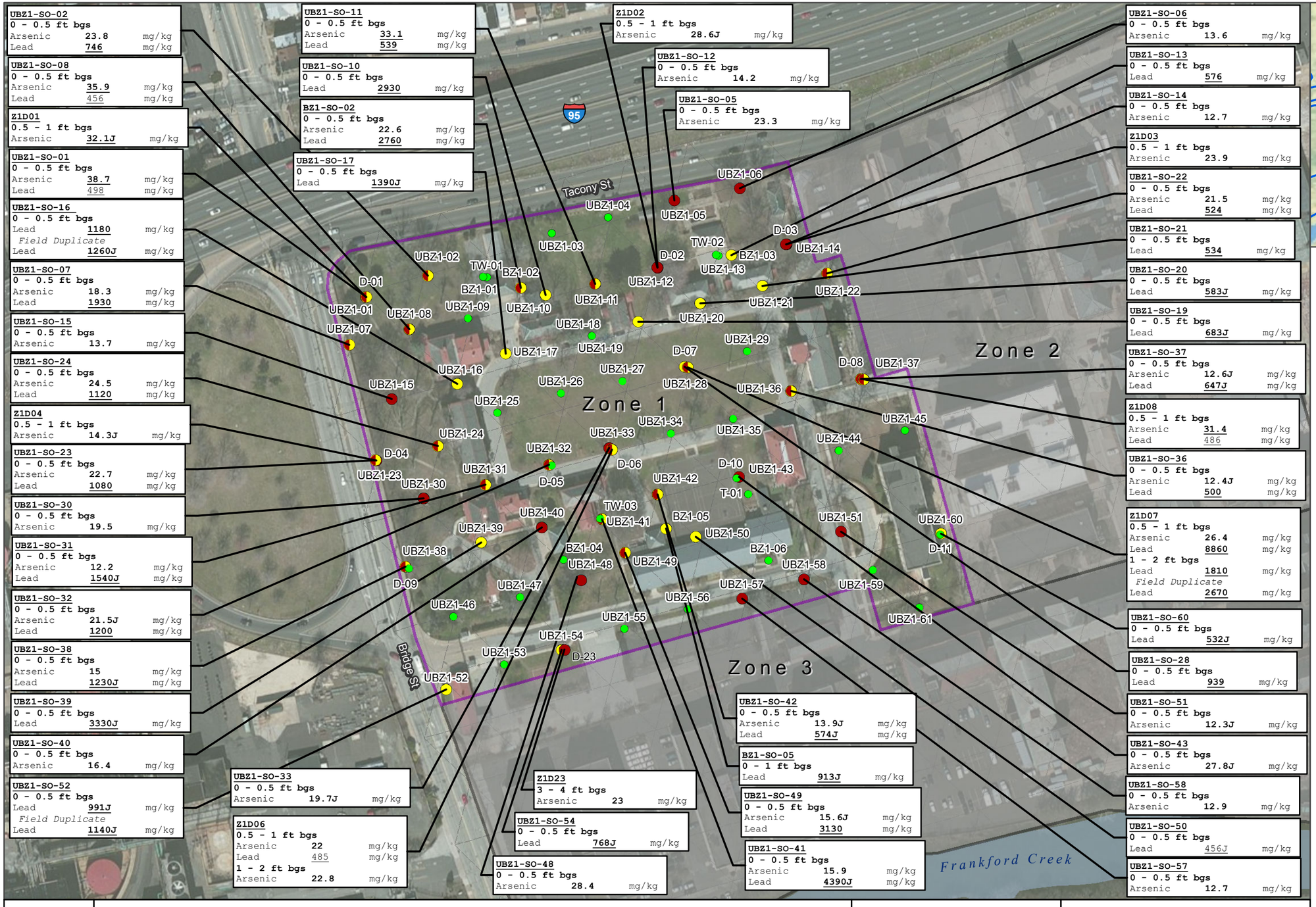
- **AOI 7** – TCE and PCE along with associated degradation products detected in TW-05, TW-06, TW-07, TW-08, TW-11, MW-21, MW-22, and MW-23. Appears to be continuation of plume identified in Area I.

- **AOI 8** – Thallium detected in TW-10 above residential MSC.

- **AOI 9** – Manganese detected above residential MSC in wells across entire site.

The fate and transport of the compounds identified in these AOIs is discussed in Chapter 7.

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Label Key

UBZ-	Unbiased Soil Sample
BZ-	Biased Soil Sample
D-	Delineation Soil Sample
Z1-	Zone 1
Z2-	Zone 2
Z3-	Zone 3
SO-	Soil Sample
J	Estimated Value
mg/kg	Milligrams per Kilogram

56.2 mg/kg (Bold) = Exceeds screening Criteria for PA Act 2 Residential Direct Contact (RDC) (0-15 ft bgs)

57.3 mg/kg (Underline) = Exceeds Screening Criteria for PA DEP Soil to Groundwater

45.6 mg/kg (Bold & Underline) = Exceeds both Screening Criteria for RDC and Soil to Groundwater

Sources
ESRI (Imagery), 2011
Cabrera, 2011
USACE, 2009

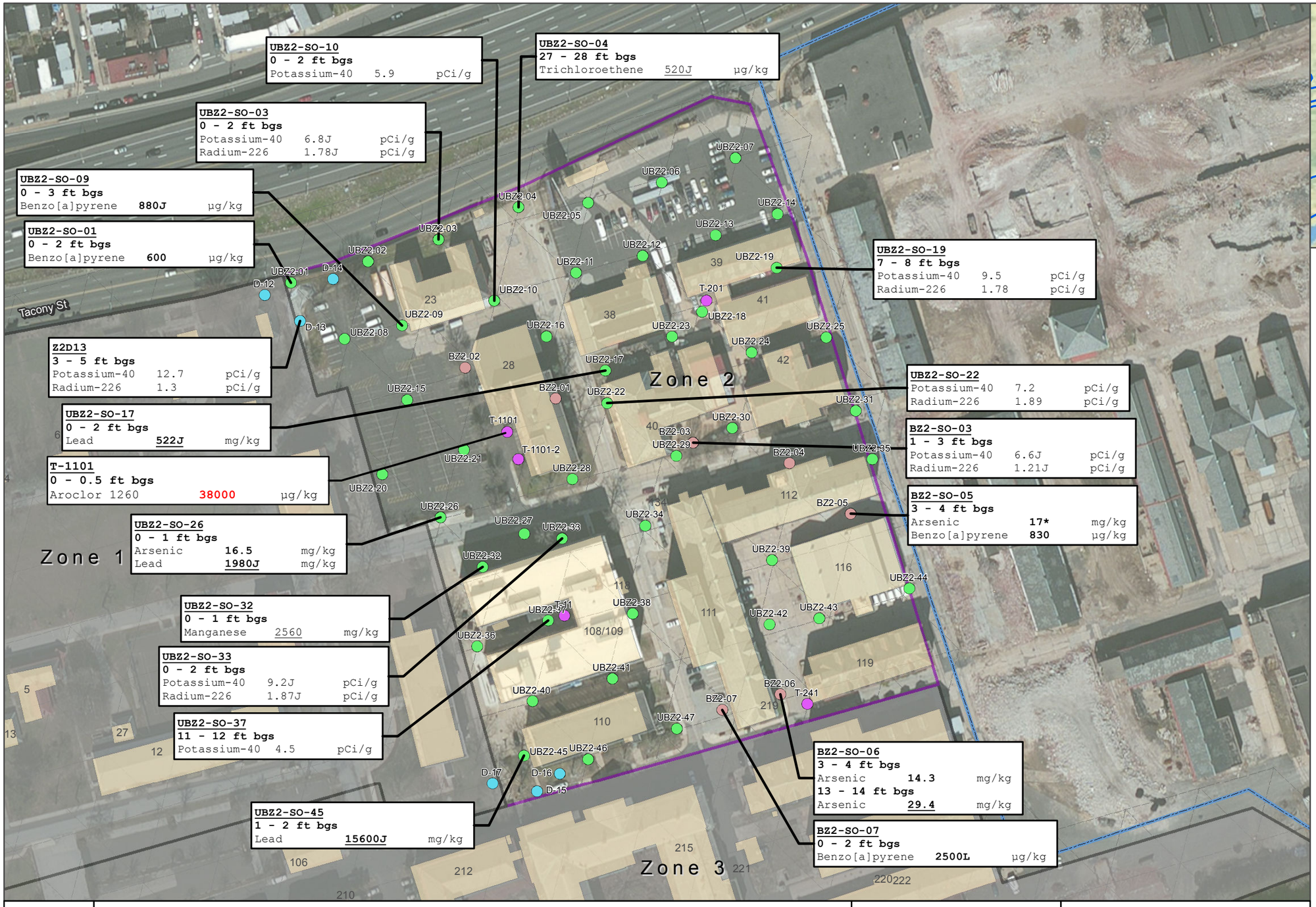
Frankford Arsenal
Philadelphia, Pennsylvania

Project: 6233017

Date: November 2013

0 50 100 200
Feet
1 inch = 150 feet

Figure 6-1
Zone 1 Lead and Arsenic Samples Exceeding Screening Criteria





Legend

- Biased Soil Sample
- Unbiased Soil Sample
- Delineation Soil Sample
- Transformer Sample

Zones

- Zone 2
- Zone 1 and Zone 3
- Existing Building
- Area I Boundary

Label Key

UBZ- Unbiased Soil Sample
BZ- Biased Soil Sample
D- Delineation Soil Sample
Z1- Zone 1
Z2- Zone 2
Z3- Zone 3
SO- Soil Sample

Lab Qualifiers

D Dilution
J Estimated Value
mg/kg Milligrams per Kilogram
µg/kg Micrograms per Kilogram
* Indicates the duplicate analysis is not within control limits

12.7 pCi/g = Exceeds Screening Criteria for US NRC NUREG/CR-5512

56.2 mg/kg (Bold) = Exceeds screening Criteria for PA Act 2 Residential Direct Contact (RDC)(0-15 ft bgs)

57.3 mg/kg (Underline) = Exceeds Screening Criteria for PA DEP Soil to Groundwater

45.6 mg/kg (Bold & Underline) = Exceeds both Screening Criteria for RDC and Soil to Groundwater

38000 µg/kg (Red) = Exceeds Screening Criteria for PA DEP MSCs for Regulated Substances in Soil Residential 0-15 ft Jan 2011

Sources
ESRI (Imagery), 2011
Cabrera, 2011
USACE, 2009

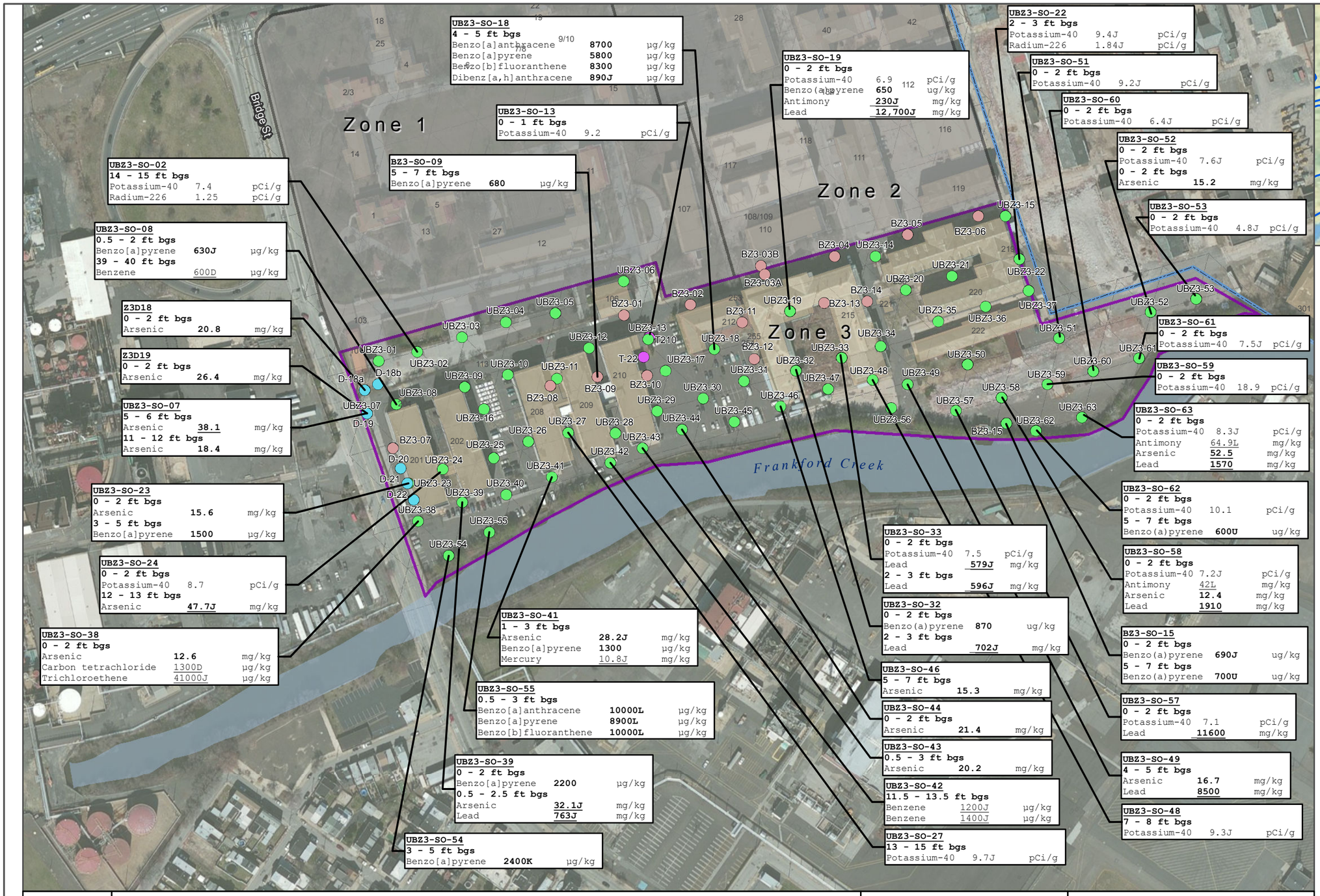
Frankford Arsenal
Philadelphia, Pennsylvania

Project: 6233017

Date: November 2013

0 50 100 200
Feet
1 inch = 125 feet

Figure 6-2 Zone 2 Soil Samples Exceeding Screening Criteria





Legend

- Biased Soil Sample
- Unbiased Soil Sample
- Delineation Soil Sample
- Transformer Sample
- Existing Building

Zones

- Zone 3
- Zone 1 and Zone 2
- Area I Boundary

Label Key

UBZ-	Unbiased Soil Sample
BZ-	Biased Soil Sample
D-	Delineation Soil Sample
Z1-	Zone 1
Z2-	Zone 2
Z3-	Zone 3
SO-	Soil Sample

Lab Qualifiers

D	Dilution
J	Estimated Value
K	Estimated Value, Biased High
U	Not detected above the level of detection
L	Analyte present (reported value may be biased low, actual value expected higher)
mg/kg	Milligrams per Kilogram
µg/kg	Micrograms per Kilogram

12.7 pCi/g = Exceeds Screening Criteria for US NRC NUREG/CR-5512

56.2 mg/kg (Bold) = Exceeds screening Criteria for PA Act 2 Residential Direct Contact (RDC) (0-15 ft bgs)

57.3 mg/kg (Underline) = Exceeds Screening Criteria for PA DEP Soil to Groundwater

45.6 mg/kg (Bold & Underline) = Exceeds both Screening Criteria for RDC and Soil to Groundwater

Sources

ESRI (Imagery) 2011

Cabrera, 2011; USACE, 2009

0 50 100 200

Feet

1 inch = 200 feet

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Project: 6233017

Date: November 2013

Figure 6-3
Zone 3 Soil Samples
Exceeding Screening Criteria



TW-01

Antimony	9.17J	µg/L
Lead	6.38	µg/L
Manganese	907	µg/L
Thallium	7.69B	µg/L

TW-03

Manganese	487	µg/L
Pentachlorophenol	1.1B	µg/L
Trichloroethene	7.8	µg/L

TW-22

Acetone	160000	µg/L
Acetophenone	5100	µg/L
Arsenic	35.7	µg/L
Benzene	260J	µg/L
Ethylbenzene	4900	µg/L
Isopropylbenzene	27000	µg/L
Manganese	2140	µg/L
Methylene Chloride	1200J	µg/L
Phenol	25000	µg/L
Thallium	4.03J	µg/L

TW-26

Arsenic	17.7	µg/L
Benzene	74	µg/L
Cumene	1100	µg/L
Benzo(a)pyrene	0.46	µg/L
Benzo(b)fluorene	0.61	µg/L

TW-27

Benzo(a)pyrene	0.47	µg/L
Benzo(b)fluorene	0.63	µg/L

TW-21

2-hexanone	80J	µg/L
Acetone	180000J	µg/L
Acetophenone	12000J	µg/L
Arsenic	80.9	µg/L
Benzene	580	µg/L
Ethylbenzene	3700	µg/L
Isopropylbenzene	39000	µg/L
Manganese	2630	µg/L
Phenol	90000	µg/L
Field Duplicate		
Acetone	190000J	µg/L
Acetophenone	12000J	µg/L
Arsenic	84.5	µg/L
Benzene	590	µg/L
Ethylbenzene	4000	µg/L
Isopropylbenzene	39000	µg/L
Manganese	2700	µg/L
Phenol	84000	µg/L

TW-20

Arsenic	55	µg/L
Manganese	1760	µg/L

TW-18

Manganese	2410	µg/L

TW-19

Manganese	5310	µg/L

TW-16

Benzene	1700	µg/L
Isopropylbenzene	3400	µg/L
Manganese	5180	µg/L
Phenol	2100	µg/L

TW-04

Manganese	458	µg/L

TW-05

Manganese	1400	µg/L
Tetrachloroethene	240	µg/L

TW-06

Cis-1,2-dichloroethene	1400	µg/L
Manganese	635	µg/L
Tetrachloroethene	170J	µg/L
Trichloroethene	120	µg/L
Vinyl chloride	5.2	µg/L

TW-23

Manganese	1090	µg/L

TW-10

Manganese	782	µg/L
Thallium	3.6J	µg/L

TW-07

Tetrachloroethene	160	µg/L
Tetrachloroethene	170	µg/L

TW-08

Cis-1,2-dichloroethene	470	µg/L
Cobalt	34.2	µg/L
Manganese	7000	µg/L
Tetrachloroethene	54	µg/L
Trichloroethene	220	µg/L
Vinyl chloride	8.1	µg/L

TW-25

Benzo(b)fluorene	0.66	µg/L

TW-14

Arsenic	17.7	µg/L
Benzene	62	µg/L
Ethylbenzene	2300	µg/L
Isopropylbenzene	5300	µg/L
Manganese	6340	µg/L

TW-17

Manganese	7210	µg/L

TW-24

2-hexanone	56J	µg/L
Acetone	150000	µg/L
Acetophenone	6400	µg/L
Arsenic	70.4	µg/L
Benzene	500J	µg/L
Ethylbenzene	8500	µg/L
Isopropylbenzene	23000	µg/L
Manganese	2160	µg/L
Phenol	32000	µg/L

TW-15

Arsenic	159	µg/L
Benzene	1000J	µg/L
Benzo[g,h,i]perylene	0.45	µg/L
Cobalt	13.6J	µg/L
Dibenz[a,h]anthracene	0.11	µg/L
Ethylbenzene	9400	µg/L
Isopropylbenzene	16000	µg/L
Manganese	876	µg/L
Naphthalene	160	µg/L

TW-12

Alpha	264J	pCi/l
Beta	417J	pCi/l
Radium-228	5.6J	pCi/l

TW-13

2-hexanone	27	µg/L
Acetone	72000	µg/L
Arsenic	41.1	µg/L
Benzene	450J	µg/L
Ethylbenzene	11000	µg/L
Isopropylbenzene	27000	µg/L
Manganese	3800	µg/L
Naphthalene	110	µg/L
Phenol	10000J	µg/L

TW-11

Carbon tetrachloride	6.9	µg/L
Cis-1,2-dichloroethene	120	µg/L
Manganese	780	µg/L
Tetrachloroethene	27	µg/L
Trichloroethene	3600	µg/L
Vinyl chloride	4.5J	µg/L



Legend

- Temporary Well
- Zones
- Area I Boundary
- Existing Building

Utility Line

- Sanitary Sewer
- Electric
- Storm Drain
- Water

Label Key

TW	Temporary Well
J	Estimated Value
B	Not detected substantially above the level reported in the lab field blanks
µg/L	Micrograms per Liter

12.7 pCi/g (Red) = Exceeds Screening Criteria for US EPA Maximum Contaminant Level (MCL)

907 µg/L (Underline) = Exceeds Screening Criteria for PA Act 2 Medium-Specific Concentrations (MSC) tables, revisions effective 1/8/2011 Groundwater

Sources
ESRI (Imagery), 2011
Cabrera, 2011
USACE, 2009

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Philadelphia, Pennsylvania

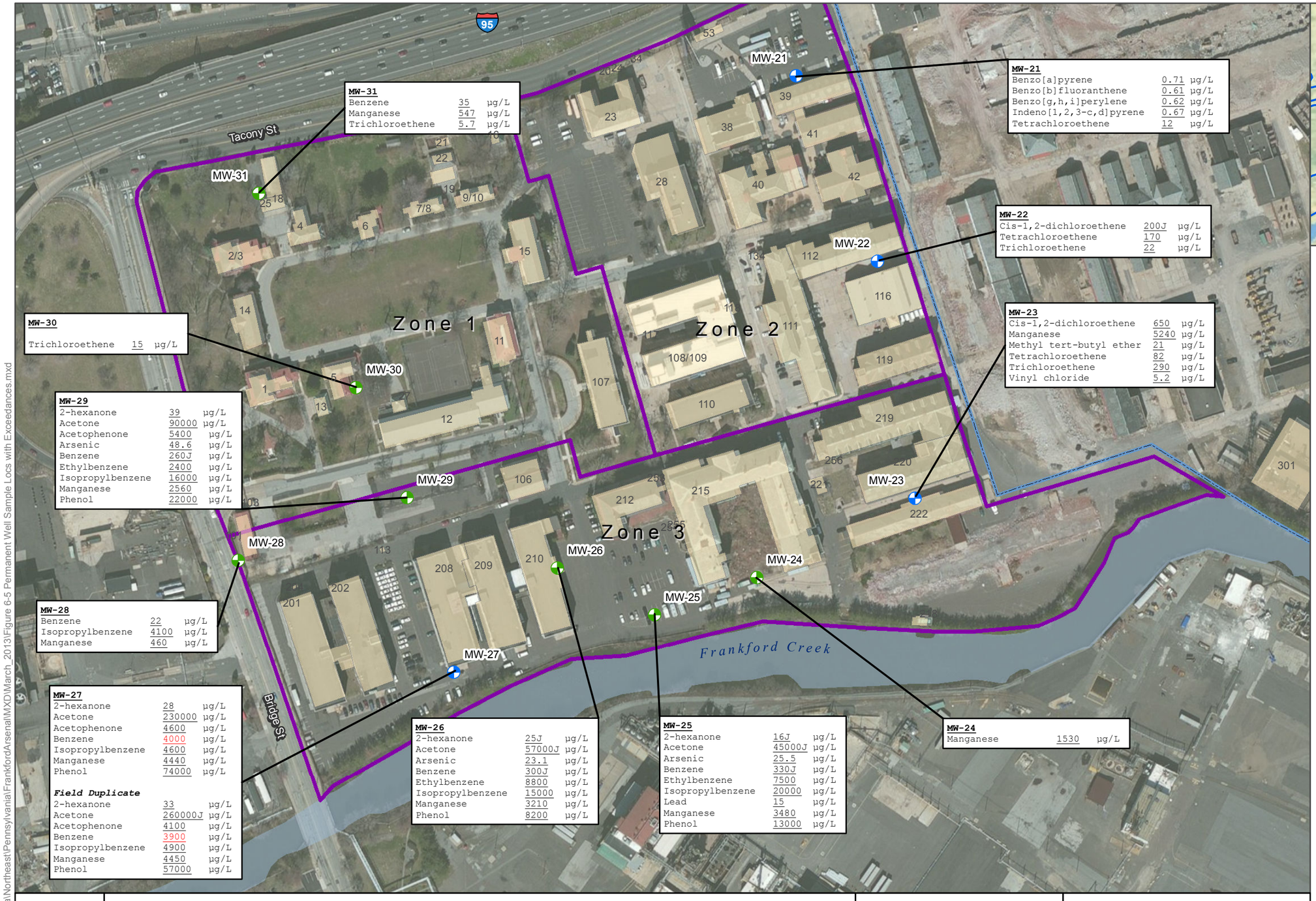
Project: 6233017

November 2013

0 75 150 300
Feet
1 inch = 185 feet

Figure 6-4
Temporary Well Groundwater Sample Locations with Exceedances of Screening Criteria

Path: L:\GIS\Data\Northeast\Pennsylvania\FrankfordArsenal\MXD\March_2013\Figure 6-4 Area II Temp Well Locs with Exceedances.mxd





Legend

Permanent Well

- Shallow Overburden
- Deep Overburden

Zones

- Zones
- Area I Boundary
- Existing Building

Label Key

MW	Monitoring Well
J	Estimated Value
µg/L	Micrograms per Liter
907 µg/L (Underline)	= Exceeds Screening Criteria for PA Act 2 Medium-Specific Concentrations (MSC's) tables, revisions effective 1/8/2011 Groundwater
12.7 pCi/g (Red & Underline)	= Exceeds Screening Criteria for Act 2 MSC and PA Residential Volatilization to Indoor Air Criteria

Sources
ESRI (Imagery), 2011
Cabrera, 2011
USACE, 2009

Figure 6-5
Monitoring Well Groundwater Sample Locations with Exceedances of Screening Criteria

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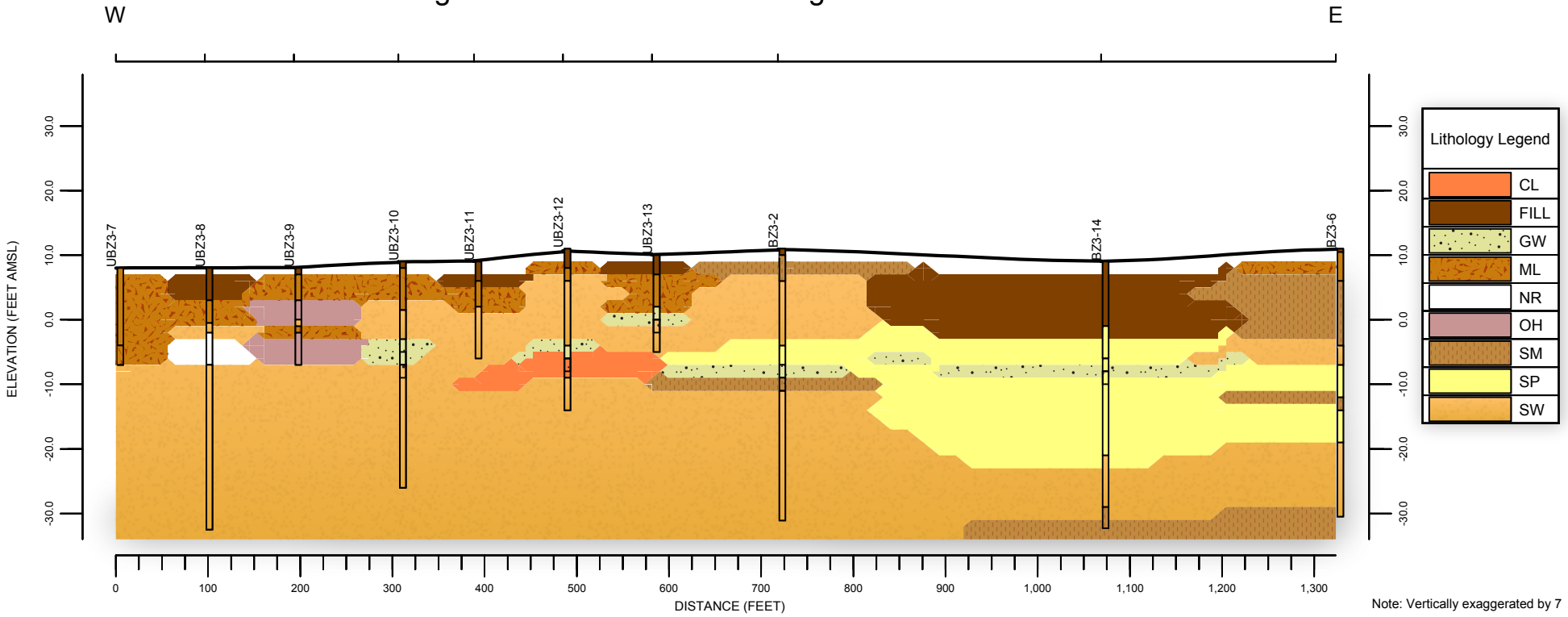
Project: 6233017

Date: November 2013

0 75 150 300
Feet
1 inch = 185 feet

Path: L:\GISData\Northeast\Pennsylvania\FrankfordArsenal\MXD\March_2013\Figure 6-5 Permanent Well Sample Locs with Exceedances.mxd

Figure 6-6 West to East Geologic Cross Section



CL - Clay

FILL - Fill Material

GW - Well Graded Gravel

ML - Silt

NR - No Recovery

OH - Organic Clay/Silt

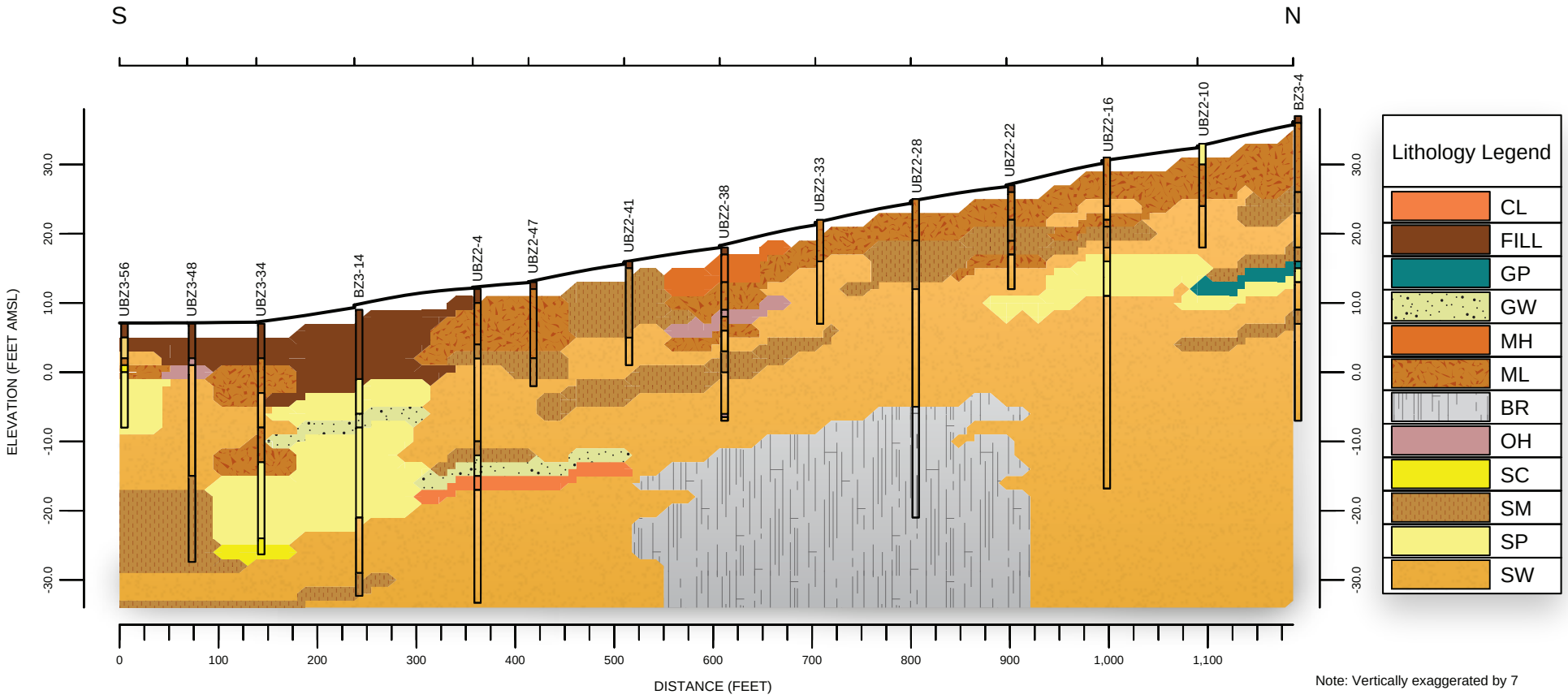
SM - Sandy Silt

SP - Poorly Graded Sand

SW - Well Graded Sand

Generated using RockWorks 14 Version 2009 3.23

Figure 6-7 South to North Geologic Cross Section



Note: Vertically exaggerated by 7

BR- Bedrock

CL - Clay

GP - Poorly Graded Gravel

FILL - Fill Material

GW - Well Graded Gravel

MH - Elastic Silt

ML - Silt

OH - Organic Clay/Silt

SC - Silt and Clay

SM - Sandy Silt

SP - Poorly Graded Sand

SW - Well Graded Sand

Generated using RockWorks 14 Version 2009 3.23





Legend

- Deep Overburden Monitoring Well
- Shallow Overburden Monitoring Well
- Shallow Overburden Groundwater Contour (groundwater elevation feet above mean sea level)

Zones

- Zones
- Area I Boundary
- Existing Building

Sources
ESRI (Imagery), 2011
Cabrera, 2011
USACE, 2009

EA	**Frankford Arsenal** **Philadelphia, Pennsylvania**	Project: 6233017 November 2013	0 75 150 300 Feet 1 inch = 180 feet

Figure 6-8
Shallow Overburden
Groundwater Contour Map

Path: L:\GISData\Northeast\Pennsylvania\FrankfordArsenal\MXD\March_2013\Figure 6-8 Shallow Groundwater Contours.mxd





Legend

- Deep Overburden Monitoring Well
- Shallow Overburden Monitoring Well
- Deep Overburden Groundwater Contour (groundwater elevation feet above mean sea level)

Zones

- Zones
- Area I Boundary
- Existing Building

Sources
ESRI (Imagery), 2011
Cabrera, 2011
USACE, 2009

Figure 6-9
Deep Overburden Groundwater Contour Map

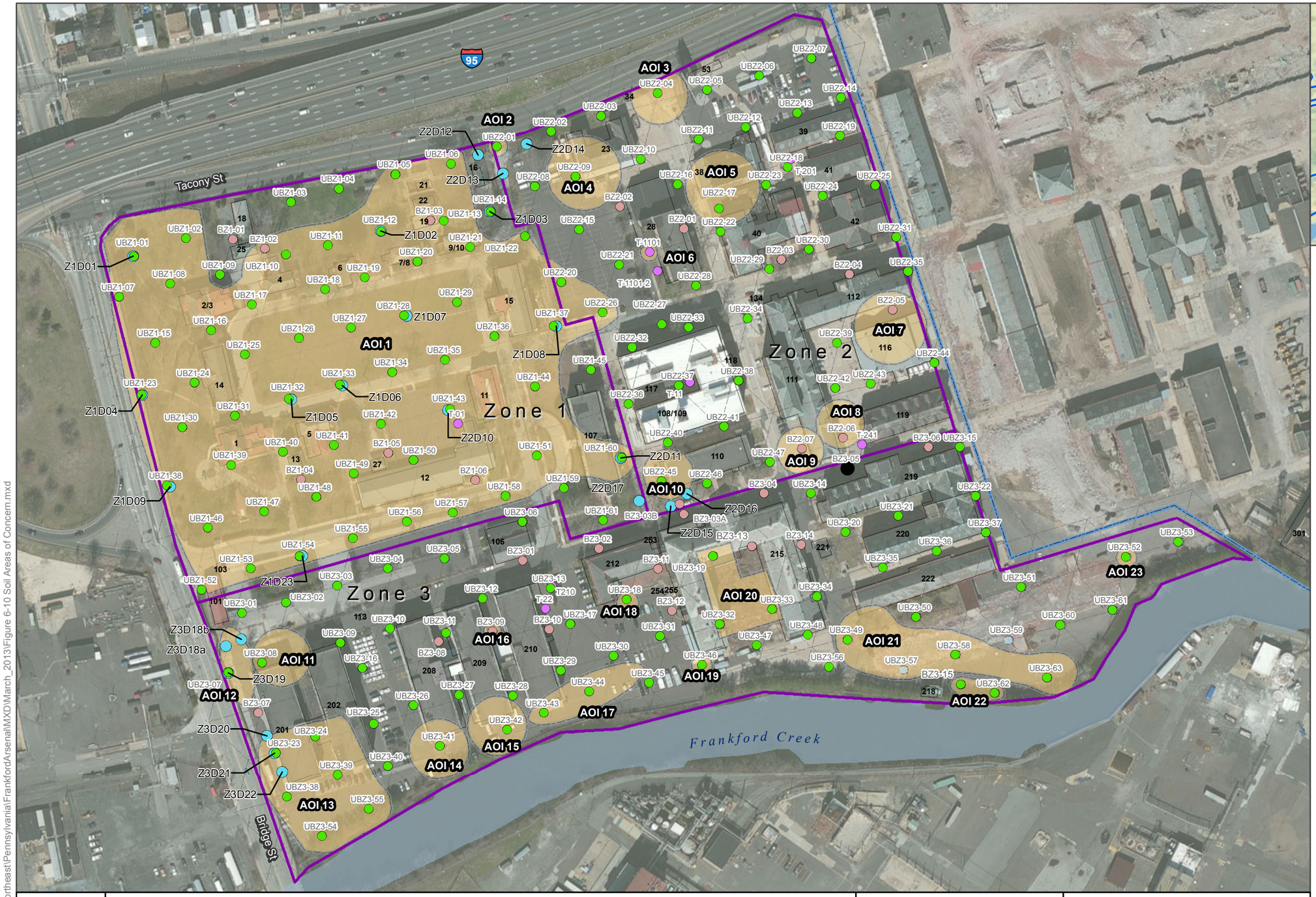
Frankford Arsenal
Philadelphia, Pennsylvania

Project: 6233017

November 2013

0 75 150 300
Feet
1 inch = 180 feet

Path: L:\GIS\Data\Northeast\Pennsylvania\FrankfordArsenal\MXD\March_2013\Figure 6-9 Deep Groundwater Contours.mxd





Legend

Soil Sample Locations

- Biased Soil Sample
- Unbiased Soil Sample
- Transformer Soil Sample
- Delineation Soil Sample
- Location Not Sampled (refusal)

Zones

- Zone 1, 2 and 3
- Approximate Area of Interest (Soil)
- Area I Boundary

Label Key

UBZ-	Unbiased Soil Sample
BZ-	Biased Soil Sample
D-	Delineation Soil Sample
Z1-	Zone 1
Z2-	Zone 2
Z3-	Zone 3

Sources
ESRI (Imagery), 2011
Cabrera, 2011
USACE, 2009

Figure 6-10
Soil Areas of Interest

Frankford Arsenal
Philadelphia, Pennsylvania

Project: 6233017

Date: November 2013

0 75 150 300
Feet
1 inch = 175 feet

Path: L:\GIS\Data\Northeast\Pennsylvania\FrankfordArsenal\MXD\March_2013\Figure 6-10 Soil Areas of Concern.mxd





Legend

Soil Sample Locations

- Delineation Soil Sample
- Biased Soil Sample
- Unbiased Soil Sample
- Lead Contaminant Contour Line (Concentrations are in mg/kg)

Zones

- Zone 1, 2 and 3

Label Key

UBZ-	Unbiased Soil Sample
BZ-	Biased Soil Sample
D-	Delineation Soil Sample
Z1-	Zone 1
Z2-	Zone 2
Z3-	Zone 3

Sources
ESRI (Imagery), 2011
Cabrera, 2011
USACE, 2009

Frankford Arsenal
Philadelphia, Pennsylvania

Project: 6233017

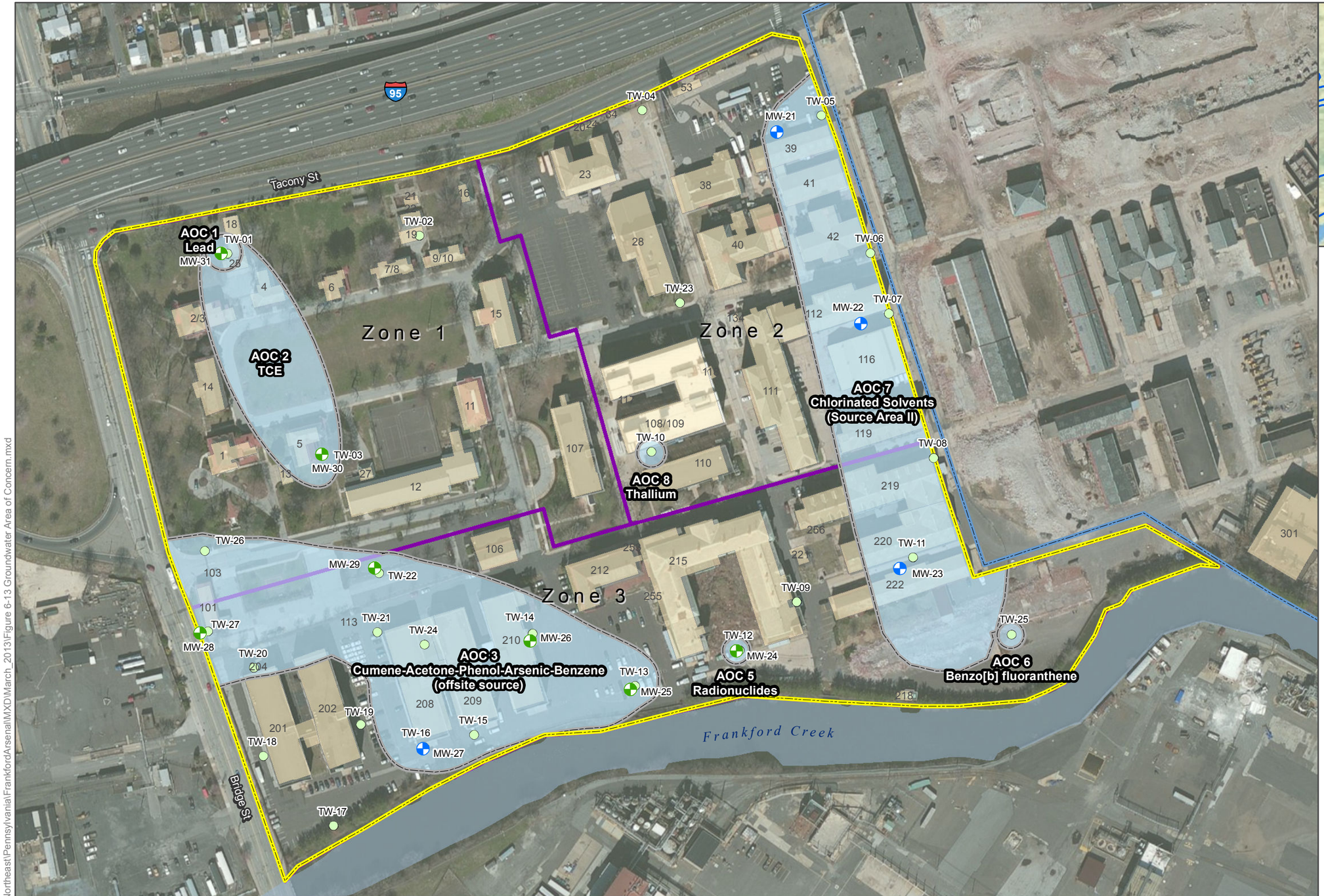
Date: November 2013

0 25 50 100
Feet
1 inch = 100 feet

Figure 6-11
Extent of Lead Concentrations in Zone 1 Surface Soil (0-6 inches)

Path: L:\GISData\Northeast\Pennsylvania\FrankfordArsenal\MXD\March_2013\Figure 6-11 Lead Extent of Contamination.mxd


Tacony St
Zone 1
Zone 2
Zone 3
Z1D01
Z1D02
Z1D03
Z1D04
Z1D05
Z1D06
Z1D07
Z1D08
Z1D09
Z1D23
Z2D10
Z2D11
Z2D12
Z2D13
Z2D14
Z2D15
Z2D16
Z2D17
Z3D18b
UBZ1-01
UBZ1-02
UBZ1-03
UBZ1-04
UBZ1-05
UBZ1-06
UBZ1-07
UBZ1-08
UBZ1-09
UBZ1-10
UBZ1-11
UBZ1-12
UBZ1-13
UBZ1-14
UBZ1-15
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UBZ1-41
UBZ1-42
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UBZ1-60
UBZ1-61
UBZ2-01
UBZ2-02
UBZ2-03
UBZ2-04
UBZ2-05
UBZ2-06
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Legend

Permanent Well

- Shallow Overburden
- Deep Overburden
- Temporary Well

Zones

- Zones
- Approximate Area of Concern (Groundwater)
- Area I Boundary
- Area II Boundary
- Existing Building

Sources
ESRI (Imagery), 2011
Cabrera, 2011
USACE, 2009

Figure 6-13
Groundwater Areas of Interest

EA	**Frankford Arsenal** **Philadelphia, Pennsylvania**	Project: 6233017 Date: November 2013	0 75 150 300 Feet 1 inch = 180 feet

Path: L:\GIS\Data\Northeast\Pennsylvania\FrankfordArsenal\MXD\March_2013\Figure 6-13 Groundwater Area of Concern.mxd

Table 6-1 - Soil - Analytical Summary of Detected Metals

			Location ID	BZ1-SO-01	BZ1-SO-01	BZ1-SO-02	BZ1-SO-02	BZ1-SO-02	BZ1-SO-02	BZ1-SO-03	BZ1-SO-03	BZ1-SO-04	BZ1-SO-04	BZ1-SO-05	BZ1-SO-05
			Sample Name	BZ1-SO-01-0-2	BZ1-SO-01-5-7	BZ1-SO-02-0-0.5	BZ1-SO-02-1-2	BZ1-SO-02-3-5	BZ1-SO-02-5-7	BZ1-SO-03-1-3	BZ1-SO-03-7-8	BZ1-SO-04-0-2	BZ1-SO-04-5-7	BZ1-SO-5-0-1	BZ1-SO-5-6-7
			Date Sampled	1/4/2012	1/4/2012	1/4/2012	1/4/2012	1/4/2012	1/4/2012	1/4/2012	1/4/2012	1/4/2012	1/4/2012	12/29/2011	12/29/2011
			Parent Sample Name												
	Act 2 MSCs (Residential)[1]		Depth Interval	0-2	5-7	0-0.5	1-2	3-5	5-7	1-3	7-8	0-2	5-7	0-1	6-7
Analyte	**RDC MSC**	**RSGW**	**Unit**												
Inorganics (SW6010)															
Aluminum	190000	NSA	mg/kg	11300	5790	NA	NA	5460	7290	7850	4530	7820	7000	6550 J	7230 J
Antimony	88	27	mg/kg	< 1.265 U	< 1.265 U	NA	NA	< 1.11 U	< 1.475 U	0.888 J	< 1.175 U	< 1.26 U	< 1.29 U	1.38 J	< 1.4 U
Arsenic	12	29	mg/kg	7.23	3.34	**22.6**	6.68	2.98	6.8	10.5	2.88	4.37	4.13	10.9	3.12
Barium	44000	8200	mg/kg	45.3	32.2	NA	NA	13.1	26.8	70.4	14.9	33.7	23	49.1	27.3
Beryllium	440	320	mg/kg	0.502	0.421	NA	NA	0.227 J	0.47	0.493	0.25 J	0.312	0.366	0.49	0.53
Cadmium	110	38	mg/kg	0.91	0.656	1.72	0.784	0.5	0.841	0.769	0.478	0.573	0.606	0.29	< 0.17 U
Calcium	NSA	NSA	mg/kg	776	290	NA	NA	241	306	1930	275	221	118	1140 L	392 L
Chromium	NSA	NSA	mg/kg	14.5	10.1	NA	NA	7	14	9.64	9.01	10.1	7.7	15.6 J	13 J
Cobalt	66	50	mg/kg	5.88	5.97	NA	NA	4.19	7.5	5.72	3.94	3.89	4.69	7.61	8
Copper	8100	43000	mg/kg	12.1	7.95	NA	NA	6.9	11.6	17.5	5.48	5.85	6.94	57.2	9.73
Iron	150000	NSA	mg/kg	19500	12700	NA	NA	10500	17600	14300	10100	12400	13000	12000	17100
Lead	500	450	mg/kg	24.8	5.87	**2760**	48	6.58	10.9	82.9	3.81	9.3	7.33	**913 J**	7.79 J
Magnesium	NSA	NSA	mg/kg	2130	1650	NA	NA	1610	1810	1460	1150	1440	1590	1560	2110
Manganese	10000	2000	mg/kg	179	577	NA	NA	105	384	230	100	127	198	338	409
Nickel	4400	650	mg/kg	11.6	11	NA	NA	8.23	11.5	9.2	6.6	7.8	9	14.2	12.2
Potassium	NSA	NSA	mg/kg	513	504	NA	NA	346	672	433	634	280	453	398	779
Selenium	1100	26	mg/kg	< 0.505 U	< 0.505 U	NA	NA	< 0.443 U	< 0.59 U	0.717 J	< 0.4705 U	< 0.505 U	< 0.515 U	0.56 J	0.55 J
Silver	1100	84	mg/kg	< 0.2535 U	< 0.2535 U	NA	NA	< 0.2215 U	< 0.295 U	< 0.239 U	< 0.2355 U	< 0.2525 U	< 0.2585 U	< 0.2 U	< 0.28 U
Sodium	NSA	NSA	mg/kg	285	164	NA	NA	116	126	238	130	67.1 J	88.7 J	46.1 J	48.2 J
Thallium	15	14	mg/kg	< 1.015 U	< 1.015 U	NA	NA	< 0.885 U	< 1.18 U	< 0.955 U	< 0.94 U	< 1.01 U	< 1.035 U	< 0.8 U	< 1.12 U
Vanadium	1500	26000	mg/kg	20.8	12.8	NA	NA	9.63	18.1	14.2	14	13.7	12.8	20.9	17.7
Zinc	66000	12000	mg/kg	42.2 J	34.9 J	NA	NA	35.2 J	34.9 J	57.8 J	23.6 J	37 J	34 J	112	35.3
Inorganics (SW6020)															
Uranium-238	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury (SW7471)															
Mercury	35	10	mg/kg	0.024	0.003 J	NA	NA	0.017	0.011 J	0.429	< 0.0055 U	0.419	0.004 J	0.407	0.009 J

Table 6-1 - Soil - Analytical Summary of Detected Metals

			Location ID	BZ1-SO-06	BZ1-SO-06	BZ1-SO-06	BZ2-SO-01	BZ2-SO-01	BZ2-SO-02	BZ2-SO-02	BZ2-SO-03	BZ2-SO-03	BZ2-SO-04	BZ2-SO-04	BZ2-SO-05
			Sample Name	BZ1-SO-6-0.5-1.5	BZ1-SO-6-8-9	BZ1-SO-DUP7	BZ2-SO-1-11-12	BZ2-SO-1-1-2	BZ2-SO-2-1-2	BZ2-SO-2-6-8	BZ2-SO-3-10-11	BZ2-SO-3-1-3	BZ2-SO-4-0.5-1.5	BZ2-SO-4-8-9	BZ2-SO-5-11-12
			Date Sampled	12/29/2011	12/29/2011	12/29/2011	1/9/2012	1/9/2012	12/30/2011	12/30/2011	12/30/2011	12/30/2011	12/30/2011	12/30/2011	12/22/2011
			Parent Sample Name			BZ1-SO-6-8-9									
	Act 2 MSCs (Residential)[1]		Depth Interval	0.5-1.5	8-9	8-9	11-12	1-2	1-2	6-8	10-11	1-3	0.5-1.5	8-9	11-12
Analyte	RDC MSC	RSGW	Unit												
Inorganics (SW6010)															
Aluminum	190000	NSA	mg/kg	7450 J	5500 J	5500 J	5770 J	5370 J	6180 J	5300 J	6020 J	4670 J	5270 J	3590 J	3260 J
Antimony	88	27	mg/kg	< 0.935 U	< 0.885 U	< 1.01 U	< 1.245 U	1.05 J	< 1.23 U	< 1.35 U	< 1.085 U	< 1.105 U	0.767 J	< 1.235 U	1.24 J
Arsenic	12	29	mg/kg	5.07	3.34	2.75	2.29 B	5.44	5.18	4.35	0.741 J	4.22	3.38	3.27	1.89 *
Barium	44000	8200	mg/kg	59.3	14.9	14.8	19.4	73.8	18.7 N	19.7 N	36 N	10.1 N	85.3 N	19 N	19.8 J
Beryllium	440	320	mg/kg	0.45	0.38	0.35	0.27 J	0.27 J	0.249 J	0.377	0.104 J	0.232 J	0.361	0.208 J	0.15 J
Cadmium	110	38	mg/kg	0.05 J	< 0.105 U	< 0.12 U	< 0.15 U	< 0.155 U	0.626	0.73	0.296	0.567	0.559	0.452	< 0.14 U
Calcium	NSA	NSA	mg/kg	609 L	212 L	191 L	< 49.85 UR	153 B	469 B	315 B	490	336	1030	315	5350 *
Chromium	NSA	NSA	mg/kg	9.38 J	10.7 J	9.53 J	7.98	7.97	7.78 J	11.6 J	6.13	6.23	6.86	5.63	7.69 J
Cobalt	66	50	mg/kg	5.79	5.69	5.31	4.02	4.08	5.54	5.16	2.97	5.49	4.1	2.7	3.71 *
Copper	8100	43000	mg/kg	16.7	6.96	6.6	4.79	42.6	6.64	8.58	4	6.57	7.88	4.3	7.82 J
Iron	150000	NSA	mg/kg	12300	12100	11500	10400 J	10400 J	13000 J	14500 J	5870	11200	10800	8620	6070 J
Lead	500	450	mg/kg	147 J	5.82 J	5.77 J	5.78	87.3	6.64	5.12	6.78	4.93	28.2	5.2	5.42 J
Magnesium	NSA	NSA	mg/kg	1550	1690	1660	1300	1140	1420 J	1490 J	1520	1400	1210	1070	1010 J
Manganese	10000	2000	mg/kg	410	164	140	200 J	227 J	184 J	169 J	64.4	184	389	74.3	158 J
Nickel	4400	650	mg/kg	9.81	9.5	9.63	7.89	8.7	7.53	8.58	8	7.23	6.57	5.9	5.49 J
Potassium	NSA	NSA	mg/kg	520	454	472	584	446	336	796	326	263	236	348	261 *
Selenium	1100	26	mg/kg	0.53 J	< 0.355 U	< 0.405 U	< 0.5 U	< 0.515 U	0.584 J	0.568 J	< 0.4335 U	0.664 J	0.978 J	0.506 J	0.51 J
Silver	1100	84	mg/kg	< 0.185 U	< 0.175 U	< 0.2 U	< 0.25 U	< 0.255 U	< 0.246 U	< 0.27 U	< 0.2165 U	< 0.2205 U	< 0.246 U	< 0.247 U	< 0.23 U
Sodium	NSA	NSA	mg/kg	49.3 J	44.2 J	47.9 J	104 B	109 B	622 B	258 B	529	261	120	250	114 *
Thallium	15	14	mg/kg	< 0.745 U	< 0.705 U	< 0.805 U	< 0.995 U	< 1.03 U	< 0.985 U	< 1.08 U	< 0.865 U	< 0.885 U	< 0.985 U	< 0.985 U	< 0.92 U
Vanadium	1500	26000	mg/kg	13	11.2	10.5	12.5	12	11.6 N	18.7 N	5.92	9.2	10.4	7.47	4.67 J
Zinc	66000	12000	mg/kg	53.2	32.8	33.6	37.8	50.6	24.8 J	25.5 J	29 N	25 N	28.6 N	25.8 N	21.6 J
Inorganics (SW6020)															
Uranium-238	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury (SW7471)															
Mercury	35	10	mg/kg	0.657 D	0.006 J	0.005 J	0.19 J	1.87 J	0.017	< 0.0055 U	0.01 J	0.024	0.599 D	< 0.005 U	0.002 J

Table 6-1 - Soil - Analytical Summary of Detected Metals

			Location ID	BZ2-SO-05	BZ2-SO-06	BZ2-SO-06	BZ2-SO-07	BZ2-SO-07	BZ3-SO-01	BZ3-SO-01	BZ3-SO-01	BZ3-SO-02	BZ3-SO-02	BZ3-SO-03A	BZ3-SO-03A	BZ3-SO-03B
			Sample Name	BZ2-SO-5-3-4	BZ2-SO-6-13-14	BZ2-SO-6-3-4	BZ2-SO-07-0-2	BZ2-SO-07-11-12	BZ3-SO-1-1-2	BZ3-SO-13-0-1	BZ3-SO-1-6-7	BZ3-SO-2	BZ3-SO-2-5-6	BZ3-SO-3A-10-11	BZ3-SO-3A-1-2	BZ3-SO-3B-1-2
			Date Sampled	12/22/2011	12/21/2011	12/21/2011	1/6/2012	1/6/2012	12/29/2011	4/18/2012	12/29/2011	12/22/2011	12/22/2011	12/22/2011	12/22/2011	12/22/2011
			Parent Sample Name													
	Act 2 MSCs (Residential)[1]		Depth Interval	3-4	13-14	3-4	0-2	11-12	1-2	0-1	6-7	1-2	5-6	10-11	1-2	1-2
Analyte	**RDC MSC**	**RSGW**	**Unit**													
Inorganics (SW6010)																
Aluminum	190000	NSA	mg/kg	6920 J	4120 J	6520 J	5030	4080	9250	4690	4950	1980 J	4760 J	1660 J	4550 J	8430 J
Antimony	88	27	mg/kg	2.22 J	< 1.385 U	< 1.175 U	< 1.325 U	< 0.975 U	< 1.455 U	28.4 L	< 1.04 U	< 1.3 U	< 1.15 U	< 1.34 U	1.05 J	< 0.985 U
Arsenic	12	29	mg/kg	**17 ***	**29.4**	**14.3**	3.52	3.58	3.18	4.17 L	1.88	0.44 J	1.89 *	0.39 J	2.6 *	3.63 *
Barium	44000	8200	mg/kg	52 J	24.7	29.6	41.5	21.9	55.7	40.9 J	20.2	10.1 J	15.9 J	10.5 J	22.7 J	33 J
Beryllium	440	320	mg/kg	0.47	0.27 J	0.43	0.25 J	0.178 J	0.47	0.339 L	0.32	0.08 J	0.23 J	0.07 J	0.26 J	0.38
Cadmium	110	38	mg/kg	0.1 J	0.11 J	< 0.14 U	0.081 J	< 0.1175 U	< 0.175 U	0.787	< 0.125 U	< 0.155 U	< 0.14 U	< 0.16 U	< 0.16 U	< 0.12 U
Calcium	NSA	NSA	mg/kg	4960 *	682 N	540 N	886 B	253 B	1620	1060	242	130 B	437 *	126 B	4160 *	293 *
Chromium	NSA	NSA	mg/kg	15.2 J	8.11 J	12.6 J	7	6.43	12.5 N	22.7 L	8.24 N	3.18 J	11.2 J	1.97 J	9.82 J	10.1 J
Cobalt	66	50	mg/kg	6.36 *	7.26	7.44	4.94	8.99	7.88	5.58 L	5.52	1.28 J	3.52 *	1.66 *	4.33 *	5.01 *
Copper	8100	43000	mg/kg	76.5 J	25.1	22.3	11.8	4.7	8.41	270 L	7.24	1.62 J	7.19 J	1.65 J	9.29 J	30.5 J
Iron	150000	NSA	mg/kg	15000 J	11300	16300	10200	10100	15900	12400	10700	3320 J	10600 J	2840 J	11600 J	12900 J
Lead	500	450	mg/kg	75.3 J	28.8	17.1	60.6	4.38	138	248	4.58	1.15 J	3.43 J	1.98 J	20.3 J	17.9 J
Magnesium	NSA	NSA	mg/kg	2140 J	1230 J	1770 J	1060	1100	1880 N	1520	1550 N	599 J	1150 J	558 J	1900 J	1420 J
Manganese	10000	2000	mg/kg	290 J	365	290	221	275	349	257	295	30.3 J	165 J	76.5 J	248 J	163 J
Nickel	4400	650	mg/kg	12 J	8.08 B	11 B	6.81	5.56	11.2	9.46 L	9.32	3.07 J	6.74 J	3.14 J	8.13 J	8.44 J
Potassium	NSA	NSA	mg/kg	765 *	459	692	270	241	708	469 L	574	173 *	403 *	148 *	512 *	403 *
Selenium	1100	26	mg/kg	2.05	< 0.555 U	< 0.47 U	0.967 J	1.02	< 0.58 U	0.537 L	< 0.415 U	< 0.52 U	1.44	< 0.535 U	1.42	1.88
Silver	1100	84	mg/kg	< 0.205 U	< 0.275 U	< 0.235 U	< 0.265 U	< 0.1955 U	< 0.29 U	0.379 J	< 0.21 U	< 0.26 U	< 0.23 U	< 0.27 U	< 0.265 U	< 0.195 U
Sodium	NSA	NSA	mg/kg	300 *	133	223	149 B	105 B	700	< 52 UL	158	133 *	83.1 B	72.5 B	193 *	26.1 B
Thallium	15	14	mg/kg	< 0.82 U	< 1.11 U	< 0.94 U	0.287 J	< 0.78 U	< 1.165 U	< 1.04 U	< 0.835 U	< 1.04 U	< 0.92 U	< 1.07 U	< 1.065 U	< 0.79 U
Vanadium	1500	26000	mg/kg	21.4 J	11.6	20.4	10.1	8.26	16.9	13.6 L	10.6	2.7 J	11.5 J	1.67 J	11.8 J	14.1 J
Zinc	66000	12000	mg/kg	95.5 J	42 J	36.7 J	46.8	20.1	37.4	198 J	28.2	19 J	20.9 J	15.8 J	26.7 J	38.3 J
Inorganics (SW6020)																
Uranium-238	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	< 0.0495 U	NA	NA	NA	NA	NA	NA
Mercury (SW7471)																
Mercury	35	10	mg/kg	0.343	0.673 D	0.857 D	1.39 B	0.006 J	0.07	5.64 J	0.007 J	0.004 J	0.008 J	< 0.005 U	0.09	0.033

Table 6-1 - Soil - Analytical Summary of Detected Metals

			Location ID	BZ3-SO-03B	BZ3-SO-04	BZ3-SO-04	BZ3-SO-04	BZ3-SO-06	BZ3-SO-06	BZ3-SO-07	BZ3-SO-07	BZ3-SO-08	BZ3-SO-08	BZ3-SO-08
			Sample Name	BZ3-SO-3B-5.5-6.5	BZ3-SO-04-0-2	BZ3-SO-04-5-7	BZ3-SO-DUP10	BZ3-SO-6-0.5-1.5	BZ3-SO-6-7-8	BZ3-SO-07-0-2	BZ3-SO-07-3-5	BZ3-SO-08-0-2	BZ3-SO-08-13-15	UBZ3-SO-DUP3
			Date Sampled	12/22/2011	1/5/2012	1/5/2012	1/5/2012	12/21/2011	12/21/2011	12/16/2011	12/16/2011	12/16/2011	12/16/2011	12/16/2011
			Parent Sample Name				BZ3-SO-04-0-2							BZ3-SO-08-13-15
	Act 2 MSCs (Residential)[1]		Depth Interval	5.5-6.5	0-2	5-7	0-2	0.5-1.5	7-8	0-2	3-5	0-2	13-15	13-15
Analyte	**RDC MSC**	**RSGW**	**Unit**											
Inorganics (SW6010)														
Aluminum	190000	NSA	mg/kg	5080 J	5010 J	5800 J	4700 J	4560 J	7120 J	6500 J	7080 J	5000 J	5350 J	3390 J
Antimony	88	27	mg/kg	< 1.22 U	6.84 J	< 1.335 U	0.913 J	< 0.895 U	< 1.46 U	< 1.27 U	< 1.395 U	1.37 J	< 1.265 U	< 1.17 U
Arsenic	12	29	mg/kg	2.08 *	4.43	5.71	3.66	7.21	2.44 B	3.88	3.72	2.25	1.33	1.45
Barium	44000	8200	mg/kg	27.4 J	33.6	26.9	36.1	46.8	22.1	31.2 J	50.3 J	53.8 J	21.6 J	14.2 J
Beryllium	440	320	mg/kg	0.41	0.336	0.485	0.314	0.35	0.44	0.33	0.39	0.86	0.61	0.37
Cadmium	110	38	mg/kg	< 0.145 U	< 0.1545 U	0.143 J	< 0.1545 U	0.27	< 0.175 U	< 0.15 U	< 0.165 U	< 0.15 U	< 0.15 U	< 0.14 U
Calcium	NSA	NSA	mg/kg	215 B	12100	2940	13900	836 N	438 N	268	551	74800	< 50.5 U	66 J
Chromium	NSA	NSA	mg/kg	14.9 J	6.71 J	14.8 J	6.69 J	8.66 J	10.4 J	9.38	10.9	31.5	14.5	7.87
Cobalt	66	50	mg/kg	5.37 *	4.6	7.44	3.85	4.54	5.87	6.37	5.73	4.7	8.68	4.33
Copper	8100	43000	mg/kg	11.6 J	54.9	19.5	19.3	70.2	16.8 B	16.2 J	24.3 J	23.1 J	9.87 J	6.84 J
Iron	150000	NSA	mg/kg	16400 J	9750	18000	8780	10700	14800	11600	13900	21100	11800	8750
Lead	500	450	mg/kg	4.45 J	181 J	14.2 J	39.6 J	71.8	7.68	46.9 J	71.3 J	25.5 J	1.59 J	2 J
Magnesium	NSA	NSA	mg/kg	1420 J	2500	1760	2080	1420 J	2460 J	1450 J	1650 J	24700 J	1760 J	937 J
Manganese	10000	2000	mg/kg	291 J	198	394	165	191	228	172 J	248 J	668 J	187 J	161 J
Nickel	4400	650	mg/kg	8.9 J	6.56	11.7	5.96	7.87 B	12.3 B	8.27	9.33	7.73	9.62	6.27
Potassium	NSA	NSA	mg/kg	566 *	357	448	341	432	662	460	657	794	770	281
Selenium	1100	26	mg/kg	1.96	1.44	1.8	1.42	< 0.36 U	< 0.585 U	< 0.505 U	< 0.555 U	< 0.505 U	< 0.505 U	< 0.47 U
Silver	1100	84	mg/kg	< 0.245 U	< 0.2575 U	< 0.267 U	< 0.2575 U	< 0.18 U	< 0.29 U	< 0.255 U	< 0.28 U	< 0.255 U	< 0.255 U	< 0.235 U
Sodium	NSA	NSA	mg/kg	33.6 B	1690	305	1770	56.4 J	181	504	604	343	150	93.5 J
Thallium	15	14	mg/kg	< 0.975 U	< 1.03 U	< 1.07 U	< 1.03 U	0.21 B	< 1.165 U	< 1.015 U	< 1.115 U	< 1.015 U	< 1.015 U	< 0.94 U
Vanadium	1500	26000	mg/kg	20.2 J	11.8	23.6	9.35	11.9	12.7	13.7	14.7	13.6	15.4	8.95
Zinc	66000	12000	mg/kg	31 J	35.5 L	40.6 L	33.2 L	93.5 J	38.8 J	42.8 J	43.4 J	24.8 J	38.7 J	23.4 J
Inorganics (SW6020)														
Uranium-238	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury (SW7471)														
Mercury	35	10	mg/kg	0.004 J	0.039 J	0.009 J	0.379 J	0.373	0.011 J	0.48 L	0.638 L	0.02 L	< 0.005 UR	0.006 L

Table 6-1 - Soil - Analytical Summary of Detected Metals

			Location ID	BZ3-SO-09	BZ3-SO-09	BZ3-SO-10	BZ3-SO-10	BZ3-SO-10	BZ3-SO-11	BZ3-SO-11	BZ3-SO-12	BZ3-SO-12	BZ3-SO-13	BZ3-SO-13	BZ3-SO-14
			Sample Name	BZ3-SO-09-13-15	BZ3-SO-09-5-7	BZ3-SO-10-12-14	BZ3-SO-10-2-4	BZ3-SO-10-5-8	BZ3-SO-11-10-11	BZ3-SO-11-5-6	BZ3-SO-12-11-12	BZ3-SO-12-5-7	BZ3-SO-13-1-2	BZ3-SO-13-2-3	BZ3-SO-14-4-5
			Date Sampled	12/16/2011	12/16/2011	12/14/2011	12/14/2011	12/14/2011	12/22/2011	12/22/2011	12/13/2011	12/13/2011	4/18/2012	4/20/2012	12/21/2011
			Parent Sample Name												
	Act 2 MSCs (Residential)[1]		Depth Interval	13-15	5-7	12-14	2-4	5-8	10-11	5-6	11-12	5-7	1-2	2-3	4-5
Analyte	RDC MSC	RSGW	Unit												
Inorganics (SW6010)															
Aluminum	190000	NSA	mg/kg	1930 J	3180 J	3150	7360	7700	2310 J	4170 J	2640	5950	6020	7710 J	4960 J
Antimony	88	27	mg/kg	< 1.24 U	< 1.345 U	< 1.015 U	0.59 J	< 1.135 U	< 1.07 U	0.8 J	< 1.235 U	< 1.135 U	3.57 L	1.98 J	< 1.215 U
Arsenic	12	29	mg/kg	< 0.495 U	2.61	0.772 J	4.93	4.88	0.54 J	2.4 *	0.919 J	2.79	3.77 L	2.54	2.07 B
Barium	44000	8200	mg/kg	13.3 J	18.4 J	13.9	70.5	42.8	7.87 J	21 J	8.74	30.9	29.2 J	32.3 J	26.2
Beryllium	440	320	mg/kg	0.12 J	0.19 J	0.176 J	0.545	0.447	0.08 J	0.24 J	0.168 J	0.308	0.431 L	0.4	0.28 J
Cadmium	110	38	mg/kg	< 0.15 U	< 0.16 U	0.291	1.67	0.968	< 0.13 U	< 0.13 U	0.292 J	0.801	0.513	0.21 J	< 0.145 U
Calcium	NSA	NSA	mg/kg	106 B	1220	132	78300	7440	178 B	5230 *	352	1240	840	575 J	801 N
Chromium	NSA	NSA	mg/kg	3.67 N	4.71 N	4.19	14.9	10.4	2.87 J	6.85 J	6.14	16.3	32.8 L	17.9	8.25 J
Cobalt	66	50	mg/kg	2.12	2.72	2.47	7.46	6.77	1.62 *	3.57 *	2.19	4.29	6.21 L	6.61	4.85
Copper	8100	43000	mg/kg	3.39	9.42	3.53	21.5	12.1	2.62 J	11.2 J	2.64	8.26	55.8 L	25.4 J	90.6
Iron	150000	NSA	mg/kg	3440	7030	4540	10600	14200	3910 J	9270 J	4480	12200	16700	17000 J	12100
Lead	500	450	mg/kg	2.73 J	30.8 J	2.47	81.5	17.2	1.74 J	30.7 J	1.99	6.45	54.5	34.2 J	16.7
Magnesium	NSA	NSA	mg/kg	618	895	721	26200	2830	682 J	1750 J	535 L	1630 L	1630	1590 J	1310 J
Manganese	10000	2000	mg/kg	31.7 J	323 J	44.5	221	266	48.4 J	173 J	106	262	232	240 J	202
Nickel	4400	650	mg/kg	6.37	4.56	4.72	9.87	10.8	3.99 J	6.35 J	3.31 L	9.79 L	19.7 L	14.4 J	8.88 B
Potassium	NSA	NSA	mg/kg	295	289	346	1440	793	194 *	430 *	271	864	608 L	619	429
Selenium	1100	26	mg/kg	< 0.495 U	< 0.54 U	< 0.4055 U	< 0.402 U	< 0.4535 U	0.49 J	1.24	< 0.4935 U	< 0.454 U	< 0.4885 UL	< 0.395 UL	< 0.485 U
Silver	1100	84	mg/kg	< 0.25 U	< 0.27 U	< 0.2025 U	< 0.201 U	< 0.227 U	< 0.215 U	< 0.215 U	< 0.2465 U	< 0.227 U	0.388 J	< 0.2 U	< 0.245 U
Sodium	NSA	NSA	mg/kg	52.8 B	86.6 B	124	997	389	12.4 B	23.2 B	145	129	< 48.85 UL	56.6 J	50.3 J
Thallium	15	14	mg/kg	< 0.99 U	< 1.075 U	< 0.81 U	< 0.805 U	< 0.905 U	< 0.855 U	< 0.86 U	< 0.985 U	< 0.91 U	< 0.975 U	< 0.795 U	< 0.97 U
Vanadium	1500	26000	mg/kg	3.15	6.21	4.94	17.9	17.4	2.75 J	8.75 J	4.71	16.1	16.7 L	17.9	12.7
Zinc	66000	12000	mg/kg	15.6 L	33.3 L	22	129	42.6	17.3 J	24.2 J	15.6	28.8	69.7 J	45.7 J	92.3 J
Inorganics (SW6020)															
Uranium-238	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 0.043 U	NA	NA
Mercury (SW7471)															
Mercury	35	10	mg/kg	< 0.005 U	0.022 J	< 0.0055 U	0.17 *	0.038 *	0.002 J	0.113	0.016 J	0.088 J	1.28 J	1.48	0.063

Table 6-1 - Soil - Analytical Summary of Detected Metals

			Location ID	BZ3-SO-15	BZ3-SO-15	MW-21	MW-22	MW-23	MW-24	MW-25	MW-26	MW-27	MW-27	MW-28	MW-29
			Sample Name	BZ3-SO-15-0-2	BZ3-SO-15-5-7	MW-21-SO-10-12	MW-22-SO-0-2	MW-23-SO-0-2	MW-24-SO-10-12	MW-25-SO-0-2	MW-26-SO-0-2	MW-27-SO-4-6	MW-SO-DUP1	MW-28-SO-0-2	MW-29-SO-5-7
			Date Sampled	4/19/2012	4/19/2012	4/30/2012	5/4/2012	5/4/2012	5/2/2012	5/2/2012	5/3/2012	5/3/2012	5/3/2012	5/3/2012	5/3/2012
			Parent Sample Name										MW-27-SO-4-6		
	Act 2 MSCs (Residential)[1]		Depth Interval	0-2	5-7	10-12	0-2	0-2	10-12	0-2	0-2	4-6	4-6	0-2	5-7
Analyte	RDC MSC	RSGW	Unit												
Inorganics (SW6010)															
Aluminum	190000	NSA	mg/kg	6560	10500	3270 J	8740	10300	15400	7830	10000	7500	9150	11600	9040
Antimony	88	27	mg/kg	< 1.26 UL	< 1.465 UL	< 1.125 UL	1.47 J	2.07 J	< 1.205 UL	6.11 L	< 1.27 UL	< 1.03 UL	< 1 UL	< 1.315 UL	< 1.005 UL
Arsenic	12	29	mg/kg	8.43	4.25	2.83	10.4	**13.7**	3.37	**16.4**	5.08	5.26	4.33	5.33	4.13
Barium	44000	8200	mg/kg	56.3 J	97.1 J	14.3	55 K	63.6 K	29.5	147	83.2 J	37.9 J	66.1 J	40.7 J	29.4 J
Beryllium	440	320	mg/kg	0.418 J	0.935 J	0.136 J	0.45	0.4	0.522	0.702	0.547	0.343	0.491	0.618	0.634
Cadmium	110	38	mg/kg	0.561	1.26	< 0.135 U	0.97	0.92	0.072 J	0.264 J	0.242 J	< 0.1235 U	0.056 J	< 0.158 U	0.327
Calcium	NSA	NSA	mg/kg	19600	1440	335 J	34000	4960	900	22700	33800	3280	2240	1540	373
Chromium	NSA	NSA	mg/kg	13.4	28.9	10.1 K	16.4	18.3	42.9 J	20 J	14.7 J	12.3 J	12.7 J	17.1 J	16.3 J
Cobalt	66	50	mg/kg	7.45	10.9	3.33	5.85	9.39	20.1	10.7	7.54	7.19	6.94	8.88	7.81
Copper	8100	43000	mg/kg	24.5	24	5.48 J	49.5	35.7	31.7 L	46.6 L	36.9 J	19.1 J	19 J	15.6 J	10.4 J
Iron	150000	NSA	mg/kg	14100	17000	11200 J	13700	19100	28000 J	22400 J	15400 J	15000 J	15600 J	21900 J	17300 J
Lead	500	450	mg/kg	55.5	54.1	4.7	56	81.3	7.29 J	107 J	128 J	40 J	52.5 J	44.2 J	20.6 J
Magnesium	NSA	NSA	mg/kg	5240	2980	882 J	3040	1900	8270 J	7000 J	11800 J	2560 J	2240 J	2620 J	2000 J
Manganese	10000	2000	mg/kg	349	325	201 J	266	257	628 J	315 J	326 J	700 J	229 J	368 J	131 J
Nickel	4400	650	mg/kg	11.2	18.8	5.71	15.2	15.7	38.7	21.9	13.8	12.7	12.5	14.8	11.5
Potassium	NSA	NSA	mg/kg	768 L	680 L	209	949	742	370 K	1170 K	1040 K	621 K	538 K	789 K	716 K
Selenium	1100	26	mg/kg	0.636 J	0.539 J	< 0.451 U	< 0.455 U	< 0.515 U	< 0.4815 U	< 0.4985 U	< 0.51 U	< 0.412 U	< 0.4005 U	< 0.525 U	< 0.4025 U
Silver	1100	84	mg/kg	< 0.252 U	< 0.2935 U	< 0.2255 U	< 0.225 U	< 0.255 U	< 0.241 U	< 0.249 U	< 0.254 U	< 0.206 U	< 0.2005 U	< 0.263 U	< 0.201 U
Sodium	NSA	NSA	mg/kg	82.1 J	50.7 J	135 B	580	857	< 48.15 UL	344 L	912 J	197 J	197 J	< 52.5 UL	169 J
Thallium	15	14	mg/kg	< 1.01 U	< 1.175 U	< 0.9 U	< 0.905 U	< 1.03 U	< 0.965 U	< 0.995 U	< 1.015 U	< 0.825 U	< 0.8 U	< 1.05 U	< 0.805 U
Vanadium	1500	26000	mg/kg	21.7 L	23.9 L	7.11 J	17.9	23.5	85.1 J	34.1 J	22.2 J	17.8 J	17.9 J	25.9 J	24.1 J
Zinc	66000	12000	mg/kg	57.2	198	21.5 J	62.1	55.8	85.6 J	101 J	93.3 J	47.7 J	43.2 J	49.7 J	36.2 J
Inorganics (SW6020)															
Uranium-238	NSA	NSA	mg/kg	< 0.05 U	< 0.055 U	< 0.0405 U	< 0.0495 U	< 0.048 U	2	< 0.042 U	< 0.043 U	< 0.05 U	< 0.042 U	< 0.046 U	< 0.0445 U
Mercury (SW7471)															
Mercury	35	10	mg/kg	0.045 K	0.082 K	0.004 J	0.223	0.08	0.007 J	0.053	0.331 J	0.161 J	0.312 J	0.012 J	0.033 J

Table 6-1 - Soil - Analytical Summary of Detected Metals

			Location ID	MW-31	UBZ1-SO-01	UBZ1-SO-02	UBZ1-SO-03	UBZ1-SO-04	UBZ1-SO-05	UBZ1-SO-06	UBZ1-SO-07	UBZ1-SO-08	UBZ1-SO-09	UBZ1-SO-10
			Sample Name	MW-31-SO-10-12	UBZ1-SO-1-0-0.5	UBZ1-SO-2-0-0.5	UBZ1-SO-3-0-0.5	UBZ1-SO-4-0-0.5	UBZ1-SO-5-0-0.5	UBZ1-SO-6-0-0.5	UBZ1-SO-7-0-0.5	UBZ1-SO-8-0-0.5	UBZ1-SO-9-0-0.5	UBZ1-SO-10-0-0.5
			Date Sampled	5/3/2012	12/8/2011	12/8/2011	12/8/2011	12/8/2011	12/8/2011	12/8/2011	12/8/2011	12/8/2011	12/8/2011	12/8/2011
			Parent Sample Name											
	Act 2 MSCs (Residential)[1]		Depth Interval	10-12	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
Analyte	**RDC MSC**	**RSGW**	**Unit**											
Inorganics (SW6010)														
Aluminum	190000	NSA	mg/kg	6000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	88	27	mg/kg	< 1.16 UL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	12	29	mg/kg	3.23	**38.7**	**23.8**	8.39	11.5	**23.3**	**13.6**	**18.3**	**35.9**	10.4	8.48
Barium	44000	8200	mg/kg	33.4 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	440	320	mg/kg	0.373	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	110	38	mg/kg	< 0.139 U	0.29 J	0.83	< 0.205 U	< 0.185 U	< 0.175 U	1.24	5.24	0.24 J	0.26 J	0.27 J
Calcium	NSA	NSA	mg/kg	357	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	NSA	NSA	mg/kg	11.8 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	66	50	mg/kg	6.69	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	8100	43000	mg/kg	6.76 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	150000	NSA	mg/kg	12400 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	500	450	mg/kg	5.76 J	498	**746**	292	328	359	384	**1930**	456	299	**2930**
Magnesium	NSA	NSA	mg/kg	1570 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	10000	2000	mg/kg	726 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	4400	650	mg/kg	10.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	NSA	NSA	mg/kg	554 K	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	1100	26	mg/kg	< 0.4635 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	1100	84	mg/kg	< 0.232 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	NSA	NSA	mg/kg	27.6 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thallium	15	14	mg/kg	< 0.925 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	1500	26000	mg/kg	12.9 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	66000	12000	mg/kg	32.5 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Inorganics (SW6020)														
Uranium-238	NSA	NSA	mg/kg	< 0.0385 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury (SW7471)														
Mercury	35	10	mg/kg	0.037 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 6-1 - Soil - Analytical Summary of Detected Metals

			Location ID	UBZ1-SO-11	UBZ1-SO-12	UBZ1-SO-13	UBZ1-SO-14	UBZ1-SO-15	UBZ1-SO-16	UBZ1-SO-16	UBZ1-SO-17	UBZ1-SO-18	UBZ1-SO-19
			Sample Name	UBZ1-SO-11-0-0.5	UBZ1-SO-12-0-0.5	UBZ1-SO-13-0-0.5	UBZ1-SO-14-0-0.5	UBZ1-SO-15-0-0.5	UBZ1-SO-16-0-0.5	UBZ1-SO-DUP2	UBZ1-SO-17-0-0.5	UBZ1-SO-18-0-0.5	UBZ1-SO-19-0-0.5
			Date Sampled	12/8/2011	12/8/2011	12/8/2011	12/8/2011	12/8/2011	12/8/2011	12/9/2011	12/27/2011	12/27/2011	12/27/2011
			Parent Sample Name							UBZ1-SO-16-0-0.5			
	Act 2 MSCs (Residential)[1]		**Depth Interval**	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
Analyte	**RDC MSC**	**RSGW**	**Unit**										
Inorganics (SW6010)													
Aluminum	190000	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	88	27	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	12	29	mg/kg	**33.1**	**14.2**	11.4	**12.7**	**13.7**	10.6	10.5	9.66 J	11.9 J	11.1 J
Barium	44000	8200	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	440	320	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	110	38	mg/kg	0.16 J	< 0.16 U	0.58	0.24 J	< 0.16 U	0.23 J	2.05 J	1.16	0.49	0.37
Calcium	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	66	50	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	8100	43000	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	150000	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	500	450	mg/kg	**539**	250	**576**	328	162	**1180**	**1260 J**	**1390 J**	390 J	**683 J**
Magnesium	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	10000	2000	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	4400	650	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	1100	26	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	1100	84	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thallium	15	14	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	1500	26000	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	66000	12000	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Inorganics (SW6020)													
Uranium-238	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury (SW7471)													
Mercury	35	10	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 6-1 - Soil - Analytical Summary of Detected Metals

			Location ID	UBZ1-SO-20	UBZ1-SO-21	UBZ1-SO-21	UBZ1-SO-22	UBZ1-SO-23	UBZ1-SO-24	UBZ1-SO-25	UBZ1-SO-26	UBZ1-SO-27	UBZ1-SO-28
			Sample Name	UBZ1-SO-20-0-0.5	UBZ1-SO-21-0-0.5	UBZ1-SO-DUP3	UBZ1-SO-22-0-0.5	UBZ1-SO-23-0-0.5	UBZ1-SO-24-0-0.5	UBZ1-SO-25-0-0.5	UBZ1-SO-26-0-0.5	UBZ1-SO-27-0-0.5	UBZ1-SO-28-0-0.5
			Date Sampled	12/27/2011	12/27/2011	12/27/2011	12/8/2011	12/8/2011	12/8/2011	12/27/2011	12/27/2011	12/27/2011	12/27/2011
			Parent Sample Name			UBZ1-SO-21-0-0.5							
	Act 2 MSCs (Residential)[1]		Depth Interval	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
Analyte	**RDC MSC**	**RSGW**	**Unit**										
Inorganics (SW6010)													
Aluminum	190000	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	88	27	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	12	29	mg/kg	8.49 J	7.75 J	11.1 J	**21.5**	**22.7**	**24.5**	11.1 J	6.68 J	10.6 J	11.5 J
Barium	44000	8200	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	440	320	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	110	38	mg/kg	0.39	0.64	0.88	0.09 J	1.59	0.33 J	0.3 J	0.1 J	0.26 J	0.11 J
Calcium	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	66	50	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	8100	43000	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	150000	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	500	450	mg/kg	**583 J**	397	**534**	**524**	**1080**	**1120**	398	92.8	193	**939**
Magnesium	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	10000	2000	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	4400	650	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	1100	26	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	1100	84	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thallium	15	14	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	1500	26000	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	66000	12000	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Inorganics (SW6020)													
Uranium-238	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury (SW7471)													
Mercury	35	10	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 6-1 - Soil - Analytical Summary of Detected Metals

			Location ID	UBZ1-SO-29	UBZ1-SO-30	UBZ1-SO-31	UBZ1-SO-32	UBZ1-SO-33	UBZ1-SO-34	UBZ1-SO-35	UBZ1-SO-36	UBZ1-SO-37	UBZ1-SO-38
			Sample Name	UBZ1-SO-29-0-0.5	UBZ1-SO-30-0-0.5	UBZ1-SO-31-0-0.5	UBZ1-SO-32-0-0.5	UBZ1-SO-33-0-0.5	UBZ1-SO-34-0-0.5	UBZ1-SO-35-0-0.5	UBZ1-SO-36-0-0.5	UBZ1-SO-37-0-0.5	UBZ1-SO-38-0-0.5
			Date Sampled	12/27/2011	12/8/2011	12/8/2011	12/27/2011	12/27/2011	12/27/2011	12/27/2011	12/27/2011	12/27/2011	12/8/2011
			Parent Sample Name										
	Act 2 MSCs (Residential)[1]		Depth Interval	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
Analyte	**RDC MSC**	**RSGW**	**Unit**										
Inorganics (SW6010)													
Aluminum	190000	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	88	27	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	12	29	mg/kg	11.7 J	**19.5**	**12.2**	**21.5 J**	**19.7 J**	11.4 J	7.81 J	**12.4 J**	**12.6 J**	**15**
Barium	44000	8200	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	440	320	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	110	38	mg/kg	0.15 J	0.32 J	< 0.165 U	1.34	0.2 J	0.54	0.21 J	0.65	0.54	1.63
Calcium	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	66	50	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	8100	43000	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	150000	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	500	450	mg/kg	199	428	**1540 J**	**1200**	331	217 J	129 J	500	**647 J**	**1230 J**
Magnesium	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	10000	2000	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	4400	650	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	1100	26	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	1100	84	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thallium	15	14	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	1500	26000	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	66000	12000	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Inorganics (SW6020)													
Uranium-238	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury (SW7471)													
Mercury	35	10	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 6-1 - Soil - Analytical Summary of Detected Metals

			Location ID	UBZ1-SO-39	UBZ1-SO-40	UBZ1-SO-41	UBZ1-SO-42	UBZ1-SO-43	UBZ1-SO-44	UBZ1-SO-45	UBZ1-SO-46	UBZ1-SO-47	UBZ1-SO-48
			Sample Name	UBZ1-SO-39-0-0.5	UBZ1-SO-40-0-0.5	UBZ1-SO-41-0-0.5	UBZ1-SO-42-0-0.5	UBZ1-SO-43-0-0.5	UBZ1-SO-44-0-0.5	UBZ1-SO-45-0-0.5	UBZ1-SO-46-0-0.5	UBZ1-SO-47-0-0.5	UBZ1-SO-48-0-0.5
			Date Sampled	12/8/2011	12/8/2011	12/8/2011	12/27/2011	12/27/2011	12/27/2011	12/27/2011	12/8/2011	12/8/2011	12/8/2011
			Parent Sample Name										
	Act 2 MSCs (Residential)[1]		**Depth Interval**	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
Analyte	**RDC MSC**	**RSGW**	**Unit**										
Inorganics (SW6010)													
Aluminum	190000	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	88	27	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	12	29	mg/kg	11	**16.4**	**15.9**	**13.9 J**	**27.8 J**	11.3 J	9.28 J	8.23	9.59	**28.4**
Barium	44000	8200	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	440	320	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	110	38	mg/kg	0.14 J	0.34 J	0.64	0.9	0.51	0.57	0.19 J	< 0.215 U	< 0.255 U	< 0.155 U
Calcium	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	66	50	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	8100	43000	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	150000	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	500	450	mg/kg	**3330 J**	410 J	**4390 J**	**574 J**	156 J	437	200 J	93.4 J	158 J	200 J
Magnesium	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	10000	2000	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	4400	650	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	1100	26	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	1100	84	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thallium	15	14	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	1500	26000	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	66000	12000	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Inorganics (SW6020)													
Uranium-238	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury (SW7471)													
Mercury	35	10	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 6-1 - Soil - Analytical Summary of Detected Metals

			Location ID	UBZ1-SO-49	UBZ1-SO-50	UBZ1-SO-51	UBZ1-SO-52	UBZ1-SO-52	UBZ1-SO-53	UBZ1-SO-54	UBZ1-SO-55	UBZ1-SO-56	UBZ1-SO-57
			Sample Name	UBZ1-SO-49-0-0.5	UBZ1-SO-50-0-0.5	UBZ1-SO-51-0-0.5	UBZ1-SO-52-0-0.5	UBZ1-SO-DUP1	UBZ1-SO-53-0-0.5	UBZ1-SO-54-0-0.5	UBZ1-SO-55-0-0.5	UBZ1-SO-56-0-0.5	UBZ1-SO-57-0-0.5
			Date Sampled	12/27/2011	12/27/2011	12/27/2011	12/9/2011	12/9/2011	12/9/2011	12/9/2011	12/9/2011	12/9/2011	12/9/2011
			Parent Sample Name					UBZ1-SO-52-0-0.5					
	Act 2 MSCs (Residential)[1]		**Depth Interval**	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
Analyte	**RDC MSC**	**RSGW**	**Unit**										
Inorganics (SW6010)													
Aluminum	190000	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	88	27	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	12	29	mg/kg	**15.6 J**	7.82 J	**12.3 J**	10.5	9.66	8.01	9.64	6.76	7.87	**12.7**
Barium	44000	8200	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	440	320	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	110	38	mg/kg	1.14	0.79	< 0.15 U	1.86 J	0.31 J	0.42	0.13 J	< 0.175 U	< 0.195 U	1.07
Calcium	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	66	50	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	8100	43000	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	150000	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	500	450	mg/kg	**3130**	456 J	255 J	**991 J**	**1140 J**	388 J	**768 J**	111 J	291 J	424 J
Magnesium	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	10000	2000	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	4400	650	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	1100	26	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	1100	84	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thallium	15	14	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	1500	26000	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	66000	12000	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Inorganics (SW6020)													
Uranium-238	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury (SW7471)													
Mercury	35	10	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 6-1 - Soil - Analytical Summary of Detected Metals

			Location ID	UBZ1-SO-58	UBZ1-SO-59	UBZ1-SO-59	UBZ1-SO-60	UBZ1-SO-61	UBZ2-SO-01	UBZ2-SO-01	UBZ2-SO-02	UBZ2-SO-02	UBZ2-SO-03	UBZ2-SO-03
			Sample Name	UBZ1-SO-58-0-0.5	UBZ1-SO-59-0-0.5	UBZ1-SO-DUP4	UBZ1-SO-60-0-0.5	UBZ1-SO-61-0-0.5	UBZ2-SO-01-0-2	UBZ2-SO-01-5-7	UBZ2-SO-02-0-2	UBZ2-SO-02-5-7	UBZ2-SO-03-0-2	UBZ2-SO-03-8-10
			Date Sampled	12/9/2011	12/27/2011	12/27/2011	12/27/2011	12/27/2011	1/4/2012	1/4/2012	1/4/2012	1/4/2012	1/4/2012	1/4/2012
			Parent Sample Name			UBZ1-SO-59-0-0.5								
	Act 2 MSCs (Residential)[1]		Depth Interval	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-2	5-7	0-2	5-7	0-2	8-10
Analyte	**RDC MSC**	**RSGW**	**Unit**											
Inorganics (SW6010)														
Aluminum	190000	NSA	mg/kg	NA	NA	NA	NA	NA	11600	11400	12500	5090	7950	9620
Antimony	88	27	mg/kg	NA	NA	NA	NA	NA	< 1.4 U	< 1.175 U	< 1.235 U	< 1.315 U	< 1.41 U	< 0.935 U
Arsenic	12	29	mg/kg	**12.9**	5.92 J	5.93 J	6.54 J	8.34 J	11.3	5.07	9.29	4.47	7.41	3.26
Barium	44000	8200	mg/kg	NA	NA	NA	NA	NA	75	36	81.7	33.9	58.7	22.7
Beryllium	440	320	mg/kg	NA	NA	NA	NA	NA	0.767	0.449	0.644	0.433	0.381	0.462
Cadmium	110	38	mg/kg	0.55	0.21 J	0.13 J	0.65	0.3 J	1.06	0.953	1.11	0.8	0.762	0.654
Calcium	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	1830	770	1130	517	1230	652
Chromium	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	20.6	20.6	22.1	11.6	15.6	8.53
Cobalt	66	50	mg/kg	NA	NA	NA	NA	NA	7.36	7.95	6.51	6.84	3.41	6.01
Copper	8100	43000	mg/kg	NA	NA	NA	NA	NA	14.1	11.6	13.9	7.68	8.56	9.18
Iron	150000	NSA	mg/kg	NA	NA	NA	NA	NA	19300	19500	20600	13800	13600	13400
Lead	500	450	mg/kg	365 J	168 J	172 J	**532 J**	228	38.5	9.36	23.3	4.8	30.5	6.88
Magnesium	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	1730	3300	1810	1040	1150	2490
Manganese	10000	2000	mg/kg	NA	NA	NA	NA	NA	411	175	363	598	171	148
Nickel	4400	650	mg/kg	NA	NA	NA	NA	NA	11.6	14.8	10.7	10.4	6.4	13.9
Potassium	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	474	1240	455	609	312	554
Selenium	1100	26	mg/kg	NA	NA	NA	NA	NA	< 0.56 U	< 0.4695 U	< 0.4945 U	< 0.525 U	0.895 J	< 0.374 U
Silver	1100	84	mg/kg	NA	NA	NA	NA	NA	< 0.28 U	< 0.2345 U	< 0.247 U	< 0.2625 U	< 0.282 U	< 0.187 U
Sodium	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	134	277	157	95.8 J	123	90.5
Thallium	15	14	mg/kg	NA	NA	NA	NA	NA	< 1.12 U	< 0.94 U	< 0.99 U	< 1.05 U	< 1.13 U	< 0.75 U
Vanadium	1500	26000	mg/kg	NA	NA	NA	NA	NA	29.3	28.9	31.6	18.5	23.8	11.2
Zinc	66000	12000	mg/kg	NA	NA	NA	NA	NA	47.7 J	48.2 J	42.7 J	23.6 J	47.8 J	42.4 J
Inorganics (SW6020)														
Uranium-238	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury (SW7471)														
Mercury	35	10	mg/kg	NA	NA	NA	NA	NA	0.105	0.006 J	0.222	0.003 J	0.206	0.006 J

Table 6-1 - Soil - Analytical Summary of Detected Metals

			Location ID	UBZ2-SO-04	UBZ2-SO-04	UBZ2-SO-04	UBZ2-SO-05	UBZ2-SO-05	UBZ2-SO-06	UBZ2-SO-06	UBZ2-SO-07	UBZ2-SO-07	UBZ2-SO-08	UBZ2-SO-08
			Sample Name	UBZ2-SO-04-27-28	UBZ2-SO-04-5-7	UBZ2-SO-DUP13	UBZ2-SO-05-10-12	UBZ2-SO-05-1-3	UBZ2-SO-06-0-2	UBZ2-SO-06-6-8	UBZ2-SO-07-0-2	UBZ2-SO-07-5-7	UBZ2-SO-08-0-2	UBZ2-SO-08-5-7
			Date Sampled	1/9/2012	1/9/2012	1/9/2012	1/6/2012	1/6/2012	1/6/2012	1/6/2012	1/6/2012	1/6/2012	1/4/2012	1/4/2012
			Parent Sample Name			UBZ2-SO-04-5-7								
	Act 2 MSCs (Residential)[1]		Depth Interval	27-28	5-7	5-7	10-12	1-3	0-2	6-8	0-2	5-7	0-2	5-7
Analyte	**RDC MSC**	**RSGW**	**Unit**											
Inorganics (SW6010)														
Aluminum	190000	NSA	mg/kg	16000 J	4710 J	5190 J	3290	9740	8190	5380	7990	5160	5170 J	3820 J
Antimony	88	27	mg/kg	< 1.275 U	< 1.06 U	< 1.355 U	< 1.065 U	2.8	0.842 J	< 1.095 U	0.797 J	< 1.325 U	1.85 J	1.48 J
Arsenic	12	29	mg/kg	5.17	2.94	2.43	2.72	5.95	6.92	3.71	6.4	3.9	9.3	4.78
Barium	44000	8200	mg/kg	59.8	27.5	20.8	24.4	33.7	40.1	25.6	40.1	22.3	43.1	56
Beryllium	440	320	mg/kg	0.6	0.26	0.32 J	0.264	0.361	0.322	0.293	0.313	0.289 J	0.334	0.29
Cadmium	110	38	mg/kg	< 0.155 U	< 0.125 U	< 0.165 U	< 0.128 U	0.078 J	0.12 J	0.056 J	0.427	< 0.159 U	0.228 J	0.126 J
Calcium	NSA	NSA	mg/kg	429 B	133 B	52.5 B	1860	972 B	667 B	241 B	1880	429 B	2310	15100
Chromium	NSA	NSA	mg/kg	48.1	9.61	10.5	9.12	11.7	11.2	9.07	10.9	9.6	10.1 J	7.18 J
Cobalt	66	50	mg/kg	16.6	6.69	5.03	3.79	6.66	6.93	5.35	5.97	5.32	5	4.16
Copper	8100	43000	mg/kg	50.5	5.09	4.89	31.4	10.2	17	6.66	21	7.77	44.7	19.1
Iron	150000	NSA	mg/kg	24400 J	11600 J	12800 J	8850	17400	16600	13800	15300	13800	15200	7370
Lead	500	450	mg/kg	10.3	8	4.81	3.74	15.2	71.9	6.82	96.2	4.95	173 J	67.4 J
Magnesium	NSA	NSA	mg/kg	5940	1120	1390	1490	1900	1960	1490	2200	1460	1360	1200
Manganese	10000	2000	mg/kg	102 J	467 J	258 J	264	172	211	281	186	230	241	177
Nickel	4400	650	mg/kg	16	8.43	8.7	7.23	11.4	13.6	8.96	10.7	8.73	10.3	7.31
Potassium	NSA	NSA	mg/kg	289	725	807	323	451	431	480	413	611	466	727
Selenium	1100	26	mg/kg	< 0.51 U	< 0.425 U	< 0.54 U	0.894	1.02	1.39	1.04	1.3	0.89 J	1.88	1.35
Silver	1100	84	mg/kg	< 0.255 U	< 0.21 U	< 0.27 U	< 0.213 U	< 0.2285 U	< 0.2365 U	< 0.2185 U	< 0.222 U	< 0.2645 U	< 0.2325 U	< 0.2355 U
Sodium	NSA	NSA	mg/kg	130 B	131 B	161 B	266 B	798 J	441 B	249 B	647 B	308 B	228	183
Thallium	15	14	mg/kg	< 1.02 U	< 0.85 U	< 1.085 U	< 0.855 U	< 0.915 U	< 0.945 U	< 0.875 U	< 0.89 U	< 1.06 U	< 0.93 U	< 0.945 U
Vanadium	1500	26000	mg/kg	118	16.9	16.3	9.13	17.3	15.8	17	16	15.9	15.1	12.2
Zinc	66000	12000	mg/kg	84	22	26.1	24.4	46.7	70.1	26.3	65.1	27	89.4 L	55.4 L
Inorganics (SW6020)														
Uranium-238	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury (SW7471)														
Mercury	35	10	mg/kg	< 0.006 U	0.004 J	0.004 J	< 0.005 U	0.042 *	0.216 *	0.006 J	0.194 *	0.003 J	0.509	0.33

Table 6-1 - Soil - Analytical Summary of Detected Metals

			Location ID	UBZ2-SO-09	UBZ2-SO-09	UBZ2-SO-10	UBZ2-SO-10	UBZ2-SO-11	UBZ2-SO-11	UBZ2-SO-12	UBZ2-SO-12	UBZ2-SO-13	UBZ2-SO-13	UBZ2-SO-13
			Sample Name	UBZ2-SO-09-0-3	UBZ2-SO-09-5-7	UBZ2-SO-10-0-2	UBZ2-SO-10-5-7	UBZ2-SO-11-10-12	UBZ2-SO-11-1-3	UBZ2-SO-12-1-3	UBZ2-SO-12-5-7	UBZ2-SO-13-0.5-2	UBZ2-SO-13-5-7	UBZ2-SO-DUP11
			Date Sampled	1/4/2012	1/4/2012	1/5/2012	1/5/2012	1/6/2012	1/6/2012	1/6/2012	1/6/2012	1/6/2012	1/6/2012	1/6/2012
			Parent Sample Name											UBZ2-SO-13-0.5-2
	Act 2 MSCs (Residential)[1]		Depth Interval	0-3	5-7	0-2	5-7	11-12	1-3	1-3	5-7	0.5-2	5-7	0.5-2
Analyte	**RDC MSC**	**RSGW**	**Unit**											
Inorganics (SW6010)														
Aluminum	190000	NSA	mg/kg	4340 J	5510 J	2700 J	4350 J	2560	7880	5430	4510	6160	5390	5610
Antimony	88	27	mg/kg	1.21 J	< 1.175 U	< 0.91 U	< 1.03 U	< 1.225 U	2.23 J	< 1.24 U	< 1.12 U	< 1.285 U	< 1.11 U	< 1.155 U
Arsenic	12	29	mg/kg	9.93	5.04	4.23	3.8	2.51	7.7	3.9	3.99	4.54	4.85	4.03
Barium	44000	8200	mg/kg	51	31.7	12.8	18.7	19	42	15.4	17.5	12.4	28.8	12.4
Beryllium	440	320	mg/kg	0.347	0.456	0.148 J	0.303	0.155 J	0.36	0.227 J	0.256 J	0.201 J	0.427	0.162 J
Cadmium	110	38	mg/kg	0.364	0.14 J	0.258	0.07 J	< 0.1475 U	0.216 J	< 0.149 U	< 0.1345 U	< 0.1545 U	0.12 J	< 0.1385 U
Calcium	NSA	NSA	mg/kg	33200	730	32400	14100	737 B	781 B	543 B	247 B	286 B	1900	275 B
Chromium	NSA	NSA	mg/kg	7.46 J	11 J	4.49 J	10.5 J	5.53	11.3	7.92	9.42	7.7	12.3	7.19
Cobalt	66	50	mg/kg	5.7	6.28	3.08	6.09	2.73	6.4	4.48	4.64	4.76	6.63	4.7
Copper	8100	43000	mg/kg	42.5	10.4	12.6	8.4	3.99	50.5	9.9	7.2	7.39	10.4	7.1
Iron	150000	NSA	mg/kg	11700	13800	6430	11700	6350	16900	10800	13100	12800	17000	11700
Lead	500	450	mg/kg	135 J	7.45 J	70.9 J	6.52 J	3.2	331	10.9	5.13	5.49	10.8	6.26
Magnesium	NSA	NSA	mg/kg	13500	1580	20000	9440	896	1870	1450	1170	1820	2070	1620
Manganese	10000	2000	mg/kg	195	377	164	341	228	234	173	229	116	363	124
Nickel	4400	650	mg/kg	13.3	9.39	6.4	8.14	5.3	14	7.98	7.72	9.33	11.4	8.83
Potassium	NSA	NSA	mg/kg	754	715	238	584	227	638	345	568	300	594	261
Selenium	1100	26	mg/kg	1.56	1.63	0.919	0.861	0.644 J	1.52	0.994	1.15	0.952 J	1.18	0.718 J
Silver	1100	84	mg/kg	< 0.224 U	< 0.2345 U	0.356 J	< 0.2055 U	< 0.2455 U	< 0.283 U	< 0.248 U	< 0.224 U	< 0.257 U	< 0.222 U	< 0.231 U
Sodium	NSA	NSA	mg/kg	326	160	113	210	262 B	1610 J	591 B	446 B	437 B	380 B	442 B
Thallium	15	14	mg/kg	< 0.895 U	< 0.94 U	< 0.73 U	< 0.825 U	0.296 J	< 1.135 U	< 0.995 U	< 0.895 U	< 1.03 U	< 0.89 U	< 0.925 U
Vanadium	1500	26000	mg/kg	16	17.7	7.18	13.4	6.29	16.8	9.79	16.5	10	19.9	9.2
Zinc	66000	12000	mg/kg	78.5 L	27.5 L	43.2 L	24.7 L	17.9	109	28.7	23.8	29.9	38.9	32.4
Inorganics (SW6020)														
Uranium-238	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury (SW7471)														
Mercury	35	10	mg/kg	0.147	0.009 J	0.139	0.006 J	0.005 J	0.477 *	0.084 *	0.004 J	0.024 *	0.007 J	0.017 *

Table 6-1 - Soil - Analytical Summary of Detected Metals

			Location ID	UBZ2-SO-14	UBZ2-SO-14	UBZ2-SO-14	UBZ2-SO-15	UBZ2-SO-15	UBZ2-SO-15	UBZ2-SO-16	UBZ2-SO-16	UBZ2-SO-17	UBZ2-SO-17	UBZ2-SO-18
			Sample Name	UBZ2-SO-14-0.5-2	UBZ2-SO-14-5-7	UBZ2-SO-DUP12	UBZ2-SO-15-5-6	UBZ2-SO-15-7-8	UBZ2-SO-DUP08	UBZ2-SO-16-1-2	UBZ2-SO-16-5-7	UBZ2-SO-17-0-2	UBZ2-SO-17-5-7	UBZ2-SO-18-10-11
			Date Sampled	1/6/2012	1/6/2012	1/6/2012	12/29/2011	12/29/2011	12/29/2011	1/9/2012	1/9/2012	1/5/2012	1/5/2012	12/30/2011
			Parent Sample Name			UBZ2-SO-14-0.5-2			UBZ2-SO-15-7-8					
	Act 2 MSCs (Residential)[1]		Depth Interval	0.5-2	5-7	0.5-2	5-6	7-8	7-8	1-2	5-7	0-2	5-7	10-11
Analyte	RDC MSC	RSGW	Unit											
Inorganics (SW6010)														
Aluminum	190000	NSA	mg/kg	4430	4550	5330	2830 J	6390 J	4670 J	7830 J	4960 J	5120 J	4310 J	1740 J
Antimony	88	27	mg/kg	1.47 J	< 1.175 U	1.94 J	< 1.325 U	< 0.935 U	< 1.02 U	1.58 J	< 1.325 U	3.45	< 0.835 U	< 0.98 U
Arsenic	12	29	mg/kg	4.27	3.3	5.11	3.12	4.81	3.94	7.09	3.1	6.57	2.36	1.59 B
Barium	44000	8200	mg/kg	19.1	18.4	20.9	6.99 B	30.8 N	22 N	54.6	31.2	55.9	21.8	7.57 B
Beryllium	440	320	mg/kg	0.224 J	0.251 J	0.248	0.196 J	0.433	0.335	0.38	0.33	0.344	0.312	0.087 J
Cadmium	110	38	mg/kg	0.098 J	< 0.141 U	0.094 J	0.344	0.843	0.632	< 0.16 U	< 0.16 U	0.542	0.046 J	0.146 J
Calcium	NSA	NSA	mg/kg	895 B	11900	878 B	578 B	365 B	279 B	199 B	< 53 UR	647	249	98.3 B
Chromium	NSA	NSA	mg/kg	6.28	8.48	7.19	3.96 J	10.8 J	8.81 J	10.7	12.2	10.1 J	7.92 J	2.69 B
Cobalt	66	50	mg/kg	4.45	4.46	5.61	3.29	6.19	4.42	5.89	5.05	5.42	4.29	1.18
Copper	8100	43000	mg/kg	17.6	6.87	19.1	4.46	9.27	7.24	28.4	6.15	146	7.65	2.91
Iron	150000	NSA	mg/kg	10600	11500	12200	6800 J	16300 J	12400 J	14800 J	14800 J	13800	10200	3020 J
Lead	500	450	mg/kg	86.9	5.11	106	4.18	6.81	5.83	114	5.79	**522 J**	12.7 J	1.83
Magnesium	NSA	NSA	mg/kg	1640	8020	1910	1100 J	1780 J	1320 J	1680	1420	1330	1250	437 B
Manganese	10000	2000	mg/kg	217	226	271	158 J	276 J	185 J	272 J	310 J	321	247	22.6 J
Nickel	4400	650	mg/kg	8.69	8.39	10.5	6.29	10.3	7.47	10.7	8.9	11	7.12	3.75
Potassium	NSA	NSA	mg/kg	284	608	326	246	624	473	543	653	363	421	102 B
Selenium	1100	26	mg/kg	0.892 J	0.495 J	0.886	< 0.53 U	0.356 J	0.583 J	< 0.53 U	< 0.53 U	1.88	1.27	< 0.393 U
Silver	1100	84	mg/kg	< 0.266 U	< 0.235 U	< 0.196 U	< 0.2655 U	< 0.187 U	< 0.2045 U	< 0.265 U	< 0.265 U	< 0.2435 U	< 0.167 U	< 0.1965 U
Sodium	NSA	NSA	mg/kg	223 B	245 B	234 B	138 B	414 B	318 B	141 B	104 B	64.2 J	40.6 J	151 B
Thallium	15	14	mg/kg	< 1.065 U	< 0.94 U	< 0.785 U	< 1.06 U	< 0.745 U	< 0.82 U	< 1.06 U	< 1.06 U	< 0.975 U	< 0.67 U	< 0.785 U
Vanadium	1500	26000	mg/kg	8.73	15.4	10.2	4.92 N	17.8 N	14.2 N	16.1	17.9	16.3	9.98	2.43 N
Zinc	66000	12000	mg/kg	36.3	24.9	40.1	23 J	32.5 J	27.4 J	44.7	28.9	224 L	27 L	13.2 J
Inorganics (SW6020)														
Uranium-238	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury (SW7471)														
Mercury	35	10	mg/kg	0.235 *	0.004 J	0.247 *	0.004 J	0.003 J	< 0.005 U	0.622 J	0.073 J	1.22 D	0.065	< 0.0045 U

Table 6-1 - Soil - Analytical Summary of Detected Metals

			Location ID	UBZ2-SO-18	UBZ2-SO-18	UBZ2-SO-19	UBZ2-SO-19	UBZ2-SO-20	UBZ2-SO-20	UBZ2-SO-21	UBZ2-SO-21	UBZ2-SO-22	UBZ2-SO-22
			Sample Name	UBZ2-SO-18-5-6	UBZ2-SO-DUP9	UBZ2-SO-19-0.5-1.5	UBZ2-SO-19-7-8	UBZ2-SO-20-1-2	UBZ2-SO-20-5.5-6.5	UBZ2-SO-21-10-11	UBZ2-SO-21-5-6	UBZ2-SO-22-1-2	UBZ2-SO-22-8-9
			Date Sampled	12/30/2011	12/30/2011	12/30/2011	12/30/2011	12/28/2011	12/28/2011	12/28/2011	12/28/2011	1/9/2012	1/9/2012
			Parent Sample Name		UBZ2-SO-18-10-11								
	Act 2 MSCs (Residential)[1]		Depth Interval	5-6	10-11	0.5-1.5	7-8	1-2	5.5-6.5	10-11	5-6	1-2	8-9
Analyte	**RDC MSC**	**RSGW**	**Unit**										
Inorganics (SW6010)													
Aluminum	190000	NSA	mg/kg	4470 J	2380 J	2990 J	3930 J	7380 J	4800 J	2840 J	5360 J	4030 J	6250 J
Antimony	88	27	mg/kg	< 1.075 U	< 1.055 U	< 1.19 U	< 1.31 U	< 1.3 U	< 1.2 U	< 1.005 U	< 1.19 U	< 1.275 U	< 0.95 U
Arsenic	12	29	mg/kg	4.57	2.16	2.97 B	3.16	2.54	2.97	2.14	3.47	3.47	4.68
Barium	44000	8200	mg/kg	16.8 N	9.64 N	15.9 N	18.6 N	44.7	22.5	23.3	24.5	9.41 B	25.4 K
Beryllium	440	320	mg/kg	0.261	0.123 J	0.235 J	0.25 J	0.37	0.34	0.19 J	0.33	0.149 J	0.486
Cadmium	110	38	mg/kg	0.689	0.191 J	0.482	0.515	< 0.155 U	< 0.145 U	< 0.12 U	< 0.145 U	< 0.1535 U	0.093 J
Calcium	NSA	NSA	mg/kg	320 B	114	234 B	232 B	892 L	< 47.95 UL	289 L	218 L	242 B	291 B
Chromium	NSA	NSA	mg/kg	15.4 J	3.61	6.67 J	6.26 J	10.1 J	9.38 J	5.86 J	10.1 J	8.16	39.8
Cobalt	66	50	mg/kg	4.7	1.56	3.73	3.96	5.42	4.93	3.85	7.28	4.06	9.57
Copper	8100	43000	mg/kg	8.78	4.56	5.78	4.83	5.27	6.96	3.4	7.62	6.1	8.84
Iron	150000	NSA	mg/kg	13300 J	3910	9460 J	9450 J	13400	12500	6880	13900	8650 J	18100 J
Lead	500	450	mg/kg	16.6	2.21	3.79	4.6	9.23 J	6.08 J	3.79 J	7.45 J	4.99	7.72
Magnesium	NSA	NSA	mg/kg	1200 J	514	863 J	1170 J	1950	1400	896	1580	1190	1490
Manganese	10000	2000	mg/kg	215 J	26.6	193 J	164 J	210	339	351	372	178 J	569 J
Nickel	4400	650	mg/kg	6.76	4.62	5.19	6.54	10.3	8.6	6.3	10.6	12.2	11
Potassium	NSA	NSA	mg/kg	479	112	487	435	429	572	312	550	274	602
Selenium	1100	26	mg/kg	0.689 J	0.421 J	< 0.4765 U	< 0.525 U	0.57 J	0.54 J	< 0.4 U	< 0.475 U	0.619 J	1.31
Silver	1100	84	mg/kg	< 0.2155 U	< 0.211 U	< 0.238 U	< 0.2615 U	< 0.26 U	< 0.24 U	< 0.2 U	< 0.24 U	< 0.2555 U	< 0.1905 U
Sodium	NSA	NSA	mg/kg	298 B	201	42.2 B	48 B	628 *	391 *	138 *	189 *	274 B	383 B
Thallium	15	14	mg/kg	< 0.86 U	< 0.845 U	< 0.955 U	< 1.045 U	< 1.04 U	< 0.96 U	< 0.805 U	< 0.95 U	0.312 J	< 0.76 U
Vanadium	1500	26000	mg/kg	17.1 N	3.55	11.5 N	10.6 N	14	14.4	6.09	15.2	6.38	21.2
Zinc	66000	12000	mg/kg	23 J	16.4 N	18.5 J	20.9 J	61.4	25.1	20.7	30.2	27.5	27.4
Inorganics (SW6020)													
Uranium-238	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury (SW7471)													
Mercury	35	10	mg/kg	0.09	< 0.0045 U	< 0.005 U	< 0.005 U	0.013	0.007 J	< 0.005 U	0.006 J	0.033	0.009 J

Table 6-1 - Soil - Analytical Summary of Detected Metals

			Location ID	UBZ2-SO-23	UBZ2-SO-23	UBZ2-SO-24	UBZ2-SO-24	UBZ2-SO-25	UBZ2-SO-25	UBZ2-SO-26	UBZ2-SO-26	UBZ2-SO-27	UBZ2-SO-27
			Sample Name	UBZ2-SO-23-1-2	UBZ2-SO-23-5-7	UBZ2-SO-24-11-12	UBZ2-SO-24-6-7	UBZ2-SO-25-0-1	UBZ2-SO-25-1-2	UBZ2-SO-26-0-1	UBZ2-SO-26-6-7	UBZ2-SO-27-0.5-1.5	UBZ2-SO-27-12.5-13.5
			Date Sampled	12/30/2011	12/30/2011	12/30/2011	12/30/2011	12/30/2011	12/30/2011	12/28/2011	12/28/2011	12/28/2011	12/28/2011
			Parent Sample Name										
	Act 2 MSCs (Residential)[1]		Depth Interval	1-2	5-7	11-12	6-7	0-1	1-2	0-1	6-7	0.5-1.5	12.5-13.5
Analyte	RDC MSC	RSGW	Unit										
Inorganics (SW6010)													
Aluminum	190000	NSA	mg/kg	5360 J	6360 J	1590 J	3660 J	5000 J	4120 J	7620 J	5040 J	6810 J	2020 J
Antimony	88	27	mg/kg	0.933 J	< 1.38 U	< 1.14 U	< 1.355 U	< 1.5 U	< 0.965 U	2.34 J	< 1.185 U	0.43 J	< 1.04 U
Arsenic	12	29	mg/kg	4.82	5.18	1.66 B	2.98 B	3.76	3.91	**16.5**	2.75	7.05	0.96
Barium	44000	8200	mg/kg	15.3 N	27.1 N	7.51 B	25.1 N	31.4 N	11.6 N	86.1	16.7	34.4	10.2
Beryllium	440	320	mg/kg	0.218 J	0.435	0.105 J	0.295 J	0.255 J	0.177 J	0.56	0.4	0.31	0.37
Cadmium	110	38	mg/kg	0.635	0.966	0.149 J	0.586	0.596	0.514	< 0.155 U	< 0.14 U	0.14 J	< 0.125 U
Calcium	NSA	NSA	mg/kg	573	3910	112 B	284 B	2620 B	1440 B	16200 L	< 47.35 UL	696 L	< 41.55 UL
Chromium	NSA	NSA	mg/kg	6.76	14.7	2.34 B	8.85 J	6.25 J	6.69 J	32.5 J	11 J	9.9 J	3.98 J
Cobalt	66	50	mg/kg	5.42	6.2	1.3 J	4.67	4.25	4.47	7.46	6.02	6.95	2.32
Copper	8100	43000	mg/kg	8.26	10.4	1.09	6.32	14.4	36.9	74.5	7.32	16.5	1.1
Iron	150000	NSA	mg/kg	12400	18100	3240 J	11200 J	10500 J	9700 J	16100	15200	13200	8210
Lead	500	450	mg/kg	11.9	14	1.43	5.05	90.9	15.6	**1980 J**	6.25 J	96.5 J	1.94 J
Magnesium	NSA	NSA	mg/kg	1580	1900	433 B	1090 J	1510 J	1470 J	6470	1420	1490	586
Manganese	10000	2000	mg/kg	199	303	70.3 J	288 J	125 J	186 J	450	313	321	56.2
Nickel	4400	650	mg/kg	8.28	10.5	2.78	6.99	7.87	7.65	18.3	9.69	10.3	3.82
Potassium	NSA	NSA	mg/kg	292	669	115 B	429	1320	436	1380	558	444	153
Selenium	1100	26	mg/kg	0.629 J	0.844 J	< 0.4555 U	< 0.54 U	< 0.6 U	0.544 J	0.6 J	0.58 J	< 0.365 U	0.37 J
Silver	1100	84	mg/kg	< 0.2795 U	< 0.2755 U	< 0.228 U	< 0.271 U	< 0.2995 U	< 0.193 U	< 0.26 U	< 0.235 U	< 0.18 U	< 0.21 U
Sodium	NSA	NSA	mg/kg	113	139	68.1 B	199 B	792 B	339 B	1120 *	155 *	568 *	135 *
Thallium	15	14	mg/kg	< 1.12 U	< 1.105 U	< 0.91 U	< 1.085 U	< 1.2 U	< 0.775 U	< 1.045 U	< 0.945 U	< 0.73 U	< 0.83 U
Vanadium	1500	26000	mg/kg	9.98	20.7	2.71 N	13.3 N	8.86 N	8.21 N	26	18.3	13.6	5.02
Zinc	66000	12000	mg/kg	29.4 N	31.4 N	12.8 J	24.3 J	37 J	43.9 J	215	29.1	59.7	17
Inorganics (SW6020)													
Uranium-238	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury (SW7471)													
Mercury	35	10	mg/kg	0.362	< 0.0055 U	< 0.005 U	0.005 J	4.31 D	1.3 D	0.302	0.007 J	0.242	< 0.005 U

Table 6-1 - Soil - Analytical Summary of Detected Metals

			Location ID	UBZ2-SO-28	UBZ2-SO-28	UBZ2-SO-29	UBZ2-SO-29	UBZ2-SO-29	UBZ2-SO-30	UBZ2-SO-30	UBZ2-SO-31	UBZ2-SO-31	UBZ2-SO-32
			Sample Name	UBZ2-SO-28-0-1	UBZ2-SO-28-11-12	UBZ2-SO-29-0.5-1.5	UBZ2-SO-29-6.5-8.5	UBZ2-SO-Dup14	UBZ2-SO-30-2-3	UBZ2-SO-30-7-8	UBZ2-SO-31-1-2	UBZ2-SO-31-3-4	UBZ2-SO-32-0-1
			Date Sampled	12/28/2011	12/28/2011	1/16/2012	1/16/2012	1/16/2012	1/16/2012	1/16/2012	12/29/2011	12/29/2011	12/30/2011
			Parent Sample Name					UBZ2-SO-29-6.5-8.5					
	Act 2 MSCs (Residential)[1]		Depth Interval	0-1	11-12	0.5-1.5	6.5-8.5	6.5-8.5	2-3	7-8	1-2	3-4	0-1
Analyte	RDC MSC	RSGW	Unit										
Inorganics (SW6010)													
Aluminum	190000	NSA	mg/kg	5910 J	5920 J	3390	4960	3320	3830	4810	6780 J	6950 J	6230 J
Antimony	88	27	mg/kg	2.6 J	< 1.355 U	< 1.29 U	< 1.175 U	< 1.275 U	< 1.24 U	< 1.355 U	< 1.28 U	< 1.275 U	< 1.415 U
Arsenic	12	29	mg/kg	10.1	2.1 B	2.31	2.33	2.12	2.4	2.51	4.76	4.99	7.81
Barium	44000	8200	mg/kg	73.3 L	17 L	9.88	28.7	16.9	15.7	24.6	36.8 N	22.7 N	133 N
Beryllium	440	320	mg/kg	0.39	0.29 J	0.15 J	0.36	0.25 J	0.25 J	0.39	0.367	0.324	0.729
Cadmium	110	38	mg/kg	0.18 J	< 0.165 U	< 0.155 U	0.26 J	< 0.155 U	< 0.15 U	< 0.165 U	0.651	0.666	1.23
Calcium	NSA	NSA	mg/kg	1280 L	322 L	133 B	17.9 B	45.6 B	134 B	< 54.5 UR	708 B	589 B	1090
Chromium	NSA	NSA	mg/kg	12.4 J	22.1 J	5.27	11.9	8.89	5.93	11.7	8.02 J	8.32 J	13.6
Cobalt	66	50	mg/kg	4.41	4.85	3.58	6.13	5.67	5.39	3.81	4.4	5.77	13.2
Copper	8100	43000	mg/kg	59.9	5.15 *	4.9	7.07	4.99	171	108	22.8	7.86	18.3
Iron	150000	NSA	mg/kg	11800	10800 J	7860 J	14200 J	10100 J	8960 J	14900 J	12600 J	13500 J	19000
Lead	500	450	mg/kg	219	4.66 J	6.53 J	5.73 J	4.51 J	31 J	6.52 J	36.2	9.37	58
Magnesium	NSA	NSA	mg/kg	1380	1540 J	1080	1430	1010	1130	1350	1430 J	1530 J	1250
Manganese	10000	2000	mg/kg	225 J	261 J	159	366	241	141	92.7	185 J	199 J	2560
Nickel	4400	650	mg/kg	10.3	11.9 *	6.53	9.17	6.85	6.41	7.63	7.55	7.91	11.2
Potassium	NSA	NSA	mg/kg	585 J	547 *	217	650	522	253	555	296	321	318
Selenium	1100	26	mg/kg	0.68 J	0.45 J	< 0.515 U	< 0.47 U	< 0.51 U	< 0.495 U	< 0.545 U	0.578 J	0.718 J	1.51
Silver	1100	84	mg/kg	< 0.27 U	< 0.27 U	< 0.26 U	< 0.235 U	< 0.255 U	< 0.25 U	< 0.27 U	< 0.256 U	< 0.255 U	< 0.2825 U
Sodium	NSA	NSA	mg/kg	60 B	202 N*	181 B	239 B	170 B	126 B	128 B	199 B	216 B	79.8 J
Thallium	15	14	mg/kg	< 1.07 U	< 1.085 U	< 1.03 U	< 0.94 U	< 1.02 U	< 0.99 U	< 1.085 U	< 1.025 U	< 1.02 U	< 1.13 U
Vanadium	1500	26000	mg/kg	20.3 J	9.9 *	5.9	19.9	13.8	8.26	19.6	12.7 N	13.2 N	27.6
Zinc	66000	12000	mg/kg	110 L	28.5 J	24.9 B	29.6 B	24.6 B	28.3 B	29.7 B	32.8 J	29.1 J	103 N
Inorganics (SW6020)													
Uranium-238	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury (SW7471)													
Mercury	35	10	mg/kg	0.342	0.005 J	0.021 B	0.012 B	0.013 B	0.119	0.063	4.55 D	0.253	0.236

Table 6-1 - Soil - Analytical Summary of Detected Metals

			Location ID	UBZ2-SO-32	UBZ2-SO-33	UBZ2-SO-33	UBZ2-SO-34	UBZ2-SO-34	UBZ2-SO-35	UBZ2-SO-35	UBZ2-SO-36	UBZ2-SO-36	UBZ2-SO-37	UBZ2-SO-37
			Sample Name	UBZ2-SO-32-6-7	UBZ2-SO-33-0-2	UBZ2-SO-33-3-4	UBZ2-SO-34-11-12	UBZ2-SO-34-5-6	UBZ2-SO-35-0-2	UBZ2-SO-35-5-7	UBZ2-SO-36-11-12	UBZ2-SO-36-5-6	UBZ2-SO-37-1-2	UBZ2-SO-37-2-2.5
			Date Sampled	12/30/2011	12/30/2011	12/30/2011	12/28/2011	12/28/2011	1/5/2012	1/5/2012	12/30/2011	12/30/2011	12/30/2011	12/30/2011
			Parent Sample Name											
	Act 2 MSCs (Residential)[1]		Depth Interval	6-7	0-2	3-4	11-12	5-6	0-2	5-7	11-12	5-6	1-2	2-2.5
Analyte	RDC MSC	RSGW	Unit											
Inorganics (SW6010)														
Aluminum	190000	NSA	mg/kg	5570 J	4000 J	4210 J	3830 J	5710 J	5470 J	4810 J	2340 J	4590 J	3990 J	4860 J
Antimony	88	27	mg/kg	< 0.995 U	< 1.36 U	< 1.355 U	< 0.97 U	< 1.37 U	1.03 J	< 0.98 U	< 1.315 U	< 1.285 U	< 1.21 U	< 1.355 U
Arsenic	12	29	mg/kg	4.9	3.37	3.87	3.42	2.27 B	4.66	4.11	2.29	3.97	3.95	3.7
Barium	44000	8200	mg/kg	22.4 N	23.2 N	19.4 N	18.1 L	24.3 L	30.9	23.1	13.6 N	23.1 N	15 N	19.6 N
Beryllium	440	320	mg/kg	0.29	0.273 J	0.256 J	0.25	0.34	0.303 J	0.353	0.174 J	0.257 J	0.28 J	0.307 J
Cadmium	110	38	mg/kg	0.736	0.467	0.489	< 0.115 U	< 0.165 U	0.088 J	0.083 J	0.377	0.608	0.569	0.591
Calcium	NSA	NSA	mg/kg	539	437	337	204 L	380 L	15000	750	1500	7060	165	209
Chromium	NSA	NSA	mg/kg	7.3	6.48	6.16	7.64 J	11 J	8.01 J	10.4 J	6.84	9.77	9.15	14.3
Cobalt	66	50	mg/kg	5.79	3.47	4.54	4.65	7.9	4.69	6.09	4.86	5.29	4.6	4.3
Copper	8100	43000	mg/kg	7.69	8.03	5.02	3.72	5.5	145	8.68	3.53	8.76	6.59	6.09
Iron	150000	NSA	mg/kg	12600	9130	9810	10700	14400	11400	15500	6980	11200	11100	11500
Lead	500	450	mg/kg	15	32.8	15.4	3.24	5.38	145 J	6.08 J	4.58	13.5	4.2	6.07
Magnesium	NSA	NSA	mg/kg	1540	1120	988	1260	1500	1920	1340	925	2480	1100	1480
Manganese	10000	2000	mg/kg	293	175	202	178 J	339 J	216	273	154	234	218	146
Nickel	4400	650	mg/kg	8.55	5.82	5.24	8.33	9.65	45.1	8.82	4.78	7.64	6.63	10.3
Potassium	NSA	NSA	mg/kg	256	245	238	358 J	725 J	518	585	253	492	433	412
Selenium	1100	26	mg/kg	0.71 J	1.25	0.623 J	< 0.39 U	< 0.55 U	1.28	1.67	0.66 J	0.675 J	0.621 J	0.723 J
Silver	1100	84	mg/kg	< 0.199 U	< 0.2725 U	< 0.2705 U	< 0.195 U	< 0.275 U	< 0.2575 U	< 0.1955 U	< 0.2635 U	< 0.257 U	< 0.242 U	< 0.2705 U
Sodium	NSA	NSA	mg/kg	49.1 J	57.8 J	101 J	68.8 B	114 B	338	179	140	283	79.3 J	234
Thallium	15	14	mg/kg	< 0.795 U	< 1.09 U	< 1.085 U	< 0.775 U	< 1.095 U	< 1.03 U	< 0.78 U	< 1.055 U	< 1.025 U	< 0.97 U	< 1.08 U
Vanadium	1500	26000	mg/kg	10.8	9.15	9.73	6.6 J	18.6 J	11.1	18.5	5.87	11	12.1	10.1
Zinc	66000	12000	mg/kg	30.4 N	30.3 N	20.4 N	23 L	29.9 L	48.5 L	27.9 L	18.7 N	30.7 N	24 N	30.8 N
Inorganics (SW6020)														
Uranium-238	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury (SW7471)														
Mercury	35	10	mg/kg	0.056	0.602 D	0.088	< 0.0045 U	< 0.0055 U	0.241	0.006 J	< 0.005 U	0.045	< 0.0045 U	< 0.0055 U

Table 6-1 - Soil - Analytical Summary of Detected Metals

			Location ID	UBZ2-SO-38	UBZ2-SO-38	UBZ2-SO-40	UBZ2-SO-40	UBZ2-SO-41	UBZ2-SO-41	UBZ2-SO-41	UBZ2-SO-42	UBZ2-SO-42	UBZ2-SO-43	UBZ2-SO-43
			Sample Name	UBZ2-SO-38-0-2	UBZ2-SO-38-5-7	UBZ2-SO-40-0.5-1.5	UBZ2-SO-40-11-12	UBZ2-SO-41-4-5	UBZ2-SO-41-5-7	UBZ2-SO-DUP6	UBZ2-SO-42-5-6	UBZ2-SO-42-7-8	UBZ2-SO-43-13-14	UBZ2-SO-43-9-10
			Date Sampled	12/27/2011	12/27/2011	12/27/2011	12/27/2011	12/27/2011	12/27/2011	12/27/2011	12/21/2011	12/21/2011	12/21/2011	12/21/2011
			Parent Sample Name							UBZ2-SO-41-5-7				
	Act 2 MSCs (Residential)[1]		Depth Interval	0-2	5-7	0.5-1.5	11-12	4-5	5-7	5-7	5-6	7-8	13-14	9-10
Analyte	RDC MSC	RSGW	Unit											
Inorganics (SW6010)														
Aluminum	190000	NSA	mg/kg	7380 J	4180 J	4330 J	6510 J	5250 J	4290 J	3890 J	5560 J	4520 J	2130 J	4160 J
Antimony	88	27	mg/kg	0.97 J	< 1.11 U	< 1.1 U	< 1.39 U	0.76 J	< 0.93 U	< 1.13 U	< 1.35 U	< 1.165 U	< 0.945 U	< 0.995 U
Arsenic	12	29	mg/kg	5.27	2.27 B	2.59	2.06 B	2.96	2.35 B	2.01 B	3.23 B	2.35 B	0.69 B	1.28 B
Barium	44000	8200	mg/kg	41.3 L	18 L	20.1 L	28.4 L	23.8 L	19.9 L	13.5 L	20.5	12.5	9.6 B	22.7
Beryllium	440	320	mg/kg	0.5	0.28	0.24 J	0.3 J	0.3	0.31	0.25 J	0.46	0.33	0.11 J	0.27
Cadmium	110	38	mg/kg	0.11 J	< 0.135 U	< 0.13 U	< 0.165 U	< 0.145 U	< 0.11 U	< 0.135 U	< 0.16 U	< 0.14 U	< 0.115 U	< 0.12 U
Calcium	NSA	NSA	mg/kg	974 L	297 L	480 L	466 L	5080 L	699 L	660 L	1350 N	427 N	148 N	253 N
Chromium	NSA	NSA	mg/kg	15.6 J	11.9 J	7.15 J	8.87 J	8.09 J	8.29 J	7.38 J	14.8 J	9.2 J	3.7 J	7.65 J
Cobalt	66	50	mg/kg	6.87	5.61	4.33	4.38	4.74	6.23	3.67	6.43	3.91	5.28	4.46
Copper	8100	43000	mg/kg	26.5	5.5	4.67	3.87	6.44 N	5.74 N	5.07 N	21.1 B	13 B	5.7 B	13.3 B
Iron	150000	NSA	mg/kg	14700	11000	9780	10500	11900 J	12200 J	10900 J	17800	11300	5820	11100
Lead	500	450	mg/kg	111	4.86	9.97	4.63	10.5 J	4.79 J	3.98 J	7.63	5.33	2.57	5.25
Magnesium	NSA	NSA	mg/kg	1240	1090	1130	1370	1710 J	1300 J	1290 J	1780 J	1370 J	737 B	1390 J
Manganese	10000	2000	mg/kg	323 J	271 J	177 J	222 J	256 J	326 J	211 J	367	180	116	217
Nickel	4400	650	mg/kg	9.93	8.39	6.8	7.05	8.34	7.66	7.06	10.9 B	8.05 B	3.78 B	8 B
Potassium	NSA	NSA	mg/kg	577 J	532 J	437 J	743 J	365	446	437	597	559	226	477
Selenium	1100	26	mg/kg	< 0.585 U	< 0.445 U	< 0.44 U	< 0.555 U	< 0.48 U	< 0.37 U	< 0.45 U	< 0.54 U	< 0.465 U	< 0.38 U	< 0.395 U
Silver	1100	84	mg/kg	< 0.295 U	< 0.22 U	< 0.22 U	< 0.28 U	< 0.24 U	< 0.185 U	< 0.225 U	< 0.27 U	< 0.235 U	< 0.19 U	< 0.2 U
Sodium	NSA	NSA	mg/kg	57 B	36 B	85.9 B	83.9 B	210	151	140	439	254	46.2 J	196
Thallium	15	14	mg/kg	< 1.17 U	< 0.89 U	< 0.88 U	< 1.11 U	< 0.955 U	< 0.745 U	< 0.9 U	< 1.08 U	< 0.93 U	0.32 B	< 0.795 U
Vanadium	1500	26000	mg/kg	21.5 J	13.2 J	11 J	12.8 J	9.37 N	13.9 N	11.6 N	20.8	13.4	4.75	12.1
Zinc	66000	12000	mg/kg	56.1 L	21.5 L	24.6 L	24.5 L	27.7 J	23 J	23 J	46.7 J	27.9 J	17.7 J	27.3 J
Inorganics (SW6020)														
Uranium-238	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury (SW7471)														
Mercury	35	10	mg/kg	0.312	0.004 J	0.213	< 0.0055 U	0.17	0.004 J	0.005 J	0.018	0.006 J	0.008 J	0.006 J

Table 6-1 - Soil - Analytical Summary of Detected Metals

			Location ID	UBZ2-SO-43	UBZ2-SO-45	UBZ2-SO-45	UBZ2-SO-46	UBZ2-SO-46	UBZ2-SO-47	UBZ2-SO-47	UBZ3-SO-01	UBZ3-SO-01	UBZ3-SO-01	UBZ3-SO-02
			Sample Name	UBZ2-SO-DUP5	UBZ2-SO-45-1-2	UBZ2-SO-45-5-6	UBZ2-SO-46-0-1	UBZ2-SO-46-7-8	UBZ2-SO-47-0-1	UBZ2-SO-47-11-12	UBZ3-SO-1-1-2	UBZ3-SO-1-8-9	UBZ3-SO-DUP4	UBZ3-SO-2-14-15
			Date Sampled	12/21/2011	12/22/2011	12/22/2011	12/22/2011	12/22/2011	12/22/2011	12/22/2011	12/19/2011	12/19/2011	12/19/2011	12/19/2011
			Parent Sample Name	UBZ2-SO-43-9-10									UBZ3-SO-1-8-9	
	Act 2 MSCs (Residential)[1]		Depth Interval	9-10	1-2	5-6	0-1	7-8	0-1	11-12	1-2	8-9	8-9	14-15
Analyte	RDC MSC	RSGW	Unit											
Inorganics (SW6010)														
Aluminum	190000	NSA	mg/kg	5290 J	9550 J	3470 J	6110 J	3990 J	7770 J	4430 J	7590	3570	3580	8980
Antimony	88	27	mg/kg	< 0.96 U	24.8 J	< 1.025 U	< 1.13 U	< 1.235 U	0.75 J	0.62 J	< 1.005 U	< 1.155 U	< 1.15 U	< 1.245 U
Arsenic	12	29	mg/kg	1.95 B	5.94 *	1.52 *	3.74 *	2.72 *	5.6 *	2.2 *	4.99	2.71	1.9	6.99
Barium	44000	8200	mg/kg	24.1	899 J	14.8 J	36.2 J	14.3 J	52 J	21.9 J	26.8	22.3	16.5	29.6
Beryllium	440	320	mg/kg	0.35	0.56	0.26	0.3	0.22 J	0.42	0.24 J	0.483	0.31	0.358	0.456
Cadmium	110	38	mg/kg	< 0.115 U	< 0.165 U	< 0.125 U	< 0.135 U	< 0.15 U	0.07 J	< 0.135 U	0.698	0.32	0.303	0.695
Calcium	NSA	NSA	mg/kg	307 N	873 *	202 B	661 *	334 *	973 *	615 *	315	98.5	78.6 J	1270
Chromium	NSA	NSA	mg/kg	9.57 J	19.9 J	7.93 J	9.24 J	7.48 J	12.9 J	7.71 J	12.4	7.25	7.6	11.1
Cobalt	66	50	mg/kg	5.45	9.72 *	3.83 *	4.86 *	3.79 *	5.74 *	3.3 *	5.72	6.87	4.9	7.03
Copper	8100	43000	mg/kg	15.8 B	2150 J	7.33 J	21.9 J	6.24 J	78.2 J	12.2 J	9.8	5.21	5.99	12.3
Iron	150000	NSA	mg/kg	12600	22100 J	9930 J	12900 J	9790 J	14800 J	9760 J	16700	7460	7280	16900
Lead	500	450	mg/kg	5.94	**15600 J**	3.31 J	41 J	3.86 J	141 J	26.2 J	7.76	2.96	2.99	57.9
Magnesium	NSA	NSA	mg/kg	1700 J	2550 J	1010 J	1410 J	1100 J	1770 J	1300 J	2000	943	1030	2320
Manganese	10000	2000	mg/kg	213	438 J	163 J	188 J	184 J	209 J	140 J	169	125	87	197
Nickel	4400	650	mg/kg	9.42 B	352 J	6.27 J	8.25 J	6.53 J	14.1 J	6.36 J	10.9	6.63	6.9	12.1
Potassium	NSA	NSA	mg/kg	528	748 *	390 *	394 *	314 *	523 *	539 *	647	334	227	573
Selenium	1100	26	mg/kg	< 0.385 U	3.46	1.26	1.94	1.22	1.98	1.36	< 0.403 U	< 0.4625 U	< 0.46 U	< 0.497 U
Silver	1100	84	mg/kg	< 0.19 U	0.43 J	< 0.205 U	< 0.225 U	< 0.245 U	< 0.19 U	< 0.225 U	< 0.2015 U	< 0.2315 U	< 0.23 U	< 0.2485 U
Sodium	NSA	NSA	mg/kg	75.3 J	168 *	35.9 B	62.2 B	39.9 B	38.9 B	827 *	433	242	197	181
Thallium	15	14	mg/kg	< 0.77 U	< 1.1 U	< 0.82 U	< 0.905 U	< 0.99 U	< 0.755 U	< 0.91 U	< 0.805 U	< 0.925 U	< 0.92 U	< 0.995 U
Vanadium	1500	26000	mg/kg	14.3	25.5 J	13.1 J	14.1 J	8.27 J	18.7 J	10.2 J	19.2	7.4	7.48	15.6
Zinc	66000	12000	mg/kg	30.1 J	101 J	19.7 J	52.3 J	20.9 J	95.7 J	27.7 J	31.7	23	26.3	35.2
Inorganics (SW6020)														
Uranium-238	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury (SW7471)														
Mercury	35	10	mg/kg	0.006 J	1.02 D	< 0.005 U	0.377	0.003 J	0.56 D	0.376	0.011	0.004 J	0.004 J	0.043

Table 6-1 - Soil - Analytical Summary of Detected Metals

			Location ID	UBZ3-SO-02	UBZ3-SO-03	UBZ3-SO-03	UBZ3-SO-04	UBZ3-SO-04	UBZ3-SO-05	UBZ3-SO-05	UBZ3-SO-06	UBZ3-SO-06	UBZ3-SO-07	UBZ3-SO-07
			Sample Name	UBZ3-SO-2-6-7	UBZ3-SO-3-1-2	UBZ3-SO-3-14-15	UBZ3-SO-4-13-14	UBZ3-SO-4-3-4	UBZ3-SO-5-12-13	UBZ3-SO-5-2-3	UBZ3-SO-6-0.5-2	UBZ3-SO-6-6-7	UBZ3-SO-7-11-12	UBZ3-SO-7-5-6
			Date Sampled	12/19/2011	12/19/2011	12/19/2011	12/29/2011	12/29/2011	12/29/2011	12/29/2011	12/29/2011	12/29/2011	12/19/2011	12/19/2011
			Parent Sample Name											
	Act 2 MSCs (Residential)[1]		Depth Interval	6-7	1-2	14-15	13-14	3-4	12-13	2-3	0.5-2	6-7	11-11	5-6
Analyte	**RDC MSC**	**RSGW**	**Unit**											
Inorganics (SW6010)														
Aluminum	190000	NSA	mg/kg	9100	5830	1920	1740 J	5400 J	1370 J	7210 J	6040	7760	9800	10500 J
Antimony	88	27	mg/kg	< 1.165 U	< 1.18 U	< 1.02 U	< 1.015 U	< 1.25 U	< 1.25 U	< 1.085 U	< 1.25 U	< 1.17 U	< 1.245 U	0.79 J
Arsenic	12	29	mg/kg	6.2	6.46	0.775 J	< 0.405 U	2.9	< 0.5 U	5.81	3.67	2.39	**18.4**	**38.1**
Barium	44000	8200	mg/kg	32.4	23.8	9.05	7.04	21.5	7.4	26.6	20.6	32.1	69.5	98.5 J
Beryllium	440	320	mg/kg	0.458	0.423	0.123 J	0.09 J	0.37	< 0.15 U	0.43	0.3	0.49	0.702	0.6
Cadmium	110	38	mg/kg	0.668	0.581	0.109 J	< 0.12 U	< 0.15 U	< 0.15 U	0.12 J	< 0.15 U	0.06 J	0.84	< 0.185 U
Calcium	NSA	NSA	mg/kg	594	717	97.9	85.8 B	332 L	93.2 B	2480 L	316	347	3040	1450
Chromium	NSA	NSA	mg/kg	11.2	9.27	3.14	2.74 J	11 J	2.53 J	13.3 J	9.94 N	13.9 N	34.5	53.2 N
Cobalt	66	50	mg/kg	7.49	5.93	2.21	2.58	6.15	1.26 J	7.17	6.08	9.6	8.74	8.45
Copper	8100	43000	mg/kg	21.6	18.1	2.36	1.79	7.59	1.6	18.3	7.58	8.63	24.3	42.1
Iron	150000	NSA	mg/kg	16500	13700	2680	2970	12900	2220	14500	12700	15300	18100	19200
Lead	500	450	mg/kg	8.99	34.7	1.92	1.34 J	6.28 J	0.81 J	29 J	6.41	7.78	132	203 J
Magnesium	NSA	NSA	mg/kg	1810	1990	540	538	1540	407	1890	1510 N	1980 N	3430	2900
Manganese	10000	2000	mg/kg	149	239	33.8	51.2	279	25.7	253	280	358	372	485 J
Nickel	4400	650	mg/kg	10.4	10.8	3.15	3.43	9.22	2.72	11.4	9.8	11.4	14.8	12.1
Potassium	NSA	NSA	mg/kg	479	416	168	162	628	159	828	463	835	850	990
Selenium	1100	26	mg/kg	< 0.4665 U	< 0.4715 U	< 0.407 U	< 0.405 U	0.44 J	0.41 J	< 0.435 U	0.48 J	< 0.47 U	< 0.498 U	< 0.625 U
Silver	1100	84	mg/kg	< 0.233 U	< 0.236 U	< 0.2035 U	< 0.205 U	< 0.25 U	< 0.25 U	< 0.215 U	< 0.25 U	< 0.235 U	< 0.249 U	< 0.31 U
Sodium	NSA	NSA	mg/kg	199	291	155	105 *	192 *	91.2 J	275 *	124	183	327	343 B
Thallium	15	14	mg/kg	< 0.935 U	< 0.945 U	< 0.815 U	< 0.815 U	< 1 U	< 1 U	< 0.87 U	< 1 U	< 0.935 U	< 0.995 U	< 1.245 U
Vanadium	1500	26000	mg/kg	17.1	12.9	3.31	3.67	14.6	2.04	17.8	12.9	20.2	21.9	23.7
Zinc	66000	12000	mg/kg	36.3	43.5	17.1	19.8	28.6	14.8	35.3	31.9	32.4	53.5	49.9 L
Inorganics (SW6020)														
Uranium-238	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury (SW7471)														
Mercury	35	10	mg/kg	2.2	0.109	< 0.005 U	0.004 J	0.017	< 0.005 U	0.051	0.021	0.011	0.167	0.266 J

Table 6-1 - Soil - Analytical Summary of Detected Metals

			Location ID	UBZ3-SO-08	UBZ3-SO-08	UBZ3-SO-09	UBZ3-SO-09	UBZ3-SO-10	UBZ3-SO-10	UBZ3-SO-11	UBZ3-SO-11	UBZ3-SO-12	UBZ3-SO-12	UBZ3-SO-12
			Sample Name	UBZ3-SO-8-0.5-2	UBZ3-SO-8-39-40	UBZ3-SO-09-0-2	UBZ3-SO-09-5-7	UBZ3-SO-10-0-2	UBZ3-SO-10-13-14	UBZ3-SO-11-13-15	UBZ3-SO-11-2-4	UBZ3-SO-12-1-2	UBZ3-SO-12-14-15	UBZ3-SO-12-24-25
			Date Sampled	12/19/2011	12/19/2011	12/16/2011	12/16/2011	12/16/2011	12/16/2011	12/16/2011	12/16/2011	12/19/2011	12/19/2011	12/19/2011
			Parent Sample Name											
	Act 2 MSCs (Residential)[1]		Depth Interval	0.5-2	39-40	0-2	5-7	0-2	13-14	13-15	2-4	1-2	14-15	24-25
Analyte	RDC MSC	RSGW	Unit											
Inorganics (SW6010)														
Aluminum	190000	NSA	mg/kg	3800 J	926 J	5100 J	8380 J	4910 J	1530 J	2050 J	5200 J	4280 J	1620 J	5650 J
Antimony	88	27	mg/kg	0.82 J	< 1.105 U	0.98 J	< 1.035 U	0.88 J	< 1.145 U	< 0.96 U	1.19 J	< 1.085 U	< 1.32 U	< 1.18 U
Arsenic	12	29	mg/kg	5	0.39 J	4.07	3.53	2.82	1.18	0.82	1.82	2.58	0.52 J	3.39
Barium	44000	8200	mg/kg	36.7 J	10.6 J	36.7 J	56.6 J	28.2 J	10.6 J	10.2 J	36.9 J	25.1 J	8.68 J	34.6 J
Beryllium	440	320	mg/kg	0.27 J	0.05 J	0.31	0.51	0.3 J	0.21 J	0.21 J	0.36	0.26 J	0.09 J	0.49
Cadmium	110	38	mg/kg	< 0.16 U	< 0.13 U	< 0.15 U	< 0.125 U	< 0.155 U	< 0.14 U	< 0.115 U	< 0.165 U	< 0.13 U	< 0.16 U	< 0.14 U
Calcium	NSA	NSA	mg/kg	2360	43 B	31200	584	18000	330	64 B	11300	418	47.4 B	162 B
Chromium	NSA	NSA	mg/kg	6.91 N	1.75 N	10.9	12.4	9.26	5.42	6.23 N	7.27 N	6.15 N	3.55 N	7.79 N
Cobalt	66	50	mg/kg	3.83	1.49	4.02	5.21	3.5	9.97	4.04	2.91	3.69	2.34	3.36
Copper	8100	43000	mg/kg	20.9	1.38 B	12.8 J	14.3 J	13.6 J	4.54 J	4.02	15.8	18.5	2.9	9.8
Iron	150000	NSA	mg/kg	9010	1820	7680	12100	9100	6370	4300	7650	8720	2420	6660
Lead	500	450	mg/kg	142 J	1.19 J	26.9 J	56.6 J	45 J	1.39 J	1.12 J	131 J	272 J	1.35 J	9.28 J
Magnesium	NSA	NSA	mg/kg	1650	320	4840 J	1320 J	3630 J	200 J	368	2280	972	380	1440
Manganese	10000	2000	mg/kg	178 J	17.5 J	165 J	191 J	143 J	870 J	43.7 J	155 J	164 J	54.7 J	70.1 J
Nickel	4400	650	mg/kg	5.92	1.8	5.7	8.35	5.94	2.24	3.87	4.83	5.52	2.67	7.37
Potassium	NSA	NSA	mg/kg	375	64.6 J	738	590	621	113	153	809	285	136	347
Selenium	1100	26	mg/kg	< 0.525 U	< 0.44 U	< 0.51 U	< 0.415 U	< 0.515 U	< 0.46 U	< 0.385 U	< 0.55 U	< 0.435 U	< 0.525 U	< 0.47 U
Silver	1100	84	mg/kg	< 0.265 U	< 0.22 U	< 0.255 U	< 0.205 U	< 0.255 U	< 0.23 U	< 0.19 U	0.48 J	< 0.215 U	< 0.265 U	< 0.235 U
Sodium	NSA	NSA	mg/kg	138 B	110 B	479	818	177	78.5 J	90.2 B	533	304 B	88.7 B	139 B
Thallium	15	14	mg/kg	< 1.055 U	< 0.885 U	< 1.015 U	< 0.825 U	< 1.025 U	0.65 J	< 0.765 U	< 1.1 U	< 0.865 U	< 1.055 U	< 0.945 U
Vanadium	1500	26000	mg/kg	9.51	1.29 J	15.5	15.1	13.3	10.8	5.28	10.5	8.44	2.25	11.3
Zinc	66000	12000	mg/kg	45.1 L	12.2 L	32.8 J	40.5 J	36 J	12.2 J	14.9 L	29.5 L	23.6 L	18.6 L	33.8 L
Inorganics (SW6020)														
Uranium-238	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury (SW7471)														
Mercury	35	10	mg/kg	0.502 J	< 0.006 U	0.064 L	0.066 L	0.067 L	0.012 L	< 0.005 U	0.446 J	0.031 J	< 0.0055 U	0.007 J

Table 6-1 - Soil - Analytical Summary of Detected Metals

			Location ID	UBZ3-SO-13	UBZ3-SO-13	UBZ3-SO-14	UBZ3-SO-14	UBZ3-SO-14	UBZ3-SO-15	UBZ3-SO-15	UBZ3-SO-16	UBZ3-SO-16	UBZ3-SO-17
			Sample Name	UBZ3-SO-13-0-2	UBZ3-SO-13-5-7	UBZ3-SO-14-0.5-1.5	UBZ3-SO-14-10-11	UBZ3-SO-14-38-39	UBZ3-SO-15-12-13	UBZ3-SO-15-8-9	UBZ3-SO-16-2.5-3.5	UBZ3-SO-16-6-7	UBZ3-SO-17-12-14
			Date Sampled	1/10/2012	1/10/2012	12/29/2011	12/29/2011	12/21/2011	12/20/2011	12/20/2011	1/10/2012	1/10/2012	12/14/2011
			Parent Sample Name										
	Act 2 MSCs (Residential)[1]		Depth Interval	0-2	5-7	0.5-1.5	10-11	38-38	12-13	8-8	2.5-3.5	6-7	12-14
Analyte	RDC MSC	RSGW	Unit										
Inorganics (SW6010)													
Aluminum	190000	NSA	mg/kg	5460 J	4640 J	5150	1980	7240 J	5990 J	5170 J	6200 J	4980 J	2170
Antimony	88	27	mg/kg	1.24 J	< 1.085 U	< 1.39 U	< 1.07 U	< 1.58 U	< 1.07 U	< 1.115 U	< 1.17 U	< 1.31 U	< 1.405 U
Arsenic	12	29	mg/kg	5.51	3.25	3.06	0.82 J	3.58	0.84 B	3.27 B	3.64	5.57	0.641 J
Barium	44000	8200	mg/kg	36.7 K	13.1 K	30.4	7.38	28.7	35.7	18.6	30.9 K	31.9 K	11.9
Beryllium	440	320	mg/kg	0.292	0.258 J	0.32 J	0.13 J	0.37 J	0.39	0.49	0.271 J	0.263 J	0.169 J
Cadmium	110	38	mg/kg	0.128 J	< 0.13 U	< 0.165 U	< 0.13 U	< 0.19 U	< 0.13 U	< 0.135 U	< 0.1405 U	< 0.157 U	0.229 J
Calcium	NSA	NSA	mg/kg	2960 B	322 B	863	134	498 N	466 N	336 N	554 B	700 B	105 J
Chromium	NSA	NSA	mg/kg	9.98	11.4	9.14 N	3.75 N	10.3 J	8.41 J	14.7 J	8.86	6.82	6.63
Cobalt	66	50	mg/kg	4.71	3.8	7.05	1.97	3.85	4.74	5.57	5.01	4.3	1.88
Copper	8100	43000	mg/kg	27	5.2	14.2	9.11	10.2 B	11.4 B	18.1 B	11.6	27.1	2.68
Iron	150000	NSA	mg/kg	12200 J	11000 J	12800	5080	9450	7870	15800	11800 J	10700 J	3230
Lead	500	450	mg/kg	296	4.44	33	1.5	6.7	8.35	4.72	67.7	80.8	2.02
Magnesium	NSA	NSA	mg/kg	1480	1120	1380 N	499 N	2270 J	1940 J	1560 J	1360	1150	527
Manganese	10000	2000	mg/kg	161 J	146 J	340	263	91.4	77.3	283	165 J	225 J	39.3
Nickel	4400	650	mg/kg	8.78	6.42	11.3	3.36	10.1 B	11 B	10 B	9.16	7.02	4.45
Potassium	NSA	NSA	mg/kg	442	410	454	186	637	630	783	510	478	278
Selenium	1100	26	mg/kg	0.769 J	0.595 J	< 0.555 U	< 0.43 U	< 0.63 U	0.36 J	< 0.445 U	0.782 J	0.873 J	< 0.56 U
Silver	1100	84	mg/kg	< 0.233 U	< 0.217 U	< 0.28 U	< 0.215 U	< 0.315 U	< 0.215 U	< 0.225 U	< 0.234 U	< 0.2615 U	< 0.281 U
Sodium	NSA	NSA	mg/kg	175 B	126 B	199	77.3 J	293	281	158	262 B	481 B	168
Thallium	15	14	mg/kg	< 0.93 U	< 0.87 U	< 1.115 U	< 0.855 U	< 1.265 U	< 0.86 U	0.58 J	< 0.935 U	< 1.045 U	< 1.125 U
Vanadium	1500	26000	mg/kg	13.3	12.8	13.8	3.66	10.5	10.4	17.3	12.1	10.7	4.38
Zinc	66000	12000	mg/kg	52.4	19.8	34.4	17.2	43.6 J	44.9 J	29.3 J	37.9	44.9	17.3
Inorganics (SW6020)													
Uranium-238	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury (SW7471)													
Mercury	35	10	mg/kg	3.71	0.016	0.075	0.01 J	0.004 J	0.004 J	0.006 J	0.382	0.397	< 0.0055 U

Table 6-1 - Soil - Analytical Summary of Detected Metals

			Location ID	UBZ3-SO-17	UBZ3-SO-18	UBZ3-SO-18	UBZ3-SO-19	UBZ3-SO-19	UBZ3-SO-20	UBZ3-SO-20	UBZ3-SO-21	UBZ3-SO-21	UBZ3-SO-22	UBZ3-SO-22
			Sample Name	UBZ3-SO-17-2-4	UBZ3-SO-18-4-5	UBZ3-SO-18-9-10	UBZ3-SO-19-0-2	UBZ3-SO-19-2-3	UBZ3-SO-20-0.5-2	UBZ3-SO-20-5-6	UBZ3-SO-21-0-0.5	UBZ3-SO-21-5-6	UBZ3-SO-22-2-3	UBZ3-SO-22-4-5
			Date Sampled	12/14/2011	12/14/2011	12/14/2011	4/20/2012	4/20/2012	12/12/2011	12/12/2011	12/12/2011	12/12/2011	12/20/2011	12/20/2011
			Parent Sample Name											
	Act 2 MSCs (Residential)[1]		Depth Interval	2-4	4-5	9-10	0-2	2-3	0.5-2	5-6	0-0.5	5-6	2-3	4-5
Analyte	**RDC MSC**	**RSGW**	**Unit**											
Inorganics (SW6010)														
Aluminum	190000	NSA	mg/kg	3890	4760	1990	4520 J	5720 J	7750	4880	4530	3600	7890 J	5170 J
Antimony	88	27	mg/kg	2.18	0.919 J	< 0.865 U	**230 J**	18.6 J	< 1.08 U	< 1.16 U	< 1.39 U	< 0.975 U	0.73 B	< 1.075 U
Arsenic	12	29	mg/kg	5.55	4.47	1.06	5.25	2.71	6.03	3.97	4.26	3.35	5.99	3.08 B
Barium	44000	8200	mg/kg	41.2	63.3	6.86	77.6 J	34 J	53.8	15.4	13	17.8	51.3	21.5
Beryllium	440	320	mg/kg	0.275	0.441	0.142 J	0.35	0.31	0.434	0.364	0.241 J	0.242	0.44	0.44
Cadmium	110	38	mg/kg	1.47	0.795	0.251	1.23	< 0.125 U	1.28	0.75	< 0.1665 U	0.062 J	0.44	0.31
Calcium	NSA	NSA	mg/kg	4090	30300	160	4410 J	652 J	8150	668	957	1380	1040 N	388 N
Chromium	NSA	NSA	mg/kg	8.1	13.8	7.51	11	9.34	12	8.72	7.37	8.88	13.1 J	13.4 J
Cobalt	66	50	mg/kg	5.94	4.18	1.75	5.79	5.26	8.15	4.49	4.5	3.61	7.47	6.38
Copper	8100	43000	mg/kg	95.5	36.5	2.58	195 J	15.7 J	17.7	6.19	7.29	10.7	24.6	19.6
Iron	150000	NSA	mg/kg	20800	9410	3910	12600 J	12400 J	17800	11400	9830	8410	15100	15400
Lead	500	450	mg/kg	312	118	1.76	**12700 J**	137 J	21.4	5.76	4.58	4.34	62.4	9.21
Magnesium	NSA	NSA	mg/kg	1630	5500	448	1590 J	1360 J	1780 L	1320 L	1300	1020	1540 J	1560 J
Manganese	10000	2000	mg/kg	195	141	45.4	327 J	340 J	423	228	194	200	338	229
Nickel	4400	650	mg/kg	35.9	6.49	3.35	24.3 J	11.6 J	15.1 L	8.05 L	8.03	7.87	11.7 B	10.8 B
Potassium	NSA	NSA	mg/kg	679	1090	177	493	402	635	486	575	452	752	605
Selenium	1100	26	mg/kg	< 0.4145 U	< 0.54 U	< 0.345 U	< 0.46 UL	< 0.415 UL	< 0.4325 U	< 0.464 U	< 0.555 U	< 0.3895 U	< 0.55 U	< 0.43 U
Silver	1100	84	mg/kg	< 0.207 U	< 0.269 U	< 0.1725 U	< 0.23 U	< 0.205 U	< 0.2165 U	< 0.232 U	< 0.278 U	< 0.1945 U	< 0.275 U	< 0.215 U
Sodium	NSA	NSA	mg/kg	441	476	148	79.2 J	63.9 J	182	121	96.1 J	78.1	131	77.3 J
Thallium	15	14	mg/kg	< 0.83 U	< 1.075 U	< 0.69 U	< 0.915 U	< 0.83 U	< 0.865 U	< 0.93 U	< 1.11 U	< 0.78 U	< 1.105 U	< 0.86 U
Vanadium	1500	26000	mg/kg	13	14	4.89	13.2	11.6	20.7	11.5	8.76	7.38	19.1	19.5
Zinc	66000	12000	mg/kg	42	59.7	15.1	263 J	33.9 J	40.1	26.5	26.3 J	75.2 J	49.5 J	35.7 J
Inorganics (SW6020)														
Uranium-238	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury (SW7471)														
Mercury	35	10	mg/kg	0.686 *D	0.285 *	< 0.005 U	2.2	0.16	0.084 J	0.01 J	0.1	0.021	0.234	0.025

Table 6-1 - Soil - Analytical Summary of Detected Metals

			Location ID	UBZ3-SO-23	UBZ3-SO-23	UBZ3-SO-24	UBZ3-SO-24	UBZ3-SO-25	UBZ3-SO-25	UBZ3-SO-26	UBZ3-SO-26	UBZ3-SO-27	UBZ3-SO-27	UBZ3-SO-28
			Sample Name	UBZ3-SO-23-0-2	UBZ3-SO-23-3-5	UBZ3-SO-24-0-2	UBZ3-SO-24-12-13	UBZ3-SO-25-0.5-2	UBZ3-SO-25-5-7	UBZ3-SO-26-0-3	UBZ3-SO-26-8-10	UBZ3-SO-27-13-15	UBZ3-SO-27-4.5-6.5	UBZ3-SO-28-3-5
			Date Sampled	12/16/2011	12/16/2011	12/15/2011	12/15/2011	12/15/2011	12/15/2011	12/15/2011	12/15/2011	12/14/2011	12/14/2011	12/14/2011
			Parent Sample Name											
	Act 2 MSCs (Residential)[1]		Depth Interval	0-2	3-5	0-2	12-13	0.5-2	5-7	0-3	8-10	13-15	4.5-6.5	3-5
Analyte	RDC MSC	RSGW	Unit											
Inorganics (SW6010)														
Aluminum	190000	NSA	mg/kg	8450 J	5680 J	4770	3630	5090	3470	4900	6220	8590	5860	2620
Antimony	88	27	mg/kg	1.05 J	0.77 J	6.71	7.11	< 1.255 U	< 1.165 U	< 1.07 U	< 1 U	< 2.46 U	0.848 J	5.16
Arsenic	12	29	mg/kg	**15.6**	6.44	6.47 J	**47.7 J**	4.74 J	5.5 J	4.06 J	6.26 J	2.41 J	6.35 J	7.73
Barium	44000	8200	mg/kg	54.9 J	53.9 J	235 J	105 J	48.5 J	25.3 J	34.2 J	31.2 J	93.6 J	51.3 J	50.7
Beryllium	440	320	mg/kg	0.64	0.3	0.389	0.309 J	0.433	0.249 J	0.411	0.378	0.673	0.358	0.312
Cadmium	110	38	mg/kg	< 0.175 U	< 0.145 U	1.04	7.04	0.969	0.945	0.665	0.962	0.734	1	1.02
Calcium	NSA	NSA	mg/kg	2790	537	5500	2890	35900	7210	31300	944	2420	3910	5910
Chromium	NSA	NSA	mg/kg	15.7	9.2	8.26	9.29	12.7	10.5	10.1	9.93	19.1	9.84	8.33
Cobalt	66	50	mg/kg	8.95	4.75	4.81	24.4	4.15	3.6	13.4	5.2	4.67	4.82	4.38
Copper	8100	43000	mg/kg	39.7 J	32.4 J	103 J	1490 J	15.9 J	38.1 J	12 J	10.4 J	8.71 J	102 J	45
Iron	150000	NSA	mg/kg	19500	11600	12800	96000	11800	12000	8690	14400	10300	13600	13100
Lead	500	450	mg/kg	119 J	73.2 J	109 J	361 J	36.2 J	31.7 J	19.8 J	29.5 J	10.8 J	242 J	205
Magnesium	NSA	NSA	mg/kg	3100 J	1380 J	1410 J	729 J	14700 J	1260 J	6010 J	1360 J	2560 J	1610 J	1030
Manganese	10000	2000	mg/kg	235 J	308 J	267	1350	228	137	119	293	152	227	85.1
Nickel	4400	650	mg/kg	12.5	7.93	8.79	17.8	7.7	7.92	7.3	8.21	11.7	8.76	10.9
Potassium	NSA	NSA	mg/kg	1110	619	413	446	1030	390	821	482	767	524	455
Selenium	1100	26	mg/kg	< 0.575 U	< 0.485 U	< 0.4775 U	< 0.52 U	< 0.505 U	< 0.465 U	< 0.427 U	< 0.4005 U	< 0.985 U	< 0.52 U	< 0.391 U
Silver	1100	84	mg/kg	< 0.29 U	< 0.245 U	< 0.2385 U	< 0.2605 U	< 0.2515 U	< 0.2325 U	< 0.2135 U	< 0.2005 U	< 0.492 U	3.21	< 0.1955 U
Sodium	NSA	NSA	mg/kg	448	628	222	475	448	148	405	204	371	240	343
Thallium	15	14	mg/kg	< 1.155 U	< 0.975 U	0.275 B	0.379 B	< 1.005 U	0.253 B	< 0.855 U	< 0.8 U	< 1.97 U	0.449 B	< 0.78 U
Vanadium	1500	26000	mg/kg	23.6	14.6	11.9	17.1	18.8	12.9	16.5	15.8	20.4	14	13.6
Zinc	66000	12000	mg/kg	80.8 J	57 J	197 J	330 J	57 J	77.8 J	45.1 J	32.4 J	42.9 J	74 J	69.7
Inorganics (SW6020)														
Uranium-238	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury (SW7471)														
Mercury	35	10	mg/kg	1.38 L	1.73 L	0.171 J	0.695 J	0.102 J	0.09 J	0.041 J	0.208 J	0.431 J	0.229 J	0.284 *

Table 6-1 - Soil - Analytical Summary of Detected Metals

			Location ID	UBZ3-SO-28	UBZ3-SO-29	UBZ3-SO-29	UBZ3-SO-30	UBZ3-SO-30	UBZ3-SO-31	UBZ3-SO-31	UBZ3-SO-32	UBZ3-SO-32	UBZ3-SO-33	UBZ3-SO-33
			Sample Name	UBZ3-SO-28-5.5-7.5	UBZ3-SO-29-3-5	UBZ3-SO-29-8-10	UBZ3-SO-30-0.5-3	UBZ3-SO-30-13-14	UBZ3-SO-31-0-3	UBZ3-SO-31-5-7	UBZ3-SO-32-0-2	UBZ3-SO-32-2-3	UBZ3-SO-33-0-2	UBZ3-SO-33-2-3
			Date Sampled	12/14/2011	12/13/2011	12/13/2011	12/14/2011	12/14/2011	12/13/2011	12/13/2011	4/20/2012	4/20/2012	4/20/2012	4/20/2012
			Parent Sample Name											
	Act 2 MSCs (Residential)[1]		Depth Interval	5.5-7.5	3-5	8-10	0.5-3	13-14	0-3	5-7	0-2	2-3	0-2	2-3
Analyte	RDC MSC	RSGW	Unit											
Inorganics (SW6010)														
Aluminum	190000	NSA	mg/kg	13400	6640	11500	6500	5700	8020	7270	6800 J	7260 J	7750 J	8450 J
Antimony	88	27	mg/kg	< 1.555 U	< 1.245 U	< 1.265 U	0.529 J	< 1.255 U	1.31 J	< 1.215 U	9.47 J	20.1 J	17 J	19 J
Arsenic	12	29	mg/kg	4.26	5.94	4.37	5.03	3.56	11.5	3.04	3.93	3.47	3.12	2.97
Barium	44000	8200	mg/kg	120	36.7	109	68.5	19.3	119	21.1	62.9 J	63 J	133 J	79 J
Beryllium	440	320	mg/kg	0.917	0.337	0.805	0.44	0.739	0.635	0.298	0.38	0.39	0.4	0.43
Cadmium	110	38	mg/kg	0.923	1.14	0.946	1.14	1.64	1.66	0.777	0.27 J	0.27 J	0.98	0.47
Calcium	NSA	NSA	mg/kg	2340	1780	1320	58700	673	58800	1300	3770 J	9990 J	12200 J	6440 J
Chromium	NSA	NSA	mg/kg	19.2	11.3	17.9	13.3	15.1	14.8	9.49	13.9	13.8	22	19.4
Cobalt	66	50	mg/kg	6.83	9.34	6.14	9.25	6.72	8.2	4.76	6.02	6.2	7.39	6.96
Copper	8100	43000	mg/kg	8.12	20.8	8.99	26	8.97	89.9	8.17	86.9 J	146 J	493 J	81.5 J
Iron	150000	NSA	mg/kg	13800	15800	13800	10100	24300	12800	12000	14400 J	14500 J	14000 J	15000 J
Lead	500	450	mg/kg	11.7	45.3	12.1	70.9	3.47	204	12.1	397 J	**702 J**	**579 J**	**596 J**
Magnesium	NSA	NSA	mg/kg	2530	1760	2480	19200	1190	9150 L	1970 L	1910 J	2750 J	2340 J	2180 J
Manganese	10000	2000	mg/kg	190	227	146	295	394	254	129	303 J	296 J	227 J	227 J
Nickel	4400	650	mg/kg	14	11	13.3	10.4	8.56	11.9 L	9.86 L	16.8 J	15.8 J	20 J	18.7 J
Potassium	NSA	NSA	mg/kg	1160	590	561	1420	371	1210	589	614	679	928	867
Selenium	1100	26	mg/kg	< 0.62 U	< 0.499 U	< 0.505 U	< 0.455 U	< 0.505 U	< 0.51 U	< 0.4855 U	< 0.455 UL	< 0.47 UL	< 0.35 UL	< 0.46 UL
Silver	1100	84	mg/kg	< 0.3105 U	< 0.2495 U	< 0.253 U	< 0.2275 U	< 0.2515 U	< 0.2555 U	< 0.243 U	< 0.225 U	< 0.235 U	< 0.175 U	< 0.23 U
Sodium	NSA	NSA	mg/kg	310	272	381	464	194	831	259	79.4 J	84 J	115	151
Thallium	15	14	mg/kg	< 1.24 U	< 1 U	< 1.01 U	< 0.91 U	< 1.005 U	< 1.02 U	< 0.97 U	< 0.905 U	< 0.94 U	< 0.705 U	< 0.925 U
Vanadium	1500	26000	mg/kg	26.7	19.2	22.8	18.3	14.7	16.5	12.6	15.1	15.5	17.2	18.1
Zinc	66000	12000	mg/kg	38.9	45.9	39.6	89.6	33.4	146	36.3	132 J	132 J	397 J	272 J
Inorganics (SW6020)														
Uranium-238	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury (SW7471)														
Mercury	35	10	mg/kg	0.165 *	0.056 *	0.043 *	0.227 *	< 0.005 U	0.905 J	0.043 J	1.65	1.57	0.136	0.171

Table 6-1 - Soil - Analytical Summary of Detected Metals

			Location ID	UBZ3-SO-34	UBZ3-SO-34	UBZ3-SO-35	UBZ3-SO-35	UBZ3-SO-36	UBZ3-SO-36	UBZ3-SO-37	UBZ3-SO-37	UBZ3-SO-38	UBZ3-SO-38
			Sample Name	UBZ3-SO-34-34-35	UBZ3-SO-34-6-7	UBZ3-SO-35-13-14	UBZ3-SO-35-2-3	UBZ3-SO-36-14-15	UBZ3-SO-36-8-9	UBZ3-SO-37-12-13	UBZ3-SO-37-3-4	UBZ3-SO-38-0-2	UBZ3-SO-38-10-12
			Date Sampled	12/20/2011	12/20/2011	12/20/2011	12/20/2011	12/20/2011	12/20/2011	12/20/2011	12/20/2011	12/15/2011	12/15/2011
			Parent Sample Name										
	Act 2 MSCs (Residential)[1]		Depth Interval	34-35	6-7	13-14	2-3	14-14	8-8	12-12	3-3	0-2	10-12
Analyte	RDC MSC	RSGW	Unit										
Inorganics (SW6010)													
Aluminum	190000	NSA	mg/kg	9740	4440	4750	8090	3600 J	7740 J	2760 J	2680 J	5840 J	3840 J
Antimony	88	27	mg/kg	< 1.165 U	< 1.16 U	< 1.245 U	0.736 J	< 1.195 U	0.95 B	< 1.075 U	< 1.305 U	1.13 J	0.51 J
Arsenic	12	29	mg/kg	2.18	4.36	2.1	9.4	1.21 B	3.13 B	3.52	1.18 B	**12.6**	2.29
Barium	44000	8200	mg/kg	56.7	17.9	15.7	38.9	12.7	52	12.3	13.4	79.1 J	25.4 J
Beryllium	440	320	mg/kg	0.737	0.412	0.467	0.491	0.31	1	0.28	0.24 J	0.38	0.23 J
Cadmium	110	38	mg/kg	0.643	0.511	0.469	1.01	< 0.145 U	0.35	< 0.13 U	< 0.155 U	< 0.18 U	< 0.125 U
Calcium	NSA	NSA	mg/kg	1140	298	403	800	226 N	944 N	201 N	246 N	1500	670
Chromium	NSA	NSA	mg/kg	15.7	11	11.4	13.8	11.1 J	24 J	12.8 J	12.7 J	11.6	6.32
Cobalt	66	50	mg/kg	5.96	4.45	5.56	7.83	4.82	6.2	4.45	4.16	3.66	4.33
Copper	8100	43000	mg/kg	11.7	71.2	28	25.7	9.65 B	25.1	9.32 B	9.79 B	45.2 J	536 J
Iron	150000	NSA	mg/kg	16300	13000	11300	19800	8850	13300	10200	8000	16200	14600
Lead	500	450	mg/kg	9.94	5.76	13.1	48.5	2.76	24.1	2.11	3.95	142 J	219 J
Magnesium	NSA	NSA	mg/kg	3050	1280	1060	1880	989 J	2710 J	561 B	904 J	1280 J	1050 J
Manganese	10000	2000	mg/kg	139	136	125	339	115	513	171	306	149 J	217 J
Nickel	4400	650	mg/kg	15.1	8.4	9.14	12.6	6.36 B	16.8	4.61 B	6.5 B	8.14	7.96
Potassium	NSA	NSA	mg/kg	555	399	389	597	415	2640	483	481	736	339
Selenium	1100	26	mg/kg	< 0.4665 U	< 0.4645 U	< 0.498 U	< 0.4545 U	0.76 J	< 0.515 U	< 0.43 U	< 0.52 U	0.54 J	< 0.415 U
Silver	1100	84	mg/kg	< 0.233 U	< 0.2325 U	< 0.249 U	< 0.2275 U	< 0.24 U	< 0.26 U	< 0.215 U	< 0.26 U	< 0.3 U	< 0.21 U
Sodium	NSA	NSA	mg/kg				1040	177	141	77.8 J	146	412	191
Thallium	15	14	mg/kg	< 0.935 U	< 0.93 U	< 0.995 U	< 0.91 U	1.07 B	0.32 B	< 0.86 U	0.43 B	< 1.19 U	< 0.835 U
Vanadium	1500	26000	mg/kg	21.6	14.3	11.2	22.3	9.51	21.4	8.45	8.54	16.1	9.03
Zinc	66000	12000	mg/kg	70.2	93	27.7	55.5	23.5 J	65 J	17.2 J	23.1 J	40.5 J	257 J
Inorganics (SW6020)													
Uranium-238	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury (SW7471)													
Mercury	35	10	mg/kg	0.012	0.035	0.009 J	0.272	< 0.005 U	0.027	0.002 J	0.052	0.582 L	0.202 L

Table 6-1 - Soil - Analytical Summary of Detected Metals

			Location ID	UBZ3-SO-39	UBZ3-SO-39	UBZ3-SO-39	UBZ3-SO-39	UBZ3-SO-40	UBZ3-SO-40	UBZ3-SO-41	UBZ3-SO-41	UBZ3-SO-42	UBZ3-SO-42
			Sample Name	UBZ3-SO-39-0.5-2.5	UBZ3-SO-39-0-2	UBZ3-SO-39-6-8	UBZ3-SO-39-7-8	UBZ3-SO-40-14-15	UBZ3-SO-40-3-5	UBZ3-SO-41-1-3	UBZ3-SO-41-7-8	UBZ3-SO-42-11.5-13.5	UBZ3-SO-42-3-5
			Date Sampled	12/15/2011	1/5/2012	12/15/2011	1/5/2012	12/15/2011	12/15/2011	12/15/2011	12/15/2011	12/14/2011	12/14/2011
			Parent Sample Name										
	Act 2 MSCs (Residential)[1]		Depth Interval	0.5-2.5	0-2	6-8	7-8	14-15	3-5	1-3	7-8	11.5-13.5	3-5
Analyte	**RDC MSC**	**RSGW**	**Unit**										
Inorganics (SW6010)													
Aluminum	190000	NSA	mg/kg	6150	5620 J	6250	3940 J	2390	3580	2240	4110	13200	3530
Antimony	88	27	mg/kg	2.64	2.2	< 1.045 U	< 0.81 U	< 0.885 U	< 1.04 U	< 1.305 U	0.597 J	< 2.195 U	< 1.385 U
Arsenic	12	29	mg/kg	**32.1 J**	7.72	4.53 J	3.94	11.6 J	6 J	**28.2 J**	4.39 J	5.31	6.05
Barium	44000	8200	mg/kg	58.7 J	50.6	29 J	22.8	26.8 J	23.4 J	94.8 J	24.2 J	133	28.1
Beryllium	440	320	mg/kg	0.387	0.37	0.426	0.275	0.221	0.188 J	0.368	0.243 J	0.876	0.226 J
Cadmium	110	38	mg/kg	1.25	0.205 J	1.06	0.083 J	0.48	0.483	0.796	0.56	1.29	0.812
Calcium	NSA	NSA	mg/kg	8990	3630	411	201	4360	500	8720	423	2250 J	410
Chromium	NSA	NSA	mg/kg	13.7	10.7 J	11.1	9.37 J	13.2	5.26	9.9	5.21	32.6	9.77
Cobalt	66	50	mg/kg	9.66	4.85	4.07	5.73	2.55	2.38	5.19	3.27	9.65	4.71
Copper	8100	43000	mg/kg	74.7 J	43.9	14.2 J	7.28	8.43 J	5.57 J	23.9 J	12.1 J	10.3	11.3
Iron	150000	NSA	mg/kg	16300	12800	16300	14100	7050	7240	10100	8060	18200	12300
Lead	500	450	mg/kg	**763 J**	89.3 J	8.42 J	5.26 J	5.53 J	5.72 J	15.5 J	139 J	10.1	18.1
Magnesium	NSA	NSA	mg/kg	2020 J	1550	1610 J	1160	2280 J	916 J	3170 J	950 J	4140	949
Manganese	10000	2000	mg/kg	260	280	94.7	271	149	80	139	89.5	252	83.8
Nickel	4400	650	mg/kg	18.8	9.71	9.06	7.84	6.65	6.21	12.5	5.86	21	8.12
Potassium	NSA	NSA	mg/kg	628	463	684	402	406	298	597	228	1200	400
Selenium	1100	26	mg/kg	< 0.461 U	1.39	< 0.418 U	1.28	< 0.353 U	< 0.4165 U	< 0.52 U	< 0.455 U	< 0.875 U	< 0.555 U
Silver	1100	84	mg/kg	< 0.2305 U	< 0.2165 U	< 0.209 U	< 0.162 U	< 0.1765 U	< 0.2085 U	< 0.2605 U	< 0.2275 U	< 0.4385 U	< 0.277 U
Sodium	NSA	NSA	mg/kg	276	376	219	106	176	128	406	208	244	362
Thallium	15	14	mg/kg	< 0.92 U	< 0.865 U	< 0.835 U	< 0.65 U	< 0.705 U	0.265 B	< 1.045 U	0.284 B	< 1.755 U	< 1.105 U
Vanadium	1500	26000	mg/kg	21	15	20.5	16.8	12	8.72	20	8.03	30.3	10.1
Zinc	66000	12000	mg/kg	88.6 J	56.8 L	27.4 J	23.9 L	21 J	24 J	44.7 J	31.4 J	64	39.7
Inorganics (SW6020)													
Uranium-238	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury (SW7471)													
Mercury	35	10	mg/kg	0.984 J	0.063	0.033 J	0.005 J	0.046 J	0.01 J	10.8 J	0.136 J	0.011 J	0.038 *

Table 6-1 - Soil - Analytical Summary of Detected Metals

			Location ID	UBZ3-SO-42	UBZ3-SO-43	UBZ3-SO-43	UBZ3-SO-44	UBZ3-SO-44	UBZ3-SO-44	UBZ3-SO-45	UBZ3-SO-45	UBZ3-SO-46	UBZ3-SO-46	UBZ3-SO-47
			Sample Name	UBZ3-SO-DUP2	UBZ3-SO-43-0.5-3	UBZ3-SO-43-13-14	UBZ3-SO-44-0-2	UBZ3-SO-44-0-2	UBZ3-SO-44-8-10	UBZ3-SO-45-2-3	UBZ3-SO-45-8-9	UBZ3-SO-46-4-5	UBZ3-SO-46-5-7	UBZ3-SO-47-0-2
			Date Sampled	12/14/2011	12/14/2011	12/14/2011	12/13/2011	1/5/2012	12/13/2011	12/13/2011	12/13/2011	12/13/2011	12/13/2011	12/13/2011
			Parent Sample Name	UBZ3-SO-42-11.5-13.5										
	Act 2 MSCs (Residential)[1]		Depth Interval	11.5-13.5	0.5-3	13-14	0-2	0-2	8-10	2-3	8-9	4-5	5-7	0-2
Analyte	**RDC MSC**	**RSGW**	**Unit**											
Inorganics (SW6010)														
Aluminum	190000	NSA	mg/kg	14200	4400	2470	6540	4510 J	13000	6800	5590	10700	5190	3630 J
Antimony	88	27	mg/kg	< 1.325 U	1.88 J	< 1.265 U	8.1	< 1.045 U	< 1.53 U	0.903 J	< 1.055 U	< 1.35 U	3.58	1.97 J
Arsenic	12	29	mg/kg	4.1	**20.2**	1.46	**21.4**	10.6	5.08	6	4.48	5.17	**15.3**	10.9
Barium	44000	8200	mg/kg	155	88.8	13.1	94.3	54.1	122	69.1	33.4	72.4	70.5	116
Beryllium	440	320	mg/kg	0.861	0.576	0.166 J	0.723	0.376	1.01	0.441	0.341	0.625	0.402	0.636
Cadmium	110	38	mg/kg	1.32	2.84	0.315	1.34	0.26	1.02	0.87	0.692	1.3	1.43	2.48
Calcium	NSA	NSA	mg/kg	1690 J	9350	322	19000	20400	3080	22400	1390	994	1730	2260
Chromium	NSA	NSA	mg/kg	32.2	20.9	6.78	11	9.37 J	18.9	11.9	9.18	15.4	9.49	9.85
Cobalt	66	50	mg/kg	14	14.6	2.2	9.44	3.97	6.33	6.19	4.27	7.84	5.74	7.76
Copper	8100	43000	mg/kg	7.17	102	5.4	38.3	32.4	10.1	50.2	11	16.2	22.3	246 J
Iron	150000	NSA	mg/kg	18700	22100	4870	15500	11500	14900	11500	10300	17400	17800	36000
Lead	500	450	mg/kg	11.1	105	12	332	59 J	20.1	158	77.3	178	65.3	94.3 J
Magnesium	NSA	NSA	mg/kg	4120	3300	596	4310	1790	2780	3290	1450	2520 L	1230 L	520 J
Manganese	10000	2000	mg/kg	225	397	34.5	129	172	265	232	107	209	173	203
Nickel	4400	650	mg/kg	28.7	18.5	4.13	13.5	9.19	15	9.35	7.6	13.9 L	9.59 L	154 J
Potassium	NSA	NSA	mg/kg	947	779	239	748	1050	865	1170	480	676	673	379
Selenium	1100	26	mg/kg	< 0.53 U	< 0.595 U	< 0.505 U	< 0.55 U	1.73	< 0.61 U	< 0.4485 U	< 0.4225 U	< 0.54 U	< 0.545 U	< 0.585 U
Silver	1100	84	mg/kg	< 0.2655 U	< 0.297 U	< 0.2525 U	< 0.2745 U	< 0.209 U	< 0.306 U	< 0.224 U	< 0.211 U	< 0.2705 U	< 0.2735 U	< 0.2935 U
Sodium	NSA	NSA	mg/kg	214	499	146	850	235	808	441	205	253	371	197
Thallium	15	14	mg/kg	< 1.06 U	< 1.19 U	< 1.01 U	< 1.1 U	< 0.835 U	< 1.225 U	< 0.895 U	< 0.845 U	< 1.08 U	< 1.095 U	< 1.175 U
Vanadium	1500	26000	mg/kg	30.6	25.9	6.07	20.6	11.6	25.1	21.1	12	20.4	16	13
Zinc	66000	12000	mg/kg	61.9	525	17	97.9	48 L	42.8	42.2	27	44.2	49.6	32.2
Inorganics (SW6020)														
Uranium-238	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury (SW7471)														
Mercury	35	10	mg/kg	0.009 J	0.273 *	0.025 *	0.193 *	0.289	0.016 *	0.184 *	0.045 *	0.286 J	0.147 J	0.129 J

Table 6-1 - Soil - Analytical Summary of Detected Metals

			Location ID	UBZ3-SO-47	UBZ3-SO-47	UBZ3-SO-48	UBZ3-SO-48	UBZ3-SO-49	UBZ3-SO-49	UBZ3-SO-50	UBZ3-SO-50	UBZ3-SO-51	UBZ3-SO-51	UBZ3-SO-52
			Sample Name	UBZ3-SO-47-7-8	UBZ3-SO-DUP1	UBZ3-SO-48-2-4	UBZ3-SO-48-5-6	UBZ3-SO-49-14-15	UBZ3-SO-49-4-5	UBZ3-SO-50-0-2	UBZ3-SO-50-5-7	UBZ3-SO-51-5-7	UBZ-SO-51-0-2	UBZ3-SO-52-0-2
			Date Sampled	12/13/2011	12/13/2011	12/12/2011	12/12/2011	12/20/2011	12/20/2011	4/19/2012	4/19/2012	4/19/2012	4/19/2012	4/18/2012
			Parent Sample Name		UBZ3-SO-47-7-8									
	Act 2 MSCs (Residential)[1]		Depth Interval	7-8	7-8	2-4	5-6	14-15	4-5	0-2	5-7	5-7	0-2	0-2
Analyte	**RDC MSC**	**RSGW**	**Unit**											
Inorganics (SW6010)														
Aluminum	190000	NSA	mg/kg	13000	11400 J	2200	6360	2550	4770	5240	8450	3720	4210	4170
Antimony	88	27	mg/kg	< 1.385 U	< 1.215 U	4.63	0.864 J	< 1.085 U	5.4	< 1.185 UL	3.75 L	0.863 L	0.572 L	1.03 L
Arsenic	12	29	mg/kg	6.67	5.4	4.36	3.77	0.945	**16.7**	5.26	5.34	4	7.71	**15.2 L**
Barium	44000	8200	mg/kg	65.4	69.7	39.6	35.4	8.64	127	27.4 J	103 J	27.8 J	33.2 J	53 J
Beryllium	440	320	mg/kg	0.661	0.7	0.281 J	0.365	0.171 J	0.687	0.292 J	0.526 J	0.25 J	0.255 J	0.35 L
Cadmium	110	38	mg/kg	1.46	1.25	0.955	0.936	0.201 J	1.51	0.482	0.86	0.548	1.66	0.579
Calcium	NSA	NSA	mg/kg	4690	2570	3220	1410	159	4060	808	3120	970	15500	39200
Chromium	NSA	NSA	mg/kg	21.2	17.5	6.59	11.5	4.2	11.4	10.1	14.8	9.47	9.07	14.7 L
Cobalt	66	50	mg/kg	7.6	6.94	5.08	5.38	4.28	8.14	5.84	7.54	3.87	4.13	4.05 L
Copper	8100	43000	mg/kg	18.6	13.2 J	96.8	43.7	12.9	875	24.9	85.7	12.4	19.7	44.1 L
Iron	150000	NSA	mg/kg	21500	19400	13600	13800	4520	30500	14300	20600	9130	9380	8810
Lead	500	450	mg/kg	23.9	22.5 J	151	246	4	**8500**	29.4	241	33.6	43.9	68.5
Magnesium	NSA	NSA	mg/kg	3180 L	2790 J	712 L	1930 L	753	670	1620	2250	1090	6420	11600
Manganese	10000	2000	mg/kg	209	244	131	110	193	115	258	160	167	169	151
Nickel	4400	650	mg/kg	15.5 L	13.4 J	11.1 L	9.7 L	4.73	14	10.1	14.2	6.8	8.99	14 L
Potassium	NSA	NSA	mg/kg	1170	881	330	638	214	436	431 L	485 L	349 L	435 L	808 L
Selenium	1100	26	mg/kg	< 0.555 U	< 0.4865 U	< 0.505 U	< 0.51 U	< 0.4345 U	3.94	< 0.474 U	0.849 J	< 0.372 U	< 0.356 U	< 0.474 UL
Silver	1100	84	mg/kg	< 0.277 U	< 0.243 U	< 0.2515 U	< 0.254 U	< 0.217 U	0.447 J	< 0.237 U	< 0.2485 U	< 0.186 U	< 0.178 U	0.256 J
Sodium	NSA	NSA	mg/kg	313	248	134	168	166	380	< 47.4 UL	< 49.7 UL	71.7 J	84 J	299 L
Thallium	15	14	mg/kg	< 1.11 U	< 0.975 U	< 1.005 U	< 1.015 U	< 0.87 U	< 1.345 U	< 0.95 U	< 0.995 U	< 0.745 U	< 0.71 U	< 0.95 U
Vanadium	1500	26000	mg/kg	31.7	27.1	11	17.3	5.16	20.1	14.8 L	19.9 L	9.96 L	11.1 L	15.7 L
Zinc	66000	12000	mg/kg	46.2	43.7	37.8	80.7	20.5	394	46.3	139	32.4	46.9	133 J
Inorganics (SW6020)														
Uranium-238	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	< 0.0465 U	< 0.055 U	< 0.055 U	< 0.043 U	< 0.048 U
Mercury (SW7471)														
Mercury	35	10	mg/kg	0.028 J	0.075 J	0.293 J	0.099 J	< 0.0055 U	1.63	0.021 K	1.56 K	< 0.005 U	0.193 K	0.514 J

Table 6-1 - Soil - Analytical Summary of Detected Metals

			Location ID	UBZ3-SO-52A	UBZ3-SO-52A	UBZ3-SO-53	UBZ3-SO-53	UBZ3-SO-54	UBZ3-SO-54	UBZ3-SO-55	UBZ3-SO-55	UBZ3-SO-56	UBZ3-SO-56	UBZ3-SO-57
			Sample Name	UBZ3-SO-52a-0-2	UBZ3-SO-52a-5-7	UBZ3-SO-53-0-2	UBZ3-SO-53-4-5	UBZ3-SO-54-3-5	UBZ3-SO-54-5-7	UBZ3-SO-55-0.5-3	UBZ3-SO-55-5-8	UBZ3-SO-56-6-7	UBZ3-SO-56-9-10	UBZ3-SO-57-0-2
			Date Sampled	4/18/2012	4/18/2012	4/18/2012	4/18/2012	12/15/2011	12/15/2011	12/15/2011	12/15/2011	12/20/2011	12/20/2011	4/19/2012
			Parent Sample Name											
	Act 2 MSCs (Residential)[1]		Depth Interval	0-2	5-7	0-2	4-5	3-5	5-7	0.5-3	5-8	6-7	9-10	0-2
Analyte	**RDC MSC**	**RSGW**	**Unit**											
Inorganics (SW6010)														
Aluminum	190000	NSA	mg/kg	4300	8330	4050	7450	6840	5510	5010 J	6570 J	11600	9820	6900
Antimony	88	27	mg/kg	0.531 L	< 1.47 UL	0.921 L	0.89 L	0.975 J	< 1.15 U	1.24 J	1.17 J	< 1.755 U	< 1.21 U	14 L
Arsenic	12	29	mg/kg	11.8 L	2.96 L	6.26 L	4.88 L	9.03 J	5.96 J	3.21	9.97	4.09	2.51	7.12
Barium	44000	8200	mg/kg	56.5 J	90.9 J	208 J	67.6 J	69.5 J	44.7 J	48.4 J	51.3 J	140	81.1	61.9 J
Beryllium	440	320	mg/kg	0.348 L	0.524 L	0.41 L	0.521 L	0.407	0.334	0.29	0.37	0.946	0.677	0.392 J
Cadmium	110	38	mg/kg	0.427	0.482	0.529	0.52	1.16	0.718	< 0.14 U	< 0.125 U	0.657	0.426	1.98
Calcium	NSA	NSA	mg/kg	32800	1560	22100	1350	2690	1430	15400	6540	2190	815	47700
Chromium	NSA	NSA	mg/kg	14.7 L	22.2 L	8.36 L	26.3 L	12.4	13.7	8.76	16.1	24.1	18.6	23.3
Cobalt	66	50	mg/kg	4.27 L	8.1 L	4.59 L	7.03 L	5.87	5.16	4.63	5.04	6.22	5.47	5.19
Copper	8100	43000	mg/kg	25.4 L	8.51 L	50.4 L	22.5 L	33 J	29.2 J	50.2 J	30.9 J	19	12.5	647
Iron	150000	NSA	mg/kg	7060	16100	10900	14700	15400	10100	12500	11600	13700	10900	14200
Lead	500	450	mg/kg	38.9	12.5	35.4	65.5	140 J	58.2 J	29.6 J	141 J	16.4	12.8	**11600**
Magnesium	NSA	NSA	mg/kg	4020	2950	3530	2210	1470 J	1280 J	1910 J	4640 J	3230	2540	3110
Manganese	10000	2000	mg/kg	135	227	192	238	184	100	121 J	322 J	160	82.4	165
Nickel	4400	650	mg/kg	17.5 L	17.2 L	11 L	11.7 L	10.2	7.64	7.75	8.89	14.7	11.8	31
Potassium	NSA	NSA	mg/kg	744 L	801 L	581 L	755 L	609	585	677	614	892	1640	635 L
Selenium	1100	26	mg/kg	0.703 L	< 0.59 UL	0.545 L	0.642 L	< 0.58 U	< 0.4595 U	< 0.465 U	0.55 J	0.715 J	< 0.4845 U	< 0.515 U
Silver	1100	84	mg/kg	0.257 J	0.331 J	0.372 J	0.37 J	< 0.29 U	< 0.23 U	< 0.23 U	< 0.205 U	< 0.3515 U	< 0.2425 U	0.521
Sodium	NSA	NSA	mg/kg	284 L	130 L	253 L	87.7 L	313	206	266	188	483	263	100 J
Thallium	15	14	mg/kg	< 0.905 U	< 1.175 U	< 1.035 U	< 1.17 U	< 1.16 U	< 0.92 U	< 0.925 U	< 0.82 U	< 1.405 U	< 0.97 U	< 1.025 U
Vanadium	1500	26000	mg/kg	14.6 L	18.4 L	10.5 L	17.8 L	18.5	13.3	28.3	14.5	26.3	16.2	14.4 L
Zinc	66000	12000	mg/kg	55.8 J	51 J	85.1 J	64.1 J	95.6 J	53 J	424 J	82.8 J	47.8	34.6	679
Inorganics (SW6020)														
Uranium-238	NSA	NSA	mg/kg	< 0.055 U	< 0.07 U	< 0.055 U	< 0.065 U	NA	NA	NA	NA	NA	NA	< 0.046 U
Mercury (SW7471)														
Mercury	35	10	mg/kg	0.206 J	0.084 J	2.67 J	2.21 J	0.681 J	1.67 J	0.09 L	0.252 L	0.022	0.016	0.497 K

Table 6-1 - Soil - Analytical Summary of Detected Metals

			Location ID	UBZ3-SO-57	UBZ3-SO-58	UBZ3-SO-58	UBZ3-SO-58	UBZ3-SO-59	UBZ3-SO-59	UBZ3-SO-60	UBZ3-SO-60	UBZ3-SO-61	UBZ3-SO-61	UBZ3-SO-62
			Sample Name	UBZ3-SO-57-5-7	UBZ3-SO-58-0-2	UBZ3-SO-58-5-7	UBZ3-SO-DUP22	UBZ3-SO-59-0-2	UBZ3-SO-59-4-6	UBZ3-SO-60-0-2	UBZ3-SO-60-4-5	UBZ3-SO-61-0-2	UBZ3-SO-61-5-7	UBZ3-SO-62-0-2
			Date Sampled	4/19/2012	4/19/2012	4/19/2012	4/19/2012	4/19/2012	4/19/2012	4/18/2012	4/18/2012	4/18/2012	4/18/2012	4/19/2012
			Parent Sample Name				UBZ3-SO-58-0-2							
	Act 2 MSCs (Residential)[1]		Depth Interval	5-7	0-2	5-7	0-2	0-2	4-6	2-2	4-5	0-2	5-7	0-2
Analyte	RDC MSC	RSGW	Unit											
Inorganics (SW6010)														
Aluminum	190000	NSA	mg/kg	10300	4550	5270	4480	8730	7280	7100	4120	6800	9420	9050
Antimony	88	27	mg/kg	< 1.43 UL	42 L	1.38 L	40.4 L	1.14 L	0.644 L	1.49 L	1.73 L	0.892 L	< 1.54 UL	0.992 L
Arsenic	12	29	mg/kg	4.47	**12.4**	4.03	**12.8**	7.33	5.91	9.18 L	7.99 L	5.05 L	6.17 L	9.22
Barium	44000	8200	mg/kg	59 J	154 J	39.9 J	174 J	116 J	60.3 J	60.7 J	45.3 J	66.1 J	96.1 J	59.2 J
Beryllium	440	320	mg/kg	0.517 J	0.357 J	0.324 J	0.398 J	0.758 J	0.492 J	0.469 L	0.34 L	0.533 L	0.611 L	0.698 J
Cadmium	110	38	mg/kg	0.522	2.88	0.498	2.63	0.975	0.517	0.622	1.03	0.655	0.455	0.679
Calcium	NSA	NSA	mg/kg	2470	17900	717	18500	34700	6800	54800	1070	42200	1740	31100
Chromium	NSA	NSA	mg/kg	14.9	11.8	9.99	9.44	25.9	24.6	19.5 L	15.2 L	19.2 L	27.5 L	19.2
Cobalt	66	50	mg/kg	9.05	4.55	5.99	4.79	12.5	8.33	4.85 L	4.6 L	6.31 L	6.62 L	7.33
Copper	8100	43000	mg/kg	26.5	189	158	152	60.2	52.7	70.1 L	139 L	32.6 L	28.1 L	31
Iron	150000	NSA	mg/kg	16900	11800	12000	13000	24000	15100	14900	11700	14000	16100	18800
Lead	500	450	mg/kg	71.2	**1910**	85.2	**1570**	65.7	59.1	78.4	166	72.6	41.5	52.1
Magnesium	NSA	NSA	mg/kg	2220	2010	1520	2050	8940	3330	8310	1160	8610	2660	4790
Manganese	10000	2000	mg/kg	114	117	154	133	427	322	231	194	293	345	340
Nickel	4400	650	mg/kg	16.6	12.4	10.8	12.6	20.6	14.5	10.3 L	10 L	14.7 L	12.6 L	15.2
Potassium	NSA	NSA	mg/kg	624 L	457 L	440 L	452 L	1740 L	825 L	822 L	499 L	959 L	716 L	1610 L
Selenium	1100	26	mg/kg	< 0.57 U	0.596 J	0.488 J	< 0.4545 U	< 0.409 U	< 0.505 U	0.58 L	< 0.53 UL	< 0.4265 UL	< 0.615 UL	0.476 J
Silver	1100	84	mg/kg	< 0.286 U	< 0.231 U	< 0.2 U	< 0.227 U	< 0.2045 U	< 0.2535 U	0.418 J	0.353 J	0.433	0.383 J	< 0.2765 U
Sodium	NSA	NSA	mg/kg	< 57 UL	< 46.25 UL	< 39.95 UL	< 45.45 UL	352 J	95.7 J	237 L	113 L	441 L	285 L	128 J
Thallium	15	14	mg/kg	< 1.145 U	< 0.925 U	< 0.8 U	< 0.91 U	< 0.82 U	< 1.015 U	< 1 U	< 1.06 U	< 0.855 U	< 1.235 U	< 1.105 U
Vanadium	1500	26000	mg/kg	21.4 L	12.4 L	13.3 L	12.2 L	38.1 L	23.2 L	19.4 L	12.6 L	22.9 L	21.1 L	25.7 L
Zinc	66000	12000	mg/kg	66	1020	73.3	882	77.3	59.2	129 J	979 J	71.6 J	74.5 J	161
Inorganics (SW6020)														
Uranium-238	NSA	NSA	mg/kg	< 0.06 U	< 0.047 U	< 0.0445 U	< 0.055 U	< 0.0445 U	< 0.055 U	< 0.05 U	< 0.05 U	< 0.048 U	< 0.05 U	< 0.055 U
Mercury (SW7471)														
Mercury	35	10	mg/kg	0.27 K	0.505 K	0.219 K	1.07 K	0.656 K	1.95 K	0.129 J	9.25 J	0.444 J	0.297 J	0.16 K

Table 6-1 - Soil - Analytical Summary of Detected Metals

			Location ID	UBZ3-SO-62	UBZ3-SO-63	UBZ3-SO-63	UBZ3-SO-63	Z1D01	Z1D01	Z1D01	Z1D02	Z1D02	Z1D02	Z1D03	Z1D03	Z1D03
			Sample Name	UBZ3-SO-62-5-7	UBZ3-SO-63-0-2	UBZ3-SO-63-5-7	UBZ3-SO-DUP21	Z1D1-SO-0.5-1	Z1D1-SO-1-2	Z1D1-SO-3-4	Z1D2-SO-0.5-1	Z1D2-SO-1-2	Z1D2-SO-3-4	Z1D3-SO-0.5-1	Z1D3-SO-1-2	Z1D3-SO-3-4
			Date Sampled	4/19/2012	4/19/2012	4/19/2012	4/19/2012	1/26/2012	1/26/2012	1/26/2012	1/26/2012	1/26/2012	1/26/2012	1/17/2012	1/17/2012	1/17/2012
			Parent Sample Name				UBZ3-SO-63-0-2									
	Act 2 MSCs (Residential)[1]		Depth Interval	5-7	0-2	5-7	0-2	0.5-1	1-2	3-4	0.5-1	1-2	3-4	0.5-1	1-2	3-4
Analyte	**RDC MSC**	**RSGW**	**Unit**													
Inorganics (SW6010)																
Aluminum	190000	NSA	mg/kg	3400	7280	5890	8370	NA	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	88	27	mg/kg	0.8 L	0.916 L	64.6 L	0.904 L	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	12	29	mg/kg	9.72	9.89	**52.5**	**16.4**	**32.1 J**	7.93 J	5.57 J	**28.6 J**	8.6 J	5.37 J	**23.9**	5.85	7.68
Barium	44000	8200	mg/kg	35.2 J	66.9 J	157 J	87.6 J	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	440	320	mg/kg	0.322 J	0.43 J	0.674 J	0.622 J	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	110	38	mg/kg	0.501	0.595	0.94	0.687	0.365	< 0.1835 U	< 0.149 U	0.519	< 0.143 U	< 0.1195 U	1.34	0.977	1.08
Calcium	NSA	NSA	mg/kg	7470	100000	7610	38500	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	NSA	NSA	mg/kg	16.4	18.5	30.4	18.4	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	66	50	mg/kg	3.47	4.95	7.94	7.15	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	8100	43000	mg/kg	68.5	40.1	135	48.7	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	150000	NSA	mg/kg	9740	12900	20600	15900	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	500	450	mg/kg	65.3	49.9	**1570**	62.7	211 J	9.83 J	8.83 J	364 J	44.3 J	6.54 J	332	16.6	9.1
Magnesium	NSA	NSA	mg/kg	1410	34200	1170	8070	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	10000	2000	mg/kg	172	294	204	290	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	4400	650	mg/kg	6.62	12.2	17.5	13.1	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	NSA	NSA	mg/kg	577 L	1040 L	513 L	1740 L	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	1100	26	mg/kg	< 0.595 U	< 0.4205 U	1.8	0.691 J	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	1100	84	mg/kg	< 0.2975 U	< 0.21 U	< 0.3005 U	< 0.2365 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	NSA	NSA	mg/kg	57.2 J	116 J	51.3 J	159 J	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thallium	15	14	mg/kg	< 1.19 U	< 0.84 U	< 1.2 U	< 0.945 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	1500	26000	mg/kg	13.5 L	17.1 L	23.3 L	30.8 L	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	66000	12000	mg/kg	184	65.4	248	81.8	NA	NA	NA	NA	NA	NA	NA	NA	NA
Inorganics (SW6020)																
Uranium-238	NSA	NSA	mg/kg	< 0.049 U	< 0.05 U	< 0.0475 U	< 0.048 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury (SW7471)																
Mercury	35	10	mg/kg	0.192 K	0.077 K	0.197 K	0.549 K	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 6-1 - Soil - Analytical Summary of Detected Metals

			Location ID	Z1D04	Z1D04	Z1D04	Z1D05	Z1D05	Z1D05	Z1D06	Z1D06	Z1D06	Z1D07	Z1D07	Z1D07	Z1D07	Z1D08
			Sample Name	Z1D4-SO-0.5-1	Z1D4-SO-1-2	Z1D4-SO-3-4	Z1D5-SO-0.5-1	Z1D5-SO-1-2	Z1D5-SO-3-4	Z1D6-SO-0.5-1	Z1D6-SO-1-2	Z1D6-SO-3-4	Z1D7-SO-0.5-1	Z1D7-SO-1-2	Z1D7-SO-3-4	Z1-SO-Dup17	Z1D8-SO-0.5-1
			Date Sampled	1/26/2012	1/26/2012	1/26/2012	1/16/2012	1/16/2012	1/16/2012	1/16/2012	1/16/2012	1/16/2012	1/16/2012	1/16/2012	1/16/2012	1/16/2012	1/16/2012
			Parent Sample Name													Z1D7-SO-1-2	
	Act 2 MSCs (Residential)[1]		Depth Interval	0.5-1	1-2	3-4	0.5-1	1-2	3-4	0.5-1	1-2	3-4	0.5-1	1-2	3-4	1-2	0.5-1
Analyte	**RDC MSC**	**RSGW**	**Unit**														
Inorganics (SW6010)																	
Aluminum	190000	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	88	27	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	12	29	mg/kg	**14.3 J**	7.62 J	4.23 J	5.29	4.54	5.84	**22**	**22.8**	3.9	**26.4**	3.23	3.98	3.58	**31.4**
Barium	44000	8200	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	440	320	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	110	38	mg/kg	0.709	0.11 J	0.064 J	0.44	0.26 J	0.976	0.54	0.4	0.09 J	0.47	0.32	0.17 J	0.37	0.58
Calcium	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	66	50	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	8100	43000	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	150000	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	500	450	mg/kg	272 J	143 J	52 J	34.1	10	10.2	485	167	6.86	**8860**	**1810**	17	**2670**	486
Magnesium	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	10000	2000	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	4400	650	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	1100	26	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	1100	84	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thallium	15	14	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	1500	26000	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	66000	12000	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Inorganics (SW6020)																	
Uranium-238	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury (SW7471)																	
Mercury	35	10	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 6-1 - Soil - Analytical Summary of Detected Metals

			Location ID	Z1D08	Z1D08	Z1D09	Z1D09	Z1D09	Z1D09	Z1D10	Z1D10	Z1D10	Z1D11	Z1D11	Z1D11	Z1D11
			Sample Name	Z1D8-SO-1-2	Z1D8-SO-3-4	Z1-D9-SO-0.5-1	Z1-D9-SO-1-2	Z1-D9-SO-3-4	Z1-SO-DUP-4	Z1D10-SO-0.5-1	Z1D10-SO-1-2	Z1D10-SO-3-4	Z1D11-SO-0.5-1	Z1D11-SO-1-2	Z1D11-SO-3-4	Z1D-SO-Dup16
			Date Sampled	1/16/2012	1/16/2012	1/31/2012	1/31/2012	1/31/2012	1/31/2012	1/16/2012	1/16/2012	1/16/2012	1/16/2012	1/16/2012	1/16/2012	1/16/2012
			Parent Sample Name						Z1-D9-3-4							Z1D11-SO-3-4
	Act 2 MSCs (Residential)[1]		Depth Interval	1-2	3-4	0.5-1	1-2	3-4	3-4	0.5-1	1-2	3-4	0.5-1	1-2	3-4	3-4
Analyte	**RDC MSC**	**RSGW**	**Unit**													
Inorganics (SW6010)																
Aluminum	190000	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	88	27	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	12	29	mg/kg	4.78	3.26	6.31	4.12	3.15	< 0.397 U	**25.4**	5.85	6.06	5.87	2.72	3.27	4.3
Barium	44000	8200	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	440	320	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	110	38	mg/kg	0.16 J	0.08 J	0.078 J	< 0.134 U	< 0.1345 U	0.117 J	1.02	< 0.17 U	0.28 J	0.48	0.13 J	0.27	0.17 J
Calcium	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	66	50	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	8100	43000	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	150000	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	500	450	mg/kg	21.9	5.21	22.5	7.92	4.98	9.16	190	136	18.6	267	95.8	256	**692**
Magnesium	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	10000	2000	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	4400	650	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	1100	26	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	1100	84	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thallium	15	14	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	1500	26000	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	66000	12000	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Inorganics (SW6020)																
Uranium-238	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury (SW7471)																
Mercury	35	10	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 6-1 - Soil - Analytical Summary of Detected Metals

			Location ID	Z1D23	Z1D23	Z1D23	Z2D15	Z2D15	Z2D15	Z2D16	Z2D16	Z2D17	Z2D17	Z3D18	Z3D18	Z3D18
			Sample Name	Z1D23-SO-0.5-1	Z1D23-SO-1-2	Z1D23-SO-3-4	Z2D15-SO-1-2	Z2D15-SO-3-5	Z2-SO-Dup18	Z2D16-SO-1-2	Z2D16-SO-3-5	Z2D17-SO-1-2	Z2D17-SO-3-5	Z3D18-SO-0-2	Z3-D18-SO-0-2	Z3-D18-SO-14-15
			Date Sampled	1/17/2012	1/17/2012	1/17/2012	1/16/2012	1/16/2012	1/16/2012	1/16/2012	1/16/2012	1/16/2012	1/16/2012	1/17/2012	1/31/2012	1/31/2012
			Parent Sample Name						Z2D15-SO-3-5							
	Act 2 MSCs (Residential)[1]		Depth Interval	0.5-1	1-2	3-4	1-2	3-5	3-5	1-2	3-5	1-2	3-5	0-2	0-2	14-15
Analyte	**RDC MSC**	**RSGW**	**Unit**													
Inorganics (SW6010)																
Aluminum	190000	NSA	mg/kg	NA	NA	NA	7510 J	6450 J	6000 J	5020 J	8590 J	7210	5300	3860 J	6300	2270
Antimony	88	27	mg/kg	NA	NA	NA	2.67	< 1.445 U	< 1.205 U	1.14 J	< 1.385 U	< 1.14 U	< 1.44 U	2.27 J	4.5	< 1.12 U
Arsenic	12	29	mg/kg	11.7	10.7	**23**	11	5	4.17	5.72	5.26	3.74	2.59	**20.8**	6.18	0.594 B
Barium	44000	8200	mg/kg	NA	NA	NA	54.5 L	24.2 L	26.2 L	43.8 L	29.8 L	34.4	16.7	52.4 L	69.2	8.16 B
Beryllium	440	320	mg/kg	NA	NA	NA	0.349	0.367	0.171 J	0.193 J	0.249 J	0.35	0.3 J	0.223 J	0.471	0.172 B
Cadmium	110	38	mg/kg	1.14	1.08	1.34	1.18	0.755	0.644	0.659	0.848	0.26 J	< 0.175 U	1.54	0.113 J	< 0.134 U
Calcium	NSA	NSA	mg/kg	NA	NA	NA	1050 B	403 B	473 B	590 B	651 B	680 B	36.2 B	5090 L	1060	106 B
Chromium	NSA	NSA	mg/kg	NA	NA	NA	11.8	9.91	8.09	9.93	11	9.85	9.8	13.7	13.1	6.84
Cobalt	66	50	mg/kg	NA	NA	NA	5.25	6.14	4.85	4.45	6.16	5.98	5.12	4.16	5.38	2.93
Copper	8100	43000	mg/kg	NA	NA	NA	144	10.9	19.3	91	9.73	6.44	6.74	119	34.9	3.25
Iron	150000	NSA	mg/kg	NA	NA	NA	13000 J	13900 J	11300 J	9800 J	15200 J	12700 J	10900 J	9890 J	13900	3770
Lead	500	450	mg/kg	109	66.6	103	227 J	22.1 J	38.5 J	369 J	14.2 J	14 J	5.84 J	315 J	105	2.24
Magnesium	NSA	NSA	mg/kg	NA	NA	NA	1540	1650	1440	1140	1960	1640	1490	1590	1400	499
Manganese	10000	2000	mg/kg	NA	NA	NA	194 J	368 J	214 J	206 J	217 J	161	239	141 J	145	65.3
Nickel	4400	650	mg/kg	NA	NA	NA	11.2	9.91	8.23	17.4	10.6	8.76	8.74	13.6	9.53	5.24
Potassium	NSA	NSA	mg/kg	NA	NA	NA	560	567	423	344	398	339	517	509	467	170
Selenium	1100	26	mg/kg	NA	NA	NA	0.927	0.678 J	0.688 J	0.97 J	0.613 J	< 0.455 U	< 0.575 U	0.818 J	< 0.4555 U	< 0.447 U
Silver	1100	84	mg/kg	NA	NA	NA	< 0.223 U	< 0.2895 U	< 0.2415 U	< 0.283 U	< 0.277 U	< 0.23 U	< 0.29 U	< 0.243 U	< 0.2275 U	< 0.2235 U
Sodium	NSA	NSA	mg/kg	NA	NA	NA	85.1 B	142 B	108 B	87.5 B	88.4 B	431 B	185 B	91.8 B	199	59 J
Thallium	15	14	mg/kg	NA	NA	NA	< 0.89 U	< 1.155 U	< 0.965 U	< 1.13 U	< 1.11 U	< 0.91 U	< 1.15 U	< 0.97 U	< 0.91 U	< 0.895 U
Vanadium	1500	26000	mg/kg	NA	NA	NA	18.1	14.5	12	11.7	15.3	13.3	13.2	16.8	17	4.72
Zinc	66000	12000	mg/kg	NA	NA	NA	175 J	34.2 B	35.1 B	73.6 J	32.9 B	34.5 B	30.1 B	214 J	57.2	20.2
Inorganics (SW6020)																
Uranium-238	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury (SW7471)																
Mercury	35	10	mg/kg	NA	NA	NA	0.37	0.109	0.124 J	0.261	0.039 J	0.108	0.026	0.13	0.391	< 0.005 U

Table 6-1 - Soil - Analytical Summary of Detected Metals

			Location ID	Z3D18	Z3D18	Z3D19	Z3D19	Z3D20	Z3D20	Z3D21	Z3D22	Z3D22	Z3D22
			Sample Name	Z3-D18-SO-5-7	Z3-SO-DUP3	Z3D19-SO-0-2	Z3D19-SO-14-15	Z3D20-SO-5-7	Z3-SO-Dup20	Z3D21-SO-5-7	Z3D22-SO-0-2	Z3D22-SO-4-5	Z3D22-SO-5-7
			Date Sampled	1/31/2012	1/31/2012	1/17/2012	1/17/2012	1/17/2012	1/17/2012	1/17/2012	1/17/2012	1/17/2012	1/17/2012
			Parent Sample Name		Z3-D18-SO-5-7				Z3D20-SO-5-7				
	Act 2 MSCs (Residential)[1]		Depth Interval	5-7	5-7	0-2	14-15	5-7	5-7	5-7	0-2	4-5	5-7
Analyte	**RDC MSC**	**RSGW**	**Unit**										
Inorganics (SW6010)													
Aluminum	190000	NSA	mg/kg	8580	8880	9340 J	3830 J	5740 J	6900 J	11700 J	7600 J	7450 J	7920 J
Antimony	88	27	mg/kg	< 1 U	< 1.26 U	< 1.7 U	< 1.3 U	< 1.27 U	< 1.09 U	< 1.27 U	< 1.28 U	1.22 J	< 1.28 U
Arsenic	12	29	mg/kg	4.72	4.07	**26.4**	0.594 J	3.45	5.58	3.96	5.52	9.91	4.27
Barium	44000	8200	mg/kg	28.9	26.6	75.4 L	15.5 L	30.7 L	45.6 L	53.4 L	43 L	44.9 L	59.5 L
Beryllium	440	320	mg/kg	0.487	0.576	0.358 J	0.08 J	0.245 J	0.416	0.484	0.315	0.379	0.436
Cadmium	110	38	mg/kg	< 0.1205 U	< 0.1515 U	1.02	0.198 J	0.54	0.692	0.877	1.19	0.992	0.826
Calcium	NSA	NSA	mg/kg	903 J	2830 J	1730 B	210 B	5170 L	4750 L	1070 B	4110 B	2510 B	1620 B
Chromium	NSA	NSA	mg/kg	11.4	13	36	6.19	9.92	10.5	20	12.4	11.5	15
Cobalt	66	50	mg/kg	5.36	6.62	7.24	1.8	4.8	4.86	7.37	5.4	6.19	5.54
Copper	8100	43000	mg/kg	9.78	11.4	35.1	2.93	26.6	41.9	12.6	29.7	30.9	13.2
Iron	150000	NSA	mg/kg	15000	15200	16700 J	3770 J	9610 J	11700 J	15800 J	14300 J	13400 J	14000 J
Lead	500	450	mg/kg	11.5	9.21	160 J	3.32 J	30.5 J	300 J	14.3 J	85.3 J	108 J	54.2 J
Magnesium	NSA	NSA	mg/kg	1810	2950	2380	823 B	2560	2690	1660	3040	1890	1840
Manganese	10000	2000	mg/kg	113	129	378 J	35.7 J	231 J	198 J	205 J	240 J	147 J	377 J
Nickel	4400	650	mg/kg	9.74	11.1	11.1	4.47	6.43	7.74	10.1	9.61	10.3	9.53
Potassium	NSA	NSA	mg/kg	572	643	916	345	918	854	1240	578	618	547
Selenium	1100	26	mg/kg	< 0.401 U	< 0.505 U	0.641 J	< 0.52 U	< 0.51 U	0.871 J	0.998 J	1.09	2.43	0.715 J
Silver	1100	84	mg/kg	< 0.2005 U	< 0.2525 U	< 0.3395 U	< 0.2595 U	< 0.254 U	< 0.218 U	< 0.254 U	< 0.256 U	< 0.2695 U	< 0.2565 U
Sodium	NSA	NSA	mg/kg	180	196	264 B	90.9 B	139 B	201 B	291 B	438 B	313 B	310 B
Thallium	15	14	mg/kg	< 0.8 U	< 1.01 U	< 1.36 U	< 1.04 U	< 1.015 U	< 0.87 U	< 1.015 U	< 1.025 U	< 1.075 U	< 1.025 U
Vanadium	1500	26000	mg/kg	18	19.3	20.6	5.78	14.5	16.1	30	18.4	17.2	18
Zinc	66000	12000	mg/kg	35.2	35.4	60.3 B	20.8 B	31.3 B	66.7 B	28.6 B	297 J	81.6 J	52.5 B
Inorganics (SW6020)													
Uranium-238	NSA	NSA	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury (SW7471)													
Mercury	35	10	mg/kg	0.057	0.035	0.419	0.02 B	0.426	0.437	0.156	0.2	0.345	0.356

(1) Pennsylvania Act 1995-2, known as "Act 2", established a program for recycling existing industrial and commercial sites. Values are from Chapter 250 of the Pennsylvania Code, "Administration of Land Recycling Program", Subchapter C, "Statewide Health Standards", Appendix A, "Medium-Specific Concentrations" tables, revisions effective 1/8/2011.

RDC - Residential Direct Contact.
RSW - Soil to

NSA- No Screening Level Available.

NA- Not Analyzed.

U- Not detected above the Level of Detection.

J- Value is estimated.

L-Analyte present. Reported value may be biased low. Acutal value is expected higher.

D-Dilution

K - Estimated, biased high.

R-Rejected result. Analyte may or may not be present in the sample. Supporting data necessary to confirm result.

*-Indicates the duplicate analysis is not within control limits.

B-Not detected substantilly above the level reported in the laboratory or field blanks

N - Presumptive evidence of a compound.

Bolded values exceed Residential Direct Contact (0-15 ft bgs).

Gray shaded values exceed Soil to Groundwater.

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Table 6-2 - Soil - Analytical Summary of Detected VOCs

			Location ID	BZ1-SO-01	BZ1-SO-01	BZ1-SO-02	BZ1-SO-02	BZ1-SO-03	BZ1-SO-03	BZ1-SO-04	BZ1-SO-04	BZ1-SO-05	BZ1-SO-05
			Sample Name	BZ1-SO-01-0-2	BZ1-SO-01-5-7	BZ1-SO-02-3-5	BZ1-SO-02-5-7	BZ1-SO-03-1-3	BZ1-SO-03-7-8	BZ1-SO-04-0-2	BZ1-SO-04-5-7	BZ1-SO-5-0-1	BZ1-SO-5-6-7
			Date Sampled	1/4/2012	1/4/2012	1/4/2012	1/4/2012	1/4/2012	1/4/2012	1/4/2012	1/4/2012	12/29/2011	12/29/2011
			Parent Sample Name										
	Act 2 MSCs (Residential)[1]		Depth Interval	0-2	5-7	3-5	5-7	1-3	7-8	0-2	5-7	0-1	6-7
Analyte	**RDC MSC**	**RSGW**	**Unit**										
VOCs (SW8260)													
2-butanone	10000000	400000	ug/kg	12 U	11 U	11.5 U	12 U	11 U	11.5 U	12.5 U	11.5 U	11.5 U	11.5 U
2-hexanone	96000	1100	ug/kg	12 U	11 U	11.5 U	12 U	11 U	11.5 U	12.5 U	11.5 U	11.5 U	11.5 U
4-methyl-2-pentanone	10000000	290000	ug/kg	12 U	11 U	11.5 U	12 U	11 U	11.5 U	12.5 U	11.5 U	11.5 U	11.5 U
Acetone	10000000	3300000	ug/kg	12 U	11 U	11.5 U	12 U	11 U	11.5 U	12.5 U	11.5 U	11.5 U	34
Benzene	57000	500	ug/kg	2.35 U	2.25 U	2.25 U	2.4 U	2.2 U	2.3 U	2.45 U	2.3 U	2.25 U	2.3 U
Carbon disulfide	10000000	150000	ug/kg	2.35 U	2.25 U	2.25 U	2.4 U	2.2 U	2.3 U	2.45 U	2.3 U	2.25 U	2.3 U
Carbon tetrachloride	30000	500	ug/kg	2.35 U	2.25 U	2.25 U	2.4 U	2.2 U	2.3 U	2.45 U	2.3 U	2.25 U	2.3 U
Chloroform	19000	8000	ug/kg	2.35 U	2.25 U	2.25 U	2.4 U	2.2 U	2.3 U	2.45 U	2.3 U	2.25 U	2.3 U
Cis-1,2-dichloroethene	2200000	7000	ug/kg	2.35 U	2.25 U	2.25 U	2.4 U	2.2 U	2.3 U	2.45 U	2.3 U	2.25 U	2.3 U
Cyclohexane	10000000	1700000	ug/kg	2.35 U	2.25 U	2.25 U	2.4 U	2.2 U	2.3 U	2.45 U	2.3 U	2.25 U	2.3 U
Ethylbenzene	10000000	70000	ug/kg	2.35 U	2.25 U	2.25 U	2.4 U	2.2 U	2.3 U	2.45 U	2.3 U	2.25 U	2.3 U
Isopropylbenzene	7700000	600000	ug/kg	2.35 U	2.25 U	2.25 U	2.4 U	2.2 U	2.3 U	2.45 U	2.3 U	2.25 U	2.3 U
Methyl acetate	10000000	3700000	ug/kg	2.35 U	2.25 U	2.25 U	2.4 U	2.2 U	2.3 U	2.45 U	2.3 U	2.25 U	2.3 U
Methylcyclohexane	NSA	NSA	ug/kg	2.35 U	2.25 U	2.25 U	2.4 U	2.2 U	2.3 U	2.45 U	2.3 U	2.25 U	2.3 U
Methylene Chloride	950000	500	ug/kg	2.35 U	2.25 U	2.25 U	2.4 U	2.2 U	2.3 U	2.45 U	2.3 U	2.25 U	2.3 U
Tetrachloroethene	340000	500	ug/kg	2.35 U	2.25 U	2.25 U	2.4 U	2.2 U	2.3 U	2.45 U	2.3 U	2.25 U	2.3 U
Toluene	10000000	100000	ug/kg	2.35 U	2.25 U	2.25 U	2.4 U	2.2 U	2.3 U	2.45 U	2.3 U	2.25 U	2.3 U
Trichloroethene	260000	500	ug/kg	2.35 U	2.25 U	2.25 U	2.4 U	2.2 U	2.3 U	2.45 U	2.3 U	2.25 U	2.3 U

Table 6-2 - Soil - Analytical Summary of Detected VOCs

			Location ID	BZ1-SO-06	BZ1-SO-06	BZ1-SO-06	BZ2-SO-01	BZ2-SO-01	BZ2-SO-02	BZ2-SO-02	BZ2-SO-03	BZ2-SO-03
			Sample Name	BZ1-SO-6-0.5-1.5	BZ1-SO-6-8-9	BZ1-SO-DUP7	BZ2-SO-1-11-12	BZ2-SO-1-1-2	BZ2-SO-2-1-2	BZ2-SO-2-6-8	BZ2-SO-3-10-11	BZ2-SO-3-1-3
			Date Sampled	12/29/2011	12/29/2011	12/29/2011	1/9/2012	1/9/2012	12/30/2011	12/30/2011	12/30/2011	12/30/2011
			Parent Sample Name			BZ1-SO-6-8-9						
	Act 2 MSCs (Residential)[1]		Depth Interval	0.5-1.5	8-9	8-9	11-12	1-2	1-2	6-8	10-11	1-3
Analyte	**RDC MSC**	**RSGW**	**Unit**									
VOCs (SW8260)												
2-butanone	10000000	400000	ug/kg	12 U	11 U	11.5 U	11 U	11 U	11.5 U	10.5 U	11 U	12 U
2-hexanone	96000	1100	ug/kg	12 U	11 U	11.5 U	11 U	11 U	11.5 U	10.5 U	11 U	12 U
4-methyl-2-pentanone	10000000	290000	ug/kg	12 U	11 U	11.5 U	11 U	11 U	11.5 U	10.5 U	11 U	12 U
Acetone	10000000	3300000	ug/kg	12 U	11 U	11.5 U	11 U	11 U	8.1 J	9.1 J	36	12 U
Benzene	57000	500	ug/kg	2.45 U	2.2 U	2.3 U	2.15 U	2.15 U	2.35 U	2.15 U	2.2 U	2.35 U
Carbon disulfide	10000000	150000	ug/kg	2.45 U	2.2 U	2.3 U	2.15 U	2.15 U	2.35 U	2.15 U	2.2 U	2.35 U
Carbon tetrachloride	30000	500	ug/kg	2.45 U	2.2 U	2.3 U	2.15 U	2.15 U	2.35 U	2.15 U	2.2 U	2.35 U
Chloroform	19000	8000	ug/kg	2.45 U	2.2 U	2.3 U	2.15 U	2.15 U	2.35 U	2.15 U	2.2 U	2.35 U
Cis-1,2-dichloroethene	2200000	7000	ug/kg	2.45 U	2.2 U	2.3 U	2.15 U	2.15 U	2.35 U	2.15 U	2.2 U	2.35 U
Cyclohexane	10000000	1700000	ug/kg	2.45 U	2.2 U	2.3 U	2.15 U	2.15 U	2.35 U	2.15 U	2.2 U	2.35 U
Ethylbenzene	10000000	70000	ug/kg	2.45 U	2.2 U	2.3 U	2.15 U	2.15 U	2.35 U	2.15 U	2.2 U	2.35 U
Isopropylbenzene	7700000	600000	ug/kg	2.45 U	2.2 U	2.3 U	2.15 U	2.15 U	2.35 U	2.15 UL	2.2 U	2.35 U
Methyl acetate	10000000	3700000	ug/kg	2.45 U	2.2 U	2.3 U	2.15 U	2.15 U	2.35 U	2.15 U	2.2 U	2.35 U
Methylcyclohexane	NSA	NSA	ug/kg	2.45 U	2.2 U	2.3 U	2.15 U	2.15 U	2.35 U	2.15 U	2.2 U	2.35 U
Methylene Chloride	950000	500	ug/kg	3.9 J	4.5	2.3 U	2.15 U	2.15 U	2.35 U	2.15 U	2.2 U	4.5 B
Tetrachloroethene	340000	500	ug/kg	2.45 U	2.2 U	2.3 U	2.15 U	2.15 U	2.35 U	2.15 UL	2.2 U	2.35 U
Toluene	10000000	100000	ug/kg	2.45 U	2.2 U	2.3 U	2.15 U	2.15 U	2.35 U	2.15 U	2.2 U	2.35 U
Trichloroethene	260000	500	ug/kg	2.45 U	2.2 U	2.3 U	2.15 U	2.15 U	2.35 U	2.15 U	2.2 U	2.35 U

Table 6-2 - Soil - Analytical Summary of Detected VOCs

			Location ID	BZ2-SO-04	BZ2-SO-04	BZ2-SO-05	BZ2-SO-05	BZ2-SO-06	BZ2-SO-06	BZ2-SO-07	BZ2-SO-07	BZ3-SO-01
			Sample Name	BZ2-SO-4-0.5-1.5	BZ2-SO-4-8-9	BZ2-SO-5-11-12	BZ2-SO-5-3-4	BZ2-SO-6-13-14	BZ2-SO-6-3-4	BZ2-SO-07-0-2	BZ2-SO-07-11-12	BZ3-SO-1-1-2
			Date Sampled	12/30/2011	12/30/2011	12/22/2011	12/22/2011	12/21/2011	12/21/2011	1/6/2012	1/6/2012	12/29/2011
			Parent Sample Name									
	Act 2 MSCs (Residential)[1]		Depth Interval	0.5-1.5	8-9	11-12	3-4	13-14	3-4	0-2	11-12	1-2
Analyte	**RDC MSC**	**RSGW**	**Unit**									
VOCs (SW8260)												
2-butanone	10000000	400000	ug/kg	12 U	11 U	14 U	11.5 UJ	12.5 U	11 U	11.5 U	13 U	11.5 U
2-hexanone	96000	1100	ug/kg	12 U	11 U	14 U	11.5 UJ	12.5 U	11 U	11.5 U	13 U	11.5 U
4-methyl-2-pentanone	10000000	290000	ug/kg	12 U	11 U	14 U	11.5 UJ	12.5 U	11 U	11.5 U	13 U	11.5 U
Acetone	10000000	3300000	ug/kg	12 U	11 U	10 J	45 J	12.5 U	11 U	11.5 U	13 U	11.5 U
Benzene	57000	500	ug/kg	2.4 U	2.15 U	2.75 U	2.35 UJ	2.55 U	2.25 U	2.35 U	2.6 U	2.25 U
Carbon disulfide	10000000	150000	ug/kg	2.4 U	2.15 U	2.75 U	2.35 UJ	2.55 U	2.25 U	2.35 U	2.6 U	2.25 U
Carbon tetrachloride	30000	500	ug/kg	2.4 U	2.15 U	2.75 U	2.35 UJ	2.55 U	2.25 U	2.35 U	2.6 U	2.25 U
Chloroform	19000	8000	ug/kg	2.4 U	2.15 U	2.75 U	2.35 UJ	2.55 U	2.25 U	2.35 U	2.6 U	2.25 U
Cis-1,2-dichloroethene	2200000	7000	ug/kg	2.4 U	2.15 U	2.75 U	2.35 UJ	2.55 U	2.25 U	2.35 U	2.6 U	2.25 U
Cyclohexane	10000000	1700000	ug/kg	2.4 U	2.15 U	2.75 U	2.35 UJ	2.55 U	2.25 U	2.35 U	2.6 U	2.25 U
Ethylbenzene	10000000	70000	ug/kg	2.4 U	2.15 U	2.75 U	2.35 UR	2.55 U	2.25 U	2.35 U	2.6 U	2.25 U
Isopropylbenzene	7700000	600000	ug/kg	2.4 U	2.15 U	2.75 U	2.35 UR	2.55 U	2.25 U	2.35 U	2.6 U	2.25 U
Methyl acetate	10000000	3700000	ug/kg	2.4 U	2.15 U	2.75 U	2.35 UJ	2.55 U	2.25 U	2.35 U	2.6 U	2.25 U
Methylcyclohexane	NSA	NSA	ug/kg	2.4 U	2.15 U	2.75 U	2.35 UJ	2.55 U	2.25 U	2.35 U	2.6 U	2.25 U
Methylene Chloride	950000	500	ug/kg	2.4 U	2.15 U	2.75 U	2.35 UJ	17	16	2.35 U	2.6 U	2.25 U
Tetrachloroethene	340000	500	ug/kg	2.4 U	2.15 U	2.75 U	2.35 UJ	2.55 U	2.25 U	2.35 U	2.6 U	2.25 U
Toluene	10000000	100000	ug/kg	2.4 U	2.15 U	2.75 U	2.35 UJ	2.55 U	2.25 U	2.35 U	2.6 U	2.25 U
Trichloroethene	260000	500	ug/kg	2.4 U	2.15 U	2.75 U	2.35 UJ	2.55 U	2.25 U	2.35 U	2.6 U	2 J

Table 6-2 - Soil - Analytical Summary of Detected VOCs

			Location ID	BZ3-SO-01	BZ3-SO-01	BZ3-SO-02	BZ3-SO-02	BZ3-SO-03A	BZ3-SO-03A	BZ3-SO-03B	BZ3-SO-03B	BZ3-SO-04
			Sample Name	BZ3-SO-13-0-1	BZ3-SO-1-6-7	BZ3-SO-2	BZ3-SO-2-5-6	BZ3-SO-3A-10-11	BZ3-SO-3A-1-2	BZ3-SO-3B-1-2	BZ3-SO-3B-5.5-6.5	BZ3-SO-04-0-2
			Date Sampled	4/18/2012	12/29/2011	12/22/2011	12/22/2011	12/22/2011	12/22/2011	12/22/2011	12/22/2011	1/5/2012
			Parent Sample Name									
	Act 2 MSCs (Residential)[1]		Depth Interval	0-1	6-7	1-2	5-6	10-11	1-2	1-2	5.5-6.5	0-2
Analyte	**RDC MSC**	**RSGW**	**Unit**									
VOCs (SW8260)												
2-butanone	10000000	400000	ug/kg	12 UJ	10.5 U	13 U	11.5 U	13.5 U	10.5 U	11 U	11.5 U	11.5 U
2-hexanone	96000	1100	ug/kg	12 UJ	10.5 U	13 U	11.5 U	13.5 U	10.5 U	11 U	11.5 U	11.5 U
4-methyl-2-pentanone	10000000	290000	ug/kg	12 UJ	10.5 U	13 U	11.5 U	13.5 U	10.5 U	11 U	11.5 U	11.5 U
Acetone	10000000	3300000	ug/kg	12 UJ	13 J	13 U	10 J	45	29	11 U	6.4 J	11.5 U
Benzene	57000	500	ug/kg	2.4 UJ	2.1 U	2.6 U	2.35 U	2.65 U	2.1 U	2.2 U	2.3 U	2.3 U
Carbon disulfide	10000000	150000	ug/kg	2.4 UJ	2.1 U	2.6 U	2.35 U	2.65 U	2.1 U	2.2 U	2.3 U	2.3 U
Carbon tetrachloride	30000	500	ug/kg	2.4 UJ	2.1 U	2.6 U	2.35 U	2.65 U	2.1 U	2.2 U	2.3 U	2.3 U
Chloroform	19000	8000	ug/kg	2.4 UJ	2.1 U	2.4 J	2.35 U	2.65 U	2.1 U	2.2 U	2.3 U	2.3 U
Cis-1,2-dichloroethene	2200000	7000	ug/kg	2.4 UJ	2.1 U	2.6 U	2.35 U	2.65 U	2.1 U	2.2 U	2.3 U	2.3 U
Cyclohexane	10000000	1700000	ug/kg	2.4 UJ	2.1 U	2.6 U	2.35 U	2.65 U	2.1 U	2.2 U	2.3 U	2.3 U
Ethylbenzene	10000000	70000	ug/kg	2.4 UJ	2.1 U	2.6 U	2.35 U	2.65 U	2.1 U	2.2 U	2.3 U	2.3 U
Isopropylbenzene	7700000	600000	ug/kg	2.4 UJ	2.1 U	2.6 U	2.35 U	2.65 U	2.1 U	2.2 U	2.3 U	2.3 U
Methyl acetate	10000000	3700000	ug/kg	2.4 UJ	2.1 U	2.6 U	2.35 U	2.65 U	2.1 U	2.2 U	2.3 U	2.3 U
Methylcyclohexane	NSA	NSA	ug/kg	2.4 UJ	2.1 U	2.6 U	2.35 U	2.65 U	2.1 U	2.2 U	2.3 U	2.3 U
Methylene Chloride	950000	500	ug/kg	2.4 UJ	2.1 U	2.6 U	2.35 U	24	23	2.2 U	2.3 U	2.3 U
Tetrachloroethene	340000	500	ug/kg	2.4 UJ	2.1 U	2.6 U	2.35 U	2.65 U	2.1 U	2.2 U	2.3 U	2.3 U
Toluene	10000000	100000	ug/kg	2.4 UJ	2.1 U	2.6 U	2.35 U	2.65 U	2.1 U	2.2 U	2.3 U	2.3 U
Trichloroethene	260000	500	ug/kg	2.4 UJ	2.1 U	2.6 U	2.35 U	2.65 U	2.1 U	2.2 U	2.3 U	2.3 U

Table 6-2 - Soil - Analytical Summary of Detected VOCs

			Location ID	BZ3-SO-04	BZ3-SO-04	BZ3-SO-06	BZ3-SO-06	BZ3-SO-07	BZ3-SO-07	BZ3-SO-08	BZ3-SO-08	BZ3-SO-08
			Sample Name	BZ3-SO-04-5-7	BZ3-SO-DUP10	BZ3-SO-6-0.5-1.5	BZ3-SO-6-7-8	BZ3-SO-07-0-2	BZ3-SO-07-3-5	BZ3-SO-08-0-2	BZ3-SO-08-13-15	UBZ3-SO-DUP3
			Date Sampled	1/5/2012	1/5/2012	12/21/2011	12/21/2011	12/16/2011	12/16/2011	12/16/2011	12/16/2011	12/16/2011
			Parent Sample Name		BZ3-SO-04-0-2							BZ3-SO-08-13-15
	Act 2 MSCs (Residential)[1]		Depth Interval	5-7	0-2	0.5-1.5	7-8	0-2	3-5	0-2	13-15	13-15
Analyte	**RDC MSC**	**RSGW**	**Unit**									
VOCs (SW8260)												
2-butanone	10000000	400000	ug/kg	12 UJ	11 U	11.5 U	11.5 U	11 U	11 U	14 U	1100 U	16 J
2-hexanone	96000	1100	ug/kg	12 U	11 U	11.5 U	11.5 U	11 U	11 U	14 U	1100 U	11 U
4-methyl-2-pentanone	10000000	290000	ug/kg	12 U	11 U	11.5 U	11.5 U	11 U	11 U	14 U	1100 U	5.8 J
Acetone	10000000	3300000	ug/kg	12 J	11 U	11.5 U	10 J	10 J	27	6.4 J	40000 D	39000 D
Benzene	57000	500	ug/kg	2.45 U	2.25 U	2.3 U	2.3 U	2.2 U	2.15 U	2.75 U	220 U	18
Carbon disulfide	10000000	150000	ug/kg	2.45 UJ	2.25 U	2.3 U	2.3 U	2.2 U	2.15 U	4.2 J	220 U	2.15 U
Carbon tetrachloride	30000	500	ug/kg	2.45 UJ	2.25 U	2.3 U	2.3 U	2.2 U	2.15 U	2.75 U	220 U	2.15 U
Chloroform	19000	8000	ug/kg	2.45 UJ	2.25 U	2.3 U	2.3 U	2.2 U	2.15 U	2.75 U	220 U	2.15 U
Cis-1,2-dichloroethene	2200000	7000	ug/kg	2.45 UJ	2.25 U	2.3 U	2.3 U	2.2 U	2.15 U	2.75 U	220 U	2.15 U
Cyclohexane	10000000	1700000	ug/kg	2.45 UJ	2.25 U	2.3 U	2.3 U	2.2 U	2.15 U	2.75 U	220 U	2.15 U
Ethylbenzene	10000000	70000	ug/kg	2.45 U	2.25 U	2.3 U	2.3 U	2.2 U	2.15 U	6.3	1300 D	1500 D
Isopropylbenzene	7700000	600000	ug/kg	2.45 U	2.25 U	2.3 U	2.3 U	2.2 U	2.15 U	5700 J	5600 D	6500 D
Methyl acetate	10000000	3700000	ug/kg	2.45 UJ	2.25 U	2.3 U	2.3 U	2.2 U	2.15 U	2.75 U	220 U	2.15 U
Methylcyclohexane	NSA	NSA	ug/kg	2.45 U	2.25 U	2.3 U	2.3 U	2.2 U	2.15 U	2.75 U	220 U	2.15 U
Methylene Chloride	950000	500	ug/kg	2.45 UJ	2.25 U	6.3	9.2	2.2 U	2.15 U	2.75 U	220 U	2.15 U
Tetrachloroethene	340000	500	ug/kg	2.45 U	2.25 U	2.3 U	2.3 U	2.2 U	2.15 U	2.75 U	220 U	2.15 U
Toluene	10000000	100000	ug/kg	2.45 U	2.25 U	2.3 U	2.3 U	2.2 U	2.15 U	2.75 U	220 U	2.15 U
Trichloroethene	260000	500	ug/kg	2.45 U	2.25 U	2.3 U	2.3 UL	2.2 U	2.15 U	2.75 U	220 U	2.15 U

Table 6-2 - Soil - Analytical Summary of Detected VOCs

			Location ID	BZ3-SO-09	BZ3-SO-09	BZ3-SO-10	BZ3-SO-10	BZ3-SO-10	BZ3-SO-11	BZ3-SO-11	BZ3-SO-12	BZ3-SO-12
			Sample Name	BZ3-SO-09-13-15	BZ3-SO-09-5-7	BZ3-SO-10-12-14	BZ3-SO-10-2-4	BZ3-SO-10-5-8	BZ3-SO-11-10-11	BZ3-SO-11-5-6	BZ3-SO-12-11-12	BZ3-SO-12-5-7
			Date Sampled	12/16/2011	12/16/2011	12/14/2011	12/14/2011	12/14/2011	12/22/2011	12/22/2011	12/13/2011	12/13/2011
			Parent Sample Name									
	Act 2 MSCs (Residential)[1]		Depth Interval	13-15	5-7	12-14	2-4	5-8	10-11	5-6	11-12	5-7
Analyte	**RDC MSC**	**RSGW**	**Unit**									
VOCs (SW8260)												
2-butanone	10000000	400000	ug/kg	12.5 U	13.5 U	11 U	13.5 U	10.5 U	13.5 U	13.5 U	13 U	11 U
2-hexanone	96000	1100	ug/kg	12.5 U	13.5 U	11 U	13.5 U	10.5 U	13.5 U	13.5 U	13 U	11 U
4-methyl-2-pentanone	10000000	290000	ug/kg	12.5 U	13.5 U	11 U	13.5 U	10.5 U	13.5 U	13.5 U	13 U	11 U
Acetone	10000000	3300000	ug/kg	12.5 U	13.5 U	53	11 J	13 J	16 J	12 J	13 U	11 U
Benzene	57000	500	ug/kg	2.45 U	2.7 U	8.6	2.75 U	2.05 U	2.7 U	2.65 U	2.55 U	2.2 U
Carbon disulfide	10000000	150000	ug/kg	2.45 U	2.7 U	2.2 U	2.75 U	2.05 U	2.7 U	2.65 U	2.55 U	2.2 U
Carbon tetrachloride	30000	500	ug/kg	2.45 U	2.7 U	2.2 U	2.75 U	2.05 U	2.7 U	2.65 U	2.55 U	2.2 U
Chloroform	19000	8000	ug/kg	2.45 U	2.7 U	2.2 U	2.75 U	2.05 U	2.7 U	2.65 U	2.55 U	2.2 U
Cis-1,2-dichloroethene	2200000	7000	ug/kg	2.45 U	2.7 U	2.2 U	2.75 U	2.05 U	2.7 U	2.65 U	2.55 U	2.2 U
Cyclohexane	10000000	1700000	ug/kg	2.45 U	2.7 U	2.2 U	2.75 U	2.05 U	2.7 U	2.65 U	2.55 U	2.2 U
Ethylbenzene	10000000	70000	ug/kg	6.8	2.7 U	1000 D	2.75 U	2.05 U	2.7 U	2.65 U	2.55 U	2.2 U
Isopropylbenzene	7700000	600000	ug/kg	23	2.7 U	2800 D	2.75 U	2.05 U	2.7 U	2.65 U	2.55 U	2.2 U
Methyl acetate	10000000	3700000	ug/kg	2.45 U	2.7 U	2.2 U	2.75 U	2.05 U	2.7 U	2.65 U	2.55 U	2.2 U
Methylcyclohexane	NSA	NSA	ug/kg	2.45 U	2.7 U	2.2 U	2.75 U	2.05 U	2.7 U	2.65 U	2.55 U	2.2 U
Methylene Chloride	950000	500	ug/kg	2.45 U	2.7 U	2.2 U	2.75 U	2.05 U	2.7 U	2.65 U	2.55 U	2.2 U
Tetrachloroethene	340000	500	ug/kg	2.45 U	2.7 U	2.2 U	2.75 U	2.05 U	2.7 U	2.65 U	2.55 U	2.2 U
Toluene	10000000	100000	ug/kg	2.45 U	2.7 U	2.2 U	2.75 U	2.05 U	2.7 U	2.65 U	2.55 U	2.2 U
Trichloroethene	260000	500	ug/kg	2.45 U	2.7 U	2.2 U	2.75 U	2.05 U	2.7 U	2.65 U	2.55 U	2.2 U

Table 6-2 - Soil - Analytical Summary of Detected VOCs

			Location ID	BZ3-SO-13	BZ3-SO-13	BZ3-SO-14	BZ3-SO-15	BZ3-SO-15	MW-21	MW-22	MW-23	MW-24
			Sample Name	BZ3-SO-13-1-2	BZ3-SO-13-2-3	BZ3-SO-14-4-5	BZ3-SO-15-0-2	BZ3-SO-15-5-7	MW-21-SO-10-12	MW-22-SO-0-2	MW-23-SO-0-2	MW-24-SO-10-12
			Date Sampled	4/18/2012	4/20/2012	12/21/2011	4/19/2012	4/19/2012	4/30/2012	5/4/2012	5/4/2012	5/2/2012
			Parent Sample Name									
	Act 2 MSCs (Residential)[1]		Depth Interval	1-2	2-3	4-5	0-2	5-7	10-12	0-2	0-2	10-12
Analyte	**RDC MSC**	**RSGW**	**Unit**									
VOCs (SW8260)												
2-butanone	10000000	400000	ug/kg	12 U	12 U	12 U	11.5 UJ	53 J	13 U	16 U	11.5 U	14 U
2-hexanone	96000	1100	ug/kg	12 U	12 U	12 U	11.5 UJ	19 UJ	13 U	16 U	11.5 U	14 U
4-methyl-2-pentanone	10000000	290000	ug/kg	12 U	12 U	12 U	11.5 UJ	19 UJ	13 U	16 U	11.5 U	14 U
Acetone	10000000	3300000	ug/kg	12 U	12 U	12 U	11.5 UJ	180 J	13 U	92	11.5 U	16 J
Benzene	57000	500	ug/kg	2.4 U	2.4 U	2.35 U	2.3 UJ	3.85 UJ	2.65 U	3.2 U	2.3 U	2.75 U
Carbon disulfide	10000000	150000	ug/kg	2.4 U	2.4 U	2.35 U	2.3 UJ	3.85 UJ	2.65 U	3.8 J	2.3 U	2.75 U
Carbon tetrachloride	30000	500	ug/kg	2.4 U	2.4 U	2.35 U	2.3 UJ	3.85 UJ	2.65 U	3.2 U	2.3 U	2.75 U
Chloroform	19000	8000	ug/kg	2.4 U	2.4 U	2.35 U	2.3 UJ	3.85 UJ	2.65 U	3.2 U	2.3 U	2.75 U
Cis-1,2-dichloroethene	2200000	7000	ug/kg	2.4 U	2.4 U	2.35 U	2.3 UJ	3.85 UJ	2.65 U	3.2 U	2.3 U	2.75 U
Cyclohexane	10000000	1700000	ug/kg	2.4 U	2.4 U	2.35 U	2.3 UJ	3.85 UJ	2.65 U	3.2 U	2.3 U	2.75 U
Ethylbenzene	10000000	70000	ug/kg	2.4 U	2.4 U	2.35 U	2.3 UJ	3.85 UJ	2.65 U	3.2 U	2.3 U	2.75 U
Isopropylbenzene	7700000	600000	ug/kg	2.4 U	2.4 U	2.35 U	2.3 UJ	3.85 UJ	2.65 U	3.2 U	2.3 U	2.75 U
Methyl acetate	10000000	3700000	ug/kg	2.4 U	2.4 U	2.35 U	2.3 UJ	5.1 J	2.65 U	3.2 U	2.3 U	2.75 U
Methylcyclohexane	NSA	NSA	ug/kg	2.4 U	2.4 U	2.35 U	2.3 UJ	3.85 UJ	2.65 U	3.2 U	2.3 U	2.75 U
Methylene Chloride	950000	500	ug/kg	2.4 U	2.6 J	23 J	2.3 UJ	3.85 UJ	2.65 U	9.2	2.3 U	2.75 U
Tetrachloroethene	340000	500	ug/kg	2.4 U	2.4 U	2.35 U	2.3 UJ	3.85 UJ	2.65 U	3.2 U	2.3 U	2.75 U
Toluene	10000000	100000	ug/kg	2.4 U	2.4 U	2.35 U	2.3 UJ	3.85 UJ	2.65 U	3.2 U	2.3 U	2.75 U
Trichloroethene	260000	500	ug/kg	2.4 U	2.4 U	2.35 U	2.3 UJ	3.85 UJ	2.65 U	3.2 U	2.3 U	2.75 U

Table 6-2 - Soil - Analytical Summary of Detected VOCs

			Location ID	MW-25	MW-26	MW-27	MW-27	MW-28	MW-29	MW-31	UBZ2-SO-01	UBZ2-SO-01
			Sample Name	MW-25-SO-0-2	MW-26-SO-0-2	MW-27-SO-4-6	MW-SO-DUP1	MW-28-SO-0-2	MW-29-SO-5-7	MW-31-SO-10-12	UBZ2-SO-01-0-2	UBZ2-SO-01-5-7
			Date Sampled	5/2/2012	5/3/2012	5/3/2012	5/3/2012	5/3/2012	5/3/2012	5/3/2012	1/4/2012	1/4/2012
			Parent Sample Name				MW-27-SO-4-6					
	Act 2 MSCs (Residential)[1]		Depth Interval	0-2	0-2	4-6	4-6	0-2	5-7	10-12	0-2	5-7
Analyte	**RDC MSC**	**RSGW**	**Unit**									
VOCs (SW8260)												
2-butanone	10000000	400000	ug/kg	11 U	19.5 UJ	11.5 U	11.5 UJ	15.5 U	11.5 U	12 U	12.5 U	11.5 U
2-hexanone	96000	1100	ug/kg	11 U	19.5 UJ	11.5 U	11.5 UJ	15.5 U	11.5 U	12 U	12.5 U	11.5 U
4-methyl-2-pentanone	10000000	290000	ug/kg	11 U	19.5 UJ	11.5 U	11.5 UJ	15.5 U	11.5 U	12 U	12.5 U	11.5 U
Acetone	10000000	3300000	ug/kg	35	19.5 UJ	11.5 U	43 J	24 J	11.5 U	9.8 J	12.5 U	11.5 U
Benzene	57000	500	ug/kg	2.25 U	3.9 UJ	2.3 U	2.35 UJ	3.15 U	2.3 U	2.35 U	2.5 U	2.25 U
Carbon disulfide	10000000	150000	ug/kg	2.25 U	3.9 UJ	2.3 U	2.35 UJ	3.15 U	2.3 U	2.35 U	2.5 U	2.25 U
Carbon tetrachloride	30000	500	ug/kg	2.25 U	3.9 UJ	2.3 U	2.35 UJ	3.15 U	2.3 U	2.35 U	2.5 U	2.25 U
Chloroform	19000	8000	ug/kg	2.25 U	3.9 UJ	2.3 U	2.35 UJ	3.15 U	2.3 U	2.35 U	2.5 U	2.25 U
Cis-1,2-dichloroethene	2200000	7000	ug/kg	2.25 U	3.9 UJ	2.3 U	2.35 UJ	3.15 U	2.3 U	2.35 U	2.5 U	2.25 U
Cyclohexane	10000000	1700000	ug/kg	2.25 U	3.9 UJ	2.3 U	2.35 UJ	3.15 U	2.3 U	2.35 U	2.5 U	2.25 U
Ethylbenzene	10000000	70000	ug/kg	2.25 U	3.9 UJ	2.3 U	2.35 UJ	3.15 U	2.3 U	2.35 U	2.5 U	2.25 U
Isopropylbenzene	7700000	600000	ug/kg	2.25 U	3.9 R	2.3 U	2.35 UJ	3.15 U	2.3 U	1 J	2.5 U	2.25 U
Methyl acetate	10000000	3700000	ug/kg	2.25 U	3.9 UJ	2.3 U	2.35 UJ	3.15 U	2.3 U	2.35 U	2.5 U	2.25 U
Methylcyclohexane	NSA	NSA	ug/kg	2.25 U	3.9 UJ	2.3 U	2.35 UJ	3.15 U	2.3 U	2.35 U	2.5 U	2.25 U
Methylene Chloride	950000	500	ug/kg	2.25 U	2.5 J	2.3 U	1.9 J	2.7 J	2.3 U	2.2 J	2.5 U	2.25 U
Tetrachloroethene	340000	500	ug/kg	2.25 U	3.9 UJ	2.3 U	2.35 UJ	3.15 U	2.3 U	2.35 U	2.5 U	2.25 U
Toluene	10000000	100000	ug/kg	2.25 U	3.9 UJ	2.3 U	2.35 UJ	3.15 U	2.3 U	2.35 U	2.5 U	2.25 U
Trichloroethene	260000	500	ug/kg	2.25 U	3.9 UJ	2.3 U	2.35 UJ	3.15 U	2.3 U	2.35 U	2.5 U	2.25 U

Table 6-2 - Soil - Analytical Summary of Detected VOCs

			Location ID	UBZ2-SO-02	UBZ2-SO-02	UBZ2-SO-03	UBZ2-SO-03	UBZ2-SO-04	UBZ2-SO-04	UBZ2-SO-04	UBZ2-SO-05
			Sample Name	UBZ2-SO-02-0-2	UBZ2-SO-02-5-7	UBZ2-SO-03-0-2	UBZ2-SO-03-8-10	UBZ2-SO-04-27-28	UBZ2-SO-04-5-7	UBZ2-SO-DUP13	UBZ2-SO-05-10-12
			Date Sampled	1/4/2012	1/4/2012	1/4/2012	1/4/2012	1/9/2012	1/9/2012	1/9/2012	1/6/2012
			Parent Sample Name							UBZ2-SO-04-5-7	
	Act 2 MSCs (Residential)[1]		Depth Interval	0-2	5-7	0-2	8-10	27-28	5-7	5-7	10-12
Analyte	**RDC MSC**	**RSGW**	**Unit**								
VOCs (SW8260)											
2-butanone	10000000	400000	ug/kg	13.5 U	11.5 U	13.5 U	11.5 U	15 U	11 U	10.5 U	12 U
2-hexanone	96000	1100	ug/kg	13.5 U	11.5 U	13.5 U	11.5 U	15 U	11 U	10.5 U	12 U
4-methyl-2-pentanone	10000000	290000	ug/kg	13.5 U	11.5 U	13.5 U	11.5 U	15 U	11 U	10.5 U	12 U
Acetone	10000000	3300000	ug/kg	13.5 U	48	13.5 U	11.5 U	15 U	11 U	10.5 U	12 U
Benzene	57000	500	ug/kg	2.7 U	2.35 U	2.75 U	2.25 U	2.95 U	2.2 U	2.1 U	2.45 U
Carbon disulfide	10000000	150000	ug/kg	2.7 U	2.35 U	2.75 U	2.25 U	2.95 U	2.2 U	2.1 U	2.45 U
Carbon tetrachloride	30000	500	ug/kg	2.7 U	2.35 U	2.75 U	2.25 U	2.95 U	2.2 U	2.1 U	2.45 U
Chloroform	19000	8000	ug/kg	2.7 U	2.35 U	2.75 U	2.25 U	2.95 U	2.2 U	2.1 U	2.45 U
Cis-1,2-dichloroethene	2200000	7000	ug/kg	2.7 U	2.35 U	2.75 U	2.25 U	26	2.2 U	2.1 U	2.45 U
Cyclohexane	10000000	1700000	ug/kg	2.7 U	2.35 U	2.75 U	2.25 U	2.95 U	2.2 U	2.1 U	2.45 U
Ethylbenzene	10000000	70000	ug/kg	2.7 U	2.35 U	2.75 U	2.25 U	2.95 U	2.2 U	2.1 U	2.45 U
Isopropylbenzene	7700000	600000	ug/kg	2.7 U	2.35 U	2.75 U	2.25 U	2.95 U	2.2 U	2.1 U	2.45 U
Methyl acetate	10000000	3700000	ug/kg	2.7 U	2.35 U	2.75 U	2.25 U	2.95 U	2.2 U	2.1 U	2.45 U
Methylcyclohexane	NSA	NSA	ug/kg	2.7 U	2.35 U	2.75 U	2.25 U	2.95 U	2.2 U	2.1 U	2.45 U
Methylene Chloride	950000	500	ug/kg	2.7 U	2.35 U	2.75 U	2.25 U	2.95 U	2.2 U	2.1 U	2.45 U
Tetrachloroethene	340000	500	ug/kg	2.7 U	2.35 U	2.75 U	2.25 U	2.95 U	2.2 U	2.1 U	2.45 U
Toluene	10000000	100000	ug/kg	2.7 U	2.35 U	2.75 U	2.25 U	2.95 U	2.2 U	2.1 U	2.45 U
Trichloroethene	260000	500	ug/kg	2.7 U	2.35 U	2.75 U	2.25 U	520 J	2.2 U	2.1 U	2.45 U

Table 6-2 - Soil - Analytical Summary of Detected VOCs

			Location ID	UBZ2-SO-05	UBZ2-SO-06	UBZ2-SO-06	UBZ2-SO-07	UBZ2-SO-07	UBZ2-SO-08	UBZ2-SO-08	UBZ2-SO-09
			Sample Name	UBZ2-SO-05-1-3	UBZ2-SO-06-0-2	UBZ2-SO-06-6-8	UBZ2-SO-07-0-2	UBZ2-SO-07-5-7	UBZ2-SO-08-0-2	UBZ2-SO-08-5-7	UBZ2-SO-09-0-3
			Date Sampled	1/6/2012	1/6/2012	1/6/2012	1/6/2012	1/6/2012	1/4/2012	1/4/2012	1/4/2012
			Parent Sample Name								
	Act 2 MSCs (Residential)[1]		Depth Interval	1-3	0-2	6-8	0-2	5-7	0-2	5-7	0-3
Analyte	**RDC MSC**	**RSGW**	**Unit**								
VOCs (SW8260)											
2-butanone	10000000	400000	ug/kg	10 U	12 U	10 U	11.5 U	11.5 U	12 U	12 U	10.5 UJ
2-hexanone	96000	1100	ug/kg	10 U	12 U	10 U	11.5 U	11.5 U	12 U	12 U	10.5 UJ
4-methyl-2-pentanone	10000000	290000	ug/kg	10 U	12 U	10 U	11.5 U	11.5 U	12 U	12 U	10.5 UJ
Acetone	10000000	3300000	ug/kg	10 U	12 U	10 U	36 B	11.5 U	12 U	12 U	5.9 J
Benzene	57000	500	ug/kg	2.05 U	2.4 U	2 U	2.35 U	2.25 U	2.4 U	2.4 U	2.1 UJ
Carbon disulfide	10000000	150000	ug/kg	2.05 U	2.4 U	2 U	2.35 U	2.25 U	2.4 U	2.4 U	2.1 UJ
Carbon tetrachloride	30000	500	ug/kg	2.05 U	2.4 U	2 U	2.35 U	2.25 U	2.4 U	2.4 U	2.1 UJ
Chloroform	19000	8000	ug/kg	2.05 U	2.4 U	2 U	2.35 U	2.25 U	2.4 U	2.4 U	2.1 UJ
Cis-1,2-dichloroethene	2200000	7000	ug/kg	2.05 U	2.4 U	2 U	2.35 U	2.25 U	2.4 U	2.4 U	2.1 UJ
Cyclohexane	10000000	1700000	ug/kg	2.05 U	2.4 U	2 U	2.35 U	2.25 U	2.4 U	2.4 U	2.1 UJ
Ethylbenzene	10000000	70000	ug/kg	2.05 U	2.4 U	2 U	2.35 U	2.25 U	2.4 U	2.4 U	2.1 UJ
Isopropylbenzene	7700000	600000	ug/kg	2.05 U	2.4 U	2 U	2.35 U	2.25 U	2.4 U	2.4 U	2.1 UJ
Methyl acetate	10000000	3700000	ug/kg	2.05 U	2.4 U	2 U	2.35 U	2.25 U	2.4 U	2.4 U	2.1 UJ
Methylcyclohexane	NSA	NSA	ug/kg	2.05 U	2.4 U	2 U	2.35 U	2.25 U	2.4 U	2.4 U	2.1 UJ
Methylene Chloride	950000	500	ug/kg	2.05 U	2.4 U	2 U	7	4.4 J	2.4 U	2.4 U	2.1 UJ
Tetrachloroethene	340000	500	ug/kg	2.05 U	2.4 U	2 U	2.35 U	2.25 U	2.4 U	2.4 U	2.1 UJ
Toluene	10000000	100000	ug/kg	2.05 U	2.4 U	2 U	2.35 U	2.25 U	2.4 U	2.4 U	2.1 UJ
Trichloroethene	260000	500	ug/kg	2.05 U	2.4 U	2 U	2.35 U	2.25 U	2.4 U	2.4 U	2.1 UJ

Table 6-2 - Soil - Analytical Summary of Detected VOCs

			Location ID	UBZ2-SO-09	UBZ2-SO-10	UBZ2-SO-10	UBZ2-SO-11	UBZ2-SO-11	UBZ2-SO-12	UBZ2-SO-12	UBZ2-SO-13
			Sample Name	UBZ2-SO-09-5-7	UBZ2-SO-10-0-2	UBZ2-SO-10-5-7	UBZ2-SO-11-10-12	UBZ2-SO-11-1-3	UBZ2-SO-12-1-3	UBZ2-SO-12-5-7	UBZ2-SO-13-0.5-2
			Date Sampled	1/4/2012	1/5/2012	1/5/2012	1/6/2012	1/6/2012	1/6/2012	1/6/2012	1/6/2012
			Parent Sample Name								
	Act 2 MSCs (Residential)[1]		Depth Interval	5-7	0-2	5-7	11-12	1-3	1-3	5-7	0.5-2
Analyte	**RDC MSC**	**RSGW**	**Unit**								
VOCs (SW8260)											
2-butanone	10000000	400000	ug/kg	12 U	12 U	10.5 U	12 U	13 U	11.5 U	14.5 U	12 U
2-hexanone	96000	1100	ug/kg	12 U	12 U	10.5 U	12 U	13 U	11.5 U	14.5 U	12 U
4-methyl-2-pentanone	10000000	290000	ug/kg	12 U	12 U	10.5 U	12 U	13 U	11.5 U	14.5 U	12 U
Acetone	10000000	3300000	ug/kg	12 U	12 U	10.5 U	12 U	13 U	11.5 U	14.5 U	12 U
Benzene	57000	500	ug/kg	2.45 U	2.4 U	2.05 U	2.35 U	2.55 UL	2.25 U	2.9 U	2.35 U
Carbon disulfide	10000000	150000	ug/kg	2.45 U	2.4 U	2.05 U	2.35 U	2.55 U	2.25 U	2.9 U	2.35 U
Carbon tetrachloride	30000	500	ug/kg	2.45 U	2.4 U	2.05 U	2.35 U	2.55 U	2.25 U	2.9 U	2.35 U
Chloroform	19000	8000	ug/kg	2.45 U	2.4 U	2.05 U	2.35 U	2.55 U	2.25 U	2.9 U	2.35 U
Cis-1,2-dichloroethene	2200000	7000	ug/kg	2.45 U	2.4 U	2.05 U	2.35 U	2.55 U	2.25 U	2.9 U	2.35 U
Cyclohexane	10000000	1700000	ug/kg	2.45 U	2.4 U	2.05 U	2.35 U	2.55 U	2.25 U	2.9 U	2.35 U
Ethylbenzene	10000000	70000	ug/kg	2.45 U	2.4 U	2.05 U	2.35 U	2.55 U	2.25 U	2.9 U	2.35 U
Isopropylbenzene	7700000	600000	ug/kg	2.45 U	2.4 U	2.05 U	2.35 U	2.55 U	2.25 U	2.9 U	2.35 U
Methyl acetate	10000000	3700000	ug/kg	2.45 U	2.4 U	2.05 U	2.35 U	2.55 U	2.25 U	2.9 U	2.35 U
Methylcyclohexane	NSA	NSA	ug/kg	2.45 U	2.4 U	2.05 U	2.35 U	2.55 U	2.25 U	2.9 U	2.35 U
Methylene Chloride	950000	500	ug/kg	2.45 U	2.4 U	2.05 U	2.35 U	2.55 U	2.25 U	2.9 U	2.35 U
Tetrachloroethene	340000	500	ug/kg	2.45 U	2.4 U	2.05 U	2.35 U	2.55 U	2.25 U	2.9 U	2.35 U
Toluene	10000000	100000	ug/kg	2.45 U	2.4 U	2.05 U	2.35 U	2.55 U	2.25 U	2.9 U	2.35 U
Trichloroethene	260000	500	ug/kg	2.45 U	2.4 U	2.05 U	2.35 U	2.55 UL	2.25 U	2.9 U	2.35 U

Table 6-2 - Soil - Analytical Summary of Detected VOCs

			Location ID	UBZ2-SO-13	UBZ2-SO-13	UBZ2-SO-14	UBZ2-SO-14	UBZ2-SO-14	UBZ2-SO-15	UBZ2-SO-15	UBZ2-SO-15
			Sample Name	UBZ2-SO-13-5-7	UBZ2-SO-DUP11	UBZ2-SO-14-0.5-2	UBZ2-SO-14-5-7	UBZ2-SO-DUP12	UBZ2-SO-15-5-6	UBZ2-SO-15-7-8	UBZ2-SO-DUP08
			Date Sampled	1/6/2012	1/6/2012	1/6/2012	1/6/2012	1/6/2012	12/29/2011	12/29/2011	12/29/2011
			Parent Sample Name		UBZ2-SO-13-0.5-2			UBZ2-SO-14-0.5-2			UBZ2-SO-15-7-8
	Act 2 MSCs (Residential)[1]		Depth Interval	5-7	0.5-2	0.5-2	5-7	0.5-2	5-6	7-8	7-8
Analyte	**RDC MSC**	**RSGW**	**Unit**								
VOCs (SW8260)											
2-butanone	10000000	400000	ug/kg	11.5 U	12.5 U	12.5 U	12 U	12.5 U	11.5 U	10.5 U	11.5 U
2-hexanone	96000	1100	ug/kg	11.5 U	12.5 U	12.5 U	12 U	12.5 U	11.5 U	10.5 U	11.5 U
4-methyl-2-pentanone	10000000	290000	ug/kg	11.5 U	12.5 U	12.5 U	12 U	12.5 U	11.5 U	10.5 U	11.5 U
Acetone	10000000	3300000	ug/kg	11.5 U	12.5 U	12.5 U	12 U	12.5 U	16 B	9.7 B	9.1 B
Benzene	57000	500	ug/kg	2.35 U	2.5 U	2.55 U	2.4 U	2.45 U	2.3 U	2.15 U	2.35 U
Carbon disulfide	10000000	150000	ug/kg	2.35 U	2.5 U	2.55 U	2.4 U	2.45 U	2.3 U	2.15 U	2.35 U
Carbon tetrachloride	30000	500	ug/kg	2.35 U	2.5 U	2.55 U	2.4 U	2.45 U	2.3 U	2.15 U	2.35 U
Chloroform	19000	8000	ug/kg	2.35 U	2.5 U	2.55 U	2.4 U	2.45 U	2.3 U	2.15 U	2.35 U
Cis-1,2-dichloroethene	2200000	7000	ug/kg	2.35 U	2.5 U	2.55 U	2.4 U	2.45 U	2.3 U	2.15 U	2.35 U
Cyclohexane	10000000	1700000	ug/kg	2.35 U	2.5 U	2.55 U	2.4 U	2.45 U	2.3 U	2.15 U	2.35 U
Ethylbenzene	10000000	70000	ug/kg	2.35 U	2.5 U	2.55 U	2.4 U	2.45 U	2.3 U	2.15 U	2.35 U
Isopropylbenzene	7700000	600000	ug/kg	2.35 U	2.5 U	2.55 U	2.4 U	2.45 U	2.3 U	2.15 U	2.35 U
Methyl acetate	10000000	3700000	ug/kg	2.35 U	2.5 U	2.55 U	2.4 U	2.45 U	2.3 U	2.15 U	2.35 U
Methylcyclohexane	NSA	NSA	ug/kg	2.35 U	2.5 U	2.55 U	2.4 U	2.45 U	2.3 U	2.15 U	2.35 U
Methylene Chloride	950000	500	ug/kg	2.35 U	2.5 U	2.55 U	2.4 U	2.45 U	2.3 U	2.15 U	2.35 U
Tetrachloroethene	340000	500	ug/kg	2.35 U	2.5 U	2.55 U	2.4 U	2.45 U	2.3 U	2.15 U	2.35 U
Toluene	10000000	100000	ug/kg	2.35 U	2.5 U	2.55 U	2.4 U	2.45 U	2.3 U	2.15 U	2.35 U
Trichloroethene	260000	500	ug/kg	2.35 U	2.5 U	2.55 U	2.4 U	2.45 U	2.3 U	2.15 U	2.35 U

Table 6-2 - Soil - Analytical Summary of Detected VOCs

			Location ID	UBZ2-SO-16	UBZ2-SO-16	UBZ2-SO-17	UBZ2-SO-17	UBZ2-SO-18	UBZ2-SO-18	UBZ2-SO-18	UBZ2-SO-19
			Sample Name	UBZ2-SO-16-1-2	UBZ2-SO-16-5-7	UBZ2-SO-17-0-2	UBZ2-SO-17-5-7	UBZ2-SO-18-10-11	UBZ2-SO-18-5-6	UBZ2-SO-DUP9	UBZ2-SO-19-0.5-1.5
			Date Sampled	1/9/2012	1/9/2012	1/5/2012	1/5/2012	12/30/2011	12/30/2011	12/30/2011	12/30/2011
			Parent Sample Name							UBZ2-SO-18-10-11	
	Act 2 MSCs (Residential)[1]		Depth Interval	1-2	5-7	0-2	5-7	10-11	5-6	10-11	0.5-1.5
Analyte	**RDC MSC**	**RSGW**	**Unit**								
VOCs (SW8260)											
2-butanone	10000000	400000	ug/kg	12 U	10.5 U	12 UJ	12.5 U	13 U	10 U	13 U	12 U
2-hexanone	96000	1100	ug/kg	12 U	10.5 U	12 UJ	12.5 U	13 U	10 U	13 U	12 U
4-methyl-2-pentanone	10000000	290000	ug/kg	12 U	10.5 U	12 UJ	12.5 U	13 U	10 U	13 U	12 U
Acetone	10000000	3300000	ug/kg	12 U	10.5 U	12 UJ	9.5 J	20 J	9.7 J	13 U	10 J
Benzene	57000	500	ug/kg	2.4 U	2.1 U	2.45 UJ	2.5 U	2.55 U	2.05 U	2.6 U	2.4 U
Carbon disulfide	10000000	150000	ug/kg	2.4 U	2.1 U	2.45 UJ	2.5 U	2.55 U	2.05 U	2.6 U	2.4 U
Carbon tetrachloride	30000	500	ug/kg	2.4 U	2.1 U	2.45 UJ	2.5 U	2.55 U	2.05 U	2.6 U	2.4 U
Chloroform	19000	8000	ug/kg	2.4 U	2.1 U	2.45 UJ	2.5 U	2.55 U	2.05 U	2.6 U	2.4 U
Cis-1,2-dichloroethene	2200000	7000	ug/kg	2.4 U	2.1 U	2.45 UJ	2.5 U	2.55 U	2.05 U	2.6 U	2.4 U
Cyclohexane	10000000	1700000	ug/kg	2.4 U	2.1 U	2.45 UJ	2.5 U	2.55 U	2.05 U	2.6 U	2.4 U
Ethylbenzene	10000000	70000	ug/kg	2.4 U	2.1 U	2.45 UJ	2.5 U	2.55 U	2.05 U	2.6 U	2.4 U
Isopropylbenzene	7700000	600000	ug/kg	2.4 U	2.1 U	2.45 UJ	2.5 U	2.55 U	2.05 U	2.6 U	2.4 U
Methyl acetate	10000000	3700000	ug/kg	2.4 U	2.1 U	2.45 UJ	2.5 U	2.55 U	2.05 U	2.6 U	2.4 U
Methylcyclohexane	NSA	NSA	ug/kg	2.4 U	2.1 U	2.45 UJ	2.5 U	2.55 U	2.05 U	2.6 U	2.4 U
Methylene Chloride	950000	500	ug/kg	2.4 U	2.1 U	2.45 UJ	2.5 U	2.55 U	2.05 U	2.6 U	2.4 U
Tetrachloroethene	340000	500	ug/kg	2.4 U	2.1 U	2.45 UJ	2.5 U	2.55 U	2.05 U	2.6 U	2.4 U
Toluene	10000000	100000	ug/kg	2.4 U	2.1 U	2.45 UJ	2.5 U	2.55 U	2.05 U	2.6 U	2.4 U
Trichloroethene	260000	500	ug/kg	2.4 U	2.1 U	2.45 UJ	2.5 U	2.55 U	2.05 U	2.6 U	2.4 U

Table 6-2 - Soil - Analytical Summary of Detected VOCs

			Location ID	UBZ2-SO-19	UBZ2-SO-20	UBZ2-SO-20	UBZ2-SO-21	UBZ2-SO-21	UBZ2-SO-22	UBZ2-SO-22	UBZ2-SO-23
			Sample Name	UBZ2-SO-19-7-8	UBZ2-SO-20-1-2	UBZ2-SO-20-5.5-6.5	UBZ2-SO-21-10-11	UBZ2-SO-21-5-6	UBZ2-SO-22-1-2	UBZ2-SO-22-8-9	UBZ2-SO-23-1-2
			Date Sampled	12/30/2011	12/28/2011	12/28/2011	12/28/2011	12/28/2011	1/9/2012	1/9/2012	12/30/2011
			Parent Sample Name								
	Act 2 MSCs (Residential)[1]		Depth Interval	7-8	1-2	5.5-6.5	10-11	5-6	1-2	8-9	1-2
Analyte	**RDC MSC**	**RSGW**	**Unit**								
VOCs (SW8260)											
2-butanone	10000000	400000	ug/kg	10.5 U	11.5 U	14.5 U	12 U	13 U	12 U	11 U	11 U
2-hexanone	96000	1100	ug/kg	10.5 U	11.5 U	14.5 U	12 U	13 U	12 U	11 U	11 U
4-methyl-2-pentanone	10000000	290000	ug/kg	10.5 U	11.5 U	14.5 U	12 U	13 U	12 U	11 U	11 U
Acetone	10000000	3300000	ug/kg	18 J	11.5 U	14.5 U	35	13 U	12 U	11 U	11 U
Benzene	57000	500	ug/kg	2.15 U	2.3 U	2.95 U	2.35 U	2.6 U	2.4 U	2.2 U	2.25 U
Carbon disulfide	10000000	150000	ug/kg	2.15 U	2.3 U	2.95 U	2.35 U	2.6 U	2.4 U	2.2 U	2.25 U
Carbon tetrachloride	30000	500	ug/kg	2.15 U	2.3 U	2.95 U	2.35 U	2.6 U	2.4 U	2.2 U	2.25 U
Chloroform	19000	8000	ug/kg	2.15 U	2.3 U	2.95 U	2.35 U	2.6 U	2.4 U	2.2 U	2.25 U
Cis-1,2-dichloroethene	2200000	7000	ug/kg	2.15 U	2.3 U	2.95 U	2.35 U	2.6 U	2.4 U	2.2 U	2.25 U
Cyclohexane	10000000	1700000	ug/kg	2.15 U	2.3 U	2.95 U	2.35 U	2.6 U	2.4 U	2.2 U	2.25 U
Ethylbenzene	10000000	70000	ug/kg	2.15 U	2.3 U	2.95 U	2.35 U	2.6 U	2.4 U	2.2 U	2.25 U
Isopropylbenzene	7700000	600000	ug/kg	2.15 U	2.3 U	2.95 U	2.35 U	2.6 U	2.4 U	2.2 U	2.25 U
Methyl acetate	10000000	3700000	ug/kg	2.15 U	2.3 U	2.95 U	2.35 U	2.6 U	2.4 U	2.2 U	2.25 U
Methylcyclohexane	NSA	NSA	ug/kg	2.15 U	2.3 U	2.95 U	2.35 U	2.6 U	2.4 U	2.2 U	2.25 U
Methylene Chloride	950000	500	ug/kg	2.15 U	2.3 U	2.95 U	2.35 U	2.6 U	2.4 U	2.2 U	2.2 B
Tetrachloroethene	340000	500	ug/kg	2.15 U	2.3 U	2.95 U	2.35 U	2.6 U	2.4 U	2.2 U	2.25 U
Toluene	10000000	100000	ug/kg	2.15 U	2.3 U	2.95 U	2.35 U	2.6 U	2.4 U	2.2 U	2.25 U
Trichloroethene	260000	500	ug/kg	2.15 U	2.3 U	2.95 U	2.35 U	2.6 U	2.4 U	2.2 U	2.25 U

Table 6-2 - Soil - Analytical Summary of Detected VOCs

			Location ID	UBZ2-SO-23	UBZ2-SO-24	UBZ2-SO-24	UBZ2-SO-25	UBZ2-SO-25	UBZ2-SO-26	UBZ2-SO-26	UBZ2-SO-27
			Sample Name	UBZ2-SO-23-5-7	UBZ2-SO-24-11-12	UBZ2-SO-24-6-7	UBZ2-SO-25-0-1	UBZ2-SO-25-1-2	UBZ2-SO-26-0-1	UBZ2-SO-26-6-7	UBZ2-SO-27-0.5-1.5
			Date Sampled	12/30/2011	12/30/2011	12/30/2011	12/30/2011	12/30/2011	12/28/2011	12/28/2011	12/28/2011
			Parent Sample Name								
	Act 2 MSCs (Residential)[1]		Depth Interval	5-7	11-12	6-7	0-1	1-2	0-1	6-7	0.5-1.5
Analyte	**RDC MSC**	**RSGW**	**Unit**								
VOCs (SW8260)											
2-butanone	10000000	400000	ug/kg	12 U	12 U	11 U	14 U	12 U	16.5 U	12.5 U	12.5 U
2-hexanone	96000	1100	ug/kg	12 U	12 U	11 U	14 U	12 U	16.5 U	12.5 U	12.5 U
4-methyl-2-pentanone	10000000	290000	ug/kg	12 U	12 U	11 U	14 U	12 U	16.5 U	12.5 U	12.5 U
Acetone	10000000	3300000	ug/kg	12 U	15 J	17 J	10 J	19 J	16.5 U	12.5 U	12.5 U
Benzene	57000	500	ug/kg	2.35 U	2.45 U	2.15 U	2.85 U	2.4 U	3.25 U	2.5 U	2.45 U
Carbon disulfide	10000000	150000	ug/kg	2.35 U	2.45 U	2.15 U	2.85 U	2.4 U	3.25 U	2.5 U	2.45 U
Carbon tetrachloride	30000	500	ug/kg	2.35 U	2.45 U	2.15 U	2.85 U	2.4 U	3.25 U	2.5 U	2.45 U
Chloroform	19000	8000	ug/kg	2.35 U	2.45 U	2.15 U	2.85 U	2.4 U	3.25 U	2.5 U	2.45 U
Cis-1,2-dichloroethene	2200000	7000	ug/kg	2.35 U	2.45 U	2.15 U	2.85 U	2.4 U	3.25 U	2.5 U	2.45 U
Cyclohexane	10000000	1700000	ug/kg	2.35 U	2.45 U	2.15 U	2.85 U	2.4 U	3.25 U	2.5 U	2.45 U
Ethylbenzene	10000000	70000	ug/kg	2.35 U	2.45 U	2.15 U	2.85 U	2.4 U	3.25 U	2.5 U	2.45 U
Isopropylbenzene	7700000	600000	ug/kg	2.35 U	2.45 U	2.15 U	2.85 U	2.4 U	3.25 U	2.5 U	2.45 U
Methyl acetate	10000000	3700000	ug/kg	2.35 U	2.45 U	2.15 U	2.85 U	2.4 U	3.25 U	2.5 U	2.45 U
Methylcyclohexane	NSA	NSA	ug/kg	2.35 U	2.45 U	2.15 U	2.85 U	2.4 U	3.25 U	2.5 U	2.45 U
Methylene Chloride	950000	500	ug/kg	2.35 U	2.4 B	2.15 U	2.85 U	2.4 U	3.25 U	2.5 U	2.45 U
Tetrachloroethene	340000	500	ug/kg	2.35 U	2.45 U	2.15 U	2.85 U	2.4 U	3.25 U	2.5 U	2.45 U
Toluene	10000000	100000	ug/kg	2.35 U	2.45 U	2.15 U	2.85 U	2.4 U	3.25 U	2.5 U	2.45 U
Trichloroethene	260000	500	ug/kg	2.35 U	2.45 U	2.15 U	2.85 U	2.4 U	3.25 U	2.5 U	2.45 U

Table 6-2 - Soil - Analytical Summary of Detected VOCs

			Location ID	UBZ2-SO-27	UBZ2-SO-28	UBZ2-SO-28	UBZ2-SO-29	UBZ2-SO-29	UBZ2-SO-29	UBZ2-SO-30
			Sample Name	UBZ2-SO-27-12.5-13.5	UBZ2-SO-28-0-1	UBZ2-SO-28-11-12	UBZ2-SO-29-0.5-1.5	UBZ2-SO-29-6.5-8.5	UBZ2-SO-Dup14	UBZ2-SO-30-2-3
			Date Sampled	12/28/2011	12/28/2011	12/28/2011	1/16/2012	1/16/2012	1/16/2012	1/16/2012
			Parent Sample Name						UBZ2-SO-29-6.5-8.5	
	Act 2 MSCs (Residential)[1]		Depth Interval	12.5-13.5	0-1	11-12	0.5-1.5	6.5-8.5	6.5-8.5	2-3
Analyte	**RDC MSC**	**RSGW**	**Unit**							
VOCs (SW8260)										
2-butanone	10000000	400000	ug/kg	12.5 U	12.5 U	10.5 U	11.5 U	11 U	12.5 U	11 U
2-hexanone	96000	1100	ug/kg	12.5 U	12.5 U	10.5 U	11.5 U	11 U	12.5 U	11 U
4-methyl-2-pentanone	10000000	290000	ug/kg	12.5 U	12.5 U	10.5 U	11.5 U	11 U	12.5 U	11 U
Acetone	10000000	3300000	ug/kg	12.5 U	12.5 U	10.5 U	11.5 U	11 U	12.5 U	11 U
Benzene	57000	500	ug/kg	2.5 U	2.5 U	2.05 U	2.3 U	2.15 U	2.45 U	2.2 U
Carbon disulfide	10000000	150000	ug/kg	2.5 U	2.5 U	2.05 U	2.3 U	2.15 U	2.45 U	2.2 U
Carbon tetrachloride	30000	500	ug/kg	2.5 U	2.5 U	2.05 U	2.3 U	2.15 U	2.45 U	2.2 U
Chloroform	19000	8000	ug/kg	2.5 U	2.5 U	2.05 U	2.3 U	2.15 U	2.45 U	2.2 U
Cis-1,2-dichloroethene	2200000	7000	ug/kg	2.5 U	2.5 U	2.05 U	2.3 U	2.15 U	2.45 U	2.2 U
Cyclohexane	10000000	1700000	ug/kg	2.5 U	2.5 U	2.05 U	2.3 U	2.15 U	2.45 U	2.2 U
Ethylbenzene	10000000	70000	ug/kg	2.5 U	2.5 U	2.05 U	2.3 U	2.15 U	2.45 U	2.2 U
Isopropylbenzene	7700000	600000	ug/kg	2.5 U	2.5 U	2.05 U	2.3 U	2.15 U	2.45 U	2.2 U
Methyl acetate	10000000	3700000	ug/kg	2.5 U	2.5 U	2.05 U	2.3 U	2.15 U	2.45 U	2.2 U
Methylcyclohexane	NSA	NSA	ug/kg	2.5 U	2.5 U	2.05 U	2.3 U	2.15 U	2.45 U	2.2 U
Methylene Chloride	950000	500	ug/kg	2.5 U	2.5 U	2.05 U	2.3 U	2.15 U	2.45 U	2.2 U
Tetrachloroethene	340000	500	ug/kg	2.5 U	2.5 U	2.05 U	2.3 U	2.15 U	2.45 U	2.2 U
Toluene	10000000	100000	ug/kg	2.5 U	2.5 U	2.05 U	2.3 U	2.15 U	2.45 U	2.2 U
Trichloroethene	260000	500	ug/kg	2.5 U	2.5 U	2.05 U	2.3 U	2.15 U	2.45 U	2.2 U

Table 6-2 - Soil - Analytical Summary of Detected VOCs

			Location ID	UBZ2-SO-30	UBZ2-SO-31	UBZ2-SO-31	UBZ2-SO-32	UBZ2-SO-32	UBZ2-SO-33	UBZ2-SO-33	UBZ2-SO-34
			Sample Name	UBZ2-SO-30-7-8	UBZ2-SO-31-1-2	UBZ2-SO-31-3-4	UBZ2-SO-32-0-1	UBZ2-SO-32-6-7	UBZ2-SO-33-0-2	UBZ2-SO-33-3-4	UBZ2-SO-34-11-12
			Date Sampled	1/16/2012	12/29/2011	12/29/2011	12/30/2011	12/30/2011	12/30/2011	12/30/2011	12/28/2011
			Parent Sample Name								
	Act 2 MSCs (Residential)[1]		Depth Interval	7-8	1-2	3-4	0-1	6-7	0-2	3-4	11-12
Analyte	**RDC MSC**	**RSGW**	**Unit**								
VOCs (SW8260)											
2-butanone	10000000	400000	ug/kg	12 U	10.5 UJ	12 UJ	12.5 U	11.5 U	10.5 U	12.5 U	13.5 U
2-hexanone	96000	1100	ug/kg	12 U	10.5 UJ	12 UJ	12.5 U	11.5 U	10.5 U	12.5 U	13.5 U
4-methyl-2-pentanone	10000000	290000	ug/kg	12 U	10.5 UJ	12 UJ	12.5 U	11.5 U	10.5 U	12.5 U	13.5 U
Acetone	10000000	3300000	ug/kg	12 U	7.1 B	8.4 B	12.5 U	11.5 U	10.5 U	12.5 U	13.5 U
Benzene	57000	500	ug/kg	2.4 U	2.15 UJ	2.4 UJ	2.5 U	2.3 U	2.15 U	2.45 U	2.7 U
Carbon disulfide	10000000	150000	ug/kg	2.4 U	2.15 UJ	2.4 UJ	2.5 U	2.3 U	2.15 U	2.45 U	2.7 U
Carbon tetrachloride	30000	500	ug/kg	2.4 U	2.15 UJ	2.4 UJ	2.5 U	2.3 U	2.15 U	2.45 U	2.7 U
Chloroform	19000	8000	ug/kg	2.4 U	2.15 UJ	2.4 UJ	2.5 U	2.3 U	2.15 U	2.45 U	2.7 U
Cis-1,2-dichloroethene	2200000	7000	ug/kg	2.4 U	2.15 UJ	2.4 UJ	2.5 U	2.3 U	2.15 U	2.45 U	2.7 U
Cyclohexane	10000000	1700000	ug/kg	2.4 U	2.15 UJ	2.4 UJ	2.5 U	2.3 U	2.15 U	2.45 U	2.7 U
Ethylbenzene	10000000	70000	ug/kg	2.4 U	2.15 UJ	2.4 UJ	2.5 U	2.3 U	2.15 U	2.45 U	2.7 U
Isopropylbenzene	7700000	600000	ug/kg	2.4 U	2.15 UJ	2.4 UJ	2.5 U	2.3 U	2.15 U	2.45 U	2.7 U
Methyl acetate	10000000	3700000	ug/kg	2.4 U	2.15 UJ	2.4 UJ	2.5 U	2.3 U	2.15 U	2.45 U	2.7 U
Methylcyclohexane	NSA	NSA	ug/kg	2.4 U	2.15 UJ	2.4 UJ	2.5 U	2.3 U	2.15 U	2.45 U	2.7 U
Methylene Chloride	950000	500	ug/kg	2.4 U	2.15 UJ	2.4 UJ	2.5 U	2.3 U	2.15 U	2.45 U	2.7 U
Tetrachloroethene	340000	500	ug/kg	2.4 U	2.15 UJ	2.4 UJ	2.5 U	2.3 U	2.15 U	2.45 U	2.7 U
Toluene	10000000	100000	ug/kg	2.4 U	2.15 UJ	2.4 UJ	2.5 U	2.3 U	2.15 U	2.45 U	2.7 U
Trichloroethene	260000	500	ug/kg	2.4 U	2.15 UJ	2.4 UJ	2.5 U	2.3 U	2.15 U	2.45 U	2.7 U

Table 6-2 - Soil - Analytical Summary of Detected VOCs

			Location ID	UBZ2-SO-34	UBZ2-SO-35	UBZ2-SO-35	UBZ2-SO-36	UBZ2-SO-36	UBZ2-SO-37	UBZ2-SO-37	UBZ2-SO-38
			Sample Name	UBZ2-SO-34-5-6	UBZ2-SO-35-0-2	UBZ2-SO-35-5-7	UBZ2-SO-36-11-12	UBZ2-SO-36-5-6	UBZ2-SO-37-1-2	UBZ2-SO-37-2-2.5	UBZ2-SO-38-0-2
			Date Sampled	12/28/2011	1/5/2012	1/5/2012	12/30/2011	12/30/2011	12/30/2011	12/30/2011	12/27/2011
			Parent Sample Name								
	Act 2 MSCs (Residential)[1]		Depth Interval	5-6	0-2	5-7	11-12	5-6	1-2	2-2.5	0-2
Analyte	**RDC MSC**	**RSGW**	**Unit**								
VOCs (SW8260)											
2-butanone	10000000	400000	ug/kg	10 U	12 UJ	13.5 U	12.5 U	9.5 U	12 U	11.5 U	12.5 U
2-hexanone	96000	1100	ug/kg	10 U	12 UJ	13.5 U	12.5 U	9.5 U	12 U	11.5 U	12.5 U
4-methyl-2-pentanone	10000000	290000	ug/kg	10 U	12 UJ	13.5 U	12.5 U	9.5 U	12 U	11.5 U	12.5 U
Acetone	10000000	3300000	ug/kg	5.8 B	12 UJ	11 J	12.5 U	30	12 U	11.5 U	12.5 U
Benzene	57000	500	ug/kg	2.05 U	2.4 UJ	2.65 U	2.45 U	1.95 U	2.35 U	2.25 U	2.45 U
Carbon disulfide	10000000	150000	ug/kg	2.05 U	2.4 UJ	2.65 U	2.45 U	1.95 U	2.35 U	2.25 U	2.45 U
Carbon tetrachloride	30000	500	ug/kg	2.05 U	2.4 UJ	2.65 U	2.45 U	1.95 U	2.35 U	2.25 U	2.45 U
Chloroform	19000	8000	ug/kg	2.05 U	2.4 UJ	2.65 U	2.45 U	1.95 U	2.35 U	2.25 U	2.45 U
Cis-1,2-dichloroethene	2200000	7000	ug/kg	2.05 U	2.4 UJ	2.65 U	2.45 U	1.95 U	2.35 U	2.25 U	2.45 U
Cyclohexane	10000000	1700000	ug/kg	2.05 U	2.4 UJ	2.65 U	2.45 U	1.95 U	2.35 U	2.25 U	2.45 U
Ethylbenzene	10000000	70000	ug/kg	2.05 U	2.4 UJ	2.65 U	2.45 U	1.95 U	2.35 U	2.25 U	2.45 U
Isopropylbenzene	7700000	600000	ug/kg	2.05 U	2.4 UJ	2.65 U	2.45 U	1.95 U	2.35 U	2.25 U	2.45 U
Methyl acetate	10000000	3700000	ug/kg	2.05 U	2.4 UJ	2.65 U	2.45 U	1.95 U	2.35 U	2.25 U	2.45 U
Methylcyclohexane	NSA	NSA	ug/kg	2.05 U	2.4 UJ	2.65 U	2.45 U	1.95 U	2.35 U	2.25 U	2.45 U
Methylene Chloride	950000	500	ug/kg	2.05 U	2.4 UJ	2.65 U	2.45 U	1.95 U	2.35 U	2.25 U	9.4
Tetrachloroethene	340000	500	ug/kg	2.05 U	3 J	2.65 U	2.45 U	1.95 U	2.35 U	2.25 U	2.45 U
Toluene	10000000	100000	ug/kg	2.05 U	2.4 UJ	2.65 U	2.45 U	1.95 U	2.35 U	2.25 U	2.45 U
Trichloroethene	260000	500	ug/kg	2.05 U	2.2 J	2.65 U	2.45 U	1.95 U	2.35 U	2.25 U	2.6 J

Table 6-2 - Soil - Analytical Summary of Detected VOCs

			Location ID	UBZ2-SO-38	UBZ2-SO-40	UBZ2-SO-40	UBZ2-SO-41	UBZ2-SO-41	UBZ2-SO-41	UBZ2-SO-42	UBZ2-SO-42
			Sample Name	UBZ2-SO-38-5-7	UBZ2-SO-40-0.5-1.5	UBZ2-SO-40-11-12	UBZ2-SO-41-4-5	UBZ2-SO-41-5-7	UBZ2-SO-DUP6	UBZ2-SO-42-5-6	UBZ2-SO-42-7-8
			Date Sampled	12/27/2011	12/27/2011	12/27/2011	12/27/2011	12/27/2011	12/27/2011	12/21/2011	12/21/2011
			Parent Sample Name						UBZ2-SO-41-5-7		
	Act 2 MSCs (Residential)[1]		Depth Interval	5-7	0.5-1.5	11-12	4-5	5-7	5-7	5-6	7-8
Analyte	**RDC MSC**	**RSGW**	**Unit**								
VOCs (SW8260)											
2-butanone	10000000	400000	ug/kg	12.5 U	9.5 U	11 U	13.5 U	10.5 U	16.5 U	13.5 U	16 U
2-hexanone	96000	1100	ug/kg	12.5 U	9.5 U	11 U	13.5 U	10.5 U	16.5 U	13.5 U	16 U
4-methyl-2-pentanone	10000000	290000	ug/kg	12.5 U	9.5 U	11 U	13.5 U	10.5 U	16.5 U	13.5 U	16 U
Acetone	10000000	3300000	ug/kg	12.5 U	9.5 U	7.2 B	13.5 U	10.5 U	15 B	13.5 U	16 U
Benzene	57000	500	ug/kg	2.5 U	1.9 U	2.25 U	2.75 U	2.15 U	3.35 U	2.7 U	3.15 U
Carbon disulfide	10000000	150000	ug/kg	2.5 U	1.9 U	2.25 U	2.75 U	2.15 U	3.35 U	2.7 U	3.15 U
Carbon tetrachloride	30000	500	ug/kg	2.5 U	1.9 U	2.25 U	2.75 U	2.15 U	3.35 U	2.7 U	3.15 U
Chloroform	19000	8000	ug/kg	2.5 U	1.9 U	2.25 U	2.75 U	2.15 U	3.35 U	2.7 U	3.15 U
Cis-1,2-dichloroethene	2200000	7000	ug/kg	2.5 U	1.9 U	2.25 U	2.75 U	2.15 U	3.35 U	2.7 U	3.15 U
Cyclohexane	10000000	1700000	ug/kg	2.5 U	1.9 U	2.25 U	2.75 U	2.15 U	3.35 U	2.7 U	3.15 U
Ethylbenzene	10000000	70000	ug/kg	2.5 U	1.9 U	2.25 U	2.75 U	2.15 U	3.35 U	2.7 U	3.15 U
Isopropylbenzene	7700000	600000	ug/kg	2.5 U	1.9 U	2.25 U	2.75 U	2.15 U	3.35 U	2.7 U	3.15 U
Methyl acetate	10000000	3700000	ug/kg	2.5 U	1.9 U	2.25 U	2.75 U	2.15 U	3.35 U	2.7 U	3.15 U
Methylcyclohexane	NSA	NSA	ug/kg	2.5 U	1.9 U	2.25 U	2.75 U	2.15 U	3.35 U	2.7 U	3.15 U
Methylene Chloride	950000	500	ug/kg	2.5 U	1.9 U	2.25 U	2.75 U	2.15 U	3.35 U	23 J	20
Tetrachloroethene	340000	500	ug/kg	2.5 U	1.9 U	2.25 U	2.75 U	2.15 U	3.35 U	2.7 U	3.15 U
Toluene	10000000	100000	ug/kg	2.5 U	1.9 U	2.25 U	2.75 U	2.15 U	3.35 U	2.7 U	3.15 U
Trichloroethene	260000	500	ug/kg	2.5 U	1.9 U	2.25 U	2.75 U	2.15 U	3.35 U	2.7 U	3.15 U

Table 6-2 - Soil - Analytical Summary of Detected VOCs

			Location ID	UBZ2-SO-43	UBZ2-SO-43	UBZ2-SO-43	UBZ2-SO-45	UBZ2-SO-45	UBZ2-SO-46	UBZ2-SO-46	UBZ2-SO-47
			Sample Name	UBZ2-SO-43-13-14	UBZ2-SO-43-9-10	UBZ2-SO-DUP5	UBZ2-SO-45-1-2	UBZ2-SO-45-5-6	UBZ2-SO-46-0-1	UBZ2-SO-46-7-8	UBZ2-SO-47-0-1
			Date Sampled	12/21/2011	12/21/2011	12/21/2011	12/22/2011	12/22/2011	12/22/2011	12/22/2011	12/22/2011
			Parent Sample Name			UBZ2-SO-43-9-10					
	Act 2 MSCs (Residential)[1]		Depth Interval	13-14	9-10	9-10	1-2	5-6	0-1	7-8	0-1
Analyte	**RDC MSC**	**RSGW**	**Unit**								
VOCs (SW8260)											
2-butanone	10000000	400000	ug/kg	10.5 U	15.5 U	12.5 U	14.5 U	11.5 U	10.5 U	12 U	12.5 U
2-hexanone	96000	1100	ug/kg	10.5 U	15.5 U	12.5 U	14.5 U	11.5 U	10.5 U	12 U	12.5 U
4-methyl-2-pentanone	10000000	290000	ug/kg	10.5 U	15.5 U	12.5 U	14.5 U	11.5 U	10.5 U	12 U	12.5 U
Acetone	10000000	3300000	ug/kg	12 J	15.5 U	9.4 J	14.5 U	11.5 U	10.5 U	11 J	12.5 U
Benzene	57000	500	ug/kg	2.1 U	3.05 U	2.45 U	2.9 U	2.25 U	2.1 U	2.4 U	2.55 U
Carbon disulfide	10000000	150000	ug/kg	2.1 U	3.05 U	2.45 U	2.9 U	2.25 U	2.1 U	2.4 U	2.55 U
Carbon tetrachloride	30000	500	ug/kg	2.1 U	3.05 U	2.45 U	2.9 U	2.25 U	2.1 U	2.4 U	2.55 U
Chloroform	19000	8000	ug/kg	2.1 U	3.05 U	2.45 U	2.9 U	2.25 U	2.1 U	2.4 U	2.55 U
Cis-1,2-dichloroethene	2200000	7000	ug/kg	2.1 U	3.05 U	2.45 U	2.9 U	2.25 U	2.1 U	2.4 U	2.55 U
Cyclohexane	10000000	1700000	ug/kg	2.1 U	3.05 U	2.45 U	2.9 U	2.25 U	2.1 U	2.4 U	2.55 U
Ethylbenzene	10000000	70000	ug/kg	2.1 U	3.05 U	2.45 U	2.9 U	2.25 U	2.1 U	2.4 U	2.55 U
Isopropylbenzene	7700000	600000	ug/kg	2.1 U	3.05 U	2.45 U	2.9 U	2.25 U	2.1 U	2.4 U	2.55 U
Methyl acetate	10000000	3700000	ug/kg	2.1 U	3.05 U	2.45 U	2.9 U	2.25 U	2.1 U	2.4 U	2.55 U
Methylcyclohexane	NSA	NSA	ug/kg	2.1 U	3.05 U	2.45 U	2.9 U	2.25 U	2.1 U	2.4 U	2.55 U
Methylene Chloride	950000	500	ug/kg	2.1 U	35 J	23 K	2.9 U	3 J	2.1 U	2.4 U	2.55 U
Tetrachloroethene	340000	500	ug/kg	2.1 U	3.05 U	2.45 U	2.9 U	2.25 U	2.1 U	2.4 U	2.55 U
Toluene	10000000	100000	ug/kg	2.1 U	3.05 U	2.45 U	2.9 U	2.25 U	2.1 U	2.4 U	2.55 U
Trichloroethene	260000	500	ug/kg	2.1 U	3.05 U	2.45 U	2.9 U	2.25 U	2.1 U	2.4 U	2.55 U

Table 6-2 - Soil - Analytical Summary of Detected VOCs

			Location ID	UBZ2-SO-47	UBZ3-SO-01	UBZ3-SO-01	UBZ3-SO-01	UBZ3-SO-02	UBZ3-SO-02	UBZ3-SO-03	UBZ3-SO-03	UBZ3-SO-04
			Sample Name	UBZ2-SO-47-11-12	UBZ3-SO-1-1-2	UBZ3-SO-1-8-9	UBZ3-SO-DUP4	UBZ3-SO-2-14-15	UBZ3-SO-2-6-7	UBZ3-SO-3-1-2	UBZ3-SO-3-14-15	UBZ3-SO-4-13-14
			Date Sampled	12/22/2011	12/19/2011	12/19/2011	12/19/2011	12/19/2011	12/19/2011	12/19/2011	12/19/2011	12/29/2011
			Parent Sample Name				UBZ3-SO-1-8-9					
	Act 2 MSCs (Residential)[1]		Depth Interval	11-12	1-2	8-9	8-9	14-15	6-7	1-2	14-15	13-14
Analyte	**RDC MSC**	**RSGW**	**Unit**									
VOCs (SW8260)												
2-butanone	10000000	400000	ug/kg	12 U	7.9 J	13 U	12.5 U	15 J	14 J	13.5 U	12 U	15 K
2-hexanone	96000	1100	ug/kg	12 U	13 U	13 U	12.5 U	13 U	12 U	13.5 U	12 U	5.5 K
4-methyl-2-pentanone	10000000	290000	ug/kg	12 U	13 U	13 U	12.5 U	13 U	12 U	13.5 U	12 U	14 K
Acetone	10000000	3300000	ug/kg	12 U	92	19 J	12.5 U	73	78	13.5 U	12 U	51000 D
Benzene	57000	500	ug/kg	2.4 U	2.6 U	2.6 U	2.5 U	2.55 U	2.4 U	2.7 U	2.4 U	29 K
Carbon disulfide	10000000	150000	ug/kg	2.4 U	2.6 U	2.6 U	2.5 U	2.55 U	2.4 U	2.7 U	2.4 U	2.65 U
Carbon tetrachloride	30000	500	ug/kg	2.4 U	2.6 U	2.6 U	2.5 U	2.55 U	2.4 U	2.7 U	2.4 U	2.65 U
Chloroform	19000	8000	ug/kg	2.4 U	2.6 U	2.6 U	2.5 U	2.55 U	2.4 U	2.7 U	2.4 U	2.65 U
Cis-1,2-dichloroethene	2200000	7000	ug/kg	2.4 U	2.6 U	2.6 U	2.5 U	2.55 U	2.4 U	2.7 U	2.4 U	2.65 U
Cyclohexane	10000000	1700000	ug/kg	2.4 U	2.6 U	2.6 U	2.5 U	2.55 U	2.4 U	2.7 U	2.4 U	2.65 U
Ethylbenzene	10000000	70000	ug/kg	2.4 U	2.6 U	2.6 U	2.5 U	2.55 U	2.4 U	2.7 U	2.4 U	1600 D
Isopropylbenzene	7700000	600000	ug/kg	2.4 U	2.6 U	2.6 U	2.5 U	2.55 U	2.4 U	2.7 U	2.4 U	10000 D
Methyl acetate	10000000	3700000	ug/kg	2.4 U	2.6 U	2.6 U	2.5 U	2.55 U	2.4 U	2.7 U	2.4 U	2.65 U
Methylcyclohexane	NSA	NSA	ug/kg	2.4 U	2.6 U	2.6 U	2.5 U	2.55 U	2.4 U	2.7 U	2.4 U	2.65 U
Methylene Chloride	950000	500	ug/kg	2.4 U	2.6 U	20	15	2.55 U	11	2.7 U	2.4 U	2.65 U
Tetrachloroethene	340000	500	ug/kg	2.4 U	2.6 U	2.6 U	2.5 U	2.55 U	2.4 U	2.7 U	2.4 U	2.65 U
Toluene	10000000	100000	ug/kg	2.4 U	2.6 U	2.6 U	2.5 U	2.55 U	2.4 U	2.7 U	2.4 U	2.65 U
Trichloroethene	260000	500	ug/kg	2.4 U	2.6 U	2.6 U	2.5 U	2.55 U	2.4 U	2.7 U	2.4 U	2.65 U

Table 6-2 - Soil - Analytical Summary of Detected VOCs

			Location ID	UBZ3-SO-04	UBZ3-SO-05	UBZ3-SO-05	UBZ3-SO-06	UBZ3-SO-06	UBZ3-SO-07	UBZ3-SO-07	UBZ3-SO-08
			Sample Name	UBZ3-SO-4-3-4	UBZ3-SO-5-12-13	UBZ3-SO-5-2-3	UBZ3-SO-6-0.5-2	UBZ3-SO-6-6-7	UBZ3-SO-7-11-12	UBZ3-SO-7-5-6	UBZ3-SO-8-0.5-2
			Date Sampled	12/29/2011	12/29/2011	12/29/2011	12/29/2011	12/29/2011	12/19/2011	12/19/2011	12/19/2011
			Parent Sample Name								
	Act 2 MSCs (Residential)[1]		Depth Interval	3-4	12-13	2-3	0.5-2	6-7	11-11	5-6	0.5-2
Analyte	**RDC MSC**	**RSGW**	**Unit**								
VOCs (SW8260)											
2-butanone	10000000	400000	ug/kg	11 U	12.5 U	10.5 U	11.5 U	11 U	18 J	13.5 U	14.5 UJ
2-hexanone	96000	1100	ug/kg	11 U	12.5 U	10.5 U	11.5 U	11 U	10.5 U	13.5 U	14.5 UJ
4-methyl-2-pentanone	10000000	290000	ug/kg	11 U	12.5 U	10.5 U	11.5 U	11 U	10.5 U	13.5 U	14.5 UJ
Acetone	10000000	3300000	ug/kg	11 U	42	10.5 U	9.2 J	11 J	100	13.5 U	14.5 UJ
Benzene	57000	500	ug/kg	2.2 U	12	2.1 U	2.25 U	2.25 U	2.15 U	2.7 U	2.85 UJ
Carbon disulfide	10000000	150000	ug/kg	2.2 U	2.5 U	2.1 U	2.25 U	2.25 U	2.15 U	2.7 U	2.85 UJ
Carbon tetrachloride	30000	500	ug/kg	2.2 U	2.5 U	2.1 U	2.25 U	2.25 U	2.15 U	2.7 U	2.85 UJ
Chloroform	19000	8000	ug/kg	2.2 U	2.5 U	2.1 U	2.25 U	2.25 U	2.15 U	2.7 U	2.85 UJ
Cis-1,2-dichloroethene	2200000	7000	ug/kg	2.2 U	2.5 U	2.1 U	2.25 U	2.25 U	2.15 U	2.7 U	2.85 UJ
Cyclohexane	10000000	1700000	ug/kg	2.2 U	2.5 U	2.1 U	2.25 U	2.25 U	2.15 U	2.7 U	2.85 UJ
Ethylbenzene	10000000	70000	ug/kg	2.2 U	850 D	2.1 U	2.25 U	2.25 U	2.15 U	2.7 U	2.85 UR
Isopropylbenzene	7700000	600000	ug/kg	2.2 U	4100 D	2.1 U	2.25 U	2.25 U	2.15 U	2.7 U	2.85 UR
Methyl acetate	10000000	3700000	ug/kg	2.2 U	2.5 U	2.1 U	2.25 U	2.25 U	2.15 U	2.7 U	2.85 UJ
Methylcyclohexane	NSA	NSA	ug/kg	2.2 U	2.5 U	2.1 U	2.25 U	2.25 U	2.15 U	2.7 U	2.85 UJ
Methylene Chloride	950000	500	ug/kg	2.2 U	2.5 U	2.1 U	2.25 U	2.25 U	11	2.7 U	2.85 UJ
Tetrachloroethene	340000	500	ug/kg	2.2 U	2.5 U	2.1 U	2.25 U	2.25 U	2.15 U	2.7 U	2.85 UR
Toluene	10000000	100000	ug/kg	2.2 U	2.5 U	2.1 U	2.25 U	2.25 U	2.15 U	2.7 U	2.85 UJ
Trichloroethene	260000	500	ug/kg	2.2 U	2.5 U	2.1 U	2.25 U	2.25 U	2.15 U	6.9 L	2.85 UJ

Table 6-2 - Soil - Analytical Summary of Detected VOCs

			Location ID	UBZ3-SO-08	UBZ3-SO-09	UBZ3-SO-09	UBZ3-SO-10	UBZ3-SO-10	UBZ3-SO-10	UBZ3-SO-11	UBZ3-SO-11
			Sample Name	UBZ3-SO-8-39-40	UBZ3-SO-09-0-2	UBZ3-SO-09-5-7	UBZ3-SO-10-0-2	UBZ3-SO-10-13-14	UBZ3-SO-10-34.5-35	UBZ3-SO-11-13-15	UBZ3-SO-11-2-4
			Date Sampled	12/19/2011	12/16/2011	12/16/2011	12/16/2011	12/16/2011	12/16/2011	12/16/2011	12/16/2011
			Parent Sample Name								
	Act 2 MSCs (Residential)[1]		Depth Interval	39-40	0-2	5-7	0-2	13-14	34.5-35	13-15	2-4
Analyte	**RDC MSC**	**RSGW**	**Unit**								
VOCs (SW8260)											
2-butanone	10000000	400000	ug/kg	1400 U	13.5 U	12 U	14.5 U	11 J	19 J	14 U	13.5 U
2-hexanone	96000	1100	ug/kg	1400 U	13.5 U	12 U	14.5 U	11.5 U	11.5 U	14 U	13.5 U
4-methyl-2-pentanone	10000000	290000	ug/kg	1400 U	13.5 U	12 U	14.5 U	11.5 U	14 J	5.7 J	13.5 U
Acetone	10000000	3300000	ug/kg	140000 D	7.4 J	36	14.5 U	19000 D	34000 D	26000 D	13.5 U
Benzene	57000	500	ug/kg	600 D	2.7 U	2.4 U	2.9 U	18	91	19	2.7 U
Carbon disulfide	10000000	150000	ug/kg	280 U	2.7 U	2.4 U	2.9 U	3.7 J	8.4	2.75 U	2.7 U
Carbon tetrachloride	30000	500	ug/kg	280 U	2.7 U	2.4 U	2.9 U	2.25 U	2.3 U	2.75 U	2.7 U
Chloroform	19000	8000	ug/kg	280 U	2.7 U	2.4 U	2.9 U	2.25 U	2.3 U	2.75 U	2.7 U
Cis-1,2-dichloroethene	2200000	7000	ug/kg	280 U	2.7 U	2.4 U	2.9 U	2.25 U	2.3 U	2.75 U	2.7 U
Cyclohexane	10000000	1700000	ug/kg	280 U	2.7 U	2.4 U	2.9 U	2.25 U	2.3 U	2.75 U	2.7 U
Ethylbenzene	10000000	70000	ug/kg	5300 D	2.7 U	2.4 U	2.9 U	1200 D	3100 D	1500 D	2.7 U
Isopropylbenzene	7700000	600000	ug/kg	10000 D	2.7 U	2.4 U	2.9 U	13000 D	8500 D	4200 D	2.7 U
Methyl acetate	10000000	3700000	ug/kg	280 U	2.7 U	2.4 U	2.9 U	2.25 U	2.3 U	2.75 U	2.7 U
Methylcyclohexane	NSA	NSA	ug/kg	280 U	2.7 U	2.4 U	2.9 U	2.25 U	2.3 U	2.75 U	2.7 U
Methylene Chloride	950000	500	ug/kg	280 U	2.7 U	2.4 U	2.9 U	2.25 U	2.3 U	2.75 U	2.7 U
Tetrachloroethene	340000	500	ug/kg	280 U	2.7 U	2.4 U	2.9 U	2.25 U	2.3 U	2.75 U	2.7 U
Toluene	10000000	100000	ug/kg	280 U	2.7 U	2.4 U	2.9 U	2.25 U	4.4 J	2.75 U	2.7 U
Trichloroethene	260000	500	ug/kg	280 U	2.7 U	2.4 U	2.9 U	2.25 U	2.3 U	2.75 U	2.7 U

Table 6-2 - Soil - Analytical Summary of Detected VOCs

			Location ID	UBZ3-SO-12	UBZ3-SO-12	UBZ3-SO-12	UBZ3-SO-13	UBZ3-SO-13	UBZ3-SO-14	UBZ3-SO-14	UBZ3-SO-14
			Sample Name	UBZ3-SO-12-1-2	UBZ3-SO-12-14-15	UBZ3-SO-12-24-25	UBZ3-SO-13-0-2	UBZ3-SO-13-5-7	UBZ3-SO-14-0.5-1.5	UBZ3-SO-14-10-11	UBZ3-SO-14-38-39
			Date Sampled	12/19/2011	12/19/2011	12/19/2011	1/10/2012	1/10/2012	12/29/2011	12/29/2011	12/21/2011
			Parent Sample Name								
	Act 2 MSCs (Residential)[1]		Depth Interval	1-2	14-15	24-25	0-2	5-7	0.5-1.5	10-11	38-38
Analyte	**RDC MSC**	**RSGW**	**Unit**								
VOCs (SW8260)											
2-butanone	10000000	400000	ug/kg	12.5 U	14 J	17 J	11 U	11 U	11.5 U	12 U	14 U
2-hexanone	96000	1100	ug/kg	12.5 U	11.5 U	12.5 U	11 U	11 U	11.5 U	12 U	14 U
4-methyl-2-pentanone	10000000	290000	ug/kg	12.5 U	10 J	7.8 J	11 U	11 U	11.5 U	12 U	14 U
Acetone	10000000	3300000	ug/kg	12.5 U	34000 D	51000 D	11 U	11 U	11.5 U	12 U	14 U
Benzene	57000	500	ug/kg	2.45 U	33	53	2.2 U	2.25 U	2.3 U	2.4 U	2.8 U
Carbon disulfide	10000000	150000	ug/kg	2.45 U	2.35 U	2.45 U	2.2 U	2.25 U	2.3 U	2.4 U	2.8 U
Carbon tetrachloride	30000	500	ug/kg	2.45 U	2.35 U	2.45 U	2.2 U	2.25 U	2.3 U	2.4 U	2.8 U
Chloroform	19000	8000	ug/kg	2.45 U	2.35 U	2.45 U	2.2 U	2.25 U	2.3 U	2.4 U	2.8 U
Cis-1,2-dichloroethene	2200000	7000	ug/kg	2.45 U	2.35 U	2.45 U	2.2 U	2.25 U	2.3 U	2.4 U	2.3 J
Cyclohexane	10000000	1700000	ug/kg	2.45 U	2.35 U	2.45 U	2.2 U	2.25 U	2.3 U	2.4 U	2.8 U
Ethylbenzene	10000000	70000	ug/kg	2.45 U	960 D	6000 D	2.2 U	2.25 U	2.3 U	2.4 U	2.8 U
Isopropylbenzene	7700000	600000	ug/kg	2.1 J	5900 D	16000 D	2.2 U	2.25 U	2.3 U	2.4 U	2.8 U
Methyl acetate	10000000	3700000	ug/kg	2.45 U	2.35 U	2.45 U	2.2 U	2.25 U	2.3 U	2.4 U	2.8 U
Methylcyclohexane	NSA	NSA	ug/kg	2.45 U	2.35 U	2.45 U	2.2 U	2.25 U	2.3 U	2.4 U	2.8 U
Methylene Chloride	950000	500	ug/kg	13	2.35 U	2.45 U	2.2 U	2.25 U	2.3 U	2.4 U	25
Tetrachloroethene	340000	500	ug/kg	2.45 U	2.35 U	2.45 U	2.2 U	2.25 U	2.3 U	2.4 U	2.8 U
Toluene	10000000	100000	ug/kg	2.45 U	2.35 U	2.2 J	2.2 U	2.25 U	2.3 U	2.4 U	2.8 U
Trichloroethene	260000	500	ug/kg	2.45 U	2.35 U	2.45 U	2.2 U	2.25 U	2.3 U	2.4 U	2.8 U

Table 6-2 - Soil - Analytical Summary of Detected VOCs

			Location ID	UBZ3-SO-15	UBZ3-SO-15	UBZ3-SO-16	UBZ3-SO-16	UBZ3-SO-17	UBZ3-SO-17	UBZ3-SO-18	UBZ3-SO-18
			Sample Name	UBZ3-SO-15-12-13	UBZ3-SO-15-8-9	UBZ3-SO-16-2.5-3.5	UBZ3-SO-16-6-7	UBZ3-SO-17-12-14	UBZ3-SO-17-2-4	UBZ3-SO-18-4-5	UBZ3-SO-18-9-10
			Date Sampled	12/20/2011	12/20/2011	1/10/2012	1/10/2012	12/14/2011	12/14/2011	12/14/2011	12/14/2011
			Parent Sample Name								
	Act 2 MSCs (Residential)[1]		Depth Interval	12-13	8-8	2.5-3.5	6-7	12-14	2-4	4-5	9-10
Analyte	**RDC MSC**	**RSGW**	**Unit**								
VOCs (SW8260)											
2-butanone	10000000	400000	ug/kg	10 U	13.5 U	11 U	14 J	6.4 J	12.5 U	21 U	15.5 U
2-hexanone	96000	1100	ug/kg	10 U	13.5 U	11 U	14 U	10.5 U	12.5 U	21 U	15.5 U
4-methyl-2-pentanone	10000000	290000	ug/kg	10 U	13.5 U	11 U	14 U	10.5 U	12.5 U	21 U	15.5 U
Acetone	10000000	3300000	ug/kg	10 U	13.5 U	11 U	85 B	12000 D	11 J	19 J	7.7 J
Benzene	57000	500	ug/kg	2 U	2.7 U	2.2 U	2.8 U	20	2.55 U	4.25 U	3.15 U
Carbon disulfide	10000000	150000	ug/kg	2 U	2.7 U	2.2 U	2.8 U	2.15 U	2.55 U	4.25 U	3.15 U
Carbon tetrachloride	30000	500	ug/kg	2 U	2.7 U	2.2 U	2.8 U	2.15 U	2.55 U	4.25 U	3.15 U
Chloroform	19000	8000	ug/kg	2 U	2.7 U	2.2 U	2.8 U	2.15 U	2.55 U	4.25 U	3.15 U
Cis-1,2-dichloroethene	2200000	7000	ug/kg	2 U	2.7 U	2.2 U	2.8 U	2.15 U	2.55 U	4.25 U	3.15 U
Cyclohexane	10000000	1700000	ug/kg	2 U	2.7 U	2.2 U	2.8 U	2.15 U	2.55 U	4.25 U	3.15 U
Ethylbenzene	10000000	70000	ug/kg	2 U	2.7 U	2.2 U	2.8 U	1400 D	2.55 U	4.25 U	3.15 U
Isopropylbenzene	7700000	600000	ug/kg	2 U	2.7 U	2.2 U	2.8 U	3400 D	2.55 UJ	4.25 U	3.15 U
Methyl acetate	10000000	3700000	ug/kg	2 U	2.7 U	2.2 U	2.8 U	2.15 U	2.55 U	4.25 U	3.15 U
Methylcyclohexane	NSA	NSA	ug/kg	2 U	2.7 U	2.2 U	2.8 U	2.15 U	2.55 U	4.25 U	3.15 U
Methylene Chloride	950000	500	ug/kg	2 U	2.7 U	2.2 U	2.8 U	2.15 U	2.55 U	4.25 U	3.15 U
Tetrachloroethene	340000	500	ug/kg	2 U	2.7 U	2.2 U	2.8 U	2.15 U	2.55 U	4.25 U	3.15 U
Toluene	10000000	100000	ug/kg	2 U	2.7 U	2.2 U	2.8 U	2.15 U	2.55 U	4.25 U	3.15 U
Trichloroethene	260000	500	ug/kg	2 U	2.7 U	2.7 J	2.8 U	2.15 U	2.55 U	4.25 U	3.15 U

Table 6-2 - Soil - Analytical Summary of Detected VOCs

			Location ID	UBZ3-SO-19	UBZ3-SO-19	UBZ3-SO-20	UBZ3-SO-20	UBZ3-SO-21	UBZ3-SO-21	UBZ3-SO-22	UBZ3-SO-22
			Sample Name	UBZ3-SO-19-0-2	UBZ3-SO-19-2-3	UBZ3-SO-20-0.5-2	UBZ3-SO-20-5-6	UBZ3-SO-21-0-0.5	UBZ3-SO-21-5-6	UBZ3-SO-22-2-3	UBZ3-SO-22-4-5
			Date Sampled	4/20/2012	4/20/2012	12/12/2011	12/12/2011	12/12/2011	12/12/2011	12/20/2011	12/20/2011
			Parent Sample Name								
	Act 2 MSCs (Residential)[1]		Depth Interval	0-2	2-3	0.5-2	5-6	0-0.5	5-6	2-3	4-5
Analyte	**RDC MSC**	**RSGW**	**Unit**								
VOCs (SW8260)											
2-butanone	10000000	400000	ug/kg	8.5 U	13 U	NA	11.5 U	12.5 U	10 U	13 U	10.5 UJ
2-hexanone	96000	1100	ug/kg	8.5 U	13 U	11.5 U	11.5 U	8.5 J	10 U	13 U	10.5 UJ
4-methyl-2-pentanone	10000000	290000	ug/kg	8.5 U	13 U	11.5 U	11.5 U	12.5 U	10 U	13 U	10.5 UJ
Acetone	10000000	3300000	ug/kg	8.5 U	13 U	NA	13 J	6.5 J	7 J	13 U	10.5 UJ
Benzene	57000	500	ug/kg	1.65 U	2.55 U	NA	2.25 U	2.55 U	1.95 U	2.55 U	2.1 UJ
Carbon disulfide	10000000	150000	ug/kg	1.65 U	2.55 U	2.35 U	2.25 U	2.55 U	1.95 U	2.55 U	2.1 UJ
Carbon tetrachloride	30000	500	ug/kg	1.65 U	2.55 U	NA	2.25 U	2.55 U	1.95 U	2.55 U	2.1 UJ
Chloroform	19000	8000	ug/kg	1.65 U	2.55 U	NA	2.25 U	2.55 U	1.95 U	2.55 U	2.1 UJ
Cis-1,2-dichloroethene	2200000	7000	ug/kg	1.65 U	2.55 U	NA	2.25 U	2.55 U	1.95 U	2.55 U	2.1 UJ
Cyclohexane	10000000	1700000	ug/kg	1.65 U	2.55 U	2.35 U	2.25 U	2.55 U	1.95 U	2.55 U	2.1 UJ
Ethylbenzene	10000000	70000	ug/kg	1.65 U	2.55 U	NA	2.25 U	2.55 U	1.95 U	2.55 U	2.1 UJ
Isopropylbenzene	7700000	600000	ug/kg	1.65 U	2.55 U	2.35 U	2.25 U	2.55 U	1.95 U	2.55 U	2.1 UJ
Methyl acetate	10000000	3700000	ug/kg	1.65 U	2.55 U	2.35 U	2.25 U	2.55 U	1.95 U	2.55 U	2.1 UJ
Methylcyclohexane	NSA	NSA	ug/kg	1.65 U	2.55 U	2.35 U	2.25 U	2.55 U	1.95 U	2.55 U	2.1 UJ
Methylene Chloride	950000	500	ug/kg	1.4 J	8.8	NA	2.25 U	2.55 U	1.95 U	2.55 U	2.1 UJ
Tetrachloroethene	340000	500	ug/kg	1.65 U	2.55 U	NA	2.25 U	2.55 U	1.95 U	2.55 U	2.1 UJ
Toluene	10000000	100000	ug/kg	1.65 U	2.55 U	NA	2.25 U	2.55 U	1.95 U	2.55 U	2.1 UJ
Trichloroethene	260000	500	ug/kg	1.65 U	2.55 U	NA	2.25 U	2.55 U	1.95 U	2.55 U	2.1 UJ

Table 6-2 - Soil - Analytical Summary of Detected VOCs

			Location ID	UBZ3-SO-23	UBZ3-SO-23	UBZ3-SO-24	UBZ3-SO-24	UBZ3-SO-25	UBZ3-SO-25	UBZ3-SO-26	UBZ3-SO-26
			Sample Name	UBZ3-SO-23-0-2	UBZ3-SO-23-3-5	UBZ3-SO-24-0-2	UBZ3-SO-24-12-13	UBZ3-SO-25-0.5-2	UBZ3-SO-25-5-7	UBZ3-SO-26-0-3	UBZ3-SO-26-8-10
			Date Sampled	12/16/2011	12/16/2011	12/15/2011	12/15/2011	12/15/2011	12/15/2011	12/15/2011	12/15/2011
			Parent Sample Name								
	Act 2 MSCs (Residential)[1]		Depth Interval	0-2	3-5	0-2	12-13	0.5-2	5-7	0-3	8-10
Analyte	**RDC MSC**	**RSGW**	**Unit**								
VOCs (SW8260)											
2-butanone	10000000	400000	ug/kg	12 U	13 J	11 U	7.6 J	12.5 U	6.4 J	16 U	39
2-hexanone	96000	1100	ug/kg	12 U	12.5 U	11 U	13.5 U	12.5 U	11.5 U	16 U	13 U
4-methyl-2-pentanone	10000000	290000	ug/kg	12 U	12.5 U	11 U	13.5 U	12.5 U	11.5 U	16 U	13 U
Acetone	10000000	3300000	ug/kg	12 U	49	11 U	26 J	12.5 U	27 J	16 U	190
Benzene	57000	500	ug/kg	2.45 U	2.45 U	2.2 U	2.7 U	2.5 U	2.25 U	3.2 U	2.6 U
Carbon disulfide	10000000	150000	ug/kg	2.45 U	2.45 U	2.2 U	2.7 U	2.5 U	2.25 U	3.2 U	2.6 U
Carbon tetrachloride	30000	500	ug/kg	2.45 U	2.45 U	2.2 U	2.7 U	2.5 U	2.25 U	3.2 U	2.6 U
Chloroform	19000	8000	ug/kg	2.45 U	2.45 U	2.2 U	2.7 U	2.5 U	2.25 U	3.2 U	2.6 U
Cis-1,2-dichloroethene	2200000	7000	ug/kg	2.45 U	2.45 U	2.2 U	2.7 U	2.5 U	2.25 U	3.2 U	2.6 U
Cyclohexane	10000000	1700000	ug/kg	2.45 U	2.45 U	2.2 U	2.7 U	2.5 U	2.25 U	3.2 U	2.6 U
Ethylbenzene	10000000	70000	ug/kg	2.45 U	2.45 U	2.2 U	2.7 U	2.5 U	2.25 U	3.2 U	2.6 U
Isopropylbenzene	7700000	600000	ug/kg	2.45 U	2.45 U	2.2 U	2.7 U	2.5 U	5.4 J	3.2 UJ	2.6 UJ
Methyl acetate	10000000	3700000	ug/kg	2.45 U	2.45 U	2.2 U	2.7 U	2.5 U	2.25 U	3.2 U	2.6 U
Methylcyclohexane	NSA	NSA	ug/kg	2.45 U	2.45 U	2.2 U	2.7 U	2.5 U	19 J	3.2 U	2.6 U
Methylene Chloride	950000	500	ug/kg	2.45 U	2.45 U	2.2 U	2.7 U	2.5 U	2.25 U	3.2 U	2.6 U
Tetrachloroethene	340000	500	ug/kg	2.45 U	2.45 U	2.2 U	2.7 U	2.5 U	2.25 U	3.2 U	2.6 U
Toluene	10000000	100000	ug/kg	2.45 U	2.45 U	2.2 U	2.7 U	2.5 U	2.25 U	7.7	2.6 U
Trichloroethene	260000	500	ug/kg	2.45 U	2.45 U	13	2.7 U	2.5 U	2.25 U	3.2 U	2.6 U

Table 6-2 - Soil - Analytical Summary of Detected VOCs

			Location ID	UBZ3-SO-27	UBZ3-SO-27	UBZ3-SO-28	UBZ3-SO-28	UBZ3-SO-29	UBZ3-SO-29	UBZ3-SO-30	UBZ3-SO-30
			Sample Name	UBZ3-SO-27-13-15	UBZ3-SO-27-4.5-6.5	UBZ3-SO-28-3-5	UBZ3-SO-28-5.5-7.5	UBZ3-SO-29-3-5	UBZ3-SO-29-8-10	UBZ3-SO-30-0.5-3	UBZ3-SO-30-13-14
			Date Sampled	12/14/2011	12/14/2011	12/14/2011	12/14/2011	12/13/2011	12/13/2011	12/14/2011	12/14/2011
			Parent Sample Name								
	Act 2 MSCs (Residential)[1]		Depth Interval	13-15	4.5-6.5	3-5	5.5-7.5	3-5	8-10	0.5-3	13-14
Analyte	**RDC MSC**	**RSGW**	**Unit**								
VOCs (SW8260)											
2-butanone	10000000	400000	ug/kg	280	14 U	14.5 U	18 J	11 U	16 J	13.5 U	11.5 U
2-hexanone	96000	1100	ug/kg	29 U	14 U	14.5 U	15 U	11 U	12.5 U	13.5 U	11.5 U
4-methyl-2-pentanone	10000000	290000	ug/kg	29 U	14 U	14.5 U	15 U	11 U	12.5 U	13.5 U	11.5 U
Acetone	10000000	3300000	ug/kg	1100	14 U	12 J	80	11 U	75	8.7 J	45
Benzene	57000	500	ug/kg	6 U	2.8 U	2.9 U	2.95 U	2.15 U	2.5 U	2.75 U	23
Carbon disulfide	10000000	150000	ug/kg	6 U	2.8 U	2.9 U	2.95 U	2.15 U	2.5 U	2.75 U	2.35 U
Carbon tetrachloride	30000	500	ug/kg	6 U	2.8 U	17	2.95 U	2.15 U	2.5 U	2.75 U	2.35 U
Chloroform	19000	8000	ug/kg	6 U	2.8 U	5.6 J	2.95 U	2.15 U	2.5 U	2.75 U	2.35 U
Cis-1,2-dichloroethene	2200000	7000	ug/kg	6 U	2.8 U	2.9 U	2.95 U	2.15 U	2.5 U	2.75 U	2.35 U
Cyclohexane	10000000	1700000	ug/kg	6 U	2.8 U	2.9 U	2.7 J	2.15 U	2.5 U	2.75 U	2.35 U
Ethylbenzene	10000000	70000	ug/kg	6 UJ	2.8 U	2.9 UJ	2.95 U	2.15 U	2.5 U	2.75 U	930 D
Isopropylbenzene	7700000	600000	ug/kg	8100 D	2.8 U	2.9 UR	33000 D	2.15 U	2.5 U	2.75 U	2600 D
Methyl acetate	10000000	3700000	ug/kg	6 U	2.8 U	2.9 U	2.95 U	2.15 U	2.5 U	2.75 U	2.35 U
Methylcyclohexane	NSA	NSA	ug/kg	6 U	2.8 U	2.9 U	2.95 U	2.15 U	2.5 U	2.75 U	2.35 U
Methylene Chloride	950000	500	ug/kg	6 U	2.8 U	2.9 U	2.95 U	2.15 U	2.5 U	2.75 U	2.35 U
Tetrachloroethene	340000	500	ug/kg	6 UJ	2.8 U	2.9 UJ	2.95 U	2.15 U	2.5 U	2.75 U	2.35 U
Toluene	10000000	100000	ug/kg	6 U	2.8 U	2.9 U	2.95 U	2.15 U	2.5 U	2.75 U	2.35 U
Trichloroethene	260000	500	ug/kg	6 U	2.8 U	17	2.95 U	2.15 U	2.5 U	2.75 U	2.35 U

Table 6-2 - Soil - Analytical Summary of Detected VOCs

			Location ID	UBZ3-SO-31	UBZ3-SO-31	UBZ3-SO-32	UBZ3-SO-32	UBZ3-SO-33	UBZ3-SO-33	UBZ3-SO-34	UBZ3-SO-34
			Sample Name	UBZ3-SO-31-0-3	UBZ3-SO-31-5-7	UBZ3-SO-32-0-2	UBZ3-SO-32-2-3	UBZ3-SO-33-0-2	UBZ3-SO-33-2-3	UBZ3-SO-34-34-35	UBZ3-SO-34-6-7
			Date Sampled	12/13/2011	12/13/2011	4/20/2012	4/20/2012	4/20/2012	4/20/2012	12/20/2011	12/20/2011
			Parent Sample Name								
	Act 2 MSCs (Residential)[1]		Depth Interval	0-3	5-7	0-2	2-3	0-2	2-3	34-35	6-7
Analyte	**RDC MSC**	**RSGW**	**Unit**								
VOCs (SW8260)											
2-butanone	10000000	400000	ug/kg	12.5 U	11.5 U	12.5 U	14 U	7.6 J	13.5 U	11.5 U	11.5 U
2-hexanone	96000	1100	ug/kg	12.5 U	11.5 U	12.5 U	14 U	13.5 U	13.5 U	11.5 U	11.5 U
4-methyl-2-pentanone	10000000	290000	ug/kg	12.5 U	11.5 U	12.5 U	14 U	13.5 U	13.5 U	11.5 U	11.5 U
Acetone	10000000	3300000	ug/kg	18 J	12 J	12.5 U	14 U	43	36	11.5 U	11.5 U
Benzene	57000	500	ug/kg	2.5 U	2.3 U	2.55 U	2.85 U	2.7 U	2.75 U	2.3 U	2.25 U
Carbon disulfide	10000000	150000	ug/kg	11	2.3 U	2.55 U	2.85 U	2.7 U	2.75 U	2.3 U	2.25 U
Carbon tetrachloride	30000	500	ug/kg	2.5 U	2.3 U	2.55 U	2.85 U	2.7 U	2.75 U	2.3 U	2.25 U
Chloroform	19000	8000	ug/kg	2.5 U	2.3 U	2.55 U	2.85 U	2.7 U	2.75 U	2.3 U	2.25 U
Cis-1,2-dichloroethene	2200000	7000	ug/kg	2.5 U	2.3 U	2.55 U	2.85 U	2.7 U	2.75 U	9.1	2.25 U
Cyclohexane	10000000	1700000	ug/kg	2.5 U	2.3 U	2.55 U	2.85 U	2.7 U	2.75 U	2.3 U	2.25 U
Ethylbenzene	10000000	70000	ug/kg	2.5 U	2.3 U	2.55 U	2.85 U	2.7 U	2.75 U	2.3 U	2.25 U
Isopropylbenzene	7700000	600000	ug/kg	2.5 U	2.3 U	2.55 U	2.85 U	2.7 U	2.75 U	2.3 U	2.25 U
Methyl acetate	10000000	3700000	ug/kg	2.5 U	2.3 U	2.55 U	2.85 U	2.7 U	2.75 U	2.3 U	2.25 U
Methylcyclohexane	NSA	NSA	ug/kg	2.5 U	2.3 U	2.55 U	2.85 U	2.7 U	2.75 U	2.3 U	2.25 U
Methylene Chloride	950000	500	ug/kg	2.5 U	2.3 U	2.55 U	3.8 J	2.7 U	2.7 J	2.3 U	2.25 U
Tetrachloroethene	340000	500	ug/kg	2.5 U	2.3 U	1.1 J	2.85 U	2.7 U	2.75 U	2.3 U	2.25 U
Toluene	10000000	100000	ug/kg	2.5 U	2.3 U	2.55 U	2.85 U	2.7 U	2.75 U	2.3 U	2.25 U
Trichloroethene	260000	500	ug/kg	2.5 U	2.3 U	1.6 J	5.5 J	2.7 U	2.75 U	430 J	2.25 U

Table 6-2 - Soil - Analytical Summary of Detected VOCs

			Location ID	UBZ3-SO-35	UBZ3-SO-35	UBZ3-SO-36	UBZ3-SO-36	UBZ3-SO-37	UBZ3-SO-37	UBZ3-SO-38	UBZ3-SO-38
			Sample Name	UBZ3-SO-35-13-14	UBZ3-SO-35-2-3	UBZ3-SO-36-14-15	UBZ3-SO-36-8-9	UBZ3-SO-37-12-13	UBZ3-SO-37-3-4	UBZ3-SO-38-0-2	UBZ3-SO-38-10-12
			Date Sampled	12/20/2011	12/20/2011	12/20/2011	12/20/2011	12/20/2011	12/20/2011	12/15/2011	12/15/2011
			Parent Sample Name								
	Act 2 MSCs (Residential)[1]		Depth Interval	13-14	2-3	14-14	8-8	12-12	3-3	0-2	10-12
Analyte	RDC MSC	RSGW	Unit								
VOCs (SW8260)											
2-butanone	10000000	400000	ug/kg	13.5 U	10.5 U	11.5 U	10 U	11.5 U	12 U	1250 U	10.5 U
2-hexanone	96000	1100	ug/kg	13.5 U	10.5 U	11.5 U	10 U	11.5 U	12 U	1250 U	10.5 U
4-methyl-2-pentanone	10000000	290000	ug/kg	13.5 U	10.5 U	11.5 U	10 U	11.5 U	12 U	1250 U	10.5 U
Acetone	10000000	3300000	ug/kg	13.5 U	10.5 U	11.5 U	8.9 J	11.5 U	12 U	1250 U	7 J
Benzene	57000	500	ug/kg	2.7 U	2.05 U	2.3 U	2.05 U	2.3 U	2.35 U	245 U	2.05 U
Carbon disulfide	10000000	150000	ug/kg	2.7 U	2.05 U	2.3 U	2.05 U	2.3 U	2.35 U	245 U	2.05 U
Carbon tetrachloride	30000	500	ug/kg	2.7 U	2.05 U	2.3 U	2.05 U	2.3 U	2.35 U	1300 D	2.05 U
Chloroform	19000	8000	ug/kg	2.7 U	2.05 U	2.3 U	2.05 U	2.3 U	2.35 U	730 D	2.05 U
Cis-1,2-dichloroethene	2200000	7000	ug/kg	29	2.05 U	85	14	2.3 U	2.35 U	280 J	1.7 J
Cyclohexane	10000000	1700000	ug/kg	2.7 U	2.05 U	2.3 U	2.05 U	2.3 U	2.35 U	245 U	2.05 U
Ethylbenzene	10000000	70000	ug/kg	2.7 U	2.05 U	2.3 U	2.05 U	2.3 U	2.35 U	245 U	2.05 U
Isopropylbenzene	7700000	600000	ug/kg	2.7 U	2.05 U	2.3 U	2.05 U	2.3 U	2.35 U	245 U	2.05 U
Methyl acetate	10000000	3700000	ug/kg	2.7 U	2.05 U	2.3 U	2.05 U	2.3 U	2.35 U	245 U	2.05 U
Methylcyclohexane	NSA	NSA	ug/kg	2.7 U	2.05 U	2.3 U	2.05 U	2.3 U	2.35 U	245 U	2.05 U
Methylene Chloride	950000	500	ug/kg	2.7 U	2.05 U	2.3 U	2.05 U	2.3 U	2.35 U	245 U	2.05 U
Tetrachloroethene	340000	500	ug/kg	4.4 J	2.05 U	7.7	2.05 U	2.3 U	2.35 U	245 U	2.05 U
Toluene	10000000	100000	ug/kg	2.7 U	2.05 U	2.3 U	2.05 U	2.3 U	2.35 U	245 U	2.05 U
Trichloroethene	260000	500	ug/kg	2.7 U	2.05 U	5.5	2.05 U	2.3 U	2.35 U	41000 J	9.3

Table 6-2 - Soil - Analytical Summary of Detected VOCs

			Location ID	UBZ3-SO-39	UBZ3-SO-39	UBZ3-SO-39	UBZ3-SO-39	UBZ3-SO-40	UBZ3-SO-40	UBZ3-SO-41	UBZ3-SO-41
			Sample Name	UBZ3-SO-39-0.5-2.5	UBZ3-SO-39-0-2	UBZ3-SO-39-6-8	UBZ3-SO-39-7-8	UBZ3-SO-40-14-15	UBZ3-SO-40-3-5	UBZ3-SO-41-1-3	UBZ3-SO-41-7-8
			Date Sampled	12/15/2011	1/5/2012	12/15/2011	1/5/2012	12/15/2011	12/15/2011	12/15/2011	12/15/2011
			Parent Sample Name								
	Act 2 MSCs (Residential)[1]		Depth Interval	0.5-2.5	0-2	6-8	7-8	14-15	3-5	1-3	7-8
Analyte	**RDC MSC**	**RSGW**	**Unit**								
VOCs (SW8260)											
2-butanone	10000000	400000	ug/kg	14 U	13 UJ	12 U	11 U	12 U	10.5 U	28.5 U	7.8 J
2-hexanone	96000	1100	ug/kg	14 U	13 UJ	12 U	11 U	12 U	10.5 U	28.5 U	11.5 U
4-methyl-2-pentanone	10000000	290000	ug/kg	14 U	13 UJ	12 U	11 U	12 U	10.5 U	28.5 U	11.5 U
Acetone	10000000	3300000	ug/kg	14 U	17 J	12 U	10 J	12 U	10.5 U	28.5 U	36
Benzene	57000	500	ug/kg	2.8 U	2.6 UJ	2.35 U	2.2 U	2.45 U	2.1 U	5.5 U	2.25 U
Carbon disulfide	10000000	150000	ug/kg	2.8 U	2.6 UJ	2.35 U	2.2 U	2.45 U	2.1 U	5.5 U	2.25 U
Carbon tetrachloride	30000	500	ug/kg	2.8 U	2.6 UJ	2.35 U	2.2 U	2.45 U	2.1 U	5.5 U	2.25 U
Chloroform	19000	8000	ug/kg	2.8 U	2.6 UJ	2.35 U	2.2 U	2.45 U	2.1 U	8.7 J	2.25 U
Cis-1,2-dichloroethene	2200000	7000	ug/kg	2.8 U	2.6 UJ	2.35 U	2.2 U	2.45 U	2.1 U	5.5 U	2.25 U
Cyclohexane	10000000	1700000	ug/kg	2.8 U	2.6 UJ	2.35 U	2.2 U	2.45 U	2.1 U	5.5 U	2.25 U
Ethylbenzene	10000000	70000	ug/kg	2.8 U	2.6 UJ	2.35 U	2.2 U	2.45 U	2.1 U	5.5 UJ	2.25 U
Isopropylbenzene	7700000	600000	ug/kg	2.8 UJ	2.6 UR	2.35 U	2.2 U	2.45 U	2.1 U	17 J	2.25 U
Methyl acetate	10000000	3700000	ug/kg	2.8 U	2.6 UJ	2.35 U	2.2 U	2.45 U	2.1 U	5.5 U	2.25 U
Methylcyclohexane	NSA	NSA	ug/kg	2.8 U	2.6 UJ	2.35 U	2.2 U	2.45 U	2.1 U	5.5 U	2.25 U
Methylene Chloride	950000	500	ug/kg	2.8 U	2.6 UJ	2.35 U	2.2 U	2.45 U	2.1 U	5.5 U	2.25 U
Tetrachloroethene	340000	500	ug/kg	2.8 J	2.6 UJ	2.35 U	2.2 U	2.45 U	2.1 U	5.5 UJ	2.25 U
Toluene	10000000	100000	ug/kg	2.8 U	2.6 UJ	2.35 U	2.2 U	2.45 U	2.1 U	5.5 U	2.25 U
Trichloroethene	260000	500	ug/kg	5.4 J	2.6 UJ	2.35 U	2.2 U	2.45 U	2.1 U	5.5 U	2.25 U

Table 6-2 - Soil - Analytical Summary of Detected VOCs

			Location ID	UBZ3-SO-42	UBZ3-SO-42	UBZ3-SO-42	UBZ3-SO-43	UBZ3-SO-43	UBZ3-SO-44	UBZ3-SO-44
			Sample Name	UBZ3-SO-42-11.5-13.5	UBZ3-SO-42-3-5	UBZ3-SO-DUP2	UBZ3-SO-43-0.5-3	UBZ3-SO-43-13-14	UBZ3-SO-44-0-2	UBZ3-SO-44-0-2
			Date Sampled	12/14/2011	12/14/2011	12/14/2011	12/14/2011	12/14/2011	12/13/2011	1/5/2012
			Parent Sample Name			UBZ3-SO-42-11.5-13.5				
	Act 2 MSCs (Residential)[1]		Depth Interval	11.5-13.5	3-5	11.5-13.5	0.5-3	13-14	0-2	0-2
Analyte	**RDC MSC**	**RSGW**	**Unit**							
VOCs (SW8260)										
2-butanone	10000000	400000	ug/kg	73	10.5 U	67	16 UJ	10 U	15 U	13.5 UJ
2-hexanone	96000	1100	ug/kg	22 U	10.5 U	20.5 U	16 UJ	10 U	15 U	13.5 UJ
4-methyl-2-pentanone	10000000	290000	ug/kg	22 U	10.5 U	20.5 U	16 UJ	10 U	15 U	13.5 UJ
Acetone	10000000	3300000	ug/kg	270	10 J	250	16 UJ	32	15 U	11 J
Benzene	57000	500	ug/kg	1200 J	2.15 U	1400 J	3.15 UJ	2.05 U	2.95 U	2.65 UJ
Carbon disulfide	10000000	150000	ug/kg	4.45 U	2.15 U	4.05 U	3.15 UJ	2.05 U	2.95 U	2.65 UJ
Carbon tetrachloride	30000	500	ug/kg	4.45 U	2.15 U	4.05 U	3.15 UJ	2.05 U	2.95 U	2.65 UJ
Chloroform	19000	8000	ug/kg	4.45 U	2.15 U	4.05 U	3.15 UJ	2.05 U	2.95 U	2.65 UJ
Cis-1,2-dichloroethene	2200000	7000	ug/kg	4.45 U	2.15 U	4.05 U	3.15 UJ	2.05 U	2.95 U	2.65 UJ
Cyclohexane	10000000	1700000	ug/kg	4.45 U	2.15 U	4.05 U	3.15 UJ	2.05 U	2.95 U	2.65 UJ
Ethylbenzene	10000000	70000	ug/kg	5900 D	2.15 U	6700 D	3.15 UJ	53	2.95 U	2.65 UJ
Isopropylbenzene	7700000	600000	ug/kg	130000 D	2.15 UJ	120000 D	3.15 UR	6000 D	2.95 U	2.65 UR
Methyl acetate	10000000	3700000	ug/kg	4.45 U	2.15 U	4.05 U	3.15 UJ	2.05 U	2.95 U	2.65 UJ
Methylcyclohexane	NSA	NSA	ug/kg	4.45 U	2.15 U	4.05 U	3.15 UJ	2.05 U	2.95 U	2.65 UJ
Methylene Chloride	950000	500	ug/kg	4.45 U	2.15 U	4.05 U	3.15 UJ	2.05 U	2.95 U	2.65 UJ
Tetrachloroethene	340000	500	ug/kg	4.45 U	2.15 U	4.05 U	3.15 UJ	2.05 U	2.95 U	2.65 UJ
Toluene	10000000	100000	ug/kg	4.45 U	2.15 U	4.05 U	3.15 UJ	2.05 U	2.95 U	2.65 UJ
Trichloroethene	260000	500	ug/kg	4.45 U	25	4.05 U	3.3 J	2.05 U	2.95 U	8.8 J

Table 6-2 - Soil - Analytical Summary of Detected VOCs

			Location ID	UBZ3-SO-44	UBZ3-SO-45	UBZ3-SO-45	UBZ3-SO-46	UBZ3-SO-46	UBZ3-SO-47	UBZ3-SO-47	UBZ3-SO-47
			Sample Name	UBZ3-SO-44-8-10	UBZ3-SO-45-2-3	UBZ3-SO-45-8-9	UBZ3-SO-46-4-5	UBZ3-SO-46-5-7	UBZ3-SO-47-0-2	UBZ3-SO-47-7-8	UBZ3-SO-DUP1
			Date Sampled	12/13/2011	12/13/2011	12/13/2011	12/13/2011	12/13/2011	12/13/2011	12/13/2011	12/13/2011
			Parent Sample Name								UBZ3-SO-47-7-8
	Act 2 MSCs (Residential)[1]		Depth Interval	8-10	2-3	8-9	4-5	5-7	0-2	7-8	7-8
Analyte	**RDC MSC**	**RSGW**	**Unit**								
VOCs (SW8260)											
2-butanone	10000000	400000	ug/kg	100	13 U	10 J	12 U	31 J	19 UJ	7 J	4.8 J
2-hexanone	96000	1100	ug/kg	19 U	13 U	11.5 U	12 U	15.5 U	19 UJ	10 U	11 U
4-methyl-2-pentanone	10000000	290000	ug/kg	19 U	13 U	11.5 U	12 U	15.5 U	19 UJ	10 U	11 U
Acetone	10000000	3300000	ug/kg	380	15 J	54	12 U	150	19 UJ	51	34
Benzene	57000	500	ug/kg	3.85 U	2.6 U	2.3 U	2.4 U	3.15 U	3.8 UJ	2.05 U	2.15 U
Carbon disulfide	10000000	150000	ug/kg	10	2.6 U	2.3 U	2.4 U	9.5	150 J	2.05 U	2.15 U
Carbon tetrachloride	30000	500	ug/kg	3.85 U	2.6 U	2.3 U	2.4 U	3.15 U	3.8 UJ	2.05 U	2.15 U
Chloroform	19000	8000	ug/kg	3.85 U	2.6 U	2.3 U	2.4 U	3.15 U	3.8 UJ	2.05 U	2.15 U
Cis-1,2-dichloroethene	2200000	7000	ug/kg	3.85 U	2.6 U	2.3 U	2.4 U	3.15 U	3.8 UJ	2.05 U	2.15 U
Cyclohexane	10000000	1700000	ug/kg	6 J	2.6 U	2.3 U	2.4 U	3.15 U	3.8 UJ	2.05 U	2.15 U
Ethylbenzene	10000000	70000	ug/kg	3.85 U	2.6 U	2.3 U	2.4 U	3.15 U	3.8 UR	2.05 U	2.15 U
Isopropylbenzene	7700000	600000	ug/kg	3.85 UJ	2.6 U	39	2.4 U	3.15 U	3.8 UR	2.05 U	2.15 U
Methyl acetate	10000000	3700000	ug/kg	3.85 U	2.6 U	2.3 U	2.4 U	3.15 U	3.8 UJ	2.05 U	2.15 U
Methylcyclohexane	NSA	NSA	ug/kg	3.85 U	2.6 U	2.3 U	2.4 U	3.15 U	3.8 UJ	2.05 U	2.15 U
Methylene Chloride	950000	500	ug/kg	3.85 U	2.6 U	2.3 U	2.4 U	3.15 U	3.8 UJ	2.05 U	2.15 U
Tetrachloroethene	340000	500	ug/kg	3.85 U	2.6 U	2.3 U	2.4 U	3.15 U	3.8 UR	2.05 U	2.15 U
Toluene	10000000	100000	ug/kg	3.85 U	2.6 U	2.3 U	2.4 U	3.15 U	3.8 UJ	2.05 U	2.15 U
Trichloroethene	260000	500	ug/kg	3.85 U	2.6 U	2.3 U	2.4 U	3.15 U	3.8 UJ	2.05 U	2.15 U

Table 6-2 - Soil - Analytical Summary of Detected VOCs

			Location ID	UBZ3-SO-48	UBZ3-SO-48	UBZ3-SO-49	UBZ3-SO-49	UBZ3-SO-50	UBZ3-SO-50	UBZ3-SO-51	UBZ3-SO-51
			Sample Name	UBZ3-SO-48-2-4	UBZ3-SO-48-5-6	UBZ3-SO-49-14-15	UBZ3-SO-49-4-5	UBZ3-SO-50-0-2	UBZ3-SO-50-5-7	UBZ3-SO-51-5-7	UBZ-SO-51-0-2
			Date Sampled	12/12/2011	12/12/2011	12/20/2011	12/20/2011	4/19/2012	4/19/2012	4/19/2012	4/19/2012
			Parent Sample Name								
	Act 2 MSCs (Residential)[1]		Depth Interval	2-4	5-6	14-15	4-5	0-2	5-7	5-7	0-2
Analyte	**RDC MSC**	**RSGW**	**Unit**								
VOCs (SW8260)											
2-butanone	10000000	400000	ug/kg	13 U	12.5 U	13 U	17 J	35 U	49	18.5 U	16.5 UJ
2-hexanone	96000	1100	ug/kg	13 U	12.5 U	13 U	9 U	35 U	18 U	18.5 U	16.5 UJ
4-methyl-2-pentanone	10000000	290000	ug/kg	13 U	12.5 U	13 U	9 U	35 U	18 U	18.5 U	16.5 UJ
Acetone	10000000	3300000	ug/kg	13 U	57	13 U	77 J	81	150	18.5 U	16.5 UJ
Benzene	57000	500	ug/kg	2.65 U	2.5 U	2.65 U	1.8 U	7 U	3.65 U	3.7 U	3.3 UJ
Carbon disulfide	10000000	150000	ug/kg	2.65 U	2.7 J	2.65 U	1.8 U	7 U	2.4 J	3.7 U	3.3 UJ
Carbon tetrachloride	30000	500	ug/kg	2.65 U	2.5 U	2.65 U	1.8 U	7 U	3.65 U	3.7 U	3.3 UJ
Chloroform	19000	8000	ug/kg	2.65 U	2.5 U	2.65 U	1.8 U	7 U	3.65 U	3.7 U	8.4 J
Cis-1,2-dichloroethene	2200000	7000	ug/kg	2.65 U	2.5 U	11	1.8 U	7 U	3.65 U	3.7 U	3.3 UJ
Cyclohexane	10000000	1700000	ug/kg	2.65 U	2.5 U	2.65 U	4.4 J	7 U	3.65 U	3.7 U	3.3 UJ
Ethylbenzene	10000000	70000	ug/kg	2.65 U	2.5 U	2.65 U	1.8 UJ	7 U	3.65 U	3.7 U	3.3 UJ
Isopropylbenzene	7700000	600000	ug/kg	2.65 U	2.5 U	2.65 U	1.8 UJ	7 U	3.65 U	3.7 U	3.3 R
Methyl acetate	10000000	3700000	ug/kg	2.65 U	2.5 U	2.65 U	1.8 U	7 U	3.65 U	3.7 U	3.3 UJ
Methylcyclohexane	NSA	NSA	ug/kg	2.65 U	2.5 U	2.65 U	5 J	7 U	3.65 U	3.7 U	3.3 UJ
Methylene Chloride	950000	500	ug/kg	2.65 U	2.5 U	2.65 U	1.8 U	7 U	3.65 U	3.7 U	3.3 UJ
Tetrachloroethene	340000	500	ug/kg	2.65 U	2.5 U	5.2 J	1.8 UJ	7 U	3.65 U	3.7 U	11 J
Toluene	10000000	100000	ug/kg	2.65 U	2.5 U	2.65 U	1.8 U	7 U	3.65 U	3.7 U	3.3 UJ
Trichloroethene	260000	500	ug/kg	2.65 U	2.5 U	3.5 J	1.8 U	7 U	3.65 U	3.7 U	91 J

Table 6-2 - Soil - Analytical Summary of Detected VOCs

			Location ID	UBZ3-SO-52	UBZ3-SO-52A	UBZ3-SO-52A	UBZ3-SO-53	UBZ3-SO-53	UBZ3-SO-54	UBZ3-SO-54	UBZ3-SO-55
			Sample Name	UBZ3-SO-52-0-2	UBZ3-SO-52a-0-2	UBZ3-SO-52a-5-7	UBZ3-SO-53-0-2	UBZ3-SO-53-4-5	UBZ3-SO-54-3-5	UBZ3-SO-54-5-7	UBZ3-SO-55-0.5-3
			Date Sampled	4/18/2012	4/18/2012	4/18/2012	4/18/2012	4/18/2012	12/15/2011	12/15/2011	12/15/2011
			Parent Sample Name								
	Act 2 MSCs (Residential)[1]		Depth Interval	0-2	0-2	5-7	0-2	4-5	3-5	5-7	0.5-3
Analyte	**RDC MSC**	**RSGW**	**Unit**								
VOCs (SW8260)											
2-butanone	10000000	400000	ug/kg	17 U	16 UJ	85	17.5 U	27 J	9.2 J	11.5 U	12 U
2-hexanone	96000	1100	ug/kg	17 U	16 UJ	19 U	17.5 U	18 U	12 U	11.5 U	12 U
4-methyl-2-pentanone	10000000	290000	ug/kg	17 U	16 UJ	19 U	17.5 U	18 U	12 U	11.5 U	12 U
Acetone	10000000	3300000	ug/kg	37	31 J	230	17.5 U	90	35	9.5 J	12 U
Benzene	57000	500	ug/kg	3.45 U	3.15 UJ	3.8 U	3.55 U	3.65 U	2.4 U	2.25 U	2.35 U
Carbon disulfide	10000000	150000	ug/kg	3.45 U	3.15 UJ	3.8 U	3.55 U	3.65 U	2.4 U	2.25 U	2.35 U
Carbon tetrachloride	30000	500	ug/kg	3.45 U	3.15 UJ	3.8 U	3.55 U	3.65 U	2.4 U	2.25 U	2.35 U
Chloroform	19000	8000	ug/kg	3.45 U	3.15 UJ	3.8 U	3.55 U	3.65 U	2.4 U	2.25 U	2.35 U
Cis-1,2-dichloroethene	2200000	7000	ug/kg	3.45 U	3.15 UJ	3.8 U	3.55 U	3.65 U	2.4 U	2.25 U	2.35 U
Cyclohexane	10000000	1700000	ug/kg	3.45 U	3.15 UJ	3.8 U	3.55 U	3.65 U	2.4 U	2.25 U	2.35 U
Ethylbenzene	10000000	70000	ug/kg	3.45 U	3.15 UJ	3.8 U	3.55 U	3.65 U	2.4 U	2.25 U	2.35 UJ
Isopropylbenzene	7700000	600000	ug/kg	3.45 U	3.15 UJ	3.8 U	3.55 U	3.65 U	2.4 U	2.25 U	2.35 UR
Methyl acetate	10000000	3700000	ug/kg	3.45 U	3.15 UJ	3.8 U	3.55 U	3.65 U	2.4 U	2.25 U	2.35 U
Methylcyclohexane	NSA	NSA	ug/kg	3.45 U	3.15 UJ	3.8 U	3.55 U	3.65 U	2.4 U	2.25 U	2.35 U
Methylene Chloride	950000	500	ug/kg	3.45 U	3.15 UJ	3.8 U	3.55 U	3.65 U	2.4 U	2.25 U	2.35 U
Tetrachloroethene	340000	500	ug/kg	3.45 U	3.15 UJ	3.8 U	3.55 U	3.65 U	2.4 U	2.25 U	2.35 UJ
Toluene	10000000	100000	ug/kg	3.45 U	3.15 UJ	3.8 U	3.55 U	3.65 U	2.4 U	2.25 U	1.9 J
Trichloroethene	260000	500	ug/kg	3.45 U	3.15 UJ	3.8 U	2.2 J	3.65 U	2.4 U	2.25 U	7.3

Table 6-2 - Soil - Analytical Summary of Detected VOCs

			Location ID	UBZ3-SO-55	UBZ3-SO-56	UBZ3-SO-56	UBZ3-SO-57	UBZ3-SO-57	UBZ3-SO-58	UBZ3-SO-58	UBZ3-SO-58
			Sample Name	UBZ3-SO-55-5-8	UBZ3-SO-56-6-7	UBZ3-SO-56-9-10	UBZ3-SO-57-0-2	UBZ3-SO-57-5-7	UBZ3-SO-58-0-2	UBZ3-SO-58-5-7	UBZ3-SO-DUP22
			Date Sampled	12/15/2011	12/20/2011	12/20/2011	4/19/2012	4/19/2012	4/19/2012	4/19/2012	4/19/2012
			Parent Sample Name								UBZ3-SO-58-0-2
	Act 2 MSCs (Residential)[1]		Depth Interval	5-8	6-7	9-10	0-2	5-7	0-2	5-7	0-2
Analyte	**RDC MSC**	**RSGW**	**Unit**								
VOCs (SW8260)											
2-butanone	10000000	400000	ug/kg	24 J	43	8.9 J	20 UL	14.5 U	16.5 UL	23 J	24 UJ
2-hexanone	96000	1100	ug/kg	14 U	17 U	9 U	20 UL	14.5 U	16.5 UL	13 U	24 UJ
4-methyl-2-pentanone	10000000	290000	ug/kg	14 U	17 U	9 U	20 UL	14.5 U	16.5 UL	13 U	24 UJ
Acetone	10000000	3300000	ug/kg	110	200	34	20 UL	55	16.5 UL	75	24 UJ
Benzene	57000	500	ug/kg	2.85 U	3.4 U	1.8 U	4.05 UL	2.85 U	3.35 UL	2.65 U	4.75 UJ
Carbon disulfide	10000000	150000	ug/kg	2.85 U	3.4 U	1.8 U	4.05 UL	2.85 U	3.35 UL	1.2 J	5.9 J
Carbon tetrachloride	30000	500	ug/kg	2.85 U	3.4 U	1.8 U	4.05 UL	2.85 U	3.35 UL	2.65 U	4.75 UJ
Chloroform	19000	8000	ug/kg	2.85 U	3.4 U	1.8 U	2.8 L	2.85 U	5.9 L	2.65 U	4.75 UJ
Cis-1,2-dichloroethene	2200000	7000	ug/kg	2.85 U	3.4 U	1.8 U	4.05 UL	2.85 U	3.35 UL	2.65 U	4.75 UJ
Cyclohexane	10000000	1700000	ug/kg	2.85 U	3.4 U	1.8 U	4.05 UL	2.85 U	3.35 UL	2.65 U	4.75 UJ
Ethylbenzene	10000000	70000	ug/kg	2.85 U	3.4 U	1.8 U	4.05 UJ	2.85 U	3.35 UJ	2.65 U	4.75 UJ
Isopropylbenzene	7700000	600000	ug/kg	2.85 U	3.4 U	1.8 U	4.05 R	2.85 U	3.35 R	2.65 U	4.75 R
Methyl acetate	10000000	3700000	ug/kg	2.85 U	3.4 U	1.8 U	4.05 UL	2.85 U	3.35 UL	2.65 U	4.75 UJ
Methylcyclohexane	NSA	NSA	ug/kg	2.85 U	3.4 U	1.8 U	4.05 UL	2.85 U	3.35 UL	2.65 U	4.75 UJ
Methylene Chloride	950000	500	ug/kg	2.85 U	3.4 U	1.8 U	4.05 UL	2.85 U	3.35 UL	2.65 U	4.75 UJ
Tetrachloroethene	340000	500	ug/kg	2.85 U	3.4 U	1.8 U	4.05 UJ	2.85 U	3.35 UJ	2.65 U	4.75 UJ
Toluene	10000000	100000	ug/kg	2.85 U	3.4 U	1.8 U	4.05 UL	2.85 U	3.35 UL	2.65 U	4.75 UJ
Trichloroethene	260000	500	ug/kg	2.85 U	3.4 U	1.8 U	12 L	2.85 U	11 L	2.65 U	4.4 J

Table 6-2 - Soil - Analytical Summary of Detected VOCs

			Location ID	UBZ3-SO-59	UBZ3-SO-59	UBZ3-SO-60	UBZ3-SO-60	UBZ3-SO-61
			Sample Name	UBZ3-SO-59-0-2	UBZ3-SO-59-4-6	UBZ3-SO-60-0-2	UBZ3-SO-60-4-5	UBZ3-SO-61-0-2
			Date Sampled	4/19/2012	4/19/2012	4/18/2012	4/18/2012	4/18/2012
			Parent Sample Name					
	Act 2 MSCs (Residential)[1]		Depth Interval	0-2	4-6	2-2	4-5	0-2
Analyte	**RDC MSC**	**RSGW**	**Unit**					
VOCs (SW8260)								
2-butanone	10000000	400000	ug/kg	16.5 UL	15.5 UJ	14 UJ	14 UJ	12 U
2-hexanone	96000	1100	ug/kg	16.5 UL	15.5 UJ	14 UJ	14 UJ	12 U
4-methyl-2-pentanone	10000000	290000	ug/kg	16.5 UL	15.5 UJ	14 UJ	14 UJ	12 U
Acetone	10000000	3300000	ug/kg	44 L	27 J	14 UJ	14 UJ	12 U
Benzene	57000	500	ug/kg	3.25 UL	3.1 UJ	2.8 UJ	2.8 UJ	2.4 U
Carbon disulfide	10000000	150000	ug/kg	1.5 L	3.1 UJ	2.8 UJ	2.8 UJ	2.4 U
Carbon tetrachloride	30000	500	ug/kg	3.25 UL	3.1 UJ	2.8 UJ	2.8 UJ	2.4 U
Chloroform	19000	8000	ug/kg	2.2 L	3.1 UJ	2.8 UJ	2.8 UJ	2.4 U
Cis-1,2-dichloroethene	2200000	7000	ug/kg	3.25 UL	3.1 UJ	2.8 UJ	2.8 UJ	2.4 U
Cyclohexane	10000000	1700000	ug/kg	3.25 UL	3.1 UJ	2.8 UJ	2.8 UJ	2.4 U
Ethylbenzene	10000000	70000	ug/kg	3.25 UL	3.1 UJ	2.8 UJ	2.8 UJ	2.4 U
Isopropylbenzene	7700000	600000	ug/kg	3.25 R	3.1 UJ	2.8 UJ	2.8 UJ	2.4 U
Methyl acetate	10000000	3700000	ug/kg	3.25 UL	3.1 UJ	2.8 UJ	2.8 UJ	2.4 U
Methylcyclohexane	NSA	NSA	ug/kg	3.25 UL	3.1 UJ	2.8 UJ	2.8 UJ	2.4 U
Methylene Chloride	950000	500	ug/kg	3.25 UL	3.1 UJ	2.8 UJ	2.8 UJ	2.4 U
Tetrachloroethene	340000	500	ug/kg	3.25 UL	3.1 UJ	2.8 UJ	2.8 UJ	2.4 U
Toluene	10000000	100000	ug/kg	3.25 UL	3.1 UJ	2.8 UJ	2.8 UJ	2.4 U
Trichloroethene	260000	500	ug/kg	8.7 L	3.1 UJ	2.8 UJ	25 J	2.4 U

Table 6-2 - Soil - Analytical Summary of Detected VOCs

			Location ID	UBZ3-SO-61	UBZ3-SO-62	UBZ3-SO-62	UBZ3-SO-63	UBZ3-SO-63	UBZ3-SO-63
			Sample Name	UBZ3-SO-61-5-7	UBZ3-SO-62-0-2	UBZ3-SO-62-5-7	UBZ3-SO-63-0-2	UBZ3-SO-63-5-7	UBZ3-SO-DUP21
			Date Sampled	4/18/2012	4/19/2012	4/19/2012	4/19/2012	4/19/2012	4/19/2012
			Parent Sample Name						UBZ3-SO-63-0-2
	Act 2 MSCs (Residential)[1]		Depth Interval	5-7	0-2	5-7	0-2	5-7	0-2
Analyte	**RDC MSC**	**RSGW**	**Unit**						
VOCs (SW8260)									
2-butanone	10000000	400000	ug/kg	18 J	15.5 UJ	16.5 UJ	19 UJ	19.5 UJ	16 UJ
2-hexanone	96000	1100	ug/kg	14 U	15.5 UJ	16.5 UJ	19 UJ	19.5 UJ	16 UJ
4-methyl-2-pentanone	10000000	290000	ug/kg	14 U	15.5 UJ	16.5 UJ	19 UJ	19.5 UJ	16 UJ
Acetone	10000000	3300000	ug/kg	65	15.5 UJ	40 J	47 J	67 J	91 J
Benzene	57000	500	ug/kg	2.8 U	3.15 UJ	3.35 UJ	3.85 UJ	3.9 UJ	3.5 J
Carbon disulfide	10000000	150000	ug/kg	2.8 U	3.15 UJ	3.35 UJ	3.85 UJ	2.5 J	3.25 UJ
Carbon tetrachloride	30000	500	ug/kg	2.8 U	3.15 UJ	3.35 UJ	3.85 UJ	3.9 UJ	3.25 UJ
Chloroform	19000	8000	ug/kg	2.8 U	3.15 UJ	3.35 UJ	3.85 UJ	3.9 UJ	3.25 UJ
Cis-1,2-dichloroethene	2200000	7000	ug/kg	2.8 U	3.15 UJ	3.35 UJ	3.85 UJ	3.9 UJ	3.25 UJ
Cyclohexane	10000000	1700000	ug/kg	2.8 U	3.15 UJ	3.35 UJ	3.85 UJ	3.9 UJ	3.25 UJ
Ethylbenzene	10000000	70000	ug/kg	2.8 U	3.15 UJ	3.35 UJ	3.85 UJ	3.9 UJ	3.25 UJ
Isopropylbenzene	7700000	600000	ug/kg	2.8 U	3.15 UJ	3.35 UJ	3.85 UJ	3.9 UJ	3.25 UJ
Methyl acetate	10000000	3700000	ug/kg	2.8 U	3.15 UJ	3.35 UJ	3.85 UJ	3.9 UJ	3.25 UJ
Methylcyclohexane	NSA	NSA	ug/kg	2.8 U	3.15 UJ	3.35 UJ	3.85 UJ	3.9 UJ	3.25 UJ
Methylene Chloride	950000	500	ug/kg	2.8 U	3.15 UJ	3.35 UJ	3.85 UJ	3.9 UJ	3.25 UJ
Tetrachloroethene	340000	500	ug/kg	2.8 U	3.15 UJ	3.35 UJ	3.85 UJ	3.9 UJ	3.25 UJ
Toluene	10000000	100000	ug/kg	2.8 U	3.15 UJ	3.35 UJ	3.85 UJ	3.9 UJ	1.7 J
Trichloroethene	260000	500	ug/kg	2.8 U	2.2 J	2.7 J	3.85 UJ	3.9 UJ	3.25 UJ

(1) Pennsylvania Act 1995-2, known as "Act 2", established a program for recycling existing industrial and commercial sites. Values are from Chapter 250 of the Pennsylvania Code, "Administration of Land Recycling Program", Subchapter C, "Statewide Health Standards", Appendix A, "Medium-Specific Concentrations" tables, revisions effective 1/8/2011.

RDC - Residential Direct Contact.
RSW - Soil to

NSA- No Screening Level Available.

NA- Not Analyzed.

U- Not detected above the Level of Detection.

J- Value is estimated.

L-Analyte present. Reported value may be biased low. Acutal value is expected higher.

D-Dilution

K - Estimated, biased high.

R-Rejected result. Analyte may or may not be present in the sample. Supporting data necessary to confirm result.

*-Indicates the duplicate analysis is not within control limits.

B-Not detected substantilly above the level reported in the laboratory or field blanks

N - Presumptive evidence of a compound.

Bolded values exceed Residential Direct Contact (0-15 ft bgs).

Gray shaded values exceed Soil to Groundwater.

Table 6-3 - Soil - Analytical Summary of Detected SVOC

			Location ID	BZ1-SO-01	BZ1-SO-01	BZ1-SO-02	BZ1-SO-02	BZ1-SO-03	BZ1-SO-03	BZ1-SO-04	BZ1-SO-04	BZ1-SO-05
			Sample Name	BZ1-SO-01-0-2	BZ1-SO-01-5-7	BZ1-SO-02-3-5	BZ1-SO-02-5-7	BZ1-SO-03-1-3	BZ1-SO-03-7-8	BZ1-SO-04-0-2	BZ1-SO-04-5-7	BZ1-SO-5-0-1
			Date Sampled	1/4/2012	1/4/2012	1/4/2012	1/4/2012	1/4/2012	1/4/2012	1/4/2012	1/4/2012	12/29/2011
			Parent Sample Name									
	Act 2 MSCs (Residential)[1]		Depth Interval	0-2	5-7	3-5	5-7	1-3	7-8	0-2	5-7	0-1
Analyte	**RDC MSC**	**RSGW**	**Unit**									
SVOCs (SW8270)												
2-methylnaphthalene	880000	600000	ug/kg	200 U	180 U	195 U	195 U	195 U	180 U	200 U	185 U	195 U
Acenaphthene	13000000	2700000	ug/kg	200 U	180 U	195 U	195 U	195 U	180 U	200 U	185 U	195 U
Acenaphthylene	13000000	2500000	ug/kg	200 U	180 U	195 U	195 U	195 U	180 U	200 U	185 U	195 U
Acetophenone	10000000	370000	ug/kg	200 U	180 U	195 U	195 U	195 U	180 U	200 U	185 U	195 U
Anthracene	66000000	350000	ug/kg	200 U	180 U	195 U	195 U	195 U	180 U	200 U	185 U	195 U
Benzaldehyde	NSA	NSA	ug/kg	200 U	180 U	195 U	195 U	195 U	180 U	200 U	185 U	195 U
Benzo[a]anthracene	5700	25000	ug/kg	200 U	180 U	195 U	195 U	195 U	180 U	200 U	185 U	195 U
Benzo[a]pyrene	570	46000	ug/kg	200 U	180 U	195 U	195 U	195 U	180 U	200 U	185 U	195 U
Benzo[b]fluoranthene	5700	40000	ug/kg	200 U	180 U	195 U	195 U	195 U	180 U	200 U	185 U	195 U
Benzo[g,h,i]perylene	13000000	180000	ug/kg	200 U	180 U	195 U	195 U	195 U	180 U	200 U	185 U	195 U
Benzo[k]fluoranthene	57000	610000	ug/kg	200 U	180 U	195 U	195 U	195 U	180 U	200 U	185 U	195 U
Bis(2-ethylhexyl) phthalate	1300000	130000	ug/kg	200 U	180 U	195 U	195 U	195 U	180 U	200 U	185 U	195 U
Carbazole	900000	21000	ug/kg	200 U	180 U	195 U	195 U	195 U	180 U	200 U	185 U	195 U
Chrysene	570000	230000	ug/kg	200 U	180 U	195 U	195 U	195 U	180 U	200 U	185 U	195 U
Dibenz[a,h]anthracene	570	13000	ug/kg	200 U	180 U	195 U	195 U	195 U	180 U	200 U	185 U	195 U
Dibenzofuran	220000	95000	ug/kg	200 U	180 U	195 U	195 U	195 U	180 U	200 U	185 U	195 U
Diethyl phthalate	10000000	2900000	ug/kg	200 U	180 U	195 U	195 U	195 U	180 U	200 U	185 U	195 U
Dimethyl phthalate	NSA	NSA	ug/kg	160 J	180 U	195 U	210 J	195 U	180 U	220 J	185 U	195 U
Fluoranthene	8800000	3200000	ug/kg	200 U	180 U	195 U	195 U	195 U	180 U	170 J	185 U	195 U
Fluorene	8800000	3000000	ug/kg	200 U	180 U	195 U	195 U	195 U	180 U	200 U	185 U	195 U
Indeno[1,2,3-c,d]pyrene	5700	2200000	ug/kg	200 U	180 U	195 U	195 U	195 U	180 U	200 U	185 U	195 U
Naphthalene	4400000	25000	ug/kg	200 U	180 U	195 U	195 U	195 U	180 U	200 U	185 U	195 U
Pentachlorophenol	150000	5000	ug/kg	200 U	180 U	195 U	195 U	195 U	180 U	200 U	185 U	195 U
Phenanthrene	66000000	10000000	ug/kg	200 U	180 U	195 U	195 U	195 U	180 U	200 U	185 U	195 U
Phenol	66000000	200000	ug/kg	200 U	180 U	195 U	195 U	195 U	180 U	200 U	185 U	195 U
Pyrene	6600000	2200000	ug/kg	200 U	180 U	195 U	195 U	195 U	180 U	200 U	185 U	195 U

Table 6-3 - Soil - Analytical Summary of Detected SVOC

			Location ID	BZ1-SO-05	BZ1-SO-06	BZ1-SO-06	BZ1-SO-06	BZ2-SO-01	BZ2-SO-01	BZ2-SO-02	BZ2-SO-02	BZ2-SO-03
			Sample Name	BZ1-SO-5-6-7	BZ1-SO-6-0.5-1.5	BZ1-SO-6-8-9	BZ1-SO-DUP7	BZ2-SO-1-11-12	BZ2-SO-1-1-2	BZ2-SO-2-1-2	BZ2-SO-2-6-8	BZ2-SO-3-10-11
			Date Sampled	12/29/2011	12/29/2011	12/29/2011	12/29/2011	1/9/2012	1/9/2012	12/30/2011	12/30/2011	12/30/2011
			Parent Sample Name				BZ1-SO-6-8-9					
	Act 2 MSCs (Residential)[1]		Depth Interval	6-7	0.5-1.5	8-9	8-9	11-12	1-2	1-2	6-8	10-11
Analyte	RDC MSC	RSGW	Unit									
SVOCs (SW8270)												
2-methylnaphthalene	880000	600000	ug/kg	185 U	195 U	185 U	185 U	180 U	195 U	190 U	175 U	190 U
Acenaphthene	13000000	2700000	ug/kg	185 U	195 U	185 U	185 U	180 U	195 U	190 U	175 U	190 U
Acenaphthylene	13000000	2500000	ug/kg	185 U	195 U	185 U	185 U	180 U	195 U	190 U	175 U	190 U
Acetophenone	10000000	370000	ug/kg	185 U	195 U	185 U	185 U	180 U	195 U	190 U	175 U	190 U
Anthracene	66000000	350000	ug/kg	185 U	195 U	185 U	185 U	180 U	195 U	190 U	175 U	190 U
Benzaldehyde	NSA	NSA	ug/kg	185 U	195 U	185 U	185 U	180 U	195 U	190 U	175 U	190 U
Benzo[a]anthracene	5700	25000	ug/kg	185 U	195 U	185 U	185 U	180 U	195 U	190 U	175 U	190 U
Benzo[a]pyrene	570	46000	ug/kg	185 U	195 U	185 U	185 U	180 U	195 U	190 U	175 U	190 U
Benzo[b]fluoranthene	5700	40000	ug/kg	185 U	195 U	185 U	185 U	180 U	195 U	190 U	175 U	190 U
Benzo[g,h,i]perylene	13000000	180000	ug/kg	185 U	195 U	185 U	185 U	180 U	195 U	190 U	175 U	190 U
Benzo[k]fluoranthene	57000	610000	ug/kg	185 U	195 U	185 U	185 U	180 U	195 U	190 U	175 U	190 U
Bis(2-ethylhexyl) phthalate	1300000	130000	ug/kg	185 U	195 U	185 U	185 U	180 U	195 U	190 U	175 U	190 U
Carbazole	900000	21000	ug/kg	185 U	195 U	185 U	185 U	180 U	195 U	190 U	175 U	190 U
Chrysene	570000	230000	ug/kg	185 U	195 U	185 U	185 U	180 U	195 U	190 U	175 U	190 U
Dibenz[a,h]anthracene	570	13000	ug/kg	185 U	195 U	185 U	185 U	180 U	195 U	190 U	175 U	190 U
Dibenzofuran	220000	95000	ug/kg	185 U	195 U	185 U	185 U	180 U	195 U	190 U	175 U	190 U
Diethyl phthalate	10000000	2900000	ug/kg	185 U	195 U	185 U	185 U	180 U	195 U	190 U	175 U	190 U
Dimethyl phthalate	NSA	NSA	ug/kg	185 U	195 U	185 U	185 U	180 U	195 U	190 U	175 U	190 U
Fluoranthene	8800000	3200000	ug/kg	185 U	195 U	185 U	185 U	180 U	195 U	190 U	175 U	190 U
Fluorene	8800000	3000000	ug/kg	185 U	195 U	185 U	185 U	180 U	195 U	190 U	175 U	190 U
Indeno[1,2,3-c,d]pyrene	5700	2200000	ug/kg	185 U	195 U	185 U	185 U	180 U	195 U	190 U	175 U	190 U
Naphthalene	4400000	25000	ug/kg	185 U	195 U	185 U	185 U	180 U	195 U	190 U	175 U	190 U
Pentachlorophenol	150000	5000	ug/kg	185 U	195 U	185 U	185 U	180 U	195 U	190 U	175 U	190 U
Phenanthrene	66000000	10000000	ug/kg	185 U	195 U	185 U	185 U	180 U	195 U	190 U	175 U	190 U
Phenol	66000000	200000	ug/kg	185 U	195 U	185 U	185 U	180 U	195 U	190 U	175 U	190 U
Pyrene	6600000	2200000	ug/kg	185 U	195 U	185 U	185 U	180 U	195 U	190 U	175 U	190 U

Table 6-3 - Soil - Analytical Summary of Detected SVOC

			Location ID	BZ2-SO-03	BZ2-SO-04	BZ2-SO-04	BZ2-SO-05	BZ2-SO-05	BZ2-SO-06	BZ2-SO-06	BZ2-SO-07	BZ2-SO-07
			Sample Name	BZ2-SO-3-1-3	BZ2-SO-4-0.5-1.5	BZ2-SO-4-8-9	BZ2-SO-5-11-12	BZ2-SO-5-3-4	BZ2-SO-6-13-14	BZ2-SO-6-3-4	BZ2-SO-07-0-2	BZ2-SO-07-11-12
			Date Sampled	12/30/2011	12/30/2011	12/30/2011	12/22/2011	12/22/2011	12/21/2011	12/21/2011	1/6/2012	1/6/2012
			Parent Sample Name									
	Act 2 MSCs (Residential)[1]		Depth Interval	1-3	0.5-1.5	8-9	11-12	3-4	13-14	3-4	0-2	11-12
Analyte	**RDC MSC**	**RSGW**	**Unit**									
SVOCs (SW8270)												
2-methylnaphthalene	880000	600000	ug/kg	195 U	200 U	185 U	175 U	185 U	185 U	185 U	950 U	190 U
Acenaphthene	13000000	2700000	ug/kg	195 U	200 U	185 U	175 U	185 U	185 U	185 U	950 U	190 U
Acenaphthylene	13000000	2500000	ug/kg	195 U	200 U	185 U	175 U	185 U	185 U	185 U	950 U	190 U
Acetophenone	10000000	370000	ug/kg	195 U	200 U	185 U	175 U	185 U	185 U	185 U	950 U	190 U
Anthracene	66000000	350000	ug/kg	195 U	200 U	185 U	175 U	260 J	185 U	185 U	950 UL	190 UL
Benzaldehyde	NSA	NSA	ug/kg	195 U	200 U	185 U	175 U	185 U	185 U	185 U	950 U	190 U
Benzo[a]anthracene	5700	25000	ug/kg	195 U	200 U	185 U	175 U	920	185 U	185 U	2900 L	190 UL
Benzo[a]pyrene	570	46000	ug/kg	195 U	200 U	185 U	175 U	**830**	185 U	185 U	**2500 L**	190 UL
Benzo[b]fluoranthene	5700	40000	ug/kg	195 U	200 U	185 U	175 U	1200	185 U	185 U	3200 L	190 UL
Benzo[g,h,i]perylene	13000000	180000	ug/kg	195 U	200 U	185 U	175 U	570	185 U	185 U	950 J	190 U
Benzo[k]fluoranthene	57000	610000	ug/kg	195 U	200 U	185 U	175 U	390	185 U	185 U	1300 L	190 UL
Bis(2-ethylhexyl) phthalate	1300000	130000	ug/kg	195 U	200 U	185 U	175 U	185 U	185 U	185 U	950 UL	190 UL
Carbazole	900000	21000	ug/kg	195 U	200 U	185 U	175 U	160 J	185 U	185 U	950 UL	190 UL
Chrysene	570000	230000	ug/kg	195 U	200 U	185 U	175 U	960	185 U	185 U	2900 L	190 UL
Dibenz[a,h]anthracene	570	13000	ug/kg	195 U	200 U	185 U	175 U	185 U	185 U	185 U	950 U	190 U
Dibenzofuran	220000	95000	ug/kg	195 U	200 U	185 U	175 U	185 U	185 U	185 U	950 UL	190 UL
Diethyl phthalate	10000000	2900000	ug/kg	195 U	200 U	185 U	175 U	185 U	185 U	185 U	950 UL	190 UL
Dimethyl phthalate	NSA	NSA	ug/kg	195 U	200 U	185 U	175 U	185 U	185 U	185 U	950 UL	190 UL
Fluoranthene	8800000	3200000	ug/kg	195 U	200 U	185 U	175 U	1600	185 U	185 U	4800 L	190 UL
Fluorene	8800000	3000000	ug/kg	195 U	200 U	185 U	175 U	185 U	185 U	185 U	950 UL	190 UL
Indeno[1,2,3-c,d]pyrene	5700	2200000	ug/kg	195 U	200 U	185 U	175 U	540	185 U	185 U	970 J	190 U
Naphthalene	4400000	25000	ug/kg	195 U	200 U	185 U	175 U	185 U	185 U	185 U	950 U	190 U
Pentachlorophenol	150000	5000	ug/kg	195 U	200 U	185 U	175 U	185 U	185 U	185 U	950 U	190 U
Phenanthrene	66000000	10000000	ug/kg	195 U	200 U	185 U	175 U	1100	185 U	170 J	2200 L	190 UL
Phenol	66000000	200000	ug/kg	195 U	200 U	185 U	175 U	185 U	185 U	185 U	950 UL	190 UL
Pyrene	6600000	2200000	ug/kg	195 U	200 U	185 U	175 U	1400	185 U	220 J	4400 L	190 UL

Table 6-3 - Soil - Analytical Summary of Detected SVOC

			Location ID	BZ3-SO-01	BZ3-SO-01	BZ3-SO-01	BZ3-SO-02	BZ3-SO-02	BZ3-SO-03A	BZ3-SO-03A	BZ3-SO-03B	BZ3-SO-03B
			Sample Name	BZ3-SO-1-1-2	BZ3-SO-13-0-1	BZ3-SO-1-6-7	BZ3-SO-2	BZ3-SO-2-5-6	BZ3-SO-3A-10-11	BZ3-SO-3A-1-2	BZ3-SO-3B-1-2	BZ3-SO-3B-5.5-6.5
			Date Sampled	12/29/2011	4/18/2012	12/29/2011	12/22/2011	12/22/2011	12/22/2011	12/22/2011	12/22/2011	12/22/2011
			Parent Sample Name									
	Act 2 MSCs (Residential)[1]		Depth Interval	1-2	0-1	6-7	1-2	5-6	10-11	1-2	1-2	5.5-6.5
Analyte	**RDC MSC**	**RSGW**	**Unit**									
SVOCs (SW8270)												
2-methylnaphthalene	880000	600000	ug/kg	200 U	165 U	180 U	215 U	180 U	180 U	185 U	175 U	180 U
Acenaphthene	13000000	2700000	ug/kg	200 U	165 U	180 U	215 U	180 U	180 U	185 U	175 U	180 U
Acenaphthylene	13000000	2500000	ug/kg	200 U	165 U	180 U	215 U	180 U	180 U	185 U	175 U	180 U
Acetophenone	10000000	370000	ug/kg	200 U	165 U	180 U	215 U	180 U	180 U	185 U	175 U	180 U
Anthracene	66000000	350000	ug/kg	200 U	165 U	180 U	215 U	180 U	180 U	185 U	175 U	180 U
Benzaldehyde	NSA	NSA	ug/kg	200 U	165 U	180 U	215 U	180 U	180 U	185 U	175 U	180 U
Benzo[a]anthracene	5700	25000	ug/kg	200 U	320 J	180 U	215 U	180 U	180 U	185 U	175 U	180 U
Benzo[a]pyrene	570	46000	ug/kg	200 U	250 J	180 U	215 U	180 U	180 U	185 U	175 U	180 U
Benzo[b]fluoranthene	5700	40000	ug/kg	200 U	370	180 U	215 U	180 U	180 U	185 U	175 U	180 U
Benzo[g,h,i]perylene	13000000	180000	ug/kg	200 U	165 U	180 U	215 U	180 U	180 U	185 U	175 U	180 U
Benzo[k]fluoranthene	57000	610000	ug/kg	200 U	170 J	180 U	215 U	180 U	180 U	185 U	175 U	180 U
Bis(2-ethylhexyl) phthalate	1300000	130000	ug/kg	200 U	140 J	180 U	215 U	180 U	180 U	185 U	175 U	180 U
Carbazole	900000	21000	ug/kg	200 U	165 U	180 U	215 U	180 U	180 U	185 U	175 U	180 U
Chrysene	570000	230000	ug/kg	200 U	320 J	180 U	215 U	180 U	180 U	185 U	175 U	180 U
Dibenz[a,h]anthracene	570	13000	ug/kg	200 U	165 U	180 U	215 U	180 U	180 U	185 U	175 U	180 U
Dibenzofuran	220000	95000	ug/kg	200 U	165 U	180 U	215 U	180 U	180 U	185 U	175 U	180 U
Diethyl phthalate	10000000	2900000	ug/kg	200 U	165 U	180 U	215 U	180 U	180 U	185 U	175 U	180 U
Dimethyl phthalate	NSA	NSA	ug/kg	200 U	750	180 U	215 U	180 U	180 U	185 U	175 U	180 U
Fluoranthene	8800000	3200000	ug/kg	200 U	660	180 U	215 U	180 U	180 U	185 U	175 U	180 U
Fluorene	8800000	3000000	ug/kg	200 U	165 U	180 U	215 U	180 U	180 U	185 U	175 U	180 U
Indeno[1,2,3-c,d]pyrene	5700	2200000	ug/kg	200 U	165 U	180 U	215 U	180 U	180 U	185 U	175 U	180 U
Naphthalene	4400000	25000	ug/kg	200 U	165 U	180 U	215 U	180 U	180 U	185 U	175 U	180 U
Pentachlorophenol	150000	5000	ug/kg	200 U	165 U	180 U	215 U	180 U	180 U	185 U	175 U	180 U
Phenanthrene	66000000	10000000	ug/kg	200 U	360	180 U	215 U	180 U	180 U	185 U	175 U	180 U
Phenol	66000000	200000	ug/kg	200 U	165 U	180 U	215 U	180 U	180 U	185 U	175 U	180 U
Pyrene	6600000	2200000	ug/kg	200 U	510	180 U	215 U	180 U	180 U	185 U	175 U	180 U

Table 6-3 - Soil - Analytical Summary of Detected SVOC

			Location ID	BZ3-SO-04	BZ3-SO-04	BZ3-SO-04	BZ3-SO-06	BZ3-SO-06	BZ3-SO-07	BZ3-SO-07	BZ3-SO-08	BZ3-SO-08
			Sample Name	BZ3-SO-04-0-2	BZ3-SO-04-5-7	BZ3-SO-DUP10	BZ3-SO-6-0.5-1.5	BZ3-SO-6-7-8	BZ3-SO-07-0-2	BZ3-SO-07-3-5	BZ3-SO-08-0-2	BZ3-SO-08-13-15
			Date Sampled	1/5/2012	1/5/2012	1/5/2012	12/21/2011	12/21/2011	12/16/2011	12/16/2011	12/16/2011	12/16/2011
			Parent Sample Name			BZ3-SO-04-0-2						
	Act 2 MSCs (Residential)[1]		Depth Interval	0-2	5-7	0-2	0.5-1.5	7-8	0-2	3-5	0-2	13-15
Analyte	RDC MSC	RSGW	Unit									
SVOCs (SW8270)												
2-methylnaphthalene	880000	600000	ug/kg	190 U	175 U	190 U	190 U	190 U	195 U	185 U	180 U	180 U
Acenaphthene	13000000	2700000	ug/kg	190 U	175 U	190 U	190 U	190 U	195 U	185 U	180 U	180 U
Acenaphthylene	13000000	2500000	ug/kg	190 U	175 U	190 U	190 U	190 U	195 U	185 U	180 U	180 U
Acetophenone	10000000	370000	ug/kg	190 U	175 U	190 U	190 U	190 U	195 U	185 U	180 U	410
Anthracene	66000000	350000	ug/kg	190 U	175 U	190 U	190 U	190 U	195 U	185 U	180 U	180 U
Benzaldehyde	NSA	NSA	ug/kg	190 U	175 U	190 U	190 U	190 U	195 U	185 U	180 U	180 U
Benzo[a]anthracene	5700	25000	ug/kg	160 J	175 U	190 U	240 J	190 U	195 U	185 U	180 U	180 U
Benzo[a]pyrene	570	46000	ug/kg	190 U	175 U	190 U	260 J	190 U	195 U	185 U	180 U	180 U
Benzo[b]fluoranthene	5700	40000	ug/kg	180 J	175 U	190 U	320 J	190 U	195 U	185 U	180 U	180 U
Benzo[g,h,i]perylene	13000000	180000	ug/kg	190 U	175 U	190 U	190 U	190 U	195 U	185 U	180 U	180 U
Benzo[k]fluoranthene	57000	610000	ug/kg	190 U	175 U	190 U	190 U	190 U	195 U	185 U	180 U	180 U
Bis(2-ethylhexyl) phthalate	1300000	130000	ug/kg	190 U	175 U	190 U	190 U	190 U	195 U	185 U	180 U	180 U
Carbazole	900000	21000	ug/kg	190 U	175 U	190 U	190 U	190 U	195 U	185 U	180 U	180 U
Chrysene	570000	230000	ug/kg	190 U	175 U	190 U	230 J	190 U	195 U	185 U	180 U	180 U
Dibenz[a,h]anthracene	570	13000	ug/kg	190 U	175 U	190 U	190 U	190 U	195 U	185 U	180 U	180 U
Dibenzofuran	220000	95000	ug/kg	190 UL	175 UL	190 UL	190 U	190 U	195 U	185 U	180 U	180 U
Diethyl phthalate	10000000	2900000	ug/kg	190 U	175 U	190 U	190 U	190 U	195 U	185 U	180 U	180 U
Dimethyl phthalate	NSA	NSA	ug/kg	190 U	175 U	190 U	190 U	190 U	200 J	190 J	260 J	180 U
Fluoranthene	8800000	3200000	ug/kg	260 J	175 U	180 J	450	190 U	195 U	185 U	180 U	180 U
Fluorene	8800000	3000000	ug/kg	190 U	175 U	190 U	190 U	190 U	195 U	185 U	180 U	180 U
Indeno[1,2,3-c,d]pyrene	5700	2200000	ug/kg	190 U	175 U	190 U	190 U	190 U	195 U	185 U	180 U	180 U
Naphthalene	4400000	25000	ug/kg	190 U	175 U	190 U	190 U	190 U	195 U	185 U	180 U	180 U
Pentachlorophenol	150000	5000	ug/kg	190 U	175 U	190 U	190 U	190 U	195 U	185 U	180 U	180 U
Phenanthrene	66000000	10000000	ug/kg	220 J	175 U	190 U	330 J	190 U	195 U	185 U	180 U	180 U
Phenol	66000000	200000	ug/kg	190 U	175 U	190 U	190 U	190 U	195 U	185 U	180 U	7900 D
Pyrene	6600000	2200000	ug/kg	210 J	175 U	190 U	390	190 U	195 U	185 U	180 U	180 U

Table 6-3 - Soil - Analytical Summary of Detected SVOC

			Location ID	BZ3-SO-08	BZ3-SO-09	BZ3-SO-09	BZ3-SO-10	BZ3-SO-10	BZ3-SO-10	BZ3-SO-11	BZ3-SO-11
			Sample Name	UBZ3-SO-DUP3	BZ3-SO-09-13-15	BZ3-SO-09-5-7	BZ3-SO-10-12-14	BZ3-SO-10-2-4	BZ3-SO-10-5-8	BZ3-SO-11-10-11	BZ3-SO-11-5-6
			Date Sampled	12/16/2011	12/16/2011	12/16/2011	12/14/2011	12/14/2011	12/14/2011	12/22/2011	12/22/2011
			Parent Sample Name	BZ3-SO-08-13-15							
	Act 2 MSCs (Residential)[1]		Depth Interval	13-15	13-15	5-7	12-14	2-4	5-8	10-11	5-6
Analyte	**RDC MSC**	**RSGW**	**Unit**								
SVOCs (SW8270)											
2-methylnaphthalene	880000	600000	ug/kg	185 U	185 U	195 U	195 U	1950 U	185 U	185 U	190 U
Acenaphthene	13000000	2700000	ug/kg	185 U	185 U	195 U	195 U	1950 U	185 U	185 U	190 U
Acenaphthylene	13000000	2500000	ug/kg	185 U	185 U	195 U	195 U	1950 U	185 U	185 U	190 U
Acetophenone	10000000	370000	ug/kg	430	185 U	195 U	195 U	1950 U	185 U	185 U	190 U
Anthracene	66000000	350000	ug/kg	185 U	185 U	260 J	195 U	1950 U	185 U	185 U	190 U
Benzaldehyde	NSA	NSA	ug/kg	185 U	185 U	195 U	195 UR	1950 UR	185 UR	185 U	190 U
Benzo[a]anthracene	5700	25000	ug/kg	185 U	185 U	720	195 U	1950 U	185 U	185 U	190 U
Benzo[a]pyrene	570	46000	ug/kg	185 U	185 U	**680**	195 U	1950 U	185 U	185 U	190 U
Benzo[b]fluoranthene	5700	40000	ug/kg	185 U	185 U	790	195 U	1950 U	185 U	185 U	190 U
Benzo[g,h,i]perylene	13000000	180000	ug/kg	185 U	185 U	440	195 U	1950 U	185 U	185 U	190 U
Benzo[k]fluoranthene	57000	610000	ug/kg	185 U	185 U	290 J	195 U	1950 U	185 U	185 U	190 U
Bis(2-ethylhexyl) phthalate	1300000	130000	ug/kg	185 U	185 U	195 U	195 U	1950 U	185 U	185 U	190 U
Carbazole	900000	21000	ug/kg	185 U	185 U	195 U	195 U	1950 U	185 U	185 U	190 U
Chrysene	570000	230000	ug/kg	185 U	185 U	690	195 U	1950 U	185 U	185 U	190 U
Dibenz[a,h]anthracene	570	13000	ug/kg	185 U	185 U	195 U	195 U	1950 U	185 U	185 U	190 U
Dibenzofuran	220000	95000	ug/kg	185 U	185 U	195 U	195 U	1950 U	185 U	185 U	190 U
Diethyl phthalate	10000000	2900000	ug/kg	185 U	185 U	195 U	195 U	1950 U	185 U	185 U	190 U
Dimethyl phthalate	NSA	NSA	ug/kg	200 J	340 J	370 J	195 U	1950 U	185 U	185 U	190 U
Fluoranthene	8800000	3200000	ug/kg	185 U	185 U	1700	195 U	1950 U	185 U	185 U	190 U
Fluorene	8800000	3000000	ug/kg	185 U	185 U	195 U	195 U	1950 U	185 U	185 U	190 U
Indeno[1,2,3-c,d]pyrene	5700	2200000	ug/kg	185 U	185 U	380 J	195 U	1950 U	185 U	185 U	190 U
Naphthalene	4400000	25000	ug/kg	185 U	185 U	195 U	195 U	1950 U	185 U	185 U	190 U
Pentachlorophenol	150000	5000	ug/kg	185 U	185 U	195 U	195 U	1950 U	185 U	185 U	190 U
Phenanthrene	66000000	10000000	ug/kg	185 U	185 U	790	195 U	1950 U	185 U	185 U	190 U
Phenol	66000000	200000	ug/kg	8000 D	185 U	195 U	195 U	1950 U	185 U	185 U	190 U
Pyrene	6600000	2200000	ug/kg	185 U	185 U	1300	195 U	1950 U	185 U	185 U	190 U

Table 6-3 - Soil - Analytical Summary of Detected SVOC

			Location ID	BZ3-SO-12	BZ3-SO-12	BZ3-SO-13	BZ3-SO-13	BZ3-SO-14	BZ3-SO-15	BZ3-SO-15	MW-21	MW-22
			Sample Name	BZ3-SO-12-11-12	BZ3-SO-12-5-7	BZ3-SO-13-1-2	BZ3-SO-13-2-3	BZ3-SO-14-4-5	BZ3-SO-15-0-2	BZ3-SO-15-5-7	MW-21-SO-10-12	MW-22-SO-0-2
			Date Sampled	12/13/2011	12/13/2011	4/18/2012	4/20/2012	12/21/2011	4/19/2012	4/19/2012	4/30/2012	5/4/2012
			Parent Sample Name									
	Act 2 MSCs (Residential)[1]		Depth Interval	11-12	5-7	1-2	2-3	4-5	0-2	5-7	10-12	0-2
Analyte	**RDC MSC**	**RSGW**	**Unit**									
SVOCs (SW8270)												
2-methylnaphthalene	880000	600000	ug/kg	190 U	185 U	165 U	180 U	185 U	550 U	700 U	175 U	220 U
Acenaphthene	13000000	2700000	ug/kg	190 U	185 U	165 U	180 U	185 U	550 U	700 U	175 U	220 U
Acenaphthylene	13000000	2500000	ug/kg	190 U	185 U	165 U	180 U	185 U	550 U	700 U	175 U	220 U
Acetophenone	10000000	370000	ug/kg	190 U	185 U	165 U	180 U	185 U	550 U	700 U	175 U	220 U
Anthracene	66000000	350000	ug/kg	190 U	185 U	165 U	180 U	185 U	550 U	700 U	175 U	220 U
Benzaldehyde	NSA	NSA	ug/kg	190 U	185 U	165 U	180 U	185 U	550 U	700 U	175 U	220 U
Benzo[a]anthracene	5700	25000	ug/kg	190 U	185 U	165 U	180 U	185 U	790 J	700 U	175 U	220 U
Benzo[a]pyrene	570	46000	ug/kg	190 U	185 U	165 U	180 U	185 U	**690 J**	700 U	175 U	220 U
Benzo[b]fluoranthene	5700	40000	ug/kg	190 U	185 U	165 U	180 U	185 U	1000 J	700 U	175 U	220 U
Benzo[g,h,i]perylene	13000000	180000	ug/kg	190 U	185 U	165 U	180 U	185 U	550 U	700 U	175 U	220 U
Benzo[k]fluoranthene	57000	610000	ug/kg	190 U	185 U	165 U	180 U	185 U	550 U	700 U	175 U	220 U
Bis(2-ethylhexyl) phthalate	1300000	130000	ug/kg	190 U	185 U	165 U	180 U	185 U	550 U	700 U	175 U	410 J
Carbazole	900000	21000	ug/kg	190 U	185 U	165 U	180 U	185 U	550 U	700 U	175 U	220 U
Chrysene	570000	230000	ug/kg	190 U	185 U	165 U	180 U	185 U	810 J	700 U	175 U	220 U
Dibenz[a,h]anthracene	570	13000	ug/kg	190 U	185 U	165 U	180 U	185 U	550 U	700 U	175 U	220 U
Dibenzofuran	220000	95000	ug/kg	190 U	185 U	165 U	180 U	185 U	550 U	700 U	175 U	220 U
Diethyl phthalate	10000000	2900000	ug/kg	190 U	185 U	165 U	180 U	185 U	550 U	700 U	175 U	220 U
Dimethyl phthalate	NSA	NSA	ug/kg	190 U	185 U	730	540	185 U	1700	2500	260 J	630
Fluoranthene	8800000	3200000	ug/kg	190 U	185 U	165 U	180 U	185 U	1600	700 U	175 U	190 J
Fluorene	8800000	3000000	ug/kg	190 U	185 U	165 U	180 U	185 U	550 U	700 U	175 U	220 U
Indeno[1,2,3-c,d]pyrene	5700	2200000	ug/kg	190 U	185 U	165 U	180 U	185 U	550 U	700 U	175 U	220 U
Naphthalene	4400000	25000	ug/kg	190 U	185 U	165 U	180 U	185 U	550 U	700 U	175 U	220 U
Pentachlorophenol	150000	5000	ug/kg	190 U	185 U	165 U	180 U	185 U	550 U	700 U	175 U	220 U
Phenanthrene	66000000	10000000	ug/kg	190 U	185 U	165 U	180 U	185 U	970 J	700 U	175 U	220 U
Phenol	66000000	200000	ug/kg	190 U	185 U	165 U	180 U	185 U	550 U	700 U	175 U	220 U
Pyrene	6600000	2200000	ug/kg	190 U	185 U	165 U	180 U	185 U	1300	700 U	175 U	190 J

Table 6-3 - Soil - Analytical Summary of Detected SVOC

			Location ID	MW-23	MW-24	MW-25	MW-26	MW-27	MW-27	MW-28	MW-29	MW-31
			Sample Name	MW-23-SO-0-2	MW-24-SO-10-12	MW-25-SO-0-2	MW-26-SO-0-2	MW-27-SO-4-6	MW-SO-DUP1	MW-28-SO-0-2	MW-29-SO-5-7	MW-31-SO-10-12
			Date Sampled	5/4/2012	5/2/2012	5/2/2012	5/3/2012	5/3/2012	5/3/2012	5/3/2012	5/3/2012	5/3/2012
			Parent Sample Name						MW-27-SO-4-6			
	Act 2 MSCs (Residential)[1]		Depth Interval	0-2	10-12	0-2	0-2	4-6	4-6	0-2	5-7	10-12
Analyte	**RDC MSC**	**RSGW**	**Unit**									
SVOCs (SW8270)												
2-methylnaphthalene	880000	600000	ug/kg	195 U	195 U	2850 U	550 U	185 U	195 U	185 U	185 U	175 U
Acenaphthene	13000000	2700000	ug/kg	195 U	195 U	2850 U	550 U	185 U	195 U	185 U	185 U	175 U
Acenaphthylene	13000000	2500000	ug/kg	195 U	195 U	2850 U	550 U	185 U	195 U	185 U	185 U	175 U
Acetophenone	10000000	370000	ug/kg	195 U	195 U	2850 U	550 U	185 U	195 U	185 U	185 U	175 U
Anthracene	66000000	350000	ug/kg	195 U	195 U	2850 U	550 U	185 U	195 U	185 U	185 U	175 U
Benzaldehyde	NSA	NSA	ug/kg	195 U	195 U	2850 U	550 U	185 U	195 U	185 U	185 U	175 U
Benzo[a]anthracene	5700	25000	ug/kg	720	195 U	2850 U	1000 J	185 U	195 U	185 U	185 U	175 U
Benzo[a]pyrene	570	46000	ug/kg	560	195 U	2850 U	**880 J**	185 U	195 U	185 U	185 U	175 U
Benzo[b]fluoranthene	5700	40000	ug/kg	730	195 U	2850 U	1300	185 U	195 U	185 U	185 U	175 U
Benzo[g,h,i]perylene	13000000	180000	ug/kg	310 J	195 U	2850 U	560 J	240 J	195 U	185 U	185 U	175 U
Benzo[k]fluoranthene	57000	610000	ug/kg	280 J	195 U	2850 U	600 J	185 U	195 U	185 U	185 U	175 U
Bis(2-ethylhexyl) phthalate	1300000	130000	ug/kg	195 U	195 U	2850 U	550 U	185 U	195 U	185 U	185 U	175 U
Carbazole	900000	21000	ug/kg	195 U	195 U	2850 U	550 U	185 U	195 U	185 U	185 U	175 U
Chrysene	570000	230000	ug/kg	700	195 U	2850 U	1100 L	185 U	195 U	185 U	185 U	175 U
Dibenz[a,h]anthracene	570	13000	ug/kg	195 U	195 U	2850 U	550 U	185 U	195 U	185 U	185 U	175 U
Dibenzofuran	220000	95000	ug/kg	195 U	195 U	2850 U	550 U	185 U	195 U	185 U	185 U	175 U
Diethyl phthalate	10000000	2900000	ug/kg	195 U	195 U	2850 U	550 U	185 U	195 U	185 U	185 U	175 U
Dimethyl phthalate	NSA	NSA	ug/kg	490	240 J	2850 U	890 L	240 J	240 J	230 J	240 J	330 J
Fluoranthene	8800000	3200000	ug/kg	1200	195 U	2850 U	2000 L	185 U	195 U	185 U	185 U	175 U
Fluorene	8800000	3000000	ug/kg	195 U	195 U	2850 U	550 U	185 U	195 U	185 U	185 U	175 U
Indeno[1,2,3-c,d]pyrene	5700	2200000	ug/kg	310 J	195 U	2850 U	560 J	160 J	195 U	185 U	185 U	175 U
Naphthalene	4400000	25000	ug/kg	195 U	195 U	2850 U	550 U	185 U	195 U	185 U	185 U	175 U
Pentachlorophenol	150000	5000	ug/kg	195 U	195 U	2850 U	550 U	185 U	195 U	185 U	185 U	175 U
Phenanthrene	66000000	10000000	ug/kg	470	195 U	2850 U	1000 J	190 J	195 U	185 U	185 U	175 U
Phenol	66000000	200000	ug/kg	195 U	195 U	2850 U	550 U	185 U	195 U	185 U	185 U	175 U
Pyrene	6600000	2200000	ug/kg	1200	195 U	2850 U	1700 L	185 U	195 U	185 U	185 U	175 U

Table 6-3 - Soil - Analytical Summary of Detected SVOC

			Location ID	UBZ2-SO-01	UBZ2-SO-01	UBZ2-SO-02	UBZ2-SO-02	UBZ2-SO-03	UBZ2-SO-03	UBZ2-SO-04	UBZ2-SO-04
			Sample Name	UBZ2-SO-01-0-2	UBZ2-SO-01-5-7	UBZ2-SO-02-0-2	UBZ2-SO-02-5-7	UBZ2-SO-03-0-2	UBZ2-SO-03-8-10	UBZ2-SO-04-27-28	UBZ2-SO-04-5-7
			Date Sampled	1/4/2012	1/4/2012	1/4/2012	1/4/2012	1/4/2012	1/4/2012	1/9/2012	1/9/2012
			Parent Sample Name								
	Act 2 MSCs (Residential)[1]		Depth Interval	0-2	5-7	0-2	5-7	0-2	8-10	27-28	5-7
Analyte	RDC MSC	RSGW	Unit								
SVOCs (SW8270)											
2-methylnaphthalene	880000	600000	ug/kg	200 U	205 U	195 U	180 U	195 U	190 U	215 U	180 U
Acenaphthene	13000000	2700000	ug/kg	200 U	205 U	195 U	180 U	195 U	190 U	215 U	180 U
Acenaphthylene	13000000	2500000	ug/kg	200 U	205 U	195 U	180 U	195 U	190 U	215 U	180 U
Acetophenone	10000000	370000	ug/kg	200 U	205 U	195 U	180 U	195 U	190 U	215 U	180 U
Anthracene	66000000	350000	ug/kg	200 U	205 U	195 U	180 U	195 U	190 U	215 U	180 U
Benzaldehyde	NSA	NSA	ug/kg	200 U	205 U	195 U	180 U	195 U	190 U	215 U	180 U
Benzo[a]anthracene	5700	25000	ug/kg	760	205 U	340 J	180 U	380 J	190 U	215 U	180 U
Benzo[a]pyrene	570	46000	ug/kg	**600**	205 U	300 J	180 U	350 J	190 U	215 U	180 U
Benzo[b]fluoranthene	5700	40000	ug/kg	800	205 U	410	180 U	440	190 U	215 U	180 U
Benzo[g,h,i]perylene	13000000	180000	ug/kg	360 J	205 U	180 J	180 U	190 J	190 U	215 U	180 U
Benzo[k]fluoranthene	57000	610000	ug/kg	300 J	205 U	195 U	180 U	170 J	190 U	215 U	180 U
Bis(2-ethylhexyl) phthalate	1300000	130000	ug/kg	200 U	205 U	195 U	180 U	195 U	190 U	215 U	180 U
Carbazole	900000	21000	ug/kg	200 U	205 U	195 U	180 U	195 U	190 U	215 U	180 U
Chrysene	570000	230000	ug/kg	720	205 U	360 J	180 U	350 J	190 U	215 U	180 U
Dibenz[a,h]anthracene	570	13000	ug/kg	200 U	205 U	195 U	180 U	195 U	190 U	215 U	180 U
Dibenzofuran	220000	95000	ug/kg	200 U	205 U	195 U	180 U	195 U	190 U	215 U	180 U
Diethyl phthalate	10000000	2900000	ug/kg	200 U	205 U	195 U	180 U	195 U	190 U	215 U	180 U
Dimethyl phthalate	NSA	NSA	ug/kg	190 J	220 J	195 U	180 U	195 U	190 U	215 U	180 U
Fluoranthene	8800000	3200000	ug/kg	1400	205 U	590	180 U	710	190 U	215 U	180 U
Fluorene	8800000	3000000	ug/kg	200 U	205 U	195 U	180 U	195 U	190 U	215 U	180 U
Indeno[1,2,3-c,d]pyrene	5700	2200000	ug/kg	340 J	205 U	170 J	180 U	200 J	190 U	215 U	180 U
Naphthalene	4400000	25000	ug/kg	200 U	205 U	195 U	180 U	195 U	190 U	215 U	180 U
Pentachlorophenol	150000	5000	ug/kg	200 U	205 U	195 U	180 U	195 U	190 U	215 U	180 U
Phenanthrene	66000000	10000000	ug/kg	630	205 U	250 J	180 U	320 J	190 U	215 U	180 U
Phenol	66000000	200000	ug/kg	200 U	205 U	195 U	180 U	195 U	190 U	215 U	180 U
Pyrene	6600000	2200000	ug/kg	1200	205 U	540	180 U	640	190 U	215 U	180 U

Table 6-3 - Soil - Analytical Summary of Detected SVOC

			Location ID	UBZ2-SO-04	UBZ2-SO-05	UBZ2-SO-05	UBZ2-SO-06	UBZ2-SO-06	UBZ2-SO-07	UBZ2-SO-07	UBZ2-SO-08
			Sample Name	UBZ2-SO-DUP13	UBZ2-SO-05-10-12	UBZ2-SO-05-1-3	UBZ2-SO-06-0-2	UBZ2-SO-06-6-8	UBZ2-SO-07-0-2	UBZ2-SO-07-5-7	UBZ2-SO-08-0-2
			Date Sampled	1/9/2012	1/6/2012	1/6/2012	1/6/2012	1/6/2012	1/6/2012	1/6/2012	1/4/2012
			Parent Sample Name	UBZ2-SO-04-5-7							
	Act 2 MSCs (Residential)[1]		Depth Interval	5-7	10-12	1-3	0-2	6-8	0-2	5-7	0-2
Analyte	RDC MSC	RSGW	Unit								
SVOCs (SW8270)											
2-methylnaphthalene	880000	600000	ug/kg	180 U	850 U	185 U	185 U	180 U	185 U	175 U	185 U
Acenaphthene	13000000	2700000	ug/kg	180 U	850 U	185 U	185 U	180 U	185 U	175 U	185 U
Acenaphthylene	13000000	2500000	ug/kg	180 U	850 U	185 U	185 U	180 U	185 U	175 U	185 U
Acetophenone	10000000	370000	ug/kg	180 U	850 U	185 U	185 U	180 U	185 U	175 U	185 U
Anthracene	66000000	350000	ug/kg	180 U	850 UL	185 UL	185 UL	180 UL	185 UL	175 UL	185 U
Benzaldehyde	NSA	NSA	ug/kg	180 U	850 U	185 U	185 U	180 U	185 U	175 U	185 U
Benzo[a]anthracene	5700	25000	ug/kg	180 U	850 UL	185 UL	185 UL	180 UL	185 UL	175 UL	185 U
Benzo[a]pyrene	570	46000	ug/kg	180 U	850 UL	185 UL	185 UL	180 UL	185 UL	175 UL	185 U
Benzo[b]fluoranthene	5700	40000	ug/kg	180 U	850 UL	185 UL	185 UL	180 UL	185 UL	175 UL	180 J
Benzo[g,h,i]perylene	13000000	180000	ug/kg	180 U	850 U	185 U	185 U	180 U	185 U	175 U	185 U
Benzo[k]fluoranthene	57000	610000	ug/kg	180 U	850 UL	185 UL	185 UL	180 UL	185 UL	175 UL	185 U
Bis(2-ethylhexyl) phthalate	1300000	130000	ug/kg	180 U	850 UL	185 UL	185 UL	180 UL	185 UL	175 UL	185 U
Carbazole	900000	21000	ug/kg	180 U	850 UL	185 UL	185 UL	180 UL	185 UL	175 UL	185 U
Chrysene	570000	230000	ug/kg	180 U	850 UL	185 UL	185 UL	180 UL	185 UL	175 UL	160 J
Dibenz[a,h]anthracene	570	13000	ug/kg	180 U	850 U	185 U	185 U	180 U	185 U	175 U	185 U
Dibenzofuran	220000	95000	ug/kg	180 U	850 UL	185 UL	185 UL	180 UL	185 UL	175 UL	185 UL
Diethyl phthalate	10000000	2900000	ug/kg	180 U	850 UL	185 UL	185 UL	180 UL	185 UL	175 UL	185 U
Dimethyl phthalate	NSA	NSA	ug/kg	180 U	850 UL	185 UL	185 UL	180 UL	185 UL	175 UL	185 U
Fluoranthene	8800000	3200000	ug/kg	180 U	850 UL	185 UL	185 UL	180 UL	185 UL	175 UL	280 J
Fluorene	8800000	3000000	ug/kg	180 U	850 UL	185 UL	185 UL	180 UL	185 UL	175 UL	185 U
Indeno[1,2,3-c,d]pyrene	5700	2200000	ug/kg	180 U	850 U	185 U	185 U	180 U	185 U	175 U	185 U
Naphthalene	4400000	25000	ug/kg	180 U	850 U	185 U	185 U	180 U	185 U	175 U	185 U
Pentachlorophenol	150000	5000	ug/kg	180 U	850 U	185 U	185 U	180 U	185 U	175 U	185 U
Phenanthrene	66000000	10000000	ug/kg	180 U	850 UL	185 UL	185 UL	180 UL	185 UL	175 UL	185 U
Phenol	66000000	200000	ug/kg	180 U	850 UL	185 UL	185 UL	180 UL	185 UL	175 UL	185 U
Pyrene	6600000	2200000	ug/kg	180 U	850 UL	185 UL	185 UL	180 UL	185 UL	175 UL	220 J

Table 6-3 - Soil - Analytical Summary of Detected SVOC

			Location ID	UBZ2-SO-08	UBZ2-SO-09	UBZ2-SO-09	UBZ2-SO-10	UBZ2-SO-10	UBZ2-SO-11	UBZ2-SO-11	UBZ2-SO-12
			Sample Name	UBZ2-SO-08-5-7	UBZ2-SO-09-0-3	UBZ2-SO-09-5-7	UBZ2-SO-10-0-2	UBZ2-SO-10-5-7	UBZ2-SO-11-10-12	UBZ2-SO-11-1-3	UBZ2-SO-12-1-3
			Date Sampled	1/4/2012	1/4/2012	1/4/2012	1/5/2012	1/5/2012	1/6/2012	1/6/2012	1/6/2012
			Parent Sample Name								
	Act 2 MSCs (Residential)[1]		Depth Interval	5-7	0-3	5-7	0-2	5-7	11-12	1-3	1-3
Analyte	RDC MSC	RSGW	Unit								
SVOCs (SW8270)											
2-methylnaphthalene	880000	600000	ug/kg	195 U	550 U	175 U	3700 U	175 U	175 U	185 U	190 U
Acenaphthene	13000000	2700000	ug/kg	195 U	550 U	175 U	3700 U	175 U	175 U	185 U	190 U
Acenaphthylene	13000000	2500000	ug/kg	195 U	550 U	175 U	3700 U	175 U	175 U	185 U	190 U
Acetophenone	10000000	370000	ug/kg	195 U	550 U	175 U	3700 U	175 U	175 U	185 U	190 U
Anthracene	66000000	350000	ug/kg	195 U	550 U	175 U	3700 U	175 U	175 UL	185 UL	190 UL
Benzaldehyde	NSA	NSA	ug/kg	195 U	550 U	175 U	3700 U	175 U	175 U	185 U	190 U
Benzo[a]anthracene	5700	25000	ug/kg	195 U	1100 J	175 U	3700 U	175 U	175 UL	185 UL	190 UL
Benzo[a]pyrene	570	46000	ug/kg	195 U	**880 J**	175 U	3700 U	175 U	175 UL	185 UL	190 UL
Benzo[b]fluoranthene	5700	40000	ug/kg	195 U	1200	175 U	3700 U	175 U	175 UL	185 UL	190 UL
Benzo[g,h,i]perylene	13000000	180000	ug/kg	195 U	500 J	175 U	3700 U	175 U	175 U	185 U	190 U
Benzo[k]fluoranthene	57000	610000	ug/kg	195 U	670 J	175 U	3700 U	175 U	175 UL	185 UL	190 UL
Bis(2-ethylhexyl) phthalate	1300000	130000	ug/kg	195 U	550 U	175 U	3700 U	175 U	175 UL	185 UL	190 UL
Carbazole	900000	21000	ug/kg	195 U	550 U	175 U	3700 U	175 U	175 UL	185 UL	190 UL
Chrysene	570000	230000	ug/kg	195 U	1000 J	175 U	3700 U	175 U	175 UL	185 UL	190 UL
Dibenz[a,h]anthracene	570	13000	ug/kg	195 U	550 U	175 U	3700 U	175 U	175 U	185 U	190 U
Dibenzofuran	220000	95000	ug/kg	195 UL	550 UL	175 UL	3700 UL	175 UL	175 UL	185 UL	190 UL
Diethyl phthalate	10000000	2900000	ug/kg	195 U	550 U	175 U	3700 U	175 U	175 UL	185 UL	190 UL
Dimethyl phthalate	NSA	NSA	ug/kg	195 U	550 U	175 U	3700 U	175 U	175 UL	185 UL	190 UL
Fluoranthene	8800000	3200000	ug/kg	195 U	1700	175 U	3700 U	175 U	175 UL	185 UL	190 UL
Fluorene	8800000	3000000	ug/kg	195 U	550 U	175 U	3700 U	175 U	175 UL	185 UL	190 UL
Indeno[1,2,3-c,d]pyrene	5700	2200000	ug/kg	195 U	550 U	175 U	3700 U	175 U	175 U	185 U	190 U
Naphthalene	4400000	25000	ug/kg	195 U	550 U	175 U	3700 U	175 U	175 U	185 U	190 U
Pentachlorophenol	150000	5000	ug/kg	195 U	540 J	175 U	3700 U	175 U	175 U	185 U	190 U
Phenanthrene	66000000	10000000	ug/kg	195 U	800 J	175 U	3700 U	175 U	175 UL	185 UL	190 UL
Phenol	66000000	200000	ug/kg	195 U	550 U	175 U	3700 U	175 U	175 UL	185 UL	190 UL
Pyrene	6600000	2200000	ug/kg	195 U	1500	175 U	3700 U	175 U	175 UL	185 UL	190 UL

Table 6-3 - Soil - Analytical Summary of Detected SVOC

			Location ID	UBZ2-SO-12	UBZ2-SO-13	UBZ2-SO-13	UBZ2-SO-13	UBZ2-SO-14	UBZ2-SO-14	UBZ2-SO-14	UBZ2-SO-15
			Sample Name	UBZ2-SO-12-5-7	UBZ2-SO-13-0.5-2	UBZ2-SO-13-5-7	UBZ2-SO-DUP11	UBZ2-SO-14-0.5-2	UBZ2-SO-14-5-7	UBZ2-SO-DUP12	UBZ2-SO-15-5-6
			Date Sampled	1/6/2012	1/6/2012	1/6/2012	1/6/2012	1/6/2012	1/6/2012	1/6/2012	12/29/2011
			Parent Sample Name				UBZ2-SO-13-0.5-2			UBZ2-SO-14-0.5-2	
	Act 2 MSCs (Residential)[1]		Depth Interval	5-7	0.5-2	5-7	0.5-2	0.5-2	5-7	0.5-2	5-6
Analyte	**RDC MSC**	**RSGW**	**Unit**								
SVOCs (SW8270)											
2-methylnaphthalene	880000	600000	ug/kg	180 U	195 U	175 U	195 U	190 U	900 U	185 U	175 U
Acenaphthene	13000000	2700000	ug/kg	180 U	195 U	175 U	195 U	190 U	900 U	185 U	175 U
Acenaphthylene	13000000	2500000	ug/kg	180 U	195 U	175 U	195 U	190 U	900 U	185 U	175 U
Acetophenone	10000000	370000	ug/kg	180 U	195 U	175 U	195 U	190 U	900 U	185 U	175 U
Anthracene	66000000	350000	ug/kg	180 UL	195 UL	175 UL	195 UL	190 UL	900 UL	185 UL	175 U
Benzaldehyde	NSA	NSA	ug/kg	180 U	195 U	175 U	195 U	190 U	900 U	185 U	175 U
Benzo[a]anthracene	5700	25000	ug/kg	180 UL	195 UL	175 UL	195 UL	190 UL	900 UL	185 UL	175 U
Benzo[a]pyrene	570	46000	ug/kg	180 UL	195 UL	175 UL	195 UL	190 UL	900 UL	185 UL	175 U
Benzo[b]fluoranthene	5700	40000	ug/kg	180 UL	195 UL	175 UL	195 UL	190 UL	900 UL	185 UL	175 U
Benzo[g,h,i]perylene	13000000	180000	ug/kg	180 U	195 U	175 U	195 U	190 U	900 U	185 U	175 U
Benzo[k]fluoranthene	57000	610000	ug/kg	180 UL	195 UL	175 UL	195 UL	190 UL	900 UL	185 UL	175 U
Bis(2-ethylhexyl) phthalate	1300000	130000	ug/kg	180 UL	195 UL	175 UL	195 UL	190 UL	900 UL	185 UL	175 U
Carbazole	900000	21000	ug/kg	180 UL	195 UL	175 UL	195 UL	190 UL	900 UL	185 UL	175 U
Chrysene	570000	230000	ug/kg	180 UL	195 UL	175 UL	195 UL	190 UL	900 UL	185 UL	175 U
Dibenz[a,h]anthracene	570	13000	ug/kg	180 U	195 U	175 U	195 U	190 U	900 U	185 U	175 U
Dibenzofuran	220000	95000	ug/kg	180 UL	195 UL	175 UL	195 UL	190 UL	900 UL	185 UL	175 U
Diethyl phthalate	10000000	2900000	ug/kg	180 UL	195 UL	175 UL	195 UL	190 UL	900 UL	185 UL	175 U
Dimethyl phthalate	NSA	NSA	ug/kg	180 UL	195 UL	175 UL	195 UL	190 UL	900 UL	185 UL	175 U
Fluoranthene	8800000	3200000	ug/kg	180 UL	195 UL	175 UL	195 UL	190 UL	900 UL	185 UL	175 U
Fluorene	8800000	3000000	ug/kg	180 UL	195 UL	175 UL	195 UL	190 UL	900 UL	185 UL	175 U
Indeno[1,2,3-c,d]pyrene	5700	2200000	ug/kg	180 U	195 U	175 U	195 U	190 U	900 U	185 U	175 U
Naphthalene	4400000	25000	ug/kg	180 U	195 U	175 U	195 U	190 U	900 U	185 U	175 U
Pentachlorophenol	150000	5000	ug/kg	180 U	195 U	175 U	195 U	190 U	900 U	185 U	175 U
Phenanthrene	66000000	10000000	ug/kg	180 UL	195 UL	175 UL	195 UL	190 UL	900 UL	185 UL	175 U
Phenol	66000000	200000	ug/kg	180 UL	195 UL	175 UL	195 UL	190 UL	900 UL	185 UL	175 U
Pyrene	6600000	2200000	ug/kg	180 UL	195 UL	175 UL	195 UL	190 UL	900 UL	185 UL	175 U

Table 6-3 - Soil - Analytical Summary of Detected SVOC

			Location ID	UBZ2-SO-15	UBZ2-SO-15	UBZ2-SO-16	UBZ2-SO-16	UBZ2-SO-17	UBZ2-SO-17	UBZ2-SO-18	UBZ2-SO-18
			Sample Name	UBZ2-SO-15-7-8	UBZ2-SO-DUP08	UBZ2-SO-16-1-2	UBZ2-SO-16-5-7	UBZ2-SO-17-0-2	UBZ2-SO-17-5-7	UBZ2-SO-18-10-11	UBZ2-SO-18-5-6
			Date Sampled	12/29/2011	12/29/2011	1/9/2012	1/9/2012	1/5/2012	1/5/2012	12/30/2011	12/30/2011
			Parent Sample Name		UBZ2-SO-15-7-8						
	Act 2 MSCs (Residential)[1]		Depth Interval	7-8	7-8	1-2	5-7	0-2	5-7	10-11	5-6
Analyte	RDC MSC	RSGW	Unit								
SVOCs (SW8270)											
2-methylnaphthalene	880000	600000	ug/kg	185 U	180 U	195 U	175 U	190 U	175 U	170 U	180 U
Acenaphthene	13000000	2700000	ug/kg	185 U	180 U	195 U	175 U	190 U	175 U	170 U	180 U
Acenaphthylene	13000000	2500000	ug/kg	185 U	180 U	195 U	175 U	190 U	175 U	170 U	180 U
Acetophenone	10000000	370000	ug/kg	185 U	180 U	195 U	175 U	190 U	175 U	170 U	180 U
Anthracene	66000000	350000	ug/kg	185 U	180 U	195 U	175 U	190 J	175 U	170 U	180 U
Benzaldehyde	NSA	NSA	ug/kg	185 U	180 U	195 U	175 U	190 U	175 U	170 U	180 U
Benzo[a]anthracene	5700	25000	ug/kg	185 U	180 U	270 J	175 U	530	175 U	170 U	180 U
Benzo[a]pyrene	570	46000	ug/kg	185 U	180 U	230 J	175 U	420	175 U	170 U	180 U
Benzo[b]fluoranthene	5700	40000	ug/kg	185 U	180 U	270 J	175 U	650	175 U	170 U	180 U
Benzo[g,h,i]perylene	13000000	180000	ug/kg	185 U	180 U	195 U	175 U	200 J	175 U	170 U	180 U
Benzo[k]fluoranthene	57000	610000	ug/kg	185 U	180 U	195 U	175 U	210 J	175 U	170 U	180 U
Bis(2-ethylhexyl) phthalate	1300000	130000	ug/kg	185 U	180 U	195 U	175 U	190 U	175 U	170 U	180 U
Carbazole	900000	21000	ug/kg	185 U	180 U	195 U	175 U	190 U	175 U	170 U	180 U
Chrysene	570000	230000	ug/kg	185 U	180 U	280 J	175 U	480	175 U	170 U	180 U
Dibenz[a,h]anthracene	570	13000	ug/kg	185 U	180 U	195 U	175 U	190 U	175 U	170 U	180 U
Dibenzofuran	220000	95000	ug/kg	185 U	180 U	195 U	175 U	190 UL	175 UL	170 U	180 U
Diethyl phthalate	10000000	2900000	ug/kg	185 U	180 U	195 U	175 U	190 U	175 U	170 U	180 U
Dimethyl phthalate	NSA	NSA	ug/kg	185 U	180 U	195 U	175 U	190 U	175 U	170 U	180 U
Fluoranthene	8800000	3200000	ug/kg	185 U	180 U	670	175 U	1100	175 U	170 U	180 U
Fluorene	8800000	3000000	ug/kg	185 U	180 U	195 U	175 U	190 U	175 U	170 U	180 U
Indeno[1,2,3-c,d]pyrene	5700	2200000	ug/kg	185 U	180 U	195 U	175 U	190 J	175 U	170 U	180 U
Naphthalene	4400000	25000	ug/kg	185 U	180 U	195 U	175 U	190 U	175 U	170 U	180 U
Pentachlorophenol	150000	5000	ug/kg	185 U	180 U	195 U	175 U	190 U	175 U	170 U	180 U
Phenanthrene	66000000	10000000	ug/kg	185 U	180 U	630	140 J	780	175 U	170 U	180 U
Phenol	66000000	200000	ug/kg	185 U	180 U	195 U	175 U	190 U	175 U	170 U	180 U
Pyrene	6600000	2200000	ug/kg	185 U	180 U	630	175 U	800	175 U	170 U	180 U

Table 6-3 - Soil - Analytical Summary of Detected SVOC

			Location ID	UBZ2-SO-18	UBZ2-SO-19	UBZ2-SO-19	UBZ2-SO-20	UBZ2-SO-20	UBZ2-SO-21	UBZ2-SO-21	UBZ2-SO-22
			Sample Name	UBZ2-SO-DUP9	UBZ2-SO-19-0.5-1.5	UBZ2-SO-19-7-8	UBZ2-SO-20-1-2	UBZ2-SO-20-5.5-6.5	UBZ2-SO-21-10-11	UBZ2-SO-21-5-6	UBZ2-SO-22-1-2
			Date Sampled	12/30/2011	12/30/2011	12/30/2011	12/28/2011	12/28/2011	12/28/2011	12/28/2011	1/9/2012
			Parent Sample Name	UBZ2-SO-18-10-11							
	Act 2 MSCs (Residential)[1]		Depth Interval	10-11	0.5-1.5	7-8	1-2	5.5-6.5	10-11	5-6	1-2
Analyte	**RDC MSC**	**RSGW**	**Unit**								
SVOCs (SW8270)											
2-methylnaphthalene	880000	600000	ug/kg	170 U	175 U	185 U	195 U	180 U	170 U	175 U	195 U
Acenaphthene	13000000	2700000	ug/kg	170 U	175 U	185 U	195 U	180 U	170 U	175 U	195 U
Acenaphthylene	13000000	2500000	ug/kg	170 U	175 U	185 U	195 U	180 U	170 U	175 U	195 U
Acetophenone	10000000	370000	ug/kg	170 U	175 U	185 U	195 U	180 U	170 U	175 U	195 U
Anthracene	66000000	350000	ug/kg	170 U	175 U	185 U	195 U	180 U	170 U	175 U	195 U
Benzaldehyde	NSA	NSA	ug/kg	170 U	175 U	185 U	195 U	180 U	170 U	175 U	195 U
Benzo[a]anthracene	5700	25000	ug/kg	170 U	175 U	185 U	195 U	180 U	170 U	175 U	195 U
Benzo[a]pyrene	570	46000	ug/kg	170 U	175 U	185 U	195 U	180 U	170 U	175 U	195 U
Benzo[b]fluoranthene	5700	40000	ug/kg	170 U	175 U	185 U	195 U	180 U	170 U	175 U	195 U
Benzo[g,h,i]perylene	13000000	180000	ug/kg	170 U	175 U	185 U	195 U	180 U	170 U	175 U	195 U
Benzo[k]fluoranthene	57000	610000	ug/kg	170 U	175 U	185 U	195 U	180 U	170 U	175 U	195 U
Bis(2-ethylhexyl) phthalate	1300000	130000	ug/kg	170 U	175 U	185 U	195 U	180 U	170 U	175 U	195 U
Carbazole	900000	21000	ug/kg	170 U	175 U	185 U	195 U	180 U	170 U	175 U	195 U
Chrysene	570000	230000	ug/kg	170 U	175 U	185 U	195 U	180 U	170 U	175 U	195 U
Dibenz[a,h]anthracene	570	13000	ug/kg	170 U	175 U	185 U	195 U	180 U	170 U	175 U	195 U
Dibenzofuran	220000	95000	ug/kg	170 U	175 U	185 U	195 U	180 U	170 U	175 U	195 U
Diethyl phthalate	10000000	2900000	ug/kg	170 U	175 U	185 U	195 U	180 U	160 J	175 U	195 U
Dimethyl phthalate	NSA	NSA	ug/kg	170 U	175 U	185 U	195 U	180 U	170 U	175 U	195 U
Fluoranthene	8800000	3200000	ug/kg	170 U	175 U	185 U	195 U	180 U	170 U	175 U	195 U
Fluorene	8800000	3000000	ug/kg	170 U	175 U	185 U	195 U	180 U	170 U	175 U	195 U
Indeno[1,2,3-c,d]pyrene	5700	2200000	ug/kg	170 U	175 U	185 U	195 U	180 U	170 U	175 U	195 U
Naphthalene	4400000	25000	ug/kg	170 U	175 U	185 U	195 U	180 U	170 U	175 U	195 U
Pentachlorophenol	150000	5000	ug/kg	170 U	175 U	185 U	195 U	180 U	170 U	175 U	195 U
Phenanthrene	66000000	10000000	ug/kg	170 U	175 U	185 U	195 U	180 U	170 U	175 U	195 U
Phenol	66000000	200000	ug/kg	170 U	175 U	185 U	195 U	180 U	170 U	175 U	195 U
Pyrene	6600000	2200000	ug/kg	170 U	175 U	185 U	195 U	180 U	170 U	175 U	195 U

Table 6-3 - Soil - Analytical Summary of Detected SVOC

			Location ID	UBZ2-SO-22	UBZ2-SO-23	UBZ2-SO-23	UBZ2-SO-24	UBZ2-SO-24	UBZ2-SO-25	UBZ2-SO-25	UBZ2-SO-26
			Sample Name	UBZ2-SO-22-8-9	UBZ2-SO-23-1-2	UBZ2-SO-23-5-7	UBZ2-SO-24-11-12	UBZ2-SO-24-6-7	UBZ2-SO-25-0-1	UBZ2-SO-25-1-2	UBZ2-SO-26-0-1
			Date Sampled	1/9/2012	12/30/2011	12/30/2011	12/30/2011	12/30/2011	12/30/2011	12/30/2011	12/28/2011
			Parent Sample Name								
	Act 2 MSCs (Residential)[1]		Depth Interval	8-9	1-2	5-7	11-12	6-7	0-1	1-2	0-1
Analyte	**RDC MSC**	**RSGW**	**Unit**								
SVOCs (SW8270)											
2-methylnaphthalene	880000	600000	ug/kg	180 U	200 U	180 U	175 U	180 U	205 U	195 U	1300 U
Acenaphthene	13000000	2700000	ug/kg	180 U	200 U	180 U	175 U	180 U	205 U	195 U	1300 U
Acenaphthylene	13000000	2500000	ug/kg	180 U	200 U	180 U	175 U	180 U	205 U	195 U	1300 U
Acetophenone	10000000	370000	ug/kg	180 U	200 U	180 U	175 U	180 U	205 U	195 U	1300 U
Anthracene	66000000	350000	ug/kg	180 U	200 U	180 U	175 U	180 U	205 U	195 U	1300 U
Benzaldehyde	NSA	NSA	ug/kg	180 U	200 U	180 U	175 U	180 U	205 U	195 U	1300 U
Benzo[a]anthracene	5700	25000	ug/kg	180 U	200 U	180 U	175 U	180 U	205 U	195 U	1300 U
Benzo[a]pyrene	570	46000	ug/kg	180 U	200 U	180 U	175 U	180 U	205 U	195 U	1300 U
Benzo[b]fluoranthene	5700	40000	ug/kg	180 U	200 U	180 U	175 U	180 U	205 U	195 U	1400 J
Benzo[g,h,i]perylene	13000000	180000	ug/kg	180 U	200 U	180 U	175 U	180 U	205 U	195 U	1300 U
Benzo[k]fluoranthene	57000	610000	ug/kg	180 U	200 U	180 U	175 U	180 U	205 U	195 U	1300 U
Bis(2-ethylhexyl) phthalate	1300000	130000	ug/kg	180 U	200 U	180 U	175 U	180 U	205 U	195 U	1300 U
Carbazole	900000	21000	ug/kg	180 U	200 U	180 U	175 U	180 U	205 U	195 U	1300 U
Chrysene	570000	230000	ug/kg	180 U	200 U	180 U	175 U	180 U	205 U	195 U	1300 U
Dibenz[a,h]anthracene	570	13000	ug/kg	180 U	200 U	180 U	175 U	180 U	205 U	195 U	1300 U
Dibenzofuran	220000	95000	ug/kg	180 U	200 U	180 U	175 U	180 U	205 U	195 U	1300 U
Diethyl phthalate	10000000	2900000	ug/kg	180 U	200 U	180 U	175 U	180 U	205 U	195 U	1300 U
Dimethyl phthalate	NSA	NSA	ug/kg	180 U	200 U	180 U	175 U	180 U	205 U	195 U	1300 U
Fluoranthene	8800000	3200000	ug/kg	180 U	200 U	180 U	175 U	180 U	205 U	195 U	1400 J
Fluorene	8800000	3000000	ug/kg	180 U	200 U	180 U	175 U	180 U	205 U	195 U	1300 U
Indeno[1,2,3-c,d]pyrene	5700	2200000	ug/kg	180 U	200 U	180 U	175 U	180 U	205 U	195 U	1300 U
Naphthalene	4400000	25000	ug/kg	180 U	200 U	180 U	175 U	180 U	205 U	195 U	1300 U
Pentachlorophenol	150000	5000	ug/kg	180 U	200 U	180 U	175 U	180 U	205 U	195 U	1300 U
Phenanthrene	66000000	10000000	ug/kg	180 U	200 U	180 U	175 U	180 U	205 U	195 U	1300 U
Phenol	66000000	200000	ug/kg	180 U	200 U	180 U	175 U	180 U	205 U	195 U	1300 U
Pyrene	6600000	2200000	ug/kg	180 U	200 U	180 U	175 U	180 U	205 U	195 U	1200 J

Table 6-3 - Soil - Analytical Summary of Detected SVOC

			Location ID	UBZ2-SO-26	UBZ2-SO-27	UBZ2-SO-27	UBZ2-SO-28	UBZ2-SO-28	UBZ2-SO-29	UBZ2-SO-29
			Sample Name	UBZ2-SO-26-6-7	UBZ2-SO-27-0.5-1.5	UBZ2-SO-27-12.5-13.5	UBZ2-SO-28-0-1	UBZ2-SO-28-11-12	UBZ2-SO-29-0.5-1.5	UBZ2-SO-29-6.5-8.5
			Date Sampled	12/28/2011	12/28/2011	12/28/2011	12/28/2011	12/28/2011	1/16/2012	1/16/2012
			Parent Sample Name							
	Act 2 MSCs (Residential)[1]		Depth Interval	6-7	0.5-1.5	12.5-13.5	0-1	11-12	0.5-1.5	6.5-8.5
Analyte	RDC MSC	RSGW	Unit							
SVOCs (SW8270)										
2-methylnaphthalene	880000	600000	ug/kg	180 U	190 U	175 U	205 U	180 U	190 U	175 U
Acenaphthene	13000000	2700000	ug/kg	180 U	190 U	175 U	205 U	180 U	190 U	175 U
Acenaphthylene	13000000	2500000	ug/kg	180 U	190 U	175 U	205 U	180 U	190 U	175 U
Acetophenone	10000000	370000	ug/kg	180 U	190 U	175 U	205 U	180 U	190 U	175 U
Anthracene	66000000	350000	ug/kg	180 U	190 U	175 U	205 U	180 U	190 U	175 U
Benzaldehyde	NSA	NSA	ug/kg	180 U	190 U	175 U	205 U	180 U	190 U	175 U
Benzo[a]anthracene	5700	25000	ug/kg	180 U	190 U	175 U	240 J	180 U	190 U	170 J
Benzo[a]pyrene	570	46000	ug/kg	180 U	190 U	175 U	230 J	180 U	190 U	150 J
Benzo[b]fluoranthene	5700	40000	ug/kg	180 U	190 U	175 U	340 J	180 U	190 U	230 J
Benzo[g,h,i]perylene	13000000	180000	ug/kg	180 U	190 U	175 U	205 U	180 U	190 U	175 U
Benzo[k]fluoranthene	57000	610000	ug/kg	180 U	190 U	175 U	205 U	180 U	190 U	175 U
Bis(2-ethylhexyl) phthalate	1300000	130000	ug/kg	180 U	190 U	175 U	205 U	180 U	190 U	175 U
Carbazole	900000	21000	ug/kg	180 U	190 U	175 U	205 U	180 U	190 U	175 U
Chrysene	570000	230000	ug/kg	180 U	190 U	175 U	270 J	180 U	190 U	200 J
Dibenz[a,h]anthracene	570	13000	ug/kg	180 U	190 U	175 U	205 U	180 U	190 U	175 U
Dibenzofuran	220000	95000	ug/kg	180 U	190 U	175 U	205 U	180 U	190 U	175 U
Diethyl phthalate	10000000	2900000	ug/kg	180 U	190 U	175 U	205 U	180 U	190 U	175 U
Dimethyl phthalate	NSA	NSA	ug/kg	180 U	190 U	175 U	205 U	180 U	190 U	175 U
Fluoranthene	8800000	3200000	ug/kg	180 U	190 U	175 U	480	180 U	190 U	320 J
Fluorene	8800000	3000000	ug/kg	180 U	190 U	175 U	205 U	180 U	190 U	175 U
Indeno[1,2,3-c,d]pyrene	5700	2200000	ug/kg	180 U	190 U	175 U	205 U	180 U	190 U	175 U
Naphthalene	4400000	25000	ug/kg	180 U	190 U	175 U	205 U	180 U	190 U	175 U
Pentachlorophenol	150000	5000	ug/kg	180 U	190 U	175 U	205 U	180 U	190 U	175 U
Phenanthrene	66000000	10000000	ug/kg	180 U	190 U	175 U	230 J	180 U	190 U	160 J
Phenol	66000000	200000	ug/kg	180 U	190 U	175 U	205 U	180 U	190 U	175 U
Pyrene	6600000	2200000	ug/kg	180 U	190 U	175 U	420	180 U	190 U	270 J

Table 6-3 - Soil - Analytical Summary of Detected SVOC

			Location ID	UBZ2-SO-29	UBZ2-SO-30	UBZ2-SO-30	UBZ2-SO-31	UBZ2-SO-31	UBZ2-SO-32	UBZ2-SO-32	UBZ2-SO-33
			Sample Name	UBZ2-SO-Dup14	UBZ2-SO-30-2-3	UBZ2-SO-30-7-8	UBZ2-SO-31-1-2	UBZ2-SO-31-3-4	UBZ2-SO-32-0-1	UBZ2-SO-32-6-7	UBZ2-SO-33-0-2
			Date Sampled	1/16/2012	1/16/2012	1/16/2012	12/29/2011	12/29/2011	12/30/2011	12/30/2011	12/30/2011
			Parent Sample Name	UBZ2-SO-29-6.5-8.5							
	Act 2 MSCs (Residential)[1]		Depth Interval	6.5-8.5	2-3	7-8	1-2	3-4	0-1	6-7	0-2
Analyte	RDC MSC	RSGW	Unit								
SVOCs (SW8270)											
2-methylnaphthalene	880000	600000	ug/kg	180 U	190 U	180 U	190 U	200 U	200 U	195 U	190 U
Acenaphthene	13000000	2700000	ug/kg	180 U	190 U	180 U	190 U	200 U	200 U	195 U	190 U
Acenaphthylene	13000000	2500000	ug/kg	180 U	190 U	180 U	190 U	200 U	200 U	195 U	190 U
Acetophenone	10000000	370000	ug/kg	180 U	190 U	180 U	190 U	200 U	200 U	195 U	190 U
Anthracene	66000000	350000	ug/kg	180 U	190 U	180 U	190 U	200 U	200 U	195 U	190 U
Benzaldehyde	NSA	NSA	ug/kg	180 U	190 U	180 U	190 U	200 U	200 U	195 U	190 U
Benzo[a]anthracene	5700	25000	ug/kg	180 U	190 U	180 U	190 U	200 U	200 U	195 U	190 U
Benzo[a]pyrene	570	46000	ug/kg	180 U	190 U	180 U	190 U	200 U	200 U	195 U	190 U
Benzo[b]fluoranthene	5700	40000	ug/kg	180 U	190 U	180 U	190 U	200 U	160 J	195 U	190 U
Benzo[g,h,i]perylene	13000000	180000	ug/kg	180 U	190 U	180 U	190 U	200 U	200 U	195 U	190 U
Benzo[k]fluoranthene	57000	610000	ug/kg	180 U	190 U	180 U	190 U	200 U	200 U	195 U	190 U
Bis(2-ethylhexyl) phthalate	1300000	130000	ug/kg	180 U	190 U	180 U	190 U	200 U	200 U	195 U	190 U
Carbazole	900000	21000	ug/kg	180 U	190 U	180 U	190 U	200 U	200 U	195 U	190 U
Chrysene	570000	230000	ug/kg	180 U	190 U	180 U	190 U	200 U	200 U	195 U	190 U
Dibenz[a,h]anthracene	570	13000	ug/kg	180 U	190 U	180 U	190 U	200 U	200 U	195 U	190 U
Dibenzofuran	220000	95000	ug/kg	180 U	190 U	180 U	190 U	200 U	200 U	195 U	190 U
Diethyl phthalate	10000000	2900000	ug/kg	180 U	190 U	180 U	190 U	200 U	200 U	195 U	190 U
Dimethyl phthalate	NSA	NSA	ug/kg	180 U	190 U	180 U	190 U	200 U	200 U	195 U	190 U
Fluoranthene	8800000	3200000	ug/kg	180 U	190 U	180 U	190 U	200 U	360 J	195 U	190 U
Fluorene	8800000	3000000	ug/kg	180 U	190 U	180 U	190 U	200 U	200 U	195 U	190 U
Indeno[1,2,3-c,d]pyrene	5700	2200000	ug/kg	180 U	190 U	180 U	190 U	200 U	200 U	195 U	190 U
Naphthalene	4400000	25000	ug/kg	180 U	190 U	180 U	190 U	200 U	200 U	195 U	190 U
Pentachlorophenol	150000	5000	ug/kg	180 U	190 U	180 U	190 U	200 U	200 U	195 U	190 U
Phenanthrene	66000000	10000000	ug/kg	180 U	190 U	180 U	190 U	200 U	280 J	195 U	190 U
Phenol	66000000	200000	ug/kg	180 U	190 U	180 U	190 U	200 U	200 U	195 U	190 U
Pyrene	6600000	2200000	ug/kg	180 U	190 U	180 U	190 U	200 U	280 J	195 U	190 U

Table 6-3 - Soil - Analytical Summary of Detected SVOC

			Location ID	UBZ2-SO-33	UBZ2-SO-34	UBZ2-SO-34	UBZ2-SO-35	UBZ2-SO-35	UBZ2-SO-36	UBZ2-SO-36	UBZ2-SO-37
			Sample Name	UBZ2-SO-33-3-4	UBZ2-SO-34-11-12	UBZ2-SO-34-5-6	UBZ2-SO-35-0-2	UBZ2-SO-35-5-7	UBZ2-SO-36-11-12	UBZ2-SO-36-5-6	UBZ2-SO-37-1-2
			Date Sampled	12/30/2011	12/28/2011	12/28/2011	1/5/2012	1/5/2012	12/30/2011	12/30/2011	12/30/2011
			Parent Sample Name								
	Act 2 MSCs (Residential)[1]		Depth Interval	3-4	11-12	5-6	0-2	5-7	11-12	5-6	1-2
Analyte	RDC MSC	RSGW	Unit								
SVOCs (SW8270)											
2-methylnaphthalene	880000	600000	ug/kg	190 U	175 U	180 U	190 U	175 U	180 U	180 U	175 U
Acenaphthene	13000000	2700000	ug/kg	190 U	175 U	180 U	190 U	175 U	180 U	180 U	175 U
Acenaphthylene	13000000	2500000	ug/kg	190 U	175 U	180 U	190 U	175 U	180 U	180 U	175 U
Acetophenone	10000000	370000	ug/kg	190 U	175 U	180 U	190 U	175 U	180 U	180 U	175 U
Anthracene	66000000	350000	ug/kg	190 U	175 U	180 U	190 U	175 U	180 U	180 U	175 U
Benzaldehyde	NSA	NSA	ug/kg	190 U	175 U	180 U	190 U	175 U	180 U	180 U	175 U
Benzo[a]anthracene	5700	25000	ug/kg	190 U	175 U	180 U	190 U	175 U	180 U	280 J	175 U
Benzo[a]pyrene	570	46000	ug/kg	190 U	175 U	180 U	190 U	175 U	180 U	230 J	175 U
Benzo[b]fluoranthene	5700	40000	ug/kg	190 U	175 U	180 U	190 U	175 U	180 U	310 J	175 U
Benzo[g,h,i]perylene	13000000	180000	ug/kg	190 U	175 U	180 U	190 U	175 U	180 U	180 U	175 U
Benzo[k]fluoranthene	57000	610000	ug/kg	190 U	175 U	180 U	190 U	175 U	180 U	180 U	175 U
Bis(2-ethylhexyl) phthalate	1300000	130000	ug/kg	190 U	175 U	180 U	190 U	175 U	180 U	180 U	175 U
Carbazole	900000	21000	ug/kg	190 U	175 U	180 U	190 U	175 U	180 U	180 U	175 U
Chrysene	570000	230000	ug/kg	190 U	175 U	180 U	190 U	175 U	180 U	270 J	175 U
Dibenz[a,h]anthracene	570	13000	ug/kg	190 U	175 U	180 U	190 U	175 U	180 U	180 U	175 U
Dibenzofuran	220000	95000	ug/kg	190 U	175 U	180 U	190 UL	175 UL	180 U	180 U	175 U
Diethyl phthalate	10000000	2900000	ug/kg	190 U	175 U	180 U	190 U	175 U	180 U	180 U	175 U
Dimethyl phthalate	NSA	NSA	ug/kg	190 U	175 U	180 U	190 U	175 U	180 U	180 U	175 U
Fluoranthene	8800000	3200000	ug/kg	190 U	175 U	180 U	190 U	175 U	180 U	650	175 U
Fluorene	8800000	3000000	ug/kg	190 U	175 U	180 U	190 U	175 U	180 U	180 U	175 U
Indeno[1,2,3-c,d]pyrene	5700	2200000	ug/kg	190 U	175 U	180 U	190 U	175 U	180 U	180 U	175 U
Naphthalene	4400000	25000	ug/kg	190 U	175 U	180 U	620	175 U	180 U	180 U	175 U
Pentachlorophenol	150000	5000	ug/kg	190 U	175 U	180 U	190 U	175 U	180 U	180 UR	175 U
Phenanthrene	66000000	10000000	ug/kg	190 U	175 U	180 U	190 U	175 U	180 U	490	175 U
Phenol	66000000	200000	ug/kg	190 U	175 U	180 U	190 U	175 U	180 U	180 UR	175 U
Pyrene	6600000	2200000	ug/kg	190 U	175 U	180 U	190 U	175 U	180 U	510	175 U

Table 6-3 - Soil - Analytical Summary of Detected SVOC

			Location ID	UBZ2-SO-37	UBZ2-SO-38	UBZ2-SO-38	UBZ2-SO-40	UBZ2-SO-40	UBZ2-SO-41	UBZ2-SO-41	UBZ2-SO-41
			Sample Name	UBZ2-SO-37-2-2.5	UBZ2-SO-38-0-2	UBZ2-SO-38-5-7	UBZ2-SO-40-0.5-1.5	UBZ2-SO-40-11-12	UBZ2-SO-41-4-5	UBZ2-SO-41-5-7	UBZ2-SO-DUP6
			Date Sampled	12/30/2011	12/27/2011	12/27/2011	12/27/2011	12/27/2011	12/27/2011	12/27/2011	12/27/2011
			Parent Sample Name								UBZ2-SO-41-5-7
	Act 2 MSCs (Residential)[1]		Depth Interval	2-2.5	0-2	5-7	0.5-1.5	11-12	4-5	5-7	5-7
Analyte	RDC MSC	RSGW	Unit								
SVOCs (SW8270)											
2-methylnaphthalene	880000	600000	ug/kg	185 U	195 U	185 U	185 U	185 U	195 U	180 U	180 U
Acenaphthene	13000000	2700000	ug/kg	185 U	195 U	185 U	185 U	185 U	195 U	180 U	180 U
Acenaphthylene	13000000	2500000	ug/kg	185 U	195 U	185 U	185 U	185 U	195 U	180 U	180 U
Acetophenone	10000000	370000	ug/kg	185 U	195 U	185 U	185 U	185 U	195 U	180 U	180 U
Anthracene	66000000	350000	ug/kg	185 U	195 U	185 U	185 U	185 U	195 U	180 U	180 U
Benzaldehyde	NSA	NSA	ug/kg	185 U	195 U	185 U	185 U	185 U	195 U	180 U	180 U
Benzo[a]anthracene	5700	25000	ug/kg	185 U	195 U	185 U	185 U	185 U	195 U	180 U	180 U
Benzo[a]pyrene	570	46000	ug/kg	185 U	195 U	185 U	185 U	185 U	195 U	180 U	180 U
Benzo[b]fluoranthene	5700	40000	ug/kg	185 U	195 U	185 U	150 J	185 U	195 U	180 U	180 U
Benzo[g,h,i]perylene	13000000	180000	ug/kg	185 U	195 U	185 U	185 U	185 U	195 U	180 U	180 U
Benzo[k]fluoranthene	57000	610000	ug/kg	185 U	195 U	185 U	185 U	185 U	195 U	180 U	180 U
Bis(2-ethylhexyl) phthalate	1300000	130000	ug/kg	185 U	195 U	185 U	185 U	185 U	195 U	180 U	180 U
Carbazole	900000	21000	ug/kg	185 U	195 U	185 U	185 U	185 U	195 U	180 U	180 U
Chrysene	570000	230000	ug/kg	185 U	195 U	185 U	185 U	185 U	195 U	180 U	180 U
Dibenz[a,h]anthracene	570	13000	ug/kg	185 U	195 U	185 U	185 U	185 U	195 U	180 U	180 U
Dibenzofuran	220000	95000	ug/kg	185 U	195 U	185 U	185 U	185 U	195 U	180 U	180 U
Diethyl phthalate	10000000	2900000	ug/kg	185 U	195 U	185 U	185 U	185 U	195 U	180 U	180 U
Dimethyl phthalate	NSA	NSA	ug/kg	185 U	195 U	185 U	185 U	185 U	195 U	180 U	180 U
Fluoranthene	8800000	3200000	ug/kg	185 U	160 J	185 U	300 J	185 U	195 U	180 U	180 U
Fluorene	8800000	3000000	ug/kg	185 U	195 U	185 U	185 U	185 U	195 U	180 U	180 U
Indeno[1,2,3-c,d]pyrene	5700	2200000	ug/kg	185 U	195 U	185 U	185 U	185 U	195 U	180 U	180 U
Naphthalene	4400000	25000	ug/kg	185 U	195 U	185 U	185 U	185 U	195 U	180 U	180 U
Pentachlorophenol	150000	5000	ug/kg	185 U	195 U	185 U	185 U	185 U	195 U	180 U	180 U
Phenanthrene	66000000	10000000	ug/kg	185 U	195 U	185 U	220 J	185 U	195 U	180 U	180 U
Phenol	66000000	200000	ug/kg	185 U	195 U	185 U	185 U	185 U	195 U	180 U	180 U
Pyrene	6600000	2200000	ug/kg	185 U	195 U	185 U	240 J	185 U	195 U	180 U	180 U

Table 6-3 - Soil - Analytical Summary of Detected SVOC

			Location ID	UBZ2-SO-42	UBZ2-SO-42	UBZ2-SO-43	UBZ2-SO-43	UBZ2-SO-43	UBZ2-SO-45	UBZ2-SO-45	UBZ2-SO-46
			Sample Name	UBZ2-SO-42-5-6	UBZ2-SO-42-7-8	UBZ2-SO-43-13-14	UBZ2-SO-43-9-10	UBZ2-SO-DUP5	UBZ2-SO-45-1-2	UBZ2-SO-45-5-6	UBZ2-SO-46-0-1
			Date Sampled	12/21/2011	12/21/2011	12/21/2011	12/21/2011	12/21/2011	12/22/2011	12/22/2011	12/22/2011
			Parent Sample Name					UBZ2-SO-43-9-10			
	Act 2 MSCs (Residential)[1]		Depth Interval	5-6	7-8	13-14	9-10	9-10	1-2	5-6	0-1
Analyte	RDC MSC	RSGW	Unit								
SVOCs (SW8270)											
2-methylnaphthalene	880000	600000	ug/kg	180 U	180 U	185 U	185 U	185 U	180 U	180 U	190 U
Acenaphthene	13000000	2700000	ug/kg	180 U	180 U	185 U	185 U	185 U	180 U	180 U	190 U
Acenaphthylene	13000000	2500000	ug/kg	180 U	180 U	185 U	185 U	185 U	180 U	180 U	190 U
Acetophenone	10000000	370000	ug/kg	180 U	180 U	185 U	185 U	185 U	180 U	180 U	190 U
Anthracene	66000000	350000	ug/kg	180 U	180 U	185 U	185 U	185 U	180 U	180 U	190 U
Benzaldehyde	NSA	NSA	ug/kg	180 U	180 U	185 U	185 U	185 U	180 U	180 U	190 U
Benzo[a]anthracene	5700	25000	ug/kg	180 U	180 U	185 U	185 U	185 U	180 U	180 U	190 U
Benzo[a]pyrene	570	46000	ug/kg	180 U	180 U	185 U	185 U	185 U	180 U	180 U	190 U
Benzo[b]fluoranthene	5700	40000	ug/kg	180 U	180 U	185 U	185 U	185 U	180 U	180 U	190 U
Benzo[g,h,i]perylene	13000000	180000	ug/kg	180 U	180 U	185 U	185 U	185 U	180 U	180 U	190 U
Benzo[k]fluoranthene	57000	610000	ug/kg	180 U	180 U	185 U	185 U	185 U	180 U	180 U	190 U
Bis(2-ethylhexyl) phthalate	1300000	130000	ug/kg	180 U	180 U	185 U	185 U	185 U	180 U	180 U	190 U
Carbazole	900000	21000	ug/kg	180 U	180 U	185 U	185 U	185 U	180 U	180 U	190 U
Chrysene	570000	230000	ug/kg	180 U	180 U	185 U	185 U	185 U	180 U	180 U	190 U
Dibenz[a,h]anthracene	570	13000	ug/kg	180 U	180 U	185 U	185 U	185 U	180 U	180 U	190 U
Dibenzofuran	220000	95000	ug/kg	180 U	180 U	185 U	185 U	185 U	180 U	180 U	190 U
Diethyl phthalate	10000000	2900000	ug/kg	180 U	180 U	185 U	185 U	185 U	180 U	180 U	190 U
Dimethyl phthalate	NSA	NSA	ug/kg	180 U	180 U	185 U	185 U	185 U	180 U	180 U	190 U
Fluoranthene	8800000	3200000	ug/kg	180 U	180 U	185 U	185 U	185 U	180 U	180 U	190 U
Fluorene	8800000	3000000	ug/kg	180 U	180 U	185 U	185 U	185 U	180 U	180 U	190 U
Indeno[1,2,3-c,d]pyrene	5700	2200000	ug/kg	180 U	180 U	185 U	185 U	185 U	180 U	180 U	190 U
Naphthalene	4400000	25000	ug/kg	180 U	180 U	185 U	185 U	185 U	180 U	180 U	190 U
Pentachlorophenol	150000	5000	ug/kg	180 U	180 U	185 U	185 U	185 U	180 U	180 U	190 U
Phenanthrene	66000000	10000000	ug/kg	180 U	180 U	185 U	185 U	185 U	180 U	180 U	190 U
Phenol	66000000	200000	ug/kg	180 U	180 U	185 U	185 U	185 U	180 U	180 U	190 U
Pyrene	6600000	2200000	ug/kg	180 U	180 U	185 U	185 U	185 U	180 U	180 U	190 U

Table 6-3 - Soil - Analytical Summary of Detected SVOC

			Location ID	UBZ2-SO-46	UBZ2-SO-47	UBZ2-SO-47	UBZ3-SO-01	UBZ3-SO-01	UBZ3-SO-01	UBZ3-SO-02	UBZ3-SO-02
			Sample Name	UBZ2-SO-46-7-8	UBZ2-SO-47-0-1	UBZ2-SO-47-11-12	UBZ3-SO-1-1-2	UBZ3-SO-1-8-9	UBZ3-SO-DUP4	UBZ3-SO-2-14-15	UBZ3-SO-2-6-7
			Date Sampled	12/22/2011	12/22/2011	12/22/2011	12/19/2011	12/19/2011	12/19/2011	12/19/2011	12/19/2011
			Parent Sample Name						UBZ3-SO-1-8-9		
	Act 2 MSCs (Residential)[1]		Depth Interval	7-8	0-1	11-12	1-2	8-9	8-9	14-15	6-7
Analyte	RDC MSC	RSGW	Unit								
SVOCs (SW8270)											
2-methylnaphthalene	880000	600000	ug/kg	185 U	195 U	185 U	185 U	180 U	180 U	195 U	205 U
Acenaphthene	13000000	2700000	ug/kg	185 U	195 U	185 U	185 U	180 U	180 U	195 U	205 U
Acenaphthylene	13000000	2500000	ug/kg	185 U	195 U	185 U	185 U	180 U	180 U	195 U	205 U
Acetophenone	10000000	370000	ug/kg	185 U	195 U	185 U	185 U	180 U	180 U	195 U	205 U
Anthracene	66000000	350000	ug/kg	185 U	170 J	185 U	185 U	180 U	180 U	195 U	205 U
Benzaldehyde	NSA	NSA	ug/kg	185 U	195 U	185 U	185 U	180 U	180 U	195 U	205 U
Benzo[a]anthracene	5700	25000	ug/kg	185 U	550	185 U	185 U	180 U	180 U	195 U	205 U
Benzo[a]pyrene	570	46000	ug/kg	185 U	490	185 U	185 U	180 U	180 U	195 U	205 U
Benzo[b]fluoranthene	5700	40000	ug/kg	185 U	700	185 U	185 U	180 U	180 U	195 U	205 U
Benzo[g,h,i]perylene	13000000	180000	ug/kg	185 U	340 J	185 U	185 U	180 U	180 U	195 U	205 U
Benzo[k]fluoranthene	57000	610000	ug/kg	185 U	270 J	185 U	185 U	180 U	180 U	195 U	205 U
Bis(2-ethylhexyl) phthalate	1300000	130000	ug/kg	185 U	195 U	185 U	185 U	180 U	180 U	195 U	205 U
Carbazole	900000	21000	ug/kg	185 U	195 U	185 U	185 U	180 U	180 U	195 U	205 U
Chrysene	570000	230000	ug/kg	185 U	590	185 U	185 U	180 U	180 U	195 U	205 U
Dibenz[a,h]anthracene	570	13000	ug/kg	185 U	195 U	185 U	185 U	180 U	180 U	195 U	205 U
Dibenzofuran	220000	95000	ug/kg	185 U	195 U	185 U	185 U	180 U	180 U	195 U	205 U
Diethyl phthalate	10000000	2900000	ug/kg	185 U	195 U	185 U	185 U	180 U	180 U	195 U	205 U
Dimethyl phthalate	NSA	NSA	ug/kg	185 U	195 U	185 U	185 U	180 U	180 U	195 U	205 U
Fluoranthene	8800000	3200000	ug/kg	185 U	1100	185 U	185 U	180 U	180 U	195 U	205 U
Fluorene	8800000	3000000	ug/kg	185 U	195 U	185 U	185 U	180 U	180 U	195 U	205 U
Indeno[1,2,3-c,d]pyrene	5700	2200000	ug/kg	185 U	310 J	185 U	185 U	180 U	180 U	195 U	205 U
Naphthalene	4400000	25000	ug/kg	185 U	195 U	185 U	185 U	180 U	180 U	195 U	205 U
Pentachlorophenol	150000	5000	ug/kg	185 U	195 U	185 U	185 U	180 U	180 U	195 U	205 U
Phenanthrene	66000000	10000000	ug/kg	185 U	820	185 U	185 U	180 U	180 U	195 U	205 U
Phenol	66000000	200000	ug/kg	185 U	195 U	185 U	185 U	180 U	180 U	195 U	205 U
Pyrene	6600000	2200000	ug/kg	185 U	960	185 U	185 U	180 U	180 U	195 U	205 U

Table 6-3 - Soil - Analytical Summary of Detected SVOC

			Location ID	UBZ3-SO-03	UBZ3-SO-03	UBZ3-SO-04	UBZ3-SO-04	UBZ3-SO-05	UBZ3-SO-05	UBZ3-SO-06	UBZ3-SO-06
			Sample Name	UBZ3-SO-3-1-2	UBZ3-SO-3-14-15	UBZ3-SO-4-13-14	UBZ3-SO-4-3-4	UBZ3-SO-5-12-13	UBZ3-SO-5-2-3	UBZ3-SO-6-0.5-2	UBZ3-SO-6-6-7
			Date Sampled	12/19/2011	12/19/2011	12/29/2011	12/29/2011	12/29/2011	12/29/2011	12/29/2011	12/29/2011
			Parent Sample Name								
	Act 2 MSCs (Residential)[1]		Depth Interval	1-2	14-15	13-14	3-4	12-13	2-3	0.5-2	6-7
Analyte	**RDC MSC**	**RSGW**	**Unit**								
SVOCs (SW8270)											
2-methylnaphthalene	880000	600000	ug/kg	180 U	185 U	190 U	180 U	185 U	190 U	190 U	185 U
Acenaphthene	13000000	2700000	ug/kg	180 U	185 U	190 U	180 U	185 U	190 U	190 U	185 U
Acenaphthylene	13000000	2500000	ug/kg	180 U	185 U	190 U	180 U	185 U	190 U	190 U	185 U
Acetophenone	10000000	370000	ug/kg	180 U	185 U	1800	180 U	185 U	190 U	190 U	185 U
Anthracene	66000000	350000	ug/kg	180 U	185 U	190 U	180 U	185 U	190 U	190 U	185 U
Benzaldehyde	NSA	NSA	ug/kg	180 U	185 U	190 U	180 U	185 U	190 U	190 U	185 U
Benzo[a]anthracene	5700	25000	ug/kg	180 U	185 U	190 U	180 U	185 U	190 U	190 U	185 U
Benzo[a]pyrene	570	46000	ug/kg	180 U	185 U	190 U	180 U	185 U	190 U	190 U	185 U
Benzo[b]fluoranthene	5700	40000	ug/kg	180 U	185 U	190 U	180 U	185 U	190 U	190 U	185 U
Benzo[g,h,i]perylene	13000000	180000	ug/kg	180 U	185 U	190 U	180 U	185 U	190 U	190 U	185 U
Benzo[k]fluoranthene	57000	610000	ug/kg	180 U	185 U	190 U	180 U	185 U	190 U	190 U	185 U
Bis(2-ethylhexyl) phthalate	1300000	130000	ug/kg	180 U	185 U	190 U	180 U	185 U	190 U	190 U	185 U
Carbazole	900000	21000	ug/kg	180 U	185 U	190 U	180 U	185 U	190 U	190 U	185 U
Chrysene	570000	230000	ug/kg	180 U	185 U	190 U	180 U	185 U	190 U	190 U	185 U
Dibenz[a,h]anthracene	570	13000	ug/kg	180 U	185 U	190 U	180 U	185 U	190 U	190 U	185 U
Dibenzofuran	220000	95000	ug/kg	180 U	185 U	190 U	180 U	185 U	190 U	190 U	185 U
Diethyl phthalate	10000000	2900000	ug/kg	180 U	185 U	190 U	180 U	185 U	190 U	190 U	185 U
Dimethyl phthalate	NSA	NSA	ug/kg	180 U	185 U	190 U	180 U	185 U	190 U	190 U	185 U
Fluoranthene	8800000	3200000	ug/kg	180 U	185 U	190 U	180 U	185 U	190 U	190 U	185 U
Fluorene	8800000	3000000	ug/kg	180 U	185 U	190 U	180 U	185 U	190 U	190 U	185 U
Indeno[1,2,3-c,d]pyrene	5700	2200000	ug/kg	180 U	185 U	190 U	180 U	185 U	190 U	190 U	185 U
Naphthalene	4400000	25000	ug/kg	180 U	185 U	190 U	180 U	185 U	190 U	190 U	185 U
Pentachlorophenol	150000	5000	ug/kg	180 U	185 U	190 U	180 U	185 U	190 U	190 U	185 U
Phenanthrene	66000000	10000000	ug/kg	180 U	185 U	190 U	180 U	185 U	190 U	190 U	185 U
Phenol	66000000	200000	ug/kg	180 U	185 U	46000 D	180 U	185 U	190 U	190 U	185 U
Pyrene	6600000	2200000	ug/kg	180 U	185 U	190 U	180 U	185 U	190 U	190 U	185 U

Table 6-3 - Soil - Analytical Summary of Detected SVOC

			Location ID	UBZ3-SO-07	UBZ3-SO-07	UBZ3-SO-08	UBZ3-SO-08	UBZ3-SO-09	UBZ3-SO-09	UBZ3-SO-10	UBZ3-SO-10
			Sample Name	UBZ3-SO-7-11-12	UBZ3-SO-7-5-6	UBZ3-SO-8-0.5-2	UBZ3-SO-8-39-40	UBZ3-SO-09-0-2	UBZ3-SO-09-5-7	UBZ3-SO-10-0-2	UBZ3-SO-10-13-14
			Date Sampled	12/19/2011	12/19/2011	12/19/2011	12/19/2011	12/16/2011	12/16/2011	12/16/2011	12/16/2011
			Parent Sample Name								
	Act 2 MSCs (Residential)[1]		Depth Interval	11-11	5-6	0.5-2	39-40	0-2	5-7	0-2	13-14
Analyte	**RDC MSC**	**RSGW**	**Unit**								
SVOCs (SW8270)											
2-methylnaphthalene	880000	600000	ug/kg	215 U	205 U	550 U	205 U	3650 UR	200 U	1850 U	185 U
Acenaphthene	13000000	2700000	ug/kg	215 U	205 U	550 U	205 U	3650 UR	200 U	1850 U	185 U
Acenaphthylene	13000000	2500000	ug/kg	215 U	205 U	550 U	205 U	3650 UR	200 U	1850 U	185 U
Acetophenone	10000000	370000	ug/kg	215 U	205 U	550 U	1100	3650 UR	200 U	1850 U	680
Anthracene	66000000	350000	ug/kg	215 U	205 U	550 U	205 U	3650 UR	200 U	1850 U	185 U
Benzaldehyde	NSA	NSA	ug/kg	215 U	205 U	550 U	205 U	3650 UR	200 U	1850 U	185 U
Benzo[a]anthracene	5700	25000	ug/kg	215 U	205 U	660 J	205 U	3650 UR	200 U	1850 U	185 U
Benzo[a]pyrene	570	46000	ug/kg	215 U	205 U	**630 J**	205 U	3650 UR	200 U	1850 U	185 U
Benzo[b]fluoranthene	5700	40000	ug/kg	215 U	205 U	800 J	205 U	3650 UR	200 U	1850 U	185 U
Benzo[g,h,i]perylene	13000000	180000	ug/kg	215 U	205 U	550 U	205 U	3650 UR	200 U	1850 U	185 U
Benzo[k]fluoranthene	57000	610000	ug/kg	215 U	205 U	550 U	205 U	3650 UR	200 U	1850 U	185 U
Bis(2-ethylhexyl) phthalate	1300000	130000	ug/kg	215 U	205 U	550 U	205 U	3650 UR	200 U	1850 U	185 U
Carbazole	900000	21000	ug/kg	215 U	205 U	550 U	205 U	3650 UR	200 U	1850 U	185 U
Chrysene	570000	230000	ug/kg	215 U	205 U	680 J	205 U	3650 UR	200 U	1850 U	185 U
Dibenz[a,h]anthracene	570	13000	ug/kg	215 U	205 U	550 U	205 U	3650 UR	200 U	1850 U	185 U
Dibenzofuran	220000	95000	ug/kg	215 U	205 U	550 U	205 U	3650 UR	200 U	1850 U	185 U
Diethyl phthalate	10000000	2900000	ug/kg	215 U	205 U	550 U	205 U	3650 UR	200 U	1850 U	185 U
Dimethyl phthalate	NSA	NSA	ug/kg	215 U	205 U	550 U	205 U	3650 UR	170 J	1850 U	200 J
Fluoranthene	8800000	3200000	ug/kg	215 U	205 U	1500	205 U	3650 UR	200 U	1850 U	185 U
Fluorene	8800000	3000000	ug/kg	215 U	205 U	550 U	205 U	3650 UR	200 U	1850 U	185 U
Indeno[1,2,3-c,d]pyrene	5700	2200000	ug/kg	215 U	205 U	550 U	205 U	3650 UR	200 U	1850 U	185 U
Naphthalene	4400000	25000	ug/kg	215 U	205 U	550 U	205 U	3650 UR	200 U	1850 U	185 U
Pentachlorophenol	150000	5000	ug/kg	215 U	205 U	550 U	205 U	3650 UR	200 U	1850 U	185 U
Phenanthrene	66000000	10000000	ug/kg	215 U	205 U	670 J	205 U	3650 UR	200 U	1850 U	185 U
Phenol	66000000	200000	ug/kg	215 U	205 U	550 U	74000 D	3650 UR	200 U	1850 U	21000 D
Pyrene	6600000	2200000	ug/kg	215 U	205 U	1200	205 U	3650 UR	200 U	1850 U	185 U

Table 6-3 - Soil - Analytical Summary of Detected SVOC

			Location ID	UBZ3-SO-11	UBZ3-SO-11	UBZ3-SO-12	UBZ3-SO-12	UBZ3-SO-12	UBZ3-SO-13	UBZ3-SO-13	UBZ3-SO-14
			Sample Name	UBZ3-SO-11-13-15	UBZ3-SO-11-2-4	UBZ3-SO-12-1-2	UBZ3-SO-12-14-15	UBZ3-SO-12-24-25	UBZ3-SO-13-0-2	UBZ3-SO-13-5-7	UBZ3-SO-14-0.5-1.5
			Date Sampled	12/16/2011	12/16/2011	12/19/2011	12/19/2011	12/19/2011	1/10/2012	1/10/2012	12/29/2011
			Parent Sample Name								
	Act 2 MSCs (Residential)[1]		Depth Interval	13-15	2-4	1-2	14-15	24-25	0-2	5-7	0.5-1.5
Analyte	**RDC MSC**	**RSGW**	**Unit**								
SVOCs (SW8270)											
2-methylnaphthalene	880000	600000	ug/kg	180 U	200 U	195 U	190 U	220 U	190 U	185 U	185 U
Acenaphthene	13000000	2700000	ug/kg	180 U	200 U	195 U	190 U	220 U	190 U	185 U	185 U
Acenaphthylene	13000000	2500000	ug/kg	180 U	200 U	195 U	190 U	220 U	190 U	185 U	185 U
Acetophenone	10000000	370000	ug/kg	280 J	200 U	195 U	890	290 J	190 U	185 U	185 U
Anthracene	66000000	350000	ug/kg	180 U	200 U	195 U	190 U	220 U	190 U	185 U	185 U
Benzaldehyde	NSA	NSA	ug/kg	180 U	200 U	195 U	190 U	220 U	190 U	185 U	185 U
Benzo[a]anthracene	5700	25000	ug/kg	180 U	200 U	195 U	190 U	220 U	330 J	185 U	180 J
Benzo[a]pyrene	570	46000	ug/kg	180 U	200 U	195 U	190 U	220 U	270 J	185 U	185 U
Benzo[b]fluoranthene	5700	40000	ug/kg	180 U	200 U	195 U	190 U	220 U	360 J	185 U	190 J
Benzo[g,h,i]perylene	13000000	180000	ug/kg	180 U	200 U	195 U	190 U	220 U	190 U	185 U	185 U
Benzo[k]fluoranthene	57000	610000	ug/kg	180 U	200 U	195 U	190 U	220 U	180 J	185 U	185 U
Bis(2-ethylhexyl) phthalate	1300000	130000	ug/kg	180 U	200 U	195 U	190 U	220 U	190 U	185 U	185 U
Carbazole	900000	21000	ug/kg	180 U	200 U	195 U	190 U	220 U	190 U	185 U	185 U
Chrysene	570000	230000	ug/kg	180 U	200 U	195 U	190 U	220 U	350 J	185 U	200 J
Dibenz[a,h]anthracene	570	13000	ug/kg	180 U	200 U	195 U	190 U	220 U	190 U	185 U	185 U
Dibenzofuran	220000	95000	ug/kg	180 U	200 U	195 U	190 U	220 U	190 U	185 U	185 U
Diethyl phthalate	10000000	2900000	ug/kg	180 U	200 U	195 U	190 U	220 U	190 U	185 U	185 U
Dimethyl phthalate	NSA	NSA	ug/kg	180 U	200 U	195 U	190 U	220 U	190 U	185 U	185 U
Fluoranthene	8800000	3200000	ug/kg	180 U	200 U	200 J	190 U	220 U	720	185 U	480
Fluorene	8800000	3000000	ug/kg	180 U	200 U	195 U	190 U	220 U	190 U	185 U	185 U
Indeno[1,2,3-c,d]pyrene	5700	2200000	ug/kg	180 U	200 U	195 U	190 U	220 U	190 U	185 U	185 U
Naphthalene	4400000	25000	ug/kg	180 U	200 U	195 U	190 U	220 U	190 U	185 U	185 U
Pentachlorophenol	150000	5000	ug/kg	180 U	200 U	195 U	190 U	220 U	190 U	185 U	185 U
Phenanthrene	66000000	10000000	ug/kg	180 U	200 U	180 J	190 U	220 U	560	185 U	330 J
Phenol	66000000	200000	ug/kg	9000 D	200 U	195 U	29000 D	5000 D	190 U	185 U	185 U
Pyrene	6600000	2200000	ug/kg	180 U	200 U	195 U	190 U	220 U	590	185 U	420

Table 6-3 - Soil - Analytical Summary of Detected SVOC

			Location ID	UBZ3-SO-14	UBZ3-SO-14	UBZ3-SO-15	UBZ3-SO-15	UBZ3-SO-16	UBZ3-SO-16	UBZ3-SO-17	UBZ3-SO-17
			Sample Name	UBZ3-SO-14-10-11	UBZ3-SO-14-38-39	UBZ3-SO-15-12-13	UBZ3-SO-15-8-9	UBZ3-SO-16-2.5-3.5	UBZ3-SO-16-6-7	UBZ3-SO-17-12-14	UBZ3-SO-17-2-4
			Date Sampled	12/29/2011	12/21/2011	12/20/2011	12/20/2011	1/10/2012	1/10/2012	12/14/2011	12/14/2011
			Parent Sample Name								
	Act 2 MSCs (Residential)[1]		Depth Interval	10-11	38-38	12-13	8-8	2.5-3.5	6-7	12-14	2-4
Analyte	RDC MSC	RSGW	Unit								
SVOCs (SW8270)											
2-methylnaphthalene	880000	600000	ug/kg	185 U	210 U	190 U	175 U	185 U	205 U	190 U	175 UJ
Acenaphthene	13000000	2700000	ug/kg	185 U	210 U	190 U	175 U	185 U	205 U	190 U	175 UJ
Acenaphthylene	13000000	2500000	ug/kg	185 U	210 U	190 U	175 U	185 U	205 U	190 U	175 UJ
Acetophenone	10000000	370000	ug/kg	185 U	210 U	190 U	175 U	185 U	205 U	190 U	175 UJ
Anthracene	66000000	350000	ug/kg	185 U	210 U	190 U	175 U	185 U	205 U	190 U	175 UJ
Benzaldehyde	NSA	NSA	ug/kg	185 U	210 U	190 U	175 U	185 U	205 U	190 UR	175 UR
Benzo[a]anthracene	5700	25000	ug/kg	185 U	210 U	190 U	175 U	185 U	205 U	190 U	380 J
Benzo[a]pyrene	570	46000	ug/kg	185 U	210 U	190 U	175 U	185 U	205 U	190 U	270 J
Benzo[b]fluoranthene	5700	40000	ug/kg	185 U	210 U	190 U	175 U	185 U	205 U	190 U	440 J
Benzo[g,h,i]perylene	13000000	180000	ug/kg	185 U	210 U	190 U	175 U	185 U	205 U	190 U	160 J
Benzo[k]fluoranthene	57000	610000	ug/kg	185 U	210 U	190 U	175 U	185 U	205 U	190 U	175 UJ
Bis(2-ethylhexyl) phthalate	1300000	130000	ug/kg	185 U	210 U	190 U	175 U	185 U	205 U	190 U	175 UJ
Carbazole	900000	21000	ug/kg	185 U	210 U	190 U	175 U	185 U	205 U	190 U	175 UJ
Chrysene	570000	230000	ug/kg	185 U	210 U	190 U	175 U	185 U	205 U	190 U	340 J
Dibenz[a,h]anthracene	570	13000	ug/kg	185 U	210 U	190 U	175 U	185 U	205 U	190 U	175 UJ
Dibenzofuran	220000	95000	ug/kg	185 U	210 U	190 U	175 U	185 U	205 U	190 U	175 UJ
Diethyl phthalate	10000000	2900000	ug/kg	185 U	210 U	190 U	175 U	185 U	205 U	190 U	175 UJ
Dimethyl phthalate	NSA	NSA	ug/kg	185 U	210 U	190 U	175 U	185 U	205 U	190 U	175 UJ
Fluoranthene	8800000	3200000	ug/kg	185 U	210 U	190 U	175 U	185 U	205 U	190 U	410 J
Fluorene	8800000	3000000	ug/kg	185 U	210 U	190 U	175 U	185 U	205 U	190 U	175 UJ
Indeno[1,2,3-c,d]pyrene	5700	2200000	ug/kg	185 U	210 U	190 U	175 U	185 U	205 U	190 U	160 J
Naphthalene	4400000	25000	ug/kg	185 U	210 U	190 U	175 U	185 U	205 U	190 U	175 UJ
Pentachlorophenol	150000	5000	ug/kg	185 U	210 U	190 U	175 U	185 U	205 U	190 U	175 UJ
Phenanthrene	66000000	10000000	ug/kg	185 U	210 U	190 U	175 U	185 U	205 U	190 U	230 J
Phenol	66000000	200000	ug/kg	185 U	210 U	190 U	175 U	185 U	205 U	190 U	175 UJ
Pyrene	6600000	2200000	ug/kg	185 U	210 U	190 U	175 U	185 U	205 U	190 U	510 J

Table 6-3 - Soil - Analytical Summary of Detected SVOC

			Location ID	UBZ3-SO-18	UBZ3-SO-18	UBZ3-SO-19	UBZ3-SO-19	UBZ3-SO-20	UBZ3-SO-20	UBZ3-SO-21	UBZ3-SO-21
			Sample Name	UBZ3-SO-18-4-5	UBZ3-SO-18-9-10	UBZ3-SO-19-0-2	UBZ3-SO-19-2-3	UBZ3-SO-20-0.5-2	UBZ3-SO-20-5-6	UBZ3-SO-21-0-0.5	UBZ3-SO-21-5-6
			Date Sampled	12/14/2011	12/14/2011	4/20/2012	4/20/2012	12/12/2011	12/12/2011	12/12/2011	12/12/2011
			Parent Sample Name								
	Act 2 MSCs (Residential)[1]		Depth Interval	4-5	9-10	0-2	2-3	0.5-2	5-6	0-0.5	5-6
Analyte	**RDC MSC**	**RSGW**	**Unit**								
SVOCs (SW8270)											
2-methylnaphthalene	880000	600000	ug/kg	950 U	185 U	185 U	180 U	185 U	180 U	185 U	190 U
Acenaphthene	13000000	2700000	ug/kg	960 J	185 U	185 U	180 U	185 U	180 U	185 U	190 U
Acenaphthylene	13000000	2500000	ug/kg	950 U	185 U	185 U	180 U	185 U	180 U	185 U	190 U
Acetophenone	10000000	370000	ug/kg	950 U	185 U	185 U	180 U	185 U	180 U	185 U	190 U
Anthracene	66000000	350000	ug/kg	3200	185 U	185 U	180 U	185 U	180 U	185 U	190 U
Benzaldehyde	NSA	NSA	ug/kg	950 UR	185 UR	185 U	180 U	185 U	180 U	185 UR	190 UR
Benzo[a]anthracene	5700	25000	ug/kg	**8700**	185 U	680	180 U	185 U	180 U	185 U	190 U
Benzo[a]pyrene	570	46000	ug/kg	**5800**	185 U	**650**	180 U	185 U	180 U	185 U	190 U
Benzo[b]fluoranthene	5700	40000	ug/kg	**8300**	185 U	830	180 U	185 U	180 U	185 U	190 U
Benzo[g,h,i]perylene	13000000	180000	ug/kg	3300	185 U	370	180 U	185 U	180 U	185 U	190 U
Benzo[k]fluoranthene	57000	610000	ug/kg	2500	185 U	340 J	180 U	185 U	180 U	185 U	190 U
Bis(2-ethylhexyl) phthalate	1300000	130000	ug/kg	950 U	185 U	185 U	180 U	185 U	180 U	185 U	190 U
Carbazole	900000	21000	ug/kg	950 J	185 U	185 U	180 U	185 U	180 U	185 U	190 U
Chrysene	570000	230000	ug/kg	7700	185 U	770	180 U	185 U	180 U	185 U	190 U
Dibenz[a,h]anthracene	570	13000	ug/kg	**890 J**	185 U	185 U	180 U	185 U	180 U	185 U	190 U
Dibenzofuran	220000	95000	ug/kg	950 U	185 U	185 U	180 U	185 U	180 U	185 U	190 U
Diethyl phthalate	10000000	2900000	ug/kg	950 U	185 U	185 U	180 U	185 U	180 U	185 U	190 U
Dimethyl phthalate	NSA	NSA	ug/kg	950 U	185 U	740	670	185 U	180 U	180 J	190 U
Fluoranthene	8800000	3200000	ug/kg	14000	185 U	1300	180 U	185 U	180 U	185 U	190 U
Fluorene	8800000	3000000	ug/kg	1000 J	185 U	185 U	180 U	185 U	180 U	185 U	190 U
Indeno[1,2,3-c,d]pyrene	5700	2200000	ug/kg	3200	185 U	330 J	180 U	185 U	180 U	185 U	190 U
Naphthalene	4400000	25000	ug/kg	950 U	185 U	185 U	180 U	185 U	180 U	185 U	190 U
Pentachlorophenol	150000	5000	ug/kg	950 U	185 U	185 U	180 U	185 U	180 U	185 U	190 U
Phenanthrene	66000000	10000000	ug/kg	13000	185 U	500	180 U	185 U	180 U	185 U	190 U
Phenol	66000000	200000	ug/kg	950 U	185 U	185 U	180 U	185 U	180 U	185 U	190 U
Pyrene	6600000	2200000	ug/kg	13000	185 U	1300	180 U	185 U	180 U	185 U	190 U

Table 6-3 - Soil - Analytical Summary of Detected SVOC

			Location ID	UBZ3-SO-22	UBZ3-SO-22	UBZ3-SO-23	UBZ3-SO-23	UBZ3-SO-24	UBZ3-SO-24	UBZ3-SO-25	UBZ3-SO-25
			Sample Name	UBZ3-SO-22-2-3	UBZ3-SO-22-4-5	UBZ3-SO-23-0-2	UBZ3-SO-23-3-5	UBZ3-SO-24-0-2	UBZ3-SO-24-12-13	UBZ3-SO-25-0.5-2	UBZ3-SO-25-5-7
			Date Sampled	12/20/2011	12/20/2011	12/16/2011	12/16/2011	12/15/2011	12/15/2011	12/15/2011	12/15/2011
			Parent Sample Name								
	Act 2 MSCs (Residential)[1]		Depth Interval	2-3	4-5	0-2	3-5	0-2	12-13	0.5-2	5-7
Analyte	**RDC MSC**	**RSGW**	**Unit**								
SVOCs (SW8270)											
2-methylnaphthalene	880000	600000	ug/kg	195 U	185 U	195 U	200 U	950 U	220 U	1850 U	190 U
Acenaphthene	13000000	2700000	ug/kg	195 U	185 U	195 U	200 U	950 U	220 U	1850 U	190 U
Acenaphthylene	13000000	2500000	ug/kg	195 U	185 U	195 U	200 U	950 U	220 U	1850 U	190 U
Acetophenone	10000000	370000	ug/kg	195 U	185 U	195 U	200 U	950 U	220 U	1850 U	190 U
Anthracene	66000000	350000	ug/kg	195 U	185 U	195 U	310 J	950 U	220 U	1850 U	190 U
Benzaldehyde	NSA	NSA	ug/kg	195 U	185 U	195 U	200 U	950 U	220 U	1850 U	190 U
Benzo[a]anthracene	5700	25000	ug/kg	195 U	185 U	195 U	1900	950 U	220 U	1850 U	190 U
Benzo[a]pyrene	570	46000	ug/kg	195 U	185 U	195 U	**1500**	950 U	220 U	1850 U	190 U
Benzo[b]fluoranthene	5700	40000	ug/kg	195 U	185 U	195 U	2000	760 J	220 U	1850 U	190 U
Benzo[g,h,i]perylene	13000000	180000	ug/kg	195 U	185 U	195 U	810	950 U	220 U	1850 U	190 U
Benzo[k]fluoranthene	57000	610000	ug/kg	195 U	185 U	195 U	760	950 U	220 U	1850 U	190 U
Bis(2-ethylhexyl) phthalate	1300000	130000	ug/kg	195 U	185 U	195 U	200 U	950 U	220 U	1850 U	190 U
Carbazole	900000	21000	ug/kg	195 U	185 U	195 U	200 U	950 U	220 U	1850 U	190 U
Chrysene	570000	230000	ug/kg	195 U	185 U	195 U	1500	950 U	220 U	1850 U	190 U
Dibenz[a,h]anthracene	570	13000	ug/kg	195 U	185 U	195 U	210 J	950 U	220 U	1850 U	190 U
Dibenzofuran	220000	95000	ug/kg	195 U	185 U	195 U	200 U	950 U	220 U	1850 U	190 U
Diethyl phthalate	10000000	2900000	ug/kg	195 U	185 U	195 U	200 U	950 U	220 U	1850 U	190 U
Dimethyl phthalate	NSA	NSA	ug/kg	195 U	185 U	195 U	210 J	950 U	200 J	1850 U	260 J
Fluoranthene	8800000	3200000	ug/kg	195 U	185 U	195 U	3000	1300 J	220 U	1850 U	190 U
Fluorene	8800000	3000000	ug/kg	195 U	185 U	195 U	200 U	950 U	220 U	1850 U	190 U
Indeno[1,2,3-c,d]pyrene	5700	2200000	ug/kg	195 U	185 U	195 U	820	950 U	220 U	1850 U	190 U
Naphthalene	4400000	25000	ug/kg	195 U	185 U	195 U	200 U	950 U	220 U	1850 U	190 U
Pentachlorophenol	150000	5000	ug/kg	195 U	185 U	195 U	200 U	950 U	220 U	1850 U	190 U
Phenanthrene	66000000	10000000	ug/kg	195 U	185 U	195 U	840	950 U	220 U	1850 U	190 U
Phenol	66000000	200000	ug/kg	195 U	185 U	195 U	200 U	950 U	220 U	1850 U	190 U
Pyrene	6600000	2200000	ug/kg	195 U	185 U	195 U	2600	1300 J	220 U	1850 U	190 U

Table 6-3 - Soil - Analytical Summary of Detected SVOC

			Location ID	UBZ3-SO-26	UBZ3-SO-26	UBZ3-SO-27	UBZ3-SO-27	UBZ3-SO-28	UBZ3-SO-28	UBZ3-SO-29
			Sample Name	UBZ3-SO-26-0-3	UBZ3-SO-26-8-10	UBZ3-SO-27-13-15	UBZ3-SO-27-4.5-6.5	UBZ3-SO-28-3-5	UBZ3-SO-28-5.5-7.5	UBZ3-SO-29-3-5
			Date Sampled	12/15/2011	12/15/2011	12/14/2011	12/14/2011	12/14/2011	12/14/2011	12/13/2011
			Parent Sample Name							
	Act 2 MSCs (Residential)[1]		Depth Interval	0-3	8-10	13-15	4.5-6.5	3-5	5.5-7.5	3-5
Analyte	RDC MSC	RSGW	Unit							
SVOCs (SW8270)										
2-methylnaphthalene	880000	600000	ug/kg	1900 U	195 U	330 U	165 U	195 U	240 U	185 U
Acenaphthene	13000000	2700000	ug/kg	1900 U	195 U	330 U	165 U	195 U	240 U	185 U
Acenaphthylene	13000000	2500000	ug/kg	1900 U	195 U	330 U	165 U	195 U	240 U	185 U
Acetophenone	10000000	370000	ug/kg	1900 U	195 U	330 U	165 U	195 U	240 U	185 U
Anthracene	66000000	350000	ug/kg	1900 U	195 U	330 U	240 J	195 U	240 U	185 U
Benzaldehyde	NSA	NSA	ug/kg	1900 U	195 U	330 U	165 U	195 UR	240 UR	185 UR
Benzo[a]anthracene	5700	25000	ug/kg	1900 U	195 U	330 U	530	195 U	240 U	185 U
Benzo[a]pyrene	570	46000	ug/kg	1900 U	195 U	330 U	430	195 U	240 U	185 U
Benzo[b]fluoranthene	5700	40000	ug/kg	1900 U	195 U	330 U	500	195 U	240 U	185 U
Benzo[g,h,i]perylene	13000000	180000	ug/kg	1900 U	195 U	330 U	190 J	195 U	240 U	185 U
Benzo[k]fluoranthene	57000	610000	ug/kg	1900 U	195 U	330 U	210 J	195 U	240 U	185 U
Bis(2-ethylhexyl) phthalate	1300000	130000	ug/kg	1900 U	195 U	330 U	165 U	195 U	240 U	185 U
Carbazole	900000	21000	ug/kg	1900 U	195 U	330 U	165 U	195 U	240 U	185 U
Chrysene	570000	230000	ug/kg	1900 U	195 U	330 U	540	195 U	240 U	185 U
Dibenz[a,h]anthracene	570	13000	ug/kg	1900 U	195 U	330 U	165 U	195 U	240 U	185 U
Dibenzofuran	220000	95000	ug/kg	1900 U	195 U	330 U	165 U	195 U	240 U	185 U
Diethyl phthalate	10000000	2900000	ug/kg	1900 U	195 U	330 U	165 U	195 U	240 U	185 U
Dimethyl phthalate	NSA	NSA	ug/kg	1900 U	195 U	460 J	140 J	195 U	240 U	185 U
Fluoranthene	8800000	3200000	ug/kg	1900 U	195 U	330 U	1100	220 J	240 U	185 U
Fluorene	8800000	3000000	ug/kg	1900 U	195 U	330 U	165 U	195 U	240 U	185 U
Indeno[1,2,3-c,d]pyrene	5700	2200000	ug/kg	1900 U	195 U	330 U	150 J	195 U	240 U	185 U
Naphthalene	4400000	25000	ug/kg	1900 U	195 U	330 U	165 U	195 U	240 U	185 U
Pentachlorophenol	150000	5000	ug/kg	1900 U	195 U	330 U	165 U	195 U	240 U	185 U
Phenanthrene	66000000	10000000	ug/kg	1900 U	195 U	330 U	770	195 U	240 U	185 U
Phenol	66000000	200000	ug/kg	1900 U	195 U	330 U	165 U	195 U	240 U	185 U
Pyrene	6600000	2200000	ug/kg	1900 U	195 U	330 U	1100	210 J	240 U	185 U

Table 6-3 - Soil - Analytical Summary of Detected SVOC

			Location ID	UBZ3-SO-29	UBZ3-SO-30	UBZ3-SO-30	UBZ3-SO-31	UBZ3-SO-31	UBZ3-SO-32	UBZ3-SO-32	UBZ3-SO-33
			Sample Name	UBZ3-SO-29-8-10	UBZ3-SO-30-0.5-3	UBZ3-SO-30-13-14	UBZ3-SO-31-0-3	UBZ3-SO-31-5-7	UBZ3-SO-32-0-2	UBZ3-SO-32-2-3	UBZ3-SO-33-0-2
			Date Sampled	12/13/2011	12/14/2011	12/14/2011	12/13/2011	12/13/2011	4/20/2012	4/20/2012	4/20/2012
			Parent Sample Name								
	Act 2 MSCs (Residential)[1]		Depth Interval	8-10	0.5-3	13-14	0-3	5-7	0-2	2-3	0-2
Analyte	**RDC MSC**	**RSGW**	**Unit**								
SVOCs (SW8270)											
2-methylnaphthalene	880000	600000	ug/kg	210 U	1900 U	185 U	195 U	195 U	185 U	185 U	185 U
Acenaphthene	13000000	2700000	ug/kg	210 U	1900 U	185 U	195 U	195 U	185 U	185 U	185 U
Acenaphthylene	13000000	2500000	ug/kg	210 U	1900 U	185 U	195 U	195 U	185 U	185 U	185 U
Acetophenone	10000000	370000	ug/kg	210 U	1900 U	185 U	195 U	195 U	185 U	185 U	185 U
Anthracene	66000000	350000	ug/kg	210 U	1900 U	185 U	195 U	195 U	390	185 U	185 U
Benzaldehyde	NSA	NSA	ug/kg	210 UR	1900 UR	185 UR	195 U	195 U	580	185 U	185 U
Benzo[a]anthracene	5700	25000	ug/kg	210 U	1900 U	185 U	170 J	195 U	1100	185 U	185 U
Benzo[a]pyrene	570	46000	ug/kg	210 U	1900 U	185 U	195 U	195 U	**870**	185 U	185 U
Benzo[b]fluoranthene	5700	40000	ug/kg	210 U	1900 U	185 U	260 J	195 U	1100	200 J	185 U
Benzo[g,h,i]perylene	13000000	180000	ug/kg	210 U	1900 U	185 U	195 U	195 U	440	185 U	185 U
Benzo[k]fluoranthene	57000	610000	ug/kg	210 U	1900 U	185 U	195 U	195 U	430	185 U	185 U
Bis(2-ethylhexyl) phthalate	1300000	130000	ug/kg	210 U	1900 U	185 U	195 U	195 U	185 U	185 U	185 U
Carbazole	900000	21000	ug/kg	210 U	1900 U	185 U	195 U	195 U	185 U	185 U	185 U
Chrysene	570000	230000	ug/kg	210 U	1900 U	185 U	190 J	195 U	1000	160 J	185 U
Dibenz[a,h]anthracene	570	13000	ug/kg	210 U	1900 U	185 U	195 U	195 U	185 U	185 U	185 U
Dibenzofuran	220000	95000	ug/kg	210 U	1900 U	185 U	195 U	195 U	185 U	185 U	185 U
Diethyl phthalate	10000000	2900000	ug/kg	210 U	1900 U	185 U	195 U	195 U	185 U	185 U	185 U
Dimethyl phthalate	NSA	NSA	ug/kg	210 U	1900 U	185 U	195 U	195 U	770	770	850
Fluoranthene	8800000	3200000	ug/kg	210 U	1900 U	185 U	290 J	195 U	2100	210 J	185 U
Fluorene	8800000	3000000	ug/kg	210 U	1900 U	185 U	195 U	195 U	185 U	185 U	185 U
Indeno[1,2,3-c,d]pyrene	5700	2200000	ug/kg	210 U	1900 U	185 U	195 U	195 U	440	185 U	185 U
Naphthalene	4400000	25000	ug/kg	210 U	1900 U	185 U	195 U	195 U	185 U	185 U	185 U
Pentachlorophenol	150000	5000	ug/kg	210 U	1900 U	185 U	195 U	195 U	185 U	185 U	185 UR
Phenanthrene	66000000	10000000	ug/kg	210 U	1900 U	185 U	180 J	195 U	1100	185 U	185 U
Phenol	66000000	200000	ug/kg	210 U	1900 U	185 U	195 U	195 U	185 U	185 U	185 UR
Pyrene	6600000	2200000	ug/kg	210 U	1900 U	185 U	290 J	195 U	1800	200 J	185 U

Table 6-3 - Soil - Analytical Summary of Detected SVOC

			Location ID	UBZ3-SO-33	UBZ3-SO-34	UBZ3-SO-34	UBZ3-SO-35	UBZ3-SO-35	UBZ3-SO-36	UBZ3-SO-36	UBZ3-SO-37
			Sample Name	UBZ3-SO-33-2-3	UBZ3-SO-34-34-35	UBZ3-SO-34-6-7	UBZ3-SO-35-13-14	UBZ3-SO-35-2-3	UBZ3-SO-36-14-15	UBZ3-SO-36-8-9	UBZ3-SO-37-12-13
			Date Sampled	4/20/2012	12/20/2011	12/20/2011	12/20/2011	12/20/2011	12/20/2011	12/20/2011	12/20/2011
			Parent Sample Name								
	Act 2 MSCs (Residential)[1]		Depth Interval	2-3	34-35	6-7	13-14	2-3	14-14	8-8	12-12
Analyte	RDC MSC	RSGW	Unit								
SVOCs (SW8270)											
2-methylnaphthalene	880000	600000	ug/kg	190 U	205 U	180 U	185 U	185 U	185 U	185 U	185 U
Acenaphthene	13000000	2700000	ug/kg	190 U	205 U	180 U	185 U	185 U	185 U	185 U	185 U
Acenaphthylene	13000000	2500000	ug/kg	190 U	205 U	180 U	185 U	185 U	185 U	185 U	185 U
Acetophenone	10000000	370000	ug/kg	190 U	205 U	180 U	185 U	185 U	185 U	185 U	185 U
Anthracene	66000000	350000	ug/kg	190 U	205 U	180 U	185 U	185 U	185 U	185 U	185 U
Benzaldehyde	NSA	NSA	ug/kg	190 U	205 U	180 U	185 U	185 U	185 U	185 U	185 U
Benzo[a]anthracene	5700	25000	ug/kg	190 U	205 U	180 U	185 U	200 J	185 U	185 U	185 U
Benzo[a]pyrene	570	46000	ug/kg	190 U	205 U	180 U	185 U	185 U	185 U	185 U	185 U
Benzo[b]fluoranthene	5700	40000	ug/kg	190 U	205 U	180 U	185 U	180 J	185 U	185 U	185 U
Benzo[g,h,i]perylene	13000000	180000	ug/kg	190 U	205 U	180 U	185 U	185 U	185 U	185 U	185 U
Benzo[k]fluoranthene	57000	610000	ug/kg	190 U	205 U	180 U	185 U	185 U	185 U	185 U	185 U
Bis(2-ethylhexyl) phthalate	1300000	130000	ug/kg	190 U	205 U	180 U	185 U	185 U	185 U	185 U	185 U
Carbazole	900000	21000	ug/kg	190 U	205 U	180 U	185 U	185 U	185 U	185 U	185 U
Chrysene	570000	230000	ug/kg	190 U	205 U	180 U	185 U	190 J	185 U	185 U	185 U
Dibenz[a,h]anthracene	570	13000	ug/kg	190 U	205 U	180 U	185 U	185 U	185 U	185 U	185 U
Dibenzofuran	220000	95000	ug/kg	190 U	205 U	180 U	185 U	185 U	185 U	185 U	185 U
Diethyl phthalate	10000000	2900000	ug/kg	190 U	205 U	180 U	185 U	185 U	185 U	185 U	185 U
Dimethyl phthalate	NSA	NSA	ug/kg	660	205 U	180 U	185 U	185 U	185 U	185 U	185 U
Fluoranthene	8800000	3200000	ug/kg	190 U	205 U	180 U	185 U	380	185 U	185 U	185 U
Fluorene	8800000	3000000	ug/kg	190 U	205 U	180 U	185 U	185 U	185 U	185 U	185 U
Indeno[1,2,3-c,d]pyrene	5700	2200000	ug/kg	190 U	205 U	180 U	185 U	185 U	185 U	185 U	185 U
Naphthalene	4400000	25000	ug/kg	190 U	205 U	180 U	185 U	185 U	185 U	185 U	185 U
Pentachlorophenol	150000	5000	ug/kg	190 U	205 U	180 U	185 U	185 U	185 U	185 U	185 U
Phenanthrene	66000000	10000000	ug/kg	190 U	205 U	180 U	185 U	300 J	185 U	185 U	185 U
Phenol	66000000	200000	ug/kg	190 U	205 U	180 U	185 U	185 U	185 U	185 U	185 U
Pyrene	6600000	2200000	ug/kg	190 U	205 U	180 U	185 U	360 J	185 U	185 U	185 U

Table 6-3 - Soil - Analytical Summary of Detected SVOC

			Location ID	UBZ3-SO-37	UBZ3-SO-38	UBZ3-SO-38	UBZ3-SO-39	UBZ3-SO-39	UBZ3-SO-39	UBZ3-SO-39	UBZ3-SO-40
			Sample Name	UBZ3-SO-37-3-4	UBZ3-SO-38-0-2	UBZ3-SO-38-10-12	UBZ3-SO-39-0.5-2.5	UBZ3-SO-39-0-2	UBZ3-SO-39-6-8	UBZ3-SO-39-7-8	UBZ3-SO-40-14-15
			Date Sampled	12/20/2011	12/15/2011	12/15/2011	12/15/2011	1/5/2012	12/15/2011	1/5/2012	12/15/2011
			Parent Sample Name								
	Act 2 MSCs (Residential)[1]		Depth Interval	3-3	0-2	10-12	0.5-2.5	0-2	6-8	7-8	14-15
Analyte	**RDC MSC**	**RSGW**	**Unit**								
SVOCs (SW8270)											
2-methylnaphthalene	880000	600000	ug/kg	185 U	195 U	190 U	185 U	185 U	185 U	175 U	950 U
Acenaphthene	13000000	2700000	ug/kg	185 U	195 U	190 U	185 U	180 J	185 U	175 U	950 U
Acenaphthylene	13000000	2500000	ug/kg	185 U	195 U	190 U	185 U	185 U	185 U	175 U	950 U
Acetophenone	10000000	370000	ug/kg	185 U	195 U	190 U	185 U	185 U	185 U	175 U	950 U
Anthracene	66000000	350000	ug/kg	185 U	195 U	190 U	185 U	490	185 U	175 U	950 U
Benzaldehyde	NSA	NSA	ug/kg	185 U	195 U	190 U	185 U	185 U	185 U	175 U	950 U
Benzo[a]anthracene	5700	25000	ug/kg	185 U	195 U	190 U	310 J	2700	185 U	175 U	950 U
Benzo[a]pyrene	570	46000	ug/kg	185 U	195 U	190 U	300 J	**2200**	185 U	175 U	950 U
Benzo[b]fluoranthene	5700	40000	ug/kg	185 U	195 U	190 U	410	3900 K	185 U	175 U	950 U
Benzo[g,h,i]perylene	13000000	180000	ug/kg	185 U	195 U	190 U	160 J	1600	185 U	175 U	950 U
Benzo[k]fluoranthene	57000	610000	ug/kg	185 U	195 U	190 U	170 J	1100	185 U	175 U	950 U
Bis(2-ethylhexyl) phthalate	1300000	130000	ug/kg	185 U	195 U	190 U	185 U	185 U	185 U	175 U	950 U
Carbazole	900000	21000	ug/kg	185 U	195 U	190 U	185 U	185 U	185 U	175 U	950 U
Chrysene	570000	230000	ug/kg	185 U	195 U	190 U	340 J	2700	185 U	175 U	950 U
Dibenz[a,h]anthracene	570	13000	ug/kg	185 U	195 U	190 U	185 U	470	185 U	175 U	950 U
Dibenzofuran	220000	95000	ug/kg	185 U	195 U	190 U	185 U	185 UL	185 U	175 UL	950 U
Diethyl phthalate	10000000	2900000	ug/kg	185 U	195 U	190 U	185 U	185 U	185 U	175 U	950 U
Dimethyl phthalate	NSA	NSA	ug/kg	185 U	190 J	210 J	260 J	185 U	240 J	175 U	950 U
Fluoranthene	8800000	3200000	ug/kg	185 U	240 J	190 U	590	5600 K	185 U	175 U	950 U
Fluorene	8800000	3000000	ug/kg	185 U	195 U	190 U	185 U	185 U	185 U	175 U	950 U
Indeno[1,2,3-c,d]pyrene	5700	2200000	ug/kg	185 U	195 U	190 U	185 U	1500	185 U	175 U	950 U
Naphthalene	4400000	25000	ug/kg	185 U	195 U	190 U	150 J	185 U	185 U	175 U	950 U
Pentachlorophenol	150000	5000	ug/kg	185 U	195 U	190 U	185 U	185 U	185 U	175 U	950 U
Phenanthrene	66000000	10000000	ug/kg	185 U	210 J	190 U	410	2300	185 U	175 U	950 U
Phenol	66000000	200000	ug/kg	185 U	195 U	190 U	185 U	185 U	185 U	175 U	950 U
Pyrene	6600000	2200000	ug/kg	185 U	200 J	190 U	490	4700 K	185 U	175 U	950 U

Table 6-3 - Soil - Analytical Summary of Detected SVOC

			Location ID	UBZ3-SO-40	UBZ3-SO-41	UBZ3-SO-41	UBZ3-SO-42	UBZ3-SO-42	UBZ3-SO-42	UBZ3-SO-43
			Sample Name	UBZ3-SO-40-3-5	UBZ3-SO-41-1-3	UBZ3-SO-41-7-8	UBZ3-SO-42-11.5-13.5	UBZ3-SO-42-3-5	UBZ3-SO-DUP2	UBZ3-SO-43-0.5-3
			Date Sampled	12/15/2011	12/15/2011	12/15/2011	12/14/2011	12/14/2011	12/14/2011	12/14/2011
			Parent Sample Name						UBZ3-SO-42-11.5-13.5	
	Act 2 MSCs (Residential)[1]		Depth Interval	3-5	1-3	7-8	11.5-13.5	3-5	11.5-13.5	0.5-3
Analyte	**RDC MSC**	**RSGW**	**Unit**							
SVOCs (SW8270)										
2-methylnaphthalene	880000	600000	ug/kg	185 U	240 J	200 U	290 U	185 U	255 U	210 U
Acenaphthene	13000000	2700000	ug/kg	185 U	190 U	200 U	290 U	185 U	255 U	210 U
Acenaphthylene	13000000	2500000	ug/kg	185 U	220 J	200 U	290 U	185 U	255 U	210 U
Acetophenone	10000000	370000	ug/kg	185 U	190 U	200 U	290 U	185 U	255 U	210 U
Anthracene	66000000	350000	ug/kg	185 U	190 U	200 U	290 U	185 U	255 U	210 U
Benzaldehyde	NSA	NSA	ug/kg	185 U	190 U	200 U	290 UR	185 UR	255 UR	210 UR
Benzo[a]anthracene	5700	25000	ug/kg	185 U	1200	200 U	290 U	185 U	255 U	210 U
Benzo[a]pyrene	570	46000	ug/kg	185 U	**1300**	200 U	290 U	185 U	255 U	210 U
Benzo[b]fluoranthene	5700	40000	ug/kg	185 U	1800	200 U	290 U	185 U	255 U	210 U
Benzo[g,h,i]perylene	13000000	180000	ug/kg	185 U	920	200 U	290 U	185 U	255 U	210 U
Benzo[k]fluoranthene	57000	610000	ug/kg	185 U	630	200 U	290 U	185 U	255 U	210 U
Bis(2-ethylhexyl) phthalate	1300000	130000	ug/kg	185 U	190 U	200 U	290 U	185 U	255 U	210 U
Carbazole	900000	21000	ug/kg	185 U	190 U	200 U	290 U	185 U	255 U	210 U
Chrysene	570000	230000	ug/kg	185 U	1200	200 U	290 U	185 U	255 U	210 U
Dibenz[a,h]anthracene	570	13000	ug/kg	185 U	260 J	200 U	290 U	185 U	255 U	210 U
Dibenzofuran	220000	95000	ug/kg	185 U	190 U	200 U	290 U	185 U	255 U	210 U
Diethyl phthalate	10000000	2900000	ug/kg	185 U	190 U	200 U	290 U	185 U	255 U	210 U
Dimethyl phthalate	NSA	NSA	ug/kg	180 J	270 J	190 J	290 U	185 U	255 U	210 U
Fluoranthene	8800000	3200000	ug/kg	185 U	1400	200 U	290 U	185 U	255 U	210 U
Fluorene	8800000	3000000	ug/kg	185 U	190 U	200 U	290 U	185 U	255 U	210 U
Indeno[1,2,3-c,d]pyrene	5700	2200000	ug/kg	185 U	840	200 U	290 U	185 U	255 U	210 U
Naphthalene	4400000	25000	ug/kg	185 U	190 U	200 U	290 U	185 U	255 U	210 U
Pentachlorophenol	150000	5000	ug/kg	185 U	190 U	200 U	290 U	185 U	255 U	210 U
Phenanthrene	66000000	10000000	ug/kg	185 U	550	200 U	290 U	185 U	255 U	210 U
Phenol	66000000	200000	ug/kg	185 U	190 U	200 U	290 U	185 U	255 U	210 U
Pyrene	6600000	2200000	ug/kg	185 U	1500	200 U	290 U	185 U	255 U	210 U

Table 6-3 - Soil - Analytical Summary of Detected SVOC

			Location ID	UBZ3-SO-43	UBZ3-SO-44	UBZ3-SO-44	UBZ3-SO-44	UBZ3-SO-45	UBZ3-SO-45	UBZ3-SO-46	UBZ3-SO-46
			Sample Name	UBZ3-SO-43-13-14	UBZ3-SO-44-0-2	UBZ3-SO-44-0-2	UBZ3-SO-44-8-10	UBZ3-SO-45-2-3	UBZ3-SO-45-8-9	UBZ3-SO-46-4-5	UBZ3-SO-46-5-7
			Date Sampled	12/14/2011	12/13/2011	1/5/2012	12/13/2011	12/13/2011	12/13/2011	12/13/2011	12/13/2011
			Parent Sample Name								
	Act 2 MSCs (Residential)[1]		Depth Interval	13-14	0-2	0-2	8-10	2-3	8-9	4-5	5-7
Analyte	**RDC MSC**	**RSGW**	**Unit**								
SVOCs (SW8270)											
2-methylnaphthalene	880000	600000	ug/kg	185 U	1000 U	190 U	245 U	190 U	190 U	205 U	210 U
Acenaphthene	13000000	2700000	ug/kg	185 U	1000 U	190 U	245 U	190 U	190 U	205 U	210 U
Acenaphthylene	13000000	2500000	ug/kg	185 U	1000 U	190 U	245 U	190 U	190 U	205 U	210 U
Acetophenone	10000000	370000	ug/kg	185 U	1000 U	190 U	245 U	190 U	190 U	205 U	210 U
Anthracene	66000000	350000	ug/kg	185 U	1000 U	190 U	245 U	190 U	190 U	205 U	210 U
Benzaldehyde	NSA	NSA	ug/kg	185 UR	1000 UR	190 U	245 UR	190 UR	190 UR	205 U	210 U
Benzo[a]anthracene	5700	25000	ug/kg	185 U	1000 U	190 U	245 U	190 U	190 U	205 U	210 U
Benzo[a]pyrene	570	46000	ug/kg	185 U	1000 U	190 U	245 U	190 U	190 U	205 U	210 U
Benzo[b]fluoranthene	5700	40000	ug/kg	185 U	1000 U	190 U	245 U	190 U	190 U	205 U	210 U
Benzo[g,h,i]perylene	13000000	180000	ug/kg	185 U	1000 U	190 U	245 U	190 U	190 U	205 U	210 U
Benzo[k]fluoranthene	57000	610000	ug/kg	185 U	1000 U	190 U	245 U	190 U	190 U	205 U	210 U
Bis(2-ethylhexyl) phthalate	1300000	130000	ug/kg	185 U	1000 U	190 U	245 U	190 U	190 U	205 U	210 U
Carbazole	900000	21000	ug/kg	185 U	1000 U	190 U	245 U	190 U	190 U	205 U	210 U
Chrysene	570000	230000	ug/kg	185 U	1000 U	190 U	245 U	190 U	190 U	205 U	210 U
Dibenz[a,h]anthracene	570	13000	ug/kg	185 U	1000 U	190 U	245 U	190 U	190 U	205 U	210 U
Dibenzofuran	220000	95000	ug/kg	185 U	1000 U	190 UL	245 U	190 U	190 U	205 U	210 U
Diethyl phthalate	10000000	2900000	ug/kg	185 U	1000 U	190 U	245 U	190 U	190 U	205 U	210 U
Dimethyl phthalate	NSA	NSA	ug/kg	185 U	1000 U	190 U	245 U	190 U	190 U	205 U	210 U
Fluoranthene	8800000	3200000	ug/kg	185 U	1400 J	190 U	245 U	190 U	190 U	205 U	210 U
Fluorene	8800000	3000000	ug/kg	185 U	1000 U	190 U	245 U	190 U	190 U	205 U	210 U
Indeno[1,2,3-c,d]pyrene	5700	2200000	ug/kg	185 U	1000 U	190 U	245 U	190 U	190 U	205 U	210 U
Naphthalene	4400000	25000	ug/kg	185 U	1000 U	190 U	245 U	190 U	190 U	205 U	210 U
Pentachlorophenol	150000	5000	ug/kg	185 U	1000 U	190 UR	245 U	190 U	190 U	205 U	210 U
Phenanthrene	66000000	10000000	ug/kg	185 U	1200 J	190 U	245 U	190 U	190 U	205 U	210 U
Phenol	66000000	200000	ug/kg	185 U	1000 U	190 UR	245 U	190 U	190 U	205 U	210 U
Pyrene	6600000	2200000	ug/kg	185 U	1200 J	190 U	245 U	190 U	190 U	205 U	210 U

Table 6-3 - Soil - Analytical Summary of Detected SVOC

			Location ID	UBZ3-SO-47	UBZ3-SO-47	UBZ3-SO-47	UBZ3-SO-48	UBZ3-SO-48	UBZ3-SO-49	UBZ3-SO-49	UBZ3-SO-50
			Sample Name	UBZ3-SO-47-0-2	UBZ3-SO-47-7-8	UBZ3-SO-DUP1	UBZ3-SO-48-2-4	UBZ3-SO-48-5-6	UBZ3-SO-49-14-15	UBZ3-SO-49-4-5	UBZ3-SO-50-0-2
			Date Sampled	12/13/2011	12/13/2011	12/13/2011	12/12/2011	12/12/2011	12/20/2011	12/20/2011	4/19/2012
			Parent Sample Name			UBZ3-SO-47-7-8					
	Act 2 MSCs (Residential)[1]		Depth Interval	0-2	7-8	7-8	2-4	5-6	14-15	4-5	0-2
Analyte	RDC MSC	RSGW	Unit								
SVOCs (SW8270)											
2-methylnaphthalene	880000	600000	ug/kg	195 U	200 U	205 U	195 U	200 U	200 U	225 U	175 U
Acenaphthene	13000000	2700000	ug/kg	195 U	200 U	205 U	195 U	200 U	200 U	225 U	175 U
Acenaphthylene	13000000	2500000	ug/kg	195 U	200 U	205 U	195 U	200 U	200 U	225 U	175 U
Acetophenone	10000000	370000	ug/kg	195 U	200 U	205 U	195 U	200 U	200 U	225 U	175 U
Anthracene	66000000	350000	ug/kg	195 U	200 U	205 U	195 U	200 U	200 U	225 U	175 U
Benzaldehyde	NSA	NSA	ug/kg	195 UR	200 U	205 U	195 U	200 U	200 U	225 U	175 U
Benzo[a]anthracene	5700	25000	ug/kg	320 J	200 U	205 U	195 U	200 U	200 U	225 U	175 U
Benzo[a]pyrene	570	46000	ug/kg	240 J	200 U	205 U	195 U	200 U	200 U	225 U	175 U
Benzo[b]fluoranthene	5700	40000	ug/kg	320 J	200 U	205 U	195 U	200 U	200 U	225 U	175 U
Benzo[g,h,i]perylene	13000000	180000	ug/kg	195 U	200 U	205 U	195 U	200 U	200 U	225 U	175 U
Benzo[k]fluoranthene	57000	610000	ug/kg	195 U	200 U	205 U	195 U	200 U	200 U	225 U	175 U
Bis(2-ethylhexyl) phthalate	1300000	130000	ug/kg	195 U	200 U	205 U	195 U	200 U	200 U	225 U	175 U
Carbazole	900000	21000	ug/kg	195 U	200 U	205 U	195 U	200 U	200 U	225 U	175 U
Chrysene	570000	230000	ug/kg	320 J	200 U	205 U	195 U	200 U	200 U	225 U	175 U
Dibenz[a,h]anthracene	570	13000	ug/kg	195 U	200 U	205 U	195 U	200 U	200 U	225 U	175 U
Dibenzofuran	220000	95000	ug/kg	195 U	200 U	205 U	195 U	200 U	200 U	225 U	175 U
Diethyl phthalate	10000000	2900000	ug/kg	195 U	200 U	205 U	195 U	200 U	200 U	225 U	175 U
Dimethyl phthalate	NSA	NSA	ug/kg	195 U	200 U	205 U	195 U	200 U	200 U	225 U	710
Fluoranthene	8800000	3200000	ug/kg	550	200 U	205 U	200 J	200 U	200 U	225 U	175 U
Fluorene	8800000	3000000	ug/kg	195 U	200 U	205 U	195 U	200 U	200 U	225 U	175 U
Indeno[1,2,3-c,d]pyrene	5700	2200000	ug/kg	195 U	200 U	205 U	195 U	200 U	200 U	225 U	175 U
Naphthalene	4400000	25000	ug/kg	195 U	200 U	205 U	195 U	200 U	200 U	225 U	175 U
Pentachlorophenol	150000	5000	ug/kg	195 U	200 U	205 U	195 U	200 U	200 U	225 U	175 U
Phenanthrene	66000000	10000000	ug/kg	470	200 U	205 U	170 J	200 U	200 U	225 U	175 U
Phenol	66000000	200000	ug/kg	195 U	200 U	205 U	195 U	200 U	200 U	225 U	175 U
Pyrene	6600000	2200000	ug/kg	470	200 U	205 U	180 J	200 U	200 U	225 U	175 U

Table 6-3 - Soil - Analytical Summary of Detected SVOC

			Location ID	UBZ3-SO-50	UBZ3-SO-51	UBZ3-SO-51	UBZ3-SO-52	UBZ3-SO-52A	UBZ3-SO-52A	UBZ3-SO-53	UBZ3-SO-53
			Sample Name	UBZ3-SO-50-5-7	UBZ3-SO-51-5-7	UBZ-SO-51-0-2	UBZ3-SO-52-0-2	UBZ3-SO-52a-0-2	UBZ3-SO-52a-5-7	UBZ3-SO-53-0-2	UBZ3-SO-53-4-5
			Date Sampled	4/19/2012	4/19/2012	4/19/2012	4/18/2012	4/18/2012	4/18/2012	4/18/2012	4/18/2012
			Parent Sample Name								
	Act 2 MSCs (Residential)[1]		Depth Interval	5-7	5-7	0-2	0-2	0-2	5-7	0-2	4-5
Analyte	RDC MSC	RSGW	Unit								
SVOCs (SW8270)											
2-methylnaphthalene	880000	600000	ug/kg	200 U	190 U	550 U	495 U	490 U	165 U	495 U	165 U
Acenaphthene	13000000	2700000	ug/kg	200 U	190 U	550 U	495 U	490 U	165 U	495 U	165 U
Acenaphthylene	13000000	2500000	ug/kg	200 U	190 U	550 U	495 U	490 U	165 U	495 U	165 U
Acetophenone	10000000	370000	ug/kg	200 U	190 U	550 U	495 U	490 U	165 U	495 U	165 U
Anthracene	66000000	350000	ug/kg	200 U	190 U	550 U	495 U	490 U	165 U	495 U	165 U
Benzaldehyde	NSA	NSA	ug/kg	200 U	190 U	550 U	495 U	490 U	165 U	495 U	165 U
Benzo[a]anthracene	5700	25000	ug/kg	190 J	190 U	550 U	495 U	490 U	165 U	495 U	165 U
Benzo[a]pyrene	570	46000	ug/kg	200 U	190 U	550 U	495 U	490 U	165 U	495 U	165 U
Benzo[b]fluoranthene	5700	40000	ug/kg	200 J	190 U	550 U	495 U	460 J	165 U	495 U	165 U
Benzo[g,h,i]perylene	13000000	180000	ug/kg	200 U	190 U	550 U	495 U	490 U	165 U	495 U	165 U
Benzo[k]fluoranthene	57000	610000	ug/kg	200 U	190 U	550 U	495 U	490 U	165 U	495 U	165 U
Bis(2-ethylhexyl) phthalate	1300000	130000	ug/kg	200 U	190 U	550 U	495 U	490 U	165 U	495 U	165 U
Carbazole	900000	21000	ug/kg	200 U	190 U	550 U	495 U	490 U	165 U	495 U	165 U
Chrysene	570000	230000	ug/kg	200 J	190 U	550 U	495 U	410 J	165 U	495 U	165 U
Dibenz[a,h]anthracene	570	13000	ug/kg	200 U	190 U	550 U	495 U	490 U	165 U	495 U	165 U
Dibenzofuran	220000	95000	ug/kg	200 U	190 U	550 U	495 U	490 U	165 U	495 U	165 U
Diethyl phthalate	10000000	2900000	ug/kg	200 U	190 U	550 U	495 U	490 U	165 U	495 U	165 U
Dimethyl phthalate	NSA	NSA	ug/kg	740	730	1700	2100	1900	550	1600	590
Fluoranthene	8800000	3200000	ug/kg	340 J	190 U	550 U	495 U	530 J	165 U	495 U	165 U
Fluorene	8800000	3000000	ug/kg	200 U	190 U	550 U	495 U	490 U	165 U	495 U	165 U
Indeno[1,2,3-c,d]pyrene	5700	2200000	ug/kg	200 U	190 U	550 U	495 U	490 U	165 U	495 U	165 U
Naphthalene	4400000	25000	ug/kg	200 U	190 U	550 U	495 U	490 U	165 U	495 U	165 U
Pentachlorophenol	150000	5000	ug/kg	200 U	190 U	550 U	495 U	490 U	165 U	495 U	165 U
Phenanthrene	66000000	10000000	ug/kg	250 J	190 U	550 U	495 U	490 U	165 U	495 U	165 U
Phenol	66000000	200000	ug/kg	200 U	190 U	550 U	495 U	490 U	165 U	495 U	165 U
Pyrene	6600000	2200000	ug/kg	290 J	190 U	460 J	495 U	590 J	165 U	495 U	165 U

Table 6-3 - Soil - Analytical Summary of Detected SVOC

			Location ID	UBZ3-SO-54	UBZ3-SO-54	UBZ3-SO-55	UBZ3-SO-55	UBZ3-SO-56	UBZ3-SO-56	UBZ3-SO-57	UBZ3-SO-57
			Sample Name	UBZ3-SO-54-3-5	UBZ3-SO-54-5-7	UBZ3-SO-55-0.5-3	UBZ3-SO-55-5-8	UBZ3-SO-56-6-7	UBZ3-SO-56-9-10	UBZ3-SO-57-0-2	UBZ3-SO-57-5-7
			Date Sampled	12/15/2011	12/15/2011	12/15/2011	12/15/2011	12/20/2011	12/20/2011	4/19/2012	4/19/2012
			Parent Sample Name								
	Act 2 MSCs (Residential)[1]		Depth Interval	3-5	5-7	0.5-3	5-8	6-7	9-10	0-2	5-7
Analyte	RDC MSC	RSGW	Unit								
SVOCs (SW8270)											
2-methylnaphthalene	880000	600000	ug/kg	250 K	200 U	3700 UR	205 U	270 U	200 U	185 U	220 U
Acenaphthene	13000000	2700000	ug/kg	800 K	200 U	3700 UR	205 U	270 U	200 U	185 U	220 U
Acenaphthylene	13000000	2500000	ug/kg	190 U	200 U	3700 UR	205 U	270 U	200 U	185 U	220 U
Acetophenone	10000000	370000	ug/kg	190 U	200 U	3700 UR	205 U	270 U	200 U	185 U	220 U
Anthracene	66000000	350000	ug/kg	1700 K	200 U	6100 L	350 J	270 U	200 U	185 U	220 U
Benzaldehyde	NSA	NSA	ug/kg	190 U	200 U	3700 UR	205 U	270 U	200 U	185 U	220 U
Benzo[a]anthracene	5700	25000	ug/kg	2700 K	200 U	**10000 L**	560	270 U	200 U	185 U	220 U
Benzo[a]pyrene	570	46000	ug/kg	**2400 K**	200 U	**8900 L**	470	270 U	200 U	185 U	220 U
Benzo[b]fluoranthene	5700	40000	ug/kg	2800 K	200 U	**10000 L**	540	270 U	200 U	160 J	220 U
Benzo[g,h,i]perylene	13000000	180000	ug/kg	1400 K	330 J	4600 L	260 J	270 U	200 U	185 U	220 U
Benzo[k]fluoranthene	57000	610000	ug/kg	970 K	200 U	4200 L	230 J	270 U	200 U	185 U	220 U
Bis(2-ethylhexyl) phthalate	1300000	130000	ug/kg	190 U	200 U	3700 UR	205 U	270 U	200 U	185 U	220 U
Carbazole	900000	21000	ug/kg	510	200 U	3700 UR	205 U	270 U	200 U	185 U	220 U
Chrysene	570000	230000	ug/kg	2600 K	200 U	9900 L	540	270 U	200 U	160 J	220 U
Dibenz[a,h]anthracene	570	13000	ug/kg	410 K	200 U	3700 UR	205 U	270 U	200 U	185 U	220 U
Dibenzofuran	220000	95000	ug/kg	540 K	200 U	3700 UR	205 U	270 U	200 U	185 U	220 U
Diethyl phthalate	10000000	2900000	ug/kg	190 U	200 U	3700 UR	205 U	270 U	200 U	185 U	220 U
Dimethyl phthalate	NSA	NSA	ug/kg	170 J	190 J	3700 UR	270 J	270 U	200 U	770	840
Fluoranthene	8800000	3200000	ug/kg	6000 D	200 U	24000 L	1200	270 U	200 U	185 U	220 U
Fluorene	8800000	3000000	ug/kg	810	200 U	3900 L	220 J	270 U	200 U	185 U	220 U
Indeno[1,2,3-c,d]pyrene	5700	2200000	ug/kg	1400 K	200 U	4400 L	220 J	270 U	200 U	185 U	220 U
Naphthalene	4400000	25000	ug/kg	820 K	200 U	3700 UR	205 U	270 U	200 U	185 U	220 U
Pentachlorophenol	150000	5000	ug/kg	190 U	200 U	3700 UR	205 U	270 U	200 U	185 R	220 U
Phenanthrene	66000000	10000000	ug/kg	5300 D	200 U	20000 L	1200	270 U	200 U	185 U	220 U
Phenol	66000000	200000	ug/kg	190 U	200 U	3700 UR	205 U	270 U	200 U	185 R	220 U
Pyrene	6600000	2200000	ug/kg	5100 D	200 U	21000 L	1100	270 U	200 U	185 U	220 U

Table 6-3 - Soil - Analytical Summary of Detected SVOC

			Location ID	UBZ3-SO-58	UBZ3-SO-58	UBZ3-SO-58	UBZ3-SO-59	UBZ3-SO-59	UBZ3-SO-60	UBZ3-SO-60	UBZ3-SO-61
			Sample Name	UBZ3-SO-58-0-2	UBZ3-SO-58-5-7	UBZ3-SO-DUP22	UBZ3-SO-59-0-2	UBZ3-SO-59-4-6	UBZ3-SO-60-0-2	UBZ3-SO-60-4-5	UBZ3-SO-61-0-2
			Date Sampled	4/19/2012	4/19/2012	4/19/2012	4/19/2012	4/19/2012	4/18/2012	4/18/2012	4/18/2012
			Parent Sample Name			UBZ3-SO-58-0-2					
	Act 2 MSCs (Residential)[1]		Depth Interval	0-2	5-7	0-2	0-2	4-6	0-2	4-5	0-2
Analyte	**RDC MSC**	**RSGW**	**Unit**								
SVOCs (SW8270)											
2-methylnaphthalene	880000	600000	ug/kg	600 U	600 U	600 U	550 U	600 U	550 U	165 U	2450 U
Acenaphthene	13000000	2700000	ug/kg	600 U	600 U	600 U	550 U	600 U	550 U	165 U	2450 U
Acenaphthylene	13000000	2500000	ug/kg	600 U	600 U	600 U	550 U	600 U	550 U	165 U	2450 U
Acetophenone	10000000	370000	ug/kg	600 U	600 U	600 U	550 U	600 U	550 U	165 U	2450 U
Anthracene	66000000	350000	ug/kg	600 U	600 U	600 U	550 U	600 U	550 U	150 K	2450 U
Benzaldehyde	NSA	NSA	ug/kg	600 U	600 U	600 U	550 U	600 U	550 U	165 U	2450 U
Benzo[a]anthracene	5700	25000	ug/kg	600 U	600 U	600 U	550 U	600 U	550 U	310 J	2450 U
Benzo[a]pyrene	570	46000	ug/kg	600 U	600 U	600 U	550 U	600 U	550 U	240 J	2450 U
Benzo[b]fluoranthene	5700	40000	ug/kg	600 U	600 U	600 U	550 U	600 U	600 J	340	2450 U
Benzo[g,h,i]perylene	13000000	180000	ug/kg	600 U	600 U	600 U	550 U	600 U	550 U	165 U	2450 U
Benzo[k]fluoranthene	57000	610000	ug/kg	600 U	600 U	600 U	550 U	600 U	550 U	165 U	2450 U
Bis(2-ethylhexyl) phthalate	1300000	130000	ug/kg	600 U	600 U	600 U	550 U	600 U	550 U	165 U	2450 U
Carbazole	900000	21000	ug/kg	600 U	600 U	600 U	550 U	600 U	550 U	165 U	2450 U
Chrysene	570000	230000	ug/kg	600 U	600 U	600 U	550 U	600 U	530 J	310 J	2450 U
Dibenz[a,h]anthracene	570	13000	ug/kg	600 U	600 U	600 U	550 U	600 U	550 U	165 U	2450 U
Dibenzofuran	220000	95000	ug/kg	600 U	600 U	600 U	550 U	600 U	550 U	165 U	2450 U
Diethyl phthalate	10000000	2900000	ug/kg	600 U	600 U	600 U	550 U	600 U	550 U	165 U	2450 U
Dimethyl phthalate	NSA	NSA	ug/kg	2300	2200	1800	2000	1900	1500	760	2450 U
Fluoranthene	8800000	3200000	ug/kg	600 U	600 U	600 U	550 U	600 U	680 J	630	2450 U
Fluorene	8800000	3000000	ug/kg	600 U	600 U	600 U	550 U	600 U	550 U	165 U	2450 U
Indeno[1,2,3-c,d]pyrene	5700	2200000	ug/kg	600 U	600 U	600 U	550 U	600 U	550 U	165 U	2450 U
Naphthalene	4400000	25000	ug/kg	600 U	600 U	600 U	550 U	600 U	550 U	165 U	2450 U
Pentachlorophenol	150000	5000	ug/kg	600 U	600 U	600 U	550 U	600 U	550 UL	165 U	2450 U
Phenanthrene	66000000	10000000	ug/kg	600 U	600 U	600 U	550 U	600 U	550 U	470	2450 U
Phenol	66000000	200000	ug/kg	600 U	600 U	600 U	550 U	600 U	550 UL	165 U	2450 U
Pyrene	6600000	2200000	ug/kg	600 U	600 U	600 U	550 U	600 U	650 J	520	2450 U

Table 6-3 - Soil - Analytical Summary of Detected SVOC

			Location ID	UBZ3-SO-61	UBZ3-SO-62	UBZ3-SO-62	UBZ3-SO-63	UBZ3-SO-63	UBZ3-SO-63	Z2D12	Z2D12	Z2D13
			Sample Name	UBZ3-SO-61-5-7	UBZ3-SO-62-0-2	UBZ3-SO-62-5-7	UBZ3-SO-63-0-2	UBZ3-SO-63-5-7	UBZ3-SO-DUP21	Z2D12-SO-0-2	Z2D12-SO-3-5	Z2D13-SO-0-2
			Date Sampled	4/18/2012	4/19/2012	4/19/2012	4/19/2012	4/19/2012	4/19/2012	1/17/2012	1/17/2012	1/17/2012
			Parent Sample Name						UBZ3-SO-63-0-2			
	Act 2 MSCs (Residential)[1]		Depth Interval	5-7	0-2	5-7	0-2	5-7	0-2	0-2	3-5	0-2
Analyte	**RDC MSC**	**RSGW**	**Unit**									
SVOCs (SW8270)												
2-methylnaphthalene	880000	600000	ug/kg	165 U	185 U	600 U	550 U	700 U	2800 U	195 U	195 U	190 U
Acenaphthene	13000000	2700000	ug/kg	165 U	185 U	600 U	550 U	700 U	2800 U	195 U	195 U	190 U
Acenaphthylene	13000000	2500000	ug/kg	165 U	185 U	600 U	550 U	700 U	2800 U	195 U	195 U	190 U
Acetophenone	10000000	370000	ug/kg	165 U	185 U	600 U	550 U	700 U	2800 U	195 U	195 U	190 U
Anthracene	66000000	350000	ug/kg	165 U	185 U	600 U	550 U	700 U	2800 U	195 U	195 U	190 U
Benzaldehyde	NSA	NSA	ug/kg	165 U	185 U	600 U	550 U	700 U	2800 U	195 U	195 U	190 U
Benzo[a]anthracene	5700	25000	ug/kg	165 U	185 U	600 U	550 J	700 U	2800 U	195 U	195 U	190 U
Benzo[a]pyrene	570	46000	ug/kg	165 U	185 U	600 U	**590 J**	700 U	2800 U	195 U	195 U	190 U
Benzo[b]fluoranthene	5700	40000	ug/kg	165 U	160 J	600 U	870 J	700 U	2800 U	195 U	195 U	190 U
Benzo[g,h,i]perylene	13000000	180000	ug/kg	165 U	185 U	600 U	550 U	700 U	2800 U	195 U	195 U	190 U
Benzo[k]fluoranthene	57000	610000	ug/kg	165 U	185 U	600 U	550 U	700 U	2800 U	195 U	195 U	190 U
Bis(2-ethylhexyl) phthalate	1300000	130000	ug/kg	165 U	185 U	600 U	550 U	700 U	2800 U	195 U	195 U	190 U
Carbazole	900000	21000	ug/kg	165 U	185 U	600 U	550 U	700 U	2800 U	195 U	195 U	190 U
Chrysene	570000	230000	ug/kg	165 U	185 U	600 U	600 J	700 U	2800 U	195 U	195 U	190 U
Dibenz[a,h]anthracene	570	13000	ug/kg	165 U	185 U	600 U	550 U	700 U	2800 U	195 U	195 U	190 U
Dibenzofuran	220000	95000	ug/kg	165 U	185 U	600 U	550 U	700 U	2800 U	195 U	195 U	190 U
Diethyl phthalate	10000000	2900000	ug/kg	165 U	185 U	600 U	550 U	700 U	2800 U	195 U	195 U	190 U
Dimethyl phthalate	NSA	NSA	ug/kg	670	900	2200	2100	2200	2800 U	210 J	220 J	200 J
Fluoranthene	8800000	3200000	ug/kg	165 U	280 J	600 U	1000 J	700 U	2800 U	195 U	195 U	190 U
Fluorene	8800000	3000000	ug/kg	165 U	185 U	600 U	550 U	700 U	2800 U	195 U	195 U	190 U
Indeno[1,2,3-c,d]pyrene	5700	2200000	ug/kg	165 U	185 U	600 U	550 U	700 U	2800 U	195 U	195 U	190 U
Naphthalene	4400000	25000	ug/kg	165 U	185 U	600 U	550 U	700 U	2800 U	195 U	195 U	190 U
Pentachlorophenol	150000	5000	ug/kg	165 U	185 R	600 U	550 U	700 U	2800 U	195 U	195 U	190 U
Phenanthrene	66000000	10000000	ug/kg	165 U	180 J	600 U	520 J	700 U	2800 U	195 U	195 U	190 U
Phenol	66000000	200000	ug/kg	165 U	185 R	600 U	550 U	700 U	2800 U	195 U	195 U	190 U
Pyrene	6600000	2200000	ug/kg	165 U	220 J	600 U	860 J	700 U	2800 U	195 U	195 U	190 U

Table 6-3 - Soil - Analytical Summary of Detected SVOC

			Location ID	Z2D13	Z2D14	Z2D14	Z3D20	Z3D20	Z3D21	Z3D22	Z3D22	Z3D22
			Sample Name	Z2D13-SO-3-5	Z2D14-SO-0-2	Z2D14-SO-3-5	Z3D20-SO-5-7	Z3-SO-Dup20	Z3D21-SO-5-7	Z3D22-SO-0-2	Z3D22-SO-4-5	Z3D22-SO-5-7
			Date Sampled	1/17/2012	1/17/2012	1/17/2012	1/17/2012	1/17/2012	1/17/2012	1/17/2012	1/17/2012	1/17/2012
			Parent Sample Name					Z3D20-SO-5-7				
	Act 2 MSCs (Residential)[1]		Depth Interval	3-5	0-2	3-5	5-7	5-7	5-7	0-2	4-5	5-7
Analyte	RDC MSC	RSGW	Unit									
SVOCs (SW8270)												
2-methylnaphthalene	880000	600000	ug/kg	185 U	195 U	205 U	210 U	225 U	210 U	200 U	200 U	220 U
Acenaphthene	13000000	2700000	ug/kg	185 U	195 U	205 U	210 U	225 U	210 U	200 U	200 U	220 U
Acenaphthylene	13000000	2500000	ug/kg	185 U	195 U	205 U	210 U	225 U	210 U	200 U	200 U	220 U
Acetophenone	10000000	370000	ug/kg	185 U	195 U	205 U	210 U	225 U	210 U	200 U	200 U	220 U
Anthracene	66000000	350000	ug/kg	185 U	195 U	205 U	210 U	225 U	210 U	200 U	200 U	220 U
Benzaldehyde	NSA	NSA	ug/kg	185 U	195 U	205 U	210 U	225 U	210 U	200 U	200 U	220 U
Benzo[a]anthracene	5700	25000	ug/kg	185 U	195 U	205 U	210 U	225 U	210 U	200 U	200 U	220 U
Benzo[a]pyrene	570	46000	ug/kg	185 U	170 J	205 U	210 U	225 U	210 U	200 U	200 U	220 U
Benzo[b]fluoranthene	5700	40000	ug/kg	185 U	230 J	205 U	210 U	225 U	210 U	200 U	200 U	220 U
Benzo[g,h,i]perylene	13000000	180000	ug/kg	185 U	195 U	205 U	210 U	225 U	210 U	200 U	200 U	220 U
Benzo[k]fluoranthene	57000	610000	ug/kg	185 U	195 U	205 U	210 U	225 U	210 U	200 U	200 U	220 U
Bis(2-ethylhexyl) phthalate	1300000	130000	ug/kg	185 U	195 U	205 U	210 U	225 U	210 U	200 U	200 U	220 U
Carbazole	900000	21000	ug/kg	185 U	195 U	205 U	210 U	225 U	210 U	200 U	200 U	220 U
Chrysene	570000	230000	ug/kg	185 U	195 U	205 U	210 U	225 U	210 U	200 U	200 U	220 U
Dibenz[a,h]anthracene	570	13000	ug/kg	185 U	195 U	205 U	210 U	225 U	210 U	200 U	200 U	220 U
Dibenzofuran	220000	95000	ug/kg	185 U	195 U	205 U	210 U	225 U	210 U	200 U	200 U	220 U
Diethyl phthalate	10000000	2900000	ug/kg	185 U	195 U	205 U	210 U	225 U	210 U	200 U	200 U	220 U
Dimethyl phthalate	NSA	NSA	ug/kg	185 U	230 J	220 J	210 U	225 U	200 J	200 U	200 U	220 U
Fluoranthene	8800000	3200000	ug/kg	185 U	220 J	205 U	210 U	225 U	210 U	200 U	200 U	220 U
Fluorene	8800000	3000000	ug/kg	185 U	195 U	205 U	210 U	225 U	210 U	200 U	200 U	220 U
Indeno[1,2,3-c,d]pyrene	5700	2200000	ug/kg	185 U	195 U	205 U	210 U	225 U	210 U	200 U	200 U	220 U
Naphthalene	4400000	25000	ug/kg	185 U	195 U	205 U	210 U	225 U	210 U	200 U	200 U	220 U
Pentachlorophenol	150000	5000	ug/kg	185 U	195 U	205 U	210 U	225 U	210 U	200 U	200 U	220 U
Phenanthrene	66000000	10000000	ug/kg	185 U	195 U	205 U	210 U	225 U	210 U	200 U	200 U	220 U
Phenol	66000000	200000	ug/kg	185 U	195 U	205 U	210 U	225 U	210 U	200 U	200 U	220 U
Pyrene	6600000	2200000	ug/kg	185 U	210 J	205 U	210 U	225 U	210 U	200 U	200 U	220 U

(1) Pennsylvania Act 1995-2, known as "Act 2", established a program for recycling existing industrial and commercial sites. Values are from Chapter 250 of the Pennsylvania Code, "Administration of Land Recycling Program", Subchapter C, "Statewide Health Standards", Appendix A, "Medium-Specific Concentrations" tables, revisions effective 1/8/2011.

RDC - Residential Direct Contact.
RSW - Soil to Groundwater.
NSA- No Screening Level Available.
NA- Not Analyzed.
U- Not detected above the Level of Detection.
J- Value is estimated.
L-Analyte present. Reported value may be biased low. Acutal value is expected higher.
D-Dilution
K - Estimated, biased high.
R-Rejected result. Analyte may or may not be present in the sample. Supporting data necessary to confirm result.
*-Indicates the duplicate analysis is not within control limits.
B-Not detected substantilly above the level reported in the laboratory or field blanks

N - Presumptive evidence of a compound.
Bolded values exceed Residential Direct Contact (0-15 ft
Gray shaded values exceed Soil to Groundwater.

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Table 6-4 - Soil - Analytical Summary of Pesticides

			Location ID	BZ1-SO-03	BZ1-SO-03
			Sample Name	BZ1-SO-03-1-3	BZ1-SO-03-7-8
			Date Sampled	1/4/2012	1/4/2012
			Parent Sample Name		
	Act 2 MSCs (Residential)[1]		Depth Interval	1-3	7-8
Analyte	RDC MSC	RSGW	Unit		
Pesticides (SW8081)					
4,4-DDD	75000	31000	ug/kg	1 U	0.95 U
4,4-DDE	53000	41000	ug/kg	1 U	0.95 U
4,4-DDT	53000	110000	ug/kg	1 U	0.95 U
Aldrin	1100	470	ug/kg	1 U	0.95 U
alpha-BHC	2800	46	ug/kg	1 U	0.95 U
alpha-Chlordane	NSA	NSA	ug/kg	1 U	0.95 U
Beta-BHC	9900	220	ug/kg	1 U	0.95 U
delta-BHC	NSA	NSA	ug/kg	1 U	0.95 U
Dieldrin	1100	110	ug/kg	1 U	0.95 U
Endosulfan I	1300000	110000	ug/kg	1 U	0.95 U
Endosulfan II	1300000	130000	ug/kg	1 U	0.95 U
Endosulfan sulfate	1300000	70000	ug/kg	1 U	0.95 UL
Endrin	66000	5500	ug/kg	1 U	0.95 U
Endrin aldehyde	NSA	NSA	ug/kg	1 U	0.95 UL
Endrin ketone	NSA	NSA	ug/kg	1 U	0.95 UL
Gamma-BHC (Lindane)	16000	72	ug/kg	1 U	0.95 U
Heptachlor	4000	680	ug/kg	1 U	0.95 U
Heptachlor epoxide	2000	1100	ug/kg	1 U	0.95 U
Methoxychlor	1100000	630000	ug/kg	1 U	0.95 UL
Toxaphene	16000	1200	ug/kg	10 U	9.5 U
trans-Chlordane	NSA	NSA	ug/kg	1 U	0.95 U

(1) Pennsylvania Act 1995-2, known as "Act 2", established a program for recycling existing industrial and commercial sites. Values are from Chapter 250 of the Pennsylvania Code, "Administration of Land Recycling Program", Subchapter C, "Statewide Health Standards", Appendix A, "Medium-Specific Concentrations" tables, revisions effective 1/8/2011.

RDC - Residential Direct Contact.
RSW - Soil to Groundwater.

NSA- No Screening Level Available.

NA- Not Analyzed.

U- Not detected above the Level of Detection.

J- Value is estimated.

L-Analyte present. Reported value may be biased low. Acutal value is expected higher.

K - Estimated, biased high.

R-Rejected result. Analyte may or may not be present in the sample. Supporting data necessary to confirm result.

*-Indicates the duplicate analysis is not within control limits.

B-Not detected substantilly above the level reported in the laboratory or field blanks

N - Presumptive evidence of a compound.

Bolded values exceed Residential Direct Contact (0-15 ft bgs).

Gray shaded values exceed Soil to Groundwater.

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Table 6-5 - Soil - Analytical Summary of Detected PCBs

				Location ID	T-01	T-11	T-11	T-1101	T-1101	T-1101	T-12	T-201	T-22	T-22	T-23	T-2321
				Sample Name	T1-SO-1-0-0.5	T-11	T-Dup15	T-1101-SO-0-1	T1101-SO-1-0-0.5	T-1101-SO-3-5	T12-SO-1-0-0.5	T-201	T22-SO-1-0-0.5	T22-SO-2-0-0.5	T-23	T-2321
				Date Sampled	12/27/2011	1/16/2012	1/16/2012	4/19/2012	12/9/2011	4/19/2012	12/9/2011	1/16/2012	12/9/2011	12/9/2011	1/10/2012	1/10/2012
				Parent Sample Name			T-11									
		Act 2 MSCs (Residential)[1]		**Depth Interval**	0-0.5	0-0.5	0-0.5	0-1	0-0.5	3-5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
Analyte	**TSCA**	**RDC MSC**	**RSGW**	**Unit**												
PCBs (SW8082)																
Aroclor 1260	1000	9000	150000	ug/kg	*2600*	460	620	*1100*	***38000***	10 U	350 J	10 U	280	230	10 U	10.5 U

Table 6-5 - Soil - Analytical Summary of Detected PCBs

				Location ID	T-24	T-2411	UBZ3-SO-13	UBZ3-SO-13
				Sample Name	T-24	T-2411	UBZ3-SO-13-0-2	UBZ3-SO-13-5-7
				Date Sampled	1/16/2012	1/16/2012	1/10/2012	1/10/2012
				Parent Sample Name				
		Act 2 MSCs (Residential)[1]		Depth Interval	0-0.5	0-0.5	0-2	5-7
Analyte	**TSCA**	**RDC MSC**	**RSGW**	**Unit**				
PCBs (SW8082)								
Aroclor 1260	1000	9000	150000	ug/kg	9.5 U	9.5 U	430	9.5 U

(1) Pennsylvania Act 1995-2, known as "Act 2", established a program for recycling existing industrial and commercial sites. Values are from Chapter 250 of the Pennsylvania Code, "Administration of Land Recycling Program", Subchapter C, "Statewide Health Standards", Appendix A, "Medium-Specific Concentrations" tables, revisions effective 1/8/2011.

TSCA - Toxic Substance Control Act (TSCA) residential high occupancy standard cleanup level of one milligram per kilogram (mg/kg) was used for PCB contamination
Current PCB regulations can be found in the Code of Federal Regulations (CFR) at 40 CFR 761

RDC - Residential Direct Contact.
RSW - Soil to Groundwater.

NSA- No Screening Level Available.

NA- Not Analyzed.

U- Not detected above the Level of Detection.

J- Value is estimated.

L-Analyte present. Reported value may be biased low. Acutal value is expected higher.

K - Estimated, biased high.

R-Rejected result. Analyte may or may not be present in the sample. Supporting data necessary to confirm result.

*-Indicates the duplicate analysis is not within control limits.

B-Not detected substantilly above the level reported in the laboratory or field blanks

Italicized values exceed the TSCA value

Bolded values exceed Residential Direct Contact (0-15 ft bgs).

Gray shaded values exceed Soil to Groundwater.

Table 6-6 - Soil - Cyanide Analytical Summary

			Location ID	BZ3-SO-01	BZ3-SO-04	BZ3-SO-04	BZ3-SO-13	BZ3-SO-13	MW-21	MW-22	MW-23	MW-24	MW-25
			Sample Name	BZ3-SO-13-0-1	BZ3-SO-04-0-2	BZ3-SO-04-5-7	BZ3-SO-13-1-2	BZ3-SO-13-2-3	MW-21-SO-10-12	MW-22-SO-0-2	MW-23-SO-0-2	MW-24-SO-10-12	MW-25-SO-0-2
			Date Sampled	4/18/2012	1/5/2012	1/5/2012	4/18/2012	4/20/2012	4/30/2012	5/4/2012	5/4/2012	5/2/2012	5/2/2012
			Parent Sample Name										
	Act 2 MSCs (Residential)[1]		Depth Interval	0-1	0-2	5-7	1-2	2-3	10-12	0-2	0-2	10-12	0-2
Analyte	**RDC MSC**	**RSGW**	**Unit**										
Cyanide	4400	200	mg/kg	0.075 J	0.049 J	0.1335 U	0.1365 U	0.138 U	0.134 U	0.07 J	0.054 J	0.047 J	0.243 J

Table 6-6 - Soil - Cyanide Analytical Summary

			Location ID	MW-26	MW-27	MW-27	MW-28	MW-29	MW-31	UBZ3-SO-02	UBZ3-SO-19	UBZ3-SO-19	UBZ3-SO-32
			Sample Name	MW-26-SO-0-2	MW-27-SO-4-6	MW-SO-DUP1	MW-28-SO-0-2	MW-29-SO-5-7	MW-31-SO-10-12	UBZ3-SO-2-14-15	UBZ3-SO-19-0-2	UBZ3-SO-19-2-3	UBZ3-SO-32-0-2
			Date Sampled	5/3/2012	5/3/2012	5/3/2012	5/3/2012	5/3/2012	5/3/2012	12/19/2011	4/20/2012	4/20/2012	4/20/2012
			Parent Sample Name			MW-27-SO-4-6							
	Act 2 MSCs (Residential)[1]		Depth Interval	0-2	4-6	4-6	0-2	5-7	10-12	14-15	0-2	2-3	0-2
Analyte	**RDC MSC**	**RSGW**	**Unit**										
Cyanide	4400	200	mg/kg	0.172 J	0.093 J	0.069 J	0.046 J	0.045 J	0.133 U	0.039 J	0.07 J	0.1355 U	0.139 U

Table 6-6 - Soil - Cyanide Analytical Summary

			Location ID	UBZ3-SO-32	UBZ3-SO-33	UBZ3-SO-33	UBZ3-SO-46	UBZ3-SO-47	UBZ3-SO-47	UBZ3-SO-47	UBZ3-SO-48	UBZ3-SO-48
			Sample Name	UBZ3-SO-32-2-3	UBZ3-SO-33-0-2	UBZ3-SO-33-2-3	UBZ3-SO-46-4-5	UBZ3-SO-47-0-2	UBZ3-SO-47-7-8	UBZ3-SO-DUP1	UBZ3-SO-48-2-4	UBZ3-SO-48-5-6
			Date Sampled	4/20/2012	4/20/2012	4/20/2012	12/13/2011	12/13/2011	12/13/2011	12/13/2011	12/12/2011	12/12/2011
			Parent Sample Name							UBZ3-SO-47-7-8		
	Act 2 MSCs (Residential)[1]		Depth Interval	2-3	0-2	2-3	4-5	0-2	7-8	7-8	2-4	5-6
Analyte	**RDC MSC**	**RSGW**	**Unit**									
Cyanide	4400	200	mg/kg	0.1405 U	0.139 U	0.144 U	0.228 J	0.304	0.152 U	0.1565 U	0.573	0.1495 U

Table 6-6 - Soil - Cyanide Analytical Summary

			Location ID	UBZ3-SO-55
			Sample Name	UBZ3-SO-55-0.5-3
			Date Sampled	12/15/2011
			Parent Sample Name	
	Act 2 MSCs (Residential)[1]		Depth Interval	0.5-3
Analyte	**RDC MSC**	**RSGW**	**Unit**	
Cyanide	4400	200	mg/kg	0.207 J

(1) Pennsylvania Act 1995-2, known as "Act 2", established a program for recycling existing industrial and commercial sites. Values are from Chapter 250 of the Pennsylvania Code, "Administration of Land Recycling Program", Subchapter C, "Statewide Health Standards", Appendix A, "Medium-Specific Concentrations" tables, revisions effective 1/8/2011.

RDC - Residential Direct Contact.
RSW - Soil to Groundwater.
NSA- No Screening Level Available.
NA- Not Analyzed.
U- Not detected above the Level of Detection.
J- Value is estimated.
L-Analyte present. Reported value may be biased low. Acutal value is expected higher.
K - Estimated, biased high.
R-Rejected result. Analyte may or may not be present in the sample. Supporting data necessary to confirm result.
*-Indicates the duplicate analysis is not within control limits.
B-Not detected substantilly above the level reported in the laboratory or field blanks
N - Presumptive evidence of a compound.
Bolded values exceed Residential Direct Contact (0-15 ft bgs).
Gray shaded values exceed Soil to Groundwater.

Table 6-7 - Soil - Analytical Summary of Explosives

			Location ID	BZ1-SO-04	BZ2-SO-01	BZ2-SO-46	BZ3-SO-01	BZ3-SO-10	BZ3-SO-12	MW-21	MW-22	MW-23
			Sample Name	BZ1-SO-04-0-2	BZ2-SO-1-1-2	BZ2-SO-46-0-1	BZ3-SO-13-0-1	BZ3-SO-10-12-14	BZ3-SO-12-5-7	MW-21-SO-10-12	MW-22-SO-0-2	MW-23-SO-0-2
			Date Sampled	1/4/2012	1/9/2012	12/22/2011	4/18/2012	12/14/2011	12/13/2011	4/30/2012	5/4/2012	5/4/2012
			Parent Sample Name									
	Act 2 MSCs (Residential)[1]		Depth Interval	0-2	1-2	0-1	0-1	12-14	5-7	10-12	0-2	0-2
Analyte	**RDC MSC**	**RSGW**	**Unit**									
Explosives (SW8310/8330)												
Nitroglycerin	22000	500	ug/kg	1000 U	1000 U	1000 U	1000 U	12000 U	12000 U	1000 U	1000 U	1000 U
Pentaerythritol tetranitrate	NSA	NSA	ug/kg	100 U	100 U	100 U	100 U	1200 U	1200 U	100 U	100 U	100 U

Table 6-7 - Soil - Analytical Summary of Explosives

			Location ID	MW-24	MW-25	MW-26	MW-27	MW-27	MW-28	MW-29	MW-31	UBZ2-SO-40
			Sample Name	MW-24-SO-10-12	MW-25-SO-0-2	MW-26-SO-0-2	MW-27-SO-4-6	MW-SO-DUP1	MW-28-SO-0-2	MW-29-SO-5-7	MW-31-SO-10-12	UBZ2-SO-40-11-12
			Date Sampled	5/2/2012	5/2/2012	5/3/2012	5/3/2012	5/3/2012	5/3/2012	5/3/2012	5/3/2012	12/27/2011
			Parent Sample Name					MW-27-SO-4-6				
	Act 2 MSCs (Residential)[1]		Depth Interval	10-12	0-2	0-2	4-6	4-6	0-2	5-7	10-12	11-12
Analyte	**RDC MSC**	**RSGW**	**Unit**									
Explosives (SW8310/8330)												
Nitroglycerin	22000	500	ug/kg	950 U	1000 U	950 U	950 U	1000 U	1000 U	1000 U	1000 U	1000 U
Pentaerythritol tetranitrate	NSA	NSA	ug/kg	95 U	100 U	95 U	95 U	100 U	100 U	100 U	100 U	100 U

Table 6-7 - Soil - Analytical Summary of Explosives

			Location ID	UBZ2-SO-44	UBZ3-SO-09	UBZ3-SO-17	UBZ3-SO-19	UBZ3-SO-24	UBZ3-SO-31	UBZ3-SO-32	UBZ3-SO-33
			Sample Name	UBZ2-SO-44-0-2	UBZ3-SO-09-5-7	UBZ3-SO-17-12-14	UBZ3-SO-19-0-2	UBZ3-SO-24-0-2	UBZ3-SO-31-0-3	UBZ3-SO-32-0-2	UBZ3-SO-33-0-2
			Date Sampled	1/5/2012	12/16/2011	12/14/2011	4/20/2012	12/15/2011	12/13/2011	4/20/2012	4/20/2012
			Parent Sample Name								
	Act 2 MSCs (Residential)[1]		Depth Interval	0-2	5-7	12-14	0-2	0-2	0-3	0-2	0-2
Analyte	**RDC MSC**	**RSGW**	**Unit**								
Explosives (SW8310/8330)											
Nitroglycerin	22000	500	ug/kg	1000 U	1000 U	12000 U	1000 U	12000 U	12000 U	1000 U	1000 U
Pentaerythritol tetranitrate	NSA	NSA	ug/kg	100 U	100 U	1200 U	100 U	1200 U	1200 U	100 U	100 U

Table 6-7 - Soil - Analytical Summary of Explosives

			Location ID	UBZ3-SO-35	UBZ3-SO-44	UBZ3-SO-51	UBZ3-SO-52	UBZ3-SO-52A	UBZ3-SO-53	UBZ3-SO-57	UBZ3-SO-58
			Sample Name	UBZ3-SO-35-2-3	UBZ3-SO-44-0-2	UBZ3-SO-51-0-2	UBZ3-SO-52-0-2	UBZ3-SO-52a-0-2	UBZ3-SO-53-0-2	UBZ3-SO-57-0-2	UBZ3-SO-58-SO-0-2
			Date Sampled	12/20/2011	12/13/2011	4/19/2012	4/18/2012	4/18/2012	4/18/2012	4/19/2012	4/19/2012
			Parent Sample Name								
	Act 2 MSCs (Residential)[1]		Depth Interval	2-3	0-2	0-2	0-2	0-2	0-2	0-2	0-2
Analyte	**RDC MSC**	**RSGW**	**Unit**								
Explosives (SW8310/8330)											
Nitroglycerin	22000	500	ug/kg	1000 U	12000 U	950 U	950 U	1000 U	1000 U	950 U	1000 U
Pentaerythritol tetranitrate	NSA	NSA	ug/kg	100 U	1200 U	95 U	95 U	100 U	100 U	95 U	100 U

Table 6-7 - Soil - Analytical Summary of Explosives

			Location ID	UBZ3-SO-58	UBZ3-SO-59	UBZ3-SO-60	UBZ3-SO-61	UBZ3-SO-62	UBZ3-SO-63	UBZ3-SO-63
			Sample Name	UBZ3-SO-DUP-22	UBZ3-SO-59-0-2	UBZ3-SO-60-0-2	UBZ3-SO-61-0-2	UBZ3-SO-62-0-2	UBZ3-SO-63-0-2	UBZ3-SO-DUP-21
			Date Sampled	4/19/2012	4/19/2012	4/18/2012	4/18/2012	4/19/2012	4/19/2012	4/19/2012
			Parent Sample Name	UBZ3-SO-58-SO-0-2						UBZ3-SO-63-0-2
	Act 2 MSCs (Residential)[1]		Depth Interval	0-2	0-2	2-2	0-2	0-2	0-2	0-2
Analyte	**RDC MSC**	**RSGW**	**Unit**							
Explosives (SW8310/8330)										
Nitroglycerin	22000	500	ug/kg	1000 U	1000 U	950 U	1000 U	950 U	1000 U	1000 U
Pentaerythritol tetranitrate	NSA	NSA	ug/kg	100 U	100 U	95 U	100 U	95 U	100 U	100 U

(1) Pennsylvania Act 1995-2, known as "Act 2", established a program for recycling existing industrial and commercial sites. Values are from Chapter 250 of the Pennsylvania Code, "Administration of Land Recycling Program", Subchapter C, "Statewide Health Standards", Appendix A, "Medium-Specific Concentrations" tables, revisions effective 1/8/2011.

RDC - Residential Direct Contact.
RSW - Soil to

NSA- No Screening Level Available.

NA- Not Analyzed.

U- Not detected above the Level of Detection.

J- Value is estimated.

L-Analyte present. Reported value may be biased low. Acutal value is expected higher.

K - Estimated, biased high.

R-Rejected result. Analyte may or may not be present in the sample. Supporting data necessary to confirm result.

*-Indicates the duplicate analysis is not within control limits.

B-Not detected substantilly above the level reported in the laboratory or field blanks

N - Presumptive evidence of a compound.

Bolded values exceed Residential Direct Contact (0-15 ft bgs).

Gray shaded values exceed Soil to Groundwater.

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Table 6-8 - Soil - Analytical Summary of Detected Radionuclides

Location ID			BZ1-SO-01			BZ2-SO-03			MW-23			MW-24			MW-29			UBZ2-SO-03			UBZ2-SO-10			UBZ2-SO-19			UBZ2-SO-22		
Sample Name			BZ1-SO-01-5-7			BZ2-SO-3-1-3			MW-23-SO-0-2			MW-24-SO-10-12			MW-29-SO-8-9			UBZ2-SO-03-0-2			UBZ2-SO-10-0-2			UBZ2-SO-19-7-8			UBZ2-SO-22-8-9		
Date Sampled			1/4/2012			12/30/2011			5/4/2012			5/2/2012			5/3/2012			1/4/2012			1/5/2012			12/30/2011			1/10/2012		
Parent Sample Name																													
Depth Interval			5-7 ft			1-3 ft			0-2 ft			10-12 ft			8-9 ft			0-2 ft			0-2 ft			7-8 ft			8-9 ft		
Analyte	**US NRC NUREG/CR-5512**	**Unit**	Result	±TPU	MDC	Result	±TPU	MDC	Result	±TPU	MDC	Result	±TPU	MDC	Result	±TPU	MDC	Result	±TPU	MDC	Result	±TPU	MDC	Result	±TPU	MDC	Result	±TPU	MDC
Gamma Spectroscopy (713R12)																													
Actinium-228		pCi/g	1.49 J	0.52	0.66	0.99 J	0.39	0.84	1.1 UJ	0.63	1.22	0.62 J	0.41	0.54	0.81 U	0.47	0.87	1.17 J	0.49	1.02	0.74 J	52	0.7	1.7	0.45	0.76	2.02	0.53	0.77
Bismuth-212		pCi/g	1.4 U	2.0	3.4	1.3 UJ	1.4	2.3	3 J	2.1	2.9	0.2 U	1.3	2.4	1.2 U	1.7	2.9	1 UJ	1.9	3.3	0.2 U	1.3	2.5	1.3 U	1.5	2.5	1.4 U	1.9	3
Bismuth-214		pCi/g	1.19 J	0.39	0.46	1.08 J	0.36	0.39	0.56 J	0.33	0.46	0.5 J	0.21	0.23	0.41 U	0.35	0.54	1.09 J	0.42	0.48	0.25 U	0.27	0.44	1.35 J	0.34	0.37	1.49 J	0.41	0.38
Lead-212		pCi/g	1.99	0.38	0.3	1.15 J	0.30	0.32	0.85 J	0.27	0.31	0.43	0.18	0.19	0.54	0.22	0.28	1.54 J	0.36	0.31	0.54	0.21	0.25	1.94	0.36	0.3	1.51	0.35	0.33
Lead-214		pCi/g	1.31 J	0.31	0.4	0.88 J	0.26	0.35	0.9 J	0.29	0.4	0.49 J	0.82	0.26	0.4 U	0.22	0.41	1.46 J	0.36	0.41	0.42 J	0.20	0.36	1.32 J	0.29	0.34	1.4 J	0.33	0.38
Potassium-40	3.60	pCi/g	**8.9**	2.6	2.2	**6.6 J**	2.3	2.2	**3.8 J**	2.4	3.1	**5**	1.9	1.9	**5.3**	2.6	2.9	**6.8 J**	2.9	3.1	**5.9**	2.3	2.1	**9.5**	2.5	2.1	**7.2**	2.6	2.6
Radium-226	0.694	pCi/g	**1.64**	0.34	0.51	**1.21 J**	0.29	0.44	NA	NA	NA	0.64 J	0.19	0.32	NA	NA	NA	**1.78 J**	0.39	0.55	0.56 J	0.26	0.48	**1.78**	0.33	0.44	**1.89**	0.37	0.49
Gross Alpha/Beta (724R11)																													
Alpha	NSA	pCi/g	2.33 J	0.66	0.4	2.67 J	0.95	0.79	1.8 J	1.1	1.4	1.16 J	0.46	0.37	1.09 J	0.43	0.33	4.2	1.2	0.7	1 U	1.2	2.2	2.48 J	0.75	0.46	2.98 J	0.90	0.53
Beta	NSA	pCi/g	2.28 J	0.56	0.58	2.82 J	0.85	1.12	1.7 U	1.4	2.9	1.02 J	0.46	0.77	0.31 U	0.35	0.72	3.31 J	0.92	1.09	1.1 U	1.3	2.8	2.02 J	0.60	0.78	2.85 J	0.71	0.70

Table 6-8 - Soil - Analytical Summary of Detected Radionuclides

Location ID			UBZ2-SO-33			UBZ2-SO-37			UBZ3-SO-02			UBZ3-SO-13			UBZ3-SO-19			UBZ3-SO-22			UBZ3-SO-24			UBZ3-SO-27			UBZ3-SO-32		
Sample Name			UBZ2-SO-33-0-2			UBZ2-SO-37-11-12			UBZ3-SO-2-14-15			UBZ3-SO-13-0-1			UBZ3-19-0-2			UBZ3-SO-22-2-3			UBZ3-SO-24-0-2			UBZ3-SO-27-13-15			UBZ3-32-0-2		
Date Sampled			12/30/2011			12/30/2011			12/19/2011			4/18/2012			4/20/2012			12/27/2011			12/15/2011			12/14/2011			4/20/2012		
Parent Sample Name																													
Depth Interval			0-2 ft			11-12 ft			14-15 ft			0-2 ft			0.2 ft			2-3 ft			0-2 ft			13-15 ft			0-2 ft		
Analyte	**US NRC NUREG/CR-5512**	**Unit**	Result	±TPU	MDC	Result	±TPU	MDC	Result	±TPU	MDC	Result	±TPU	MDC	Result	±TPU	MDC	Result	±TPU	MDC	Result	±TPU	MDC	Result	±TPU	MDC	Result	±TPU	MDC
Gamma Spectroscopy (713R12)																													
Actinium-228		pCi/g	1.35 J	0.60	0.96	0.48 U	0.40	0.58	1.22 J	0.43	0.66	1.28 J	0.46	0.71	0.66 U	0.40	0.78	0.89 J	0.40	0.88	1.18 J	0.45	0.56	2 J	1.1	1.4	0.91 J	0.59	0.76
Bismuth-212		pCi/g	2.4 UJ	2.3	3.5	0.9 U	1.2	1.9	1.6 U	1.3	1.9	0.9 UJ	1.6	2.6	1.5 U	1.4	2	2.8 J	2.0	2.8	-0.1 U	1.7	3.1	1.9 UJ	3.2	5.5	1.3 UJ	1.5	2.4
Bismuth-214		pCi/g	1.35 J	0.45	0.45	0.34 J	0.19	0.25	0.94 J	0.31	0.32	0.56 J	0.33	0.47	0.77 J	0.33	0.42	1.32 J	0.38	0.41	1.01 J	0.33	0.41	0.63 UJ	0.57	0.88	0.73 J	0.38	0.5
Lead-212		pCi/g	1.73 J	0.42	0.42	0.45	0.18	0.24	1.06	0.26	0.24	1.17 J	0.28	0.25	1.15	0.31	0.35	1.79 J	0.36	0.27	1.22	0.31	0.32	1.31 J	0.48	0.6	0.84 J	0.31	0.39
Lead-214		pCi/g	1.53 J	0.37	0.45	0.56 J	0.18	0.24	0.99 J	0.25	0.28	0.8 J	0.25	0.34	0.73 J	0.25	0.38	1.52 J	0.35	0.41	0.8 J	0.24	0.3	0.97 J	0.49	0.64	0.93 J	0.32	0.44
Potassium-40	3.60	pCi/g	**9.2 J**	3.3	3.4	**4.5**	1.8	1.9	**7.4**	2.3	1.9	**9.2 J**	3.0	2.6	**6.9**	2.5	2.6	**9.4 J**	2.9	2.4	**8.7**	2.8	2.7	**9.7 J**	5.3	7	**7.8 J**	3.1	3.3
Radium-226	0.694	pCi/g	**1.87 J**	0.40	0.56	0.61 J	0.18	0.3	**1.25**	0.27	0.35	NA	NA	NA	NA	NA	NA	**1.84 J**	0.36	0.52	NA	NA	NA	NA	NA	NA	NA	NA	NA
Gross Alpha/Beta (724R11)																													
Alpha	NSA	pCi/g	4.2	1.1	0.6	2.62 J	0.69	0.36	3 J	1.1	0.9	2.8 J	1.1	1	3	1.2	1	3.8	1.3	1	1.68 J	0.78	0.83	4.8	1.6	1.2	2.3 J	1	0.9
Beta	NSA	pCi/g	2.83 J	0.72	0.79	1.68 J	0.47	0.57	3.1 J	1.0	1.3	2.1 J	0.88	1.39	1.82 J	0.81	1.31	3.7 J	1.1	1.3	2.13 J	0.70	0.94	4.3	1.2	1.5	1.67 J	0.81	1.37

Table 6-8 - Soil - Analytical Summary of Detected Radionuclides

Location ID			UBZ3-SO-33			UBZ3-SO-48			UBZ3-SO-51			UBZ3-SO-52			UBZ3-SO-52A			UBZ3-SO-53			UBZ3-SO-57			UBZ3-SO-58			UBZ3-SO-58		
Sample Name			UBZ3-33-0-2			UBZ3-SO-48-7-8			UBZ3-SO-51-0-2			UBZ3-SO-52-0-2			UBZ3-SO-52a-0-2			UBZ3-SO-53-0-2			UBZ3-SO-57-0-2			UBZ3-SO-58-0-2			UBZ3-SO-DUP-22		
Date Sampled			4/20/2012			12/13/2011			4/19/2012			4/18/2012			4/18/2012			4/18/2012			4/19/2012			4/19/2012			4/19/2012		
Parent Sample Name																											UBZ3-SO-58-SO-0-2		
Depth Interval			0-2 ft			7-8 ft			0-2 ft			0-2 ft			0-2 ft			0-2 ft			0-2 ft			0-2 ft			0-2 ft		
Analyte	**US NRC NUREG/CR-5512**	**Unit**	Result	±TPU	MDC	Result	±TPU	MDC	Result	±TPU	MDC	Result	±TPU	MDC	Result	±TPU	MDC	Result	±TPU	MDC	Result	±TPU	MDC	Result	±TPU	MDC	Result	±TPU	MDC
Gamma Spectroscopy (713R12)																												
Actinium-228		pCi/g	1.23 J	0.49	0.73	1.41 J	0.52	0.68	1.09 J	0.76	1.08	1.65 J	0.73	1.23	2.94 J	0.92	1.01	1.26 J	0.58	1	1.16 J	0.53	0.94	1.3 J	0.75	0.94	1.42 J	0.75	1.21
Bismuth-212		pCi/g	1.3 U	1.6	2.6	2.6 UJ	1.8	2.6	2.7 J	1.9	2.5	2.5 UJ	2.5	4	1.1 UJ	2.6	4.6	2.7 UJ	2.4	3.5	0 U	1.8	3.5	1.2 UJ	1.9	3.3	0.2 UJ	1.8	3.4
Bismuth-214		pCi/g	0.72 J	0.32	0.41	1.09 J	0.40	0.48	0.52 UJ	0.38	0.56	1.22 J	0.5	0.62	1.55 J	0.59	0.73	0.85 J	0.37	0.41	0.6 J	0.34	0.47	1.29 J	0.47	0.52	0.94 J	0.45	0.59
Lead-212		pCi/g	1.02	0.28	0.30	1.44 J	0.36	0.37	0.99 J	0.29	0.32	1.01 J	0.33	0.4	1.92 J	0.47	0.5	1.01 J	0.35	0.43	1.02	0.28	0.29	1 J	0.33	0.4	1.11 J	0.34	0.4
Lead-214		pCi/g	0.67 J	0.24	0.37	1.07 J	0.30	0.45	0.59 J	0.32	0.57	0.78 J	0.35	0.57	2.3 J	0.51	0.59	1.39 J	0.38	0.44	0.51 J	0.24	0.37	0.81 J	0.3	0.48	1.03 J	0.33	0.5
Potassium-40	3.60	pCi/g	**7.5**	2.6	2.5	**9.3 J**	0.11	2.9	**9.2 J**	3.4	3.4	**7.6 J**	3.3	3.5	**7.4 J**	4	5.5	**4.8 J**	2.9	3.8	**7.1**	2.9	3	**7.2 J**	3.2	3.8	**5.6 J**	3.2	4.3
Radium-226	0.694	pCi/g	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Gross Alpha/Beta (724R11)																												
Alpha	NSA	pCi/g	2.1 J	1.3	1.7	3.2	1.2	0.9	2 J	1.3	1.8	2.7 J	1.5	1.8	2.5 J	1.1	0.9	1.9 U	1.4	1.9	2.6 J	1.7	2.2	2.6 J	1.4	1.7	2.5 J	1.4	1.7
Beta	NSA	pCi/g	2.5 U	1.4	2.5	3.6 J	1.1	1.3	1.5 U	1.2	2.5	3 J	1.5	2.5	1.76 J	0.82	1.35	2.5 J	1.4	2.5	2.8 J	1.5	2.7	1.6 U	1.4	2.5	2.2 U	1.4	2.5

Table 6-8 - Soil - Analytical Summary of Detected Radionuclides

Location ID			UBZ3-SO-59			UBZ3-SO-60			UBZ3-SO-61			UBZ3-SO-62			UBZ3-SO-63			UBZ3-SO-63		
Sample Name			UBZ3-SO-59-0-2			UBZ3-SO-60-0-2			UBZ3-SO-61-0-2			UBZ3-SO-62-0-2			UBZ3-SO-63-0-2			UBZ3-SO-DUP-21		
Date Sampled			4/19/2012			4/18/2012			4/18/2012			4/19/2012			4/19/2012			4/19/2012		
Parent Sample Name																		UBZ3-SO-63-0-2		
Depth Interval			0-2 ft			0-2 ft			0-2 ft			0-2 ft			0-2 ft			0-2 ft		
Analyte	**US NRC NUREG/CR-5512**	**Unit**	Result	±TPU	MDC	Result	±TPU	MDC	Result	±TPU	MDC	Result	±TPU	MDC	Result	±TPU	MDC	Result	±TPU	MDC
Gamma Spectroscopy (713R12)																				
Actinium-228		pCi/g	1.05	0.41	0.78	0.84 UJ	0.51	0.97	1.25 J	0.72	0.86	0.91 J	0.41	0.62	0.06 UJ	0.58	1.09	0.66 UJ	0.58	0.84
Bismuth-212		pCi/g	2.2 U	1.7	2.5	1.4 UJ	0.19	3.1	2.2 UJ	1.9	2.7	2 U	1.8	2.7	-1 UJ	1.9	3.9	3.2 J	2	2.5
Bismuth-214		pCi/g	0.79 J	0.36	0.48	0.43 J	0.29	0.42	0.71 J	0.38	0.48	1.03 J	0.4	0.47	0.98 J	0.4	0.47	0.46 UJ	0.34	0.49
Lead-212		pCi/g	1.11	0.31	0.36	0.86 J	0.26	0.28	0.61 J	0.31	0.44	1.17	0.28	0.24	0.82 J	0.31	0.41	0.9 J	0.29	0.31
Lead-214		pCi/g	0.68 J	0.22	0.31	0.61 J	0.26	0.41	0.65 J	0.33	0.43	1.15 J	0.3	0.35	0.93 J	0.35	0.55	0.89 J	0.35	0.41
Potassium-40	3.60	pCi/g	**18.9**	4.2	2.8	**6.4 J**	2.7	3	**7.5 J**	3.5	4	**10.1**	3.2	2.9	**8.3 J**	3.4	3.7	**7.1 J**	3.1	3.4
Radium-226	0.694	pCi/g	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Gross Alpha/Beta (724R11)																				
Alpha	NSA	pCi/g	4.5	2.1	2.1	2.8 J	1.7	2.3	2.5 J	1.6	2	1.4 U	1.2	1.9	2.5 J	1.6	2.1	2.1 U	1.5	2.2
Beta	NSA	pCi/g	5.4	1.4	2.6	2.1 U	1.4	2.7	2.2 U	1.4	2.5	3.8 J	1.6	2.7	3.4 J	1.6	2.6	1.7 U	1.3	2.7

NSA- No Screening Level Available.

NA- Not Analyzed.

TPU- Total Propagated Uncertainty.

MDC- Minimum Detectable Concentration.

U- Not detected above the Level of Detection.

J- Value is estimated.

L-Analyte present. Reported value may be biased low. Acutal value is expected higher.

R-Rejected result. Analyte may or may not be present in the sample.

Supporting data necessary to confirm result.

US NRC NUREG/CR-5512- US Nuclear Regulatory Comission, Resudual Radioactive . Contamination from Decommissioning Parameter Analysis. Volume 3 Table 6.91, Pcrit=0.10.

Bolded values exceed US NRC NUREG/CR-5512.

Ac-228 is in secular equilibrium with its parent product of U-238.

Bi-212 and Pb-212 are in secular equilibrium with its parent product of Th-228.

Bi-214 and Pb-214 are in secular equilibrium with its parent prooduct of Ra-224.

Table 6-9 - Soil – Geotechnical Parameters

Location ID	MW-21	MW-26	MW-28
Sample Name	MW-21-SO-30-35	MW-26-SO-15-20	MW-28-SO-15-20
Date	4/30/2012	5/3/2012	5/3/2012
Analyte			
Geotechnical Parameters			
USCS	SM	SW-SM	SP
Saturated percent	16	15.2	16.8
Specific Gravity	2.67	2.67	2.69
Liquid Limit	NP	NP	NP
Plastic Limit	NP	NP	NP
Plasticity Index	NP	NP	NP
Cobbles	0.0	0.0	0.0
Gravel	4.8	24.5	35.3
Sand	79.9	67.6	60.5
Fines	15.4	7.9	4.2
Sieve			
3 in	100	100	100
2 in	100	100	100
1 1/2 in	100	100	100
1 in	100	100	100
3/4 in	100	92.6	94.7
3/8 in	89	82.1	75.6
1/4 in	95.9	78	68.5
No. 4	95.2	75.5	64.7
No. 10	93.4	68.2	57.1
No. 20	89	50.8	49.1
No. 40	77	20.1	24
No. 60	37.2	13	9.5
No. 140	17.2	9	5.2
No. 200	15.4	7.9	4.2

Notes:

SM - Silty Sand

SW - Well-graded Sand

SP - Poorly-graded Sand

NP - No Plasticity

USCS - Unite Soil Classification System

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Table 6-10 - Groundwater – Analytical Summary of Detected Metals

Location ID			MW-21	MW-22	MW-23	MW-24	MW-25	MW-26	MW-27	MW-27	MW-28	MW-29	MW-30	MW-31	TW-01	TW-02	TW-03	TW-04
Sample Name			MW-21	MW-22	MW-23	MW-24	MW-25	MW-26	MW-27	MW-DUP-1	MW-28	MW-29	MW-30	MW-31	TW-1	TW-2	TW-3	TW-4
Date Sampled			5/16/2012	5/16/2012	5/16/2012	5/16/2012	5/16/2012	5/16/2012	5/17/2012	5/17/2012	5/17/2012	5/17/2012	5/17/2012	5/17/2012	1/31/2012	1/31/2012	2/20/2012	1/26/2012
Parent Sample Name										MW-27								
Analyte	**Act 2 MSC (Residential, Used Aquifer)[1]**	**Unit**																
Inorganics (SW6010)																		
Aluminum	NSA	ug/l	296	14.7 J	24.2 J	9.24 J	18.5 J	16.8 J	12.7 B	25 U	13.1 B	12.4 B	25 U	25 U	9.71 J	9.25 J	24.4 B	12.3 J
Antimony	6	ug/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**9.17 J**	12.5 U	NA	12.5 U
Arsenic	10	ug/l	5.74 J	5 U	5 U	5 U	**25.5**	**23.1**	5 U	5 U	7.45 J	**48.6**	5 U	5 U	5 U	5 U	5 U	5 U
Barium	2000	ug/l	90	83.6	68.4	78.7	351	526	592	589	82.2	321	126	78.7	134	62.8	85.3	86.7
Cadmium	5	ug/l	1.5 U	1.5 U	0.71 J	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.1 J	1.5 U	1.5 U	1.5 U
Calcium	NSA	ug/l	185000	68200	69700	43700	88100	78000	53400	53500	14500	34300	45600	44000	43100	48100	39000	68100
Chromium	100	ug/l	3.36 J	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	1.12 J	1.54 J	2.24 J	2.5 U	2.5 U	2.5 U	2.07 J	2.5 U	1.29 J
Cobalt	11	ug/l	7.5 U	7.5 U	10.4 J	7.5 U	7.5 U	7.5 U	7.5 U	7.5 U	7.5 U	7.5 U	7.5 U	**15.9**	7.5 U	7.5 U	5.87 J	7.5 U
Copper	1000	ug/l	2.86 J	5 U	5 U	5 U	12.3	15.1	5 U	5 U	3.97 J	5 U	5 U	5 U	5 U	3.58 J	5 U	7.6 B
Iron	NSA	ug/l	3680	39 J	24 J	84.1	63700	77300	78500 J	78500 J	6900 J	36500 J	25 U	45.5 J	41.8 B	78.9 B	59.8	48.4 B
Lead	5	ug/l	4.13 J	4.13 J	3 U	3 U	**15**	3 U	3 U	3 U	3 U	3 U	3 U	3 U	**6.38**	3 U	3 U	3 U
Magnesium	NSA	ug/l	147000	22000	29800	8650	20400	14200	25400	25500	2130	8770	18800	16700	12800	19500	14400	17600
Manganese	300	ug/l	193	230	**5240**	**1530**	**3480**	**3210**	**4440**	**4450**	**460**	**2560**	208	**547**	**907**	277	**487**	**458**
Nickel	100	ug/l	6.03 J	4.71 J	10 U	10 U	7.88 J	11.3 J	26.5	26.8	10 U	10 U	10 U	24.3	9.76 J	10 U	5.31 J	10 U
Potassium	NSA	ug/l	130000	8130	6700	6160	12100	16100	4560	4600	3960	15800	5300	5310	5100	6040	4970	10800
Selenium	50	ug/l	5 UL	5 U	5 U	5 U	4.83 J	5 U	5 U	5 U	5 U	5 U	7.7 J	5 U	5 U	5 U	5 U	5 U
Silver	100	ug/l	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.91 B	2.5 U	2.5 U	2.5 U
Sodium	NSA	ug/l	1430000	252000	193000	105000	295000	275000	250000	249000	90400	363000	103000	140000	101000	80400	95600	116000
Thallium	2	ug/l	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	**7.69 B**	10 U	10 U	10 U
Vanadium	260	ug/l	29.9	10 U	10 U	10 U	10 U	10 U	14.1 J	13.9 J	10 U	8.23 J	10 U	10 U	10 U	10 U	10 U	10 U
Zinc	2000	ug/l	19.9 B	14.8 B	18.4 B	10.1 B	10 U	10 U	10 U	10 U	12 B	9.12 B	10 U	27.4 B	57.6	10 U	19.7 J	10 U
Inorganics (SW6020)																		
Antimony	6	ug/l	0.26 J	0.93 J	1.5 J	0.85 J	0.61 J	0.62 J	0.28 J	0.3 J	0.28 J	1 J	0.2 J	0.79 J	0.18 J	1 U	0.32 J	0.41 B
Thallium	2	ug/l	0.17 J	0.16 J	0.44 J	0.094 J	0.072 J	0.041 J	0.11 J	0.3 J	0.62 J	1.7	0.37 J	1.2	0.91 J	0.62 J	0.5 U	0.057 J
Uranium-238	NSA	ug/l	0.5 U	0.16 J	0.27 J	0.35 J	0.25 J	0.62 J	0.15 J	0.15 J	0.095 J	0.23 J	0.5 U	0.14 J	0.5 U	0.5 U	0.5 UR	0.14 J
Mercury (SW7471)																		
Mercury	2	ug/l	0.1 UN	0.237	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	NA	0.1 U	0.1 U	0.1 U

Table 6-10 - Groundwater – Analytical Summary of Detected Metals

Location ID			TW-05	TW-06	TW-07	TW-07	TW-08	TW-09	TW-10	TW-11	TW-12	TW-13	TW-14	TW-15	TW-16	TW-17	TW-18	TW-19
Sample Name			TW-5	TW-6	TW-7	TW-DUP3	TW-8	TW-9	TW-10	TW-11	TW-12	TW-13	TW-14	TW-15	TW-16	TW-17	TW-18	TW-19
Date Sampled			1/31/2012	2/20/2012	1/31/2012	1/31/2012	1/30/2012	1/25/2012	2/20/2012	1/30/2012	1/27/2012	1/24/2012	1/24/2012	1/26/2012	1/26/2012	1/26/2012	1/23/2012	1/23/2012
Parent Sample Name						TW-7												
Analyte	**Act 2 MSC (Residential, Used Aquifer)[1]**	**Unit**																
Inorganics (SW6010)																		
Aluminum	NSA	ug/l	13.3 J	29.3 B	10.7 J	11 J	11.6 B	20.8 J	26.2 B	17 B	12.8 B	8.71 J	9.37 J	11.4 B	25 U	6.71 B	8.66 J	10.1 J
Antimony	6	ug/l	12.5 U	NA	12.5 U	12.5 U	12.5 U	12.5 U	NA	12.5 U	12.5 U	12.5 U	12.5 U	12.5 U	12.5 U	12.5 U	12.5 U	12.5 U
Arsenic	10	ug/l	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	**41.1**	**17.7**	**159**	4.6 J	6.22 J	5 U	4.35 J
Barium	2000	ug/l	138	375	85.2	87	63.8	124	171	59	88.6	566	237	636	518	455	86.5	342
Cadmium	5	ug/l	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	0.57 J	0.805 J	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U
Calcium	NSA	ug/l	79900	90500	63800	65500	81300	74000	86400	94000	65000	84300	87100	76500	45700	43900	59200	37000
Chromium	100	ug/l	2.23 J	2.5 U	1.68 J	3.3 J	1.97 J	2.5 U	2.5 U	2.5 U	1.42 J	2.5 U	2.5 U	1.58 J	2.5 U	1.46 J	2.5 U	2.5 U
Cobalt	11	ug/l	7.5 U	6.58 J	7.5 U	7.5 U	**34.2**	7.5 U	6.99 J	7.5 U	7.5 U	6.16 J	7.5 U	**13.6 J**	7.5 U	7.5 U	7.5 U	7.5 U
Copper	1000	ug/l	2.35 J	2.02 J	2.56 J	3.63 J	6.07 B	12.1 B	5 U	2.81 B	2.63 B	5 U	5 U	3.56 B	2.42 B	5.39 B	5 U	5 U
Iron	NSA	ug/l	2290 J	272	545 J	555 J	1210	27.6 J	174	97.7 B	74.7 B	116000	55600	97200	86400	106000	484	76700
Lead	5	ug/l	3 U	2.61 J	3 U	3 U	3 U	3 U	3.18 J	3 U	3 U	3 U	3 U	3.77 J	4.28 J	4.92 J	3.51 J	4.68 J
Magnesium	NSA	ug/l	26400	23100	22400	22800	34100	16900	16700	29500	14500	31200	17600	32200	20400	17100	8450	13600
Manganese	300	ug/l	**1400**	**635**	198	217	**7000**	171	**782**	**780**	242	**3800**	**6340**	**876**	**5180**	**7210**	**2410**	**5310**
Nickel	100	ug/l	9.63 J	4.44 J	10 U	4.59 J	6.96 J	4.65 J	7.49 J	5.58 J	10 U	10 U	10 U	18.3 J	19.1 J	6.84 J	10 U	4.35 J
Potassium	NSA	ug/l	8930	9800	7340	7450	7210	11100	9830	6680	10400	13800	13400	19700	3720	2860	7440	2320
Selenium	50	ug/l	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	4.88 J	11.1	7.52 J	5 U	5 U	5 U	5 U	9.26 J
Silver	100	ug/l	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Sodium	NSA	ug/l	386000	324000	261000	269000	178000	265000	253000	105000	161000	305000	186000	257000	159000	28800	253000	19700
Thallium	2	ug/l	10 U	10 U	10 U	10 U	10 U	10 U	**3.6 J**	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Vanadium	260	ug/l	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	12.3 J	10 U	10 U	10 U
Zinc	2000	ug/l	26	14 J	9.3 J	15.1 J	10 U	60.7	12.3 J	10.1 J	10 U	10 U	11.6 J	16.4 B	10.6 J	10 U	15.2 J	18.2 J
Inorganics (SW6020)																		
Antimony	6	ug/l	0.43 J	1 U	0.17 J	0.2 J	0.31 B	0.81 B	0.15 J	0.98 J	0.18 J	0.24 J	0.32 J	0.47 J	0.5 B	0.41 J	0.56 J	0.52 J
Thallium	2	ug/l	0.71 J	0.5 U	0.41 J	1.9 J	0.35 B	0.41 J	0.5 U	0.79 J	1.2 J	0.14 J	0.14 J	2 J	0.4 J	0.42 J	0.99 J	0.77 J
Uranium-238	NSA	ug/l	0.089 J	0.12 L	0.5 U	0.5 U	0.23 J	0.53 J	0.41 L	1.6	0.58 J	0.5 U	0.29 J	0.19 J	0.5 U	0.5 U	0.56 J	0.096 J
Mercury (SW7471)																		
Mercury	2	ug/l	0.1 U	0.261	1.34	1.27	0.1 U	0.1 U	0.098 J	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U

Table 6-10 - Groundwater – Analytical Summary of Detected Metals

Location ID			TW-20	TW-21	TW-21	TW-22	TW-23	TW-24	TW-25	TW-26	TW-27	TW-27
Sample Name			TW-20	TW-21	TW-DUP01	TW-22	TW-23	TW-24	TW-25	TW-26	TW-27	TW-DUP4
Date Sampled			1/26/2012	1/23/2012	1/23/2012	1/25/2012	2/20/2012	1/24/2012	4/20/2012	4/20/2012	4/20/2012	4/20/2012
Parent Sample Name					TW-21							TW-27
Analyte	**Act 2 MSC (Residential, Used Aquifer)[1]**	**Unit**										
Inorganics (SW6010)												
Aluminum	NSA	ug/l	14.2 B	22.8 J	22 J	15.6 J	36.2 B	17.6 J	25 U	25 U	9.12 B	7.79 B
Antimony	6	ug/l	12.5 U	12.5 U	12.5 U	12.5 U	NA	12.5 U	NA	NA	NA	NA
Arsenic	10	ug/l	**55**	**80.9**	**84.5**	**35.7**	5 U	**70.4**	5 U	**17.4**	5 U	5 U
Barium	2000	ug/l	570	233	239	316	101	414	98.5	214	22 J	22.4 J
Cadmium	5	ug/l	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	0.803 J	1.5 U	1.5 U
Calcium	NSA	ug/l	220000	44100	45200	38400	118000	66100	59600	42500	7530	7690
Chromium	100	ug/l	1.85 J	4.19 J	3.63 J	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.71 J	2.43 J
Cobalt	11	ug/l	7.5 U	7.5 U	7.5 U	7.5 U	7.5 U	7.5 U	7.5 U	7.5 U	7.5 U	7.5 U
Copper	1000	ug/l	8.2 B	5 U	5 U	5 U	2.64 J	5 U	5 U	5 U	5 U	5 U
Iron	NSA	ug/l	49500	34700	35600	61700	357	82000	25 U	27800	1450	1920
Lead	5	ug/l	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U
Magnesium	NSA	ug/l	43600	7090	7220	10200	30100	10900	8140	8340	1130	1150
Manganese	300	ug/l	**1760**	**2630**	**2700**	**2140**	**1090**	**2160**	**359**	**2170**	**314**	**303**
Nickel	100	ug/l	7.29 J	10.1 J	10.4 J	10 U	7.41 J	10 U	10 U	10 U	10 U	10 U
Potassium	NSA	ug/l	37000	11100	11200	9180	7850	15300	7160	13900	2430	2590
Selenium	50	ug/l	5 U	6.64 J	9.3 J	6.58 J	5 U	9.78 J	5 U	5 U	5 U	5 U
Silver	100	ug/l	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Sodium	NSA	ug/l	987000	347000	353000	322000	412000	424000	55400	134000	54700	59300
Thallium	2	ug/l	10 U	10 U	10 U	**4.03 J**	10 U	10 U	NA	NA	NA	NA
Vanadium	260	ug/l	10 U	17.4 J	17.9 J	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Zinc	2000	ug/l	12.1 B	8.02 J	11.6 J	9.97 J	37.5	14.5 J	6.89 J	10 U	10 U	10 U
Inorganics (SW6020)												
Antimony	6	ug/l	0.26 J	0.45 J	0.42 J	0.41 B	0.21 J	0.41 J	0.64 B	1.1 B	0.51 B	0.33 B
Thallium	2	ug/l	0.24 J	0.66 J	0.45 J	0.1 J	0.095 J	0.26 J	0.18 B	0.56 B	0.24 B	0.069 B
Uranium-238	NSA	ug/l	0.14 J	0.5 U	0.5 U	0.5 U	0.5 L	0.5 U	0.25 B	0.5 U	0.5 U	0.5 U
Mercury (SW7471)												
Mercury	2	ug/l	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U

(1) Pennsylvania Act 1995-2, known as "Act 2", established a program for recycling existing industrial and commercial sites. Values are from Chapter 250 of the Pennsylvania Code, "Administration of Land Recycling Program", Subchapter C, "Statewide Health Standards", Appendix A, "Medium-Specific Concentrations" tables, revisions effective 1/8/2011.

NSA- No Screening Level Available.

NA- Not Analyzed.

U- Not detected above the Level of Detection.

J- Value is estimated.

L-Analyte present. Reported value may be biased low. Acutal value is expected higher.

K - Estimated, biased high.

R-Rejected result. Analyte may or may not be present in the sample. Supporting data necessary to confirm result.

*-Indicates the duplicate analysis is not within control limits.

B-Not detected substantilly above the level reported in the laboratory or field blanks

N - Presumptive evidence of a compound.

Bolded values exceed Act 2 MSC (Residential, Used Aquifer).

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Table 6-11 - Groundwater – Analytical Summary of Detected VOCs

Location ID			MW-21	MW-22	MW-23	MW-24	MW-25	MW-26	MW-27	MW-27	MW-28	MW-29	MW-30	MW-31	TW-01	TW-02	TW-03
Sample Name			MW-21	MW-22	MW-23	MW-24	MW-25	MW-26	MW-27	MW-DUP-1	MW-28	MW-29	MW-30	MW-31	TW-1	TW-2	TW-3
Date Sampled			5/16/2012	5/16/2012	5/16/2012	5/16/2012	5/16/2012	5/16/2012	5/17/2012	5/17/2012	5/17/2012	5/17/2012	5/17/2012	5/17/2012	1/31/2012	1/31/2012	2/20/2012
Parent Sample Name										MW-27							
Analyte	**Act 2 MSC (Residential, Used Aquifer)[1]**	**Unit**															
VOCs (SW8260)																	
1,1,2-trichloroethane	5	ug/l	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	0.5 U
1,1-dichloroethane	31	ug/l	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	6.6	3.6 J	2.4 J	4.6 J	3.7
1,1-dichloroethene	7	ug/l	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	3 J	2.5 U	2.5 U	2.5 U	1.5
1,3-dichlorobenzene	600	ug/l	2.5 U	2.5 U	2.5 U	2.5 U	0.45 J	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	0.5 U
1,4-dichlorobenzene	75	ug/l	2.5 U	2.5 U	2.5 U	2.5 U	2.1 J	1.1 J	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	0.5 U
2-butanone	4000	ug/l	12.5 U	12.5 U	12.5 U	12.5 U	38	45 J	280	300	12.5 U	52	12.5 U	12.5 U	12.5 U	12.5 U	2.5 U
2-hexanone	11	ug/l	12.5 U	12.5 U	12.5 U	12.5 U	**16 J**	**25 J**	**28**	**33**	12.5 U	**39**	12.5 U	12.5 U	12.5 U	12.5 U	2.5 U
4-methyl-2-pentanone	2900	ug/l	12.5 U	12.5 U	12.5 U	12.5 U	43	60 J	200	220	12 J	92	12.5 U	12.5 U	12.5 U	12.5 U	2.5 U
Acetone	33000	ug/l	12.5 U	12.5 U	12.5 U	12.5 U	**45000 J**	**57000 J**	**230000**	**260000 J**	12000	**90000**	12.5 U	35	12.5 U	12.5 U	2.5 U
Benzene	5	ug/l	2.5 U	2.5 U	2.5 U	2.5 U	**330 J**	**300 J**	**4000**	**3900**	**22**	**260 J**	5 J	**35**	2.5 U	2.5 U	0.5 U
Carbon disulfide	1500	ug/l	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	0.5 U
Carbon tetrachloride	5	ug/l	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	0.5 UL
Chlorobenzene	100	ug/l	2.5 U	2.5 U	2.5 U	2.5 U	2.3 J	1.5 J	2.5 U	2.5 U	2.5 U	5.2	2.5 U	2.5 U	2.5 U	2.5 U	0.5 U
Chloroform	80	ug/l	2.5 U	2.5 U	1.3 J	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	10	3.9 J	8.8	5.2
Chloromethane	30	ug/l	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	0.5 U
Cis-1,2-dichloroethene	70	ug/l	2.5 U	**200 J**	**650**	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	14	13	8.8	9.3	7
Ethylbenzene	700	ug/l	2.5 U	2.5 U	2.5 U	2.5 U	**7500**	**8800**	320 J	320 J	290 J	**2400**	2.7 J	9	2.5 U	2.5 U	0.5 U
Isopropylbenzene	840	ug/l	2.5 U	2.5 U	0.68 J	2.5 U	**20000**	**15000**	**4600**	**4900**	**4100**	**16000**	25	62	2.5 U	2.5 U	0.5 U
M,P-Xylene	NSA	ug/l	5 U	5 U	5 U	5 U	5 U	5 U	25	27	5 U	4.1 J	5 U	5 U	5 U	5 U	1 U
Methyl tert-butyl ether	20	ug/l	2.5 U	2.5 U	**21**	2.5 U	2.5 U	2.5 U	12	13	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	0.5 U
Methylene Chloride	5	ug/l	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	0.5 U
o-Xylene	NSA	ug/l	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	11	11	2.5 U	4 J	2.5 U	2.5 U	2.5 U	2.5 U	0.5 U
Tetrachloroethene	5	ug/l	**12**	**170**	**82**	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	0.5 UJ
Toluene	1000	ug/l	2.5 U	2.5 U	2.5 U	2.5 U	11	11 J	17	18	1.4 J	14	2.5 U	2.5 U	2.5 U	2.5 U	0.5 U
trans-1,2-dichloroethene	100	ug/l	2.5 U	1.8 J	3.8 J	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	0.53 J
Trichloroethene	5	ug/l	2.5 U	**22**	**290**	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	**15**	**5.7**	2.7 J	4.4 J	**7.8**
Vinyl chloride	2	ug/l	2.5 U	2.5 U	**5.2**	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	0.5 U

Table 6-11 - Groundwater – Analytical Summary of Detected VOCs

Location ID			TW-04	TW-05	TW-06	TW-07	TW-07	TW-08	TW-09	TW-10	TW-11	TW-12	TW-13	TW-14	TW-15	TW-16	TW-17
Sample Name			TW-4	TW-5	TW-6	TW-7	TW-DUP3	TW-8	TW-9	TW-10	TW-11	TW-12	TW-13	TW-14	TW-15	TW-16	TW-17
Date Sampled			1/26/2012	1/31/2012	2/20/2012	1/31/2012	1/31/2012	1/30/2012	1/25/2012	2/20/2012	1/30/2012	1/27/2012	1/24/2012	1/24/2012	1/26/2012	1/26/2012	1/26/2012
Parent Sample Name							TW-7										
Analyte	**Act 2 MSC (Residential, Used Aquifer)[1]**	**Unit**															
VOCs (SW8260)																	
1,1,2-trichloroethane	5	ug/l	2.5 U	2.5 U	0.5 U	2.5 U	2.5 U	2.5 U	2.5 U	0.5 U	1.1 J	2.5 U	2.5 U	2.5 U	2.5 UJ	2.5 U	2.5 U
1,1-dichloroethane	31	ug/l	1.2 J	2.5 U	1.6	2.5 U	2.5 U	1.1 J	2.5 U	4.8	2.5 U	2.5 U	2.5 U	2.5 U	2.5 UJ	2.5 U	2.5 U
1,1-dichloroethene	7	ug/l	2.5 U	2.5 U	0.5 U	2.5 U	2.5 U	0.63 J	2.5 U	0.5 U	0.83 J	2.5 U	2.5 U	2.5 U	2.5 UJ	2.5 U	2.5 U
1,3-dichlorobenzene	600	ug/l	2.5 U	2.5 U	0.5 U	2.5 U	2.5 U	2.5 U	2.5 U	0.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 UJ	2.5 U	2.5 U
1,4-dichlorobenzene	75	ug/l	2.5 U	2.5 U	0.5 U	2.5 U	2.5 U	2.5 U	2.5 U	0.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 UJ	2.5 U	2.5 U
2-butanone	4000	ug/l	12.5 U	12.5 U	2.5 U	12.5 U	12.5 U	12.5 U	12.5 U	2.5 U	12.5 U	12.5 U	74	11 J	4.8 J	12.5 U	12.5 U
2-hexanone	11	ug/l	12.5 U	12.5 U	2.5 U	12.5 U	12.5 U	12.5 U	12.5 U	2.5 U	12.5 U	12.5 U	**27**	2.9 J	5.2 J	12.5 U	12.5 U
4-methyl-2-pentanone	2900	ug/l	12.5 U	12.5 U	2.5 U	12.5 U	12.5 U	12.5 U	12.5 U	2.5 U	12.5 U	12.5 U	76	7.8 J	120 J	12.5 U	12.5 U
Acetone	33000	ug/l	12.5 U	12.5 U	2.5 U	12.5 U	12.5 U	12.5 U	12.5 U	2.5 U	12.5 U	12.5 U	**72000**	2300 J	520 J	3800	12.5 U
Benzene	5	ug/l	2.5 U	2.5 U	0.5 U	2.5 U	2.5 U	2.5 U	2.5 U	0.5 U	2.5 U	2.5 U	**450 J**	**62**	**1000 J**	**1700**	2.5 U
Carbon disulfide	1500	ug/l	2.5 U	2.5 U	0.5 U	2.5 U	2.5 U	2.5 U	2.5 U	0.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 UJ	2.5 U	2.5 U
Carbon tetrachloride	5	ug/l	2.5 U	2.5 U	0.5 U	2.5 U	2.5 U	2.5 U	2.5 U	0.5 U	**6.9**	2.5 U	2.5 U	2.5 U	2.5 UJ	2.5 U	2.5 U
Chlorobenzene	100	ug/l	2.5 U	2.5 U	0.5 U	2.5 U	2.5 U	2.5 U	2.5 U	0.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 UJ	2.5 U	2.5 U
Chloroform	80	ug/l	2.2 J	0.5 J	0.58 J	1 J	1.1 J	0.47 J	1.8 J	2.1	5.3	0.48 J	2.5 U	2.5 U	2.5 UJ	2.5 U	2.5 U
Chloromethane	30	ug/l	2.5 U	2.5 U	0.5 U	2.5 U	2.5 U	2.5 U	2.5 U	0.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 UJ	0.7 J	2.5 U
Cis-1,2-dichloroethene	70	ug/l	4.4 J	7.3	**1400**	3.2 J	3.6 J	**470**	2.4 J	7.9	**120**	0.51 J	2.5 U	2.5 U	2.5 UJ	2.5 U	2.5 U
Ethylbenzene	700	ug/l	2.5 U	2.5 U	0.5 U	2.5 U	2.5 U	4.4 J	2.5 U	0.5 U	8.5	0.59 J	**11000**	**2300**	**9400**	67 J	2.5 U
Isopropylbenzene	840	ug/l	2.5 U	2.5 U	0.5 U	2.5 U	2.5 U	13	2.5 U	0.5 U	28	2.5 U	**27000**	**5300**	**16000**	**3400**	12
M,P-Xylene	NSA	ug/l	5 U	5 U	1 U	5 U	5 U	5 U	5 U	1 U	5 U	5 U	12	5 U	13 J	7.1 J	1 J
Methyl tert-butyl ether	20	ug/l	2.5 U	2.5 U	0.5 U	2.5 U	2.5 U	2.5 U	2.5 U	0.5 U	0.47 J	2.5 U	3.4 J	2.5 U	2.5 J	5.8 J	2.5 U
Methylene Chloride	5	ug/l	2.5 U	2.5 U	0.5 U	2.5 U	2.5 U	2.5 U	2.5 U	0.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 UJ	2.5 U	2.5 U
o-Xylene	NSA	ug/l	2.5 U	2.5 U	0.5 U	2.5 U	2.5 U	2.5 U	2.5 U	0.5 U	2.5 U	2.5 U	6.7	2.5 U	6.1 J	1.9 J	1.3 J
Tetrachloroethene	5	ug/l	2.5 U	**240**	**170 J**	**160**	**170**	**54**	2.5 U	0.5 UJ	**27**	2.5 U	2.5 U	2.5 U	2.5 UJ	2.5 U	2.5 U
Toluene	1000	ug/l	2.5 U	2.5 U	0.5 U	2.5 U	2.5 U	2.5 U	2.5 U	0.5 U	2.5 U	2.5 U	18	2.6 J	27 J	0.54 J	2.5 U
trans-1,2-dichloroethene	100	ug/l	2.5 U	0.67 J	29	2.5 U	2.5 U	7.8	2.5 U	0.54 J	3.6 J	2.5 U	2.5 U	2.5 U	2.5 UJ	2.5 U	2.5 U
Trichloroethene	5	ug/l	1.2 J	1.4 J	**120**	2.5 U	2.5 U	**220**	0.92 J	2.4	**3600**	0.57 J	2.5 U	2.5 U	2.5 UJ	2.5 U	2.5 U
Vinyl chloride	2	ug/l	2.5 U	2.5 U	**5.2**	2.5 U	2.5 U	**8.1**	2.5 U	0.5 U	**4.5 J**	2.5 U	2.5 U	2.5 U	2.5 UJ	2.5 U	2.5 U

Table 6-11 - Groundwater – Analytical Summary of Detected VOCs

Location ID			TW-18	TW-19	TW-20	TW-21	TW-21	TW-22	TW-23	TW-24	TW-25	TW-26	TW-27	TW-27
Sample Name			TW-18	TW-19	TW-20	TW-21	TW-DUP01	TW-22	TW-23	TW-24	TW-25	TW-26	TW-27	TW-DUP4
Date Sampled			1/23/2012	1/23/2012	1/26/2012	1/23/2012	1/23/2012	1/25/2012	2/20/2012	1/24/2012	4/20/2012	4/20/2012	4/20/2012	4/20/2012
Parent Sample Name							TW-21							TW-27
Analyte	**Act 2 MSC (Residential, Used Aquifer)[1]**	**Unit**												
VOCs (SW8260)														
1,1,2-trichloroethane	5	ug/l	2.5 U	2.5 U	2.5 U	60 U	125 U	1250 U	0.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
1,1-dichloroethane	31	ug/l	2.5 U	2.5 U	2.5 U	60 U	125 U	1250 U	1 J	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
1,1-dichloroethene	7	ug/l	2.5 U	2.5 U	2.5 U	60 U	125 U	1250 U	0.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
1,3-dichlorobenzene	600	ug/l	2.5 U	2.5 U	2.5 U	60 U	125 U	1250 U	0.5 U	2.5 U	2.5 U	1.7 J	2.5 U	2.5 U
1,4-dichlorobenzene	75	ug/l	2.5 U	2.5 U	2.5 U	60 U	125 U	1250 U	0.5 U	2.5 U	2.5 U	5.3	2.5 U	2.5 U
2-butanone	4000	ug/l	12.5 U	12.5 U	12.5 U	120 J	600 U	6000 U	2.5 U	110 J	12.5 U	12.5 U	12.5 U	12.5 U
2-hexanone	11	ug/l	12.5 U	12.5 U	12.5 U	**80 J**	600 U	6000 U	2.5 U	**56 J**	12.5 U	12.5 U	12.5 U	12.5 U
4-methyl-2-pentanone	2900	ug/l	12.5 U	12.5 U	12.5 U	210 J	220 J	6000 U	2.5 U	160 J	12.5 U	12.5 U	12.5 U	12.5 U
Acetone	33000	ug/l	12.5 U	6.4 J	12.5 U	**180000 J**	**190000 J**	**160000**	2.5 U	**150000**	12.5 U	18 J	9.8 J	15 J
Benzene	5	ug/l	2.5 U	1.2 J	2.5 U	**580**	**590**	**260 J**	0.5 U	**500 J**	2.5 U	**130**	2.5 U	2.5 U
Carbon disulfide	1500	ug/l	2.5 U	0.66 J	2.5 U	60 U	125 U	1250 U	0.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Carbon tetrachloride	5	ug/l	2.5 U	2.5 U	2.5 U	60 U	125 U	1250 U	0.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Chlorobenzene	100	ug/l	2.5 U	2.5 U	2.5 U	60 U	125 U	1250 U	0.5 U	2.5 U	2.5 U	6.4	2.5 U	2.5 U
Chloroform	80	ug/l	2.5 U	2.5 U	2.5 U	60 U	125 U	1250 U	1.5	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Chloromethane	30	ug/l	2.5 U	2.5 U	2.5 U	60 U	125 U	1250 U	0.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Cis-1,2-dichloroethene	70	ug/l	2.5 U	2.5 U	2.5 U	60 U	125 U	1250 U	1.8	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Ethylbenzene	700	ug/l	2.5 U	2.5 U	2.5 U	**3700**	**4000**	**4900**	0.5 U	**8500**	2.5 U	3.9 J	26	27
Isopropylbenzene	840	ug/l	2.5 U	25	2.4 J	**39000**	**39000**	**27000**	0.5 U	**23000**	5.4	**1100**	340	340
M,P-Xylene	NSA	ug/l	5 U	5 U	1 J	125 U	250 U	2500 U	1 U	5 U	5 U	1.2 J	5 U	5 U
Methyl tert-butyl ether	20	ug/l	2.5 U	2.5 U	2.5 U	60 U	125 U	1250 U	0.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Methylene Chloride	5	ug/l	2.5 U	2.5 U	2.5 U	60 U	125 U	**1200 J**	0.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
o-Xylene	NSA	ug/l	2.5 U	2.5 U	2.5 U	60 U	125 U	1250 U	0.5 U	2.5 U	2.5 U	2 J	2.5 U	2.5 U
Tetrachloroethene	5	ug/l	2.5 U	2.5 U	2.5 U	60 U	125 U	1250 U	0.5 UJ	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Toluene	1000	ug/l	2.5 U	2.5 U	3 J	60 U	125 U	1250 U	0.5 U	21 J	2.5 U	2.2 J	2.5 U	2.5 U
trans-1,2-dichloroethene	100	ug/l	2.5 U	2.5 U	2.5 U	60 U	125 U	1250 U	0.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Trichloroethene	5	ug/l	2.5 U	2.5 U	2.5 U	60 U	125 U	1250 U	1	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Vinyl chloride	2	ug/l	2.5 U	2.5 U	2.5 U	60 U	125 U	1250 U	0.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U

(1) Pennsylvania Act 1995-2, known as "Act 2", established a program for recycling existing industrial and commercial sites. Values are from Chapter 250 of the Pennsylvania Code, "Administration of Land Recycling Program", Subchapter C, "Statewide Health Standards", Appendix A, "Medium-Specific Concentrations" tables, revisions effective 1/8/2011.

NSA- No Screening Level Available.

NA- Not Analyzed.

U- Not detected above the Level of Detection.

J- Value is estimated.

L-Analyte present. Reported value may be biased low. Acutal value is expected higher.

K - Estimated, biased high.

R-Rejected result. Analyte may or may not be present in the sample. Supporting data necessary to confirm result.

*-Indicates the duplicate analysis is not within control limits.

B-Not detected substantilly above the level reported in the laboratory or field blanks

N - Presumptive evidence of a compound.

Bolded values exceed Act 2 MSC (Residential, Used Aquifer).

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Table 6-12 - Groundwater – Analytical Summary of Detected SVOCs

Location ID			MW-21	MW-22	MW-23	MW-24	MW-25	MW-26	MW-27	MW-27	MW-28	MW-29	MW-30	MW-31	TW-01	TW-02	TW-03	TW-04
Sample Name			MW-21	MW-22	MW-23	MW-24	MW-25	MW-26	MW-27	MW-DUP-1	MW-28	MW-29	MW-30	MW-31	TW-1	TW-2	TW-3	TW-4
Date Sampled			5/16/2012	5/16/2012	5/16/2012	5/16/2012	5/16/2012	5/16/2012	5/17/2012	5/17/2012	5/17/2012	5/17/2012	5/17/2012	5/17/2012	1/31/2012	1/31/2012	2/20/2012	1/26/2012
Parent Sample ID										MW-27								
Analyte	**Act 2 MSC (Residential, Used Aquifer)[1]**	**Unit**																
SVOCs (SW8270)																		
1,1-biphenyl	1800	ug/l	5 U	5.5 U	5 U	5 U	89	44	26.5 U	26 U	20	78	5.5 U	5.5 U	5 U	5 U	5 U	5 U
2,4-dimethylphenol	730	ug/l	0.05 U	0.055 U	0.05 U	0.05 U	2.1	0.05 U	120	100	0.05 U	0.05 UR	0.055 U	0.055 U	0.05 U	0.05 U	0.05 U	0.05 U
2-methylnaphthalene	150	ug/l	5 U	5.5 U	5 U	5 U	5 U	5 U	26.5 U	26 U	5.5 U	5 U	5.5 U	5.5 U	5 U	5 U	5 U	5 U
2-methylphenol	1800	ug/l	5 U	5.5 U	5 U	5 U	9.5 L	6.9 L	26.5 U	26 U	5.5 R	5 R	5.5 U	5.5 U	5 U	5 U	5 U	5 U
3&4-methylphenol	NSA	ug/l	5 U	5.5 U	5 U	5 U	130	120	150	130	5.5 R	5 R	5.5 U	5.5 U	5 U	5 U	5 U	5 U
Acenaphthene	2200	ug/l	0.05 U	0.055 U	0.05 U	0.05 U	0.05 U	0.4	26.5 U	26 U	0.22	0.61	0.055 U	0.055 U	0.05 U	0.05 U	0.05 U	0.05 U
Acenaphthylene	2200	ug/l	0.05 U	0.055 U	0.05 U	0.05 U	0.05 U	0.05 U	26.5 U	26 U	0.05 U	0.05 U	0.055 U	0.055 U	0.05 U	0.05 U	0.05 U	0.05 U
Acetophenone	3700	ug/l	5 U	5.5 U	5 U	5 U	470	380	**4600**	**4100**	520	**5400**	5.5 U	6.3 J	5 U	5 U	5 U	5 U
Anthracene	66	ug/l	0.46	0.055 U	0.05 U	0.05 U	0.05 U	0.05 U	26.5 U	26 U	0.05 U	0.05 U	0.055 U	0.055 U	0.05 U	0.05 U	0.05 U	0.05 U
Benzo[a]anthracene	0.29	ug/l	0.05 U	0.055 U	0.05 U	0.05 U	0.05 U	0.05 U	26.5 U	26 U	0.05 U	0.052 J	0.055 U	0.055 U	0.05 U	0.05 U	0.05 U	0.05 U
Benzo[a]pyrene	0.2	ug/l	**0.71**	0.055 U	0.05 U	0.05 U	0.05 U	0.05 U	26.5 U	26 U	0.05 U	0.05 U	0.055 U	0.055 U	0.05 U	0.05 U	0.05 U	0.05 U
Benzo[b]fluoranthene	0.29	ug/l	**0.61**	0.055 U	0.05 U	0.05 U	0.05 U	0.05 U	26.5 U	26 U	0.05 U	0.05 U	0.055 U	0.055 U	0.05 U	0.05 U	0.05 U	0.05 U
Benzo[g,h,i]perylene	0.26	ug/l	**0.62**	0.055 U	0.05 U	0.05 U	0.05 U	0.05 U	26.5 U	26 U	0.05 U	0.05 U	0.055 U	0.055 U	0.05 U	0.05 U	0.05 U	0.05 U
Benzo[k]fluoranthene	0.55	ug/l	0.44	0.055 U	0.05 U	0.05 U	0.05 U	0.05 U	26.5 U	26 U	0.05 U	0.05 U	0.055 U	0.055 U	0.05 U	0.05 U	0.05 U	0.05 U
Bis(2-ethylhexyl) phthalate	6	ug/l	0.86 B	0.13 B	0.18 B	0.19 B	0.98 B	0.9 B	26.5 U	26 U	0.95 B	0.96 B	0.96 B	0.055 U	5 U	5 U	0.41 L	5 U
Dibenz[a,h]anthracene	0.029	ug/l	0.05 U	0.055 U	0.05 U	0.05 U	0.05 U	0.05 U	26.5 U	26 U	0.05 U	0.05 U	0.055 U	0.055 U	0.05 U	0.05 U	0.05 U	0.05 U
Dibenzofuran	37	ug/l	5 U	5.5 U	5 U	5 U	5 U	5 U	26.5 U	26 U	5.5 U	5 U	5.5 U	5.5 U	5 U	5 U	5 U	5 U
Fluoranthene	260	ug/l	0.48	0.055 U	0.041 J	0.05 U	0.48	0.5	26.5 U	26 U	0.49	0.76	0.48	0.055 U	0.05 U	0.05 U	0.05 U	0.05 U
Fluorene	1500	ug/l	0.05 U	0.055 U	0.071 J	0.05 U	0.32	0.2	26.5 U	26 U	0.063 J	0.31	0.055 U	0.055 U	0.05 U	0.05 U	0.05 U	0.05 U
Indeno[1,2,3-c,d]pyrene	0.29	ug/l	**0.67**	0.055 U	0.05 U	0.05 U	0.05 U	0.05 U	26.5 U	26 U	0.05 U	0.05 U	0.055 U	0.055 U	0.05 U	0.05 U	0.05 U	0.05 U
Naphthalene	100	ug/l	0.1 J	0.055 UJ	0.05 UJ	0.05 UJ	51	37	29 J	27 J	18	58	0.31 K	0.055 U	0.05 U	0.05 U	0.05 U	0.05 U
Pentachlorophenol	1	ug/l	1.3 U	1.35 U	1.3 U	1.3 U	1.3 U	1.3 U	26.5 U	26 U	1.3 U	1.3 UR	1.3 U	1.3 U	5 U	5 U	**1.1 B**	5 U
Phenanthrene	1100	ug/l	0.05 U	0.055 U	0.23	0.05 U	0.05 U	0.05 U	26.5 U	26 U	0.05 U	0.05 U	0.055 U	0.055 U	0.05 U	0.05 U	0.05 U	0.05 U
Phenol	2000	ug/l	0.05 U	0.055 U	0.05 U	0.05 U	**13000**	**8200**	**74000**	**57000**	1800	**22000**	0.055 U	0.055 U	5 U	5 U	0.05 U	5 U
Pyrene	130	ug/l	0.05 U	0.055 U	0.05 U	0.05 U	0.05 U	0.05 U	26.5 U	26 U	0.05 U	0.23	5.5 U	0.055 U	0.05 U	0.05 U	0.05 U	0.05 U

Table 6-12 - Groundwater – Analytical Summary of Detected SVOCs

Location ID			TW-05	TW-06	TW-07	TW-07	TW-08	TW-09	TW-10	TW-11	TW-12	TW-13	TW-14	TW-15	TW-16	TW-17	TW-18	TW-19
Sample Name			TW-5	TW-6	TW-7	TW-DUP3	TW-8	TW-9	TW-10	TW-11	TW-12	TW-13	TW-14	TW-15	TW-16	TW-17	TW-18	TW-19
Date Sampled			1/31/2012	2/20/2012	1/31/2012	1/31/2012	1/30/2012	1/25/2012	2/20/2012	1/30/2012	1/27/2012	1/24/2012	1/24/2012	1/26/2012	1/26/2012	1/26/2012	1/23/2012	1/23/2012
Parent Sample ID						TW-7												
Analyte	**Act 2 MSC (Residential, Used Aquifer)[1]**	**Unit**																
SVOCs (SW8270)																		
1,1-biphenyl	1800	ug/l	5 U	5 U	5 U	5 U	5 U	5 U	5.5 U	5 U	5 U	NA	37	5 U	5 U	5 U	5 U	5 U
2,4-dimethylphenol	730	ug/l	0.05 U	0.05 U	0.05 U	0.055 U	0.05 U	0.05 U	0.055 U	0.05 U	0.05 U	0.05 UR	0.05 U	16	7.6 J	0.05 U	0.05 U	0.05 U
2-methylnaphthalene	150	ug/l	5 U	5 U	5 U	5 U	5 U	5 U	5.5 U	5 U	5 U	5 U	5 U	27	5 U	5 U	5 U	5 U
2-methylphenol	1800	ug/l	5 U	5 U	5 U	5 U	5 U	5 U	5.5 U	5 U	5 U	5 UR	5 U	5 U	5 U	5 U	5 U	5 U
3&4-methylphenol	NSA	ug/l	5 U	5 U	5 U	5 U	5 U	5 U	5.5 U	5 U	5 U	5 UR	26	210	5 U	5 U	5 U	5 U
Acenaphthene	2200	ug/l	0.05 U	0.05 U	0.05 U	0.055 U	0.05 U	0.05 U	0.055 U	0.29	0.05 U	1.5	0.39	20	5 U	1.5	0.05 U	0.05 U
Acenaphthylene	2200	ug/l	0.05 U	0.05 U	0.05 U	0.055 U	0.05 U	0.05 U	0.055 U	0.05 U	0.05 U	0.45	0.05 U	0.17	5 U	0.05 U	0.05 U	0.05 U
Acetophenone	3700	ug/l	5 U	5 U	5 U	5 U	5 U	5 U	5.5 U	5 U	5 U	1400	16	62	120	5 U	5 U	5 U
Anthracene	66	ug/l	0.05 U	0.05 U	0.05 U	0.055 U	0.05 U	0.05 U	0.055 U	0.3	0.05 U	0.05 U	0.05 U	0.15	5 U	0.05 U	0.05 U	0.05 U
Benzo[a]anthracene	0.29	ug/l	0.05 U	0.05 U	0.05 U	0.055 U	0.05 U	0.05 U	0.055 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	5 U	0.05 U	0.05 U	0.05 U
Benzo[a]pyrene	0.2	ug/l	0.05 U	0.05 U	0.05 U	0.055 U	0.05 U	0.05 U	0.055 U	0.05 U	0.05 U	0.05 U	0.05 U	0.051 J	5 U	0.05 U	0.05 U	0.05 U
Benzo[b]fluoranthene	0.29	ug/l	0.05 U	0.05 U	0.05 U	0.055 U	0.05 U	0.05 U	0.055 U	0.05 U	0.05 U	0.05 U	0.05 U	0.051 J	5 U	0.05 U	0.05 U	0.05 U
Benzo[g,h,i]perylene	0.26	ug/l	0.05 U	0.05 U	0.05 U	0.055 U	0.05 U	0.05 U	0.055 U	0.05 U	0.05 U	0.05 U	0.05 U	**0.45**	5 U	0.05 U	0.05 U	0.05 U
Benzo[k]fluoranthene	0.55	ug/l	0.05 U	0.05 U	0.05 U	0.055 U	0.05 U	0.05 U	0.055 U	0.05 U	0.05 U	0.092 J	0.05 U	0.041 J	5 U	0.05 U	0.05 U	0.05 U
Bis(2-ethylhexyl) phthalate	6	ug/l	5 U	0.05 UL	5 U	5 U	5 U	5 U	0.055 UL	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Dibenz[a,h]anthracene	0.029	ug/l	0.05 U	0.05 U	0.05 U	0.055 U	0.05 U	0.05 U	0.055 U	0.05 U	0.05 U	0.05 U	0.05 U	**0.11**	5 U	0.05 U	0.05 U	0.05 U
Dibenzofuran	37	ug/l	5 U	5 U	5 U	5 U	5 U	5 U	5.5 U	5 U	5 U	5 U	5 U	11	5 U	5 U	5 U	5 U
Fluoranthene	260	ug/l	0.05 U	0.05 U	0.05 U	0.055 U	0.05 U	0.05 U	0.055 U	0.41	0.05 U	0.05 U	0.04 J	0.05 U	5 U	0.05 U	0.05 U	0.05 U
Fluorene	1500	ug/l	0.05 U	0.05 U	0.05 U	0.055 U	0.05 U	0.05 U	0.055 U	0.35	0.05 U	0.63	0.15	7.6	5 U	0.53	0.05 U	0.05 U
Indeno[1,2,3-c,d]pyrene	0.29	ug/l	0.05 U	0.05 U	0.05 U	0.055 U	0.05 U	0.05 U	0.055 U	0.05 U	0.05 U	0.05 U	0.05 U	0.14	5 U	5 U	0.05 U	0.05 U
Naphthalene	100	ug/l	0.05 U	0.05 U	0.05 U	0.055 U	0.05 U	0.05 U	0.055 U	0.26	0.05 U	**110**	13	**160**	6.9 J	0.96	0.051 J	0.061 J
Pentachlorophenol	1	ug/l	5 U	0.49 B	5 U	5 U	5 U	5 U	0.42 B	5 U	5 U	5 UR	5 U	5 U	5 U	5 U	5 U	5 U
Phenanthrene	1100	ug/l	0.05 U	0.05 U	0.05 U	0.055 U	0.05 U	0.05 U	0.075 J	0.05 U	0.05 U	0.05 U	0.05 U	2.6	5 U	0.05 U	0.05 U	0.05 U
Phenol	2000	ug/l	5 U	0.05 U	5 U	5 U	5 U	5 U	0.055 U	5 U	5 U	**10000 J**	11	14	**2100**	5 U	5 U	17
Pyrene	130	ug/l	0.05 U	0.05 U	0.05 U	0.055 U	0.05 U	0.05 U	0.055 U	0.32	0.05 U	0.05 U	0.05 U	0.05 U	5 U	0.05 U	0.05 U	0.05 U

Table 6-12 - Groundwater – Analytical Summary of Detected SVOCs

Location ID			TW-20	TW-21	TW-21	TW-22	TW-23	TW-24	TW-25	TW-26	TW-27	TW-27
Sample Name			TW-20	TW-21	TW-DUP01	TW-22	TW-23	TW-24	TW-25	TW-26	TW-27	TW-DUP4
Date Sampled			1/26/2012	1/23/2012	1/23/2012	1/25/2012	2/20/2012	1/24/2012	4/20/2012	4/20/2012	4/20/2012	4/20/2012
Parent Sample ID					TW-21							TW-27
Analyte	**Act 2 MSC (Residential, Used Aquifer)[1]**	**Unit**										
SVOCs (SW8270)												
1,1-biphenyl	1800	ug/l	5 U	40	38	65	5 U	53	5.5 U	5 U	5.5 U	5.5 U
2,4-dimethylphenol	730	ug/l	0.051 J	0.05 U	0.05 U	2.7	0.05 U	0.05 U	0.055 U	0.05 U	0.055 U	0.055 U
2-methylnaphthalene	150	ug/l	5 U	5.6 J	5.5 J	5 U	5 U	5 U	5.5 U	5 U	5.5 U	5.5 U
2-methylphenol	1800	ug/l	5 U	5.7 J	6.5 J	5 UR	5 U	5 UR	5.5 U	5 U	5.5 U	5.5 U
3&4-methylphenol	NSA	ug/l	5 U	5 UR	5 UR	9 R	5 U	5 UR	5.5 U	5 U	5.5 U	5.5 U
Acenaphthene	2200	ug/l	1.9	0.96	0.94	0.78	0.05 U	0.66	4.2	0.5	0.054 J	0.063 J
Acenaphthylene	2200	ug/l	0.051 J	0.05 U	0.05 U	0.05 U	0.05 U	0.46	0.055 U	0.05 U	0.055 U	0.055 U
Acetophenone	3700	ug/l	5 U	**12000 J**	**12000 J**	**5100**	5 U	**6400**	5.5 U	34	5.5 U	5.5 U
Anthracene	66	ug/l	0.64	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.2	0.05 U	0.055 U	0.055 U
Benzo[a]anthracene	0.29	ug/l	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.095 J	0.05 U	0.055 U	0.055 U
Benzo[a]pyrene	0.2	ug/l	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.055 U	**0.46**	**0.47**	**0.46**
Benzo[b]fluoranthene	0.29	ug/l	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	**0.66**	**0.61**	**0.63**	**0.62**
Benzo[g,h,i]perylene	0.26	ug/l	0.05 U	0.05 U	0.05 U	0.12	0.05 U	0.05 U	0.055 U	5 U	0.055 U	0.055 U
Benzo[k]fluoranthene	0.55	ug/l	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.055 U	0.05 U	0.055 U	0.055 U
Bis(2-ethylhexyl) phthalate	6	ug/l	5 U	5 U	5 U	5 U	0.05 UL	5 U	0.35	0.65	0.7	0.75
Dibenz[a,h]anthracene	0.029	ug/l	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.055 U	0.05 U	0.055 U	0.055 U
Dibenzofuran	37	ug/l	5 U	5 U	5 U	5 U	5 U	0.05 U	5.5 U	5 U	5.5 U	5.5 U
Fluoranthene	260	ug/l	0.69	0.092 J	0.091 J	0.07 J	0.05 U	0.072 J	2.1	0.083 J	0.055 U	0.055 U
Fluorene	1500	ug/l	1.2	0.22	0.21	0.27	0.05 U	0.23	1.8 K	0.27	0.055 U	0.055 U
Indeno[1,2,3-c,d]pyrene	0.29	ug/l	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.055 U	0.05 U	0.055 U	0.055 U
Naphthalene	100	ug/l	1.7	74	78	100	0.05 U	80	1.9	7.7	1.5	1.7
Pentachlorophenol	1	ug/l	5 U	5 UR	5 UR	5 UR	0.84 B	5 UR	0.055 UL	0.92	0.055 U	0.055 U
Phenanthrene	1100	ug/l	1.1	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	1	0.05 U	0.055 U	0.055 U
Phenol	2000	ug/l	9.9 J	**90000**	**84000**	**25000**	0.05 U	**32000**	0.055 U	0.05 U	59	73
Pyrene	130	ug/l	0.52	0.092 J	0.091 J	0.04 J	0.05 U	0.052 J	1.3	0.052 J	0.055 U	0.055 U

(1) Pennsylvania Act 1995-2, known as "Act 2", established a program for recycling existing industrial and commercial sites. Values are from Chapter 250 of the Pennsylvania Code, "Administration of Land Recycling Program", Subchapter C, "Statewide Health Standards", Appendix A, "Medium-Specific Concentrations" tables, revisions effective 1/8/2011.

NSA- No Screening Level Available.

NA- Not Analyzed.

U- Not detected above the Level of Detection.

J- Value is estimated.

L-Analyte present. Reported value may be biased low. Acutal value is expected higher.

K - Estimated, biased high.

R-Rejected result. Analyte may or may not be present in the sample. Supporting data necessary to confirm result.

*-Indicates the duplicate analysis is not within control limits.

B-Not detected substantilly above the level reported in the laboratory or field blanks

N - Presumptive evidence of a compound.

Bolded values exceed Act 2 MSC (Residential, Used Aquifer).

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Table 6-13 - Groundwater – Analytical Summary of Cyanide

Location ID			MW-21	MW-23	MW-24	MW-25	MW-26	MW-27	MW-27	MW-28	MW-29	MW-30	MW-31	TW-03	TW-19	TW-21	TW-24
Sample Name			MW-21	MW-23	MW-24	MW-25	MW-26	MW-27	MW-DUP-1	MW-28	MW-29	MW-30	MW-31	TW-3	TW-19	TW-21	TW-24
Date Sampled			5/16/2012	5/16/2012	5/16/2012	5/16/2012	5/16/2012	5/17/2012	5/17/2012	5/17/2012	5/17/2012	5/17/2012	5/17/2012	2/20/2012	1/23/2012	1/23/2012	1/24/2012
Parent Sample ID									MW-27								
Analyte	**Act 2 MSC (Residential, Used Aquifer)[1]**	**Unit**															
Cyanide (9012)																	
Cyanide	0.2	mg/l	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.004 J	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U

(1) Pennsylvania Act 1995-2, known as "Act 2", established a program for recycling existing industrial and commercial sites. Values are from Chapter 250 of the Pennsylvania Code, "Administration of Land Recycling Program", Subchapter C, "Statewide Health Standards", Appendix A, "Medium-Specific Concentrations" tables, revisions effective 1/8/2011.

NSA- No Screening Level Available.

NA- Not Analyzed.

U- Not detected above the Level of Detection.

J- Value is estimated.

L-Analyte present. Reported value may be biased low. Acutal value is expected higher.

K - Estimated, biased high.

R-Rejected result. Analyte may or may not be present in the sample. Supporting data necessary to confirm result.

*-Indicates the duplicate analysis is not within control limits.

B-Not detected substantilly above the level reported in the laboratory or field blanks

N - Presumptive evidence of a compound.

Bolded values exceed Act 2 MSC (Residential, Used Aquifer).

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Table 6-14 - Groundwater – Analytical Summary of Explosives

		Location ID	MW-21	MW-22	MW-23	MW-24	MW-25	MW-26	MW-27
		Sample Name	MW-21	MW-22	MW-23	MW-24	MW-25	MW-26	MW-27
		Date Sampled	5/16/2012	5/16/2012	5/16/2012	5/16/2012	5/16/2012	5/16/2012	5/17/2012
		Parent Sample ID							
Analyte	**Act 2 MSC (Residential, Used Aquifer)[1]**	**Unit**							
Explosives (SW8330)									
1,3,5-Trinitrobenzene	NSA	ug/l	0.105 U	0.11 U	0.105 U	0.115 U	0.12 U	0.11 U	0.11 U
1,3-Dinitrobenzene	1	ug/l	0.105 U	0.11 U	0.105 U	0.115 U	0.12 U	0.11 U	0.11 U
2,4,6-trinitrotoluene	2	ug/l	0.105 U	0.11 U	0.105 U	0.115 U	0.12 U	0.11 U	0.11 U
2,4-dinitrotoluene	2.1	ug/l	0.105 U	0.11 U	0.105 U	0.115 U	0.12 U	0.11 U	0.11 U
2,6-dinitrotoluene	37	ug/l	0.105 U	0.11 U	0.105 U	0.115 U	0.12 U	0.11 U	0.11 U
2-amino-4,6-dinitrotoluene	NSA	ug/l	0.105 U	0.11 U	0.105 U	0.115 U	0.12 U	0.11 U	0.11 U
2-nitrotoluene	NSA	ug/l	0.21 U	0.225 U	0.21 U	0.23 U	0.235 U	0.22 U	0.215 U
3,5-Dinitroaniline	NSA	ug/l	0.21 U	0.225 U	0.21 U	0.23 U	0.235 U	0.22 U	0.215 U
3-nitrotoluene	NSA	ug/l	0.21 U	0.225 U	0.21 U	0.23 U	0.235 U	0.22 U	0.215 U
4-amino-2,6-dinitrotoluene	NSA	ug/l	0.105 U	0.11 U	0.105 U	0.115 U	0.12 U	0.11 U	0.11 U
4-Nitrotoluene	NSA	ug/l	0.21 U	0.225 U	0.21 U	0.23 U	0.235 U	0.22 U	0.215 U
HMX	400	ug/l	0.21 U	0.225 U	0.21 U	0.23 U	0.235 U	0.22 U	0.215 U
Nitrobenzene	73	ug/l	0.105 U	0.11 U	0.105 U	0.115 U	0.12 U	0.11 U	0.11 U
Nitroglycerin	5	ug/l	10.5 U	11 U	10.5 U	11.5 U	12 U	11 U	11 U
Pentaerythritol tetranitrate	NSA	ug/l	0.55 U	0.55 U	0.5 U	0.55 U	0.6 U	0.55 U	0.55 U
RDX	2	ug/l	0.21 U	0.225 U	0.21 U	0.23 U	0.235 U	0.22 U	0.215 U
Tetryl	NSA	ug/l	0.21 U	0.225 U	0.21 U	0.23 U	0.235 U	0.22 U	0.215 U

Table 6-14 - Groundwater – Analytical Summary of Explosives

		Location ID	MW-27	MW-28	MW-29	MW-30	MW-31	TW-03	TW-12
		Sample Name	MW-DUP-1	MW-28	MW-29	MW-30	MW-31	TW-3	TW-12
		Date Sampled	5/17/2012	5/17/2012	5/17/2012	5/17/2012	5/17/2012	2/20/2012	1/27/2012
		Parent Sample ID	MW-27						
Analyte	**Act 2 MSC (Residential, Used Aquifer)[1]**	**Unit**							
Explosives (SW8330)									
1,3,5-Trinitrobenzene	NSA	ug/l	0.1 U	0.105 U	0.105 U	0.1 U	0.11 U	0.105 U	0.105 U
1,3-Dinitrobenzene	1	ug/l	0.1 U	0.105 U	0.105 U	0.1 U	0.11 U	0.105 U	0.105 U
2,4,6-trinitrotoluene	2	ug/l	0.1 U	0.105 U	0.105 U	0.1 U	0.11 U	0.105 U	0.105 U
2,4-dinitrotoluene	2.1	ug/l	0.1 U	0.105 U	0.105 U	0.1 U	0.11 U	0.105 U	0.105 U
2,6-dinitrotoluene	37	ug/l	0.1 U	0.105 U	0.105 U	0.1 U	0.11 U	0.105 U	0.105 U
2-amino-4,6-dinitrotoluene	NSA	ug/l	0.1 U	0.105 U	0.105 U	0.1 U	0.11 U	0.105 U	0.105 U
2-nitrotoluene	NSA	ug/l	0.2 U	0.21 U	0.21 U	0.2 U	0.22 U	0.205 U	0.21 U
3,5-Dinitroaniline	NSA	ug/l	0.2 U	0.21 U	0.21 U	0.2 U	0.22 U	NA	NA
3-nitrotoluene	NSA	ug/l	0.2 U	0.21 U	0.21 U	0.2 U	0.22 U	0.205 U	0.21 U
4-amino-2,6-dinitrotoluene	NSA	ug/l	0.1 U	0.105 U	0.105 U	0.1 U	0.11 U	0.105 U	0.105 U
4-Nitrotoluene	NSA	ug/l	0.2 U	0.21 U	0.21 U	0.2 U	0.22 U	0.205 U	0.21 U
HMX	400	ug/l	0.2 U	0.21 U	0.21 U	0.2 U	0.22 U	0.205 U	0.21 UL
Nitrobenzene	73	ug/l	0.1 U	0.105 U	0.105 U	0.1 U	0.11 U	0.105 U	0.105 U
Nitroglycerin	5	ug/l	10 U	10.5 U	10.5 U	10 U	11 U	10.5 U	10.5 U
Pentaerythritol tetranitrate	NSA	ug/l	0.5 U	0.5 U	0.55 U	0.5 U	0.55 U	0.5 U	0.55 U
RDX	2	ug/l	0.2 U	0.21 U	0.21 U	0.2 U	0.22 U	0.205 U	0.21 U
Tetryl	NSA	ug/l	0.2 U	0.21 U	0.21 U	0.2 U	0.22 U	0.205 U	0.21 U

Table 6-14 - Groundwater – Analytical Summary of Explosives

	Location ID		TW-18	TW-21	TW-21	TW-25	TW-26	TW-27	TW-27
	Sample Name		TW-18	TW-21	TW-DUP01	TW-25	TW-26	TW-27	TW-DUP4
	Date Sampled		1/23/2012	1/23/2012	1/23/2012	4/20/2012	4/20/2012	4/20/2012	4/20/2012
	Parent Sample ID				TW-21				TW-27
Analyte	**Act 2 MSC (Residential, Used Aquifer)[1]**	**Unit**							
Explosives (SW8330)									
1,3,5-Trinitrobenzene	NSA	ug/l	0.135 U	0.125 U	0.11 U	0.1 U	0.1 U	0.1 U	0.1 U
1,3-Dinitrobenzene	1	ug/l	0.135 U	0.125 U	0.11 U	0.1 U	0.1 U	0.1 U	0.1 U
2,4,6-trinitrotoluene	2	ug/l	0.135 U	0.125 U	0.11 U	0.1 U	0.1 U	0.1 U	0.1 U
2,4-dinitrotoluene	2.1	ug/l	0.135 U	0.125 U	0.11 U	0.1 U	0.1 U	0.1 U	0.1 U
2,6-dinitrotoluene	37	ug/l	0.135 U	0.125 U	0.11 U	0.1 U	0.1 U	0.1 U	0.1 U
2-amino-4,6-dinitrotoluene	NSA	ug/l	0.135 U	0.125 U	0.11 U	0.1 U	0.1 U	0.1 U	0.1 U
2-nitrotoluene	NSA	ug/l	0.265 U	0.25 U	0.22 U	0.2 U	0.2 U	0.2 U	0.2 U
3,5-Dinitroaniline	NSA	ug/l	NA	NA	NA	0.2 U	0.2 U	0.2 U	0.2 U
3-nitrotoluene	NSA	ug/l	0.265 U	0.25 U	0.22 U	0.2 U	0.2 U	0.2 U	0.2 U
4-amino-2,6-dinitrotoluene	NSA	ug/l	0.135 U	0.125 U	0.11 U	0.1 U	0.1 U	0.1 U	0.1 U
4-Nitrotoluene	NSA	ug/l	0.265 U	0.25 U	0.22 U	0.2 U	0.2 U	0.2 U	0.2 U
HMX	400	ug/l	0.265 UL	0.25 UL	0.22 UL	0.2 U	0.2 U	0.2 U	0.2 U
Nitrobenzene	73	ug/l	0.135 U	0.125 U	0.11 U	0.1 U	0.1 U	0.1 U	0.1 U
Nitroglycerin	5	ug/l	13.5 U	12.5 U	11 U	10 U	10 U	10 U	10 U
Pentaerythritol tetranitrate	NSA	ug/l	0.65 U	0.6 U	0.55 U	0.5 U	0.5 U	0.5 U	0.5 U
RDX	2	ug/l	0.265 U	0.25 U	0.22 U	0.2 U	0.2 U	0.2 U	0.2 U
Tetryl	NSA	ug/l	0.265 U	0.25 U	0.22 U	0.2 U	0.2 U	0.2 U	0.2 U

(1) Pennsylvania Act 1995-2, known as "Act 2", established a program for recycling existing industrial and commercial sites. Values are from Chapter 250 of the Pennsylvania Code, "Administration of Land Recycling Program", Subchapter C, "Statewide Health Standards", Appendix A, "Medium-Specific Concentrations" tables, revisions effective 1/8/2011.

NSA- No Screening Level Available.

NA- Not Analyzed.

U- Not detected above the Level of Detection.

J- Value is estimated.

L-Analyte present. Reported value may be biased low. Acutal value is expected higher.

K - Estimated, biased high.

R-Rejected result. Analyte may or may not be present in the sample. Supporting data necessary to confirm result.

*-Indicates the duplicate analysis is not within control limits.

B-Not detected substantilly above the level reported in the laboratory or field blanks

N - Presumptive evidence of a compound.

Bolded values exceed Act 2 MSC (Residential, Used Aquifer).

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Table 6-15 - Groundwater - Analytical Summary of Detected Radionuclides

Location ID			MW-21			MW-22			MW-23			MW-24			MW-24		
Sample Name			MW-21 DISSOLVED			MW-22			MW-23			MW-24			MW-24 DISSOLVED		
Date Sampled			5/16/2012			5/16/2012			5/16/2012			5/16/2012			5/16/2012		
Parent Sample ID																	
Analyte	**US EPA MCL for Radionuclides**	**Unit**	Result	±TPU	MDC	Result	±TPU	MDC	Result	±TPU	MDC	Result	±TPU	MDC	Result	±TPU	MDC
Gross Alpha/Beta (724R11)																	
Alpha	15	pCi/l	1.7 U	1.6	2.5	0.8 U	1.8	0.8	0.7 U	1.4	0.7	0.5 U	1.2	0.5	0.9 U	0.98	0.9
Beta	50	pCi/l	5.9	2.7	4	7.6	2.9	4.2	5.3	2.3	3.4	6.7	3.5	3.5	5.3	1.9	2.6
Gamma Spectroscopy (724R11/783R9)																	
Radium-226	5	pCi/l	0.19 U	0.34	0.59	0.45 B	0.28	0.26	0.34 U	0.29	0.34	0.17 U	0.2	0.17	0.26 B	0.21	0.25
Radium-228	5	pCi/l	2.8	1.1	1.8	0.35 UL	0.3	0.35	0.48 J	0.25	0.42	0.25 UL	0.21	0.25	0.41 UL	0.23	0.41

Table 6-15 - Groundwater - Analytical Summary of Detected Radionuclides

	Location ID		MW-25			MW-25			MW-26			MW-27		
	Sample Name		MW-25			MW-25 DISSOLVED			MW-26			MW-27		
	Date Sampled		5/16/2012			5/16/2012			5/16/2012			5/17/2012		
	Parent Sample ID													
Analyte	**US EPA MCL for Radionuclides**	**Unit**	Result	±TPU	MDC	Result	±TPU	MDC	Result	±TPU	MDC	Result	±TPU	MDC
Gross Alpha/Beta (724R11)														
Alpha	15	pCi/l	12.1	4	4.7	1.8 U	1.8	1.8	2.8 U	2	2.8	2.2 U	1.7	2.2
Beta	50	pCi/l	24.7	6.1	7.1	10.1	3.2	4.3	17.4	3.9	4	7.5	2.8	4.1
Gamma Spectroscopy (724R11/783R9)														
Radium-226	5	pCi/l	1.15 B	0.52	0.46	1.34 B	0.5	0.19	1.1 B	0.49	0.44	0.65 B	0.31	0.19
Radium-228	5	pCi/l	1.36 L	0.4	0.43	0.9 J	0.32	0.45	0.7 J	0.28	0.42	2.05 L	0.55	0.47

Table 6-15 - Groundwater - Analytical Summary of Detected Radionuclides

	Location ID		MW-27			MW-28			MW-29			MW-30			MW-31		
	Sample Name		MW-DUP-1			MW-28			MW-29			MW-30			MW-31		
	Date Sampled		5/17/2012			5/17/2012			5/17/2012			5/17/2012			5/17/2012		
	Parent Sample ID		MW-27														
Analyte	**US EPA MCL for Radionuclides**	**Unit**	Result	±TPU	MDC	Result	±TPU	MDC	Result	±TPU	MDC	Result	±TPU	MDC	Result	±TPU	MDC
Gross Alpha/Beta (724R11)																	
Alpha	15	pCi/l	2 U	1.5	2	1.5 U	1.2	1.5	1.3 U	2	1.3	0.6 U	1	0.6	1.2 U	1.2	1.2
Beta	50	pCi/l	7	2.4	3.4	5	1.8	3	18.1	4.4	5.1	5.4	1.8	2.8	3.5 U	1.9	3.5
Gamma Spectroscopy (724R11/783R9)																	
Radium-226	5	pCi/l	1.11 B	0.45	0.2	0.22 U	0.19	0.22	1.1 B	0.46	0.3	0.23 B	0.18	0.19	0.05 U	0.13	0.05
Radium-228	5	pCi/l	1.54 L	0.43	0.41	0.46 J	0.22	0.38	0.53 J	0.24	0.39	0.15 UL	0.18	0.15	0.27 UL	0.2	0.27

Table 6-15 - Groundwater - Analytical Summary of Detected Radionuclides

	Location ID		TW-03			TW-12			TW-18			TW-21		
	Sample Name		TW-3			TW-12			TW-18			TW-21		
	Date Sampled		2/20/2012			1/27/2012			1/23/2012			1/23/2012		
	Parent Sample ID													
Analyte	**US EPA MCL for Radionuclides**	**Unit**	Result	±TPU	MDC	Result	±TPU	MDC	Result	±TPU	MDC	Result	±TPU	MDC
Gross Alpha/Beta (724R11)														
Alpha	15	pCi/l	1 J	1.0	2	**264 J**	49	22	3.3	1.6	2.1	5.1 J	1.9	2.3
Beta	50	pCi/l	5.7 J	2.3	4	**417 J**	74	44	8.9	2.4	3.3	14.9 J	3.7	4.4
Gamma Spectroscopy (724R11/783R9)														
Radium-226	5	pCi/l	0.45 J	0.30	0.34	2.8	1.1	0.6	0.58 J	0.4	0.39	0.44 U	0.36	0.48
Radium-228	5	pCi/l	0.25 U	0.25	0.49	**5.6 J**	1.8	1.3	0.98 J	0.53	0.85	1.68	0.72	0.97

Table 6-15 - Groundwater - Analytical Summary of Detected Radionuclides

		Location ID	TW-21			TW-25			TW-26			TW-27			TW-27		
		Sample Name	TW-DUP01			TW-25			TW-26			TW-27			TW-DUP4		
		Date Sampled	1/23/2012			4/20/2012			4/20/2012			4/20/2012			4/20/2012		
		Parent Sample ID	TW-21												TW-27		
Analyte	**US EPA MCL for Radionuclides**	**Unit**	Result	±TPU	MDC	Result	±TPU	MDC	Result	±TPU	MDC	Result	±TPU	MDC	Result	±TPU	MDC
Gross Alpha/Beta (724R11)																	
Alpha	15	pCi/l	2.5 J	1.5	2.3	0.47 U	0.83	1.65	2.1 U	1.6	2.4	**19.8**	3.9	2.1	**26.5**	5.1	2.6
Beta	50	pCi/l	7.1 J	2.9	4.3	9.2	2.2	2.8	14.6	3.1	2.9	24.3	4.6	3.4	28.8	5.5	4.4
Gamma Spectroscopy (724R11/783R9)																	
Radium-226	5	pCi/l	0.41 U	0.39	0.57	0.44 J	0.35	0.41	0.4 J	0.28	0.26	0.73 J	0.45	0.43	0.17 U	0.23	0.37
Radium-228	5	pCi/l	1.39	0.65	0.95	0.98 J	0.54	0.88	0.58 U	0.45	0.85	-0.03 U	0.37	0.79	-0.66 U	0.46	0.95

NSA- No Screening Level Available.

NA- Not Analyzed.

TPU- Total Propagated Uncertainty.

MDC- Minimum Detectable Concentration.

U- Not detected above the MDC.

J- Value is estimated.

L-Analyte present. Reported value may be biased low.

Acutal value is expected higher.

R-Rejected result. Analyte may or may not be present in the sample.

Supporting data necessary to confirm result.

*-Indicates the duplicate analysis is not within control limits.

B-Not detected substantilly above the level reported in the laboratory

or field blanks.

Bolded values exceed the US EPA MCL.

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Table 6-16 - Quality Control Trip Blanks - Analytical Summary of Detected Volatile Organic Compounds

Sample ID		TB-011612	TB-1-10-12	TB-1-17-12	TB12-20-11	TB-12-20-11	TB-12-22-11	TB-12-28-11	TB-12-29-11	TB-12-30-11	TB-1-23-12
Date		1/16/2012	1/10/2012	1/17/2012	12/20/2011	12/19/2011	12/22/2011	12/28/2011	12/29/2011	12/30/2011	1/23/2012
Analyte	**Unit**										
VOCs (SW8260B)											
Acetone	ug/l	12.5 U	12.5 U	12.5 U	2.5 U	12.5 UJ	12.5 U	12.5 U	12.5 U	12.5 U	12.5 U
Methylene Chloride	ug/l	2.5 U	2.5 U	2.5 U	0.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U

Table 6-16 - Quality Control Trip Blanks - Analytical Summary of Detected Volatile Organic Compounds

Sample ID		TB-1-24-12	TB-1-25-12	TB1-27-12	TB1-30-12	TB-1-4-12	TB-1-5-2012	TB-1-6-2012	TB-1-9-12	TB-2-20-12	TB-4-18-20
Date		1/24/2012	1/25/2012	1/27/2012	1/30/2012	1/4/2012	1/5/2012	1/6/2012	1/9/2012	2/20/2012	4/18/2012
Analyte	**Unit**										
VOCs (SW8260B)											
Acetone	ug/l	12.5 U	12.5 U	12.5 U	**6.2 J**	2.5 U	12.5 U	12.5 U	12.5 U	2.5 U	12.5 U
Methylene Chloride	ug/l	**0.51 J**	2.5 U	2.5 U	2.5 U	0.5 U	2.5 U	2.5 U	2.5 U	0.5 U	2.5 U

Table 6-16 - Quality Control Trip Blanks - Analytical Summary of Detected Volatile Organic Compounds

Sample ID		TB-4-19-2012	TB-4-20-12	TB-4-30-12	TB-5-16-2012	TB-5-17-2012	TB-5-2-2012	TB-5-3-2012	TB-5-4-2012	TB-TW-4-20-12
Date		4/19/2012	4/20/2012	4/30/2012	5/16/2012	5/17/2012	5/2/2012	5/3/2012	5/4/2012	4/20/2012
Analyte	**Unit**									
VOCs (SW8260B)										
Acetone	ug/l	12.5 U	2.5 U	12.5 U	12.5 U	12.5 U	12.5 U	12.5 U	12.5 U	12.5 U
Methylene Chloride	ug/l	2.5 U	0.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U

Table 6-16 - Quality Control Trip Blanks - Analytical Summary of Detected Volatile Organic Compounds

Sample ID		Trip Blank 12-16-2011	Trip Blank 12-19-2011	TRIPBLANK	TRIPBLANK	TRIPBLANK	TRIPBLANK-12-15-2011
Date		12/8/2011	12/19/2011	12/12/2011	12/13/2011	12/14/2011	12/15/2011
Analyte	**Unit**						
VOCs (SW8260B)							
Acetone	ug/l	12.5 U	12.5 U	12.5 U	12.5 U	12.5 U	12.5 U
Methylene Chloride	ug/l	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U

Table 6-16 - Quality Control Trip Blanks - Analytical Summary of Detected Volatile Organic Compounds

Sample ID		TRIPBLANK-1-31-2012
Date		1/31/2012
Analyte	**Unit**	
VOCs (SW8260B)		
Acetone	ug/l	12.5 U
Methylene Chloride	ug/l	2.5 U

Notes:

U - Not Detected.

NA - Not Analyzed.

J- Value is estimated.

L-Analyte present. Reported value may be biased low. Acutal value is expected higher.

R-Rejected result. Analyte may or may not be present in the sample. Supporting data necessary to confirm result.

All detections are boldfaced.

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Table 6-17 - Quality Control Equipment Rinse Blanks - Analytical Summary of Detected Compounds

Sample ID		MW-RB-1	RB-1-16-12	RB-1-17-12	RB-12-16-2011	RB-12-20-11	RB-12-22-11	RB-12-27-11	RB-12-29-11	RB-12-30-11	RB-1-25-12
Date		5/17/2012	1/16/2012	1/17/2012	12/16/2011	12/20/2011	12/22/2011	12/27/2011	12/29/2011	12/30/2011	1/25/2012
Analyte	**Unit**										
Metals (SW6010B)											
Aluminum	ug/l	**12.5 B**	**33.6 J**	**60.9**	**8.62 B**	**7.3 B**	25 U	25 U	**7.81 B**	25 U	25 U
Antimony	ug/l	NA	12.5 U	12.5 U	12.5 U	**142**	12.5 U	12.5 U	12.5 U	12.5 U	12.5 U
Arsenic	ug/l	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	**6.26 J**	5 U
Barium	ug/l	25 U	**14.6 J**	**31 J**	25 U	**7.67 J**	25 U	25 U	**15.9 J**	**18 J**	25 U
Calcium	ug/l	**242 J**	**4540**	**8720**	**445 J**	**800 J**	**479 J**	**294 J**	**7040**	**6940**	**762 J**
Chromium	ug/l	2.5 U	**2.92 J**	**5.07**	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	**6.51**	2.5 U
Copper	ug/l	5 U	**2.49 J**	**4.59 J**	**3.1 J**	**33.3**	5 U	5 U	5 U	5 U	**8.4 J**
Iron	ug/l	25 U	**397**	**656**	**38.4 J**	**35.7 J**	**39.1 J**	25 U	**33.3 B**	**110 B**	**53.4**
Lead	ug/l	3 U	**2.7 J**	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U
Magnesium	ug/l	**52.9 J**	**883 J**	**1800**	**51.9 J**	**117 J**	**72.2 J**	**56.6 J**	**1550**	**1440**	**131 J**
Manganese	ug/l	5 U	**4.83 J**	**7.82 J**	**7.16 J**	5 U	5 U	5 U	**2.62 J**	**3.36 J**	5 U
Nickel	ug/l	10 U	10 U	10 U	10 U	**32.5**	10 U	10 U	10 U	10 U	10 U
Potassium	ug/l	500 U	**141 J**	**369 J**	500 U	500 U	500 U	500 U	**246 J**	**270 J**	500 U
Silver	ug/l	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	**1.91 B**	2.5 U	2.5 U	2.5 U
Sodium	ug/l	**791 B**	**3170**	**6460**	**792 J**	**252 J**	**196 J**	**259 J**	**4960**	**4880**	**1310**
Thallium	ug/l	10 U	**3.85 B**	10 U	**3.58 J**	**126**	10 U	**3.36 J**	10 U	10 U	10 U
Zinc	ug/l	**17.1 J**	**75.3**	**137**	**15.2 J**	**13.4 J**	**9.49 J**	10 UL	**11.5 B**	**11.6 B**	10 U
Metals (SW6020)											
Antimony	ug/l	**0.29 J**	NA	NA	NA	NA	NA	NA	NA	NA	**0.17 J**
Barium	ug/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	ug/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	ug/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	ug/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	ug/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	ug/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	ug/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	ug/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	ug/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	ug/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thallium	ug/l	**0.34 J**	NA	NA	NA	NA	NA	NA	NA	NA	**0.11 J**
Zinc	ug/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VOCs (SW8260B)											
Acetone	ug/l	12.5 U	12.5 U	12.5 U	12.5 U	2.5 U	12.5 U	**40 J**	**12 J**	12.5 U	12.5 U
Methylene Chloride	ug/l	2.5 U	2.5 U	2.5 U	2.5 U	**0.53 J**	2.5 U	2.5 U	**0.74 J**	**0.88 J**	2.5 U
SVOC (SW8270C &8270D)											
Bis(2-ethylhexyl) phthalate	ug/l	**0.094 J**	5 UL	5.5 UL	5 U	5.5 U	5 U	5 U	5 U	5 U	5.5 U
Chrysene	ug/l	**0.042 J**	5 U	5.5 U	5 U	5.5 U	5 U	5 U	5 U	5 U	0.055 U

Table 6-17 - Quality Control Equipment Rinse Blanks - Analytical Summary of Detected Compounds

RB-1-31-2012 1/31/2012	RB-1-5-2012 1/5/2012	RB-1-9-12 1/9/2012
25 U	**13.9 J**	**12.7 J**
12.5 U	12.5 U	12.5 U
6.07 J	5 U	**4.67 J**
6.48 J	**4.3 J**	**23.2 J**
763 J	**2130**	**8340**
2.5 U	2.5 U	2.5 U
5 U	5 U	5 U
26.4 J	**59.7**	**46.6 J**
3 U	3 U	3 U
53.8 J	**150 J**	**1710**
5 U	**4.63 J**	**3.35 J**
10 U	10 U	10 U
500 U	**81 J**	**260 J**
2 J	2.5 U	2.5 U
77.2 J	**1410**	**6120**
8.19 J	10 U	10 U
10 U	**11.5 J**	**10.2 J**
0.24 J	NA	NA
0.85 J	NA	NA
284 J	NA	NA
4.1	NA	NA
0.69 J	NA	NA
37.3 J	NA	NA
0.32 J	NA	NA
80.7 J	NA	NA
2.2	NA	NA
0.81 J	NA	NA
160 J	NA	NA
0.53 J	NA	NA
7.6	NA	NA
12.5 U	**18 J**	12.5 U
2.5 U	2.5 U	2.5 U
5.5 U	5 U	5 U
0.055 U	5 U	5 U

Notes:

U - Not Detected. B - Blank Contamination

NA - Not Analyzed.

J- Value is estimated.

L-Analyte present. Reported value may be biased low. Acutal value is expected higher.

R-Rejected result. Analyte may or may not be present in the sample. Supporting data necessary to confirm result.

All detections are boldfaced.

Table 6-18 - Investigation Dervived Waste -Summary of Analysis

		Location ID	IDW
		Sample Name	IDW-SS-062812
		Date Sampled	6/28/2012
Analyte	**TCLP**	**Unit**	
SW1030			
Ignitability		deg C	0
SW6010 TCLP			
Arsenic	5000	ug/l	< 50 U
Barium	100000	ug/l	546
Cadmium	1000	ug/l	< 15 U
Chromium	5000	ug/l	< 25 U
Lead	5000	ug/l	89.3
Selenium	1000	ug/l	< 50 U
Silver	5000	ug/l	< 25 U
SW7470 TCLP			
Mercury	200	ug/l	< 1 U
SW8081 TCLP			
Chlordane	30	ug/l	< 2.5 U
Endrin	20	ug/l	< 0.25 U
Gamma-BHC (Lindane)	400	ug/l	< 0.25 U
Heptachlor	8	ug/l	< 0.25 U
Heptachlor epoxide	8	ug/l	< 0.25 U
Methoxychlor	10000	ug/l	< 0.25 U
Toxaphene	500	ug/l	< 2.5 U
SW8082 TCLP			
Aroclor 1016		ug/l	< 2.5 U
Aroclor 1221		ug/l	< 2.5 U
Aroclor 1232		ug/l	< 2.5 U
Aroclor 1242		ug/l	< 2.5 U
Aroclor 1248		ug/l	< 2.5 U
Aroclor 1254		ug/l	< 2.5 U
Aroclor 1260		ug/l	< 2.5 U
SW8151 TCLP			
2,4,5-TP (silvex)	1000	ug/l	< 10 U
2,4-D	10000	ug/l	< 10 U
SW8260 TCLP			
1,1-dichloroethene	700	ug/l	< 12.5 U
1,2-dichloroethane	500	ug/l	< 12.5 U
2-butanone	200000	ug/l	< 60 U
Benzene	500	ug/l	< 12.5 U
Carbon tetrachloride	500	ug/l	< 12.5 U
Chlorobenzene	100000	ug/l	< 12.5 U
Chloroform	6000	ug/l	< 12.5 U
Tetrachloroethene	700	ug/l	< 12.5 U
Trichloroethene	500	ug/l	< 12.5 U
Vinyl chloride	200	ug/l	< 12.5 U
SW8270 TCLP			
1,4-dichlorobenzene	7500	ug/l	< 50 U
2,4,5-trichlorophenol	400000	ug/l	< 50 U
2,4,6-trichlorophenol	2000	ug/l	< 50 U
2,4-dinitrotoluene	130	ug/l	< 50 U
2-methylphenol	200000	ug/l	< 50 U

Table 6-18 - Investigation Dervived Waste -Summary of Analysis

		Location ID	IDW
		Sample Name	IDW-SS-062812
		Date Sampled	6/28/2012
Analyte	**TCLP**	**Unit**	
3&4-methylphenol	200000	ug/l	< 50 U
Hexachloro-1,3-butadiene	500	ug/l	< 50 U
Hexachlorobenzene	130	ug/l	< 50 U
Hexachloroethane	3000	ug/l	< 50 U
Nitrobenzene	2000	ug/l	< 50 U
Pentachlorophenol	100000	ug/l	< 50 U
Pyridine	5000	ug/l	< 50 U
SW9012			
Reactive Cyanide		mg/kg	< 0.025 U
SW9034			
Reactive Sulfide		mg/kg	22
SW9045			
Corrosivity as pH		pH units	8.89
SW8082			
Aroclor 1016		ug/kg	< 10 U
Aroclor 1221		ug/kg	< 10 U
Aroclor 1232		ug/kg	< 10 U
Aroclor 1242		ug/kg	< 10 U
Aroclor 1248		ug/kg	< 10 U
Aroclor 1254		ug/kg	< 10 U
Aroclor 1260		ug/kg	< 10 U

RCRA TCLP - RCRA TCLP, October 2009, http://www.epa.gov/osw/hazard/wastetypes/characteristic.htm
U - Not detected above the reporting limit

Table 6-19 - Temporary Well Groundwater Sampling Parameters

Monitoring Well	Date	Depth to Water During Sampling (ft)	pH (SU)	Specific Conductance (uS/cm)	Temperature (°C)	Oxidation Reduction Potential (mV)	Turbidity (NTU)	Dissolved Oxygen (mg/l)	Sampling Rate (ml/min)
TW-1	1/31/2012	16.75	6.36	682	15.17	105	484.8	3.63	500
TW-2	1/31/2012	18.40	6.41	727	16.29	87.9	83.1	2.76	500
TW-3	2/20/2012	15.20	7.07	0.659	13.27	-6.5	178.8	2.43	200
TW-4	1/26/2012	18.30	6.46	1016	15.31	55	124.3	5.15	750
TW-5	1/31/2012	14.95	6.11	2263	16.64	8.1	456.9	5.27	500
TW-6	2/20/2012	14.91	6.24	2.245	13.98	5.4	49.3	4.18	500
TW-7	1/31/2012	15.47	6.09	1581	15.49	56.4	50.6	2.93	500
TW-8	1/30/2012	12.25	6.34	1291	15.90	-11.5	64.7	1.71	500
TW-9	1/25/2012	7.85	6.64	1430	11.99	27.7	860.2	8.18	500
TW-10	2/20/2012	14.91	7.27	1.545	15.95	-20.1	(+)1000	8.42	200
TW-11	1/30/2012	7.30	7.04	892	14.62	8.4	914.8	3.03	500
TW-12	1/27/2012	6.80	7.02	936	12.98	0.7	1513.6	4.57	500
TW-13	1/24/2012	6.60	6.21	2059	16.76	-145.8	93.5	0.82	750
TW-14	1/24/2012	9.60	6.38	1309	11.82	-130.7	210.1	1.10	1000
TW-15	1/27/2012	7.68	6.19	1708	16.58	-61.4	826.2	12.45	750
TW-16	1/26/2012	8.30	6.21	1243	15.51	-99	262.6	3.86	500
TW-17	1/26/2012	8.30	6.14	749	14.99	-98.1	165.7	0.22	750
TW-18	1/23/2012	7.00	7.16	1219	11.68	-61.4	253.2	2.65	750
TW-19	1/23/2012	10.00	6.14	641	11.99	-1030	670.0	1.45	HAND
TW-20	1/27/2012	8.90	6.43	4960	13.96	-61.5	685.1	5.24	666
TW-21	1/23/2012	10.00	6.52	1636	14.45	-177.3	79.5	2.71	1000
TW-22	1/25/2012	11.30	6.26	1645	14.51	-117.9	96.9	1.01	750
TW-23	2/20/2012	17.00	6.49	3.347	12.80	-55.8	332.9	4.04	750
TW-24	1/24/2012	8.50	5.98	2204	14.42	-115.3	128.1	4.71	750
TW-25	4/20/2012	5.45	6.44	670	14.80	-95.6	51.2	2.15	750

Table 6-19 - Temporary Well Groundwater Sampling Parameters

Monitoring Well	Date	Depth to Water During Sampling (ft)	pH (SU)	Specific Conductance (uS/cm)	Temperature (°C)	Oxidation Reduction Potential (mV)	Turbidity (NTU)	Dissolved Oxygen (mg/l)	Sampling Rate (ml/min)
TW-26	4/20/2012	11.75	6.43	1076	16.06	-52.2	33.5	7.08	250
TW-27	4/20/2012	9.35	7.00	355	16.20	-63.1	212	7.38	250

Notes:

ft - feet

SU - standard unit

uS/cm - microsiemens per centimeter

°C - degrees Celcius

mV - millivolts

NTU - nephelometric turbidity units

mg/L - milligrams per liter

ml/min - milliliters per minute

Table 6-20- Permanent Well Groundwater Sampling Parameters

Monitoring Well	Date	Sampling Time	Depth to Water at Sampling (ft)	TOC Elevation	Groundwater Elevation	pH (SU)	Specific Conductance (uS/cm)	Temperature (°C)	Oxidation Reduction Potential (mV)	Turbidity (NTU)	Dissolved Oxygen (mg/l)	Sampling Rate (ml/min)
MW-21	5/16/2012	10:40	13.56	15.84	2.28	6.00	1.417	20.00	205.8	19	33.4 *	200
MW-22	5/16/2012	14:50	13.05	15.22	2.17	6.24	2.058	21.27	139.7	11.1	1.62	250
MW-23	5/16/2012	14:50	3.64	5.4	1.76	6.32	1.640	16.97	195.7	16.4	93.9 *	400
MW-24	5/16/2012	17:30	6.08	8.31	2.23	6.99	0.650	23.20	23.2	15.2	2.31	350
MW-25	5/16/2012	20:00	4.38	6.21	1.83	6.70	2.138	19.58	87.1	61.1	18.5 *	500
MW-26	5/16/2012	19:25	7.20	9.32	2.12	6.79	2.291	15.81	-142.1	16.1	0.69	400
MW-27	5/17/2012	8:55	5.45	6.71	1.26	6.23	1.707	17.27	7.5	6.88	6.01	400
MW-28	5/17/2012	15:25	6.45	9.36	2.91	6.85	0.454	15.45	34.2	14.1	4.67	400
MW-29	5/17/2012	14:10	8.60	11.03	2.43	6.62	1.967	16.28	-43.5	7.12	1.44	400
MW-30	5/17/2012	12:25	12.01	14.51	2.5	6.52	0.906	14.25	178.8	7.54	3.26	400
MW-31	5/17/2012	10:50	14.09	16.97	2.88	6.21	1.055	14.75	159.4	13.3	7.98	300

Notes:

ft - feet.

SU - standard unit.

uS/cm - microsiemens per centimeter.

°C - degrees Celcius.

mV - millivolts.

NTU - nephelometric turbidity units.

mg/L - milligrams per liter.

ml/min - milliliters per minute.

* detonotes results above the saturation level of oxygen in water

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TABLE 6-21 SUMMARY OF SOIL CONSTITUENTS OF POTENTIAL CONCERN

					Crtieria Exceeded			
		Detection Frequency	Minimum Detection	Maximim Detection	RDC MSC	RSGW MSC	IAQ MSC	NRC NUREG
Analyte	**Unit**							
Metals								NA
Aluminum	mg/kg	326/326	926	16000				NA
Antimony	mg/kg	106/326	0.43	230	X	X		NA
Arsenic	mg/kg	428/432	0.39	52.5	X	X		NA
Barium	mg/kg	326/326	6.86	899				NA
Beryllium	mg/kg	325/326	0.05	1.01				NA
Cadmium	mg/kg	297/432	0.046	7.04				NA
Calcium	mg/kg	319/326	17.9	100000				NA
Chromium	mg/kg	326/326	1.75	53.2				NA
Cobalt	mg/kg	326/326	1.18	24.4				NA
Copper	mg/kg	326/326	1.09	2150				NA
Iron	mg/kg	326/326	1820	96000				NA
Lead	mg/kg	432/432	0.81	15600	X	X		NA
Magnesium	mg/kg	326/326	200	34200				NA
Manganese	mg/kg	326/326	17.5	2560		X		NA
Nickel	mg/kg	326/326	1.8	352				NA
Potassium	mg/kg	326/326	64.6	2640				NA
Selenium	mg/kg	122/326	0.356	3.94				NA
Silver	mg/kg	17/326	0.256	3.21				NA
Sodium	mg/kg	316/326	12.4	1770				NA
Thallium	mg/kg	16/326	0.21	1.07				NA
Vanadium	mg/kg	326/326	1.29	118				NA
Zinc	mg/kg	326/326	12.2	1020				NA
Mercury	mg/kg	289/326	0.002	10.8		X		NA
Cyanide								NA
Cyanide	mg/kg	17/30	0.039	0.573				NA
Volatile Organic Compounds								NA
1,1,1-trichloroethane	ug/kg	0/306	ND	ND				NA
1,1,2,2-tetrachloroethane	ug/kg	0/307	ND	ND				NA
1,1,2-Trichloro-1,2,2-trifluoroethan	ug/kg	0/307	ND	ND				NA
1,1,2-trichloroethane	ug/kg	0/307	ND	ND				NA
1,1-dichloroethane	ug/kg	0/306	ND	ND				NA
1,1-dichloroethene	ug/kg	0/306	ND	ND				NA
1,2,4-trichlorobenzene	ug/kg	0/307	ND	ND				NA
1,2-Dibromo-3-chloropropane	ug/kg	0/307	ND	ND				NA
1,2-dibromoethane	ug/kg	0/307	ND	ND				NA
1,2-dichlorobenzene	ug/kg	0/307	ND	ND				NA
1,2-dichloroethane	ug/kg	0/306	ND	ND				NA
1,2-dichloropropane	ug/kg	0/307	ND	ND				NA
1,3-dichlorobenzene	ug/kg	0/307	ND	ND				NA
1,4-dichlorobenzene	ug/kg	0/307	ND	ND				NA
2-butanone	ug/kg	39/306	4.8	280				NA
2-hexanone	ug/kg	2/307	5.5	8.5				NA
4-methyl-2-pentanone	ug/kg	6/307	5.7	14				NA
Acetone	ug/kg	133/306	5.8	140000				NA
Benzene	ug/kg	15/306	3.5	1400		X	X	NA
Bromodichloromethane	ug/kg	0/307	ND	ND				NA
Bromoform	ug/kg	0/307	ND	ND				NA

TABLE 6-21 SUMMARY OF SOIL CONSTITUENTS OF POTENTIAL CONCERN

					Crtieria Exceeded			
		Detection Frequency	Minimum Detection	Maximim Detection	RDC MSC	RSGW MSC	IAQ MSC	NRC NUREG
Analyte	**Unit**							
Bromomethane	ug/kg	0/307	ND	ND				NA
Carbon disulfide	ug/kg	14/307	1.2	150				NA
Carbon tetrachloride	ug/kg	2/306	17	1300		X	X	NA
Chlorobenzene	ug/kg	0/306	ND	ND				NA
Chloroethane	ug/kg	0/307	ND	ND				NA
Chloroform	ug/kg	8/306	2.2	730			X	NA
Chloromethane	ug/kg	0/307	ND	ND				NA
Cis-1,2-dichloroethene	ug/kg	9/306	1.7	280				NA
Cis-1,3-dichloropropene	ug/kg	0/307	ND	ND				NA
Cyclohexane	ug/kg	3/307	2.7	6				NA
Dibromochloromethane	ug/kg	0/307	ND	ND				NA
Dichlorodifluoromethane	ug/kg	0/307	ND	ND				NA
Ethylbenzene	ug/kg	18/306	6.3	6700			X	NA
Isopropylbenzene	ug/kg	25/307	1	130000				NA
M,P-Xylene	ug/kg	0/307	ND	ND				NA
Methyl acetate	ug/kg	1/307	5.1	5.1				NA
Methyl tert-butyl ether	ug/kg	0/306	ND	ND				NA
Methylcyclohexane	ug/kg	2/307	5	19				NA
Methylene Chloride	ug/kg	36/306	1.4	35				NA
o-Xylene	ug/kg	0/307	ND	ND				NA
Styrene	ug/kg	0/307	ND	ND				NA
Tetrachloroethene	ug/kg	7/306	1.1	11				NA
Toluene	ug/kg	5/306	1.7	7.7				NA
trans-1,2-dichloroethene	ug/kg	0/306	ND	ND				NA
trans-1,3-dichloropropene	ug/kg	0/307	ND	ND				NA
Trichloroethene	ug/kg	29/306	1.6	41000		X	X	NA
Trichlorofluoromethane	ug/kg	0/307	ND	ND				NA
Vinyl chloride	ug/kg	0/306	ND	ND				NA
Semi-Volatile Organic Compounds								NA
1,1-biphenyl	ug/kg	0/318	ND	ND				NA
2,2-oxybis(1-chloropropane)	ug/kg	0/318	ND	ND				NA
2,4,5-trichlorophenol	ug/kg	0/318	ND	ND				NA
2,4,6-trichlorophenol	ug/kg	0/318	ND	ND				NA
2,4-dichlorophenol	ug/kg	0/318	ND	ND				NA
2,4-dimethylphenol	ug/kg	0/318	ND	ND				NA
2,4-dinitrophenol	ug/kg	0/318	ND	ND				NA
2,4-dinitrotoluene	ug/kg	0/318	ND	ND				NA
2,6-dinitrotoluene	ug/kg	0/318	ND	ND				NA
2-chloronaphthalene	ug/kg	0/318	ND	ND				NA
2-chlorophenol	ug/kg	0/318	ND	ND				NA
2-Methyl-4,6-dinitrophenol	ug/kg	0/318	ND	ND				NA
2-methylnaphthalene	ug/kg	2/318	240	250				NA
2-methylphenol	ug/kg	0/318	ND	ND				NA
2-nitroaniline	ug/kg	0/318	ND	ND				NA
2-nitrophenol	ug/kg	0/318	ND	ND				NA
3&4-methylphenol	ug/kg	0/318	ND	ND				NA
3,3-dichlorobenzidine	ug/kg	0/318	ND	ND				NA
3-nitroaniline	ug/kg	0/318	ND	ND				NA

TABLE 6-21 SUMMARY OF SOIL CONSTITUENTS OF POTENTIAL CONCERN

					Crtieria Exceeded			
		Detection Frequency	Minimum Detection	Maximim Detection	RDC MSC	RSGW MSC	IAQ MSC	NRC NUREG
Analyte	**Unit**							
4-bromophenyl phenyl ether	ug/kg	0/318	ND	ND				NA
4-chloro-3-methylphenol	ug/kg	0/318	ND	ND				NA
4-chloroaniline	ug/kg	0/318	ND	ND				NA
4-nitroaniline	ug/kg	0/318	ND	ND				NA
4-nitrophenol	ug/kg	0/318	ND	ND				NA
Acenaphthene	ug/kg	3/318	180	960				NA
Acenaphthylene	ug/kg	1/318	220	220				NA
Acetophenone	ug/kg	8/318	280	1800				NA
Anthracene	ug/kg	13/318	150	6100				NA
Atrazine	ug/kg	0/318	ND	ND				NA
Benzaldehyde	ug/kg	1/318	580	580				NA
Benzo[a]anthracene	ug/kg	40/318	160	10000	X			NA
Benzo[a]pyrene	ug/kg	36/318	150	8900	X			NA
Benzo[b]fluoranthene	ug/kg	51/318	150	10000	X			NA
Benzo[g,h,i]perylene	ug/kg	25/318	160	4600				NA
Benzo[k]fluoranthene	ug/kg	23/318	170	4200				NA
Benzyl butyl phthalate	ug/kg	0/318	ND	ND				NA
Bis(2-chloroethoxy) methane	ug/kg	0/318	ND	ND				NA
Bis(2-chloroethyl) ether	ug/kg	0/318	ND	ND				NA
Bis(2-ethylhexyl) phthalate	ug/kg	2/318	140	410				NA
Caprolactam	ug/kg	0/318	ND	ND				NA
Carbazole	ug/kg	3/318	160	950				NA
Chrysene	ug/kg	44/318	160	9900				NA
Dibenz[a,h]anthracene	ug/kg	5/318	210	890	X			NA
Dibenzofuran	ug/kg	1/318	540	540				NA
Diethyl phthalate	ug/kg	1/318	160	160				NA
Dimethyl phthalate	ug/kg	79/318	140	2500				NA
Di-n-butyl phthalate	ug/kg	0/318	ND	ND				NA
Di-n-octyl phthalate	ug/kg	0/318	ND	ND				NA
Fluoranthene	ug/kg	59/318	160	24000				NA
Fluorene	ug/kg	4/318	220	3900				NA
Hexachloro-1,3-butadiene	ug/kg	0/318	ND	ND				NA
Hexachlorocyclopentadiene	ug/kg	0/318	ND	ND				NA
Hexachloroethane	ug/kg	0/318	ND	ND				NA
Indeno[1,2,3-c,d]pyrene	ug/kg	22/318	150	4400				NA
Isophorone	ug/kg	0/318	ND	ND				NA
Naphthalene	ug/kg	3/318	150	820				NA
Nitrobenzene	ug/kg	0/318	ND	ND				NA
N-nitrosodi-n-propylamine	ug/kg	0/318	ND	ND				NA
N-nitrosodiphenylamine	ug/kg	0/318	ND	ND				NA
Pentachlorophenol	ug/kg	1/318	540	540				NA
Phenanthrene	ug/kg	50/318	140	20000				NA
Phenol	ug/kg	8/318	5000	74000				NA
Pyrene	ug/kg	57/318	180	21000				NA
Radionuclides								
Cesium-137	pCi/g	0/34	ND	ND				
Cobalt-60	pCi/g	0/34	ND	ND				
Radium-226	pCi/g	12/12	0.56	1.89				X

TABLE 6-21 SUMMARY OF SOIL CONSTITUENTS OF POTENTIAL CONCERN

					Crtieria Exceeded			
		Detection Frequency	Minimum Detection	Maximim Detection	RDC MSC	RSGW MSC	IAQ MSC	NRC NUREG
Analyte	**Unit**							
Uranium-238	mg/kg	1/40	2	2				
Alpha	pCi/g	30/34	1.09	4.8				
Beta	pCi/g	24/34	1.02	5.4				
Pesticides								
4,4-DDD	ug/kg	0/2	ND	ND				NA
4,4-DDE	ug/kg	0/2	ND	ND				NA
4,4-DDT	ug/kg	0/2	ND	ND				NA
Aldrin	ug/kg	0/2	ND	ND				NA
alpha-BHC	ug/kg	0/2	ND	ND				NA
alpha-Chlordane	ug/kg	0/2	ND	ND				NA
Beta-BHC	ug/kg	0/2	ND	ND				NA
delta-BHC	ug/kg	0/2	ND	ND				NA
Dieldrin	ug/kg	0/2	ND	ND				NA
Endosulfan I	ug/kg	0/2	ND	ND				NA
Endosulfan II	ug/kg	0/2	ND	ND				NA
Endosulfan sulfate	ug/kg	0/2	ND	ND				NA
Endrin	ug/kg	0/2	ND	ND				NA
Endrin aldehyde	ug/kg	0/2	ND	ND				NA
Endrin ketone	ug/kg	0/2	ND	ND				NA
Gamma-BHC (Lindane)	ug/kg	0/2	ND	ND				NA
Heptachlor	ug/kg	0/2	ND	ND				NA
Heptachlor epoxide	ug/kg	0/2	ND	ND				NA
Methoxychlor	ug/kg	0/2	ND	ND				NA
Toxaphene	ug/kg	0/2	ND	ND				NA
trans-Chlordane	ug/kg	0/2	ND	ND				NA
Polychlorinated Biphenyls								
Aroclor 1016	ug/kg	0/16	ND	ND				NA
Aroclor 1221	ug/kg	0/16	ND	ND				NA
Aroclor 1232	ug/kg	0/16	ND	ND				NA
Aroclor 1242	ug/kg	0/16	ND	ND				NA
Aroclor 1248	ug/kg	0/16	ND	ND				NA
Aroclor 1254	ug/kg	0/16	ND	ND				NA
Aroclor 1260	ug/kg	9/16	230	38000	X			NA
Explosives								
Nitroglycerin	ug/kg	0/42	ND	ND				NA
Pentaerythritol tetranitrate	ug/kg	0/42	ND	ND				NA

Notes:
Highlighted constituents are of potential concern
"X" indicates screening criteria exceeded in at least one sample
Blank cell indicates screening criteria not exceeded
mg/kg - milligram per kilogram
ug/kg - microgram per kilogram
ND - not detected above laboratory reporting limit
NA - Crtieria not applicable

TABLE 6-22 SUMMARY OF GROUNDWATER CONSTITUENTS OF POTENTIAL CONCERN

					Temporary Wells Criteria Exceeded			Permanent Wells Criteria Exceeded		
Analyte	Unit	Detection Frequency	Minimum Detection	Maximim Detection	Residential MSC	IAQ MSC	MCL	Residential MSC	IAQ MSC	MCL
Metals										
Aluminum	ug/l	36/42	6.71	296			NA			
Antimony	ug/l	40/43	0.15	9.17	X		NA			
Arsenic	ug/l	17/42	4.35	159	X		NA	X		
Barium	ug/l	42/42	22	636			NA			
Beryllium	ug/l	0/42	ND	ND			NA			
Cadmium	ug/l	5/42	0.57	1.1			NA			
Calcium	ug/l	42/42	7530	220000			NA			
Chromium	ug/l	18/42	1.12	4.19			NA			
Cobalt	ug/l	8/42	5.87	34.2	X		NA	X		
Copper	ug/l	19/42	2.02	15.1			NA			
Iron	ug/l	40/42	24	116000			NA			
Lead	ug/l	11/42	2.61	15	X		NA	X		
Magnesium	ug/l	42/42	1130	147000			NA			
Manganese	ug/l	42/42	171	7210	X		NA	X		
Nickel	ug/l	24/42	4.35	26.8			NA			
Potassium	ug/l	42/42	2320	130000			NA			
Selenium	ug/l	10/42	4.83	11.1			NA			
Silver	ug/l	1/42	2.91	2.91			NA			
Sodium	ug/l	42/42	19700	1430000			NA			
Thallium	ug/l	39/42	0.041	2			NA			
Thallium	ug/l	3/38	3.6	7.69			NA			
Vanadium	ug/l	7/42	8.23	29.9			NA			
Zinc	ug/l	28/42	6.89	60.7			NA			
Mercury	ug/l	5/41	0.098	1.34			NA			
Cyanide										
Cyanide	mg/l	1/15	0.004	0.004			NA			
Volatile Organic Compounds										
1,1,1-trichloroethane	ug/l	0/42	ND	ND			NA			
1,1,2,2-tetrachloroethane	ug/l	0/42	ND	ND			NA			
1,1,2-Trichloro-1,2,2-trifluoroethane	ug/l	0/42	ND	ND			NA			
1,1,2-trichloroethane	ug/l	1/42	1.1	1.1			NA			
1,1-dichloroethane	ug/l	10/42	1	6.6			NA			

TABLE 6-22 SUMMARY OF GROUNDWATER CONSTITUENTS OF POTENTIAL CONCERN

					Temporary Wells Criteria Exceeded			Permanent Wells Criteria Exceeded		
Analyte	Unit	Detection Frequency	Minimum Detection	Maximim Detection	Residential MSC	IAQ MSC	MCL	Residential MSC	IAQ MSC	MCL
1,1-dichloroethene	ug/l	4/42	0.63	3			NA			
1,2,3-trichlorobenzene	ug/l	0/16	ND	ND			NA			
1,2,4-trichlorobenzene	ug/l	0/42	ND	ND			NA			
1,2-Dibromo-3-chloropropane	ug/l	0/42	ND	ND			NA			
1,2-dibromoethane	ug/l	0/42	ND	ND			NA			
1,2-dichlorobenzene	ug/l	0/42	ND	ND			NA			
1,2-dichloroethane	ug/l	0/42	ND	ND			NA			
1,2-dichloropropane	ug/l	0/42	ND	ND			NA			
1,3-dichlorobenzene	ug/l	2/42	0.45	1.7			NA			
1,4-dichlorobenzene	ug/l	3/42	1.1	5.3			NA			
1,4-dioxane	ug/l	0/16	ND	ND			NA			
2-butanone	ug/l	10/42	4.8	300			NA			
2-hexanone	ug/l	10/42	2.9	80	X		NA	X		
4-methyl-2-pentanone	ug/l	12/42	7.8	220			NA			
Acetone	ug/l	19/42	6.4	260000	X		NA	X		
Benzene	ug/l	18/42	1.2	4000	X		NA	X	X	
Bromochloromethane	ug/l	0/16	ND	ND			NA			
Bromodichloromethane	ug/l	0/42	ND	ND			NA			
Bromoform	ug/l	0/42	ND	ND			NA			
Bromomethane	ug/l	0/42	ND	ND			NA			
Carbon disulfide	ug/l	1/42	0.66	0.66			NA			
Carbon tetrachloride	ug/l	1/42	6.9	6.9	X		NA			
Chlorobenzene	ug/l	4/42	1.5	6.4			NA			
Chloroethane	ug/l	0/42	ND	ND			NA			
Chloroform	ug/l	16/42	0.47	10			NA			
Chloromethane	ug/l	1/42	0.7	0.7			NA			
Cis-1,2-dichloroethene	ug/l	18/42	0.51	1400	X		NA	X		
Cis-1,3-dichloropropene	ug/l	0/42	ND	ND			NA			
Cyclohexane	ug/l	0/42	ND	ND			NA			
Dibromochloromethane	ug/l	0/42	ND	ND			NA			
Dichlorodifluoromethane	ug/l	0/42	ND	ND			NA			
Ethylbenzene	ug/l	22/42	0.59	11000	X		NA	X		
Isopropylbenzene (Cumene)	ug/l	26/42	0.68	39000	X		NA	X		

TABLE 6-22 SUMMARY OF GROUNDWATER CONSTITUENTS OF POTENTIAL CONCERN

					Temporary Wells Criteria Exceeded			Permanent Wells Criteria Exceeded		
Analyte	**Unit**	**Detection Frequency**	**Minimum Detection**	**Maximim Detection**	**Residential MSC**	**IAQ MSC**	**MCL**	**Residential MSC**	**IAQ MSC**	**MCL**
M,P-Xylene	ug/l	9/42	1	27			NA			
Methyl acetate	ug/l	0/42	ND	ND			NA			
Methyl tert-butyl ether	ug/l	7/42	0.47	21			NA	X		
Methylcyclohexane	ug/l	0/42	ND	ND			NA			
Methylene Chloride	ug/l	1/42	1200	1200	X		NA			
o-Xylene	ug/l	8/42	1.3	11			NA			
Styrene	ug/l	0/42	ND	ND			NA			
Tetrachloroethene	ug/l	9/42	12	240	X		NA	X		
Toluene	ug/l	13/42	0.54	27			NA			
trans-1,2-dichloroethene	ug/l	8/42	0.53	29			NA			
trans-1,3-dichloropropene	ug/l	0/42	ND	ND			NA			
Trichloroethene	ug/l	16/42	0.57	3600	X		NA	X		
Trichlorofluoromethane	ug/l	0/42	ND	ND			NA			
Vinyl chloride	ug/l	4/42	4.5	8.1	X		NA	X		
Semi-Volatile Organic Compounds										
1,1-biphenyl	ug/l	9/41	20	89			NA			
1,2,4,5-tetrachlorobenzene	ug/l	0/20	ND	ND			NA			
2,2-oxybis(1-chloropropane)	ug/l	0/42	ND	ND			NA			
2,3,4,6-tetrachlorophenol	ug/l	0/16	ND	ND			NA			
2,4,5-trichlorophenol	ug/l	0/42	ND	ND			NA			
2,4,6-trichlorophenol	ug/l	0/42	ND	ND			NA			
2,4-dichlorophenol	ug/l	0/42	ND	ND			NA			
2,4-dimethylphenol	ug/l	7/42	0.051	120			NA			
2,4-dinitrophenol	ug/l	0/42	ND	ND			NA			
2,4-dinitrotoluene	ug/l	0/42	ND	ND			NA			
2,6-dinitrotoluene	ug/l	0/42	ND	ND			NA			
2-chloronaphthalene	ug/l	0/42	ND	ND			NA			
2-chlorophenol	ug/l	0/42	ND	ND			NA			
2-Methyl-4,6-dinitrophenol	ug/l	0/42	ND	ND			NA			
2-methylnaphthalene	ug/l	3/42	5.5	27			NA			
2-methylphenol	ug/l	4/42	5.7	9.5			NA			
2-nitroaniline	ug/l	0/42	ND	ND			NA			
2-nitrophenol	ug/l	0/42	ND	ND			NA			

TABLE 6-22 SUMMARY OF GROUNDWATER CONSTITUENTS OF POTENTIAL CONCERN

					Temporary Wells Criteria Exceeded			Permanent Wells Criteria Exceeded		
Analyte	Unit	Detection Frequency	Minimum Detection	Maximim Detection	Residential MSC	IAQ MSC	MCL	Residential MSC	IAQ MSC	MCL
3&4-methylphenol	ug/l	7/42	9	210			NA			
3,3-dichlorobenzidine	ug/l	0/42	ND	ND			NA			
3-nitroaniline	ug/l	0/42	ND	ND			NA			
4-bromophenyl phenyl ether	ug/l	0/42	ND	ND			NA			
4-chloro-3-methylphenol	ug/l	0/42	ND	ND			NA			
4-chloroaniline	ug/l	0/42	ND	ND			NA			
4-chlorophenyl phenyl ether	ug/l	0/42	ND	ND			NA			
4-nitroaniline	ug/l	0/42	ND	ND			NA			
4-nitrophenol	ug/l	0/42	ND	ND			NA			
Acenaphthene	ug/l	17/42	0.054	20			NA			
Acenaphthylene	ug/l	4/42	0.051	0.46			NA			
Acetophenone	ug/l	16/42	6.3	12000	X		NA	X		
Anthracene	ug/l	5/42	0.15	0.64			NA			
Atrazine	ug/l	0/42	ND	ND			NA			
Benzaldehyde	ug/l	0/42	ND	ND			NA			
Benzo[a]anthracene	ug/l	2/42	0.052	0.095	X		NA			
Benzo[a]pyrene	ug/l	5/42	0.051	0.71	X		NA	X		
Benzo[b]fluoranthene	ug/l	6/42	0.051	0.66	X		NA	X		
Benzo[g,h,i]perylene	ug/l	3/42	0.12	0.62	X		NA	X		
Benzo[k]fluoranthene	ug/l	3/42	0.041	0.44			NA			
Benzyl butyl phthalate	ug/l	0/42	ND	ND			NA			
Bis(2-chloroethoxy) methane	ug/l	0/42	ND	ND			NA			
Bis(2-chloroethyl) ether	ug/l	0/42	ND	ND			NA			
Bis(2-ethylhexyl) phthalate	ug/l	14/42	0.13	0.98			NA			
Caprolactam	ug/l	0/42	ND	ND			NA			
Carbazole	ug/l	0/42	ND	ND			NA			
Chrysene	ug/l	0/42	ND	ND			NA			
Dibenz[a,h]anthracene	ug/l	1/42	0.11	0.11			NA			
Dibenzofuran	ug/l	1/42	11	11			NA			
Diethyl phthalate	ug/l	0/42	ND	ND			NA			
Dimethyl phthalate	ug/l	0/42	ND	ND			NA			
Di-n-butyl phthalate	ug/l	0/42	ND	ND			NA			
Di-n-octyl phthalate	ug/l	0/42	ND	ND			NA			

TABLE 6-22 SUMMARY OF GROUNDWATER CONSTITUENTS OF POTENTIAL CONCERN

					Temporary Wells Criteria Exceeded			Permanent Wells Criteria Exceeded		
Analyte	Unit	Detection Frequency	Minimum Detection	Maximim Detection	Residential MSC	IAQ MSC	MCL	Residential MSC	IAQ MSC	MCL
Fluoranthene	ug/l	16/42	0.04	2.1			NA			
Fluorene	ug/l	17/42	0.063	7.6			NA			
Hexachloro-1,3-butadiene	ug/l	0/42	ND	ND			NA			
Hexachlorobenzene	ug/l	0/42	ND	ND			NA			
Hexachlorocyclopentadiene	ug/l	0/42	ND	ND			NA			
Hexachloroethane	ug/l	0/42	ND	ND			NA			
Indeno[1,2,3-c,d]pyrene	ug/l	2/42	0.14	0.67			NA	X		
Isophorone	ug/l	0/42	ND	ND			NA			
Naphthalene	ug/l	25/42	0.051	160	X		NA			
Nitrobenzene	ug/l	0/42	ND	ND			NA			
N-nitrosodi-n-propylamine	ug/l	0/42	ND	ND			NA			
N-nitrosodiphenylamine	ug/l	0/42	ND	ND			NA			
Pentachlorophenol	ug/l	5/42	0.42	1.1	B		NA			
Phenanthrene	ug/l	5/42	0.075	2.6			NA			
Phenol	ug/l	18/42	9.9	90000	X		NA	X		
Pyrene	ug/l	9/42	0.04	1.3						
Radionuclides										
Alpha	pCi/l	7/23	2.5	264			X			
Beta	pCi/l	22/23	5	417			X			
Radium-228	pCi/l	14/23	0.46	5.6			X			
Radium-226	pCi/l	15/23	0.23	2.8						
Uranium-238	ug/l	25/42	0.089	1.6						
Explosives										
1,3,5-Trinitrobenzene	ug/l	0/21	ND	ND			NA			
1,3-Dinitrobenzene	ug/l	0/21	ND	ND			NA			
2,4,6-trinitrotoluene	ug/l	0/21	ND	ND			NA			
2,4-dinitrotoluene	ug/l	0/21	ND	ND			NA			
2,6-dinitrotoluene	ug/l	0/21	ND	ND			NA			
2-amino-4,6-dinitrotoluene	ug/l	0/21	ND	ND			NA			
2-nitrotoluene	ug/l	0/21	ND	ND			NA			
3,5-Dinitroaniline	ug/l	0/16	ND	ND			NA			
3-nitrotoluene	ug/l	0/21	ND	ND			NA			
4-amino-2,6-dinitrotoluene	ug/l	0/21	ND	ND			NA			

TABLE 6-22 SUMMARY OF GROUNDWATER CONSTITUENTS OF POTENTIAL CONCERN

					Temporary Wells Criteria Exceeded			Permanent Wells Criteria Exceeded		
Analyte	Unit	Detection Frequency	Minimum Detection	Maximim Detection	Residential MSC	IAQ MSC	MCL	Residential MSC	IAQ MSC	MCL
4-Nitrotoluene	ug/l	0/21	ND	ND			NA			
HMX	ug/l	0/21	ND	ND			NA			
Nitrobenzene	ug/l	0/21	ND	ND			NA			
Nitroglycerin	ug/l	0/21	ND	ND			NA			
Pentaerythritol tetranitrate	ug/l	0/21	ND	ND			NA			
RDX	ug/l	0/21	ND	ND			NA			
Tetryl	ug/l	0/21	ND	ND			NA			

Notes:
Highlighted constituents are of potential concern
"X" indicates screening criteria exceeded in at least one sample
Blank cell indicates screening criteria not exceeded
B Exceeds MSC but detected in blank
ND - not detected above laboratory reporting limit
NA - Crtieria not applicable

Table 6-23 - Soil – Areas of Interest

AOI	Zone	Constituent(s) of Concern	MSC Type	Sample Locations	Impacted Sample Depths (ft bgs)	Surface Cover Type	Estimated Area (ft^2)	Estimated Volume (yd^3)	Direct Contact Pathway Complete
1	1 and 2	Lead and arsenic	RDC/SGW	X total in Zone 1 and UBZ2-26	0-4	Grass	458116	16967	**Yes**
2	2	BAP	RDC	UBZ2-01	0-2	Grass	978	72	**Yes**
3	2	TCE	SGW	UBZ2-4	27-28	Concrete	6794	503	No (saturated)
4	2	BAP	RDC	UBZ2-9	0-3	Concrete	13544	1505	No
5	2	Lead	RDC/SGW	UBZ2-17	0-2	Grass	13744	1018	**Yes**
6	2	Aroclor 1260	RDC	T-1101	0-0.5	Bare/grass	767	57	**Yes**
7	2	Arsenic and BAP	RDC	BZ2-5	3-4	Asphalt/concrete	13130	486	No
8	2	Arsenic	RDC	BZ2-6	3-4 and 13-14	Grass/gravel	5944	2422	**Yes**
9	2	BAP	RDC	BZ2-7	0-2	Asphalt	5565	412	No
10	2	Lead	RDC/SGW	UBZ2-45	1-2	Grass/bare	6285	466	**Yes**
11	3	Arsenic, benzene, and BAP	RDC/SGW	UBZ3-08	0-2 and 39-40	Mulch	8455	626	**Yes**
12	3	Arsenic and BAP	RDC	UBZ3-07, Z3D18, Z3D19	0-2, 5-6, 11-12	Asphalt/concrete	6249	2777	No
13	3	Arsenic, BAP, BAA, BBF, TCE	RDC/SGW	UBZ3-23, -24, -38, -39, -54, and -55	0-5 ft and 12-13	Asphalt/concrete except 1 grass (24)	39560	19047	**Partial**
14	3	Arsenic, BAP, and Hg	RDC/SGW	UBZ3-41	1-3	Asphalt/concrete	8984	4326	No
15	3	Benzene	SGW	UBZ3-42	11.5-13.5	Asphalt/concrete	8657		No
16	3	BAP	RDC	BZ3-9	5-7	Asphalt/concrete	915	68	No
17	3	Arsenic	RDC	UBZ3-43 and UBZ3-44	0-3	Asphalt/concrete	11257	1251	No
18	3	BAP, BAA, BBF, DAHA	RDC	UBZ3-18	4-5	Asphalt/concrete	1232	46	No
19	3	Arsenic	RDC	UBZ3-46	5-7	Asphalt/concrete	1057	78	No
20	3	Arsenic, antimony, lead, and BAP	RDC/SGW	UBZ3-13, -32, -33, and BZ3-13	0-3	Weeds/bare/brick	14991	1666	**Yes**

Table 6-23 - Soil – Areas of Interest

21	3	Lead and arsenic	RDC/SGW	UZB3-49, -57, -58, and -63	0-5	Asphalt/concrete	33500	6204	No
22	3	Arsenic and BAP	RDC	UBZ3-62 and BZ3-15	0-2 and 5-7	Asphalt/concrete/gravel	2933	760	No
23	3	Arsenic	RDC	UBZ3-52	0-2	Asphalt/concrete/gravel	1084	80	No

BAP - Benzo(a)pyrene
BAA - Benzo(a)anthracene
BBF - Benzo(b)fluorene
DAHA - Dibenzo(a,h)anthracene
TCE - Trichloroethylene

Table 6-24 - Groundwater – Areas of Interest

AOI	Constituents fo Concern	Well Location	Comment
1	Lead	TW-01	Not detected in MW-31
2	Lower levels TCE	TW-03, MW-30, and MW-31	Potential transport from plume to west via underground utilities, lower detections do not indicate immediate source area
3	Cumene, acetone, phenol, arsenic, and lesser SVOCs/VOCs	TW-13, TW-14, TW-15, TW-16, TW-21, TW-22, TW-24, TW-26, TW-27, MW-25 through MW-29	Migration of contaminants from Honeywell (former Sunoco)
4	Arsenic	TW-20	Low ORP, arsenic leaching possible Needs further investigation, not addressed by permanent well
5	Radionuclides	TW-12	Not detected in MW-24 sample, TW sample high turbidity, presume associated with sediment
6	Benzo(b)fluorene	TW-25	Needs further investigation, not addressed by permanent well
7	TCE and PCE associated degradation products	TW-05, TW-06, TW-07, TW-08, TW-11, MW-21, MW-22, and MW-23	Source area in Area I
8	Thallium	TW-10	Needs further investigation, not addressed by permanent well
9	Manganese	Sitewide	Trenton gravel background

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7. FATE AND TRANSPORT

Identified impacts to soil and groundwater are evaluated in this section to determine the extent to which the presence of COPCs, and potential transport of COPCs, results in exposure pathways to receptors. The fate and transport of COPCs is focused primarily on soil. Groundwater is discussed in relation to soil impacts, potential sources, and in general pathway evaluation. Groundwater for the entire FUDS site (Areas I, II, and III) will be more fully characterized and complete fate and transport analysis conducted under OU 4.

7.1 CHEMICAL CHARACTERISTICS

The chemical characteristics pertinent to the fate and transport of COPCs are discussed in the following sections for the purpose of examining the mobility of COPCs through transport pathways.

7.1.1 Inorganic Compounds

The primary chemical characteristic for metals, the distribution coefficient (Kd, which measures the equilibrium partitioning ratio of adsorbed to dissolved contaminant) is summarized for each metal COPC on Table 7-1. Specific chemical characteristics are discussed in the following sections for metals with widespread impact in Area II (arsenic and lead).

7.1.1.1 Arsenic

Under oxidizing conditions, arsenic compounds tend to partition to soil; therefore, leaching does not occur to great depths. Arsenic tends to concentrate and remain indefinitely in the upper soil layers due to its immobility. Under reducing conditions, arsenic that is adsorbed to iron and manganese oxides may be released. Additionally, microbial action can result in dissolution when nutrient levels are adequate (U.S. Department of Health and Human Services [USDHHS], 2007a).

7.1.1.2 Lead

The accumulation of lead in most soils is a function of the rate of deposition from the atmosphere, and at the FFA, accumulation from lead-based paint particles may also contribute to the deposition of lead. Like arsenic, lead is retained strongly in soil with little transport through runoff to surface water or leaching to groundwater except under acidic conditions which release lead into solution. Lead is strongly sorbed to organic material in soils. Conditions that induce the leaching of lead include high concentrations of lead, the presence of materials in soil capable of forming chelates with lead, and a decrease in the pH of the leaching solution such as acid rain (USDHHS 2007b).

7.1.2 Organic Compounds

The primary chemical characteristics for organic compounds are summarized for each compound on Table 7-2. Chemical properties that determine transport and partitioning include, but are not

limited to, water solubility, organic carbon coefficient (K_{oc}), boiling point, and degradation coefficient (K). Water solubility is the measure of the ability of a compound to dissolve in water. A lower number indicates a less soluble compound, while a higher number reflects greater solubility. The boiling point is the temperature at which the vapor pressure of the liquid equals the pressure surrounding the liquid and the liquid changes into a vapor. This is an indication of the volatility of a substance. K_{oc} is a chemical's potential to bind to organic carbon in soil, and a higher number indicates a greater likelihood to bind to soil. The degradation coefficient K is an indication of a compound's persistence in the environment. Specific chemical characteristics are discussed in the following sections for organic compounds with widespread impact in Area II (BAP, chlorinated solvents, and PCBs).

7.1.2.1 PAHs

PAHs detected in soil include benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and dibenzo[a,h]anthracene. These compounds have a higher tendency than other PAHs to sorb to organic carbon, and sorption increases with increasing area of sorption particles and increased organic carbon content. PAHs have low water solubility and when they are found in groundwater, they are often sorbed to sediment within the groundwater (USDHHS 1995).

7.1.2.2 Chlorinated Solvents

TCE is moderately soluble in water. Its K_{oc} value (93) indicates high to medium mobility in soil depending on the organic carbon content, with high mobility in sandy soil. TCE in surface soils will either leach to the subsurface or volatize to the atmosphere. Its density is greater than that of water and it accordingly sinks within the water table (USDHHS 1997). Carbon tetrachloride has a high vapor pressure, and therefore releases to surface soil are expected to vaporize. Carbon tetrachloride is moderately mobile depending on the organic carbon content, and can leach to groundwater (USDHHS 2005a).

7.1.2.3 PCBs

Mixtures of PCBs were marketed by the major producer in the U.S. under the trade name Aroclor. Aroclors were identified by a four-digit numbering system in which the first two digits indicate the type of mixture and the last two digits indicate the approximate chlorine content by weight percent. One Aroclor was detected in Area II of the FFA, Aroclor 1260, which is a chlorinated biphenyl mixture with varying amounts of mono- through hepta-chlorinated homologs with an average chlorine content of 60 percent. Higher chlorinated congeners (such as Aroclor 1260) are more likely to sorb and are unlikely to migrate to groundwater due to strong binding to soil (USDHHS 2000).

7.2 SOURCES

7.2.1 Soil

The FFA is located in a complex urban environment. Soil contamination in such an environment can potentially be attributed to site-related and/or non-site-related processes (Meuser 2010).

General sources of non-site-related impact to site soils include:

- Dust deposition
- Bedrock/parent material
- Traffic sources
- Utility network pipes
- Floods

There is the potential for dust deposition where pervious surfaces exist, especially in the area of the parade ground in Zone 1 where historically undisturbed soils are present. Dust deposition is mainly the product of industrial emissions and is difficult to differentiate from traffic emissions where they occur simultaneously. COPCs deposited as dust include lead, arsenic, cadmium, copper, nickel, zinc, PAHs, and PCBs (Meuser 2010).

Analytical results from native soil samples collected throughout Area II do not indicate that bedrock or sediments of the Trenton gravel are sources of soil contamination. Traffic sources are a potential source, including I-95, which is elevated above the FFA and is located to the north of the FFA beyond Tacony Avenue. COCs associated with roads include benzene, PAHs, lead, chromium, copper, nickel, and zinc (Meuser 2010). Utility network pipes are present throughout Area II, but no direct evidence of releases from underground utilities has been observed. The FFA is located in the floodplain but no evidence of impact from floods has been observed.

General sources of site impact to site soils include:

- Fertilizer and pesticide application
- Releases of COPCs from historical or current operations (spills)
- Deposits (i.e., fill, cinders/slag material)

Pesticides were assessed in soil next to the former greenhouse in Zone 1. No indication of pesticide residue/release was reported. No releases other than those documented in Chapter 3 have been identified in Area II. Fill material is present throughout the developed areas of Area II, and identified metals and PAHs in Zones 2 and 3 appear to be associated with fill material.

7.2.1.1 Metals

Lead and arsenic are the most prevalent metals detected above screening criteria in Area II. Lead is commonly associated with paint (pre-1978) and dust from industrial operations. Onsite sources include the production of lead bullets (lead core manufacture in Bldg 216 with processes including the melting of lead billets), as well as plating and metallurgical laboratory operations. The FFA is located within a historically industrialized area of Philadelphia; other sources of airborne lead are possible, but not easily individually identifiable. Arsenic sources include lead arsenate used for pest control and chromated copper arsenate used to preserve lumber, as well as airborne dust from smelters and other industrial activities. FFA is located in a historically industrialized area of Philadelphia; several smelters were located approximately 0.9 miles to the southwest of FFA in Bridesburg on Hedley Street south of Richmond Street (USATODAY

2013). This may contribute to background concentrations of metals on FFA and surrounding areas.

Zone 1 arsenic and lead impact is mainly limited to the 0- to 6-in. depth interval. The widespread nature of exceedances and limited vertical impact indicates that the source of arsenic and lead is most likely historical deposition onto undisturbed soils, as discussed in Section 7.4.3. Potential sources for deposition include airborne dust particles and paint chips. Buildings in the observed highest concentration of lead (Buildings 1 through 5 and 14) are among the oldest buildings at the FFA and have been historically painted (JMA 1979). Sampling in historic buildings onsite confirmed lead based paint use/presence onsite (including walls and in sumps)(Battelle 1978). Buildings in Zones 2 and 3 are predominately brick exteriors versus painted surfaces such as wood or stucco as found in Zone 1. Arsenic concentrations are more widespread and do not appear to correlate directly to the lead.

Lead and arsenic impact in Zones 2 and 3 are associated with cinders/slag material as indicated on bore logs. Cinders were historically spread along railroad tracks in the southern area of Zone 3 (as indicated by circa 1977 facility site drawings/maps), and lead and arsenic impact in this area is associated with the occurrence of these cinders[7]. AOIs where arsenic and/or lead have been detected above screening criteria include AOI 13, AOI 14, AOI 17, AOI 19, and AOI 22. The cinders in this area have been covered with concrete and/or asphalt. Cinders have also been observed in fill material placed throughout Area II.

Antimony and mercury have been detected above screening criteria with lesser frequency in soils. Mercury use has been documented at the FFA; approximately 1 ton of mercury was removed at the time of base closure. Reported mercury concentrations exceeding the laboratory reporting limit (but less than the screening criterion) are most prevalent in the vicinity of Building 40 (former machine shop and foundry) and Building 42 (former lab and shop). Antimony is typically found in alloys or antimony oxide. It is used to harden ordnance and is used in lead storage batteries, solder, pipe and sheet metal, bearings, castings, and pewter. Antimony oxide is used as a fire retardant in textiles and plastics and in paints, enamels, ceramics, and fireworks. Reported antimony concentrations exceeding the laboratory limit were limited and appear to be associated with areas of fill material.

7.2.1.2 VOCs

Benzene detected above the residential SGW MSC in saturated soil is associated with groundwater AOI 3 (a source emanating from offsite), and the source is evaluated in Section 7.3.2.2.

TCE detected above the residential SGW MSC in saturated soil is associated with soil AOI 3 and groundwater AOI 7, and the source is evaluated in Section 7.3.2.2. The sample containing TCE and carbon tetrachloride detected above the residential SGW MSC in Zone 3 (UBZ3-38) was collected in the vicinity of the former railroad backstop. The source of this impact is likely a

[7] Samples were collected at the depth of the cinders and submitted for laboratory analysis, which reported detections and/or exceedances of lead and arsenic.

small-scale release related to the transfer of materials. The use of TCE is indicated by documented releases of TCE in Area I and historical documentation indicating its storage and use at FFA.

7.2.1.3 PAHs

Certain PAHs, a subset of SVOCs, were detected above their respective MSCs, with BAP being the most prevalent. PAHs form during the incomplete burning of oil, coal, gas, garbage, wood, or other inorganic substances (such as charbroiled meat and tobacco). They generally occur as complex mixtures and not as individual compounds. PAHs are used to make dyes, plastics, and pesticides and are contained in asphalt. They can be found in roofing tar, coal, coal tar pitch, creosote, and crude oil. It should be noted that a coal tar plant was located on the adjacent Honeywell Frankford Facility from the late 1800s to early 1900s. No single point source for PAHs can be identified based on their widespread occurrence; in general, they are detected in fill material (USDHHS 1995). AOIs where PAHS were detected above screening criteria include AOI 2, AOI 7, AOI 9, AOI 12, AOI 13, AOI 14, AOI 16, AOI 18, AOI 20, and AOI 21. The majority of affected soils in these AOCs was observed to be fill material.

7.2.1.4 Radionuclides

Potassium-40 (^{40}K) has been detected across Area II at concentrations exceeding the USNRC NUREG screening criterion with a maximum detection of 18.9 pCi/g and average detection of 7.9 pCi/g. Detections of ^{40}K in native soils varies from 1.6 to 22 pCi/g and averages 11 pCi/g (Zikovsky and Blagoeva 1994). Reported concentrations in Area II are within naturally occurring background.

Radium-226 (^{226}Ra) has been detected above the USNRC NUREG screening criterion with a maximum detection of 1.89 pCi/g and average detection of 1.36 pCi/g. Radium was historically used at the FFA in research and development and production of watch dials, fire control system dials, and other applications. Research and production work involving radium was spread throughout the FFA. In Area II, Building 23 was used for activities and storage, as were Buildings 109, 201, and 202. Previous investigations (as discussed in Section 2) have indicated that radionuclides were removed and the site cleaned up to acceptable levels for unrestricted use. The site-specific cleanup criterion for ^{226}Ra was set at 3 pCi/g (Rockwell 1981). Reported concentrations of radium are consistent with naturally occurring background concentrations in soil, and they do not exceed the site-specific surface soil cleanup criterion of 3pCi/g.

7.2.1.5 PCBs

PCBs were widely used as lubricants and coolants in electrical equipment, including transformers, because they do not burn easily and are good insulating materials. Their manufacture ceased in the U.S. in August 1977. Aroclor 1260 was detected at concentrations in soil exceeding the RDC MSC. Impacted soil is located adjacent to the concrete transformer pad at transformer station T-1101 and is the result of a release from this transformer station.

7.2.2 Groundwater Sources

Potential sources of groundwater contamination include:

- Releases directly to groundwater as a result of a spill
- Leaching from the aquifer matrix
- Migration of contamination from overlying soils
- Migration of contamination from offsite

7.2.2.1 Metals

Arsenic is associated with groundwater AOI 3. Reducing conditions as indicated by negative oxidation-reduction potential (ORP) have been observed in this AOI, and leaching of arsenic is likely occurring due to these reducing conditions.

Manganese groundwater concentrations exceed the residential MSC throughout Area II. The median manganese concentration regionally in the Trenton gravel is reported to be 1,400 µg/L, which exceeds the MSC of 300 µg/L. The elevated background concentrations are attributed to chemical reactions involving oxygen and organic substances in groundwater that may leach manganese from the aquifer matrix (USGS 1991).

7.2.2.2 VOCs

There are two distinct sources of VOC impact in groundwater, consisting of chlorinated solvents associated with groundwater AOI 7, and acetone cumene and associated other VOCs listed below associated with AOI 3. The source of chlorinated solvents in AOI 7 is located in Area I in the vicinity of Building 47/48 and the source area for AOI 7 is further discussed in the RI for Area I.

Acetone and cumene appear to be migrating into Area II from the west from a non-DoD source. The Honeywell Frankford Facility (formerly Sunoco and Allied Signal) is located to the west of the FFA (across Bridge Street). The Honeywell Frankford Facility manufactures acetone and phenol from cumene with secondary bi-products of alpha-methylstyrene and cumene hydroperoxide. Synthetic phenol plants were constructed at the Honeywell Frankford Facility during World Wars I and II, phthalic anhydride operations occurred from 1937 to 1972, and the synthetic phenol by cumene process has been used at the Honeywell Frankford facility since 1954. Prior to the Honeywell Frankford Facility, a coal tar plant was located at this site from the late 1800s to early 1900s.

A light non-aqueous phase liquid (LNAPL) plume was discovered in the central portion of the adjacent Honeywell Frankford Facility in 1984. RCRA interim measures were authorized by USEPA in 1993 to recover LNAPL, and a pumping system was installed in 1994. A recovery trench was added to this system in December 2000, and continuous pumping of this system has occurred since 2001. As of December 2011, a total of 456,354 gallons of LNAPL have been recovered, with a total of 23,912 gallons recovered between July and December 2011.

Reporting to USEPA (MWH Americas, Inc. 2004) indicates no migration of contaminated groundwater offsite of the Honeywell Frankford Facility; however, it should be noted that there are no offsite wells included in that evaluation. Shallow and deep "areas of contaminated groundwater" in overburden groundwater have been reported at the Honeywell Frankford Facility. Reported VOC impact to groundwater detected in groundwater (above screening criteria) at the Honeywell Frankford Facility includes: acetone, benzene, chlorobenzene, ethylbenzene, cumene, styrene, toluene, and xylenes. Of these, acetone, benzene, cumene, and ethylbenzene have been detected above their respective MSCs in groundwater AOI 3.

MTBE was detected in MW-23 above the residential MSC. MTBE is an additive to unleaded gasoline used to enhance octane ratings. Its use began in the 1980s, after active DoD use of the FFA; therefore, it is not related to DoD use of the FFA. Due to its high solubility, it typically travels faster and further than other components of unleaded gasoline. The presence of MTBE indicates a potential release of unleaded gasoline upgradient of this well.

7.2.2.3 SVOCs

SVOCs detected above their respective MSCs associated with the offsite Honeywell Frankford Facility include: acetophenone, acenapthalene, bis(2-chloroethyl) ether, carbazole, dibenzofuran, 2, 4 dimethylphenol, 2-methylnaphthalene, naphthalene, phenol, and pyrene (MWH Americas, Inc. 2004). Of these, acetophenone, naphthalene, and phenol have been detected above their respective MSCs in groundwater throughout AOI3. BAP, benzo(b)fluoranthene, benzo[g,h,i]perylene, and indeno[1,2,3-c,d]pyrene were also detected above their respective MSCs in MW-21. These compounds were not detected above the SGW MSCs in soil. An onsite source of this deep overburden groundwater impact is not apparent.

7.2.2.4 Radionuclides

Gross alpha, gross beta, and ^{226}Ra were detected at concentrations exceeding the MCL in TW-12. The turbidity levels in this temporary well were in excess of 1,500 NTU. Subsequently a permanent monitoring well (MW-24) was placed in this location. The final turbidity level during the June 2012 sampling event was 15 NTU and levels of gross alpha, gross beta, and ^{226}Ra did not exceed screening criteria. It can be concluded that the high sediment load in the TW-12 sample affected the radionuclide analysis (e.g., detections were related to the sediment and not water). Additional sampling of MW-24 is warranted to confirm that these radionuclides are not present above their respective screening criteria.

7.3 IMPACT OF PHYSICAL CHARACTERISTICS ON FATE AND TRANSPORT

The following sections are intended to highlight physical characteristics that can affect the fate and transport of COPCs.

7.3.1 CSM Update

Soil boring and well lithological and hydrogeologic data collected during field activities provided data used to elaborate on the preliminary CSM presented in the FSP (EA 2011b). Specifically, a more precise understanding of the overburden lithology and a general understanding of groundwater flow were expanded through the advancement of a total of 142 characterization and delineation soil borings, 27 temporary wells, and 11 permanent monitoring wells in Area II.

Much of the FFA is underlain with fill material consisting of cinders, silt, bricks, concrete, wood, sand, silt, and gravel which is present to depths of 13 ft bgs, but more typically present to depths of less than 5 ft bgs in the developed areas of Area II. Fill material deposits are thicker in the west and more common in areas surrounding buildings and underground utilities. Fill material is absent or thin (less than 1 ft bgs) in areas where manicured lawn is present such as the parade ground. Overall a general fining upward alluvial sequence is present in the native sediment deposits overlying the bedrock. Silts are present to depths of 10 ft bgs in areas where fill is not present. Coarser grained sediments composed mostly of poorly sorted sands underlie the silt from approximately 10 ft bgs to depths of 40 ft bgs. Silty sands occur overlying poorly sorted sands in the eastern portion of Area II. Well-sorted sands are less common and typically occur in lenses. Large, dense gravel and cobble deposits occur within discrete beds and are more prominent in the northern portion of the FFA parallel to Tacony Street.

Clays with peat were observed in the southwest portion of Area II in the vicinity of buildings 201 and 202 to depths of at least 15 ft bgs. Peat content decreases to the east. Along the southwest corner of building 208 these clays are present to approximately 35 ft bgs, overlying sands. Throughout the remainder of Area II rare small-scale clay lenses/beds were observed, and where borings were advanced to bedrock, clays were observed overlying the bedrock. Bedrock composed of weathered schist was observed from 34 to 44 ft bgs where borings were advanced to refusal.

Groundwater flow in shallow overburden wells is generally to the south towards Frankford Creek. An area of slightly elevated groundwater was observed in MW-28; this is likely due to a ponding effect due to less permeable clays being present to the south between MW-28 and Frankford Creek. The hydraulic gradient in the shallow overburden ranges from 0.0006 to 0.0009 ft/ft, with 0.0009 ft/ft being more representative of the shallow overburden. Groundwater flow in deep overburden wells is generally to the south-southwest towards Frankford Creek. The hydraulic gradient in the deep overburden ranges from 0.0003 to 0.0006 ft/ft, with 0.0005 ft/ft being the average value. In both the shallow and deep overburden wells, the hydraulic gradient increases in wells closer to Frankford Creek. Additional investigation to be conducted under the OU 4 investigation will further evaluate potential connectivity between the shallow and deep overburden portions of the unconfined aquifer.

7.3.2 Impervious Surfaces

Impervious surfaces such as improvements, concrete, and asphalt cover a majority of the surface area of Area II, and Figure 3-4 illustrates these areas. The impervious surfaces act as barriers to

direct contact pathways to human and ecological receptors. They also limit the recharge received to soil and groundwater which reduces the downward migration of any contaminants present. Aside from the area surrounding the parade ground, the majority of runoff from rain events is discharged into the FFA stormwater system rather than being absorbed into soil. In areas of impacted soils, this limits the vertical transport of contaminants through pore water transport through the soil column to the water table.

7.3.3 Preferential Pathways

Tunnels and underground utilities (gas, electrical, sewer, and water) connect every building in Area II to one another as illustrated on Figure 3-1. It should be noted that underground utilities are more extensive than depicted; full gas, water, and electrical lines are not completely illustrated, but are available on historical maps from the 1970s. Disturbed soil and gravel or sand sub-base immediately surround the buried underground features, and this sub-base fill material is often of a higher relative porosity than the surrounding native soils.

Underground tunnels are typically 3.5 ft wide and 6.5 ft tall and are accessed by entrances located throughout the FFA. Utilities range from 2 to 3 ft bgs up to depths greater than 20 ft bgs for the stormwater and sewer lines located parallel to Frankford Creek. Portions of these features that are located below the groundwater table provide preferential pathways for the transport of contaminants in groundwater.

The influence of these preferential pathways is most evident in groundwater AOI 3. Groundwater impact, consisting primarily of acetone, cumene, and phenol, appears to be following underground utility preferential pathways and site geology from the source area offsite to the west and into the western portion of Area II (illustrated in Figure 7-1).

The presence of TCE in MW-30 and MW-31 could potentially be attributed to a halo effect associated with preferential pathways as opposed to being the results of a release of TCE in Zone 1. A tunnel system runs east-west north of the parade ground; a defined plume of chlorinated solvents straddles the Area I and Area II boundary along Baird Street to the east.

7.3.4 Geologic and Hydrogeologic Features

Site geology and hydrogeology are summarized in Sections 3.3 and 3.4, respectively. The presence of historically undisturbed soils in Zone 1 and preferential groundwater flow based on site geology are to be noted in respect to contaminant fate and transport.

The area surrounding the parade ground in Zone 1 is where the earliest buildings were constructed at the FFA starting in 1815. Since that time, soils in this area have been subject to little disturbance other than placement of underground utilities and tunnels and the construction of improvements over time. Based on personal communications with a tenant, “Victory Gardens” were located along the stone wall on the north side of Zone I north of Buildings 4 and 6. Other noted soil disturbances include more than 300 archaeological test pits located on the nodes of a 10-ft-spaced grid system covering Zone 1 along with 6 test pits located in the center of the parade ground.

Despite the noted disturbances, the majority of the surface area is undisturbed manicured lawn. Almost 200 years of this undisturbed state has allowed for the deposition of dust particles and paint chips and receipt of runoff from improvements onsite of the FFA including any suspended sediments. The extensive lead and arsenic impact to shallow surface soils is more likely attributed to these forms of deposition over time versus a single incident leading to impact (such as a release). Anomalous subsurface detections of lead and/or arsenic impact could be attributed to soil disturbances discussed above.

Site geology affects the flow of groundwater and the transport of contaminants. As discussed in the CSM, clays and peaty clays are present in the southwest corner of Zone 2 in the vicinity of Buildings 201 and 202. Sand and gravel beds are present to the north and east of these clay beds. In cross-section, gravels are concentrated in lens-shaped beds, indicating the presence of a paleochannel. These coarse-grained beds have a higher relative hydraulic conductivity compared to the clays and peaty clays, which act as a three dimensional barrier to groundwater flow. During the first groundwater sampling event, apparent ponding of groundwater was observed in MW-25. General regional shallow overburden groundwater flow is from the north to south towards Frankford Creek. As flow encounters this clay bed it appears to pond slightly, following sand and gravel beds to the east (as illustrated in Figure 7-1).

7.4 CONTAMINANT FATE

7.4.1 Metals

Arsenic and lead are the most prevalent COPCs in Area II; antimony, manganese, and mercury are present in discrete areas. Arsenic and lead, and other metals in general, are retained strongly in soil with little transport through runoff to surface water or leaching to groundwater except under acidic conditions. Therefore, they persistent in soil indefinitely unless transported by wind or dissolution into pore or ground water. The majority of Area II is covered with impervious surfaces, and those that are not are covered by a vegetated mat, making movement of metals in soil via fugitive dust emissions insignificant.

Metals in soils saturated by water with reducing conditions may facilitate leaching into groundwater. This appears to be the case in AOI 3, where reducing conditions were observed and arsenic is reported at concentrations exceeding screening criteria. Based on data gathered to date, lead does not appear to be impacting groundwater.

7.4.2 PAHs

PAHs in soil can undergo abiotic degradation, volatilize, accumulate in plants, or biodegrade. Once in soils PAHs can also enter groundwater, but in general they have low water solubilities. BAP mainly partitions to soil and sediment; therefore, BAP present in soils in Area II is likely to remain in soil (USDHHS 1997). Degradation coefficients for specific PAHs are summarized on Table 7-2.

7.4.3 Chlorinated Solvents

The most prevalent chlorinated solvent in soil is TCE. TCE in soil can volatilize into air and enter groundwater (USDHHS 1997). It has a high to medium mobility in soil, although unsaturated occurrences of TCE at the FFA occur under impervious surfaces (concrete and asphalt). The lack of movement of recharge through the soil column is likely to hinder the transport downward towards the water table. Under the correct conditions degradation will occur. One daughter product, cis-1,2-dichloroethene, was detected in soil in association with TCE and PCE. Limited degradation appears to be occurring in soil due to the limited detection of daughter products in soil. Degradation coefficients for specific VOCs are summarized on Table 7-2.

7.4.4 PCBs

PCBs in soils can volatilize into air (less likely with higher congener PCBs) but are not likely to enter groundwater because they sorb strongly to soil. Aroclor 1260 is more persistent than lower congener PCBs. Biodegradation is the major degradation process for PCBs; photolysis of PCBs from surface soil may occur, and PCBs may also undergo base-catalyzed dechlorination (USDHHS 2000). PCBs at the FFA are present in surface soils adjacent to transformers, and they are likely to remain in soil with limited biodegradation.

7.5 PATHWAY ANALYSIS

Analysis of identified impact in soil and groundwater requires the integration of RI results into the conceptual site model to evaluate pathways to current or future receptors. The following sections evaluate the potential pathways from the impacted source to receptors.

7.5.1 Direct Contact to Receptors

7.5.1.1 Soil Direct Contact

The pathway for direct contact to site soils is complete in areas of the FFA where soils are exposed (as discussed in Section 3.7.2 and illustrated in Figure 3-2). Direct contact to human receptors from identified impact in site soils is evaluated in detail in the Human Health Baseline Risk Assessment included in Chapter 8. Direct contact to ecological receptors from identified impact in site soils is evaluated in the Screening Level Ecological Risk Assessment included in Chapter 9.

7.5.1.2 Groundwater Direct Contact

The pathway for direct contact to groundwater is currently not physically complete at the FFA for consumption of groundwater due the lack of potable wells onsite. However, no institutional controls are currently in place to prevent the placement of a potable well onsite; therefore, future pathway completion is possible. Risk to human and ecological receptors will be evaluated under the OU 4 groundwater RI.

7.5.2 Indoor Air Quality

Vapor intrusion from the volatilization of organic compounds in groundwater and soil sources must be evaluated in order to assess the potential to impact indoor air quality at sites where inhabited buildings are within 100 ft of a source. Given the distribution of inhabited buildings in Area II and the potential for future habitation, all potentially volatile compounds were screened to the Pennsylvania Act 2 default screening levels for soil and groundwater. In order for the use of screening criteria to be valid, neither free product nor any preferential pathways can be present. No free product was observed during any of the soil boring or well installation activities. Preferential pathways such as underground utilities and tunnels are present in Area II. Specific locations that exceed screening criteria are individually evaluated for the presence of preferential pathways. Where preferential pathways are present, soil vapor sampling or indoor air sampling is recommended since modeling does not account for transport along preferential pathways.

7.5.2.1 Soil Vapor Intrusion

For the evaluation of soils with a residential use the following rationale was used for evaluation of soil:

- Compounds of potential indoor air concern (COPIACs) were screened against the Pennsylvania Defaults Residential Volatilization to Indoor Air Screen values for soil as presented in Table 4 (Soil Screening Values for Protection of Indoor Air – Residential) of the *Land Recycling Program Technical Guidance Manual* (TGM) Section IV.A.4.

- Non-COPIACs were compared to the SGW MSC for a used aquifer.

- In order for use of both screening criteria to be valid, 5 ft of soil-like material (not sand or fill) must be present between the water table and the ground surface. Individual locations were evaluated to determine if 5 ft of soil-like material was present.

- Results for saturated samples were not evaluated.

- For compounds not exceeding screening criteria and meeting the above requirements, no further action is required.

- For compounds failing the above screening criteria and if preferential pathways (such as underground utilities and tunnels) exist within 30 ft, soil vapor or indoor air sampling is recommended.

The general screening of compounds analyzed in soil is presented in Table 7-3. The maximum detection for each compound was used to complete general screening to determine IAQ compounds for further evaluation. Compounds that did not exceed the appropriate screening criteria are not considered for further evaluation. Table 7-4 summarizes individual samples that exceed screening criteria. Johnson and Ettinger modeling was not completed for soil due to the presence of preferential pathways.

It was noted that there were exceedances of Default Residential Volatilization to Indoor Air Screening Values for soil at sample location UBZ3-SO-38 (carbon tetrachloride, chloroform, and TCE) and location UBZ3-SO-55 (pyrene). These exceedances present a potential vapor intrusion source.

7.5.2.2 Groundwater

For the evaluation of groundwater with a residential use, the following rationale was used for evaluation of groundwater:

- COPIACs were screened against the residential groundwater MSC for used aquifers.
- Non-COPIACs were screened against the residential non-use MSC.
- In order for use of the above screening criteria to be valid, 5 ft of soil-like material (not sand or fill) must be present between the water table and the ground surface. Individual locations were evaluated to determine if 5 ft of soil-like material was present.
- For locations where groundwater was less than 5 ft bgs, values were screened against the Pennsylvania default screening levels as presented in Table 1 (Groundwater Screening Values for Protection of Indoor Air – Residential) of the TGM Section IV.A.4.
- For compounds not exceeding screening criteria and meeting the above requirements, no further action is required.

The general screening of compounds analyzed in soil is presented in Table 7-5. The maximum detection for each compound was used to complete general screening to determine IAQ compounds for further evaluation. Table 7-6 summarizes individual samples that exceed screening criteria. Compounds that did not exceed the appropriate screening criteria are not considered for further evaluation.

There is potential for vapor intrusion in the area near MW-27 from benzene; however the groundwater impact is not FUDS related.[8]

7.5.3 Soil to Groundwater

Soil results were screened to the residential SGW MSCs as presented in Section 6.2. Five metals (antimony, arsenic, lead, manganese, and mercury) and three VOCs (benzene, carbon

[8] Compounds were detected in soils and groundwater that are associated with processes at the adjacent Honeywell Frankford Facility (including benzene as presented in Section 7.2.2.2). While these chemicals were analyzed for contribution to risk and impact to receptors via vapor intrusion, DoD is not claiming responsibility for any particular chemical in the Remedial Investigation and Risk Assessment.

tetrachloride, and TCE) were reported at concentrations above their respective residential SGW MSCs, as summarized on Table 7-7.

Antimony was detected at four locations in Zone 3 at concentrations above the residential SGW MSC of 27 mg/kg. Of those, three samples exceeded the MSC from the 0 to 2 ft bgs interval (UBZ3-1, -19, and -58) and one from the 5 to 7 ft bgs interval (UBZ3-63). Antimony was not detected at concentrations above the laboratory reporting limit in any of the temporary or permanent monitoring wells; therefore, there is no indication that migration to groundwater has occurred.

Reported arsenic concentrations exceeded the residential SGW MSC of 29 mg/kg at 8 locations: three in the 0 to 6 in. bgs interval, one in the 0.5 to 2.5 ft bgs interval (UBZ3-SO-39), one in the 5 to 6 ft bgs interval (UBZ3-SO-7), one in the 5 to 7 ft bgs interval (UBZ3-SO-63), one in the 12 to 13 ft bgs interval (UBZ3-SO-24), and one in the 13 to 14 ft bgs interval (BZ2-SO-6). As discussed in Section 7.2.1.1, arsenic tends to concentrate and remain indefinitely in upper soil layers due to its immobility. Therefore, arsenic impact in surface soils is not likely to impact groundwater. Deeper impacted soils, close to or below the groundwater table, pose a risk of a release to groundwater under certain conditions. Groundwater has been observed to occur from approximately 5.5 to 17 ft bgs (varying from 2 to 2.75 ft amsl) with shallower depths occurring towards Frankford Creek and deeper depths towards Tacony Street. Under reducing conditions, arsenic that is adsorbed to iron and manganese oxides may be released; for saturated impact in reducing areas this is a concern. Arsenic groundwater concentrations exceeding the residential MSC have been reported in the groundwater AOI 3 (acetone, cumene, benzene impact). Reducing conditions as indicated by negative ORP have been observed in AOI 3, and leaching of arsenic is likely occurring due to these reducing conditions.

Lead was detected above the residential SGW MSC of 450 mg/kg at 42 locations.[9] Of those, 29 locations exceeded in the 0 to 6 in. interval, 8 locations exceeded in the 0 to 2 ft bgs interval, 1 location exceeded in the 0 to 2.5 ft bgs interval (UBZ3-SO-39), 1 location exceeded in the 4-5 ft bgs interval (UBZ3-SO-49), 2 locations exceeded in the 2 to 3 ft bgs interval, and 1 location exceeded in the 5 to 7 ft bgs interval (UBZ3-SO-63). As discussed in Section 7.2.1.2, lead is retained strongly in soil with little transport through runoff to surface water or leaching to groundwater except under acidic conditions, which put lead into solution. Leaching of lead from surface soil impact, particularly the widespread impact from 0 to 6 in., does not appear to be occurring based on the observation of concentrations of lead not exceeding MSCs, in underlying native soils. The two locations with deeper impact, UBZ3-49 and UBZ3-63, currently are covered with asphalt, which prevents further migration downward that could lead to impact to groundwater.

Of the 27 temporary wells and 11 permanent monitoring wells, lead was detected above the MSC (5 µg/L) in TW-1 at a concentration of 6.38 µg/L and MW-25 with a concentration of 15 µg/L.

[9] As noted in Section 7.2.1.1., potential sources for deposition include airborne dust particles and paint chips. Buildings in the observed highest concentration of lead (Buildings 1 through 5 and 14) are among the oldest buildings at the FFA and have been historically painted (JMA 1979). Paint was observed to be peeling from some of these structures during the RI.

Subsequent installation and sampling of a permanent monitoring well (MW-31) at the location of TW-1 indicate that lead was not detected above the laboratory reporting limit. MW-25 is located within groundwater AOI 3 (acetone, cumene, benzene impact), and reducing conditions as indicated by negative ORP have been observed in this AOI. Leaching of lead may be occurring due to these reducing conditions.

Manganese was detected above the residential SGW MSC of 2,000 mg/kg at one location, UBZ2-32, with a concentration of 2,650 mg/kg. Manganese was reported at a concentration of 293 mg/kg in the sample collected in the 6 to 7 ft bgs interval, which is below the SGW MSC. Manganese has been detected above the MSC in groundwater across Area II and is attributable to formation background concentrations, as discussed in Section 7.3.2.1.

Mercury was detected above the residential SGW MSC of 10 mg/kg at one location (UBZ3-41) in the 1 to 3 ft bgs interval. Mercury was reported at an estimated concentration of 0.136 mg/kg in the sample collected in the 7 to 8 ft bgs interval, which is below the SGW MSC. This location is currently covered with asphalt, which prevents further migration downward that could lead to impact to groundwater. Subsequent placement of a temporary well (TW-16) and permanent well (MW-27) in the immediate vicinity of this well indicates no mercury impact to groundwater.

Benzene was detected above the residential SGW MSC (500 µg/kg) at two locations (UBZ3-08 and UBZ3-43) in two saturated samples. Benzene has been confirmed in groundwater at these locations through the placement of TW-22/MW-29 and TW-16/MW-27. The presence of benzene in groundwater is due to migration of contaminated groundwater from an offsite source as discussed in Section 7.2.2.2.

Carbon tetrachloride and TCE were detected above the residential SGW MSC at one location (UBZ3-SO-38) in the 0 to 2 ft bgs interval. Carbon tetrachloride was not detected above the laboratory reporting limit, and TCE was detected below the residential SGW MSC in the sample collected from the 10 to 12 ft bgs interval at this location. This location is currently covered with concrete, which prevents further migration downward that could lead to impact to groundwater. Results from a temporary well (TW-17) located downgradient indicate that neither carbon tetrachloride nor TCE were detected above laboratory reporting limits in the groundwater sample.

7.5.4 Soil to Surface Water

As previously discussed, the majority of soils in Area II are covered by impervious surfaces, and those that are not are covered by vegetation or gravel. Runoff from precipitation events at the FFA either is absorbed into the ground in pervious areas or is received by the stormwater drain system as runoff from impervious surfaces. The smaller diameter storm and sanitary sewer lines that run throughout the site connect into two main storm and sanitary sewer lines that converge southeast of the intersection of Hanger Road and Baird Street. Storm sewers discharge to the pump house (Building 218) where it is conveyed to Frankford Creek. The sanitary sewer main flows to the east paralleling Frankford Creek, where it combines with the larger (10 by 11 ft) Delaware Connector via an interceptor chamber east of Building 307. A sewer line then continues south, under Frankford Creek, to the city publicly owned treatment works. In the

event of heavy rains, excess flow can bypass the sewer interceptor into the lower segment of the Sanger Street sewer and discharge to the Delaware River.

7.5.5 Groundwater to Surface Water

Shallow and deep overburden groundwater flow, as discussed in the CSM, is towards Frankford Creek. There is the potential of contaminants to infiltrate into Frankford Creek; this will be evaluated under the OU 4 groundwater RI.

7.6 SITE-SPECIFIC SOIL BACKGROUND DATA EVALUATION

Lead and benzo(a)pyrene were identified by the human health risk assessment as constituents of concern necessitating further action at certain locations within Area II of the FFA. It was recognized that anthropogenic sources for these constituents are likely present onsite; however, the FFA is part of a complex urban setting which makes it difficult to obtain unbiased background soil data on or around the Area II site. Therefore, EA conducted an evaluation of the data to try and extract site-specific background data from existing site data (i.e. to distinguish background from non-background-related subpopulations within the Area II soil database) for both lead and benzo(a)pyrene. This approach included:

- Generation of spatial contour plots (Q-Q plots) using ProUCL version 5.0 for surface soil and total soil (surface and subsurface) data collected during the RI for Area II FFA. [The Q-Q plots are a graphical method of comparing two probability distributions by plotting their quantiles (Q) against each other to determine if contamination is spatially correlated].
- Conducting a visual examination of the COPC's cumulative frequency distribution plot to determine if there are subpopulations within the installation-wide database.

In addition, EA looked at available local/regional background values for lead and benzo(a)pyrene to see how the documented values compared to EA derived background values. The results of the background comparison are presented below and supporting documentation is provided in Appendix I.

7.6.1 Findings

EA examined the Q-Q plots of both lead and benzo(a)pyrene (included in Appendix I) for inflection points that indicate the presence of multiple sub-populations within the sample data sets. Q-Q plots were generated for surface soil (0 to 2 ft bgs) and total data sets, it should be noted these are the intervals evaluated in the human health risk assessment conducted as part of the RI. Analyte concentrations are plotted versus theoretical quantiles on the attached plots. Values plotted beyond an inflection point indicate a non-background sub-population. It should be noted that the source of a non-background sub-population, such as DoD or non-DoD sources, cannot be inferred from this graphical representation.

7.6.1.1 Lead Background Analysis

Surface Soil

All of the surface soil lead sample results were reported above the project reporting limit. The Q-Q plot of lead in surface soil (Figure 7-2) has an inflection point at approximately 1,000 mg/kg, which indicates at least two sub-populations are represented in the data set. The Q-Q plot indicates that lead concentrations less than (<) 1,000 mg/kg are representative of the site-specific background, whereas samples with lead greater than (>) 1,000 mg/kg most likely represent an impacted location within Area II. Results of a Wilcoxon-Mann-Whitney (WMW) test conducted between the extracted site-specific background and site data (H0: median background >= median site) show that the median of the background sample data is less than the median site sample data at the 95% confidence level; therefore, further supporting the conclusion that there are exceedances of background. Median surface soil lead values from Zones 1, 2, and 3 are 428, 81.4, and 87.3 mg/kg, respectively. The inflection point is above all of these median values. It should be noted that the inflection point also exceeds the lead SHS for residential direct contact MSC (500 mg/kg) and the residential soil to groundwater MSC (450 mg/kg).

Total Soil

All of the total soil lead sample results were reported above the project reporting limit. The Q-Q plot for lead in total soils (surface and subsurface soil) (Figure 7-3) has an inflection point at approximately 750 mg/kg, which indicates at least two sub-populations are represented in the data set. The Q-Q plot indicates that lead concentrations <750 mg/kg are representative of the site-specific background, whereas samples with lead greater than >750 mg/kg most likely represent an impacted location within Area II. Results of a WMW test conducted between the extracted site-specific background and site data (H0: median background >= median site) show that the median of the background sample data is less than the median site sample data at the 95% confidence level; therefore, further supporting the conclusion that there are exceedances of background. Median total soil lead values from Zones 1, 2, and 3 are 261.5, 7.63, and 34.7 mg/kg, respectively. The inflection point from the Q-Q plot is above all of these median values. It should be noted that the inflection point also exceeds the lead SHS for residential direct contact MSC (500 mg/kg) and the residential soil to groundwater MSC (450 mg/kg).

7.6.1.2 Benzo(a)pyrene Background Analysis

Surface Soil

Only 8 of the 59 surface soil benzo(a)pyrene sample results were reported above the project reporting limit. The Q-Q plot of detected benzo(a)pyrene in surface soil (Figure 7-4) has an inflection point at approximately 900 µg/kg, which represents the upper range of the site-specific background sub-population. The Q-Q plot indicates that benzo(a)pyrene concentrations <900 µg/kg are representative of the site-specific background, whereas samples with benzo(a)pyrene >900 µg/kg most likely represent an impacted location within the Area II. The 95% upper threshold limit (UTL) with 95% coverage of the site-specific background data (all data <900 mg/kg) was computed with ProUCL as approximately 500 mg/kg using the gamma distribution with Kaplan-Meier estimates. All of the detections (2 detected sample results) in the extracted site data set exceed the computed background surface soil UTL, and none of the 8 non-detects in the site data have a laboratory reporting limit less than the UTL; therefore, supporting the

conclusion that there are exceedances of background. Median total surface soil benzo(a)pyrene values from Zones 1, 2, and 3 are 200, 325, and 495 µg/kg, respectively. The inflection point is above all of these median values, the Zone 1 median value is below the reported laboratory detection limits. It should be noted that the inflection point also exceeds the SHS for residential direct contact MSC for benzo(a)pyrene (570 µg/kg), but doesn't exceed the residential soil to groundwater MSC (46,000 µg/kg).

Total Soil

Only 17 of the 299 total soil benzo(a)pyrene sample results were reported above the project reporting limit. The Q-Q plot of detected benzo(a)pyrene in surface and subsurface soil (Figure 4) has an inflection point at approximately 1,300 µg/kg, which represents the upper range of the site-specific background sub-population. The Q-Q plot indicates that benzo(a)pyrene concentrations <1,300 µg/kg are representative of the site-specific background, whereas samples with benzo(a)pyrene >1,300 µg/kg most likely represent an impacted location within the Area II. The 95% UTL with 95% coverage of the site-specific background data (all data <1,300 mg/kg) was computed with ProUCL as approximately 300 mg/kg using the gamma distribution with Kaplan-Meier estimates. All of the detected sample results in the extracted site data set (7 detections) exceed the computed background total soil UTL. None of the 11 non-detects in the extracted site data have a laboratory reporting limit less than the UTL; therefore, supporting the conclusion that there are exceedances of background. Median total soil benzo(a)pyrene values from Zones 1, 2, and 3 are 190, 185, and 195 µg/kg, respectively. The inflection point is above all of these median values which are all below the reported laboratory detection limits. It should be noted that the inflection point does exceed the SHS for residential direct contact MSC for benzo(a)pyrene (570 µg/kg), but doesn't exceed the residential soil to groundwater MSC (46,000 µg/kg).

7.6.2 Regional Background Studies

Regional background studies conducted by others were reviewed for comparison to the findings of the site-specific background data evaluation. One soil background study of soil samples collected in Eastwick City Park was conducted in support of an separate RI of an adjacent Superfund Site (Pennsylvania Department of Health 2013). Eastwick City Park is located to the west of FFA, but is expected to be representative of background concentrations in urban area within the greater Philadelphia area. Soil samples consisting of multi-incremental and composite samples were collected from four decision units within the park. Lead was detected in all surface soil samples collected from the four decision units with a maximum concentration of lead at 240 mg/kg or parts per million (ppm) and a mean concentration of 150 ppm. Benzo(a)pyrene exceeded the Agency for Toxic Substances and Disease Registry cancer risk evaluation guide comparison value of 0.096 ppm and the USEPA RSL of 0.015 ppm in all DUs. The maximum concentration benzo(a)pyrene was 1.0 ppm. The mean values in decision unit 01 were 0.74 ppm and 0.829 ppm in decision unit 02. Discrete samples collected in decision unit 03 and decision unit 04 showed levels of 0.42 ppm and 0.59 ppm, respectively.

A background study of 24 Philadelphia parks was completed as part of an unpublished Master's thesis (Newsworks 2014). This study found that 16 percent of the samples collected exceeded 400 mg/kg for lead. Only one sample was less than the USGS referenced average lead

concentration of 33 mg/kg. The study found a few highly elevated samples, including a maximum of 10,000 mg/kg which was collected adjacent to an old building.

The USGS notes a mean value for lead in Pennsylvania soils is 60.2 mg/kg from a background soil lead survey for soil collected from 2007 to 2010. This mean is a state average and is not necessarily representative of urban background conditions. (USGS 2014).

In general the results of the Q-Q plots seem to match the regional background numbers for benzo(a)pyrene. The results of the Q-Q plots seem to be higher than the regional background numbers for lead which may be a factor of FFA's location and the history of development on the site which dates back to the early 1800's.

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FIGURE 7-1 GROUNDWATER AOC 3 CONCEPTUAL SITE MODEL



• Potential transport from source area through sand and gravel with underground utility beds serving as preferential pathways

•Absence of impact in clay at FFA

Aerial from National Archives, circa 1968
Note full extent of FFA lithology is not depicted and Honeywell lithology is generalized from two available cross sections.

Figure 7-2- Q-Q Plot Surface Soil Lead

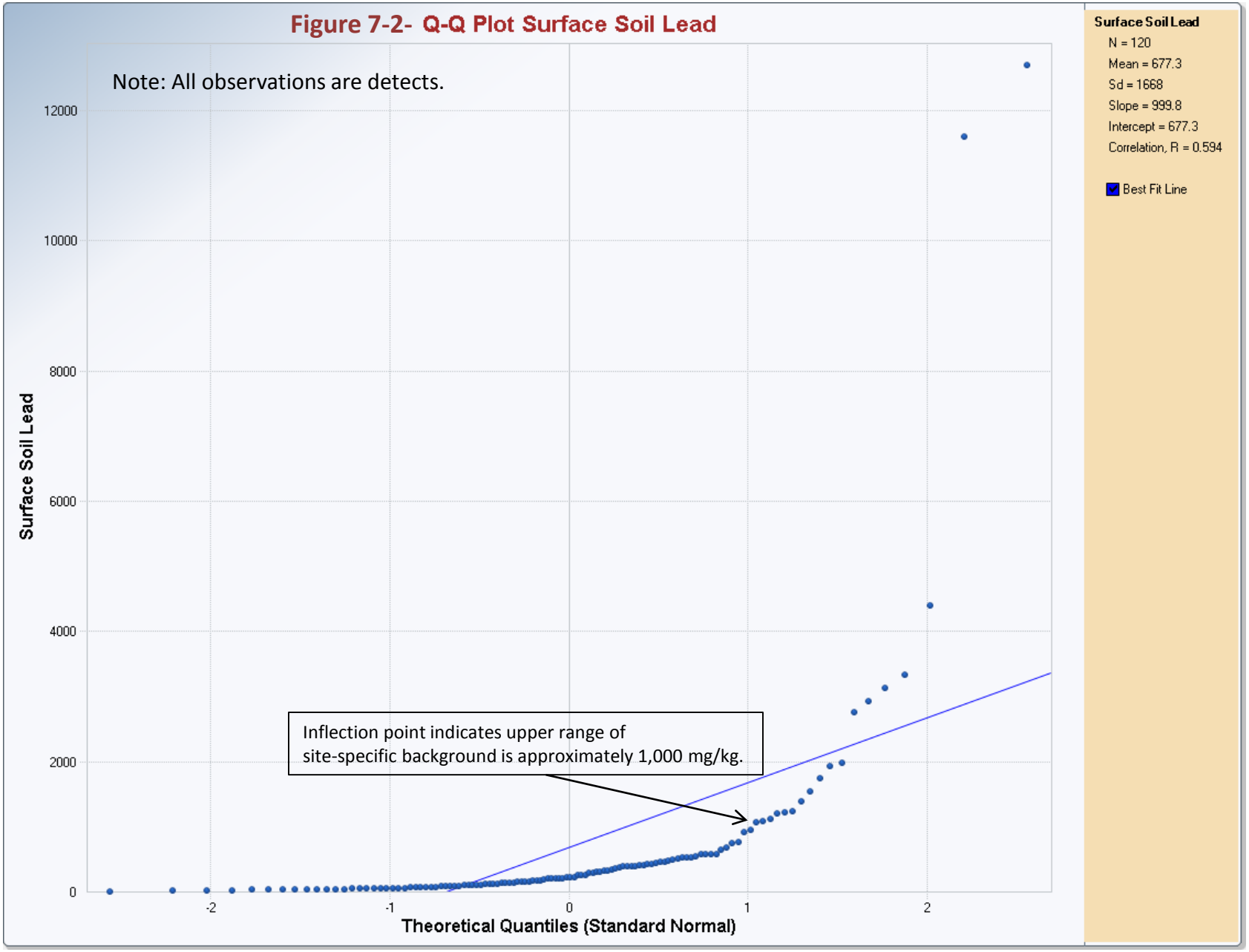
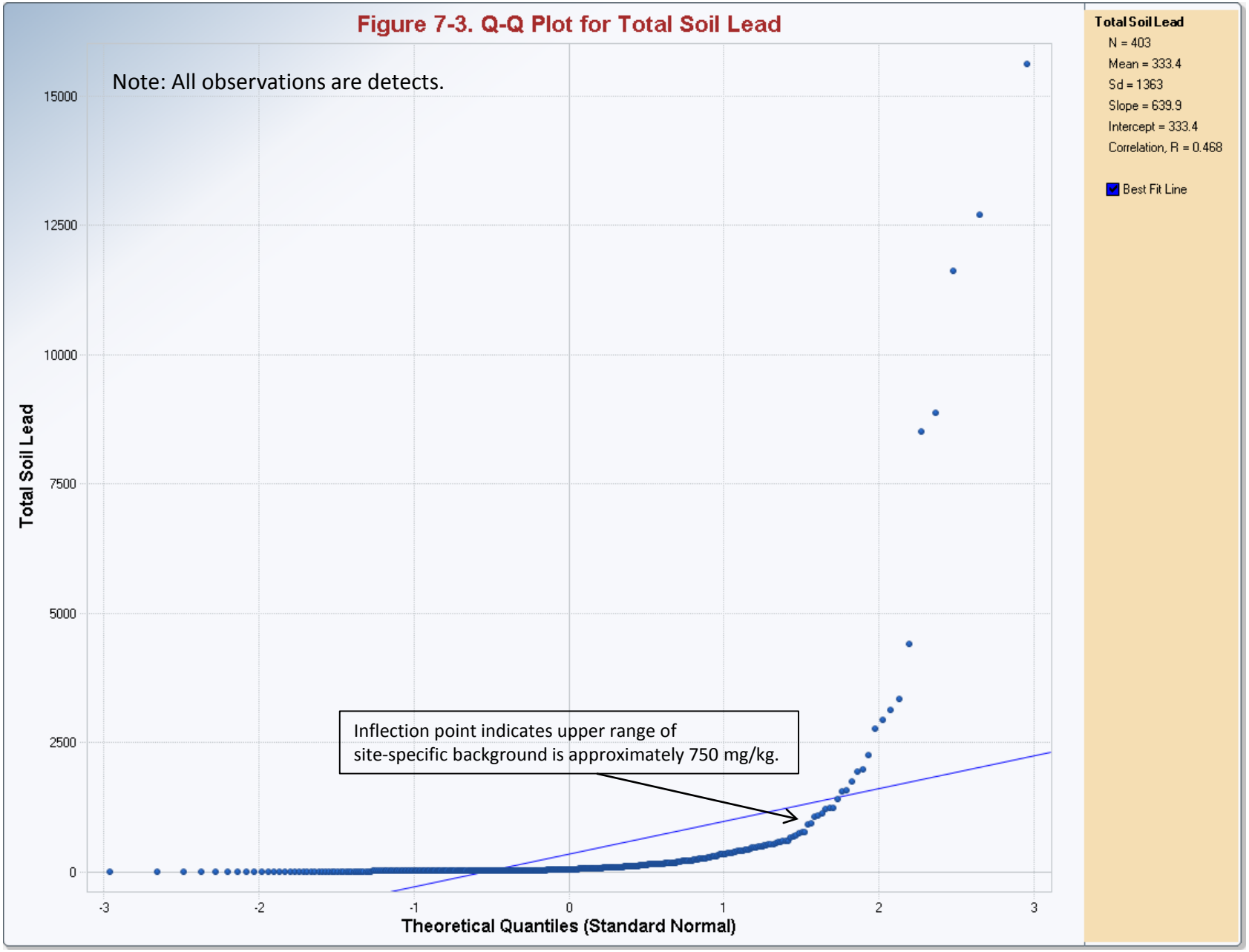


Figure 7-3. Q-Q Plot for Total Soil Lead



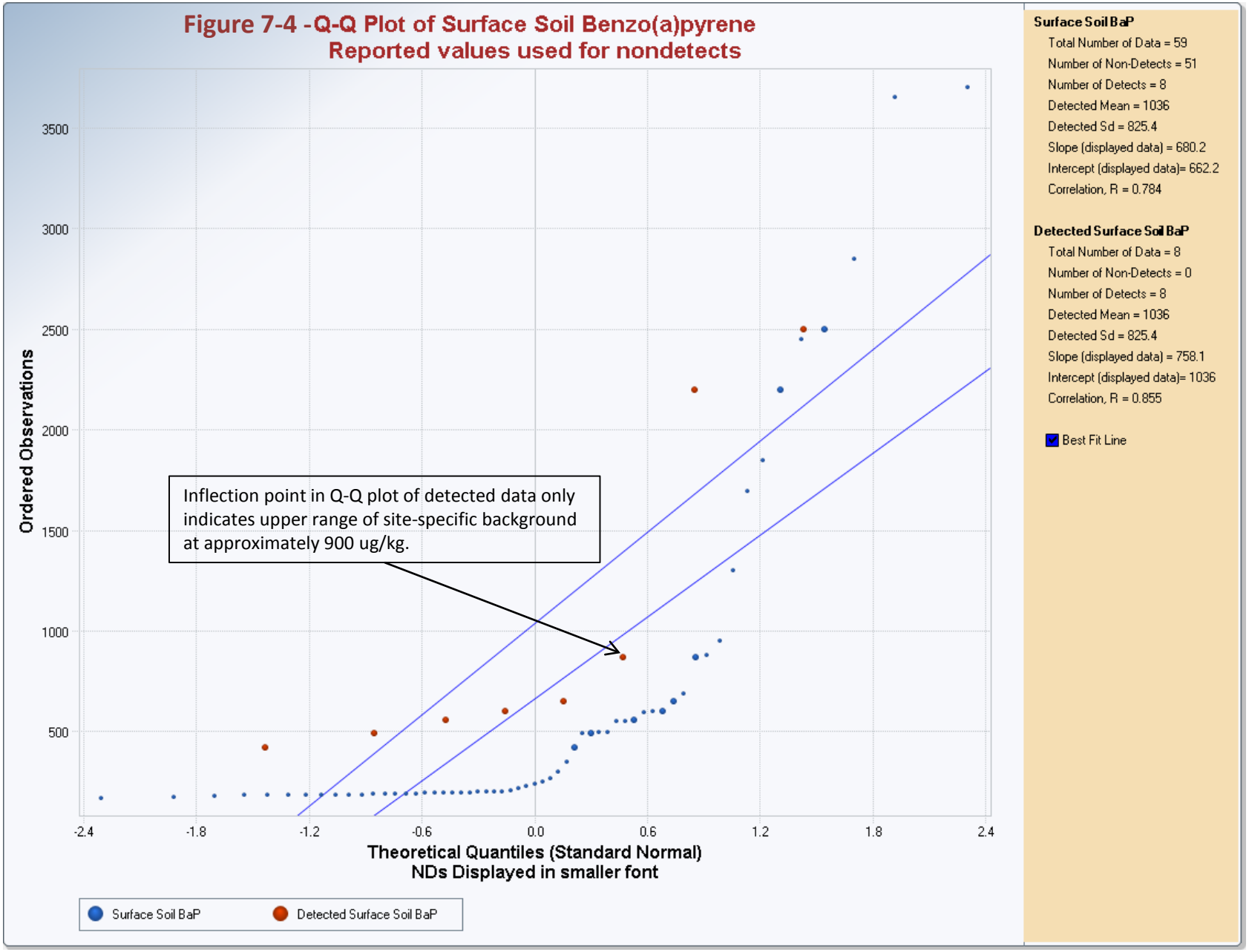

Figure 7-4 -Q-Q Plot of Surface Soil Benzo(a)pyrene
Reported values used for nondetects
Ordered Observations
3500
3000
2500
2000
1500
1000
500
-2.4
-1.8
-1.2
-0.6
0.0
0.6
1.2
1.8
2.4
Theoretical Quantiles (Standard Normal)
NDs Displayed in smaller font
Inflection point in Q-Q plot of detected data only indicates upper range of site-specific background at approximately 900 ug/kg.
Surface Soil BaP
Detected Surface Soil BaP
Surface Soil BaP
Total Number of Data = 59
Number of Non-Detects = 51
Number of Detects = 8
Detected Mean = 1036
Detected Sd = 825.4
Slope (displayed data) = 680.2
Intercept (displayed data)= 662.2
Correlation, R = 0.784
Detected Surface Soil BaP
Total Number of Data = 8
Number of Non-Detects = 0
Number of Detects = 8
Detected Mean = 1036
Detected Sd = 825.4
Slope (displayed data) = 758.1
Intercept (displayed data)= 1036
Correlation, R = 0.855
Best Fit Line

Figure 7-5 - Total Soil Q-Q Plot Benzo (a) Pyrene
Reported values used for nondetects

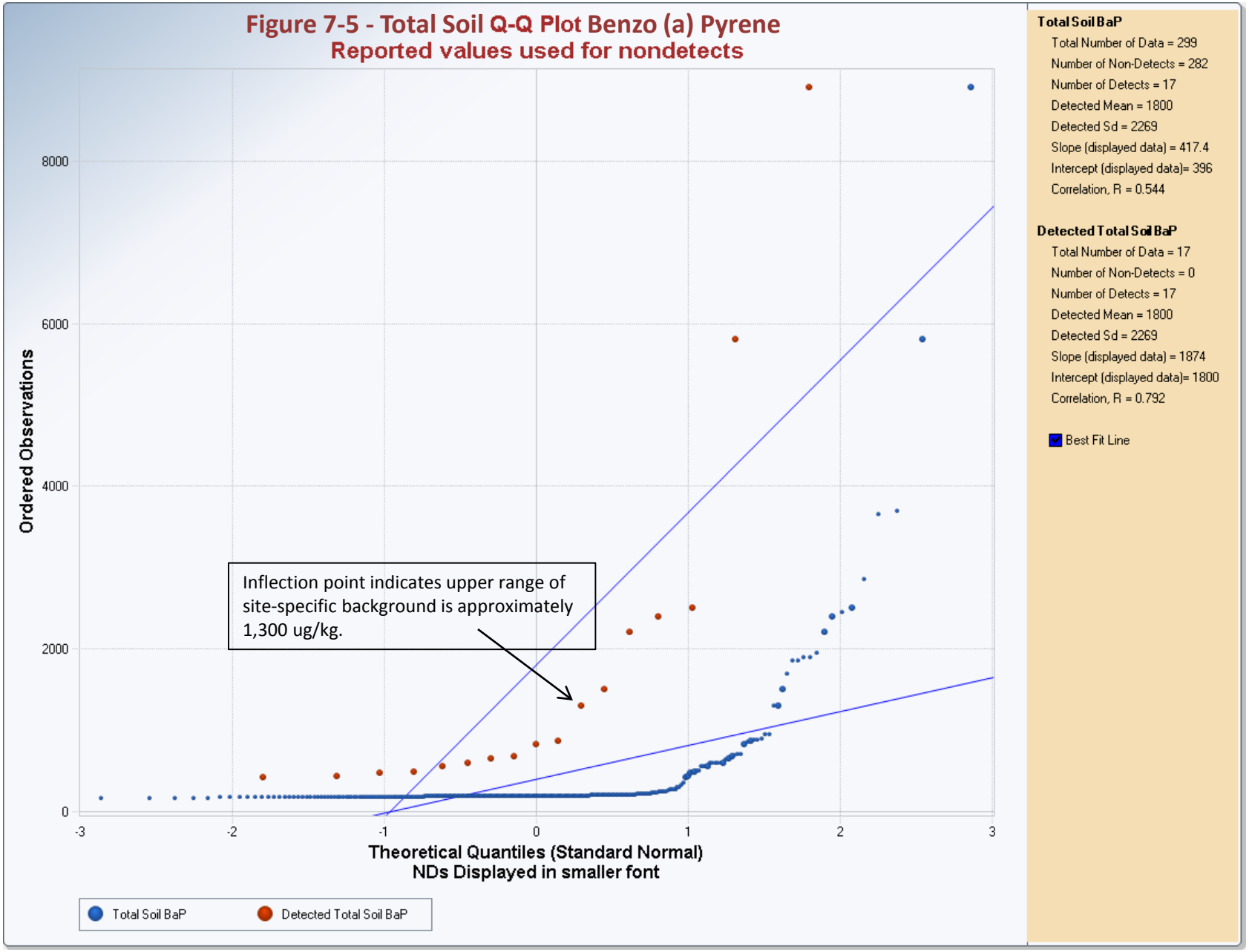


Table 7-1 - Physical and Toxicological Properties Inorganic Regulated Substances

Regulated Substance	Kd
Antimony	45
Arsenic	29
Cobalt	45
Lead	900
Manganese	65
Mercury	52

Notes:
Kd - Distribution Coefficient
Values are from Chapter 250 of the Pennsylvania Code, "Administration of Land Recycling Program", Subchapter C, "Statewide Health Standards", Appendix A, "Physical and Toxicological Properties: Inorganic Regulated Substances" table, revisions effective 1/8/2011.

Table 7-2 - Physical and Toxicological Properties Organic Regulated Substances

Analyte	Koc	VOC ?	Aqueous Solubility (mg/L)	TF Vol from Surface Soil	TF Vol from Subsurface Soil	Organic Liquid	Boiling Point (degrees Celcius)	Degradation Coefficient (K)(yr-1)
Acetone	0.31	X	1000000	13100	15000	X	56	18.07
Acetophenone	170		5500			X	203	
Benzene	58	X	1780.5	13100	15000	X	81	0.35
Benzo(a)anthracene	350000		0.011				438	0.19
Benzo(a)pyrene	910000		0.0038				495	0.24
Benzo(b)fluoranthene	550000		0.0012				357	0.21
Benzo[g,h,i]perylene	2800000		0.00026				500	0.19
Benzo[k]fluoranthene	4400000		0.00055				480	0.06
Carbon tetrachloride	160	X	795	13100	15000	X	77	0.07
Chloroform	56	X	8000	13100	15000	X	61	0.01
Cumene (Isopropylbenzene)	2800	X	50	13100	15100	X	152	15.81
Dibenz[a,h]anthracene	1800000		0.0006				524	0.13
Cis-1,2-dichloroethene	49	X	3500	13100	15000	X	60	0.01
Ethylbenzene	220	X	161	13100	15000	X	136	1.11
Indon[1,2,3-CD]pyrene	31000000		0.062				536	0.17
Methyl n-butyl ketone (2-hexanone)	54	X	17500	13100	15100	X	128	
Methyl tert-butyl ether (MTBE)	12	X	45000	13100	15100	X	55	0.69
Aroclor-1260	1800000		0.08				385	
Phenol	22	X	84300	13000	14900		182	36.14
Tetrychloroethylene (PCE)	300	X	162	13100	15000	X	121	0.03
Trichloroethylene (TCE)	93	X	1100	13100	15000	X	87	0.02
Vinyl chloride	10	X	2700	13200	15000	X	-13	0.09

Notes:
mg/L - miligrams per liter. yr - year.

Values are from Chapter 250 of the Pennsylvania Code, "Administration of Land Recycling Program", Subchapter C, "Statewide Health Standards", Appendix A, "Physical and Toxicological Properties: Organic Regulated Substances" table, revisions effective 1/8/2011.

TABLE 7-3 SOIL VOLATILIZATION TO INDOOR AIR EVALUATION

Analyte	Unit	J&E Default Screening Criteria (1)	Residential SGW MSC (2)	Detection Frequency	Minimum Detect	Maximum Detect	Max Detect Location	IAQ Determination
COPIAC								
1,2-dichloroethane	ug/kg	490	500	0/306	ND	ND		
1,1-dichloroethane	ug/kg	1600	3100	0/306	ND	ND		
1,4-dichlorobenzene	ug/kg	7500		0/307	ND	ND		
Benzene	ug/kg	370	500	15/306	3.5	**1400**	UBZ3-SO-DUP2 (UBZ3-SO-42-11.5-13.5)	Saturated sample, to be evaluated via groundwater
Bromodichloromethane	ug/kg	510	8000	0/307	ND	ND		
Bromomethane	ug/kg	950	1000	0/307	ND	ND		
Carbon disulfide	ug/kg	47000	150000	14/307	1.2	150	UBZ3-SO-47-0-2	
Carbon tetrachloride	ug/kg	74	500	2/306	17	**1300**	UBZ3-SO-38-0-2	Preferenital pathways within 30 ft, recommend soil vapor sampling
Chlorobenzene	ug/kg	9000	10000	0/306	ND	ND		
Chloroethane	ug/kg	1100	23000	0/307	ND	ND		
Chloroform	ug/kg	53	8000	8/306	2.2	**730**	UBZ3-SO-38-0-2	Preferenital pathways within 30 ft, recommend soil vapor sampling
Cis-1,2-dichloroethene	ug/kg	5400	7000	9/306	1.7	280	UBZ3-SO-38-0-2	
Cis-1,3-dichloropropene	ug/kg	200	660	0/307	ND	ND		
Dibromochloromethane	ug/kg	330000	8000	0/307	ND	ND		
Dichlorodifluoromethane	ug/kg	1900	100000	0/307	ND	ND		
Ethylbenzene	ug/kg	5700	70000	18/306	6.3	**6700**	UBZ3-SO-DUP2	Saturated sample, to be evaluated via groundwater
M,P-Xylene*	ug/kg	55000	1000000	0/307	ND	ND		
o-Xylene*	ug/kg	55000	1000000	0/307	ND	ND		
Toluene	ug/kg	76000	100000	5/306	1.7	7.7	UBZ3-SO-26-0-3	
trans-1,2-dichloroethene	ug/kg	4600	10000	0/306	ND	ND		
trans-1,3-dichloropropene	ug/kg	200	660	0/307	ND	ND		
Trichlorofluoromethane	ug/kg	9600	200000	0/307	ND	ND		
Vinyl chloride	ug/kg	37	200	0/306	ND	ND		
NON-COPIAC								
VOCS								
1,1,1-trichloroethane	ug/kg	120000	20000	0/306	ND	ND		
1,1,2,2-tetrachloroethane	ug/kg	1200	84	0/307	ND	ND		
1,1,2-Trichloro-1,2,2-trifluoroethane	ug/kg		6300000	0/307	ND	ND		
1,1,2-trichloroethane	ug/kg	1400	500	0/307	ND	ND		
1,1-dichloroethene	ug/kg	5500	700	0/306	ND	ND		
1,2,4-trichlorobenzene	ug/kg	NOC	7000	0/307	ND	ND		
1,2-Dibromo-3-chloropropane	ug/kg	2300	20	0/307	ND	ND		

TABLE 7-3 SOIL VOLATILIZATION TO INDOOR AIR EVALUATION

Analyte	Unit	J&E Default Screening Criteria (1)	Residential SGW MSC (2)	Detection Frequency	Minimum Detect	Maximum Detect	Max Detect Location	IAQ Determination
1,2-dibromoethane	ug/kg	170	1.2	0/307	ND	ND		
1,2-dichlorobenzene	ug/kg	NOC	60000	0/307	ND	ND		
1,2-dichloropropane	ug/kg	520	500	0/307	ND	ND		
1,3-dichlorobenzene	ug/kg	NOC	60000	0/307	ND	ND		
2-butanone (Methyl ethyl ketone)	ug/kg	10000000	400000	39/306	4.8	280	UBZ3-SO-27-13-15	
2-hexanone (Methyl N-butyl ketone)	ug/kg		1100	2/307	5.5	8.5	UBZ3-SO-21-0-0.5	
4-methyl-2-pentanone (Methyl isobutyl)	ug/kg	84000	290000	6/307	5.7	14	SO-4-13-14,UBZ3-SO-10-34.5-35	
Acetone	ug/kg	110000000	3300000	133/306	5.8	140000	UBZ3-SO-8-39-40	
Bromoform (Tribromomethane)	ug/kg	94000	8000	0/307	ND	ND		
Chloromethane (Methyl Chloride)	ug/kg	380	3000	0/307	ND	ND		
Cyclohexane	ug/kg		1300000	3/307	2.7	6	UBZ3-SO-44-8-10	
Isopropylbenzene (Cumene)	ug/kg	360000+	600000	25/307	1	130000	UBZ3-SO-42-11.5-13.5	
Methyl acetate	ug/kg	14000000	3700000	1/307	5.1	5.1	BZ3-SO-15-5-7	
Methyl tert-butyl ether	ug/kg	51000	2000	0/306	ND	ND		
Methylene Chloride (Dichloromethane)	ug/kg	8100	500	36/306	1.4	35	UBZ2-SO-43-9-10	
Styrene	ug/kg	720000+	10000	0/307	ND	ND		
Tetrachloroethene	ug/kg	5900	500	7/306	1.1	11	UBZ-SO-51-0-2	
Trichloroethene	ug/kg	1300	500	29/306	1.6	**41000**	UBZ3-SO-38-0-2	Preferenital pathways within 30 ft, recommend soil vapor sampling
SVOCs								
1,1-biphenyl	ug/kg	NOC	180000	0/318	ND	ND		
2-chloronaphthalene	ug/kg	NOC	290000	0/318	ND	ND		
2-chlorophenol	ug/kg	190000	4000	0/318	ND	ND		
2-methylnaphthalene	ug/kg	NOC	15000	2/318	240	250	UBZ3-SO-54-3-5	
2-methylphenol (o-cresol)	ug/kg	NOC	180000	0/318	ND	ND		
Acenaphthene	ug/kg	NOC	220000	3/254	180	960	UBZ3-SO-18-4-5	
Acenaphthylene	ug/kg	NOC	220000	1/254	220	220	UBZ3-SO-41-1-3	
Acetophenone	ug/kg	450	370000	8/318	280	**1800**	UBZ3-SO-4-13-14	Saturated sample, to be evaluated via groundwater
Anthracene	ug/kg	NOC	6600	13/318	170	6100	UBZ3-SO-55-0.5-3	
Bis(2-chloroethyl) ether	ug/kg	16000	4.5	0/318	ND	ND		
Fluorene	ug/kg	120000000+	150000	4/318	220	3900	UBZ3-SO-55-0.5-3	
Naphthalene	ug/kg	64000	10000	3/318	150	820	UBZ3-SO-54-3-5	
Nitrobenzene	ug/kg	130000	7300	0/318	ND	ND		
Phenanthrene	ug/kg	NOC	110000	50/318	140	20000	UBZ3-SO-55-0.5-3	
Phenol	ug/kg	NOC	200000	8/318	5000	74000	UBZ3-SO-8-39-40	
Pyrene	ug/kg	89000	13000	57/318	180	**21000**	UBZ3-SO-55-0.5-3	Preferenital pathways within 30 ft, recommend soil vapor sampling

NA = Not Available
Blank cells indicate no screening value
*Total Xylene screening value used
NOC - Not of Concern
(1) Residential J&E Default Screening Value from PADEP, Land Recycling Program Technical Guidance Manual – Section IV.A.4. Vapor Intrusion into Buildings from GW and Soil; Table 4, Soil Screening Values for Protection of Indoor Air – Residential
(2) Pennsylvania Act 1995-2, known as "Act 2", established a program for recycling existing industrial and commercial sites. Values are from Chapter 250 of the Pennsylvania Code, "Administration of Land Recycling Program", Subchapter C, "Statewide Health Standards", Appendix A, "Medium-Specific Concentrations" tables, revisions effective 1/8/2011.
COPIAC and exceeds J&E

TABLE 7-3 SOIL VOLATILIZATION TO INDOOR AIR EVALUATION

Analyte	Unit	J&E Default Screening Criteria (1)	Residential SGW MSC (2)	Detection Frequency	Minimum Detect	Maximum Detect	Max Detect Location	IAQ Determination
	NonCOPIAC - Suggest soil vapor sampling and J&E modeling (exceeds both criteria)							
	NonCOPIAC between SGW and J&E							
	NonCOPIAC & Exceeds SGW, no J&E criteria for given analyte							

TABLE 7-4 SOIL CONCENTRATIONS EXCEEDING VOLATILIZATION TO INDOOR AIR SCREENING CRITERIA

			Location ID	UBZ3-SO-38	UBZ3-SO-55
			Sample Name	UBZ3-SO-38-0-2	UBZ3-SO-55-0.5-3
			Date Sampled	12/15/2011	
			Parent Sample Name		
			Depth Interval	0-2 ft	0.5-3 ft
Analyte	**PA Residential Volatilization to Indoor Air Criteria (1)**	**Residential SGW MSC (2)**	**Unit**		
VOCs (SW8260)					
Benzene	370	500	ug/kg	245 U	2.35 U
Carbon tetrachloride	74	500	ug/kg	**1300 D**	2.35 U
Chloroform	53	8000	ug/kg	**730 D**	2.35 U
Ethylbenzene	5700	70000	ug/kg	245 U	2.35 UJ
Trichloroethene	1300	500	ug/kg	**41000 J**	7.3
SVOCs (SW8270)					
Acetophenone	450	370000	ug/kg	1950 U	3700 UR
Pyrene	89000	13000	ug/kg	200J	**21000 L**

(1) Residential J&E Default Screening Value from PADEP, Land Recycling Program Technical Guidance Manual – Section IV.A.4. Vapor Intrusion into Buildings from GW and Soil; Table 4, Soil Screening Values for Protection of Indoor Air – Residential

(2) Pennsylvania Act 1995-2, known as "Act 2", established a program for recycling existing industrial and commercial sites. Values are from Chapter 250 of the Pennsylvania Code, "Administration of Land Recycling Program", Subchapter C, "Statewide Health Standards", Appendix A, "Medium-Specific Concentrations" tables, revisions effective 1/8/2011.

U- Not detected above the Level of Detection.

D - Dilution

Bolded values exceed Volatilization to Indoor Air Criteria

PA Residential Volatilization to Indoor Air Criteria-Pennsylvania soil screening values for protection of indoor air

NSA- No Screening Level Available

NA- Not Analyzed

U- Not detected above the Level of Detection

J- Value is estimated

L-Analyte present. Reported value may be biased low. Acutal value is expected higher.

R-Rejected result. Analyte may or may not be present in the sample. Supporting data necessary to confirm result.

*-Indicates the duplicate analysis is not within control limits.

B-Not detected substantilly above the level reported in the laboratory or field blanks

Bolded values exceed PA Residential Volatilization to Indoor Air Criteria

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TABLE 7-5 GROUNDWATER VOLATILIZATION TO INDOOR AIR EVALUATION

Analyte	Unit	Residential MSC Used Aquifer (1)	Residential MSC Non-Use Aquifer (1)	Residential J&E Default Screening Value (2)	Detection Frequency	Minimum Detect	Maximum Detect	Max Detect Location	IAQ Determination
COPIAC									
Chloroform	ug/l	80	800	410	16/42	0.47	10	MW-31	
Chloroethane	ug/l	230	23000	22000	0/42	ND	ND		
Dibromochloromethane	ug/l	80	8000	3800	0/42	ND	ND		
Ethylbenzene	ug/l	700	70000	27000	22/42	0.59	11000	TW-13	Preferenital pathways within 30 ft, recommend soil vapor sampling
M,P-Xylene*	ug/l	10000	180000	130000	9/42	1	27	MW-DUP-1	xylene listings are for total
Naphthalene	ug/l	100	30000	25000	25/42	0.051	160	TW-15	Preferenital pathways within 30 ft, recommend soil vapor sampling
o-Xylene*	ug/l	10000	180000	130000	8/42	1.3	11	MW-27,MW-DUP-1	xylene listings are for total
NON-COPIAC									
VOCs									
1,1,1-trichloroethane	ug/l	200	2000	NOC	0/42	ND	ND		
1,1,2,2-tetrachloroethane	ug/l	0.84	84	3700	0/42	ND	ND		
1,1,2-trichloroethane	ug/l	5	50	5400	1/42	1.1	1.1	TW-11	
1,1-dichloroethane	ug/l	31	310	160000	10/42	1	6.6	MW-30	
1,1-dichloroethene (1,1-dichloroethylene	ug/l	7	70	160000	4/42	0.63	3	MW-30	
1,2,4-trichlorobenzene	ug/l	70	44000	NOC	0/42	ND	ND		
1,2-Dibromo-3-chloropropane	ug/l	0.2	20	4300	0/42	ND	ND		
1,2-dibromoethane	ug/l	0.05	5	620	0/42	ND	ND		
1,2-dichlorobenzene	ug/l	600	60000	NOC	0/42	ND	ND		
1,2-dichloroethane	ug/l	5	50	2800	0/42	ND	ND		
1,2-dichloropropane	ug/l	5	50	3900	0/42	ND	ND		
1,3-dichlorobenzene	ug/l	600	60000	NA	2/42	0.45	1.7	TW-26	
1,4-dichlorobenzene	ug/l	75	7500	8100	3/42	1.1	5.3	TW-26	
1,4-dioxane	ug/l	6.4	64	1500000	0/16	ND	ND		
2-butanone (methyl ethyl ketone)	ug/l	4000	400000	49000000	10/42	4.8	300	MW-DUP-1	
2-hexanone (methyl n-butyl ketone)	ug/l	11	11		10/42	2.9	80	TW-21	
Acetone	ug/l	33000	330000	NOC	19/42	6.4	260000	MW-DUP-1	
Benzene	ug/l	5	500	3500	18/42	1.2	**4000**	MW-27	Preferenital pathways within 30 ft, recommend soil vapor sampling
Bromochloromethane	ug/l	90	90	84000	0/16	ND	ND		
Bromodichloromethane	ug/l	80	80	1600	0/42	ND	ND		
Bromoform (Tribromoethane)	ug/l	80	8000	180000	0/42	ND	ND		

TABLE 7-5 GROUNDWATER VOLATILIZATION TO INDOOR AIR EVALUATION

Analyte	Unit	Residential MSC Used Aquifer (1)	Residential MSC Non-Use Aquifer (1)	Residential J&E Default Screening Value (2)	Detection Frequency	Minimum Detect	Maximum Detect	Max Detect Location	IAQ Determination
Bromomethane	ug/l	10	1000	4500	0/42	ND	ND		
Carbon disulfide	ug/l	1500	1500	550000	1/42	0.66	0.66	TW-19	
Carbon tetrachloride	ug/l	5	50	1400	1/42	6.9	6.9	TW-11	
Chlorobenzene	ug/l	100	10000	27000	4/42	1.5	6.4	TW-26	
Chloromethane (methyl chloride)	ug/l	30	3000	17000	1/42	0.7	0.7	TW-16	
Cis-1,2-dichloroethene (Cis-1,2-dichlord	ug/l	70	700	4200	18/42	0.51	1400	TW-6	
Cis-1,3-dichloropropene	ug/l	6.6	660	5100	0/42	ND	ND		
Cyclohexane	ug/l	13000	13000		0/42	ND	ND		
Dichlorodifluoromethane	ug/l	1000	100000	110000	0/42	ND	ND		
Isopropylbenzene (Cumene)	ug/l	840	50000	NOC	26/42	0.68	39000	TW-21,TW-DUP01	
Methyl acetate	ug/l	37000	37000	68,000,000	0/42	ND	ND		
Methyl tert-butyl ether	ug/l	20	200	380,000	7/42	0.47	21	MW-23	
Methylcyclohexane	ug/l				0/42	ND	ND		
Methylene Chloride (dichloromethane)	ug/l	5	500	17,000	1/42	1200	1200	TW-22	
Styrene	ug/l	100	10000	NOC	0/42	ND	ND		
Tetrachloroethene (tetrachloroethylene)	ug/l	5	50	42,000	9/42	12	240	TW-5	
Toluene	ug/l	1000	100000	490,000	13/42	0.54	27	TW-15	
trans-1,2-dichloroethene	ug/l	100	1000	59,000	8/42	0.53	29	TW-6	
trans-1,3-dichloropropene	ug/l	6.6	660	5,100	0/42	ND	ND		
Trichloroethene	ug/l	5	50	14,000	16/42	0.57	3600	TW-11	
Trichlorofluoromethane	ug/l	2000	200000		0/42	ND	ND		
Vinyl chloride	ug/l	2	20	1800	4/42	4.5	8.1	TW-8	
SVOCs									
1,1-biphenyl	ug/l	1800	7200	NOC	9/41	20	89	MW-25	
2-chloronaphthalene	ug/l	2900	2900	NOC	0/42	ND	ND		
2-chlorophenol	ug/l	40	40	160000	0/42	ND	ND		
2-methylnaphthalene	ug/l	150	150	NOC	3/42	5.5	27	TW-15	
2-methylphenol (cresol, o-)	ug/l	1800	180000	NOC	4/42	5.7	9.5	MW-25	
2-nitrophenol	ug/l	290	290000	NOC	0/42	ND	ND		
4-methyl-2-pentanone (methyl isobutyl l	ug/l	2900	290000	540000	12/42	7.8	220	MW-DUP-1,TW-DUP01	
Acenaphthene	ug/l	2200	3800	NOC	17/42	0.054	20	TW-15	
Acenaphthylene	ug/l	2200	16000	NOC	4/42	0.051	0.46	TW-24	
Acetophenone	ug/l	3700	3700	NOC	16/42	6.3	12000	TW-21,TW-DUP01	Preferenital pathways within 30 ft, recommend soil vapor sampling
Anthracene	ug/l	66	66	NOC	5/42	0.15	0.64	TW-20	

TABLE 7-5 GROUNDWATER VOLATILIZATION TO INDOOR AIR EVALUATION

Analyte	Unit	Residential MSC Used Aquifer (1)	Residential MSC Non-Use Aquifer (1)	Residential J&E Default Screening Value (2)	Detection Frequency	Minimum Detect	Maximum Detect	Max Detect Location	IAQ Determination
Bis(2-chloroethyl) ether	ug/l	0.15	15	13000	0/42	ND	ND		
Fluorene	ug/l	1500	1900	NOC	17/42	0.063	7.6	TW-15	
Nitrobenzene	ug/l	73	73000	290,000	0/42	ND	ND		
Phenanthrene	ug/l	1100	1100	NOC	5/42	0.075	2.6	TW-15	
Phenol	ug/l	2000	200000	NOC	18/42	9.9	90000	TW-21	

Notes:
ND - Non-detect
ug/l - micrograms per liter
*Total Xylene screening value used
Blank cells indicate that no value exists for analyte
Exceeds J&E default criteria C
(1) Pennsylvania Act 1995-2, known as "Act 2", established a program for recycling existing industrial and commercial sites. Values are from Chapter 250 of the Pennsylvania Code, "Administration of Land Recycling Program", Subchapter C, "Statewide Health Standards", Appendix A, "Medium-Specific Concentrations" tables, revisions effective 1/8/2011.
(2)Residential J&E Default Screening Value from PADEP, Land Recycling Program Technical Guidance Manual – Section IV.A.4. Vapor Intrusion into Buildings from GW and Soil; Table 1, Groundwater Screening Values (ug/L) for Protection of Indoor Air – Residential

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TABLE 7-6 GROUNDWATER CONCENTRATIONS EXCEEDING VOLATILIZATION TO INDOOR AIR SCREENING CRITERIA

		Location ID	MW-27	MW-27
		Sample Name	MW-27	MW-DUP-1
		Date Sampled	5/17/2012	5/17/2012
		Parent Sample ID		MW-27_5/17/2012
Analyte	**PA Residential Volatilization to Indoor Air Criteria (1)**	**Unit**		
VOCs (SW8260)				
Benzene	3500	ug/l	**4000**	**3900**

PA Residential Volatilization to Indoor Air Criteria-Pennsylvania groundwater screening values for protection of indoor air

Bold values exceed the PA Residential Volatilization to Indoor Air Criteria.

(1) Residential J&E Default Screening Value from PADEP, Land Recycling Program Technical Guidance Manual – Section IV.A.4. Vapor Intrusion into Buildings from GW and Soil; Table 1, Groundwater Screening Values (ug/L) for Protection of Indoor Air – Residential

TABLE 7-7 SOIL CONCENTRATIONS EXCEEDING SOIL TO GROUNDWATER SCREENING CRITERIA

		Sample Location	BZ1-SO-02	BZ1-SO-05	BZ2-SO-06	BZ3-SO-01	UBZ1-SO-01	UBZ1-SO-02
		Sample ID	BZ1-SO-02-0-0.5	BZ1-SO-5-0-1	BZ2-SO-6-13-14	BZ3-SO-13-0-1	UBZ1-SO-1-0-0.5	UBZ1-SO-2-0-0.5
		Sample Date	1/4/2012	12/29/2011	12/21/2011	4/18/2012	12/8/2011	12/8/2011
		Parent Sample ID						
		Depth Interval	0-0.5 ft	0-1 ft	13-14 ft	0-1 ft	0-0.5 ft	0-0.5 ft
Analyte	**Residential SGW MSC (1)**	**Unit**						
Inorganics (SW6010)								
Antimony	27	mg/kg	NA	1.38 J	1.385 U	**28.4 L**	NA	NA
Arsenic	29	mg/kg	22.6	10.9	**29.4**	4.17 L	**38.7**	23.8
Lead	450	mg/kg	**2760**	**913 J**	28.8	248	**498**	**746**
Manganese	2000	mg/kg	NA	338	365	257	NA	NA
Mercury (SW7471)								
Mercury	10	mg/kg	NA	0.407	0.673 D	5.64 J	NA	NA
VOCs (SW8260)								
Benzene	500	ug/kg	NA	2.25 U	2.55 U	2.4 UJ	NA	NA
Carbon tetrachloride	500	ug/kg	NA	2.25 U	2.55 U	2.4 UJ	NA	NA
Trichloroethene	500	ug/kg	NA	2.25 U	2.55 U	2.4 UJ	NA	NA

(1) Pennsylvania Act 1995-2, known as "Act 2", established a program for recycling existing industrial and commercial sites. Values are from Chapter 250 of the Pennsylvania Code, "Administratio

TABLE 7-7 SOIL CONCENTRATIONS EXCEEDING SOIL TO GROUNDWATER SCREENING CRITERIA

		Sample Location	BZ1-SO-02	UBZ1-SO-07	UBZ1-SO-08	UBZ1-SO-10	UBZ1-SO-11
		Sample ID	BZ1-SO-02-0-0.5	UBZ1-SO-7-0-0.5	UBZ1-SO-8-0-0.5	UBZ1-SO-10-0-0.5	UBZ1-SO-11-0-0.5
		Sample Date	1/4/2012	12/8/2011	12/8/2011	12/8/2011	12/8/2011
		Parent Sample ID					
		Depth Interval	0-0.5 ft	0-0.5 ft	0-0.5 ft	0-0.5 ft	0-0.5 ft
Analyte	**Residential SGW MSC (1)**	**Unit**					
Inorganics (SW6010)							
Antimony	27	mg/kg	NA	NA	NA	NA	NA
Arsenic	29	mg/kg	22.6	18.3	**35.9**	8.48	**33.1**
Lead	450	mg/kg	**2760**	**1930**	**456**	**2930**	**539**
Manganese	2000	mg/kg	NA	NA	NA	NA	NA
Mercury (SW7471)							
Mercury	10	mg/kg	NA	NA	NA	NA	NA
VOCs (SW8260)							
Benzene	500	ug/kg	NA	NA	NA	NA	NA
Carbon tetrachloride	500	ug/kg	NA	NA	NA	NA	NA
Trichloroethene	500	ug/kg	NA	NA	NA	NA	NA

(1) Pennsylvania Act 1995-2, known as "Act 2", established a program for recycling existon of Land Recycling Program", Subchapter C, "Statewide Health Standards", Appendix A, "Me

TABLE 7-7 SOIL CONCENTRATIONS EXCEEDING SOIL TO GROUNDWATER SCREENING CRITERIA

		Sample Location	BZ1-SO-02	UBZ1-SO-13	UBZ1-SO-16	UBZ1-SO-16	UBZ1-SO-17
		Sample ID	BZ1-SO-02-0-0.5	UBZ1-SO-13-0-0.5	UBZ1-SO-16-0-0.5	UBZ1-SO-DUP2	UBZ1-SO-17-0-0.5
		Sample Date	1/4/2012	12/8/2011	12/8/2011	12/9/2011	12/27/2011
		Parent Sample ID				UBZ1-SO-16-0-0.5	
		Depth Interval	0-0.5 ft	0-0.5 ft	0-0.5 ft	0-0.5 ft	0-0.5 ft
Analyte	**Residential SGW MSC (1)**	**Unit**					
Inorganics (SW6010)							
Antimony	27	mg/kg	NA	NA	NA	NA	NA
Arsenic	29	mg/kg	22.6	11.4	10.6	10.5	9.66 J
Lead	450	mg/kg	**2760**	**576**	**1180**	**1260 J**	**1390 J**
Manganese	2000	mg/kg	NA	NA	NA	NA	NA
Mercury (SW7471)							
Mercury	10	mg/kg	NA	NA	NA	NA	NA
VOCs (SW8260)							
Benzene	500	ug/kg	NA	NA	NA	NA	NA
Carbon tetrachloride	500	ug/kg	NA	NA	NA	NA	NA
Trichloroethene	500	ug/kg	NA	NA	NA	NA	NA

(1) Pennsylvania Act 1995-2, known as "Act 2", established a program for recycling existdium-Specific Concentrations" tables, revisions effective 1/8/2011.

TABLE 7-7 SOIL CONCENTRATIONS EXCEEDING SOIL TO GROUNDWATER SCREENING CRITERIA

		Sample Location	BZ1-SO-02	UBZ1-SO-19	UBZ1-SO-20	UBZ1-SO-21	UBZ1-SO-22
		Sample ID	BZ1-SO-02-0-0.5	UBZ1-SO-19-0-0.5	UBZ1-SO-20-0-0.5	UBZ1-SO-DUP3	UBZ1-SO-22-0-0.5
		Sample Date	1/4/2012	12/27/2011	12/27/2011	12/27/2011	12/8/2011
		Parent Sample ID				UBZ1-SO-21-0-0.5	
		Depth Interval	0-0.5 ft	0-0.5 ft	0-0.5 ft	0-0.5 ft	0-0.5 ft
Analyte	**Residential SGW MSC (1)**	**Unit**					
Inorganics (SW6010)							
Antimony	27	mg/kg	NA	NA	NA	NA	NA
Arsenic	29	mg/kg	22.6	11.1 J	8.49 J	11.1 J	21.5
Lead	450	mg/kg	**2760**	**683 J**	**583 J**	**534**	**524**
Manganese	2000	mg/kg	NA	NA	NA	NA	NA
Mercury (SW7471)							
Mercury	10	mg/kg	NA	NA	NA	NA	NA
VOCs (SW8260)							
Benzene	500	ug/kg	NA	NA	NA	NA	NA
Carbon tetrachloride	500	ug/kg	NA	NA	NA	NA	NA
Trichloroethene	500	ug/kg	NA	NA	NA	NA	NA

(1) Pennsylvania Act 1995-2, known as "Act 2", established a program for recycling exist

TABLE 7-7 SOIL CONCENTRATIONS EXCEEDING SOIL TO GROUNDWATER SCREENING CRITERIA

		Sample Location	BZ1-SO-02	UBZ1-SO-23	UBZ1-SO-24	UBZ1-SO-28	UBZ1-SO-31
		Sample ID	BZ1-SO-02-0-0.5	UBZ1-SO-23-0-0.5	UBZ1-SO-24-0-0.5	UBZ1-SO-28-0-0.5	UBZ1-SO-31-0-0.5
		Sample Date	1/4/2012	12/8/2011	12/8/2011	12/27/2011	12/8/2011
		Parent Sample ID					
		Depth Interval	0-0.5 ft	0-0.5 ft	0-0.5 ft	0-0.5 ft	0-0.5 ft
Analyte	**Residential SGW MSC (1)**	**Unit**					
Inorganics (SW6010)							
Antimony	27	mg/kg	NA	NA	NA	NA	NA
Arsenic	29	mg/kg	22.6	22.7	24.5	11.5 J	12.2
Lead	450	mg/kg	**2760**	**1080**	**1120**	**939**	**1540 J**
Manganese	2000	mg/kg	NA	NA	NA	NA	NA
Mercury (SW7471)							
Mercury	10	mg/kg	NA	NA	NA	NA	NA
VOCs (SW8260)							
Benzene	500	ug/kg	NA	NA	NA	NA	NA
Carbon tetrachloride	500	ug/kg	NA	NA	NA	NA	NA
Trichloroethene	500	ug/kg	NA	NA	NA	NA	NA

(1) Pennsylvania Act 1995-2, known as "Act 2", established a program for recycling exist

TABLE 7-7 SOIL CONCENTRATIONS EXCEEDING SOIL TO GROUNDWATER SCREENING CRITERIA

		Sample Location	BZ1-SO-02	UBZ1-SO-32	UBZ1-SO-36	UBZ1-SO-37	UBZ1-SO-38
		Sample ID	BZ1-SO-02-0-0.5	UBZ1-SO-32-0-0.5	UBZ1-SO-36-0-0.5	UBZ1-SO-37-0-0.5	UBZ1-SO-38-0-0.5
		Sample Date	1/4/2012	12/27/2011	12/27/2011	12/27/2011	12/8/2011
		Parent Sample ID					
		Depth Interval	0-0.5 ft	0-0.5 ft	0-0.5 ft	0-0.5 ft	0-0.5 ft
Analyte	**Residential SGW MSC (1)**	**Unit**					
Inorganics (SW6010)							
Antimony	27	mg/kg	NA	NA	NA	NA	NA
Arsenic	29	mg/kg	22.6	21.5 J	12.4 J	12.6 J	15
Lead	450	mg/kg	**2760**	**1200**	**500**	**647 J**	**1230 J**
Manganese	2000	mg/kg	NA	NA	NA	NA	NA
Mercury (SW7471)							
Mercury	10	mg/kg	NA	NA	NA	NA	NA
VOCs (SW8260)							
Benzene	500	ug/kg	NA	NA	NA	NA	NA
Carbon tetrachloride	500	ug/kg	NA	NA	NA	NA	NA
Trichloroethene	500	ug/kg	NA	NA	NA	NA	NA

(1) Pennsylvania Act 1995-2, known as "Act 2", established a program for recycling exist

TABLE 7-7 SOIL CONCENTRATIONS EXCEEDING SOIL TO GROUNDWATER SCREENING CRITERIA

		Sample Location	BZ1-SO-02	UBZ1-SO-39	UBZ1-SO-41	UBZ1-SO-42	UBZ1-SO-49
		Sample ID	BZ1-SO-02-0-0.5	UBZ1-SO-39-0-0.5	UBZ1-SO-41-0-0.5	UBZ1-SO-42-0-0.5	UBZ1-SO-49-0-0.5
		Sample Date	1/4/2012	12/8/2011	12/8/2011	12/27/2011	12/27/2011
		Parent Sample ID					
		Depth Interval	0-0.5 ft	0-0.5 ft	0-0.5 ft	0-0.5 ft	0-0.5 ft
Analyte	**Residential SGW MSC (1)**	**Unit**					
Inorganics (SW6010)							
Antimony	27	mg/kg	NA	NA	NA	NA	NA
Arsenic	29	mg/kg	22.6	11	15.9	13.9 J	15.6 J
Lead	450	mg/kg	**2760**	**3330 J**	**4390 J**	**574 J**	**3130**
Manganese	2000	mg/kg	NA	NA	NA	NA	NA
Mercury (SW7471)							
Mercury	10	mg/kg	NA	NA	NA	NA	NA
VOCs (SW8260)							
Benzene	500	ug/kg	NA	NA	NA	NA	NA
Carbon tetrachloride	500	ug/kg	NA	NA	NA	NA	NA
Trichloroethene	500	ug/kg	NA	NA	NA	NA	NA

(1) Pennsylvania Act 1995-2, known as "Act 2", established a program for recycling exist

TABLE 7-7 SOIL CONCENTRATIONS EXCEEDING SOIL TO GROUNDWATER SCREENING CRITERIA

		Sample Location	BZ1-SO-02	UBZ1-SO-50	UBZ1-SO-52	UBZ1-SO-52	UBZ1-SO-54
		Sample ID	BZ1-SO-02-0-0.5	UBZ1-SO-50-0-0.5	UBZ1-SO-52-0-0.5	UBZ1-SO-DUP1	UBZ1-SO-54-0-0.5
		Sample Date	1/4/2012	12/27/2011	12/9/2011	12/9/2011	12/9/2011
		Parent Sample ID				UBZ1-SO-52-0-0.5	
		Depth Interval	0-0.5 ft	0-0.5 ft	0-0.5 ft	0-0.5 ft	0-0.5 ft
Analyte	**Residential SGW MSC (1)**	**Unit**					
Inorganics (SW6010)							
Antimony	27	mg/kg	NA	NA	NA	NA	NA
Arsenic	29	mg/kg	22.6	7.82 J	10.5	9.66	9.64
Lead	450	mg/kg	**2760**	**456 J**	**991 J**	**1140 J**	**768 J**
Manganese	2000	mg/kg	NA	NA	NA	NA	NA
Mercury (SW7471)							
Mercury	10	mg/kg	NA	NA	NA	NA	NA
VOCs (SW8260)							
Benzene	500	ug/kg	NA	NA	NA	NA	NA
Carbon tetrachloride	500	ug/kg	NA	NA	NA	NA	NA
Trichloroethene	500	ug/kg	NA	NA	NA	NA	NA

(1) Pennsylvania Act 1995-2, known as "Act 2", established a program for recycling exist

TABLE 7-7 SOIL CONCENTRATIONS EXCEEDING SOIL TO GROUNDWATER SCREENING CRITERIA

		Sample Location	BZ1-SO-02	UBZ1-SO-60	UBZ2-SO-04	UBZ2-SO-17	UBZ2-SO-26
		Sample ID	BZ1-SO-02-0-0.5	UBZ1-SO-60-0-0.5	UBZ2-SO-04-27-28	UBZ2-SO-17-0-2	UBZ2-SO-26-0-1
		Sample Date	1/4/2012	12/27/2011	1/9/2012	1/5/2012	12/28/2011
		Parent Sample ID					
		Depth Interval	0-0.5 ft	0-0.5 ft	27-28 ft	0-2 ft	0-1 ft
Analyte	**Residential SGW MSC (1)**	**Unit**					
Inorganics (SW6010)							
Antimony	27	mg/kg	NA	NA	1.275 U	3.45	2.34 J
Arsenic	29	mg/kg	22.6	6.54 J	5.17	6.57	16.5
Lead	450	mg/kg	**2760**	**532 J**	10.3	**522 J**	**1980 J**
Manganese	2000	mg/kg	NA	NA	102 J	321	450
Mercury (SW7471)							
Mercury	10	mg/kg	NA	NA	0.006 U	1.22 D	0.302
VOCs (SW8260)							
Benzene	500	ug/kg	NA	NA	2.95 U	2.45 UJ	3.25 U
Carbon tetrachloride	500	ug/kg	NA	NA	2.95 U	2.45 UJ	3.25 U
Trichloroethene	500	ug/kg	NA	NA	**520 J**	2.45 UJ	3.25 U

(1) Pennsylvania Act 1995-2, known as "Act 2", established a program for recycling exist

TABLE 7-7 SOIL CONCENTRATIONS EXCEEDING SOIL TO GROUNDWATER SCREENING CRITERIA

		Sample Location	BZ1-SO-02	UBZ2-SO-32	UBZ2-SO-45	UBZ3-SO-07	UBZ3-SO-08
		Sample ID	BZ1-SO-02-0-0.5	UBZ2-SO-32-0-1	UBZ2-SO-45-1-2	UBZ3-SO-7-5-6	UBZ3-SO-8-39-40
		Sample Date	1/4/2012	12/30/2011	12/22/2011	12/19/2011	12/19/2011
		Parent Sample ID					
		Depth Interval	0-0.5 ft	0-1 ft	1-2 ft	5-6 ft	39-40 ft
Analyte	**Residential SGW MSC (1)**	**Unit**					
Inorganics (SW6010)							
Antimony	27	mg/kg	NA	1.415 U	24.8 J	0.79 J	1.105 U
Arsenic	29	mg/kg	22.6	7.81	5.94 *	**38.1**	0.39 J
Lead	450	mg/kg	**2760**	58	**15600 J**	203 J	1.19 J
Manganese	2000	mg/kg	NA	**2560**	438 J	485 J	17.5 J
Mercury (SW7471)							
Mercury	10	mg/kg	NA	0.236	1.02 D	0.266 J	0.006 U
VOCs (SW8260)							
Benzene	500	ug/kg	NA	2.5 U	2.9 U	2.7 U	**600 D**
Carbon tetrachloride	500	ug/kg	NA	2.5 U	2.9 U	2.7 U	280 U
Trichloroethene	500	ug/kg	NA	2.5 U	2.9 U	6.9 L	280 U

(1) Pennsylvania Act 1995-2, known as "Act 2", established a program for recycling exist

TABLE 7-7 SOIL CONCENTRATIONS EXCEEDING SOIL TO GROUNDWATER SCREENING CRITERIA

			Sample Location	BZ1-SO-02	UBZ3-SO-19	UBZ3-SO-24	UBZ3-SO-32	UBZ3-SO-33
			Sample ID	BZ1-SO-02-0-0.5	UBZ3-SO-19-0-2	UBZ3-SO-24-12-13	UBZ3-SO-32-2-3	UBZ3-SO-33-0-2
			Sample Date	1/4/2012	4/20/2012	12/15/2011	4/20/2012	4/20/2012
			Parent Sample ID					
			Depth Interval	0-0.5 ft	0-2 ft	12-13 ft	2-3 ft	0-2 ft
Analyte	**Residential SGW MSC (1)**	**Unit**						
Inorganics (SW6010)								
Antimony	27	mg/kg	NA	**230 J**	7.11	20.1 J	17 J	
Arsenic	29	mg/kg	22.6	5.25	**47.7 J**	3.47	3.12	
Lead	450	mg/kg	**2760**	**12700 J**	361 J	**702 J**	**579 J**	
Manganese	2000	mg/kg	NA	327 J	1350	296 J	227 J	
Mercury (SW7471)								
Mercury	10	mg/kg	NA	2.2	0.695 J	1.57	0.136	
VOCs (SW8260)								
Benzene	500	ug/kg	NA	1.65 U	2.7 U	2.85 U	2.7 U	
Carbon tetrachloride	500	ug/kg	NA	1.65 U	2.7 U	2.85 U	2.7 U	
Trichloroethene	500	ug/kg	NA	1.65 U	2.7 U	5.5 J	2.7 U	

(1) Pennsylvania Act 1995-2, known as "Act 2", established a program for recycling exist

TABLE 7-7 SOIL CONCENTRATIONS EXCEEDING SOIL TO GROUNDWATER SCREENING CRITERIA

		Sample Location	BZ1-SO-02	UBZ3-SO-33	UBZ3-SO-38	UBZ3-SO-39	UBZ3-SO-41
		Sample ID	BZ1-SO-02-0-0.5	UBZ3-SO-33-2-3	UBZ3-SO-38-0-2	UBZ3-SO-39-0.5-2.5	UBZ3-SO-41-1-3
		Sample Date	1/4/2012	4/20/2012	12/15/2011	12/15/2011	12/15/2011
		Parent Sample ID					
		Depth Interval	0-0.5 ft	2-3 ft	0-2 ft	0.5-2.5 ft	1-3 ft
Analyte	**Residential SGW MSC (1)**	**Unit**					
Inorganics (SW6010)							
Antimony	27	mg/kg	NA	19 J	1.13 J	2.64	1.305 U
Arsenic	29	mg/kg	22.6	2.97	12.6	**32.1 J**	28.2 J
Lead	450	mg/kg	**2760**	**596 J**	142 J	**763 J**	15.5 J
Manganese	2000	mg/kg	NA	227 J	149 J	260	139
Mercury (SW7471)							
Mercury	10	mg/kg	NA	0.171	0.582 L	0.984 J	**10.8 J**
VOCs (SW8260)							
Benzene	500	ug/kg	NA	2.75 U	245 U	2.8 U	5.5 U
Carbon tetrachloride	500	ug/kg	NA	2.75 U	**1300 D**	2.8 U	5.5 U
Trichloroethene	500	ug/kg	NA	2.75 U	**41000 J**	5.4 J	5.5 U

(1) Pennsylvania Act 1995-2, known as "Act 2", established a program for recycling exist

TABLE 7-7 SOIL CONCENTRATIONS EXCEEDING SOIL TO GROUNDWATER SCREENING CRITERIA

		Sample Location	BZ1-SO-02	UBZ3-SO-42	UBZ3-SO-42	UBZ3-SO-49	UBZ3-SO-57
		Sample ID	BZ1-SO-02-0-0.5	UBZ3-SO-42-11.5-13.5	UBZ3-SO-DUP2	UBZ3-SO-49-4-5	UBZ3-SO-57-0-2
		Sample Date	1/4/2012	12/14/2011	12/14/2011	12/20/2011	4/19/2012
		Parent Sample ID			UBZ3-SO-42-11.5-13.5		
		Depth Interval	0-0.5 ft	11.5-13.5 ft	11.5-13.5 ft	4-5 ft	0-2 ft
Analyte	**Residential SGW MSC (1)**	**Unit**					
Inorganics (SW6010)							
Antimony	27	mg/kg	NA	2.195 U	1.325 U	5.4	14 L
Arsenic	29	mg/kg	22.6	5.31	4.1	16.7	7.12
Lead	450	mg/kg	**2760**	10.1	11.1	**8500**	**11600**
Manganese	2000	mg/kg	NA	252	225	115	165
Mercury (SW7471)							
Mercury	10	mg/kg	NA	0.011 J	0.009 J	1.63	0.497 K
VOCs (SW8260)							
Benzene	500	ug/kg	NA	**1200 J**	**1400 J**	1.8 U	4.05 UL
Carbon tetrachloride	500	ug/kg	NA	4.45 U	4.05 U	1.8 U	4.05 UL
Trichloroethene	500	ug/kg	NA	4.45 U	4.05 U	1.8 U	12 L

(1) Pennsylvania Act 1995-2, known as "Act 2", established a program for recycling exist

TABLE 7-7 SOIL CONCENTRATIONS EXCEEDING SOIL TO GROUNDWATER SCREENING CRITERIA

		Sample Location	BZ1-SO-02	UBZ3-SO-58	UBZ3-SO-58	UBZ3-SO-63
		Sample ID	BZ1-SO-02-0-0.5	UBZ3-SO-58-0-2	UBZ3-SO-DUP22	UBZ3-SO-63-5-7
		Sample Date	1/4/2012	4/19/2012	4/19/2012	4/19/2012
		Parent Sample ID			UBZ3-SO-58-0-2	
		Depth Interval	0-0.5 ft	0-2 ft	0-2 ft	5-7 ft
Analyte	**Residential SGW MSC (1)**	**Unit**				
Inorganics (SW6010)						
Antimony	27	mg/kg	NA	**42 L**	**40.4 L**	**64.6 L**
Arsenic	29	mg/kg	22.6	12.4	12.8	**52.5**
Lead	450	mg/kg	**2760**	**1910**	**1570**	**1570**
Manganese	2000	mg/kg	NA	117	133	204
Mercury (SW7471)						
Mercury	10	mg/kg	NA	0.505 K	1.07 K	0.197 K
VOCs (SW8260)						
Benzene	500	ug/kg	NA	3.35 UL	4.75 UJ	3.9 UJ
Carbon tetrachloride	500	ug/kg	NA	3.35 UL	4.75 UJ	3.9 UJ
Trichloroethene	500	ug/kg	NA	11 L	4.4 J	3.9 UJ

(1) Pennsylvania Act 1995-2, known as "Act 2", established a program for recycling exist

(1) Pennsylvania Act 1995-2, known as "Act 2", established a program for recycling existing industrial and commercial sites. Values are from Chapter 250 of the Pennsylvania Code, "Administration of Land Recycling Program", Subchapter C, "Statewide Health Standards", Appendix A, "Medium-Specific Concentrations" tables, revisions effective 1/8/2011.

U- Not detected above the Level of Detection

J- Value is estimated

L-Analyte present. Reported value may be biased low. Acutal value is expected higher.

R-Rejected result. Analyte may or may not be present in the sample. Supporting data

*-Indicates the duplicate analysis is not within control limits.

B-Not detected substantilly above the level reported in the laboratory or field blanks

Bold values exceed Soil to Groundwater

NA- Not Analyzed

8. BASELINE HUMAN-HEALTH RISK ASSESSMENT

The objective of the human health risk assessment (HHRA) is to assess potential concerns for human health from environmental impacts to Area II of the FFA resulting from former DoD use of the property.[10] DERP-FUDS requires investigations at former DoD sites be conducted in a manner that is consistent with CERCLA. The HHRA is an integral part of the RI process included in the National Contingency Plan (NCP) (40 Code of Federal Regulations [CFR] 300.43) pursuant to CERCLA (42 United States Code [U.S.C.] 9605). The HHRA is also conducted in support of obtaining relief of liability under the PADEP Act 2 program under the Site-Specific-Standard. The risk assessment estimates the risk and hazard to potential human receptors for exposure to media affected by past activities related to the FFA in accordance with applicable CERCLA, USACE, and PADEP guidance. The following provides a summary of the HHRA, included in full in Appendix F, of this RI report.

8.1 OBJECTIVE

The objective of the HHRA is to evaluate potential human health risk under current and potential future conditions within Area II of the FFA. The specific objectives of the HHRA include:

- Outline the regulatory basis and guidance for conducting the HHRA.
- Outline the methods for determining COPCs for the HHRA.
- Develop a CSM that characterizes relevant contaminant pathways and receptors of concern.
- Calculate potential carcinogenic and non-carcinogenic risk to receptors of concern (e.g., any human contact at the FFA under present or future scenarios).
- Identify areas or media that pose no unacceptable risks to human health and require no further action.
- Identify areas that may pose a concern to human health and require further investigation or action.

It is noted that COPCs are determined from the class of chemicals sampled during the RI. Consideration of individual chemicals in this HHRA does not indicate DoD responsibility for these COPCs.

[10] The RI identified impact from parties other than DoD, specifically VOCs (phenol, acetone, etc.) in soils Zones 2 and 3 which may contribute to risk at the site. As such this impact was evaluated in the risk assessment for Area II (Appendix F) as summarized in Section 8. While these chemicals were evaluated for contribution to risk, DoD is not claiming responsibility for any particular chemical in this Risk Assessment.

8.2 METHODOLOGY

The HHRA evaluated potential human health concerns for exposure to environmental media within Area II of the FFA affected by past DoD activities. To determine human health concerns, the HHRA evaluates potential sources of contamination and routes of migration based on current and potential future site uses. The HHRA results are based upon potential exposure pathways that can occur or are reasonably likely to occur in the future within the FFA. Risks determined in the HHRA are considered baseline risks associated with exposure to the FFA. The baseline risk assumes no remedial actions or other means of exposure reduction (i.e., the use of PPE, digging restrictions, etc.). The HHRA evaluates the reasonable maximum exposure (RME) that has the potential to occur at the FFA. Therefore, HHRA results are considered potential and should be used as a guideline in making risk management decisions.

The HHRA follows guidance as recommended by USEPA, USACE, and PADEP. Specific application of guidance throughout the risk assessment process is detailed in Chapter 2 of Appendix F. The following guidance documents were used for this HHRA:

- Risk Assessment Guidance for Superfund (RAGS), *Volume I: Human Health Evaluation Manual (Part A) (Interim Final)*, EPA/540/1-89/002 (USEPA 1989).

- Risk Assessment Handbook, *Volume I: Human Health Evaluation, Engineer Manual*. EM 200-1-4. 31 January (USACE 1999).

- Technical Guidance Manual, *Section IV General Guidance, Site-Specific Human Health Risk Assessment Guidance*, Bureau of Land Recycling and Waste Management, Document No. 253-0300-100, June 8 (PADEP 2002).

- RAGS, *Volume I: Human Health Evaluation Manual Supplemental Guidance – "Standard Default Exposure Factors" (Interim Final)*, Publication 9285.6-03 (USEPA 1991a).

- RAGS, *Volume I – Human Health Evaluation Manual (Part B, Development of Risk-based Preliminary Remediation Goals)*. EPA/540/R-92/003. December. (USEPA 1991b).

- *Guidelines for Data Useability in Risk Assessment (Part A)*. Office of Solid Waste and Emergency Response, Publication OSWER 9285.7-09A (USEPA 1992).

- RAGS, *Volume I: Human Health Evaluation Manual (Part D, Standardized Planning, Reporting and Review of Superfund Risk Assessments)*. Office of Emergency and Remedial Response (USEPA 2002).

- *Human Health Toxicity Values in Superfund Risk Assessments*. OSWER 9285.7-53. Office of Emergency and Remedial Response (USEPA 2003a).

- RAGS, *Volume I: Human Health Evaluation Manual (Part E: Supplemental Guidance for Dermal Risk Assessment)* Final, EPA/540/R/99/005, OSWER 9285.7-02EP, Office of Superfund Remediation and Technology Innovation, July (USEPA 2004).

- *Guidelines for Carcinogen Risk Assessment*. Risk Assessment Forum. EPA/630/P-03/001F (USEPA 2005a).

- *Supplemental Guidance for Assessing Susceptibility From Early-Life Exposure to Carcinogens*. Risk Assessment Forum, EPA/630/R-03/003F (USEPA 2005b).

- *Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual (Part F: Supplemental Guidance for Inhalation Risk Assessment) Final*. Office of Superfund Remediation and Technology Innovation, EPA-540-R-070-002 (USEPA 2009a).

- *Exposure Factors Handbook*, *2011 Edition*. EPA/600/R-090/052F (USEPA 2011a).

Following USEPA Risk Assessment Guidance for Superfund (RAGS) (1989) and PADEP guidance (2002), the HHRA methodology involves a four-step process: data evaluation and hazard assessment, exposure assessment, toxicity assessment, and risk characterization.

8.2.1 Data Evaluation

In this step, site-specific analytical data are compiled and analyzed for data quality. The analytical data are reviewed to determine COPCs within distinct zones at the FFA. Samples evaluated in the HHRA were collected in support of the RI. Chapter 4 of the RI presents the sampling rational and methodologies used for investigation. Sample results evaluated in the HHRA are presented in Attachment F-1. For sample collection, Area II was divided into three potential zones based on past historical use as illustrated on Figure 2-8 of Appendix F and as follows:

- **Zone 1** occupies the northwest corner of Area II and has limited industrial use. Historically, this area was used mainly for housing with some associated garages and two historical storehouses.

- **Zone 2** occupies the northeast corner of Area II and can be divided based on historical industrial type use including a fire control laboratory, paint shop, blacksmith, and garage.

- **Zone 3** occupies the bottom third of Area II and is also divided on past industrial type/usage (with an emphasis on ammunition production).

In addition, soil samples were placed in the vicinity of transformer stations within Zone 2. Soil samples were collected up to a depth of 40 ft bgs. PADEP guidance identifies a sample depth of 0 to 15 ft bgs for residential exposures (PADEP 2002). However, within FFA Area II much of the site is covered with impervious surfaces at varying thicknesses. Therefore, in order to account for the effect of impervious surfaces at many sampling locations, the HHRA uses an

exposure depth of 20 ft bgs for a residential exposure scenario. This allows for a consistent depth for the samples collected below the impervious surfaces to be used in the risk assessment. Soil samples collected greater than 20 ft bgs were not used in the risk assessment as there is no anticipated complete exposure pathway for soils beyond 20 ft bgs.

Area II is approximately 36.9 acres. The evaluation of the entire Area II within the HHRA would not adequately represent an exposure area typical of a person that would visit or use the site. As a result, Area II was reviewed to determine appropriate exposure areas for the selection of COPCs and evaluation in the HHRA. The exposure areas were first delineated based upon the Zones identified for the RI. The Zones closely represent potential current and future exposure areas based upon site use and history.

Currently, potential exposure to soil is limited to surface soil within exposed, grassy areas (i.e., not covered by asphalt or other impervious materials). Potential future use or development of the site would result in exposure to soil in both the surface and subsurface or a depth similar to the PADEP-identified residential exposure of 0 to 15 ft bgs. As noted earlier, the depth of soil evaluation was increased to 20 ft bgs based upon the presence of asphalt and other material above soil sample locations. Therefore, soil within Area II was evaluated through a risk-based screening for Zone 1, Zone 2, and Zone 3 for both total soil (0 to 20 ft bgs) and exposed surface soil (0 to 2 ft bgs in exposed areas only).

The exposure areas based upon zones may represent a potentially large exposure area for some potential site receptors, specifically a residential child whose exposure is typically limited to a residential yard (USEPA 1989 and 1994). Risk-based screening for the zones is not expected to be a concern because the maximum detected concentration is used in screening. However, actual receptor exposure may be different than the risk-based screening. Therefore, each zone was also evaluated for potential localized areas of "elevated" concentrations based upon the results of the risk-based screening.

The USEPA Regional Screening Levels (RSLs) (USEPA 2012a) and the PADEP MSCs (PADEP 2011) were used for risk-based screening purposes in the HHRA. The screening process involved a comparison to risk-based chemical concentrations that take into account chemical toxicity and potential exposure routes. A chemical was selected as a COPC and retained for further evaluation in the HHRA if the maximum detected concentration in a sample medium exceeded the risk-based screening concentration. Tables 2.1.1 through 2.4.1 in Appendix F present the results of the risk-based screening for both total and surface soil for Zones 1, 2, and 3.

8.2.2 Exposure Assessment

In the exposure assessment, the receptors of concern and potential exposure pathways are identified. The COPCs in site environmental media are converted into systemic doses, taking into account contaminant concentrations, rates of contact (e.g., ingestion rates), and absorption rates of different COPCs. The magnitude, frequency, and duration of these exposures are then integrated to obtain estimates of daily doses over a specified period of time (e.g., lifetime,

activity-specific duration). The exposure assessment was performed based upon the following steps (PADEP 2002):

1. Characterization of the exposure setting;
2. Identification of complete exposure pathways; and
3. Quantification of exposure of the receptor.

8.2.3 Exposure Setting

The majority of the surface area of Area II is covered with impervious surfaces (asphalt, concrete, improvements). Manicured lawns and associated topsoil is present in the northwestern portion of Area II, within Zone 1, and adjacent to some buildings in berms separating the sidewalks from buildings. There are no wetlands, streams, or other surface watercourses located on the FFA property proper. Surface water at the FFA (derived from rain events) is controlled by a system of catch basins and stormwater pipes, as discussed in Section 3.6. Stormwater is conveyed by this system to a pumping, or "lift station" located adjacent to the creek and is discharged to Frankford Creek at this point. Current status of this operation is unknown.

The current site use and tenants for each zone are as follows:

- Zone 1: Office space including a security company, rare book store, and real estate management company; vacant buildings; charter school and outdoor recreational areas (former parade ground and basketball court).

- Zone 2: Vacant buildings; charter school; storage for Philadelphia Opera Company, Philadelphia Police/Homeland Security; electronic repair company.

- Zone 3: Vacant buildings; import business; commercial uses; and Philadelphia police.

There is also a potential for a future child care facility within the southeastern corner of Zone 3. Additionally, transformers are located within in Zones 1, 2, and 3.

Therefore, each zone has a variety of site uses and tenants. The current and likely future land use of Area II is a mixture of industrial, commercial, institutional, and residential. Potential exposed populations include a variety of age ranges and receptor scenarios. Exposed populations could include children, adolescent, and adults. Receptor scenarios could include trespassers, site visitors, school students, office/commercial workers, maintenance workers/landscapers, and daycare students.

Identification of Complete Exposure Pathways

The CSM presents the complete exposure pathways based upon potential sources of contamination, routes of migration, and potential receptors. Exposure pathways begin from potential source areas and progress through the environment via various fate and transport processes to potential human receptors. Figure 3-2 illustrates the HHRA CSM for Area II. The CSM identifies which exposure pathways are complete and require further evaluation in the

HHRA. An exposure pathway describes a mechanism by which a population or individual may be exposed to COPCs. A completed exposure pathway requires the following four components:

- A source and mechanism of chemical release to the environment
- An environmental transport medium for the released chemical
- A point of potential human contact with the contaminated medium
- A human exposure route at the point of exposure

All four components must exist for an exposure pathway to be complete and for exposure to occur. Incomplete exposure pathways do not result in actual human exposure and are not included in the exposure assessment and resulting risk characterization.

Potentially complete exposure pathways indicate that exposure to a contaminant may have occurred in the past, may be occurring currently, or may occur in the future. A potential exposure exists when information about one or more of the four components of an exposure pathway is uncertain. Typically, a pathway should be categorized as "potential" when the existence of human contact with or access to an environmental medium is not known.

8.2.4 Quantification of Exposure

Quantification of exposure involves the determination of an exposure point concentration (EPC) and calculation of chemical intakes. The EPC represents the approximate concentration expected to be contacted over an exposure period. Since expected exposure periods are long term, the EPC is represented by the 95th percentile upper confidence limit of the mean (95%UCL) (USEPA 2011b). Tables 3.1.1 through 3.4.1 of Appendix F present the selected EPCs for each zone.

For the daycare student, the construction of a daycare facility was only anticipated within the southeastern toe of Zone 3 (based on information provided at the beginning of the RI process). Because this area will require construction and redevelopment for use as a daycare facility, the daycare students are likely to be exposed to surface and subsurface soil (combined into total soil). The daycare student's exposure is limited to the southeastern corner of Zone 3 based upon the planned location of a daycare center, which includes sample locations UBZ3-49, UBZ3-50, UBZ3-51, UBZ3-52, UBZ3-53, UBZ3-57, UBZ3-58, UBZ3-60, UBZ3-61, UBZ3-62, UBZ3-63, and BZ3-15.

In addition, the transformers within Zone 2 were evaluated as one data set even though the areas are not contingent. For the transformers, soil was evaluated for total soil only since a majority of the samples were collected from the 0 to 2 ft bgs. Only one subsurface soil sample was collected near the transformers. Only the construction worker and resident adult and child were assumed to have contact with the transformer areas. These receptors represent a conservative evaluation (e.g., higher exposure) for any potential non-worker and worker exposure to the area near the transformers.

The next step in the exposure assessment is to estimate COPC intake or exposure for each exposure pathway considered in the HHRA. In the exposure assessment, two different measures

of intake are provided, depending on the nature of the effect being evaluated. When evaluating longer-term (i.e., chronic) exposures to chemicals that produce adverse non-carcinogenic effects, intakes are averaged over the period of exposure (i.e., the averaging time [AT]) (USEPA 1989). This measure of intake is referred to as the average daily intake (ADI) and is a less than lifetime exposure. For chemicals that produce carcinogenic effects, intakes are averaged over an entire lifetime and are referred to as the lifetime average daily intake (LADI) (USEPA 1989). Detailed equations for determining intake are provided on Tables 4.1 through 4.7 in Appendix F. Most exposure parameters used to estimate intakes are based on default assumptions described in PADEP (2002) and USEPA (1989, 1991a, 1991b, 2004, 2009a, and 2011a) guidance documents.

8.2.5 Toxicity Assessment

The toxicity assessment considers the types of potential adverse health effects associated with exposures to COPCs, the relationship between the magnitude of exposure and potential adverse effects, and related uncertainties, such as Provisional Peer Reviewed Toxicity Values (PPRTVs), which are developed by the Office of Research and Development, the National Center for Environmental Assessment (NCEA), and the Superfund Health Risk Technical Support Center on a chemical-specific basis when requested by the Superfund program.

Toxicity values are selected in keeping with appropriate exposure duration and USEPA guidance (USEPA 1989 and 2003a). Tier 1 values are found using the Integrated Risk Information System (IRIS) (USEPA 2012c) for established, current values. When toxicity values are not available from IRIS, Tier 2 values are then examined.

Tier 2 values are USEPA's Provisional Peer Reviewed Toxicity Values (PPRTVs), which are developed by the Office of Research and Development, the National Center for Environmental Assessment (NCEA), and the Superfund Health Risk Technical Support Center on a chemical-specific basis when requested by the Superfund program.

Tier 3, other toxicity values, are considered when Tier 1 or Tier 2 toxicity values are not available. These toxicity values are taken from additional USEPA and non-USEPA sources and are chosen based on the most current and best peer-reviewed source available. The California Environmental Protection Agency (CalEPA) Office of Environmental Health Hazard Assessment (OEHHA) Cancer Potency Values (CalEPA 2009), the Health Effects Assessment Summary Tables (HEAST) (USEPA 1997a), and the Agency for Toxic Substances and Disease Registry (ATSDR) Minimal Risk Levels (MRLs) (ATSDR 2012) are the Tier 3 sources utilized for this HHRA. Table 5.1.1 through 6.3.2 of Appendix F present the non-carcinogenic and carcinogenic toxicity values for each COPC identified within each of the zones.

Lead is classified as a B2-probable human carcinogen. However, USEPA has not published an SF or IUR for quantifying carcinogenic risks. Blood lead levels are the indicator of excess lead exposure in humans. Modeled blood level results are compared to the established threshold of no more than 5 percent of the population having a blood-lead of 10 micrograms (µg) lead per deciliter (dL) or greater. This blood level is considered protective of human health for children. Lead is considered a COPC for surface and total soil for both the residential and industrial exposure scenarios for all zones within Area II. Potential concerns for residential exposure to

lead in soil were evaluated using USEPA's Integrated Exposure Uptake Biokinetic (IEUBK) Lead Model (USEPA 2012b) for children 0-7 years of age. For the industrial scenarios (i.e., workers), potential concerns for lead exposure were modeled using *Recommendations of the Technical Review Workgroup (TRW) for Lead, An Interim Approach to Assessing Risks Associated With Adult Exposures to Lead in Soil* (USEPA 2003b and 2009b). Additionally, adolescent school children were evaluated using the TRW Lead Model in accordance with USEPA guidance (2003c).

8.2.6 Risk Characterization

In this step, the calculated chemical intakes and toxicity values are used to quantitatively estimate both carcinogenic and non-carcinogenic risks. Risks are calculated for each potential receptor. Carcinogenic risks and non-carcinogenic hazards are evaluated for each receptor on a cumulative basis across all pathways and media.

Carcinogenic risk results are compared to the USEPA carcinogenic "acceptable risk range" of 10^{-4} to 10^{-6}. For non-carcinogens, a threshold of 1.0 is utilized. Unacceptable risks for potential receptors are identified when cumulative carcinogenic risks exceed the upper bound of the "acceptable risk range" (i.e., 10^{-4}) or cumulative non-carcinogenic hazards exceed 1.0, based upon a target organ breakdown.

The USEPA software program, IEUBK Model, was used for predicting blood lead levels in children 0-7 years of age. The most current software is IEUBKwinv1.1 (USEPA 2010). Standard default values used as input parameters for the model are described in USEPA guidance (USEPA 2010). The model output is a probability distribution function describing the percentage of children predicted to have blood-lead levels exceeding 10 µg/dL. To achieve a specific level of protectiveness, USEPA has established that no more than a 5 percent probability of children exposed to lead would have a blood lead level exceeding 10 µg/dL (USEPA 1994). The 10 µg/dL blood lead level is based upon analyses by the Centers for Disease Control (CDC) and USEPA that reveal blood lead levels of 10 µg/L and higher result in health effects in children (USEPA 1994). More specific information on this model is contained in USEPA's *Guidance Manual for the IEUBK Model for Lead in Children*, February 1994. Outputs of the IEUBK Blood-lead modeling are presented in Attachment F-3 of Appendix F.

For estimating blood-lead levels in site workers, the USEPA TRW for Lead has developed a model to predict blood-lead levels in adult workers (USEPA 2003b and 2009b). This model is run to assess potential workers under a commercial setting. Model default parameters are used to predict blood lead impacts for female workers and their potential children (fetus) due to site exposure. The TRW adult lead model was used to evaluate all potential worker exposure each of the zones, which includes commercial workers, maintenance workers/landscapers, and construction workers.

While both the resident child and worker are potential receptors at the site, they are not the only receptors of concern. School students use both Zones 1 and 2 for recreational activities. USEPA does not have a blood lead model specific to recreational users or school students. However, USEPA does recommend the use of the adult lead model for an adolescent's exposure to lead in

soil as long as the exposure exceeds 1 day per week and duration of 3 consecutive months (USEPA 2003c). School students within Zones 1 and 2 are expected to have a continuous exposure of 5 days per week for approximately 9 months out of the year.

For the vapor intrusion pathway, benzene, carbon tetrachloride, chloroform, ethylbenzene, and trichloroethene exceeded PADEP's screening values for soil (PADEP 2004). PADEP guidance notes, "There are two conditions that must be met for the vapor intrusion pathway to be of potential concern. First, inhabited buildings must be close to a volatile/semivolatile source and, second, the source concentration must be above some threshold or screening concentration" (PADEP 2004). Both of these conditions have been met within Zone 3. Sample location UBZ3-38, at the depth of 0 to 2 ft bgs, had the maximum detected concentration of carbon tetrachloride, chloroform, and trichloroethene. Sample location UBZ3-42, at a depth of 11.5 to 13.5 ft bgs, had the maximum detected concentration of benzene and ethylbenzene. These sample locations are located adjacent to buildings. PADEP presents a decision matrix for determination of whether the vapor intrusion pathway is a concern. The decision matrix recommends sampling of soil gas or indoor air for meeting the statewide health standard. Also, if preferential exposure pathways are present and pass through the source or occur within 30 ft of the source, then the decision matrix requires that soil gas or indoor air sampling be performed. Underground utilities and tunnels connecting all of the buildings are located within 30 ft of the potential soil source area connecting all the buildings. Based upon the depth of soil contamination (less than 2 ft bgs) and magnitude of exceedance of VOC COPCs, there may be potential concerns for vapor intrusion to indoor air.

8.3 CONCLUSIONS

Calculations are presented by receptor in Tables 7.1.1 through 7.4.3 of Appendix F. The tables are divided by zone and exposure area. Estimates of cumulative risks across all pathways for non-carcinogenic and carcinogenic effects for all receptors are presented in Tables 9.1.1 through 9.4.2 of Appendix F. A summary of contributors to risk is presented in Tables 10.1.1 through 10.4.2 of Appendix F; these tables also present a summary of non-carcinogenic risk for target organs across all media evaluated. COPCs are only identified on Tables 10.1.1 through 10.4.2 of Appendix F if cumulative carcinogenic risks are greater than the target risk range of 10^{-6} to 10^{-4} or cumulative non-carcinogenic risks are greater than 1.0. Contributors to risk are identified as COPCs with carcinogenic risks greater than 10^{-6} or non-carcinogenic risks greater than 0.1.

Table 8-1 presents a summary of the HHRA results for carcinogenic and non-carcinogenic risk (not including lead) by zone and Table 8-2 presents a summary of localized areas of "elevated" concentrations. The results indicate there are no exceedances of the carcinogenic or non-carcinogenic risk thresholds for any of the receptors evaluated. The exposure areas based upon zones may represent a potentially large exposure area for some potential site receptors. Therefore, each zone was also evaluated for potential carcinogenic and non-carcinogenic risk due to localized areas of "elevated" concentrations. The localized areas of "elevated" concentrations evaluation is presented by zone in Section 5.6 of Appendix F. Localized areas of "elevated" concentrations were identified as sample locations with COPCs that potentially represent a carcinogenic risk level of 10^{-4} or a non-carcinogenic hazard quotient of 10. The

carcinogenic risk level represents the upper-bound of the acceptable risk range of 10^{-6} to 10^{-4} (USEPA 1990 and PADEP 1995).

No potential localized areas of "elevated" concentrations were identified within Zone 1. One sample location was identified within Zone 2 that contained elevated concentration of BAP. However, this area was not considered a localized area of "elevated" concentrations due to its location along the southern end of Building 111 under a parking lot and that no other elevated concentrations of BAP were detected in Zone 2. A potential localized area of "elevated" concentration of BAP was identified within the southwestern corner of Zone 3. The localized area of "elevated" BAP concentrations would be a concern only for potential residential use of this area and is not a concern for workers. Elevated concentrations of arsenic were detected in two sample locations within Zone 3. However, these locations were not identified as localized areas of "elevated" concentrations because the samples were collected below pavement at a distance of 1,300 ft apart. Additionally, sample locations adjacent to these areas did not have elevated levels of arsenic. A potential localized area of "elevated" PCB was identified within one transformer area in Zone 2. Aroclor 1260 at sample location T-1101 is a potential concern for residential receptors. This sample location was in surface soil adjacent to Building 28 in Zone 2 where surfaces are bare/vegetated and pervious.

Lead

It is noted that lead was not evaluated in terms of carcinogenic and non-carcinogenic risk. Alternately, potential concerns from localized areas of "elevated" lead concentrations were evaluated through the use the USEPA blood lead models. The IEUBK model was used to evaluate potential concerns for a resident child. The adult lead model was used to evaluate potential concerns for workers and school students. Based upon the evaluation of each entire zone as an exposure area, the IEUBK model identified potential concerns (e.g., elevated blood-lead levels) for future receptor resident children exposure to soil within the entire Zone 1 and daycare student's exposure to the southeastern portion of Zone 3. There were no concerns for workers or school student's exposure to soil within any of the zones. However, under Act 2 a school child is considered the equivalent of a residential child; therefore, if this interpretation is used there are potential concerns for current students exposure to soil within Zone 1 .

It is noted that lead was detected at high concentrations, above both the residential and industrial soil RSL, within each of the zones. The use of the arithmetic average concentrations across each zone may result in a dilution of the high lead concentrations. Additionally, the evaluation of lead across an entire zone represents an exposure area that is potentially greater than usually assessed for both a resident child and school children. For a resident child, the USEPA recommends the evaluation of a "typical residential yard area" (USEPA 1994). The area of a "typical residential yard" is not specifically defined and open for interpretation based upon planned reuse of the zones. Therefore each zone was also evaluated to identify areas containing "elevated" lead concentrations that may be a concern for human health in accordance with EPA RAGs guidance (1989). Potential localized areas of "elevated" lead concentrations were identified as those areas with sample locations having lead concentrations greater than 1,000 mg/kg. This concentration is adequately protective to the current use receptors (e.g., school students and office/commercial

workers) and removal of these "elevated" concentrations may result in lead levels that are also protective for future uses.

There are 16 sample locations within Zone 1 with lead detected at greater than 1,000 mg/kg. All of these sample locations are within exposed grassy areas. The maximum detected concentration of lead within Zone 1 was 8,860 at sample location Z1D7-0.5-1 within surface soil. This sample location is within central grassy area of Zone 1 used by school students for recreational activities. A majority of the sample locations above 1,000 mg/kg are located adjacent to the former residences that surround the parade ground.

Within Zone 2, there are two sample locations with lead detected at greater than 1,000 mg/kg. These sample locations are within exposed grassy areas in surface soil. The maximum detected concentration of lead within Zone 2 was 15,600 at sample location UBZ2-45-1-2 within surface soil (below the immediate surface). This sample location is within grassy area adjacent to an office building near the charter school.

There are five sample locations within Zone 3 with lead detected at greater than 1,000 mg/kg. The maximum detected concentration of lead within Zone 3 was 12,700 at sample location UBZ3-19-0-2 within the surface soil (in the grassy area in the courtyard of Building 215). Four of the sample locations with lead above 1,000 mg/kg are located within the southeastern portion of Zone 3 identified as the potential future location for a daycare facility.

The localized areas of "elevated" lead concentrations within Zone 1 are located within exposed, grassy areas accessible to school students and other visitors or workers. The widespread nature of exceedances and limited vertical impact of lead in Zone 1 indicates that the source is most likely historical deposition onto undisturbed soils. Potential sources for deposition include airborne dust particles and paint chips. Buildings in the areas with the observed highest concentration of lead in soil (Buildings 1 through 5 and 14) are among the oldest buildings at the FFA. These buildings have been historically painted (JMA 1979) and these buildings were observed to be flaking during the RI fieldwork.

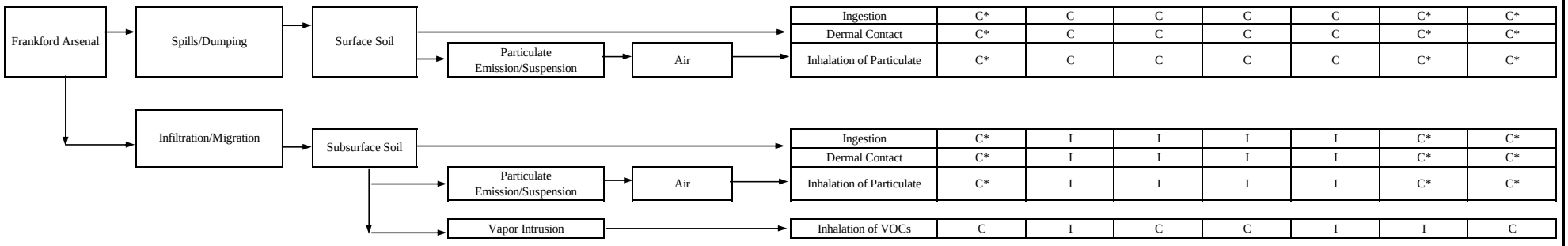
The localized areas of "elevated" lead concentrations within Zone 2 and Zone 3 (sample location UBZ3-19 in Zone 3) are located within exposed, grassy areas accessible to school students and other visitors or workers within these zones. The remaining localized areas of "elevated" lead concentrations located in the southeastern portion of Zone 3 should be evaluated further before any future use of the area that may involve children or adolescents.

Vapor Intrusion to Indoor Air

The VOCs benzene, carbon tetrachloride, chloroform, ethylbenzene, and trichloroethene exceeded PADEP's Residential Volatilization to Indoor Air screening values for soil (PADEP 2004). PADEP guidance notes, "There are two conditions that must be met for the vapor intrusion pathway to be of potential concern. First, inhabited buildings must be close to a volatile/semivolatile source and, second, the source concentration must be above some threshold or screening concentration" (PADEP 2004). Both of these conditions have been met within Zone 3. Sample location UBZ3-38, at the depth of 0 to 2 ft bgs, had the maximum detected

concentration of carbon tetrachloride, chloroform, and trichloroethene. Sample location UBZ3-42, at a depth of 11.5 to 13.5 ft bgs, had the maximum detected concentration of benzene and ethylbenzene. These sample locations are located adjacent to buildings. PADEP presents a decision matrix for determination of whether the vapor intrusion pathway is a concern. The decision matrix recommends sampling of soil gas or indoor air for meeting the statewide health standard. Also, if preferential exposure pathways are present and pass through the source or occur within 30 ft of the source, then the decision matrix requires that soil gas or indoor air sampling be performed. Underground utilities and tunnels connecting all of the buildings are located within 30 ft of the potential soil source area connecting all the buildings. Based upon the depth of soil contamination (less than 2 ft bgs) and magnitude of exceedance of VOC COPCs (carbon tetrachloride, chloroform, and trichloroethene), there may be potential concerns for vapor intrusion to indoor air.

FIGURE 8-1
HUMAN HEALTH CONCEPTUAL SITE MODEL
FORMER FRANKFORD ARSENAL



PRIMARY SOURCE	PRIMARY RELEASE MECHANISM	SECONDARY SOURCE[1]	SECONDARY RELEASE MECHANISM	TERTIARY SOURCE	EXPOSURE ROUTE	POTENTIAL RECEPTORS						
						Resident (Adult and Child)	Trespasser (Adult and Adolescent)[2]	School Students[3] (Adolescent)	Office/Commercial Worker (Adult)	Maintenance Worker/Landscaper (Adult)	Construction Worker (Adult)	Day Care Students[4] (Child)
Frankford Arsenal	Spills/Dumping	Surface Soil			Ingestion	C*	C	C	C	C	C*	C*
					Dermal Contact	C*	C	C	C	C	C*	C*
			Particulate Emission/Suspension	Air	Inhalation of Particulate	C*	C	C	C	C	C*	C*
	Infiltration/Migration	Subsurface Soil			Ingestion	C*	I	I	I	I	C*	C*
					Dermal Contact	C*	I	I	I	I	C*	C*
			Particulate Emission/Suspension	Air	Inhalation of Particulate	C*	I	I	I	I	C*	C*
			Vapor Intrusion		Inhalation of VOCs	C	I	C	C	I	I	C

LEGEND

I	Incomplete or negligible exposure pathway.
C	Potentially complete exposure pathway.
C*	Potentially complete exposure pathway evaluated, evaluated for contact with total soil (surface and subsurface soil combined).
VOC	Volatile Organic Compound

1) Groundwater is also a medium of concern but will be evaluated as a separate operable unit.
2) This receptor was not evaluated quantitatively because other receptors represent a more conservative exposure.
3) This receptor is only evaluated for Zones 1 and 2
4) The daycare receptor is only evaluated for the southeastern portion of Zone 3.

TABLE 8-1 - HHRA SUMMARY OF RESULTS

Receptor	HHRA Results[a]	
Zone 1		
Adult Office/Commercial Worker	Cancer Risk	$3x10^{-6}$
	Non-Cancer Hazard Index	0.03
Adult Maintenance Worker/Landscaper	Cancer Risk	$2x10^{-6}$
	Non-Cancer Hazard Index	0.02
Adolescent School Student	Cancer Risk	$4x10^{-6}$
	Non-Cancer Hazard Index	0.1
Adult Construction Worker	Cancer Risk	$3x10^{-7}$
	Non-Cancer Hazard Index	0.09
Child Resident[b]	Cancer Risk[b]	$4x10^{-5}$
	Non-Cancer Hazard Index	1
Adult Resident[b]	Cancer Risk[b]	$4x10^{-5}$
	Non-Cancer Hazard Index	0.1
Zone 2		
Adult Office/Commercial Worker	Cancer Risk	$2x10^{-6}$
	Non-Cancer Hazard Index	0.05
Adult Maintenance Worker/Landscaper	Cancer Risk	$1x10^{-6}$
	Non-Cancer Hazard Index	0.03
Adolescent School Student	Cancer Risk	$2x10^{-6}$
	Non-Cancer Hazard Index	0.1
Adult Construction Worker	Cancer Risk	$2x10^{-7}$
	Non-Cancer Hazard Index	0.07
Child Resident[b]	Cancer Risk[b]	$4x10^{-5}$
	Non-Cancer Hazard Index	0.8
Adult Resident[b]	Cancer Risk[b]	$4x10^{-5}$
	Non-Cancer Hazard Index	0.1
Zone 3		
Adult Office/Commercial Worker	Cancer Risk	$2x10^{-6}$
	Non-Cancer Hazard Index	0.08
Adult Maintenance Worker/Landscaper	Cancer Risk	$2x10^{-6}$
	Non-Cancer Hazard Index	0.04
Child Daycare Student	Cancer Risk	$4x10^{-5}$
	Non-Cancer Hazard Index	2[c]
Adult Construction Worker	Cancer Risk	$4x10^{-7}$
	Non-Cancer Hazard Index	0.09
Child Resident[b]	Cancer Risk[b]	$9x10^{-5}$
	Non-Cancer Hazard Index	1
Adult Resident[b]	Cancer Risk[b]	$9x10^{-5}$
	Non-Cancer Hazard Index	0.1
Transformer Area		
Adult Construction Worker	Cancer Risk	$8x10^{-7}$
	Non-Cancer Hazard Index	NA
Child Resident[b]	Cancer Risk[b]	$7x10^{-5}$

Receptor	HHRA Results[a]	
	Non-Cancer Hazard Index	NA
Adult Resident[b]	Cancer Risk[b]	$7x10^{-5}$
	Non-Cancer Hazard Index	NA
Notes:		
a) Lead is not included in this summary. b) Cancer Risk for the resident adult and child are presented as a total lifetime cancer risk. c) A breakdown by target organ did not reveal any target organ hazard index above 1.		

TABLE 8-2
SAMPLE LOCATIONS IDENTIFIED AS POTENTIAL ELEVATED AREAS DRIVING RISK
FORMER FRANKFORD ARSENAL SITE

Analyte	Sample Location	Result (mg/kg)	Sample Depth (feet)	USEPA Residential Soil RSL (mg/kg)	Carcinogenic Risk Level[2]
Zone 1					
Lead[1]	Z1D7	8,860	0.5 to 1	400	NA[3]
Lead[1]	UBZ1-SO-41	4,390	0 to 0.5	400	NA[3]
Lead[1]	UBZ1-SO-39	3,330	0 to 0.5	400	NA[3]
Lead[1]	UBZ1-SO-49	3,130	0 to 0.5	400	NA[3]
Lead[1]	UBZ1-SO-10	2,930	0 to 0.5	400	NA[3]
Lead[1]	BZ1-SO-02	2,760	0 to 0.5	400	NA[3]
Lead[1]	Z1D7	2,670	1 to 2	400	NA[3]
Lead[1]	UBZ1-SO-7	1,930	0 to 0.5	400	NA[3]
Lead[1]	UBZ1-SO-31	1,540	0 to 0.5	400	NA[3]
Lead[1]	UBZ1-SO-17	1,390	0 to 0.5	400	NA[3]
Lead[1]	UBZ1-SO-16	1,260	0 to 0.5	400	NA[3]
Lead[1]	UBZ1-SO-38	1,230	0 to 0.5	400	NA[3]
Lead[1]	UBZ1-SO-32	1,200	0 to 0.5	400	NA[3]
Lead[1]	UBZ1-SO-52	1,140	0 to 0.5	400	NA[3]
Lead[1]	UBZ1-SO-24	1,120	0 to 0.5	400	NA[3]
Lead[1]	UBZ1-SO-23	1,080	0 to 0.5	400	NA[3]
Zone 2					
Benzo(a)pyrene	BZ2-07	2.5	0 to 2	0.015	1.7.E-04
Lead[1]	UBZ2-SO-45	15,600	1 to 2	400	NA[3]
Lead[1]	UBZ2-SO-26	1,980	0 to 1	400	NA[3]
Zone 3					
Arsenic	UBZ3-SO-63	52.5	5 to 7	0.39	1.3.E-04
Arsenic	UBZ3-SO-24	47.7	12 to 13	0.39	1.2.E-04
Benzo(a)pyrene	UBZ3-SO-55	8.9	0.5 to 3	0.015	5.9.E-04
Benzo(a)pyrene	UBZ3-SO-18	5.8	4 to 5	0.015	3.9.E-04
Benzo(a)pyrene	UBZ3-SO-54	2.4	3 to 5	0.015	1.6.E-04
Benzo(a)pyrene	UBZ3-SO-39	2.2	0 to 2	0.015	1.5.E-04
Benzo(a)pyrene	UBZ3-SO-23	1.5	3 to 5	0.015	1.0.E-04
Lead[1]	UBZ3-SO-19	12,700	0 to 2	400	NA[3]
Lead[1]	UBZ3-SO-57	11,600	0 to 2	400	NA[3]
Lead[1]	UBZ3-SO-49	8,500	4 to 5	400	NA[3]
Lead[1]	UBZ3-SO-58	1,910	0 to 2	400	NA[3]
Lead[1]	UBZ3-SO-63	1,570	5 to 7	400	NA[3]
Transformer Area					
Aroclor 1260	T1101-SO-1-0-0.5	38	0 to 0.5	0.22	1.7.E-04

Notes:
1) Lead localized areas of "elevated" conentrations were identified as location where the concentration of lead exceeded 1,000 mg/kg. Please see Section 5.5.5 of the HHRA (Appendix F)for explanation of this level.
2) Carcinogenic risk level is determined by the following equation: (Analyte detected concentration/USEPA RSL)*0.000001
3) Toxicity values are not available for lead to determine a carcinogenic risk level. Risks associated with lead are determined through blood-lead modeling.

9. SCREENING LEVEL ECOLOGICAL ASSESSMENT

9.1 INTRODUCTION

The data for Area II of the FFA FUDS have been evaluated in the light of the potential for ecological risk and in support of obtaining relief of liability under the PADEP Act 2 program. Also in support of the Act 2 process, a human health risk assessment has been conducted and presented in Chapter 8.

The FFA is located in an urban, mixed-use area of northeast Philadelphia. The FFA is bounded to the north by Tacony Street and I-95; to the east by industrial properties including Dietz and Watson; by Frankford Creek and the Delaware River to the south; and to the west by Bridge Street and several industrial properties. Beyond Frankford Creek is the Rohm and Haas Refinery. Beyond I-95 to the north are more industrial properties, and further beyond those is a residential area.

The FFA was commissioned in 1816 for military use. Previously, the FFA was farm land and undeveloped wetlands. The wetland areas were entirely filled in over the years. Between 1816 and decommissioning in 1977, the FFA was used for a variety of military activities as its mission was adjusted to fit the military's changing needs. Activities at the FFA during its years of operation included military ordnance production, testing and storage, and munitions research. The FFA consisted of four component areas: a small arms division, an artillery ammunition division, a stock section area, and an ordnance depot.

The entire FFA is approximately 109 acres, located in northeast Philadelphia. This ecological risk assessment (ERA) focuses on Area II of the FFA (Figure 9-1). Area II is located to the west of Baird Street, east of Bridge Street, south of Tacony Street, and north of Frankford Creek and encompasses approximately 36.9 acres. The portion of the FUDS identified as Area II consists of 81 buildings of various sizes, age, and condition. An additional 34 buildings, which were located in this area, have been demolished over the years, creating some open spaces between buildings. For the purposes of this study, Area II has been separated into three zones (Figure 9-1). Zone 1 is the most vegetated and is approximately 12 acres. Zone 1 occupies the northwest corner of Area II and has limited industrial use. Historically, this area was used mainly for housing with some associated garages and two historical storehouses. Zone 2 is the area directly to the east of Zone 1 and consists primarily of buildings and parking lots. Zone 2 has been separated based on historical industrial use including a fire control laboratory, paint shop, blacksmith, and garage. Zone 3 is the southernmost section of Area II that consists of the area closest to Frankford Creek and runs east to west covering the southern end of Area II. Zone 3 has also been separated based on past industrial usage that had an emphasis on ammunition production. Since its decommissioning from military use, Area II is now primarily used as a commercial business park with space leased to a charter school. The USEPA Region 6 Ecological Exclusion Criteria Worksheet and Ecological Assessment Checklist from the Region 6 Corrective Action Strategy (USEPA 2008b) for the FFA are provided in Appendix G.

This ERA has been conducted based on recently collected soil data from within the FUDS Area II boundary. The purpose of the ERA is to determine if, under expected exposure

conditions, chemicals and metals found in the soil within Area II are at concentrations that may cause unacceptable risk to ecological receptors in the area. The results will be used to support the Act 2 process. The exposure area assessed in this ERA includes only Area II of the FFA. The area within the perimeter of Area II is now primarily used as a commercial business park with space leased to a charter school. The future uses for Area II have been determined to be industrial, commercial, institutional, and residential.

As can be seen in Figure 9-1, Zones 2 and 3 consist primarily of buildings and parking lots, with sparse areas of grass, and do not represent substantial habitat for natural communities. Consequently a qualitative risk review, consisting of COPC selection and qualitative evaluation related to the results, is presented for these zones within Area II. Alternatively, as shown in Figure 9-1, Zone 1 consists of grass and some trees, and represents the best ecological habitat in Area II. A quantitative Screening Level Ecological Risk Assessment (SLERA) was conducted for Zone 1.

USEPA utilizes an eight-step process (Figure 9-2) for assessing ecological risk (USEPA 1997b). The SLERA consists of Steps 1 and 2, which is a preliminary screening process using very conservative assumptions. Consequently, a second tier of the risk assessment process has been performed consistent with USEPA guidance, specifically refining exposure assumptions, which will provide a more site-specific, realistic assessment of potential risks to ecological receptors in Zone 1 of Area II of the FFA (USEPA 2001; Tri-Service ERAWG 2008). The refinements which have been included in this risk assessment include:

- Area use percentage (home range)
- Bioavailability
- Diet composition
- Food concentration
- Background

USEPA Region III uses the Federal USEPA Guidance for designing and conducting ERAs (USEPA 1997b), and these procedures have been accepted by PADEP under the Act 2 program. The ERA approach incorporates the following available guidance on ecological risk assessment:

- *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments* (USEPA 1997b)

- *Guidelines for Ecological Risk Assessment* (USEPA 1998)

- *The Role of Screening-Level Risk Assessments and Refining Constituents of Concern in Baseline Ecological Risk Assessments* (USEPA 2001)

9.2 CONCEPTUAL SITE MODEL

The CSM is a description of the physical and ecological characteristics of the FFA, potential exposure scenarios, identification of receptors of concern (ROCs), and assessment and measurement endpoints.

A major element in the CSM is a description of the exposure scenarios. This consists of four elements:

- Source of COPCs and release mechanism(s),
- Transport media and mechanism of transfer from primary to subsequent media,
- Point (or area) of potential ROC contact with the COPC, and
- Route of uptake by the ROC.

As discussed in Section 9.1, this ERA is focused on soil data collected only within Area II of the FFA.

The CSM for Area II within the FFA is shown in Figure 9-3. On the basis of this CSM, there are complete exposure pathways to surface soil for terrestrial ecological receptors within Area II at the FFA, particularly within Zone 1.

9.2.1 Receptors of Concern

Ecological ROCs are species or guilds of species that are important to the ecology of the study area and that may be susceptible to chemical constituents detected at the FFA. Selection of ROCs is systematic, representative, and ecologically based to ensure that assessment endpoints are adequately addressed. Criteria used to identify ecological ROCs include the following (Suter 1993):

- **Presence** – known or expected to occur onsite
- **Susceptibility** – exposure pathway is likely complete and of sufficient duration/magnitude to represent potential concern
- **Representative** – of the food web and/or guild
- **Data Availability** – sufficient and appropriate type of toxicity and exposure information
- **Societal Importance** – species merits public attention

Ecological ROCs identified for Area II within the FFA include terrestrial plants and invertebrates, birds (represented by a robin and hawk), and mammals (represented by a shrew, rabbit, and fox). Amphibians (e.g., bullfrog) and reptiles (e.g., black snake) were not evaluated as part of this SLERA due to the lack of toxic end points.

9.2.2 Assessment and Measurement Endpoints

USEPA guidance stresses the importance of ecologically significant endpoints. As discussed by USEPA, "Assessment endpoints are explicit expressions of the actual environmental value that is to be protected, operationally defined by an ecological entity and its attributes" (USEPA 1998). Failure to select appropriate assessment and measurement endpoints can result in the inability to answer the risk questions central to an ERA. Several criteria are applicable for endpoint selection (Suter 1993; USEPA 1998):

- **Unambiguous Definition**—Assessment endpoints should indicate a subject and a characteristic of the subject (such as bird reproduction).

- **Accessibility to Prediction and Measurement**—Assessment endpoints should be reliably predictable from measurements.

- **Susceptibility to the Hazardous Agent/Stressor**—Susceptibility of an organism (plant or animal) results from the combination of potential for exposure and the sensitivity to the concentrations of constituents or other stressors of concern.

- **Biological Relevance**—Biological relevance of impacts to an individual organism is determined by the importance of the impact to higher levels of biological organization such as populations or communities.

- **Social Relevance and Policy Goals**—Assessment endpoints should be of value to decision-makers and the public. The assessment endpoints should represent effects that could warrant consideration of site remediation or alteration of project plans. Assessment endpoint selection should also include endpoints that may be mandated legally (e.g., protected species).

There are no legally mandated endpoints in Area II as neither protected species nor wetlands occur on the FFA. The extent to which these items are considered varies from site to site, and it depends on several factors including the level of public involvement, the ecological character of the site, and the lead regulatory agency involved in the assessment.

Based on the ROCs identified for Area II of the FFA, the habitat, and the above observations, the following ecological assessment endpoints are defined:

1. Ecological health of terrestrial plants and soil invertebrates, to ensure that these organisms that live in the surface soil do not experience adverse effects on survival, growth, and reproduction.

2. Ecological health of birds and mammals that may come into contact with surface soil at the FFA, to ensure that this exposure does not result in adverse effects on survival, growth, and reproduction.

Measurement endpoints are measurable ecological characteristics that are related to the assessment endpoints (USEPA 1998). Because it is difficult to "measure" assessment endpoints, measurement endpoints were selected that permit inference regarding the above-described assessment endpoints. The measurement endpoints selected for this risk assessment include:

1. **Media Chemistry for Soil**—The measurement of chemical constituent concentrations in soil provides the means, when compared to appropriate soil screening values, to assess the protection of terrestrial organisms that live in the soil (first endpoint above).

2. **Chemical Doses for Terrestrial Birds and Mammals**—The calculation of chemical constituent doses to birds and mammals provides the means, when compared to toxic doses, for drawing inferences regarding the protection of birds and mammals that live at Area II within the FFA (second endpoint above).

9.3 SCREENING-LEVEL ECOLOGICAL RISK ASSESSMENT − CONSITITUENT OF CONCERN SELECTION

The ecological risk evaluation has been limited to surface soil, because ecological organisms are only exposed to soil in the "root zone," which is bounded by the top 6 in. to no greater than 2 ft bgs. Further, Area II within the FFA consists primarily of commercial, business, and school buildings as well as significant areas of impervious surface. There is no water source or wetlands within this site so there is no exposure to surface water or sediment within Area II in the FFA. Surface soil samples collected from this area have been included in the soil ecological risk evaluation (Figure 9-1). With the exception of land-use patterns (e.g., buildings, asphalt, etc.), particularly in Zones 2 and 3, there is no evidence of environmental impacts, such as denuded vegetation, in the terrestrial environment.

The terrestrial environment of Area II in the FFA is not forested, and has been described as highly urbanized with few landscaped areas in the 7 June 2012 ERA site visit (Attachment A). USEPA Region 6 forms were used consistent with the work scope. Zone 1 within Area II contains the majority of the vegetation in Area II, while Zones 2 and 3 contain far fewer vegetated areas including overgrown shrub/scrub, and trees. Zones 2 and 3 consist primarily of impervious land area and buildings (Figure 9-1). Only surface soil samples that are exposed (e.g., not covered with asphalt or concrete) were used for the COPC selection because there is an incomplete pathway between ecological receptors and pavement-covered samples. The majority of exposed surface soil samples were taken from Zone 1 (90 samples), followed by Zone 2 (21 samples), then Zone 3 (13 samples). Only arsenic, cadmium, and lead were analyzed in all samples collected due to their presence in paint, while other COPCs were only analyzed in three samples from Zone 1. These three samples were selected due to predetermined scoping. The three sample locations, bias samples, were selected due to their proximity to garages where COPCs were expected to be higher than the surrounding area within Zone 1. Chapter 4 of this document discusses the approach for sampling at Area II. To identify COPCs, ecological screening values were identified for these analytes using the following sources (Table 9-1):

- The lowest identified EcoSSL terrestrial screening value for the protection of plants, soil invertebrates, mammals, and birds, and in the event that EcoSSL values were not available

- Other available sources of ecological risk screening values such as Efroymson et.al. (1997a, 1997b) and USEPA (1999)

- If no appropriate screening value was available the contaminant was designated as a COPC and evaluated in the food-web if possible

The following chemicals exceeded the conservative risk screening values in one or more surface soil samples and are thus identified as COPCs (Table 9-2):

- Zone 1 (most vegetated zone in Area II)

    - Inorganics: antimony, arsenic, cadmium, copper, lead, manganese, mercury, selenium, vanadium, zinc

    - VOCs: methylene chloride

- Zone 2 (primarily buildings and parking lots)

    - Inorganics: antimony, barium, cadmium, chromium, cobalt, copper, lead, manganese, mercury, nickel, selenium, vanadium, zinc

    - VOCs: acetone, methylene chloride, trichloroethene

    - HPAHs: total HPAHs including benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[g,h,i]perylene, benzo[k]fluoranthene, chrysene, indeno[1,2,3-c,d]pyrene, pyrene

- Zone 3 (mostly industrial)

    - Inorganics: antimony, cadmium, chromium, copper, lead, manganese, mercury, nickel, selenium, vanadium, zinc

    - SVOCs: benzaldehyde

    - VOCs: 2-butanone, acetone, carbon disulfide, methylene chloride, tetrachloroethene, trichloroethene

    - HPAHs: total HPAHs including benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[g,h,i]perylene, benzo[k]fluoranthene, chrysene, indeno[1,2,3-c,d]pyrene, pyrene

    - Other: cyanide

9.4 EXPOSURE ASSESSMENT

Because a qualitative assessment of risk has been performed for Zones 2 and 3, the maximum exceedances shown in Table 9-2, along with habitat characteristics, are the basis of the assessment as discussed in Section 9.6.

A food-web model was used to estimate the dietary intake of COPCs by wildlife species to evaluate assessment endpoint 2 (Section 9.2.2) in Zone 1. The model utilized life history information for receptors (e.g., body weight, food-ingestion rate, etc.), in conjunction with site surface-soil concentrations of COPCs, to estimate the daily intake of COPCs (i.e., the exposure).

In the evaluation assessment for endpoint 2 in the food-web analysis for Zone 1, the exposure assessment represents the estimation of constituent concentrations to which ecological receptors are exposed. The exposure concentration is estimated based on the 95 percent Upper Confidence Limit of the Mean (UCLM) of Zone 1 samples. As discussed above, a conservative assumption was made that terrestrial food web organisms (birds and small mammals) were exposed to soils. There were sufficient data to determine the 95 percent UCLM using ProUCL Version 4.2 (Table 9-3) for soil COPCs in Zone 1 for arsenic, cadmium, and lead. ProUCL outputs for these COPCs can be found in Attachment 2. The other COPCs in Zone 1 had insufficient sample size (n=3) to calculate UCLM. Since the sample size was small the sample maximum was used as the default exposure concentration in the SLERA. For the food-web, it was assumed that the ROCs consume wet-weight soil, and it was calculated that Zone 1 soil contained 22 percent water.

Dietary exposures for ROCs were estimated as body-weight-normalized daily doses for comparison to body-weight-normalized daily dose toxicity reference values (TRVs). Separate doses were calculated for food ingestion and incidental soil ingestion, and these were summed to produce the total dose for each ROC.

$$Dose_{total} = Dose_{food} + Dose_{soil}$$

where:

$Dose_{total}$	=	Total daily dose of COPC received by receptor; mg COPC/kg-body weight/day
$Dose_{food}$	=	Daily dose of COPC received by receptor; mg COPC/kg-body weight/day from food items
$Dose_{soil}$	=	Daily dose of COPC received by receptor; mg COPC/kg-body weight/day from incidentally ingested soil

The total dose from food is given by:

$$Dose_{food} = \sum (F_f \times C_f \times fx_f) \times U$$

where:

Σ	=	Represents summing of the dose for each food item
F_f	=	Total daily feeding rate in kg food/kg-body weight of ROC/day (wet basis)
C_f =		Concentration of COPC in food item; calculated based on Bioaccumulation Factors (BAFs) (mg chemical/kg food)
f_{xf}	=	Fraction of the food item in the receptor diet
U	=	Habitat usage factor (fraction of habitat range represented by site) for receptor

The total dose from incidental soil is given by:

$$Dose_{soil} = F_s \, x \, U \, x \, C_s$$

where:

F_s	=	Total daily incidental soil feeding rate in kg/ kg-body weight of ROC/day (wet basis)
U	=	Habitat usage factor (fraction of habitat range represented by site) for receptor
C_s	=	Concentration of COPC in soil; mg/kg (wet basis)

Lastly, the total daily soil ingestion rate is given by:

$$F_s = F_f \times F_{xsoil}$$

where:

F_s	=	Total daily incidental soil feeding rate in kg/ kg-body weight of ROC/day (wet basis)
F_f	=	Total daily feeding rate in kg food/day (wet basis)
F_{xsoil}	=	Fraction of incidental soil ingestion as a proportion of food ingestion rate

Information necessary for calculations includes organism body weight, food ingestion rate (F_f), fraction incidental soil ingestion as a proportion of food ingestion rate (F_{xsoil}), food item fractions, area use factors, and analyte concentrations of ingested materials. Information specifically relevant to the ecology of the ROCs (i.e., body weights, food ingestion rates, and incidental soil ingestion rates) is presented in Table 9-4. The primary source used for these exposure parameters was the *Wildlife Exposure Factors Handbook* (USEPA 1993); other sources for parameters are documented in Table 9-4.

Exposure assessments consider the propensity for a COPC to bioaccumulate in the food organism. Chemicals that bioaccumulate are chemicals with higher concentrations in organisms than found in the abiotic matrix (e.g., soil). Non-polar organic compounds such as pesticides are known to bioaccumulate. In contrast, many inorganic chemicals and some organic compounds

do not bioaccumulate, and may be found in lower concentrations in food items. Where available, appropriate accumulation factors were used in the food-web exposure assessment, as this is superior to a default assumption that food-item concentrations equal soil concentrations (i.e., BAF=1.0).

Table 9-5 presents available BAFs that were used in this ERA. To the extent possible, BAFs have been identified from the scientific literature for soil invertebrates and terrestrial plants, each of which represents food for one or more ROC. In Sample et al. (1999), the scientific literature for uptake into earthworms was reported. When sufficient toxicological data points were located, a log-log regression equation was developed directly relating expected concentrations in the organism relative to concentrations in the soil:

$$\ln [X]_{earthworm} = B_0 + B_1 \, x \, \ln [X]_{soil}$$

where:

ln[X]earthworm=	the natural log of the concentration of chemical X in earthworm (dry weight), B_0 and B_1 are constants identified in Sample et al. (1999)
ln $[X]_{soil}$ =	the natural log of the concentration of chemical X in soil (dry weight)

Earthworm regression relationships were available for arsenic, cadmium, copper, lead, manganese, mercury, selenium, and zinc; values for B_0 and B_1 for these chemicals are shown in Table 9-6. In the absence of sufficient data to produce regression relationships, uptake factors, which are the equivalent of a bioaccumulation factor, were developed by Sample et al. (1999) for some chemicals. The uptake factor or bioaccumulation factor is used as follows:

$$[X]_{earthworm} = [X]_{soil} \, x \, BAF$$

where:

$[X]_{earthworm}$	=	the concentration of chemical X in earthworm (dry weight)
BAF	=	the bioaccumulation factor
$[X]_{soil}$	=	the concentration of chemical X in soil (dry weight)

In the absence of any literature-based BAFs for antimony, vanadium, and methylene chloride, concentrations in earthworms were assumed to be the same as in wet weight soil (Table 9-5).

Similar to the regression equations and uptake factors discussed above, B0 and B1 values or uptake factors for plants (Bechtel Jacobs Co. 1998) and small mammals (Sample et.al. 1998) are shown in Table 9-5.

As described above, dietary doses are calculated on a wet-weight basis. Within the food-web exposure model, after the food-item concentrations are calculated on a dry weight basis, they are converted to a wet-weight basis by multiplying the dry-weight food-item concentration by the proportion of the food-item that is dry matter. These dry matter proportions were obtained from

USEPA (1993) and are: 0.16 (earthworms) and 0.15 (plant leaves). The dry-matter proportions of incidental soil (0.78) used in the model are based on average soil moisture calculated from samples collected from Zone 1.

9.5 TOXICITY ASSESSMENT

Risks were assessed relative to soil concentrations for lower trophic receptors. The earthworm was used as a representative species for the soil invertebrates guild. EcoSSLs designed for the protection of soil invertebrates were used preferentially as toxicological endpoints. Because there are no EcoSSL values for mercury, toxicological benchmarks from Efroymson et al. (1997b) based on growth, reproduction, mortality, and activity parameters were used for this metal. No reliable soil invertebrate TRV was found for methylene chloride. The TRVs used for the terrestrial plant risk characterization were the toxicological benchmarks for terrestrial plants provided by USEPA EcoSSLs. If data were not found in EcoSSLs, the values from Oak Ridge National Laboratory (Efroymson et al., 1997a) were used. These benchmarks were derived based on the growth and yield parameters. The authors for both the EcoSSLs and Efroymson et al. (1997a) reviewed the toxicological literature, and selected appropriate and valid studies to develop the toxicity values. The TRVs for plants tend to be relatively low due to the necessity for soil to be spiked with a soluble form of the metal of concern during toxicity tests. Metal speciation in soil is very different from that found in a soluble spiked solution. No reliable terrestrial plant TRV was found for methylene chloride. In this ERA, toxicity of COPCs to wildlife is based on estimated dietary doses. Potential risks of these doses are based on comparison to threshold dietary doses termed TRVs. The TRVs were obtained from relevant scientific literature describing the effects of various chemicals on animals. To the fullest extent possible, TRVs were chosen that are based on effects on animal reproduction (e.g., decreased eggshell thickness in birds, reduced sperm count in mammals). Reproductive endpoints are most appropriate for use in ecological risk assessment because they can have population implications.

Food web TRVs have been selected and compiled in Table 9-7 for the soil COPCs of Zone 1 in Area II. Both No Observed Adverse Effects Level (NOAEL) and Lowest Observed Adverse Effects Level (LOAEL) TRVs were used for Zone 1 of Area II in the FFA FUDS ERA. Exceedance of a NOAEL TRV may or may not represent risk, depending on the nature of the underpinning study.

The TRVs were obtained from several primary sources, in a hierarchical fashion. For several metals, TRVs were available from the USEPA's EcoSSL program. These were developed from a rigorous scientific review process, and are preferred when available. After the EcoSSL values, Oak Ridge National Laboratory TRVs were selected as available (Sample et al. 1996).

9.6 RISK CHARACTERIZATION

The risk characterization consists of combining the exposure concentration to appropriate lower trophic level (e.g., plants and soil invertebrates) toxicity values, and for the food web, comparison of calculated doses to dose-based TRVs. Risk characterization in the wildlife assessment was analogous to the initial screening and lower trophic-level assessments, i.e., Hazard Quotients (HQs) were calculated, as follows:

$$HQ = \frac{Exposure\ Concentration\ or\ Calculated\ Dose}{Lower\ Tropic\ risk\ concentration\ or\ TRV}$$

If the concentration or wildlife dose from the site was less than the risk concentration or NOAEL TRV, the HQ was less than 1.0, and negligible risk was inferred. If the wildlife dose was greater than the NOAEL TRV (HQ>1), but less than the LOAEL TRV (HQ<1), there may or may not be risk, and this was evaluated qualitatively on a case-by-case basis. If a LOAEL HQ exceeded 1.0, there was an indication of potential risk.

9.6.1 Zone 1 Lower Trophic Level (Plants and Invertebrates) Risk Characterization

Lower trophic level risk calculations of Zone 1 in Area II were determined based on appropriate invertebrate and plant benchmarks (Table 9-8). As discussed in Section 9.4, the 95 percent UCLM was used as the exposure concentration for arsenic, cadmium, and lead (sample size n=90) and the maximum detected soil concentrations were used for all other COPCs (sample size n=3). Arsenic was detected in all of the 90 samples in Zone 1 and exceeded both the invertebrate and plant lower trophic level benchmarks in 82 of the 90 samples (Table 9-8) and is considered an invertebrate and plant risk. Cadmium was detected in 74 of the 90 samples but none of the samples exceeded the invertebrate or plant lower trophic level risk benchmarks and is not considered an invertebrate or plant risk. Lead was detected in all of the 90 samples from Zone 1. Eight of the lead samples exceeded the invertebrate benchmark but lead is not considered an invertebrate risk. Seventy-four of the 90 lead samples exceeded the plant benchmark at levels that make lead a plant risk. Even though lead has been found at high concentrations in Zone 1, neither plants nor invertebrates are very sensitive to toxic effects from this metal.

Vanadium was over 10 times greater than the invertebrate and plant benchmarks for all detected vanadium samples. However, vanadium samples were localized to the northeast section of Zone 1 on the border of Zone 2 and Tacony Street, suggesting a localized contamination. Mercury exceeded both invertebrate and plant risk values (HQs of 7 and 2, respectively); however, the risk screening values used to assess this risk are of low confidence due to few toxicity studies (Efroymson et.al. 1997a and b). Further, there are limited numbers of samples for both vanadium and zinc (three samples). The implication is that vanadium and zinc are not likely to be responsible for risk to populations of plants and invertebrates at Zone 1 in Area II. In general, the populations of plants and soil invertebrates at Zone 1in Area II of the FAA are not at risk from exposure to the COPCs.

9.6.2 Zone 1 Food-Web Risk Characterization

A summary of the resulting NOAEL and LOAEL HQs for all ROCs from food-web analyses is presented in Table 9-9. Individual ROC food-web analyses are presented in Tables 9-10 through 9-14 for shrew, rabbit, fox, robin, and hawk, respectively.

The LOAEL HQ exceedances in Zone 1 were for lead only (Table 9-9) for the shrew and robin (1.89 and 5.62, respectively), suggesting the primary COC is lead. Currently, approximately only 3 acres of the 12-acre Zone 1 is maintained open lawn with landscaped trees (Site Visit, 2012), much of which has remained open lawn for almost 200 years (RI Report, Section 7.3.4). The greatest concentration of lead (8,860 mg/kg) from surface soils sampled in Zone 1 was from delineation soil sample Z1D07, located in the open grassy area of the parade circle (Figure 9-1). Adjacent to the soil sample location was another sampling location, unbiased soil sample UBZ1-28, which had a lead concentration of 939 mg/kg. The second highest concentration of lead from the surface soils sampled in Zone 1 (UBZ1-41) was 4,390 mg/kg, and was located adjacent to a building to the southwest of the highest concentration, outside of the parade circle. This suggests that the high hits of lead concentration are sporadic, but fairly common within Zone 1.

NOAEL HQ exceedances in Zone 1 occurred for antimony (shrew), arsenic (shrew and rabbit), copper (robin), lead (shrew, rabbit and robin), and vanadium (robin and hawk). These NOAEL HQs are relatively small (less than 10), and likely do not represent risk to populations of the ROCs because they are based on no observed toxic endpoints.

In summary for the food-web, lead was identified as a COC for Zone 1, particularly for the shrew and robin. None of the other identified COPCs (Table 9-2) are likely to represent population-level risk to ecological receptors.

9.6.3 Zones 2 and 3 Risk Screen

Zones 2 and 3 were not carried through a SLERA due to greater cover of impervious surfaces and lack of habitat, but were analyzed for COPCs through risk screening (Table 9-2). As discussed earlier, and as seen in Figure 9-1 and the site description provided in Attachment A, these zones consist primarily of hard impervious surfaces, buildings, and little vegetation. The primary COPCs in Zone 2 are inorganic, HPAH, and VOC constituents. Zone 3 also has COPCs that are primarily inorganic, HPAH, and VOC constituents, but also has SVOCs as COPCs. If the habitat were better, lead would be identified as a COC in Zones 2 and 3 based on the screening level HQs, which are an order of magnitude greater than that found in Zone 1, and the fact that lead is a COC in the Zone 1 food-web analysis. Similarly, barium, cobalt, copper, and manganese have Zone 2 screening level HQs that are an order of magnitude greater than Zone 1 screening level HQs (Table 9-2). Three additional inorganic constituents (chromium, mercury, and nickel) in Zones 2 and 3 have screening level HQs an order of magnitude greater than the screening level HQs in Zone 1. VOCs in Zones 2 and 3 and SVOCs in Zone 3 are COPCs in these locations, but are not likely COCs due to their low detected concentrations. Total HPAHs exceed the ecological screening value (1.1 mg/kg) by nearly five and seven times for Zone 2 (5.08 mg/kg) and Zone 3 (7.18 mg/kg), respectively. HPAHs are potential COCs for these zones

due to their relatively high detected concentrations. In summary, metals are elevated in Zones 2 and 3 compared to Zone 1; however, because the habitat is not likely to support populations of ecological receptors, due to physical stressors, it is not likely that the high metal concentrations measured in some of the samples in these zones will cause risk to ecological populations.

9.7 UNCERTAINTY

USEPA (1997b) defines uncertainty as "…imperfect knowledge of the degree of hazard or of its spatial and temporal distribution." Sources of uncertainty associated with this ERA are described below.

Sampling in site investigations is typically biased toward areas of known or suspected contamination which may have the effect of biasing risk estimates higher than they actually are. While this is true for most of the identified COPCs, a systematic design was used to sample for arsenic, cadmium, and lead at Area II; consequently, for these metals, biased sampling has been avoided.

All identified metal COPCs were detected in all, or at least the majority, of samples, consequently the frequency of detection is not a source of uncertainty for these metals in Zone 1 and ecological risk conclusions have not been affected by the frequency of detection. Methylene chloride was identified as a COPC in Zone 1 due to the absence of a screening value. This volatile organic chemical was detected in two of twelve samples in this zone (a 17 % detection frequency), however there are no toxicity data for this chemical. Due to its chemical nature it is likely not directly toxic, but rather a narcotic. Because the relatively low frequency of detection and the absence of valid toxicity values it is not expected to result in toxicity to organism, although this conclusion has some uncertainty.

Toxicological data that underpin the screening values are inherently uncertain because laboratory data are extrapolated to field sites. Because conservative screening values were used, the uncertainty was biased in the direction of overestimation of risks.

For a number of chemicals detected in Area II of the FFA there were no available screening values (e.g., "NSV" on Table 9-2). This resulted in an inability to assess risk for some receptors, although any detected chemical with no available screening value was automatically designated as a COPC. This resulted in unavoidable uncertainty.

COPCs were assumed to be 100 percent available to receptors. This is a highly unlikely circumstance based on soil chemistry. Under many circumstances, both inorganic and organic compounds are chemically bound in the soil matrix and are not available for uptake by receptors. This resulted in overestimation of risks.

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Legend

- Sample Location
- Zones
- Area I Boundary
- Area II Boundary

Label Key

UBZ-	Unbiased Soil Sample
BZ-	Biased Soil Sample
D-	Delineation Soil Sample
MW-	Monitoring Well
Z1-	Zone 1
Z2-	Zone 2
Z3-	Zone 3

GIS Sources
Cabrera, 2011
ESRI (Imagery), 2011

Frankford Arsenal
Philadelphia, Pennsylvania

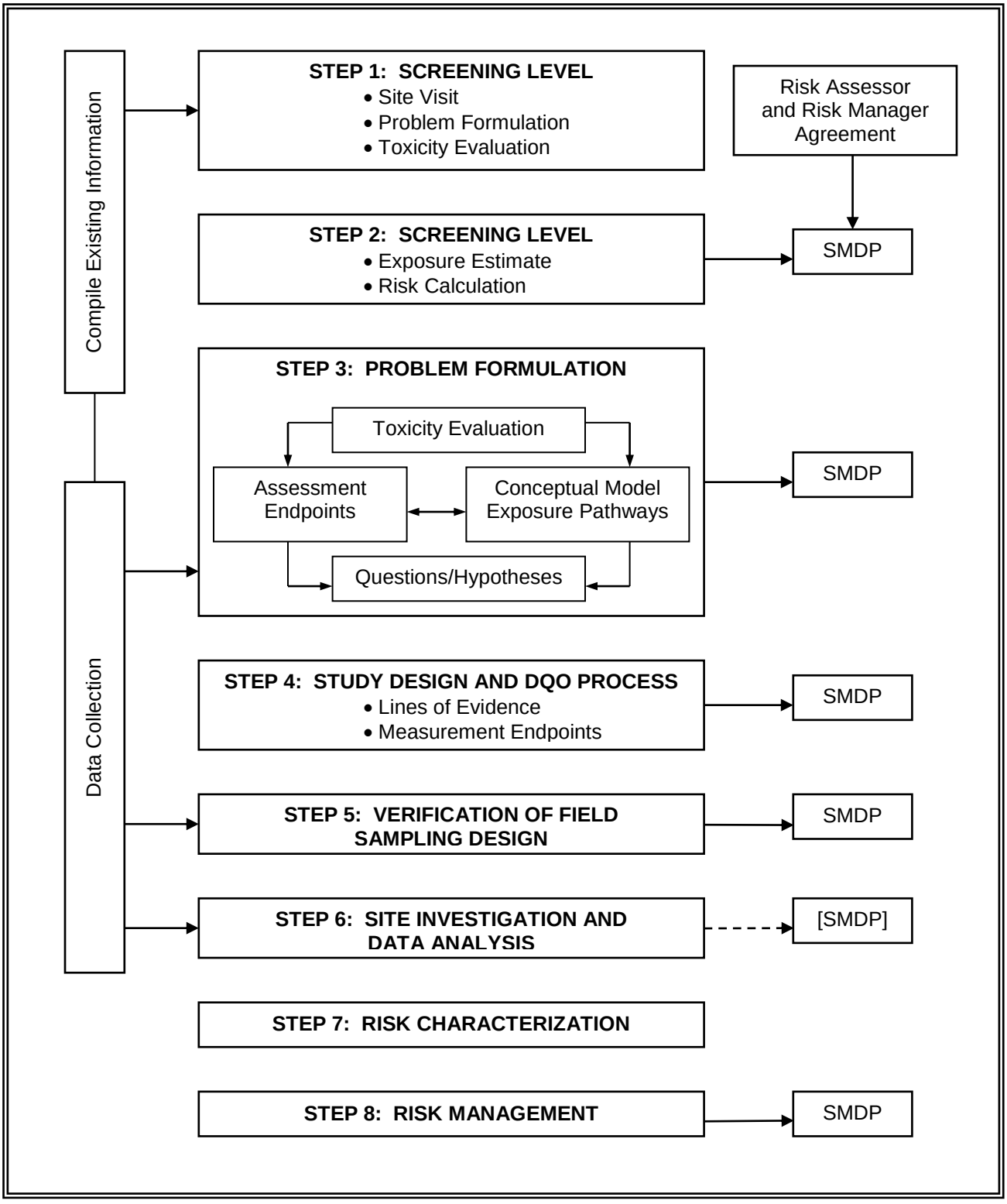
Project: 6233017

Novermber 2013

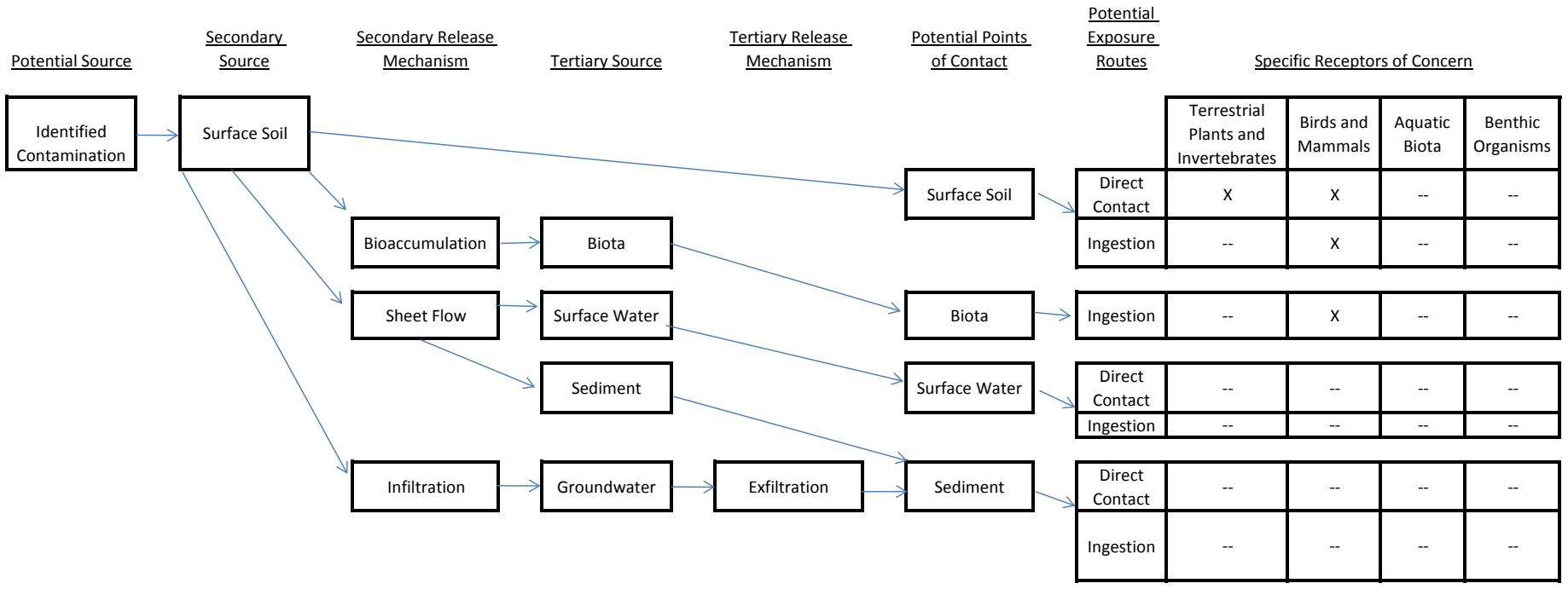
0 75 150 300
Feet
1 inch = 175 feet

Figure 9-1
Ecological Risk Site Sample Locations
Frankford Arsenal

FIGURE 9-2 ECOLOGICAL RISK ASSESSMENT PROCESS FOR SUPERFUND
(USEPA 1997)

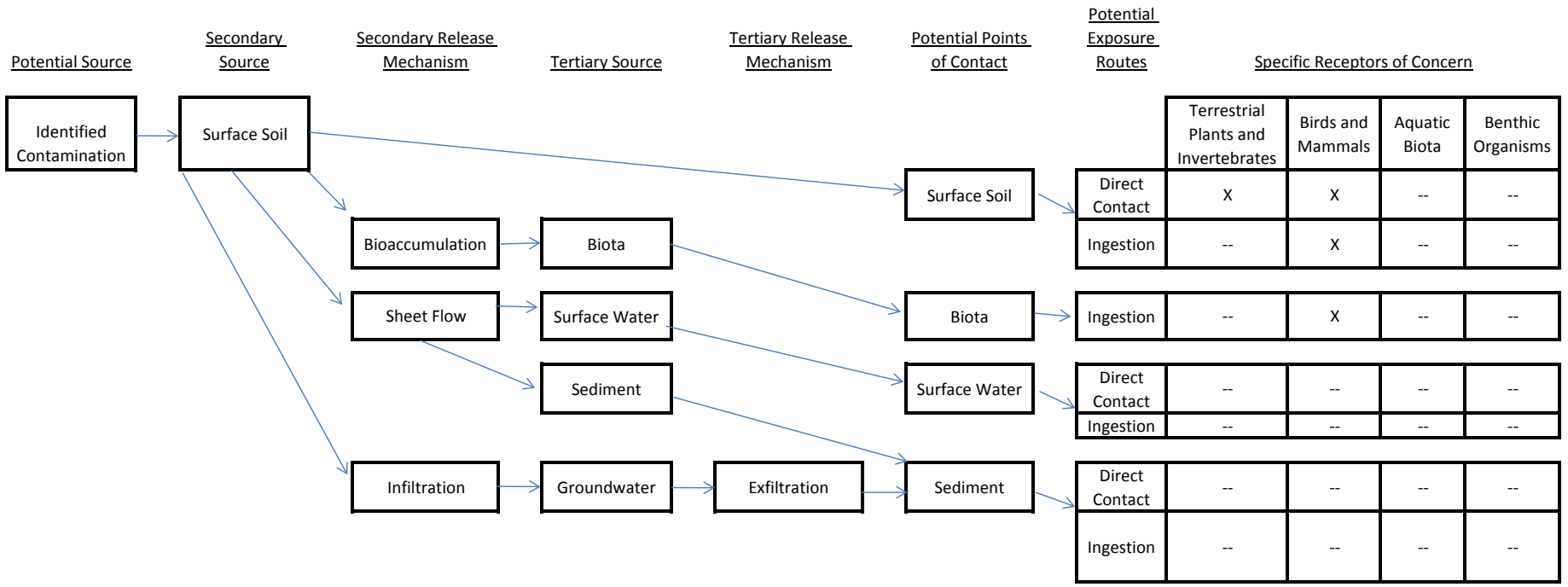


SMDP = Scientific Management Decision Point



X = Exposure Pathway Potentially Complete
-- = Exposure Pathway Incomplete

Figure 9-3. Ecological Conceptual Site Model for Frankford Arsenal



X = Exposure Pathway Potentially Complete
-- = Exposure Pathway Incomplete

Figure 9-3. Ecological Conceptual Site Model for Frankford Arsenal

Table 9-1 - Soil Screening Benchmarks for Area II of Frankford Aresenal

Analyte	Soil Screening Benchmark (mg/kg)	Benchmark Source
Inorganic Analytes		
Aluminum	pH > 5.5[1]	USEPA (2003a)
Antimony	0.27	USEPA (2005a) based on mammalian receptors
Arsenic	18	USEPA (2005b) based on terrestrial plants
Barium	330	USEPA (2005c) based on soil invertebrates
Beryllium	21	USEPA (2005d) based on mammalian receptors
Cadmium	0.36	USEPA (2005e) based on mammalian receptors
Chromium	26	USEPA (2008) based on avian receptors
Cobalt	13	USEPA (2005f) based on terrestrial plants
Copper	28	USEPA (2007b) based on avian receptors
Iron	pH > 5, < 8[2]	USEPA (2003b) Eco-SSL Values
Lead	11	USEPA (2005g) based on avian receptors
Manganese	220	USEPA (2007c) based on terrestrial plants
Mercury	0.1	Efroymson et al. (1997b)
Nickel	38	USEPA (2007d) based on terrestrial plants
Selenium	0.52	USEPA (2007e) based on terrestrial plants
Silver	4.2	USEPA (2006) based on avian receptors
Thallium	1	Efroymson et al. (1997a)
Vanadium	7.8	USEPA (2005h) based on avian receptors
Zinc	46	USEPA (2007f) based on avian receptors
Semivolatile Organic Compounds (SVOC)		
Benzaldehyde	No value	Evaluate in food-web exposure assessment
Dimethyl Phthalate	NA	Use total phthalates
Phthalates, total	4.5	Swartjes (1999) based on site-specific average 1.5% TOC
Polycyclic Aromatic Hydrocarbons (PAHs)		
Low Molecular Weight PAHs[3]	29	USEPA (2007g) based on soil invertebrates
High Molecular Weight PAHs[3]	1.1	USEPA (2007g) based on mammalian receptors
Polychlorinated Biphenyls (PCBs)		
Aroclor 1260	NA	Use Total PCBs
Total PCBs	2.5	USEPA (1999)
Volatile Organic Compounds (VOCs)		
2-butanone	No value	Evaluate in food-web exposure assessment
Acetone	No value	Evaluate in food-web exposure assessment
Carbon Disulfide	No value	Evaluate in food-web exposure assessment
Methylene chloride	No value	Evaluate in food-web exposure assessment
Tetrachloroethene	No value	Evaluate in food-web exposure assessment
Trichloroethene	No value	Evaluate in food-web exposure assessment
Other		
Cyanide	No value	Evaluate in food-web exposure assessment

[1]In their evaluation of potential soil-screening benchmarks for aluminum, USEPA (2003a) concluded that all available soil benchmarks for aluminum are based on the use of soluble aluminum in toxicity tests, and are therefore considered by the USEPA to be "inappropriate." USEPA declined to establish a soil concentration benchmark for aluminum; rather they directed that aluminum should only be identified as a soil COPC when the soil pH is less than 5.5.

[2]USEPA declined to establish a soil benchmark for iron due to the highly site-specific nature of bioavailability and toxicity to plants. They indicated that iron is not expected to be toxic to plants when soil pH is between 5 and 8.

[3]LPAH represent low molecular weight PAHs of fewer than 4 aromatic rings, HPAH represent high molecular weight PAHs of 4 or greater aromatic rings. Toxicity is additive for LPAH and HPAH respectively, consequently individual PAHs are summed as appropriate (e.g. LPAH = phenanthrene + anthracene + all detected PAHs of fewer than 4 rings and

Notes:

HPAH = benzo(a)anthracene + benz(a)pyrene + all other PAHs with 4 rings or more.)

NA = Not Appropriate.

Table 9-2 - Constituents of Potential Concern (COPC) Selection for Area II, Frankford Arsenal

Location ID:				Zone 1			Zone 2			Zone 3		
Depth Interval:				0-2 ft			0-2 ft			0-2 ft		
Analyte	Ecological Screening Value[1]	Comments	Unit	Maximum detected value	Zone 1 HQ	Zone1 analyte COPC	Maximum detected value	Zone 2 HQ	Zone2 analyte COPC	Maximum detected value	Zone 3 HQ	Zone3 analyte COPC
Inorganics												
Aluminum	pH >5.5		mg/kg	7,820	NA	NO	12,500	NA	NO	11,600	NA	NO
Antimony	0.27		mg/kg	**1.38**	**5.11**	**YES**	**24.8**	**91.9**	**YES**	**230**	**852**	**YES**
Arsenic	18		mg/kg	**38.7**	**2.15**	**YES**	16.5	0.92	NO	10.9	0.61	NO
Barium	330		mg/kg	59.3	0.18	NO	**899**	**2.72**	**YES**	235	0.71	NO
Beryllium	21		mg/kg	0.49	0.02	NO	0.767	0.04	NO	0.636	0.03	NO
Cadmium	0.36		mg/kg	**5.24**	**14.6**	**YES**	**1.23**	**3.42**	**YES**	**2.48**	**6.89**	**YES**
Chromium	26		mg/kg	15.6	0.60	NO	**32.5**	**1.25**	**YES**	**32.8**	**1.26**	**YES**
Cobalt	13		mg/kg	7.61	0.59	NO	**13.2**	**1.02**	**YES**	8.88	0.68	NO
Copper	28		mg/kg	**57.2**	**2.04**	**YES**	**2150**	**76.8**	**YES**	**493**	**17.6**	**YES**
Iron	pH >5.5		mg/kg	12,400	NA	NO	22,100	NA	NO	36,000	NA	NO
Lead	11		mg/kg	**8,860**	**805**	**YES**	**15,600**	**1,418**	**YES**	**12,700**	**1,155**	**YES**
Manganese	220		mg/kg	**410**	**1.86**	**YES**	**2,560**	**11.6**	**YES**	**423**	**1.92**	**YES**
Mercury	0.1		mg/kg	**0.657**	**6.57**	**YES**	**4.55**	**45.5**	**YES**	**3.71**	**37.1**	**YES**
Nickel	38		mg/kg	14.2	0.37	NO	**352**	**9.26**	**YES**	**154**	**4.05**	**YES**
Selenium	0.52		mg/kg	**0.56**	**1.08**	**YES**	**3.46**	**6.65**	**YES**	**1.88**	**3.62**	**YES**
Silver	4.2		mg/kg	--	NA	NO	0.43	0.10	NO	0.388	0.09	NO
Thallium	1		mg/kg	--	NA	NO	--	NA	NO	0.275	0.28	NO
Vanadium	7.8		mg/kg	**20.9**	**2.68**	**YES**	**31.6**	**4.05**	**YES**	**25.9**	**3.32**	**YES**
Zinc	46		mg/kg	**112**	**2.43**	**YES**	**224**	**4.87**	**YES**	**397**	**8.63**	**YES**
Semivolatile Organic Compounds												
Benzaldehyde	NSV		mg/kg	--	NA	NO	--	NA	NO	0.58	NA	**YES**
Dimethyl Phthalate	NSV	Use Total Phthalates	mg/kg	0.22	NA	NA	0.23	NA	NA	0.85	NA	NA
Total Phthalates	4.5		mg/kg	0.22	0.05	NO	0.23	0.05	NO	0.85	0.19	NO
Volatile Organic Compounds												
2-Butanone	NSV		mg/kg	--	NA	NO	--	NA	NO	0.0076	NA	**YES**
Acetone	NSV		mg/kg	--	NA	NO	0.0081	NA	**YES**	0.081	NA	**YES**
Carbon Disulfide	NSV		mg/kg	--	NA	NO	--	NA	NO	0.15	NA	**YES**
Methylene Chloride	NSV		mg/kg	0.0039	NA	**YES**	0.0094	NA	**YES**	0.0063	NA	**YES**
Tetrachloroethene	NSV		mg/kg	--	NA	NO	--	NA	NO	0.0011	NA	**YES**
Trichloroethene	NSV		mg/kg	--	NA	NO	0.0026	NA	**YES**	0.013	NA	**YES**

Table 9-2 - Constituents of Potential Concern (COPC) Selection for Area II, Frankford Arsenal

Location ID:				Zone 1			Zone 2			Zone 3		
Depth Interval:				0-2 ft			0-2 ft			0-2 ft		
Analyte	Ecological Screening Value[1]	Comments	Unit	Maximum detected value	Zone 1 HQ	Zone1 analyte COPC	Maximum detected value	Zone 2 HQ	Zone2 analyte COPC	Maximum detected value	Zone 3 HQ	Zone3 analyte COPC
Low MW PAHs												
Anthracene	NSV	Use Total	mg/kg	--	NA	NA	0.19	NA	NA	0.39	NA	NA
Fluoranthene	NSV	Use Total	mg/kg	0.17	NA	NA	1.4	NA	NA	2.1	NA	NA
Phenanthrene	NSV	Use Total	mg/kg	--	NA	NA	0.82	NA	NA	1.1	NA	NA
Total LPAHs	29		mg/kg	0.17	0.01	NO	2.09	0.07	NO	3.59	0.12	NO
High MW PAHs												
Benzo[a]anthracene	NSV	Use Total	mg/kg	--	NA	NA	0.76	NA	NA	1.1	NA	NA
Benzo[a]pyrene	NSV	Use Total	mg/kg	--	NA	NA	0.6	NA	NA	0.87	NA	NA
Benzo[b]fluoranthene	NSV	Use Total	mg/kg	--	NA	NA	1.4	NA	NA	1.1	NA	NA
Benzo[g,h,i]perylene	NSV	Use Total	mg/kg	--	NA	NA	0.36	NA	NA	0.44	NA	NA
Benzo[k]fluoranthene	NSV	Use Total	mg/kg	--	NA	NA	0.3	NA	NA	0.43	NA	NA
Chrysene	NSV	Use Total	mg/kg	--	NA	NA	0.72	NA	NA	1	NA	NA
Indeno[1,2,3-c,d]pyrene	NSV	Use Total	mg/kg	--	NA	NA	0.34	NA	NA	0.44	NA	NA
Pyrene	NSV	Use Total	mg/kg	--	NA	NA	1.2	NA	NA	1.8	NA	NA
Total HPAHs	1.1		mg/kg	--	NA	NO	**5.08**	**4.62**	**YES**	**7.18**	**6.53**	**YES**
Polychlorinated biphenyl (PCBs)												
Aroclor 1260	NSV	Use Total PCBs	mg/kg	--	NA	NA	--	NA	NA	0.43	NA	NA
Total PCBs	2.5		mg/kg	--	NA	NO	--	NA	NO	0.43	0.17	NO
Other												
Cyanide	NSV		mg/kg	--	NA	NO	--	NA	NO	0.304	NA	**YES**

1. Ecological Screening Values are soil screening benchmarks (see Table 9-1); detected analytes with no appropriate ecological screening value have been identified as COPC

Notes:

Bolded results exceed screening value.

NSV = No screening value.

PAH = Polycyclic aromatic hydrocarbon. HQ = Hazard quotient. MW = Molecular weight.

HQ = Hazard Quotient. NA = not applicable. ft = foot/feet.

-- analyte not detected. mg/kg = milligram per kilogram.

Table 9-3 - Frankford Arsenal Zone 1
Surface Soil 95% UCLM (mg/kg)

Analyte*	95% UCLM	UCLM Method
Inorganics		
Antimony	1.38 (a)	3 samples
Arsenic	15.53	Use 95% H-UCL
Cadmium	0.685	95% KM (BCA) UCL
Copper	57.2 (a)	3 samples
Lead	1183	Use 95% H-UCL
Manganese	410 (a)	3 samples
Mercury	0.657 (a)	3 samples
Selenium	0.56 (a)	3 samples
Vanadium	20.9 (a)	3 samples
Zinc	112 (a)	3 samples
Volatile Organic Compounds		
Methylene Chloride	0.0039 (a)	3 samples

Notes:

* Analytes listed are those identified as COPC (see Table 9-2).

(a) = sample size too small to calculate 95%UCLM, value is sample maximum.

UCLM = Upper confidence limit maximum.

Table 9-4 – Food-web Exposure Factors for Zone 1 of Area II, Frankford Arsenal

Exposure Factor	Receptor				
	American Robin	**Red-tailed Hawk**	**Eastern Cottontail**	**Short-Tailed Shrew**	**Red Fox**
Body Weight (kg) (ww)	0.082 (USEPA 1993) Average for adult, both sexes, all seasons, NY	1.13 (USEPA 1993) Average for adult, both sexes, MI, PA	1.2 (USEPA 1993) Adult average, both sexes, MD, VA	0.017 (USEPA 1993) Adult average, summer, fall; NH, PA	4.5 (USEPA 1993) Adult average, both sexes, IL
Food Ingestion Rate (g/g/day) (ww)	0.82 (USEPA 1993; Nagy 1987) Allometrically scaled to body weight	0.1 (USEPA 1993) Average for adult, both sexes, MI	0.205 (SAIC 2002) Calculated from free-living metabolic rate following USEPA (1993)	0.56 (USEPA 1993) Average for breeding adults, OH, WI	0.11 (USEPA 1993) Average for juvenile and adult, ND
Incidental Soil Ingestion Rate (g/g/day) (ww)	0.085 (USEPA 1993) Based on 10.4% soil in diet of American woodcock	0.0 No data available; assumed to be negligible based on food items and capture mode	0.013 (Arthur and Gates 1988) 6.3% based on black-tailed jackrabbit	0.0728 (Talmadge and Walton 1993) Cited in SAIC (2002)	0.0031 (Beyer et al. 1994) Based on 2.8 % soil in diet of red fox
Home Range (acres)	0.4 (USEPA 1993) Foraging range of adults feeding nestlings, Ontario	1,722 (USEPA 1993) Average territory size, MI, winter	7.7 (USEPA 1993) Average adult range, both sexes, all seasons, WI, PA	0.2 (USEPA 1993) Mid-point between high and low prey density ranges, NY	1,245 (USEPA 1993) Adult average, both sexes, MN, WI
Dietary Composition	62% fruit 38% invertebrates (USEPA 1993) Eastern U.S.	100% small mammals (USEPA 1993 range 74-94% mammals)	100% vegetation (USEPA 1993)	80% invertebrates 20% vegetation (USEPA 1993)	78% small mammals 17% vegetation 5% invertebrates (Based on USEPA 1993)

Table 9-5 - Bioaccumulation Factors for Food-web Exposure, Zone 1 of Area II, Frankford Arsenal

Analyte	Invertebrate Bioaccumulation Factor (BAF)		Plant Bioaccumulation Factor (BAF)		Small Mammal Bioaccumulation Factor (BAF)	
	BAF (dw)	Source	BAF (dw)	Source	BAF (dw)	Source
Inorganics						
Antimony	1	default	0.2	Baes et al. 1984	1	default
Arsenic	Table 9-6	-----	Table 9-6	-----	Table 9-6	-----
Cadmium	Table 9-6	-----	Table 9-6	-----	Table 9-6	-----
Copper	Table 9-6	-----	Table 9-6	-----	Table 9-6	-----
Lead	Table 9-6	-----	Table 9-6	-----	Table 9-6	-----
Manganese	Table 9-6	-----	0.0792	Bechtel 1998	1	default
Mercury	Table 9-6	-----	Table 9-6	-----	0.0543	Sample et al. 1998
Selenium	Table 9-6	-----	Table 9-6	-----	Table 9-6	-----
Vanadium	1	default	0.00485	Bechtel 1998	1	default
Zinc	Table 9-6	-----	Table 9-6	-----	Table 9-6	-----
VOCs						
Methylene chloride	1	default	7.34 (a)	Travis & Arms 1988	1	default

Notes:

(a) based on log Kow applied in the equation of Travis and Arms (1988).

When no BAF was available from the literature, a default BAF of 1.0 was used.

Table 9-6 – Bioaccumulation Regression Coefficients
Zone 1 of Area II, Frankford Arsenal

COPC	Soil Invertebrates[1]		Plants[2]		Small Mammals[3]	
	B0	B1	B0	B1	B0	B1
Arsenic	-1.421	0.706	-1.992	0.564	-4.8471	0.8188
Cadmium	2.11	0.79	-0.476	0.546	-0.4306	0.4865
Copper	1.67	0.26	0.669	0.394	2.042	0.1444
Lead	-0.21	0.81	-1.328	0.561	0.0761	0.4422
Manganese	-0.80	0.68	NA	NA	NA	NA
Mercury	-0.68	0.12	-0.996	0.544	NA	NA
Selenium	-0.075	0.73	-0.678	1.104	-0.4158	0.3764
Zinc	4.44	0.33	1.575	0.555	4.4713	0.0738

Notes:
Regression Equation is (ln [food]) = B0 + B1(ln [soil]) where the [soil] and [food] are in mg/kg dry weight.
NA = Not Applicable (poor regression fit, or not analyzed)

(1) Sample et al. (1999)
(2) Bechtel Jacobs Co. (1998)
(3) Sample et al. (1998)

Table 9-7 – Toxicity Reference Values (TRVs) Proposed for Zone 1 of Area II, Frankford Arsenal Food-web Exposure Assessment (mg/kg-body weight/day)

Analyte	Short-tailed shrew		Eastern cottontail		Red fox		American robin		Red-tailed hawk		Source		
	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	Mammal	Avian	Notes
INORGANICS													
Antimony	0.06	0.6	0.06	0.6	0.06	0.6	No TRV	No TRV	No TRV	No TRV	1	----	A
Arsenic	0.15	1.498	0.05	0.501	0.036	0.36	2.5	7.4	2.5	7.4	10	2	A
Cadmium	0.77	7.7	0.77	7.7	0.77	7.7	1.47	7.8	1.47	7.8	3	3	C
Copper	5.6	56	5.6	56	5.6	56	4.05	40.5	4.05	40.5	4	4	A, B
Lead	4.7	47	4.7	47	4.7	47	1.63	16.3	1.63	16.3	5	5	A, B
Manganese	51.5	139	51.5	139	51.5	139	179	269	179	269	6	6	C
Mercury	15.7	157	5.25	52.5	3.77	37.7	0.45	0.9	0.45	0.9	2	2	A
Selenium	0.143	1.43	0.143	1.43	0.143	1.43	0.29	2.9	0.29	2.9	7	7	A, B
Vanadium	4.16	41.6	4.16	41.6	4.16	41.6	0.344	3.44	0.344	3.44	8	8	A, B
Zinc	75.4	292.1	75.4	292.1	75.4	292.1	66.1	171	66.1	171	9	9	C
VOLATILE ORGANIC COMPOUNDS													
Methylene chloride	12.9	109.9	4.3	36.7	3.1	26.4	No TRV	No TRV	No TRV	No TRV	2	----	

Sources:
(1) USEPA (2005a)
(2) Sample et al. (1996)
(3) USEPA (2005e)
(4) USEPA (2007b)
(5) USEPA (2005g)
(6) USEPA (2007c)
(7) USEPA (2007e)
(8) USEPA (2005h)
(9) USEPA (2007f)
(10) Sample et al. (1998)

Notes:
(A) Mammal LOAEL approximated as 10 X NOAEL
(B) Avian LOAEL approximated as 10 X NOAEL
(C) LOAEL calculated as geometric mean of available Eco-SSL LOAEL values.

Table 9-8 - Lower Trophic Level Risk Calculations, Zone 1 of Area II, Frankford Arsenal

Analyte	Exposure Concentration (mg/kg)	Invertebrate Benchmark (mg/kg)	Invertebrate Benchmark source	Invertebrate HQ	Invertebrate Risk Indication	Samples Exceeding Invertebrate Benchmark	Plant Benchmark (mg/kg)	Plant Benchmark source	Plant HQ	Plant Risk Indication	Samples Exceeding Plant Benchmark
Analytes											
Antimony	1.38	78	A	0.02	NO	0/3	5	H	0.28	NO	0/3
Arsenic	15.53	5.7	J	2.7	**YES**	82/90	5.7	J	2.7	**YES**	82/90
Cadmium	0.7	140	B	0.005	NO	0/90	32	B	0.02	NO	0/90
Copper	57	80	C	0.72	NO	0/3	70	C	0.82	NO	0/3
Lead	1183	1700	D	0.70	NO	8/90	120	D	9.9	**YES**	74/90
Manganese	410	450	E	0.91	NO	0/3	220	E	1.9	**YES**	2/3
Mercury	0.657	0.1	I	6.6	**YES**	3/3	0.3	H	2.2	**YES**	3/3
Methylene chloride	0.0039	None	NA	NA	NA	NA	None	NA	NA	NA	NA
Selenium	0.56	4.1	F	0.14	NO	0/3	0.52	F	1.1	**YES**	2/3
Vanadium	20.9	1.59	J	13	**YES**	3/3	2	H	10	**YES**	3/3
Zinc	112	120	G	0.93	NO	0/3	160	G	0.70	NO	0/3

Notes:

A=USEPA, 2005a.
B=USEPA, 2005e.
C=USEPA,2007b.
D=USEPA, 2005g.
E=USEPA, 2007c.
F=USEPA,2007e.
G=USEPA, 2007f.
H=Efroymson et. al. 1997a.
I=Efroymson et. al. 1997b.
J=USEPA, 2003c.

NA=Not Appropriate, no risk screening level for this analyte.
HQ = hazard quotient.

Table 9-9 - Terrestrial Species Food Web Hazard Quotient Values
Zone 1 of Area II, Frankford Arsenal

	Shrew		Rabbit		Red fox		Robin		Hawk	
Ecological Contaminants	**NOAEL**	**LOAEL**	**NOAEL**	**LOAEL**	**NOAEL**	**LOAEL**	**NOAEL**	**LOAEL**	**NOAEL**	**LOAEL**
of Concern	**HQ_n**	**HQ_l**	**HQ_n**	**HQ_l**	**HQ_n**	**HQ_l**	**HQ_n**	**HQ_l**	**HQ_n**	**HQ_l**
Antimony	3.37E+00	3.37E-01	3.75E-01	3.75E-02	6.94E-03	6.94E-04	NA	NA	NA	NA
Arsenic	6.88E+00	6.89E-01	3.54E+00	3.54E-01	1.15E-02	1.15E-03	4.65E-01	1.57E-01	9.49E-04	3.21E-04
Cadmium	7.64E-01	7.64E-02	2.92E-02	2.92E-03	2.92E-04	2.92E-05	2.65E-01	4.99E-02	1.18E-02	2.22E-03
Copper	8.29E-01	8.29E-02	1.56E-01	1.56E-02	9.61E-04	9.61E-05	1.31E+00	1.31E-01	1.09E-01	1.09E-02
Lead	1.89E+01	1.89E+00	2.64E+00	2.64E-01	7.77E-03	7.77E-04	5.73E+01	5.62E+00	4.93E-01	4.84E-02
Manganese	4.99E-01	1.85E-01	1.00E-01	3.71E-02	2.31E-03	8.57E-04	1.73E-01	1.15E-01	7.33E-02	4.88E-02
Mercury	5.12E-03	5.12E-04	2.99E-03	2.99E-04	9.75E-06	9.75E-07	2.00E-01	9.99E-02	2.54E-03	1.27E-03
Methylene chloride	4.43E-05	5.19E-06	2.14E-04	2.51E-05	6.22E-07	7.31E-08	NA	NA	NA	NA
Selenium	6.02E-01	6.02E-02	9.73E-02	9.73E-03	1.16E-03	1.16E-04	3.03E-01	3.03E-02	5.85E-02	5.85E-03
Vanadium	7.35E-01	7.35E-02	5.17E-02	5.17E-03	1.49E-03	1.49E-04	7.08E+00	7.08E-01	1.94E+00	1.94E-01
Zinc	5.62E-01	1.45E-01	4.21E-02	1.09E-02	5.38E-04	1.39E-04	4.92E-01	1.90E-01	6.00E-02	2.32E-02

Notes:

NA = Not appropriate, due to the absence of toxicity reference values.

Table 9-10 - Food-web Exposure Model for the Short-Tailed Shrew, Zone 1 of Area II, Frankford Arsenal

Ecological Contaminant of Concern	Soil Concentration (mg/kg) (ww)	Invertebrate Concentration (mg/kg) (ww)	Dose (mg/kg/day)	NOAEL TRV (mg/kg/day)	NOAEL HQ	LOAEL TRV (mg/kg/day)	LOAEL HQ
Antimony	1.08E+00	2.21E-01	2.02E-01	0.06	3.37	0.6	0.34
Arsenic	1.21E+01	2.68E-01	1.03E+00	0.15	6.88	1.498	0.69
Cadmium	5.34E-01	9.81E-01	5.88E-01	0.77	0.76	7.7	0.08
Copper	4.46E+01	2.49E+00	4.64E+00	5.6	0.83	56	0.08
Lead	9.23E+02	3.88E+01	8.89E+01	4.7	18.92	47	1.89
Manganese	3.20E+02	4.31E+00	2.57E+01	51.5	0.50	139	0.18
Mercury	5.12E-01	7.68E-02	8.03E-02	15.7	0.01	157	0.00
Methylene chloride	3.04E-03	6.24E-04	5.71E-04	12.9	0.00004	109.9	0.00001
Selenium	4.37E-01	9.70E-02	8.61E-02	0.143	0.60	1.43	0.06
Vanadium	1.63E+01	3.34E+00	3.06E+00	4.16	0.74	41.6	0.07
Zinc	8.74E+01	6.43E+01	4.24E+01	75.4	0.56	292.1	0.15

Note: Shaded cells identify HQs>1.0.

mg/kg - milligram per kilogram

TRV - Toxicity Reference Values.

HQ - Hazard Quotient

mg/kg - milligram per kilogram

LOAEL - Lowest-Observed-Adverse-Effect Level

NOAEL - No-Observed-Adverse-Effect Level

Table 9-11 - Food-web Exposure Model for the Eastern Cottontail, Zone 1 of Area II of Frankford Arsenal

Ecological Contaminant of Concern	Soil Concentration (mg/kg) (ww)	Plant Concentration (mg/kg) (ww)	Dose (mg/kg/day) (ww)	NOAEL TRV (mg/kg/day)	NOAEL HQ	LOAEL TRV (mg/kg/day)	LOAEL HQ
Antimony	1.08E+00	4.14E-02	2.25E-02	0.06	0.37	0.6	0.037
Arsenic	1.21E+01	9.61E-02	1.77E-01	0.05	3.54	0.501	0.354
Cadmium	5.34E-01	7.58E-02	2.25E-02	0.77	0.03	7.7	0.003
Copper	4.46E+01	1.44E+00	8.76E-01	5.6	0.16	56	0.016
Lead	9.23E+02	2.11E+00	1.24E+01	4.7	2.64	47	0.264
Manganese	3.20E+02	4.87E+00	5.16E+00	51.5	0.10	139	0.037
Mercury	5.12E-01	4.41E-02	1.57E-02	5.25	0.003	52.5	0.0003
Methylene chloride	3.04E-03	4.29E-03	9.19E-04	4.3	0.0002	36.7	0.00003
Selenium	4.37E-01	4.01E-02	1.39E-02	0.143	0.10	1.43	0.010
Vanadium	1.63E+01	1.52E-02	2.15E-01	4.16	0.05	41.6	0.005
Zinc	8.74E+01	9.94E+00	3.17E+00	75.4	0.04	292.1	0.011

Note: Shaded cells identify HQs>1.0.

mg/kg - milligram per kilogram

TRV - Toxicity Reference Values.

HQ - Hazard Quotient

mg/kg - milligram per kilogram

LOAEL - Lowest-Observed-Adverse-Effect Level

NOAEL - No-Observed-Adverse-Effect Level

Table 9-12 - Food-web Exposure Model for the Red Fox, Zone 1 of Area II of Frankford Arsenal

Ecological Contaminant of Concern	Soil Concentration (mg/kg) (ww)	Invertebrate Concentration (mg/kg) (ww)	Mammal Concentration (mg/kg) (ww)	Plant Concentration (mg/kg) (ww)	Dose (mg/kg/day) (ww)	NOAEL TRV (mg/kg/day)	NOAEL HQ	LOAEL (mg/kg/day)	LOAEL TRV HQ_n
Antimony	1.08E+00	2.21E-01	4.42E-01	4.14E-02	4.17E-04	0.06	0.0069	0.6	0.00069
Arsenic	1.21E+01	2.68E-01	2.37E-02	9.61E-02	4.13E-04	0.036	0.0115	0.36	0.00115
Cadmium	5.34E-01	9.81E-01	1.73E-01	7.58E-02	2.25E-04	0.77	0.0003	7.7	0.00003
Copper	4.46E+01	2.49E+00	4.42E+00	1.44E+00	5.38E-03	5.6	0.0010	56	0.00010
Lead	9.23E+02	3.88E+01	7.89E+00	2.11E+00	3.65E-02	4.7	0.0078	47	0.00078
Manganese	3.20E+02	4.31E+00	1.31E+02	4.87E+00	1.19E-01	51.5	0.0023	139	0.00086
Mercury	5.12E-01	7.68E-02	1.14E-02	4.41E-02	3.68E-05	3.77	0.00001	37.7	0.000001
Methylene chloride	3.04E-03	6.24E-04	1.25E-03	4.29E-03	1.93E-06	3.1	0.000001	26.4	0.0000001
Selenium	4.37E-01	9.70E-02	1.70E-01	4.01E-02	1.66E-04	0.143	0.0012	1.43	0.00012
Vanadium	1.63E+01	3.34E+00	6.69E+00	1.52E-02	6.20E-03	4.16	0.0015	41.6	0.00015
Zinc	8.74E+01	6.43E+01	3.96E+01	9.94E+00	4.06E-02	75.4	0.0005	292.1	0.00014

Table 9-13 - Food-web Exposure Model for the American Robin, Zone 1 of Area II of Frankford Arsenal

Ecological Contaminant of Concern	Soil Concentration (mg/kg) (ww)	Invertebrate Concentration (mg/kg) (ww)	Plant Concentration (mg/kg) (ww)	Dose (mg/kg/day)	NOAEL TRV (mg/kg/day)	NOAEL HQ	LOAEL TRV (mg/kg/day)	LOAEL HQ
Antimony	1.08E+00	2.21E-01	4.14E-02	1.81E-01	NA	NA	NA	NA
Arsenic	1.21E+01	2.68E-01	9.61E-02	1.16E+00	2.5	0.46	7.4	0.16
Cadmium	5.34E-01	9.81E-01	7.58E-02	3.90E-01	1.47	0.27	7.8	0.05
Copper	4.46E+01	2.49E+00	1.44E+00	5.30E+00	4.05	1.31	40.5	0.13
Lead	9.23E+02	3.88E+01	2.11E+00	9.16E+01	1.6	57.25	16.3	5.62
Manganese	3.20E+02	4.31E+00	4.87E+00	3.10E+01	179	0.17	269	0.12
Mercury	5.12E-01	7.68E-02	4.41E-02	8.99E-02	0.45	0.20	0.9	0.10
Methylene chloride	3.04E-03	6.24E-04	4.29E-03	2.64E-03	NA	NA	NA	NA
Selenium	4.37E-01	9.70E-02	4.01E-02	8.78E-02	0.29	0.30	2.9	0.03
Vanadium	1.63E+01	3.34E+00	1.52E-02	2.44E+00	0.344	7.08	3.44	0.71
Zinc	8.74E+01	6.43E+01	9.94E+00	3.25E+01	66.1	0.49	171	0.19

Note: Shaded cells identify HQs>1.0.

Table 9-14 - Food-web Exposure Model for the Red-Tailed Hawk, Zone 1 of Area II of Frankford Arsenal

	Soil	Mammal					
Ecological Contaminant	Concentration	Concentration	Dose	NOAEL TRV	NOAEL	LOAEL TRV	LOAEL
of Concern	(mg/kg) (ww)	(mg/kg) (ww)	(mg/kg/day) (ww)	(mg/kg/day)	HQ	(mg/kg/day)	HQ
Antimony	1.08E+00	4.42E-01	4.42E-02	NA	NA	NA	NA
Arsenic	1.21E+01	2.37E-02	2.37E-03	2.5	0.001	7.4	0.0003
Cadmium	5.34E-01	1.73E-01	1.73E-02	1.47	0.01	7.8	0.002
Copper	4.46E+01	4.42E+00	4.42E-01	4.05	0.11	40.5	0.01
Lead	9.23E+02	7.89E+00	7.89E-01	1.6	0.49	16.3	0.05
Manganese	3.20E+02	1.31E+02	1.31E+01	179	0.07	269	0.05
Mercury	5.12E-01	1.14E-02	1.14E-03	0.45	0.003	0.9	0.001
Methylene chloride	3.04E-03	1.25E-03	1.25E-04	NA	NA	NA	NA
Selenium	4.37E-01	1.70E-01	1.70E-02	0.29	0.06	2.9	0.01
Vanadium	1.63E+01	6.69E+00	6.69E-01	0.344	1.94	3.44	0.19
Zinc	8.74E+01	3.96E+01	3.96E+00	66.1	0.06	171	0.02

Note: Shaded cells identify HQs>1.0.

10. SUMMARY

10.1 SUMMARY

10.1.1 RI Activities and Methodology

EA was contracted by USACE–Baltimore District for the completion of a RI in Area II of the FFA located in Philadelphia, Pennsylvania. The purpose of this RI is to assess potential environmental impacts to the FFA Area II resulting from former DoD use of the property and to determine if there is any risk to current or future human and ecological receptors as a result of any environmental impacts in Area II.

Sampling activities associated with this RI have been planned and conducted in accordance with Pennsylvania's *Land Recycling and Environmental Remediation Standards Act* (Act 2 of 1995) and its implementing regulations at 25 PA Code Chapter 250. Accordingly, the RI Report summarizes the site characterization results for soil and groundwater relative to applicable Act 2 standards. Act 2 standards are considered applicable standards for remediation at CERCLA sites in Pennsylvania; they do not waive or supersede federal standards. Applicable Act 2 standards for the FFA Area II consist of the Statewide Health Standard and its published Medium Specific Concentrations (MSCs, compound-specific standards), and the Site Specific Standard, which permits evaluation of site conditions and risk variables to propose risk-based, site-specific MSCs. The HHRA and screening level ecological risk assessment incorporated herein are intended to assist in future definition of remedial approaches for soils at the FFA Area II (e.g., Feasibility Study). In the context of PA Act 2, this RI Report inventories the specific compounds which require further attention under Act 2 (those that were detected in excess of residential, Statewide Health Standard MSCs), and it outlines regulatory processes through which exceedances of Act 2 criteria can be addressed toward attaining a given Act 2 standard and receiving a waiver of liability for those documented conditions. The following sections summarize the findings of the RI.

10.1.2 Results

In order to accomplish this goal, surface soil samples, subsurface soil samples, and groundwater samples were collected from areas of historical DoD use and analyzed to determine impacts/risk. Laboratory sample results for soil were compared to the PADEP SHS to evaluate whether concentrations exceed identified screening criteria in support of the demonstration of attainment of an Act 2 Standard. In addition, radionuclide soil data were compared to NRC Residual Radioactive Contamination from Decommissioning Parameter Analysis (USNRC NUREG/CR-5512) screening criteria since there are no SHS for radionuclides. Radionuclide water data were compared to the applicable USEPA maximum contaminant level (MCL). Additionally, for PCBs, soils were also screened to the TSCA site-specific soil screening limit for the level for high-occupancy areas with unrestricted future use. Laboratory sample results for groundwater were compared to the PADEP residential MSCs for used aquifers to assess direct contact and to PADEP residential groundwater screening values for protection of indoor air to assess inhalation. Groundwater results were also compared to USEPA MCLs to assess radionuclides.

10.1.2.1 Soil

Area II was divided into three zones based on past historical use, and a total of 445 soil samples consisting of biased, unbiased, and delineation surface and subsurface soil samples were collected in Zones 1, 2, and 3 as part of the RI. A summary of the soil sampling by Zone is as follows:

- **Zone 1** – Historically a mostly residential area that occupies the northwest corner of Area II. This area had limited industrial use and it was used mainly for housing with some associated garages and two historical storehouses. The following samples were placed in Zone 1:

  - 61 unbiased surface soil sample locations
  - 6 biased surface and subsurface sample locations
  - 11 delineation subsurface sample locations

- **Zone 2** – Historically a mostly industrial area that occupies the northeast corner of Area II. The area contained mostly research and support facilities to include fire control laboratory, paint shop, blacksmith shop, a garage, and other buildings. The following samples were placed in Zone 2:

  - 7 biased surface and subsurface sample locations
  - 47 unbiased surface and subsurface sample locations
  - 11 delineation surface and subsurface sample locations

- **Zone 3** – Historically a mostly industrial area that occupies the southern portion of Area II adjacent to Frankford Creek. The area contained mostly buildings which housed former ammunition production operations. The following samples were placed in Zone 3:

  - 14 biased surface and subsurface sample locations
  - 63 unbiased surface and subsurface sample locations
  - 6 delineation surface and subsurface sample locations

Additionally, 13 biased surface soil samples and1 subsurface soil sample were placed in the vicinity of transformer stations and 11 soil samples were collected during permanent well installation.

Surface soil samples in Zone 1 were submitted for the analysis of arsenic, cadmium, and lead. Biased samples in Zones 1, 2, and 3 and unbiased samples in Zones 2 and 3 were submitted for the analysis of TCL VOCs, TCL SVOCs, and metals with a subset of samples submitted for the analysis of explosives, radionuclides, pesticides, and PCBs.

Sampling data were screened and COCs were identified (analytes which exceeded MSCs are identified as COCs). Further review of exceedances was conducted and AOIs were identified as areas containing one or more samples with analytes at concentrations exceeding MSCs. Based on a review of soil data with respect to the applicable screening data, a total of 23 AOIs have

been identified as summarized on Table 6-23. Metals, primarily lead and arsenic, and SVOCs, primarily BAP, are found at concentrations exceeding their respective screening criteria in surface soils (0 to 2 ft bgs) and associated with fill materials at greater depths. VOCs, primarily benzene and TCE, with occurrences at concentrations exceeding screening criteria were less widespread.

10.1.2.2 Groundwater

A total of 27 temporary monitoring wells (TW-1 thru TW-27) were installed at locations that were based upon analytical results from soil sampling in Area II and from groundwater data from Area I. A total of 11 permanent monitoring wells (MW-21 to MW-31) were installed in areas with observed impact to groundwater (i.e., adjacent to temporary well locations and near monitoring wells in Area I which had exceedances of groundwater criteria. Shallow overburden wells (to depths of 25 ft bgs), with the exception of one well, were placed in the western half of the FFA to address contamination. Deep overburden wells were placed along the eastern boundary of Area II to evaluate chlorinated solvent contamination.

Based on a review of groundwater data from temporary and permanent wells in respect to the applicable screening data a total of 9 groundwater AOIs have been identified. Chlorinated solvent impact to groundwater was observed in the eastern portion of Area II along the Area I boundary. Acetone, cumene, phenol, and arsenic along with PAH concentrations in groundwater samples was reported from locations along the western and central western portion of Area II. The source of this impact is from offsite (non-DoD) origin.[11] Smaller areas with impact from VOCs, PAHs, and metals occur throughout Area II.

10.1.3 Fate and Transport

Identified impacts to soil and groundwater were evaluated to how COCs transport and degrade through the potential pathways to receptors. The fate and transport of COCs focused primarily on soil. Groundwater was discussed in relation to soil impacts, potential sources, and in general pathway evaluation. Groundwater fate and transport analysis was not conducted as groundwater for the entire FUDS area (Areas I, II, and III) and will be more fully characterized by USACE as part of the upcoming investigation of Area IV (site-wide FFA groundwater investigation).

Soils COCs include metals (antimony, arsenic, lead, manganese, and mercury), VOCs (benzene, carbon tetrachloride, chloroform, ethylbenzene, and TCE), SVOCs (benzo(a)anthracene, BAP, benzo(b)fluoranthene, and dibenzo[a,h]anthracene), radionuclides (^{40}K and ^{226}Ra), and PCBs (Aroclor 1260). The most prevalent COCs in soil are arsenic, lead, and BAP. ^{40}K and ^{226}Ra are prevalent but appear to be within naturally occurring typical (not site-specific) background concentrations.

[11] The RI identified impact from parties other than DoD, specifically VOCs (phenol, and acetone) in soils in Zones 2 and 3, which may contribute to risk at the site. As such this impact was evaluated in the risk assessment for Area II (Appendix F and summarized in Section 8); however DoD is not claiming responsibility for any specific chemical in the risk assessment.

Groundwater COCs include metals (antimony, arsenic, cobalt, lead, and manganese), VOCs (2-hexanone, acetone, benzene, carbon tetrachloride, cis-1,2-dichloroethene, ethylbenzene, cumene, MTBE, PCE, TCE, and vinyl chloride), and SVOCs (acetophenone, benzo(a)anthracene, BAP, benzo(b)fluoranthene, benzo[g,h,i]perylene, dibenzo[a,h]anthracene, indeno[1,2,3-c,d]pyrene, and phenol). Chlorinated solvents appear to be sourced in Area I. The most prevalent VOCs Acetone, cumene, and phenol do not appear to be sourced in Area II (i.e. non DoD source). These appear to be sourced offsite from the Honeywell Frankford facility to the west.

Lead and arsenic are the most prevalent metals detected above screening criteria in Area II. Zone 1 arsenic and lead impact is mainly limited to the 0- to 6-in. depth interval. The widespread nature and limited vertical impact indicates that the source is most likely historical deposition onto undisturbed soils. Lead and arsenic impact in Zones 2 and 3 are associated with cinders/slag material. Cinders were historically spread along railroad tracks in the southern area of Zone 3, and lead and arsenic impact in this area is associated with the occurrence of these cinders. Arsenic and lead, and other metals in general, are retained strongly in soil with little transport through runoff to surface water or leaching to groundwater except under acidic or reducing conditions. Therefore, they persist in soil indefinitely unless transported by wind or dissolution into pore or ground water. The majority of Area II is covered with impervious surfaces, and those that are not are covered by a vegetated mat, making movement of metals in soil via fugitive dust emissions insignificant.

Certain PAHs were detected above their respective MSCs, with BAP being the most prevalent. Not one point source for PAHs can be identified based on their widespread occurrence. BAP mainly partitions to soil and sediment; therefore, BAP present in soils in Area II is likely to remain in soil. PCBs at the FFA are present in surface soils adjacent to transformers; they are likely to remain in soil with limited biodegradation.

The most prevalent chlorinated solvent in soil is TCE. It has a high to medium mobility in soil, although unsaturated occurrences of TCE at the FFA occur under impervious surfaces (concrete and asphalt). The lack of movement of recharge through the soil column is likely to hinder the transport downward towards the water table. Under the correct conditions degradation will occur. One daughter product, cis-1,2-dichloroethene, was detected in soil in association with TCE and PCE. Limited degradation appears to be occurring in soil.

10.1.4 Human Health Risk Assessment

The results indicate there are no exceedances of the carcinogenic or non-carcinogenic risk thresholds for any of the current or future receptors evaluated. Based solely upon zones, the exposure areas may be potentially skewed as large exposure areas for some potential site receptors. Therefore, each zone was also evaluated for potential localized areas of "elevated" concentrations. Localized areas of "elevated" concentrations were identified as sample locations with COPCs that potentially represent a carcinogenic risk level of 10^{-4} or a non-carcinogenic hazard quotient of 10. The carcinogenic risk level represents the upper-bound of the acceptable risk range of 10^{-6} to 10^{-4} (USEPA 1990 and PADEP 1997). No potential localized areas of "elevated" concentrations were identified within Zones 1. A potential localized area of

"elevated" concentration was identified within the transformer areas in Zone 2. Aroclor 1260 at sample location T1101 is a potential concern for future residential receptors. This sample location was in surface soil adjacent to Building 28 in Zone 2 where surfaces are bare/vegetated and pervious. A potential localized area of "elevated" concentration of benzo(a)pyrene was identified within the southwestern corner of Zone 3. The localized area of "elevated" concentration would be a concern only for potential residential use of this area and is not a concern for workers.

Lead was evaluated through the use of the USEPA blood lead models. The IEUBK model was used to evaluate potential concerns for a resident child. The adult lead model was used to evaluate potential concerns for workers and school students. Based upon the evaluation of the entire zone as an exposure area, the IEUBK model identified potential concerns (e.g., elevated blood-lead levels) for future receptor resident children exposure to soil within Zone 1 and daycare students exposure to the southeastern portion of Zone 3. There were no concerns for workers or school student's exposure to soil within any of the zones. However, under Act 2 a school child is considered the equivalent of a residential child; therefore, if this interpretation is used there are potential concerns for current students exposure to soil within Zone 1.

It is noted that lead was detected at high concentrations within each of the zones. The use of the arithmetic average concentrations may result in a dilution of the high lead concentrations. Therefore, lead was also evaluated for potential localized areas of "elevated" concentrations per USEPA RAGS guidance. Potential lead localized areas of "elevated" concentrations were identified near sample locations with lead concentrations greater than 1,000 mg/kg. This concentration is adequately protective to the current use receptors (e.g., school students and office/commercial workers) and removal of these "elevated" lead concentrations may also be protective of future uses.

There are 16 sample locations within Zone 1 with lead detected at greater than 1,000 mg/kg. All of these sample locations are within exposed grassy areas. The maximum detected concentration of lead within Zone 1 was 8,860 at sample location Z1D7-0.5-1 within surface soil. This sample location is within the central grassy area of Zone 1 used by school students for recreational activities. A majority of the sample locations above 1,000 mg/kg are located adjacent to the former residences that surround the parade ground.

Within Zone 2, there are two sample locations with lead detected at greater than 1,000 mg/kg. These sample locations are within exposed grassy areas in surface soil. The maximum detected concentration of lead within Zone 2 was 15,600 at sample location UBZ2-45-1-2 within surface soil. This sample location is within grassy area near the charter school.

There are five sample locations within Zone 3 with lead detected at greater than 1,000 mg/kg. The maximum detected concentration of lead within Zone 3 was 12,700 mg/kg at sample location UBZ3-19-0-2 within surface soil. This sample location is within grassy area not far from the charter school located in Zone 1. Four of the sample locations with lead above 1,000 mg/kg are within the southeastern portion of Zone 3 identified as a potential location for a future daycare facility.

The localized areas of "elevated" concentrations of lead within Zones 1, 2, and sample location UBZ3-19 in Zone 3 are located within exposed, grassy areas accessible to school students and other visitors or workers within these zones. The remaining localized areas of "elevated" lead concentration are located in the southeastern portion of Zone 3.

The widespread nature of exceedances and limited vertical impact of lead in Zone 1 indicates that the source is most likely historical deposition onto undisturbed soils. Potential sources for deposition include airborne dust particles and paint chips. Buildings in the areas with the observed highest concentration of lead in soil (Buildings 1 through 5 and 14) are among the oldest buildings at the FFA. These buildings have been historically painted (JMA 1979) and these buildings were observed to be flaking during the RI fieldwork.

10.1.5 Ecological Risk Summary

A SLERA was performed for Area II in the FFA. The ERA followed USEPA guidance and Pennsylvania Act 2 requirements, and consisted of a hazard assessment, exposure assessment, toxicity assessment, and risk characterization. The area examined for ecological risk was soil areas around the developed buildings and impervious surfaces. Risks were characterized for terrestrial plants and invertebrates and terrestrial birds and mammals. Lead is the primary COC in Zone 1 that could cause negative effects to ecological organisms in soil. There are no threatened, endangered, or listed species identified in Area II of the FFA. The exposed surface soil samples in Zone 1 suggest that high lead concentrations do not represent an unacceptable risk to populations of lower trophic organisms (plants and soil invertebrates), but may represent risk to the robin and shrew due to food web exposure.[12]

Zones 2 and 3 contain primarily buildings, parking lots, and impervious surfaces, and consequently is not good habitat for ecological organisms. What vegetation is present is mowed and maintained or overgrown scrub areas. Concentrations of COPCs (and subsequent potential risk) in these zones were appreciably higher than that found in Zone 1, but the lack of viable habitat is likely to dissuade significant populations of ecological receptors in Zones 2 and 3.

10.1.6 Summary of Pathway Analysis

The following summarizes the current and future fate and transport pathways:

- Direct Contact − The pathway for direct contact between human and ecological receptors to site soils is complete in areas of the site where soils are exposed and accessible (i.e., most of Zone 1 and smaller areas within zones 2 and 3). Direct contact to human receptors from identified impact in site soils has been evaluated in detail in the Baseline HHRA as summarized in Section 10.1.4. Direct contact to ecological receptors from identified impact in site soils has been evaluated in the SLERA, as summarized in Section 10.1.5. Based on the HHRA and SLERA direct contact with surface soils is a pathway for certain AOCs/receptors. The pathway for direct contact to groundwater is currently not physically complete at the site for consumption of groundwater due the lack of potable wells onsite. However, no institutional controls are currently in place to prevent the placement of a potable well onsite; therefore, future pathway completion is

possible. Risk to human and ecological receptors from groundwater will be evaluated as part of the Area IV groundwater remedial investigation.

- Air − Vapor intrusion from the volatilization of organic compounds in groundwater and soil sources has been evaluated in order to assess the potential to impact indoor air quality at sites where inhabited buildings are within 100 ft of a source. Given the distribution of inhabited buildings in Area II and the potential for future habitation of additional buildings, potentially volatile compounds were screened to vapor intrusion criteria. Given the prevalence of preferential pathways combined with screening results, PADEP guidance indicates that further evaluation may be necessary to determine if indoor air quality is being impacted by identified contamination.[12]

- Soil to Groundwater − Soil results were screened to the residential SGW MSCs, and five metals (antimony, arsenic, lead, manganese, and mercury) and three VOCs (benzene, carbon tetrachloride, and TCE) were reported at concentrations above their respective residential SGW MSCs. The majority of impact from metals in soils above the SGW MSC is limited to surface soils. Those soils that are not covered by impervious surfaces need to be evaluated further by demonstrating an adequate soil buffer distance and/or groundwater equivalency based on completed groundwater characterization data from OU4 (i.e. additional groundwater sampling events).

- Soil to Surface Water − The majority of soils in Area II are covered by imperious surfaces, and those that are not are mostly covered by vegetation or gravel; therefore surface runoff will be directed to storm sewer lines. Due to the lack of exposed contaminated soil at the Site it is expected that the sediment load contributed to surface water bodies is of a very small magnitude. The smaller diameter storm and sanitary sewer lines that run throughout the site connect into two main storm and sanitary sewer lines that converge southeast of the intersection of Hanger Road and Baird Street. Storm sewers discharge to the pump house (Building 218) where it is conveyed to Frankford Creek. The portion of Frankford Creek adjacent to FFA is the remnant of the rerouted creek; it receives little active flow from outfalls along its length and is mostly under the tidal influence of the Delaware River. The sanitary sewer main flows to the east paralleling Frankford Creek, where it combines with the larger (10 by 11 ft) Delaware Connector via an interceptor chamber east of Building 307. A sewer line then continues south, under Frankford Creek, to the city publicly owned treatment works. In the event of heavy rains, excess flow can bypass the sewer interceptor into the lower segment of the Sanger Street sewer and discharge to the Delaware River. If areas of contaminated soil are disturbed in the future the proper sediment and erosion controls will be undertaken.

[12] Compounds were detected in soils and groundwater that are associated with processes at the adjacent Honeywell Frankford Facility (including phenol, acetone, benzene, and cumene as presented in Section 7.2.2.2). While these chemicals were analyzed for contribution to risk and impact to receptors via vapor intrusion, DoD is not claiming responsibility for any particular chemical in the Risk Assessment.

- Groundwater to Surface Water − Shallow and deep overburden groundwater flow, as discussed in the CSM, is towards Frankford Creek. There is a potential for contaminants to discharge into Frankford Creek, which acts as an inlet to the Delaware River; this will be evaluated under the Area IV groundwater remedial investigation.

11. RECOMMENDATIONS

Recommendations for each of the 23 soil AOCs are summarized on Table 11-1 and AOCs recommended for further evaluation in the FS and localized areas of "elevated" concentrations are illustrated on Figure 11-1. Recommendations are summarized below.

- COPCs in soil include lead, arsenic, mercury, antimony, Aroclor 1260, BAP, benzo(b)fluorene, benzo(a)antrhacene, TCE, and benzene. Of these the HHRA assessment has determined there is no unacceptable risk for arsenic, mercury, antimony, benzo(b)fluorene, benzo(a)antrhacene, TCE, and benzene. Lead, Aroclor 1260 and BAP are associated with areas of localized "elevated" concentrations that will be addressed by a Feasibility Study (FS).

- Potential unacceptable risks were identified at AOCs 1, 6, 10, 13, 20, and 21. Based on the results of the HHRA, specific localized areas of "elevated" concentrations within certain AOCs warrant further action based on the unacceptable risk or potential concerns to future receptors (i.e. localized areas of "elevated" concentrations in Zones 2 and 3 and AOCs 6, 10, and 20 are currently accessible). Further action is recommended to address these localized areas of "elevated" concentrations. AOCs 13 and 21 are currently covered with an impervious surface, and they are recommended for further action based on potential future use of Area II. A FS should be completed to evaluate alternatives for addressing these risks.

- The HHRA indicates that remaining soil AOCs associated with direct contact MSC exceedances (AOC 2, 4, 5, 7, 8, 9, 11, 12, 14, 16, 17, 18, 19, 22, and 23) do not have unacceptable risk or potential concerns to current or future receptors. Therefore, attainment of a Site-Specific Standard can be demonstrated for these AOCs. No remediation or institutional or engineering controls will be required to demonstrate attainment.

- Lead was evaluated through the use the USEPA blood lead models. The IEUBK model was used to evaluate potential concerns for a resident child. The adult lead model was used to evaluate potential concerns for workers and school students. Based upon the evaluation of the entire zone as an exposure area, the IEUBK model identified potential concerns (e.g., elevated blood-lead levels) for future receptor resident children exposure to soil within Zone 1. Based on results of SLERA, there is risk to the robin and shrew due to food web exposure as noted for Zone 1. There are 16 sample locations within Zone 1 with lead detected at greater than 1,000 mg/kg. All of these sample locations are within exposed grassy areas. A majority of the sample locations above 1,000 mg/kg are located adjacent to the former residences that surround the parade ground. The widespread nature of exceedances and limited vertical impact of lead in Zone 1 indicates that the source is most likely historical deposition onto undisturbed soils. Potential sources for deposition include airborne dust particles and paint chips. Buildings in the areas with the observed highest concentration of lead in soil (Buildings 1 through 5 and 14) are among the oldest buildings at the FFA. These buildings have been historically

painted (JMA 1979) and these buildings were observed to be flaking during the RI fieldwork.

- Soil AOCs associated with SGW MSC exceedances (1, 5, 10, 11, 13, 14, 20, and 21) can be addressed by demonstration of groundwater equivalency for those AOCs where the COC has not been detected in groundwater at concentrations exceeding groundwater MSCs.

- Soil data indicate that further evaluation is necessary to determine if indoor air quality is being impacted by COCs because concentrations of VOCs exceed VI screening criteria in soil and there are preferential pathways present at the southern end of Building 201. The Vapor Intrusion section of the PADEP Technical Guidance Manual is currently under revision and new guidance will be in effect by the time the Final Report for Area II is submitted to PADEP for approval. The VI pathway must be evaluated per the current standard at the time of the Final Report; therefore, the new guidance will be evaluated during the FS to determine path forward.

- Exceedances of soil, groundwater, and VI screening criteria which are related to chemicals emanating from the offsite Honeywell Frankford Facility (to include phenol, acetone, cumene, etc.) are not FUDS related and will not be addressed by the FS or the Area IV RI.

The path forward will involve the following steps:

- Feasibility Study (FS)
- Proposed Remedial Action Plan (PRAP)
- Public Meeting to discuss PRAP
- Record of Decision (ROD)
- Remedial Design
- Remedial action as indicated by ROD and Remedial Design





Legend

Soil Sample Locations

- Soil Sample Location
- Elevated Concentrations of Lead
- Elevated Concentrations of Benzo(a)pyrene
- Elevated Concentrations of PCB
- Area I Boundary
- Area II Boundary

Soil Area of Interest

- Recommended for Further Action
- No Risk Demonstration of Site Specific Standards

Zones

- Zone 1, 2 and 3
- Area used by schools for recreation or readily assessible to students
- School Buildling

Label Key

UBZ- Unbiased Soil Sample
BZ- Biased Soil Sample
D- Delineation Soil Sample
Z1- Zone 1
Z2- Zone 2
Z3- Zone 3

Sources
ESRI (Imagery), 2011
Cabrera, 2011
USACE, 2009

Figure 11-1
Soil Areas of Interest and Locations with Elevated Concentrations

Frankford Arsenal
Philadelphia, Pennsylvania

Project: 6233017

December 2014

0 75 150 300
Feet
1 inch = 175 feet

Path: \\lovetonfederal\GISData\Northeast\Pennsylvania\FrankfordArsenal\MXD\March_2013\Figure ES-1 Soil Areas of Concern and Associated Hot Spots.mxd

TABLE 11-1 SOIL AOCs AND RECOMMENDATIONS

AOC	Zone	Adjacent Building Number(s) and Historical DOD Use(s)	Constituent(s) of Concern	MSC Type	Human Health Risk Assessement Findings	Recommendation for Act 2 Resolution
1	1 and 2	Adjacent to identified areas of "elevated" concentrations: 1,2,3,4,5 - Housing; 14 - Storehouse and housing	Lead and arsenic	RDC/SGW	Unacceptable risk identified for future resident children receptor; 16 localized areas of "elevated" lead concentrations identified in HHRA (UBZ1-7, -10, -16, -17, -23, -24, -28/D7, -31, -32, -38, -39, -41,-49 and -52, BZ1-2)	Further action recommended for 16 localized areas of "elevated" Lead identified in HHRA to be evaluated in FS
2	2	23 - Fire Control and Housing	BAP	RDC	Risk is acceptable for identified receptors	Site-Specific-Standard to be demonstrated in Final Report based on findings from HHRA
3	2	23 - Fire Control and Housing	TCE	SGW	Groundwater risk to be evaluated during Area IV RI	Saturated sample, groundwater impact confirmed; to be addressed by USACE during Area IV investigation
4	2	23 - Fire Control and Housing	BAP	RDC	Risk is acceptable for identified receptors	Site-Specific-Standard to be demonstrated in Final Report based on findings from HHRA
5	2	38 - Ordnance Factory, Storehouse, Cafeteria, and Offices 38A - Offices and Store 40 - Machine Shop, Foundry, and Offices	Lead	RDC/SGW	Risk is acceptable for identified receptors	Site-Specific-Standard to be demonstrated in Final Report based on findings from HHRA. Soil to groundwater exceedance to be addressed by demonstrating adequate soil buffer.
6	2	28 - Fire Control and Offices	Aroclor 1260	RDC	Unacceptable risk identified for future residential receptor, one localized area of "elevated" concentration of Aroclor 1260 identified (T-1101-1).	Further action recommended for one localized area of "elevated" Aroclor 1260 identified in HHRA (T-1101-1) to be evaluated in FS

TABLE 11-1 SOIL AOCs AND RECOMMENDATIONS

AOC	Zone	Adjacent Building Number(s) and Historical DOD Use(s)	Constituent(s) of Concern	MSC Type	Human Health Risk Assessement Findings	Recommendation for Act 2 Resolution
7	2	112 - Ordnance and Fire Control Facility, 116- Power Plant, Fire Control, and Laboratory	Arsenic and BAP	RDC	Risk is acceptable for identified receptors	Site-Specific-Standard to be demonstrated in Final Report based on findings from HHRA
8	2	111 - Ordnance and Fire Control Facility	Arsenic	RDC	Risk is acceptable for identified receptors	Site-Specific-Standard to be demonstrated in Final Report based on findings from HHRA
9	2	111 - Ordnance and Fire Control Facility	BAP	RDC	Risk is acceptable for identified receptors	Site-Specific-Standard to be demonstrated in Final Report based on findings from HHRA
10	2	110 - Office	Lead	RDC/SGW	Unacceptable risk identified for future resident children receptor; one localized area of "elevated" concentration of lead (UBZ2-45) identified	Further action recommended for one localized area of "elevated" Lead identified in HHRA (UBZ2-45) to be evaluated in the Feasibility Study (FS).
11	3	101 - Guardhouse 201 - Ordnance Facility	Arsenic	RDC	Risk is acceptable for identified receptors	HHRA concludes risk is acceptable, Site-Specific-Standard via pathway elimination
12	3	201 - Ordnance Facility	BAP and benzene	RDC/SGW	Risk is acceptable for identified receptors	Site-Specific-Standard to be demonstrated in Final Report based on findings from HHRA for BAP. Benzene detected in saturated sample,
13	3	201 - Ordnance Facility 202- Storehouse and Ordnance Facility	Arsenic, BAP, BAA, BBF, TCE	RDC/SGW	Unacceptable risk for future resident receptor, one localized area of "elevated" concentration identified at one location (UBZ3-55) for BAP.	Further action recommended for one localized area of "elevated" BAP concentration identified in HHRA (UBZ2-55) to be evaluated in FS

TABLE 11-1 SOIL AOCs AND RECOMMENDATIONS

AOC	Zone	Adjacent Building Number(s) and Historical DOD Use(s)	Constituent(s) of Concern	MSC Type	Human Health Risk Assessement Findings	Recommendation for Act 2 Resolution
14	3	208 - Storehouse and Ordnance Facility	Arsenic, BAP, and Hg	RDC/SGW	Risk is acceptable for identified receptors	Site-Specific-Standard via groundwater equivalency for SGW, mercury not detected in TW-16 or TW-27; therefore soil to groundwater pathway incomplete, groundwater
15	3	209 - Storehouse and Ordnance Facility	Benzene	SGW	Groundwater risk to be evaluated during Area IV RI	Saturated sample, groundwater impact and associated impacts to saturated soil from offsite source. No further action by USACE.
16	3	209 - Storehouse and Ordnance Facility 210 - Ordnance Facility and Warehouse	BAP	RDC	Risk is acceptable for identified receptors	Site-Specific-Standard to be demonstrated in Final Report based on findings from HHRA
17	3	210 - Ordnance Facility and Warehouse 211 - Storehouse, S.A. Tool Shop, and Warehouse 214 - Storehouse and Ordnance Facility	Arsenic	RDC	Risk is acceptable for identified receptors	Site-Specific-Standard to be demonstrated in Final Report based on findings from HHRA
18	3	212 and 213 - Ordnance Facility	BAP, BAA, BBF, DAHA	RDC	Risk is acceptable for identified receptors	Site-Specific-Standard to be demonstrated in Final Report based on findings from HHRA
19	3	215 - Rolling Mill and Ordnance Facility	Arsenic	RDC	Risk is acceptable for identified receptors	Site-Specific-Standard to be demonstrated in Final Report based on findings from HHRA

TABLE 11-1 SOIL AOCs AND RECOMMENDATIONS

AOC	Zone	Adjacent Building Number(s) and Historical DOD Use(s)	Constituent(s) of Concern	MSC Type	Human Health Risk Assessement Findings	Recommendation for Act 2 Resolution
20	3	215 - Rolling Mill and Ordnance Facility 216 - Ordnance Facility 217 - Lead Shop and Ordnance Facility	Arsenic, antimony, lead, and BAP	RDC/SGW	Unacceptable risk for future resident child receptor; one localized area of "elevated" concentration of lead (UBZ3-19) identified	Further action recommended for one localized area of "elevated" lead concentration identified in HHRA (UBZ3-19) to be evaluated in FS
21	3	222 - Storehouse and Ordnance Facility Former 223 - Storehouse and Warehouse Former 224 - Storehouse and Ordnance Facility Former 225 - Storehouse Former 226 - Cooling Tower Former 227 - Ordnance Facility	Lead and arsenic	RDC/SGW	Unacceptable risk for future daycare students; Four localized areas of "elevated" concentrations of lead (UBZ3-49, -57, -58, and -63) identified	Further action recommended for four localized areas of "elevated" lead concentrations identified in HHRA (UBZ3-49, -57, -58, and -63) to be evaluated in FS
22	3	218 - Pumping Station 225 - Storehouse 226 - Cooling Tower	Arsenic and BAP	RDC	Risk is acceptable for identified receptors	Site-Specific-Standard to be demonstrated in Final Report based on findings from HHRA
23	3	None	Arsenic	RDC	Risk is acceptable for identified receptors	Site-Specific-Standard to be demonstrated in Final Report based on findings from HHRA

BAP - Benzo(a)pyrene
BAA - Benzo(a)anthracene
BBF - Benzo(b)fluorene
HHRA - Human Health Risk Assessment
DAHA - Dibenzo(a,h)anthracene
FS -Feasibility Study
TCE - Trichloroethylene
RDC - Residential Direct Contact
SGW - Soil to groundwater

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