N00639.AR.002341
NSA MID SOUTH
5090.3a

RESOURCE CONSERVATION AND RECOVERY ACT FACILITY INVESTIGATION REPORT PISTOL RANGE UNXPLODED ORDNANCE 1 (UXO 1) AND TRAP/SKEET RANGES 1 AND 2 UNEXPLODED ORDNANCE 2 (UXO 2) MILLINGTON SUPPACT TN

12/01/2013

RESOLUTION CONSULTANTS

RESOURCE CONSERVATION AND RECOVERY ACT FACILITY INVESTIGATION REPORT

Pistol Range (UXO 1) and Trap/Skeet Ranges #1 and #2 (UXO 2)

NAVAL SUPPORT ACTIVITY MID-SOUTH
MILLINGTON, TENNESSEE

Version Number: 0

Prepared For:

Department of the Navy
Naval Facilities Engineering Command Midwest
201 Decatur Avenue, Building IA
Great Lakes, Illinois 60088

Prepared By:

Resolution Consultants
A Joint Venture of AECOM & EnSafe
1500 Wells Fargo Building
440 Monticello Avenue
Norfolk, Virginia 23510

Contract Number: N62470-11-D-8013
CTO F271

December 2013

Table of Contents

EXECUTIVE SUMMARY iv

List of Acronyms vii

1.0 INTRODUCTION AND PROBLEM IDENTIFICATION 1-1
- 1.1 Report Organization 1-1
- 1.2 Purpose 1-3
- 1.3 Property Description and Problem Identification 1-3
- 1.4 Previous Investigations 1-5

2.0 FACILITY BACKGROUND AND PHYSICAL SETTING 2-1
- 2.1 General Facility Background and Physical Setting 2-1
  - 2.1.1 Regulatory Framework 2-1
  - 2.1.2 History 2-1
  - 2.1.3 Current Land Use and Anticipated Future Land Use 2-2
- 2.2 General Facility Physical/Environmental Characteristics 2-3
  - 2.2.1 Climate 2-3
  - 2.2.2 Topography 2-3
  - 2.2.3 Regional Geology 2-4
  - 2.2.4 Soil and Vegetation 2-4
  - 2.2.5 Hydrology 2-5
  - 2.2.6 Regional Hydrogeology 2-5
- 2.3 Regional Ecological Summary 2-6
  - 2.3.1 Endangered and Threatened Species 2-6
  - 2.3.2 Cultural and Archaeological Resources 2-7

3.0 PROJECT OBJECTIVES 3-1
- 3.1 Human Exposure Profile 3-1
- 3.2 Ecological Profile 3-1
- 3.3 MEC and MC Release Profile 3-2
- 3.4 Screening Levels 3-2
- 3.5 Risk Characterization for Soil 3-3
- 3.6 Project Approach and RFI Objectives 3-4

4.0 DATA COLLECTION AND SITE CHARACTERIZATION 4-1
- 4.1 Site Preparation and Utility Clearance 4-1
- 4.2 MEC Anomaly Avoidance 4-1
- 4.3 Field Investigation Methods 4-1
- 4.4 Analytical Methods 4-3
- 4.5 Data Validation Assessment 4-4

5.0 NATURE AND EXTENT 5-1
- 5.1 Lead in Soil 5-1
- 5.2 Polycyclic Aromatic Hydrocarbons in Soil 5-5
- 5.3 Summary of Nature and Extent 5-7

6.0 CONTAMINANT FATE AND TRANSPORT 6-1
6.1 Site Contaminants Summary 6-1
6.2 Contaminant Characteristics Affecting Transport 6-2
6.3 Contaminant Transport 6-2
6.3.1 Polycyclic Aromatic Hydrocarbon Contaminant Transport 6-3
6.3.2 Lead Contaminant Transport 6-4
6.4 Contaminant Persistence 6-5
6.5 Site Fate and Transport Evaluation 6-7
6.6 Summary of Potential Migration Pathways 6-8
6.6.1 Soil to Sediment 6-8
6.6.2 Soil to Air 6-8
6.6.3 Sediment to Surface Water 6-8
6.7 Fate and Transport Summary and Conclusions 6-9

7.0 HUMAN HEALTH RISK ASSESSMENT SUMMARY 7-1
7.1 Data Compilation and Evaluation 7-1
7.2 Exposure Assessment 7-2
7.3 Toxicity Assessment 7-2
7.4 Risk Characterization 7-3
7.5 Uncertainty Analysis 7-5
7.6 Risk Summary 7-5
7.7 Remedial Goal Options 7-6

8.0 SUMMARY OF RESULTS 8-1

9.0 REFERENCES 9-1

Figures

Figure 1-1 Base Location Map 1-7
Figure 1-2 UXO 1 and 2 Site Map 1-8
Figure 4-1 Soil Sample Locations UXO 1 Pistol Range 4-5
Figure 4-2 Soil Sample Locations UXO 2 — Trap/Skeet Ranges #1 and #2 4-6
Figure 5-1 UXO 1 Pistol Range Lead in Soil 5-10
Figure 5-2 UXO 2 Trap/Skeet Range Lead in Surface Soil 5-11
Figure 5-3 UXO 2 Trap/Skeet Range Lead in Subsurface Soil 5-12
Figure 5-4 UXO 1 Pistol Range Benzo(a)pyrene Soil Results 5-13
Figure 5-5 UXO 2 Trap Skeet Ranges Benzo(a)pyrene in Surface Soil 5-14
Figure 5-6 UXO 2 Trap Skeet Range Benzo(a)pyrene in Subsurface Soil 5-15
Figure 5-7 Conceptual Site Model 5-16
Figure 6-1 Rank Order Results BEQ with BEQ SPLP (all data) 6-10
Figure 6-2 Rank Order Results Total BEQ with BEQ SPLP (Top 50 Results) 6-10
Figure 8-1 UXO 2 Lead in Surface Soil Exceeding RGOs 8-6
Figure 8-2 UXO 2 Benzo(a)pyrene Equivalent in Surface Soil Exceeding RGOs 8-7
Figure 8-3 UXO 2 Lead in Subsurface Soil Exceeding RGOs 8-8
Figure 8-4 UXO 2 Benzo(a)pyrene Equivalent in Subsurface Soil Exceeding RGOs 8-9
Figure 8-5 UXO 1 Lead Results in Surface and Subsurface Soil Exceeding RGOs 8-10
Figure 8-6 UXO 1 Benzo(a)pyrene Equivalent Results Exceeding RGOs 8-11

Tables

Table E-1 Chemicals of Concern and Land Use Scenarios vi
Table 2-1 Summary of Potential Protected Species 2-6
Table-3-1 Project Action Levels for Soil and Sediment 3-3
Table-3-2 Data Quality Objectives 3-4
Table 5-1 Summary of Soil Analytical Results 5-2
Table 5-2 UXO 1 Pistol Range Soil Analytical Results 5-17
Table 5-3 UXO 2 Trap/Skeet Ranges Soil Analytical Results 5-21
Table 6-1 Site Contaminants Exceeding PALs — Soil 6-2
Table-6-2 Estimated Degradation Potential for Site Contaminants 6-6
Table-6-3 Summary of Potential Migration Pathways 6-7
Table 7-1 Summary of Risk Estimates 7-4
Table 7-2 Chemicals of Concern and Land Use Scenarios 7-6
Table 7-3 RGO Summary 7-7
Table 8-1 Chemicals of Concern and Land Use Scenarios 8-2

Appendices

Appendix A Field Notes, EOD Trip Report, and Record Keeping
Appendix B Data Validation Summary Laboratory Analytical Report
Appendix C Benzo(a)pyrene Equivalent Calculations
Appendix D Human Health Risk Assessment

EXECUTIVE SUMMARY

This Resource Conservation and Recovery Act Facility Investigation (RFI) report for unexploded ordnance (UXO) 1, the former Pistol Range, and UXO 2, the former Trap/Skeet Ranges #1 and #2 at Naval Support Activity (NSA) Mid-South was prepared by Resolution Consultants for the U.S. Navy under Contract No. N62470-11-D8013, Contract Task Order Number F271. Lead and polycyclic aromatic hydrocarbons (PAHs) were identified in soil at levels of potential concern during a 2010 Site Investigation [SI] (Tetra Tech 2010). The purpose of the RFI is to document the nature and extent of the chemicals of potential concern and evaluate their potential risk to human health during future reuse.

The former Trap/Skeet Range #1, which comprises the northern portion of the 79-acre area, was constructed around 1943 and had an unrecorded closure date sometime after World War II. The former Trap/Skeet Range #2 closed in 2005 and comprises the southern portion of the 79-acre area. The former Pistol Range is a 0.5-acre site within the trap/skeet ranges and is near the western edge of the 79-acre area. Small arms ammunition was used at the Pistol Range while it operated from approximately 1948 until its closure in 1994.

Nature and Extent

At the Pistol Range berm, lead exceeding the 400 milligrams per kilogram (mg/kg) screening project action level (PAL) is predominately in the uppermost 1 foot of soil (or 13 of 31 samples) while subsurface soil exceeds the PAL in only a few locations (or 4 of 76 samples). However, PAH concentrations exceeding the benzo(a)pyrene equivalent background of 0.565 mg/kg PAL for NSA Mid-South are prevalent in both surface and subsurface soil (9 of 11 and 52 of 86 samples, respectively). Most of the PAL exceedances are associated with the berm face (lead exceedances), soils within the berm interior, and soil beneath the berm's natural grade, likely resulting from the trap and skeet range operations that preceded berm construction. (Benzo(a)pyrene is used as a standard by which PAHs are assessed and is based on the toxicity sum of seven PAHs and their potential to cause cancer relative to benzo(a)pyrene. PAHs are therefore discussed collectively relative to their benzo(a)pyrene equivalent [or BEQ] sum of toxicities.

The horizontal extent of lead and PAH soil contamination at the trap/skeet ranges is generally confined to the areas identified in the SI and coincides with the shot- and target-fall zones, with the highest concentrations in areas closest to the shooting stations. Lead concentrations above the PAL are primarily limited to the surface-soil interval where 41 of 111 samples exceeded the PAL while only 2 of 34 sub-surface soil samples exceeded the PAL. PAH concentrations exceeding the PAL were limited to 54 of 100 surface soil samples and 17 o f 43 subsurface soil samples.

Approximately 13 acres exceed the residential lead PAL for surface soil and 6 acres exceed the PAH PAL for surface soil.

The Midway RV Park, in the northeast section of UXO 2, is a quasi-residential, short-term use area (< 1 year). Surface soil at the southwest corner of the RV park area contains lead above the 400 mg/kg PAL. No subsurface lead impacts were identified in the RV area and BEQ concentrations were below the background level in surface soil.

To refine the horizontal extent of contamination north and west of the sites, soil samples were collected north of Polaris Drive and west of the trap/skeet ranges shooting stations (parallel to Singleton Avenue). Lead impacts were not identified in the newly sampled areas. Elevated BEQ was identified west of the shooting stations but is likely the result of locations being near asphalt parking areas and consequently unrelated to the former range operations.

The comparison of soil data collected from the wet weather conveyances with that from across the site, indicates that the drainage ditches are not accumulation/collection points for site runoff, but were probably impacted from operations of the former trap/skeet ranges.

Fate and Transport

The ability of site-related contaminants to become mobile or change in the environment is based on their chemical and physical properties and the processes that govern their interaction with environmental media. The transport of lead and PAHs under average climatic events associated with Millington, Tennessee, is not likely due to the relatively flat topography at UXOs 1 and 2 and the energy required for overcoming the inertial forces on these solid materials at the surface.

Overall, PAHs and lead are relatively immobile in soil/sediment and, given their chemical and physical properties and diffuse only slightly to groundwater or surface water once released to soil. Contaminant migration from soil to sediment via surface soil erosion and to air through fugitive dust generation are the most likely transport pathways for lead and PAHs; however, the significant vegetation over the sites is likely inhibiting their transport. The RFI data also confirm the low contaminant mobility, as indicated by the significant mass reduction between the surface and subsurface soil analytical results.

Risk Assessment

The Human Health Risk Assessment (HHRA) for UXOs 1 and 2 evaluated the following land-use scenarios and receptors: hypothetical recreational users, site workers, hypothetical construction/excavation workers, and hypothetical site residents. The U.S. Environmental Protection Agency's (U.S. EPA's) upper bound target cancer risk of 1E-4 and target hazard quotient

of 1.0 for non-cancer effects were used to identify chemicals of concern (COCs). Additionally, lead in soil was evaluated using a target blood lead-level of 10 micrograms per deciliter and a probability threshold of 5 percent that blood lead levels would exceed the target level, in accordance with U.S. EPA's lead risk assessment guidance. The HHRA evaluated carcinogenic PAHs (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene) using the total equivalent benzo(a)pyrene concentration as BEQ.

The scope of the HHRA was limited to soil. Groundwater was removed as a potential medium of concern based on the Tennessee Department of the Environment and Conservation's knowledge that groundwater impacts are absent at other lead-contaminated sites in Shelby County. Surface water is not present in the study area. Soils were sampled from wet weather conveyances that are typically dry, so sediment data were included with the surface soil data set due to similar exposure conditions, in accordance with Risk Assessment Guidance (U.S. EPA 2011).

Table E-1 summarizes COCs for the land-use scenario alternatives. The COCs were identified based on U.S. EPA's acceptable risk range (for PAHs) and estimated blood levels (for lead). As shown in the table, PAHs and lead were identified as COCs in surface and subsurface soil under certain land-use scenarios. Neither PAHs nor lead were identified as COCs under the hypothetical excavation worker scenario. Lead was not identified as a COC under a recreational scenario.

Table E-1
Chemicals of Concern and Land-Use Scenarios

	Carcinogenic Polycyclic Aromatic Hydrocarbons in Soil		**Lead in Soil**	
Land Use Receptor	**Surface**	**Subsurface**	**Surface**	**Subsurface**
Hypothetical Recreational User	X	X	—	—
Site Worker	X	—	X	—
Hypothetical Excavation Worker	—	—	—	—
Hypothetical Site Resident	X	X	X	X

Notes:
X = Chemical of concern identified for the depth interval and land use receptor based on risk characterization
— = Chemical of concern not identified for the depth interval and land use receptor based on risk characterization

Remediation Goal Objectives and Alternative Reuses

Remediation goal objectives (RGOs) were developed for COCs as part of the risk assessment process and were used to evaluate COC distributions under the previously identified land use scenarios. Under a residential reuse, most of the wooded and field areas of UXO 2 are above the lead and BEQ RGOs (418 mg/kg and 1.5 mg/kg, respectively), and would require corrective measures for future residential development of the sites. Under a site worker scenario, the lead footprint for RGO exceedances is similar to residential; however, the BEQ footprint of

RGO exceedances is smaller due to its higher RGO (21.1 mg/kg). Lead is not a COC under a recreational land use; therefore, the footprint of acceptable recreational reuse is driven solely by BEQ. The recreational RGO for BEQ (6.9 mg/kg) is more conservative than the RGO for site workers (21.1 mg/kg). Therefore, a slightly larger risk management area exists in surface soil for a recreational reuse than a site worker reuse, and generally corresponds with the clay pigeon target-fall zone.

The lead and BEQ distribution in the pistol range berm is similar to UXO 2. The residential RGO exceedances for lead occur predominately in surface soil; subsurface soil is relatively clean with respect to lead. Elevated lead concentrations between 12 to 14 feet below ground surface (sampling locations PRSB01 and PRSB06), coincide with the natural ground surface beneath the berm, and indicate that if the berm were to be removed, subsurface soil in areas below the berm would pose a risk under a residential and site worker reuse scenario. BEQ exceeds the residential, recreational, and site worker RGOs at multiple depth intervals within the berm.

Recommendations and Conclusions

- The SI recommended a 1-foot surface-soil scrape of the berm face to remove elevated lead and mitigate risk associated with surface soil impacts. However, as previously discussed, elevated BEQ in subsurface soil would still pose excessive risk; therefore, a limited soil-removal action is not recommended for risk reduction.

- The clay pigeon accumulation areas along the sides of the Pistol Range berm may be an ongoing source of PAHs in soil; therefore, consideration of capping or removing soil in these areas should be considered as part of future corrective measures for the site.

- Additional soil sampling is recommended in the area of UXO 2 sample locations SRSB23 and TSR-SS022, west and southwest of the Midway RV Park, to determine whether the elevated lead concentrations (51,900 and 12,500 mg/kg, respectively) are representative of soil conditions or are biased high because of metallic lead in the previously collected soil samples.

- The Base's master development plan has no redevelopment identified for UXOs 1 and 2 and no immediate risk to human health exists at either site. Therefore, a combination of land use controls that restrict redevelopment, coupled with exposure reductions to high concentration PAH and lead in these areas, is recommended for corrective measures evaluation. Mowing of fields along the western portion of UXO 2 and inside the UXO 1 berm should be discontinued, due to the potential site worker exposure risk associated with contaminants entrained in fugitive dust emissions during dry times of the year. As an alternative, the Base may consider selective planting of native grasses that do not require mowing.

List of Acronyms

AOC	Area of Concern
BEQ	Benzo(a)pyrene Equivalents
bgs	Below Ground Surface
BRAC	Base Realignment and Closure Program
CDI	Chronic Daily Intakes
CEC	Cation Exchange Capacity
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CLEAN	Comprehensive Long-Term Environmental Action Navy
COC	Chemical of Concern
COPC	Chemical of Potential Concern
CR	Cancer Risk
CSM	Conceptual Site Model
DERP	Defense Environmental Restoration Program
DQO	Data Quality Objective
EOD	Explosive Ordnance Disposal
EPC	Exposure Point Concentration
ESS	Explosives Safety Submission
GPS	Global Positioning System
HHRA	Human Health Risk Assessment
HI	Hazard Index
HQ	Hazard Quotient
ID	Identification
IEUBK	Integrated Exposure Uptake Biokinetic
ILCR	Incremental Lifetime Cancer Risks
IUR	Inhalation Unit Risk
LANT	Naval Facilities Engineering Command Atlantic Division
LOAEL	Lowest Observed Adverse Effect Level
$\mu g/m^3$	Micrograms Per Cubic Meter
µg/dL	Micrograms Per Deciliter
MC	Munitions Constituents
MCL	Maximum Contaminant Level
MEC	Munitions and Explosives of Concern
MEQ/100g	Milliequivalent of Hydrogen per 100 Grams
mg/kg	Milligrams Per Kilogram
mg/kg-day	Milligrams Per Kilogram Per Day
mm	Millimeter
MMRP	Military Munitions Response Program
MPPEH	Material Potentially Presenting an Explosive Hazard

NA	Not Applicable
NAVFAC	Naval Facilities Engineering Command
NCP	National Contingency Plan
NOAEL	No Observed Adverse Effect Level
NOSSA	Naval Ordnance Safety and Security Activity
NSA	Naval Support Activity
PA	Preliminary Assessment
PAH	Polycyclic Aromatic Hydrocarbons
PAL	Project Action Limit
ppb	Parts Per Billion
ppm	Parts Per Million
RAGS	Risk Assessment Guidance for Superfund
RAIS	Risk Assessment Information System
RCRA	Resource Conservation and Recovery Act
RfC	Reference Concentration
RfD	Reference Dose
RFI	RCRA Facility Investigation
RGO	Remedial Goal Objective
RME	Reasonable Maximum Exposure
RSL	Regional Screening Level
RV	Recreational Vehicle
SAP	Sampling and Analysis Plan
SF	Slope Factor
SI	Site Investigation
SIM	Selective Ion Monitoring
SPLP	Synthetic Precipitation Leaching Procedure
SWMU	Solid Waste Management Unit
TDEC	Tennessee Department of The Environment and Conservation
TEF	Toxicity Equivalency Factor
TOC	Total Organic Carbon
Tt	Tetra Tech NUS, Inc.
UCL	Upper Confidence Level
U.S. EPA	United States Environmental Protection Agency
UXO	Unexploded Ordnance
WOE	Weight Of Evidence

1.0 INTRODUCTION AND PROBLEM IDENTIFICATION

Resolution Consultants prepared this report under the Navy's Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract No. N62470-11-D-8013; Contract Task Order No. F271, pursuant to the Defense Environmental Restoration Program (DERP).

In 2001, the DERP established the U.S. Navy's Military Munitions Response Program (MMRP) to address closed and transferring ranges and the potential presence of munitions constituents (MC) and munitions and explosives of concern (MEC). Based on information uncovered during a 2005 Preliminary Assessment (PA, Malcolm Pirnie 2005), seven sites at Naval Support Activity (NSA) Mid-South were identified for follow-up Site Investigations (SI). T he subsequent SIs were performed by Tetra Tech NUS, Inc. (Tt 2010) and confirmed contamination was present in sufficient concentrations at the former Pistol Range, Unexploded Ordnance (UXO) 1, and the former Trap/Skeet Ranges #1 and #2, UXO 2 to warrant a comprehensive Resource Conservation and Recovery Act Facility Investigation (RFI) evaluation of both sites.

The Navy typically follows the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) for MMRP investigations; however, since the Activity is RCRA permitted for ongoing corrective actions, the Project Team decided to follow the RCRA permit process for the site evaluations.[1] Therefore, the CERCLA terminology (i.e., a P reliminary Assessment and Site Investigation) is used for the investigations conducted prior to this RFI.

1.1 Report Organization

The RFI report for UXOs 1 and 2 contains the following organization:

- Section 1: Introduction and Problem Identification — The introduction to the RFI report describes the purpose of the investigation, provides a d escription of historical information about each site, and summarizes previous investigations.

- Section 2: Facility Background — The physical setting, climate, geology, topography, soils, hydrogeology, vegetation, ecological, and cultural settings are presented in this section.

[1] The Project Team comprises the Tennessee Division of Environment and Conservation (TDEC) Division of Waste Management, Naval Facilities Engineering Command (NAVFAC) Mid-West, NAVFAC Atlantic Division (LANT), NSA Mid-South, U.S. Geological Survey, and Resolution Consultants (the Navy's contractor).

- Section 3: Project Objectives — This section discusses the results of the project planning process, the conceptual site model (CSM), and the data quality objectives developed by the Project Team as they relate to characterizing the nature and extent of contamination.

- Section 4: Data Collection and Site Characterization — This section summarizes the approaches used for the RFI field activities. The SI evaluated expended munitions at the Pistol Range within and immediately in front of the containment berm. Expended munitions that did not impact the containment berm and that may have travelled a much farther distance (i.e., the surface danger zone) were similarly not evaluated in RFI given the large areas of undeveloped land that is encompassed by the SDZ outside the current NSA Mid-South property boundary. Therefore, the site included in the RFI for the Pistol Range is the area within the range (i.e., containment berm and the areas in front and behind it).

- Section 5: Nature and Extent — This section presents information on the nature and extent of lead and PAH constituents identified in environmental media at UXOs 1 and 2 and the physical characteristics of the project site determined from field activities conducted as part of the RFI.

- Section 6: Contaminant Fate and Transport — This section provides a discussion of the fate and transport of contaminants detected at the project site.

- Section 7: Human Health Risk Assessment Summary — This section summarizes the site-specific human health risk and hazards for UXOs 1 and 2.

- Section 8: Summary of Results — This section summarizes the results of the RFI including the following:

  - Nature and extent of lead and PAHs
  - Whether the findings are consistent with known sources
  - Summary of site risks and Remedial Goal Options
  - Conclusions and Recommendations

- Section 9: References

- Appendices:
  - Appendix A — Field Notes and Record Keeping
  - Appendix B — Data Validation Summary and Laboratory Reports
  - Appendix C — Benzo(a)pyrene Equivalent Calculations
  - Appendix D — Human Health Risk Assessment

1.2 Purpose

The purpose of the RFI is to (1) determine the nature and extent of polycyclic aromatic hydrocarbons (PAHs) and lead releases at the UXO 1 Pistol Range and the UXO 2 Trap/Skeet Ranges, and (2) conduct a human-health risk assessment. The approach of the RFI was determined during Base Cleanup (or Project) Team meetings and outlined in the approved Sampling and Analysis Plan (SAP; Resolution Consultants 2012).

The general RFI data quality objectives provided in the SAP are the following:

1. Collect adequate soil data to determine the horizontal and vertical extents of lead and PAH impacts at both sites.

2. Gather sufficient data to support a h uman-health risk assessment associated with the affected media.

3. Evaluate the physical and chemical contents of soil in the Pistol Range berm and collect adequate data so that corrective measure alternatives are appropriately evaluated.

1.3 Property Description and Problem Identification

NSA Mid-South is in Millington, Shelby County, Tennessee, approximately 20 miles north of Memphis and 7 miles east of the Mississippi River (Figure 1-1). It is part of the Navy Midwest Region and Navy Installations Command and is headquarters for the Navy Personnel Command (Bureau of Naval Personnel), the Navy Recruiting Command, the Navy Manpower Analysis Center, and the U.S. Army Corps of Engineers Finance Center. The Base employs approximately 7,500 military, civilian, and contract personnel. The 1993 Base Realignment and Closure Commission (BRAC) directed the realignment of Naval Air Station (NAS) Memphis to NSA Memphis in 1995 and to NSA Mid-South in 1998, to more closely identify the Base's mission requirements and to reflect the Navy's approach to regionalization. Today, the new mission of

NSA Mid-South is to provide administrative, operational, and logistic support to tenant activities, and to serve as the Navy's Human Resources Center of Excellence, enabling manpower and career management for the Navy Fleet and Sailors.

Following the BRAC realignment, the NSA Mid-South footprint was reduced from a 3,500-acre complex to its 1,600 acres size of today, with most of the activities/operations on the Base's Southside which lies south of Navy Road (Figure 1-2). The UXO 1 Pistol Range and UXO 2 Trap/Skeet Ranges are two of seven MMRP sites at NSA Mid-South and the only two sites requiring RFIs.

UXO 1 — Pistol Range

The former Pistol Range is within the Trap/Skeet Ranges (Figure 1-2) and was used for small arms training from approximately 1948 until 1994. Munitions use was limited to small arms ammunition, reportedly including .22-caliber, .30-caliber, 9-millimeter (mm), .38-caliber, and .45-caliber ammunition (Malcolm-Pirnie 2005). Property records indicate that the range, when active, consisted of a berm backstop for the range, shooting stations, targets, and an armory. The firing line maintained 16 firing positions with targets that operated via a manual, mechanical cable system operated from behind the firing lines. The former range contained five target lines, one each at 7 yards, 15 yards, 25 yards, 28 yards, and 50 yards. With the exception of the berm and three of the five target lines, no structures remain at the site today. Clay pigeon pieces are present on the outsides of the berm surface from the former and concurrent operation of the adjacent Trap/Skeet Ranges (UXO 2). Today, the U-shaped berm, approximately 10 to 15 feet tall and 500 feet long, contains overgrowth of small trees, bushes, and grass.

During the SI, two 40-mm riot-control training rounds were identified on the berm surface; however, subsequent interviews with Base and Naval Facilities Engineering Command (NAVFAC) Midwest personnel failed to uncover their origin (Tt 2010). During the RFI, two 20-mm heavily corroded target-practice rounds were found but were concluded to not pose an explosive hazard (discussed further in Section 4.3). No other evidence or history of MEC is associated with the site.

UXO 2 — Trap/Skeet Ranges #1 and #2

The former Trap/Skeet Ranges #1 and #2 consist of approximately 79 acres, near the southern border of NSA Mid-South, east of Singleton Avenue, off the Perimeter Security Patrol Road, and encompass the former Pistol Range (Figure 1-2). Trap/Skeet Range #1, comprising the northern portion of the site and constructed around 1943, has an unrecorded

closure date sometime after World War II. Trap/Skeet Range #2, comprising the southern portion of the site, closed in 2005. No environmental remedial efforts have taken place at either of the ranges.

Property records indicate the ranges, when active, had firing lines, a skeet office and armory, two clay pigeon storage buildings, an ammunition storage building, instruction building, and multiple shooting stations. Munitions use was limited to common small arms ammunition, primarily 12- and 20-gauge shotgun shells.

Today, the vast majority of the site is vacant, consists of woods along the eastern half, and maintained grass fields along its western half with very little evidence of the former ranges. A small cinder-block building that was used to house clay pigeons, is the only remaining structure and is present at the southwest corner of the Trap/Skeet Range #2. The Commissary grocery store, Midway recreational vehicle (RV) Park, dog park, band storage building, and water tower are all located within the northern footprint of the site (Figure 1-2). An active temporary magazine for small arms is also present within the north-central section of the site. Solid Waste Management Unit (SWMU) 2, a closed 42-acre solid-waste landfill used by NAS Memphis between 1942 and 1970, borders and overlaps with the southern footprint of Trap/Skeet Range #2; however, given the existing institutional control (fencing) and restricted access to SWMU 2, the Project Team decided not to investigate the overlap area between the ranges and SWMU 2 as part of the RFI. The area within the SWMU 2 boundaries has been adequately addressed as part of the controls implemented at the SWMU.

1.4 Previous Investigations

Previous investigations of UXOs 1 and 2 include a PA conducted by Malcolm Pirnie (2005) and an SI conducted by Tt (2010). Additional information on each investigation follows.

Preliminary Assessment — Malcolm Pirnie (2005)

The former Pistol Range UXO 1 and Trap/Skeet Range #1 were identified as MMRP eligible closed sites (UXO 1 and Area of Concern [AOC] 1) during the PA. Trap/Skeet Range #2 was active during the PA and was added to the list of inactive ranges after its 2005 closing date. Given the lengthy site histories, the PA recommended SIs for both sites. Because the footprints of Trap/Skeet Ranges #1 and #2 overlapped, the two sites were designated as UXO 2 — replacing the former AOC 1 designation for Trap/Skeet Range #1.

Site Investigation — Tetra Tech (2010)

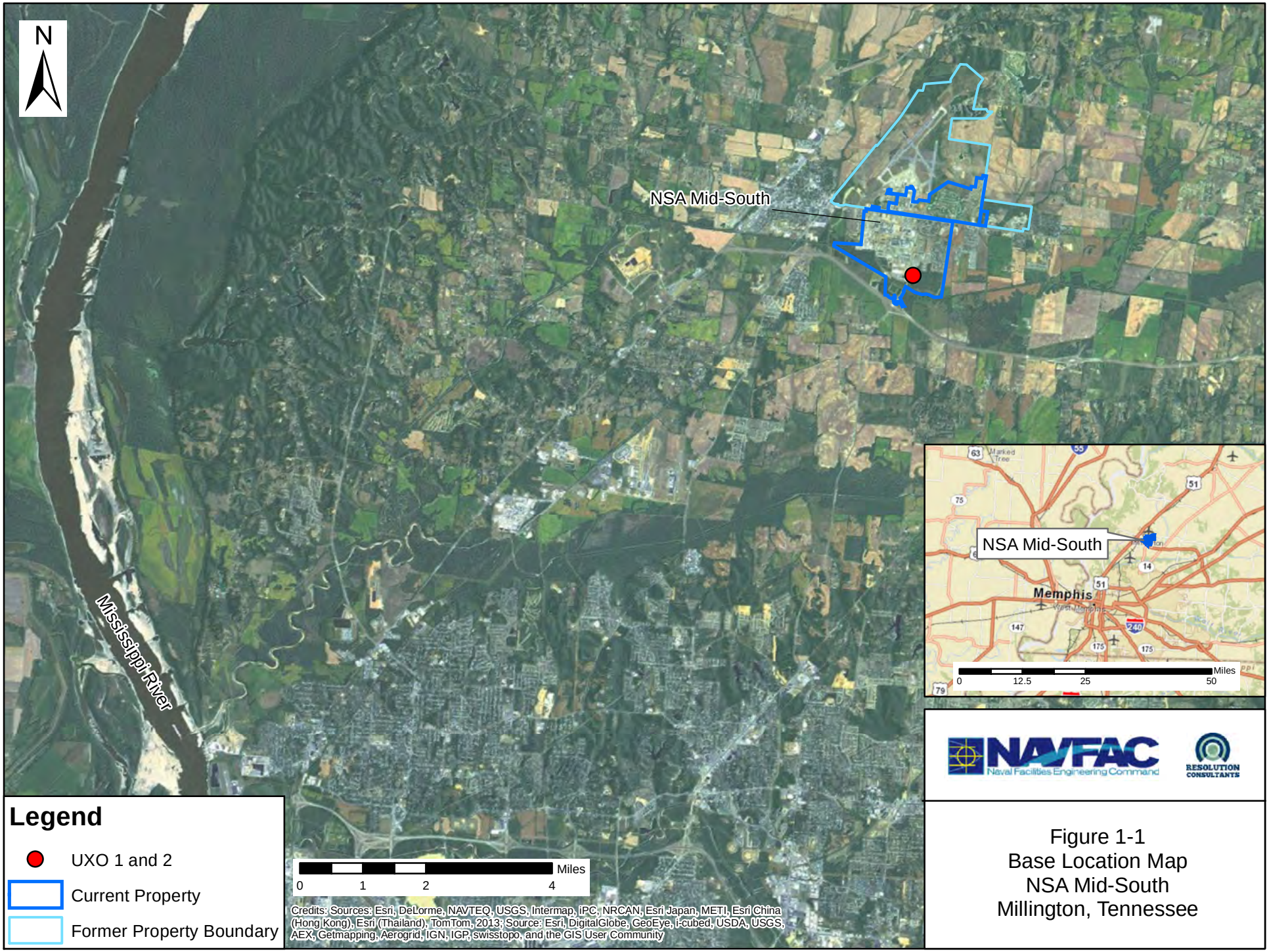
The SI o bjective was to collect additional information beyond the PA to determine if MCs (e.g., lead, nitroglycerin and PAHs) had impacted soil from previous site activities or operations at the subject MMRP sites. The SI findings for UXO 1 and 2 are summarized below.

UXO 1 Pistol Range

The visual inspection of the former Pistol Range identified expended ammunition and broken clay pigeons on the surface of the berm. Subsequent soil-sample analytical data generated from the SI indicated lead in the surface soil of the berm at concentrations that could potentially affect human health. Exceedances of the U.S. Environmental Protection Agency (U.S. EPA) Residential Regional Screening Levels (RSL; November 2012) for lead (400 milligrams per kilogram [mg/kg]) were identified in soil on the front, top, and backside of the berm at the 0- to 1-foot interval. Given the low mobility of lead in soil and expected shallow penetration depths of fired ammunition, it was decided in the SI to sample soil for lead at a maximum depth of 1 foot. Nitroglycerin was not detected in composite soil samples collected at the firing lines; therefore, nitroglycerin was not recommended for further evaluation. Recommendations made in the SI were to develop a work plan for remediating the contaminated sections of the Pistol Range berm by removing soil in 1- to 2-foot lifts with X-ray fluorescence screening for lead between each lift.

UXO 2 — Trap/Skeet Ranges #1 and #2

The SI consisted of surface- and subsurface-soil sampling from seven transects extending eastward from the Trap/Skeet Range shooting stations. S amples were collected on 100-foot centers, out to approximately 900 feet from the shooting stations. The SI data confirmed lead and PAHs above their project action level (PALs) in site surface soils with lead impacts noted in an area extending roughly 600 feet east of the shooting stations while PAH contaminated soils had a smaller footprint, extending approximately 200 feet from the former firing lines. Recommendations in the SI Report were to conduct a Focused Feasibility study to evaluate remedial options for the identified soil impacts (Tt 2010). Since the SI delineated the eastern extent of lead and PAH concentrations above the PALs, the RFI focused on a s maller area rather than the entire site, focusing on quadrants west and northwest, in-between transect sampling lines, and depths where the extent was not completely delineated.



NAVFAC Naval Facilities Engineering Command

RESOLUTION CONSULTANTS

Figure 1-1
Base Location Map
NSA Mid-South
Millington, Tennessee

10/15/2013 X:\Navy\NSA_Midsouth\project\RI Report\Fig 1-1 BaseMap_Locaiton_BL.mxd

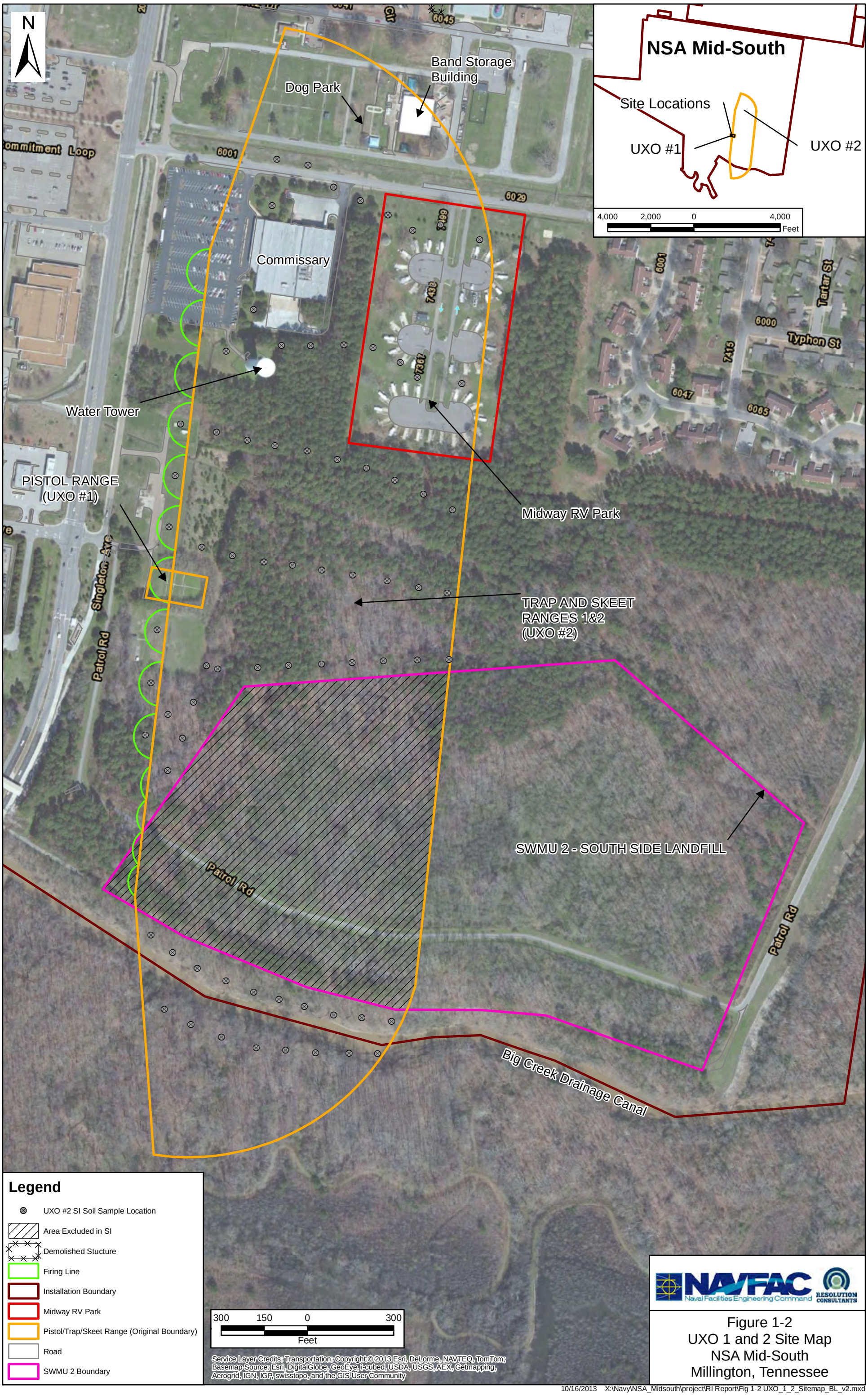


Figure 1-2
UXO 1 and 2 Site Map
NSA Mid-South
Millington, Tennessee

10/16/2013 X:\Navy\NSA_Midsouth\project\RI Report\Fig 1-2 UXO_1_2_Sitemap_BL_v2.mxd

2.0 FACILITY BACKGROUND AND PHYSICAL SETTING

2.1 General Facility Background and Physical Setting

2.1.1 Regulatory Framework

The regulatory framework for managing Navy MRP sites is guided by federal, state, and local laws, as well as Department of Defense (DoD) and Navy regulations and guidance, and provides the necessary information for Navy decision makers. The key legislation, policy, and guidance directing the program includes, but is not limited to, the following:

The DERP established the MRP in September 2001 to identify and respond to environmental and explosive safety hazards posed by UXOand MC at closed, transferred, or transferring ranges. MRP eligible sites include "other than operational" ranges where UXO or MC are known or suspected and the release of these materials occurred prior to September 2002. The National Defense Authorization Act (fiscal year 2002) reinforced the DoD's 2001 DERP Management Guidance by tasking the DoD to develop and maintain an inventory of defense sites that are known or suspected to contain MEC and MC. UXOs 1 and 2 are two of six MRP sites identified at NSA Mid-South.

The 2001 DERP Management Guidance and the 2002 National Defense Authorization Act, described above, established the MRP. The DoD provides program guidance and methods for conducting a baseline inventory of defense sites containing, or potentially containing, MEC and MC. The Navy baseline inventory of sites was completed in Fiscal Year 2002 and was used to establish the sites where PAs are needed to further evaluate the potential for MEC and MC. If the findings within a PA Report indicate further investigation of a site is warranted, an SI is initiated to collect site-specific environmental data to determine whether further response actions are necessary to address MC. If the SI data indicates, further response actions are necessary, a Remedial Investigation (RI) or RFI is then required.

2.1.2 History

According to the NSA Mid-South web site (https://www.cnic.navy.mil/MidSouth/), the installation has had a dynamic and involved history, with shifting operational missions throughout the years. The original base was created in November 1917 as an Army Signal Corps Aviation School named Park Field. Its mission was to train Allied Forces pilots to serve in World War I; however, no ordnance training is recorded from this time period. It remained in full operational service until November 1918, when all training was halted due to the signing of the Armistice. Following the Armistice, the base was transformed into an airfield incorporating airmail routes for Tennessee and bordering states. The government acquired Park Field in March 1920 but airfield use waned until it became a storage area for aircraft.

Following the stock market crash of 1929, the base became a temporary refuge for unemployed workers. The Resettlement Administration of 1937 obtained the land and converted it into a tract of modern farms, which served as teaching examples of correctly managed land. The Administration managed the land for the next few years until the beginning of World War II (WWII).

The onset of WWII brought the military facet back to the base through the arrival of naval aviation. In February 1942, the Navy Shore Station Development Board recommended approval for a reserve aviation base at Park Field. The Naval Reserve Aviation Base was commissioned on 15 September 1942, and served to train pilots for WWII duty. By 1 January 1943, the Naval Reserve Aviation Base was officially designated the NAS Memphis, and incorporated the current area north of Navy Road.

Following the end of WWII, NAS Memphis was utilized almost solely by the Reserve Training Command until 1948. On 1 April 1949, the NAS Memphis mission shifted into one of management for operational and logistical requirements for all commands of the base (excluding the Naval Hospital). As a result of the 1995 BRAC, NAS Memphis was operationally closed and realigned as NSA Memphis on 30 September 1995, and subsequently renamed NSA Mid-South on 1 October 1998. Under the closure and realignment, over 1,800 acres of government property on the north side of the base were transferred to the Millington Municipal Airport Authority and the city of Millington.

2.1.3 Current Land Use and Anticipated Future Land Use

Land use on the installation is administrative in nature, as NSA Mid-South serves as the Navy's Human Resources Center of Excellence. Its largest commands are the Navy Personnel Command, Navy Recruiting Command, and Navy Manpower Analysis Center, as well as the U.S. Army Corps of Engineers Finance Center. More than 7,500 military, civilian, and contract personnel are assigned to or work on the base. As the landlord of the installation, NSA performs the many tasks necessary for the proper functioning of a self-contained city, including housing, food service, utilities, and facilities for purchase of essential food stuffs and personal items.

The current human receptors are limited to site workers that periodically mow the grass fields within the east sections of the former trap/skeet ranges and the occasional trespasser (e.g., authorized personnel who may wander outside of designated areas). An occasional child trespasser is also a possible receptor, but given the distance from the nearest family housing area (1/4 mile east of the sites) and the difficulty accessing the area, it is a remote exposure.

While the Base's master development plan (AECOM 2012) has no reuse planned for the sites, all potential property reuses (recreational, residential, site worker, excavation worker) are evaluated in the risk assessment. Current and future ecological receptors include the current flora (predominantly grassland species) and fauna (large mammals such as deer, small mammals such as rabbits, reptiles/amphibians, and bird species) present at the sites.

2.2 General Facility Physical/Environmental Characteristics

2.2.1 Climate

The climate in southwest Tennessee can generally be described, as having mild winters and hot summers. Thunderstorms are fairly frequent in spring and summer, though winter and early spring see the most precipitation. Humidity can become uncomfortable in the summer months.

The average annual temperature is 62 degrees Fahrenheit (ºF), with an average high temperature of 41ºF in January and an average high temperature of 81ºF in July. The average low temperature in January is 33ºF, while the average low temperature in July is 72ºF. A temperature of 108ºF was recorded in the month of July as a record high and -13ºF is the record low in December. In addition, there are, on average, approximately 56 days of the year at or below 32ºF: on average, approximately 63 days of the year are above 90ºF.

The annual average precipitation recorded is 52.3 inches, with monthly average peaks as high as 5.6 inches of precipitation in the month of April and as low as 2.9 inches in October. The average annual snowfall is 5.3 inches. The annual average relative humidity is approximately 81 percent in the morning and 58 percent in the afternoon. The mean seasonal snowfall is 5.7 inches.

Prevailing winds are usually from the south/southwest with average wind speeds ranging from 7-12 miles per hour. In extreme conditions, wind speeds have been recorded in excess of 80 miles per hour, as a result of severe thunderstorms or tornadoes.

2.2.2 Topography

The general topography of Shelby County can be described as relatively flat alluvial plain with some gently rolling land. The topographic profile of NSA Mid-South is generally flat with a mean elevation of approximately 260 to 270 feet above mean sea level. The topography of NSA Mid-South has been altered through cut and fill for the construction of the air station, Park Field, which was originally built by the Army in 1917.

2.2.3 Regional Geology

Shelby County is situated within the north-central Mississippi Embayment, which is a trough of stratified rock with an overlying veneer of unconsolidated sediments, sloping together or syncline going southward to form the Mississippi River. The unconsolidated sediments are defined as the Wilcox Group, Claiborne Group, Terrace Deposits, and surficial Loess. The surface loess deposits are windblown sediments characterized as silt, clay, silty clay, and containing some sand.

The New Madrid Seismic Zone is located within the Mississippi Valley region and is known as the most earthquake-prone region of the U.S., east of the Rocky Mountains. The mid-south region has been cited as the most active seismic zone: historically the most severe earthquakes in North America have been recorded in this region.

2.2.4 Soil and Vegetation

The soils of NSA Mid-South range from a very deep silt loam, well drained with moderately slow to moderate permeability, to thin layers of silt loam characterized by slow surface runoff, poor permeability, and poor draining capabilities. Much of the land of NSA Mid-South has been filled or graded; therefore, subsurface soils have been disturbed for the preparation of construction.

Nine soil types (including urban land) occur on the installation. The chemical and physical properties of the soils affect their behavior and represent the natural capacity or suitability of the soil for a specific use.

Common limitations of the area soils are the presence of high water table, erosion hazard, flood hazard, saturated conditions, and a moderate permeability.

Two native soil types at the installation include the Falaya-Waverly Association and the Memphis-Granada-Loring Association. The soils of the installation have previously been classified and mapped by the United States Department of Agriculture's Soil Conservation Service.

Prior to the cultivation of timber in the area of NSA Mid-South, the land was covered by deciduous forest. This included green (Fraxinus pennsylvanica) and Carolina ash (Fraxinus caroliniana), elm (Ulmus sp.), cottonwood (Populus sp.), sugarberry (Celtis laevigata), sweetgum, and water tupelo (Nyssa aquatica), oak (Quercus sp.), and bald cypress (Taxodium distichum). Currently, a regrowth has occurred as a result of natural resource

management actions taken by the installation. The majority of trees found planted include loblolly pine (Pinus taeda), shortleaf pine (Pinus echinata), and other southern yellow pine species. In addition, oak, hickory (Carya sp.), sweet gum (Liquidambar styraciflua), blackgum (Nyssa sylvatica), red maple (Acer rubrum), and winged elm (Ulmus alata) are present.

Operational requirements and mission safety have created the need to maintain large portions of the station as open grassland. These areas are maintained through periodic or annual mowing. Upland areas are dominated by native grasses including Bermuda grass (Cynodon dactylon), Johnson grass (Sorghum halepense), and other native-type grasses.

2.2.5 Hydrology

Surface water resources include streams, lakes, ponds, and wetlands. The surface water features on NSA Mid-South have been engineered to control storm water runoff and prevent flooding. The most significant of these engineered controls is the Big Creek Drainage Canal, built to receive the flows from storm water culverts, collection pipes, and natural drainages. The Navy Lakes are located north of the northern parcel of the installation. The two lakes are used for recreational activities for the community. In addition, the golf course north of Navy Road contains nine small ponds that provide surface water collection, as well as aesthetic attributes to the area. Two former sewage lagoons south of Navy Road, previously served as the installation wastewater treatment plant.

A floodplain study for the installation was prepared by NSA Mid-South and submitted to the Federal Emergency Management Agency. Parts of NSA Mid-South, including UXO 1 and 2, are located within the 100-year floodplain. The installation contains 11 locations of delineated wetlands as defined by the US Army Corps of Engineers Wetlands Division, which was updated in 2013. NSA Mid-South protects seven additional delineated wetlands on leased property. These wetlands are products of the natural course of the now engineered Big Creek Drainage Canal, the former sewage lagoons, and the ponds associated with the golf course. None of the wetlands are located within the UXO 1 and 2 footprint.

2.2.6 Regional Hydrogeology

Groundwater is not a media of concern; therefore, the hydrogeology for NSA Mid-South is not presented here, but instead the reader is referred to *Hydrogeology of Post-Wilcox Group Stratigraphic Units in the Area of the Naval Air Station Memphis, Near Millington, Tennessee* (Kingsbury and Carmichael 1995).

2.3 Regional Ecological Summary

2.3.1 Endangered and Threatened Species

The Navy, through the U.S. Fish and Wildlife Service and the Tennessee Wildlife Resource Agency, performed a rare species survey of NSA Mid-South in 1996. Specifically, the survey's objectives were to determine the presence and relative abundance of rare species on NSA Mid-South and to locate and identify habitats critical to rare species. These surveys are updated on an approximately five-year basis.

During the study, mammalian, bird, amphibian, reptile, and insect surveys were completed. Additionally, all state or federally listed or candidate plant species were surveyed. Finally, all additional plant species listed by the U.S. Fish and Wildlife Service and all plant species likely to be included on a proposed state list were surveyed.

There have been no sightings of rare or protected species at NSA Mid-South. Protected species that have the potential to inhabit NSA Mid-South are listed in the following table:

Table 2-1
Summary of Potential Protected Species

Ecological Receptors	Species
Federal Endangered	Indiana Bat (Myotis sodalis)
	Interior Least Tern (Sterna antillarum)
	Turgid-Blossom (Epioblasma turgidula)
	Wood Stork (Myceteria Americana)
Federal Threatened	Bald Eagle (Haliaeetus leucocephalus)
State Endangered	Northern Pine Snake (Pituophis melanoleucus melanoleucus)
State Threatened	Bewicks' Wren (Thyromanes bewickii)
	Blue Sucker (Cycleptus elongates)
	Lark Sparrow (chondestes grammacus)
Other Ecological Receptors	Copper Iris (Iris fulva)
	Harbison's hawthorn (Crataegus harbinsonii)
	Turgid-Blossom (Epioblasma turgidula)
	Nodding rattlesnake-root (Prenanthes crepidinea)
	Ovate catchfly (Silene ovata)
	Red starvine (Schisandra glabra)

2.3.2 Cultural and Archaeological Resources

A Cultural Resources Survey (CRS) titled *Intensive Historic and Architectural Survey of Buildings/Structures at Naval Complex Memphis, Memphis, Tennessee, Final Report, Prepared For Commanding Officer, Public Works, Naval Complex Memphis*, was conducted by Thomason and Associates in 1994 for NSA Mid-South. The CRS consisted of a review of published and archival sources, a building survey, a preliminary walkover inspection of known or suspected archaeological sites, and an evaluation of the potential eligibility of the buildings and structures. The CRS also identified potential archaeological sites and developed a model for predicting the distribution of potentially significant archaeological sites at NSA Mid-South.

As a follow up to the initial survey, Thomason & Associates prepared an Integrated Cultural Resource Management Plan (ICRMP) in September 2000. This provided the Navy with a management tool to facilitate efficient compliance with the National Historic Preservation Act and Federal archaeological protection legislation. The ICRMP is composed of management recommendations, historical information of the installation, an inventory of National Register-eligible properties, and procedures for their effective management. The ICRMP listed all undertakings that might have an effect on the remaining National Register resources, as well as provided a standard operating procedure to meet compliance needs.

The 2000 ICRMP was updated by Hardy, Heck, & Moore and was republished in 2005. The revised ICRMP lists eight buildings as eligible for historic registry. Of the eight eligible buildings, seven were transferred as housing units under Public Private Venture Housing in 2005. The remaining building was converted to an MWR Bed and Breakfast thru a Memorandum of Agreement with the Tennessee State Historical Preservation Officer.

The 2005 ICRMP indicates that terrain may have been favorable for development of areas that would become archaeological sites but concludes, "However, for most of NSA Mid-South, extensive landscape modifications such as the land leveling of tenant farms prior to military acquisition of the property, the channelization of Big Creek, and construction of the airfield, buildings, and infrastructure associated with DoN activities have effectively removed most of the aforementioned topographic features; leaving a relatively flat, highly built environment that is unlikely to retain undisturbed archaeological deposits. Therefore, the ICRMP does not recommend further archaeological survey at NSA Mid-South." It also includes an Inadvertent Discovery process that is incorporated in construction contracts to cover the unlikely discovery of archaeological items.

3.0 PROJECT OBJECTIVES

The preliminary CSM presented in the SAP (Resolution Consultants, 2012) indicated the potential presence of lead and PAHs in subsurface soil, sediment, surface water and groundwater. As a result of the March 2013 Project Team meeting, groundwater was removed as a potential media of concern based on the technical knowledge and experience of the Tennessee Department of Environment and Conservation (TDEC) of lead contaminated sites in Shelby County and the absence of expected groundwater impacts. Surface water was also removed as a medium of concern since there is no surface water on the either of the two sites. The drainage ditches on both sites are wet-weather conveyances; therefore, soil in the wet-weather conveyances/drainage ditches and soil are the only media of concern.

The primary goal of the RFI is to collect an appropriate amount of data to ensure the most effective corrective measures decision can be made for each site. The emphasis of the investigation was to refine the horizontal and vertical contaminant delineation characterized by the SI and revise the preliminary CSM presented in the SAP, as warranted.

3.1 Human Exposure Profile

The majority of the former UXO 1 and 2 consists of woods and maintained grass fields. Mowers maintain the open grass fields within the west and central portions of the Trap/Skeet Ranges so a possible contaminant exposure route via dust generation could occur during excessively dry periods of the mowing season. The north end of Trap/Skeet Range #1 overlaps with the Commissary and the Midway RV Park (Figure 1-2), both of which were further evaluated in the RFI. The Midway RV Park has a combination of short-term, weekend occupants and long-term, multi-month occupants with no long-term stay limit. Several families will typically reside there for a 1- to 2-month period while waiting for pet-friendly housing. As of June 2013, there are no children living at the Midway RV Park and the current long-term occupants consist of three retired and one active duty military.[2]

3.2 Ecological Profile

The Navy, in collaboration with the Tennessee Wildlife Resource Agency, U.S. Fish and Wildlife, and the Tennessee Division of Forestry, conducts various biological and ecological surveys for the Base as part of their Integrated Natural Resource Management Plan. A rare species survey conducted in 1996 and biological resource survey conducted in 2006 did not identify any federal or state-listed endangered or threatened animal or plant species. An ecological risk assessment is not a component of the UXO 1 and 2 RFI as agreed to by TDEC during the October 2012 Base Cleanup Team and project scoping meeting.

[2] Based on June 4, 2013, telephone conversation between Mr. Andy Heustis, the RV park manager, and Ben Brantley with Resolution Consultants, Inc.

3.3 MEC and MC Release Profile

Both UXO 1 and 2 are within the controlled portion of the Base and access is available only to Base personnel. The likelihood of encountering MEC at either site is low given the historical types of small arms ammunition used at the sites (12- and 20-gauge shotgun shells and .22 caliber, .30 caliber, 9 mm, .38 caliber, and .45 caliber bullets). However, given the discovery of two riot rounds at UXO 1 during the SI, the likelihood of possibly encountering UXO is greater at the Pistol Range than at the Trap/Skeet Ranges.

The MCs are lead and PAHs which were identified in the SI to be widespread in surface soil across the face of the Pistol Range berm and the Trap/Skeet Ranges. The other inorganic MCs commonly associated with munitions ammunition used at firing rages (e.g., antimony, zinc, copper, arsenic, and tin) are typically co-located with lead; therefore the Project Team decided that lead would be the only inorganic MC investigated in the RFI given its preponderance and associated corrective measures would similarly address the other secondary-metal constituents. Nitroglycerin, a constituent of a smokeless powder and ejected unburned propellants, is another MC associated with firing ranges. Nitroglycerin was not detected in surface soil collected during the SI and was therefore not included for further assessment in the RFI.

Given the results of the SI, the detected concentrations of lead and PAHs in surface soil have the potential for impact to subsurface soil exists at both sites. Surface water is not present at the site; however, sediments within the wet-weather conveyances may be impacted from runoff and erosion from the areas containing surface-soil impacts.[3] Lead and PAHs could have leached to groundwater, but it is unlikely given the site geology (clay/silt surface soil), neutral soil pH, and the relative immobility of the contaminants (discussed further in the Fate and Transport Section 6). Lead and PAHs in surface soil may also potentially become airborne in fugitive dust.

3.4 Screening Levels

The Project Team decided the appropriate screening levels for soil are the U.S. Environmental Protection Agency (U.S. EPA) Residential Regional Screening Levels (RSLs November 2012). These screening levels are listed in Table 3-1 and are also designated as PALs as designated in the SAP. The PALs are (1) a minimum required laboratory detection limits and (2) an initial screening value to facilitate soil-data comparisons and whether further investigation is warranted.[4]

[3] Since sediments within the drainage ditches are typically dry, exposure conditions would be similar to soil; therefore, sediment data are included in and evaluated with the surface soil dataset throughout this report.
[4] Actual remedial goals are established through a combination of inputs from the baseline risk assessment (Section 7), the selected remedy, and future land use.

Table 3-1
Project Action Levels for Soil

Chemical	Project Action Level (mg/kg)
1-Methylnaphthalene	16
2-Methylnaphthalene	230
Acenaphthene	3,400
Acenaphthylene	3,400 [1]
Anthracene	17,000
BEQ [2]	0.565 [3]
Benzo(g,h,i)perylene	1,700 [4]
Fluoranthene	2,300
Fluorene	2,300
Naphthalene	3.6
Phenanthrene	1,700 [2]
Pyrene	1,700
Lead	400

Notes:
[1] Surrogate value from Acenaphthene
[2] BEQ — comprised of the following PAHs: benzo(a)pyrene, benzo(a)anthracene, benzo(k)fluoranthene, benzo(b)fluoranthene chrysene, dibenz(a,h)anthracene, iden(1,2,3-cd)pyrene
[3] BEQ site-specific soil background concentration established for NSA Mid-South (EnSafe, 1997).
[4] Surrogate value from Pyrene
mg/kg = milligrams per kilogram

3.5 Risk Characterization for Soil

The SI identified lead and PAHs in concentrations exceeding the screening numbers in surface soil, thus, a potential human-health risk may be associated with these contaminants. Lead detections exceeding the residential screening values in surface soil extended to 600 feet from the firing lines and PAH contamination comprised a smaller area of the Trap/Skeet Ranges. The MC concentrations could present a potential risk to human receptors. The SI recommended a Focused Feasibility study to evaluate remedial options for UXO 1 and 2. To determine the most appropriate remedial option and ensure it is consistent with future reuse, a human-health risk assessment that evaluates alternative reuses (recreational, site work, residential) is necessary and a component of this RFI (Section 7).

Similarly, the Pistol Range berm soil contains lead at the surface at levels posing potential health risk to human receptors. Recommendations in the SI included incremental remediation of the berm face by screening soil in 1- to 2-foot lifts, and segregating "clean" and "contaminated" soil for appropriate disposal. However, the implications associated with the removing inner contents of the berm required further evaluation given the large volume of soil associated with the berm (500 feet by 15 feet by 30 feet).

3.6 Project Approach and RFI Objectives

The RFI approach was designed to satisfy the data-quality objectives (DQOs) presented in the SAP and generally consisted of the following:

(1) Define the nature and extent of lead and PAHs in soil that exceed human-health benchmarks for UXO 1 and 2.

(2) Physically inspect the contents of the berm while delineating the vertical extents of lead and PAHs in subsurface soils for appropriate corrective measures evaluation.

The resulting DQOs and data to meet the project objectives are discussed in Table 3-2.

Table 3-2
Data Quality Objectives

DQO Element	DQO Element Description	Site-Specific DQO Statement
Intended Data Uses		
1	Problem Statement	Pistol Range Berm: Contents of Pistol Range berm unknown; extent of lead and PAHs in surface and subsurface soil around berm need refinement.
		Trap/Skeet Ranges #1 and #2: The horizontal and vertical extent of lead and PAHs in soil is unknown.
		Human-health risk associated with both sites is unknown.
Intended Need Requirements:		
2	Data use perspective	Pistol Range Berm: Evaluate human-health risk and appropriate remedy
		Trap/Skeet Ranges #1 and #2: Same
3	Contaminants of Interest	Lead and PAHs
4	Media of Interest	Pistol Range Berm: Surface and subsurface soil
		Trap/Skeet Ranges #1 and #2: Surface and subsurface soil; soil in drainage areas.
5	Required Locations or Areas	Pistol Range Berm: 8 trenches/borings through berm (soil); 11 off the berm (soil)
		Trap/Skeet Ranges #1 and #2: 66 (soil); 18 (soil in drainage areas)
6	Number of Samples Required	*Soil*
		Pistol Range Berm: 126 PAHs and Lead; Hold [1] — 22 PAHs; 8 Lead
		Trap/Skeet Ranges #1 and #2: 53 PAHs; 65 Lead; Hold — 47 PAHs; 53 Lead
		Soil in Drainage Areas
		Pistol Range Berm: none
		Trap/Skeet Ranges #1 and #2: 18 PAHs and Lead; Hold — 18 PAHs and Lead
7	Screening Levels	U.S. EPA Regional Screening Levels (residential soil)

Table 3-2
Data Quality Objectives

DQO Element	DQO Element Description	Site-Specific DQO Statement
Appropriate Sampling and Analysis Methods		
8	Sampling Methods	Intrusive investigation — hand auguring and trenching with an excavator
9	Analytical Methods	*Extent Delineation*
		Lead — SW 846 3050B /6020A; PAHs — selective ion monitoring 3550C/8270D
		Fate and Transport/CMS Evaluation
		SPLP Lead — 1312/6010B; SPLP PAHs — 1312/8270C; pH — 9045; TOC — 9060A; CEC — 9081

Notes:

U.S. EPA = U.S. Environmental Protection Agency
SIM = selective ion monitoring
SPLP = synthetic precipitation leaching procedure
PAHs = polycyclic aromatic hydrocarbons
TOC = total organic carbon
CEC = cation exchange capacity
Hold = Select subsurface samples were designated for "hold" analyses pending whether the surface soil sample exceeded a PAL.

4.0 DATA COLLECTION AND SITE CHARACTERIZATION

This section provides a brief summary of the investigative approach, field methods, and operational procedures used for the lead and PAH characterization tasks performed at UXO 1/2. The results of the SI (Tt 2010) were used to identify data gaps and to identify where supplemental assessment activities were warranted for completing the RFI. All fieldwork was conducted in accordance with the standard operating procedures and methodologies described in the SAP (Resolution Consultants 2012). The field sampling was conducted between February 25 and March 15, 2013, by a two-person sampling team with a third person, a UXO technician, providing anomaly avoidance support during the Pistol Range investigation.

4.1 Site Preparation and Utility Clearance

Prior to implementing intrusive activities, sample location coordinates from the SAP were uploaded into a handheld Global Positioning System (GPS) unit. Sample locations were located using the handheld GPS unit and all sampling points were staked. Afterwards, NSA Mid-South Public Works personnel were notified of the proposed investigative activities and a dig permit was obtained from NSA Mid-South to clear NSA Mid-South utilities. Tennessee One Call was also notified and proposed sample locations were cleared of any public utilities before starting field activities.

4.2 MEC Anomaly Avoidance

Although the PA found no historical documentation of MEC at NSA Mid-South, two 40-mm training rounds identified on the containment berm during a preliminary site walkover prior to the SI heightened the safety concerns associated with intrusive activities. As a follow-up and preliminary to the RFI, an Explosives Safety Submission (ESS) Determination Request was submitted to Naval Ordnance Safety and Security Activity (NOSSA) indicating a low likelihood of encountering MEC and/or Material Potentially Presenting an Explosive Hazard (MPPEH). NOSSA required that a Department of Defense Explosive Safety Board TP-18 qualified UXO Technician II (or equivalent) provide anomaly avoidance support for intrusive activities at the Pistol Range. MEC avoidance was practiced at the Pistol Range during the RFI by a qualified UXO technician who screened each sample location with a handheld analog metal detector. If a positive detection was identified, the sample location would be offset approximately 2 feet.

4.3 Field Investigation Methods

Surface soil sample collection was performed using a hand auger and subsurface-soil sampling was performed using both a hand auger and an excavator (for the berm only). D uring sample collection, observed lead bullets, bullet fragments, or lead shot were removed from the soil samples

to prevent anomalously biased-high lead results.[5] Upon sample collection, the soil was mixed in a stainless steel bowl and placed in the appropriate sampling containers. The sample ID, date, time, sample depth and required analyses were marked in the field logbook, on the sample container label, and on the chain of custody form. The hand auger and stainless steel bowls and spoons were decontaminated between each sample location in accordance with the SOP in Appendix A of the SAP. At the conclusion of daily field activities, water used for decontamination was placed in a Department of Transportation approved storage drum and transported to the Southside oil-water separator. Decontamination water was labeled as Investigation Derived Waste-Decontamination Water, with a unique identification number and the date. Waste-decontamination water was sampled for lead and, upon data receipt and approval by the City of Millington, was disposed into the sanitary water.

UXO 1 Pistol Range Firing Line

Figure 4-1 shows the intrusive investigation locations of the Pistol Range berm and soil sampling conducted in front of the firing lines. Prior to and during all intrusive investigations at the Pistol Range, MEC avoidance was practiced at each sample location by screening with a handheld analog metal detector by a UXO Technician II (or equivalent). A hand auger was used to sample subsurface soil in the uppermost 6 feet of the berm and at locations off the berm (Figure 4-1), while trenches, co-located with hand auger locations, were cut into the sides of the berm using a trackhoe to characterize the middle and basal sections of the berm. The adjacent photograph shows a typical berm trench completed during the RFI. Trenches were cut into the berm in approximately 2-foot lifts to complete the sampling without shoring of the sidewalls. Field crews also watched for signs of MEC

[5] Soils were not mechanically screened because of its consistency with lead and pigeon debris and the generally high moisture content which is a source for biasing high the laboratory results presented in Section 5.

within the excavation and the removed soils. Lines of site were maintained at all times with the excavator and hand signals were used to halt excavation activities in case expended bullets or items of interest were found and required inspection.

Most identified projectiles consisted of small caliber slugs (e.g., .45, .32, .22, .38 caliber) visible on the berm face and were less frequently encountered within the berm. The only potential MEC item identified during the intrusive investigation was a single 20-mm heavily corroded round, found on the southern berm face. An explosive ordnance disposal (EOD) team from Ft. Campbell was deployed to the site the next day and determined that the projectile was a target practice round and did not contain an explosive fuse or pose an explosive hazard. The projectile was subsequently removed by the EOD team. The EOD trip report is included in Appendix A. Photos of projectiles identified during the investigation and an incident report of the removed 20 mm round also are included in Appendix A.

The internal contents of the berm were characterized in anticipation of the removal of the berm. Sampling activities showed the interior of the berm primarily consisted of yellow brown clay silt mixed with minor amounts of rebar, metals posts, and clay target fragments. No trench locations were changed as a result of anomaly identifications during activities. Excavated soil was stockpiled on the ground, adjacent to each trench, until sampling was completed, after which the trench was backfilled with the excavated soil. The surface of each trench location was later covered with seed and straw to minimize soil erosion. Samp le logs with the soil descriptions from boring and trenching activities and photographs of trenching activities are included in Appendix A.

UXO 2 Trap/Skeet Ranges

The sampling strategy at UXO 2 was to characterize the vertical and horizontal extent of lead and PAHs in soil and collect data to support a human-health risk assessment in anticipation of the potential corrective measures. Areas not previously characterized, particularly in the former Midway RV Park and off the north end of the shot-fall area, were included in addition to areas where surface soil impacts were identified in the SI but potential subsurface impacts were not evaluated. Additionally, soil/sediment in the wet-weather conveyances was characterized. Figure 4-2 shows soil sample locations used for investigating UXO 2.

4.4 Analytical Methods

Soil samples were submitted to Gulf Coast Analytical Laboratories for the following analysis in accordance with the approved SAP:

Total Analyses

Lead — SW 846 3050B/6020A

PAHs — SW 846 3550C/8270D selective ion monitoring (SIM)

Synthetic Precipitation Leaching Procedure (SPLP)

Lead — SW 846 1312/6010B

PAHs — SW 846 1312/8270C

General Chemistry

pH — SW 846 9045

Total Organic Carbon (TOC) — SW 846 9060A

Cation Exchange Capacity (CEC) — SW 846 9081

Seventy-five subsurface-soil samples were designated as "Hold for Analysis", with the decision to analyze the samples pending whether the surface-soil sample results exceeded the screening numbers for lead or PAHs. Upon receipt of the preliminary sampling event, Resolution Consultants screened the data against the residential RSLs and directed the laboratory to analyze subsurface-soil samples from 60 of the 75 locations. Additionally, the distribution of detected lead and PAH concentrations were plotted and 17 samples were selected from what were considered low, medium, and high concentrations within the distribution. Selected samples were designated to be analyzed for SPLP lead and PAHs, cation exchange capacity (CEC), pH, and total organic carbon (TOC) to facilitate fate and transport evaluations and potential corrective measure evaluations.

4.5 Data Validation Assessment

The February and March 2013 NSA Mid-South soil and sediment analytical data were reviewed independently from the laboratory validation to assess data quality. Analytes having reported concentrations outside individual quality control criteria were flagged during this evaluation. Results that were flagged as estimated during the validation and estimated to be biased high or low were considered usable for their intended purpose, according to U.S. EPA guidelines. The data review is in the Data Validation report that precedes the laboratory report and is included in Appendix B.

Figure 4-1
Soil Sample Locations
UXO 1 - Pistol Range
NSA Mid-South
Millington, Tennessee

10/15/2013 X:\Navy\NSA_Midsouth\project\RI Report\Fig 3-1 UXO 1_PR_Trench Locations_BL.mxd

Sample Location

Wet Weather Conveyance

Range

Pistol Range

Trap Skeet Range

Firing Line

SWMU 2 Boundary

Installation Boundary

300 150 0 300

Feet

Credits: Copyright:© 2013 Esri, DeLorme, NAVTEQ, TomTom; Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community; Wet weather conveyance layer is from NAVFAC.

NAVFAC Naval Facilities Engineering Command

RESOLUTION CONSULTANTS

Figure 4-2
Soil Sample Locations
UXO 2 - Trap/Skeet Ranges #1 and #2
NSA Mid-South
Millington, Tennessee

10/16/2013 X:\Navy\NSA_Midsouth\project\RI Report\Fig 3-2 UXO 2 Sample Locs_BL.mxd

5.0 NATURE AND EXTENT

All soil data collected in the SI and RFI are included in the nature and extent evaluation. Table 5-1 provides a statistical summary of detections, concentration ranges, number of samples exceeding the screening numbers and the background values for lead and PAHs at both UXO 1/2. Tables 5-2 and 5-3 (provided at the end of the section) present the analytical results for each sample at UXO 1 and 2, respectively. The RFI laboratory reports provided by Gulf Coast Analytical Laboratories are included in Appendix B along with the data validation report provided by the project chemist.

5.1 Lead in Soil

Lead was detected in 141 of 142 samples in the RFI and SI surface-soil dataset and in all 110 subsurface-soil samples analyzed (Table 5-1). Background lead concentrations for NSA Mid-South surface and subsurface-soil were previously established at 26.03 mg/kg and 19.8 mg/kg, respectively (E/A&H 1996). Lead exceeded the surface-soil background concentration in 127 samples and exceeded the subsurface background concentration in 98 samples. The residential RSL of 400 mg/kg was exceeded in 53 surface soil samples and in six subsurface-soil samples. The industrial RSL of 800 mg/kg was exceeded in 38 surface-soil and five subsurface-soil samples at UXO 2.

UXO 1 Pistol Range Lead Results

Figure 5-1 presents lead results at UXO 1 for surface and subsurface soil with color coding illustrating exceedances of the residential RSL (400 mg/kg). The lead surface-soil exceedances are generally confined to the front and backside of the range backstop. The maximum lead detections in surface soil were identified at locations PR-SS032 (21,100 mg/kg), PR-SS013 (21,000 mg/kg), and PR-SS025 (17,300 mg/kg). There were 10 additional locations where berm surface-soils exceeded the residential RSL, with concentrations ranging from 2,230 mg/kg at PR-SS014 to 425 mg/kg at PR0SS027.

Lead data from the trenching and augering activities indicate most of the lead exceedances are on the berm face. As noted in red on Figure 5-1, four subsurface-soil samples exceeded the residential lead RSL. Two of these locations correspond with the center-interior of the berm. At location PRSB04, 29,300 mg/kg lead was detected at 3 to 4 feet below the top of the berm, and at PRSB05, 1,430 mg/kg lead was detected at 6 to 8 feet below the top of the berm. The other two locations correspond with depths near the natural land-surface grade, below the berm base, and likely represent impacts from the former trap/skeet range operations before the berm was constructed. At location PRSB06, lead was detected at 1,990 mg/kg at a depth of 13 to 14 feet below top of berm, and at PRSB01, lead was detected at 481 mg/kg at a depth of 12 to 14 feet below top of berm.

Table 5-1
Summary of Soil Analytical Results
UXO 1 and 2

Chemical	Number Detected	Number Analyzed	Minimum Detect	Maximum Detect	Residential RSL	Number Exceeding Residential RSL	Industrial RSL	Number Exceeding Industrial RSL	Mid-South Background	Number Exceeding Background
Pistol Range Surface Soil										
LEAD	**31**	**31**	**27.3**	**21,100**	**400**	**13**	**800**	**7**	**26.03**	**31**
2-METHYLNAPHTHALENE	5	11	0.00442	0.0201	230	0	2,200	0	NA	NA
ACENAPHTHENE	6	11	0.0239	0.15	3,400	0	33,000	0	NA	NA
ACENAPHTHYLENE	6	11	0.00475	0.0568	3,400	0	33,000	0	NA	NA
ANTHRACENE	11	11	0.0039	0.314	17,000	0	170,000	0	NA	NA
BENZO[A]ANTHRACENE	**11**	**11**	**0.0116**	**2.92**	**0.15**	**9**	**2.1**	**1**	**NA**	**NA**
BENZO[A]PYRENE	**11**	**11**	**0.0163**	**3.88**	**0.015**	**11**	**0.21**	**9**	**NA**	**NA**
BENZO[B]FLUORANTHENE	**11**	**11**	**0.0319**	**4.91**	**0.15**	**10**	**2.1**	**2**	**NA**	**NA**
BENZO[G,H,I]PERYLENE	11	11	0.018	3.01	1,700	0	17,000	0	NA	NA
BENZO[K]FLUORANTHENE	11	11	0.00967	1.86	1.5	2	21	0	NA	NA
CHRYSENE	11	11	0.0137	2.9	15	0	210	0	NA	NA
DIBENZ[A,H]ANTHRACENE	**7**	**11**	**0.00268**	**0.538**	**0.015**	**6**	**0.21**	**2**	**NA**	**NA**
FLUORANTHENE	11	11	0.0125	4.17	2,300	0	22,000	0	NA	NA
FLUORENE	4	11	0.0059	0.0531	2,300	0	22,000	0	NA	NA
INDENO[1,2,3-CD]PYRENE	**11**	**11**	**0.0146**	**2.99**	**0.15**	**9**	**2.1**	**2**	**NA**	**NA**
NAPHTHALENE	7	11	0.0117	0.0569	3.6	0	18	0	NA	NA
PHENANTHRENE	11	11	0.00568	1.49	1,700	0	17,000	0	NA	NA
PYRENE	11	11	0.0108	3.34	1,700	0	17,000	0	NA	NA
BEQ	**11**	**11**	**0.0249**	**5.24**	**0.015**	**11**	**0.21**	**9**	**0.565**	**9**
Pistol Range Subsurface Soil										
LEAD	**76**	**76**	**13.7**	**29,300**	**400**	**4**	**800**	**3**	**19.8**	**69**
2-METHYLNAPHTHALENE	39	86	0.00378	0.517	230	0	2,200	0	NA	NA
ACENAPHTHENE	64	86	0.0105	3.87	3,400	0	33,000	0	NA	NA
ACENAPHTHYLENE	34	86	0.00559	0.0393	3,400	0	33,000	0	NA	NA
ANTHRACENE	83	86	0.00147	8.8	17,000	0	170,000	0	NA	NA
BENZO[A]ANTHRACENE	**85**	**86**	**0.00805**	**62.2**	**0.15**	**65**	**2.1**	**16**	**NA**	**NA**
BENZO[A]PYRENE	**85**	**86**	**0.0113**	**84**	**0.015**	**83**	**0.21**	**66**	**NA**	**NA**
BENZO[B]FLUORANTHENE	**85**	**86**	**0.0272**	**99.7**	**0.15**	**69**	**2.1**	**22**	**NA**	**NA**
BENZO[G,H,I]PERYLENE	85	86	0.00922	45	1,700	0	17,000	0	NA	NA
BENZO[K]FLUORANTHENE	**85**	**86**	**0.00567**	**37.4**	**1.5**	**18**	**21**	**2**	**NA**	**NA**
CHRYSENE	85	86	0.0134	66.8	15	5	210	0	NA	NA
DIBENZ[A,H]ANTHRACENE	**63**	**86**	**0.00197**	**8.9**	**0.015**	**55**	**0.21**	**22**	**NA**	**NA**

Table 5-1
Summary of Soil Analytical Results
UXO 1 and 2

Chemical	Number Detected	Number Analyzed	Minimum Detect	Maximum Detect	Residential RSL	Number Exceeding Residential RSL	Industrial RSL	Number Exceeding Industrial RSL	Mid-South Background	Number Exceeding Background
FLUORANTHENE	85	86	0.00921	89.7	2300	0	22000	0	NA	NA
FLUORENE	42	86	0.00179	1.22	2300	0	22000	0	NA	NA
INDENO[1,2,3-CD]PYRENE	**85**	**86**	**0.00785**	**42.9**	**0.15**	**65**	**2.1**	**18**	**NA**	**NA**
NAPHTHALENE	61	86	0.00252	1.87	3.6	0	18	0	NA	NA
PHENANTHRENE	83	86	0.00437	33.6	1700	0	17000	0	NA	NA
PYRENE	85	86	0.00691	68.7	1700	0	17000	0	NA	NA
BEQ	**85**	**86**	**0.0179**	**77.4**	**0.015**	**85**	**0.21**	**68**	**0.565**	**52**
Trap Skeet Range Surface Soil										
LEAD	**110**	**111**	**9.24**	**51900**	**400**	**40**	**800**	**31**	**26.03**	**96**
1-METHYLNAPHTHALENE	8	21	0.00517	0.0567	16	0	53	0	NA	NA
2-METHYLNAPHTHALENE	50	100	0.00191	2.25	230	0	2200	0	NA	NA
ACENAPHTHENE	57	100	0.00204	9.14	3400	0	33000	0	NA	NA
ACENAPHTHYLENE	13	100	0.00339	0.0499	3400	0	33000	0	NA	NA
ANTHRACENE	74	100	0.00174	42.9	17000	0	170000	0	NA	NA
BENZO[A]ANTHRACENE	**86**	**100**	**0.00496**	**196**	**0.15**	**56**	**2.1**	**33**	**NA**	**NA**
BENZO[A]PYRENE	**92**	**100**	**0.00401**	**170**	**0.015**	**83**	**0.21**	**57**	**NA**	**NA**
BENZO[B]FLUORANTHENE	**92**	**100**	**0.00577**	**233**	**0.15**	**65**	**2.1**	**41**	**NA**	**NA**
BENZO[G,H,I]PERYLENE	87	100	0.00541	128	1700	0	17000	0	NA	NA
BENZO[K]FLUORANTHENE	**91**	**100**	**0.00336**	**114**	**1.5**	**34**	**21**	**4**	**NA**	**NA**
CHRYSENE	91	100	0.00543	184	15	10	210	0	NA	NA
DIBENZ[A,H]ANTHRACENE	**78**	**100**	**0.00136**	**30.9**	**0.015**	**75**	**0.21**	**47**	**NA**	**NA**
FLUORANTHENE	91	100	0.00422	402	2300	0	22000	0	NA	NA
FLUORENE	55	100	0.00158	6.22	2300	0	22000	0	NA	NA
INDENO[1,2,3-CD]PYRENE	**87**	**100**	**0.0054**	**122**	**0.15**	**60**	**2.1**	**35**	**NA**	**NA**
NAPHTHALENE	54	100	0.00185	6.77	3.6	1	18	0	NA	NA
PHENANTHRENE	83	100	0.00291	200	1700	0	17000	0	NA	NA
PYRENE	91	100	0.00565	297	1700	0	17000	0	NA	NA
BEQ	**92**	**100**	**0.00926**	**9.63**	**0.015**	**88**	**0.21**	**60**	**0.565**	**54**
Trap Skeet Range Subsurface Soil										
LEAD	**34**	**34**	**10.2**	**6360**	**400**	**2**	**800**	**2**	**19.8**	**29**
2-METHYLNAPHTHALENE	11	43	0.00365	1.25	230	0	2200	0	NA	NA
ACENAPHTHENE	22	43	0.00364	6.3	3400	0	33000	0	NA	NA
ACENAPHTHYLENE	3	43	0.00362	0.0317	3400	0	33000	0	NA	NA
ANTHRACENE	35	43	0.00177	20.8	17000	0	170000	0	NA	NA

Table 5-1
Summary of Soil Analytical Results
UXO 1 and 2

Chemical	Number Detected	Number Analyzed	Minimum Detect	Maximum Detect	Residential RSL	Number Exceeding Residential RSL	Industrial RSL	Number Exceeding Industrial RSL	Mid-South Background	Number Exceeding Background
BENZO[A]ANTHRACENE	**39**	**43**	**0.014**	**129**	**0.15**	**22**	**2.1**	**7**	**NA**	**NA**
BENZO[A]PYRENE	**39**	**43**	**0.0266**	**118**	**0.015**	**39**	**0.21**	**22**	**NA**	**NA**
BENZO[B]FLUORANTHENE	**39**	**43**	**0.0449**	**160**	**0.15**	**27**	**2.1**	**7**	**NA**	**NA**
BENZO[G,H,I]PERYLENE	39	43	0.00759	94.8	1700	0	17000	0	NA	NA
BENZO[K]FLUORANTHENE	**39**	**43**	**0.0179**	**76.3**	**1.5**	**7**	**21**	**2**	**NA**	**NA**
CHRYSENE	39	43	0.0059	110	15	4	210	0	NA	NA
DIBENZ[A,H]ANTHRACENE	**35**	**43**	**0.00582**	**18.8**	**0.015**	**31**	**0.21**	**8**	**NA**	**NA**
FLUORANTHENE	39	43	0.0047	216	2300	0	22000	0	NA	NA
FLUORENE	19	43	0.00251	4.27	2300	0	22000	0	NA	NA
INDENO[1,2,3-CD]PYRENE	**39**	**43**	**0.0205**	**84**	**0.15**	**23**	**2.1**	**7**	**NA**	**NA**
NAPHTHALENE	19	43	0.00184	4.01	3.6	1	18	0	NA	NA
PHENANTHRENE	35	43	0.00442	92.5	1700	0	17000	0	NA	NA
PYRENE	39	43	0.0043	156	1700	0	17000	0	NA	NA
BEQ	**39**	**43**	**0.041**	**83.3**	**0.015**	**39**	**0.21**	**24**	**0.565**	**17**

Notes:
All units milligrams per kilogram (mg/kg) or parts per million (ppm)
RSL = Regional Screening Level for residential and industrial land use — U.S. EPA November 2012
BEQ = benzo(a)pyrene equivalent
Italics = one or more results exceeded Residential RSL
Bold = one or more results exceeded Industrial RSL

UXO 2 Trap/Skeet Ranges Lead Results

Figures 5-2 and 5-3 present UXO 2 surface and subsurface soil lead results, respectively, and indicate where lead in soil exceeds the residential RSL (400 mg/kg). The distribution of lead in surface soil (Figure 5-2) is consistent with the expected shot-fall zone of skeet shot pellets relative to the trap firing lines[6]. According to information from the National Sport Shooting Foundation Web page, the distribution of lead shot from a trap is approximately 4 acres, with overlap between adjacent traps of 1.75 acres. Based on this information, the 10 former traps would produce a s hot-fall area of approximately 24 acres including the overlap. The area of lead detections exceeding the residential is approximately 21 acres, which is reasonably consistent with the shot-fall zone information cited above.

As shown on Figure 5-2, the maximum surface-soil lead concentrations for the UXO 2 Trap/Skeet Ranges are at locations SRSB23 (51,900 mg/kg) and TSR-SS022 (12,500 mg/kg). The maximum detections noted in surface soil at UXO 2 likely are the results of shot pellets in the sample resulting in the sample data having an order of magnitude greater than most lead maximum levels. Although no lead shot were visibly noted during sample collection, the data from these two locations should be considered biased high and not representative of lead in soil. This is also supported by the significant decrease in lead concentrations at surface and subsurface soil. The lead concentrations at location SRSB23 decreased from 51,900 mg/kg (Figure 5-2) in surface soil (0 to 1 foot below ground surface [bgs]) to 36.4 mg/kg (Figure 5-3) in subsurface soil (1 to 2 feet bgs). Similarly, lead in surface and subsurface soil at location SRSB22 decreased from 12,500 mg/kg to 130 mg/kg, respectively.

Figure 5-3 shows the extent of lead exceedances is significantly reduced from surface soil to subsurface soil, as noted at several locations where the surface-sample results exceed the residential RSL, but the corresponding subsurface-soil samples do not. Exceptions were at location SRSB32 (4,630 mg/kg in surface soil and 6,360 mg/kg in subsurface soil), and location SRSB57 (333 mg/kg in surface soil and 2,970 mg/kg in subsurface soil).

5.2 Polycyclic Aromatic Hydrocarbons in Soil

Eight PAH compounds were detected in soil at concentrations exceeding the residential RSLs (Table 5-1). Seven of the PAHs that exceeded RSLs have similar environmental characteristics and are therefore evaluated collectively as benzo(a)pyrene equivalent (BEQ), as discussed below. Naphthalene was the only other PAH exceeding residential RSLs and it is discussed separately. 1-Methylnaphthalene is the only PAH that was not detected.

[6] National Shooting Sports Foundation Web page: https://www.nssf.org/ranges/rangeresources/library/detail.cfm?filename=facility_mngmnt/environment/Need-to-know.htm&CAT=Facility%20Management

Naphthalene was detected in 61 of 111 surface and 80 of 129 subsurface-soil samples; however, concentrations exceeding the residential RSL (3.6 mg/kg) were limited to one surface-soil sample (SRSB38 at 6.77 mg/kg) and one subsurface-soil sample (SRSB57 at 4.01 mg/kg). Both exceedances are less than twice the residential RSL. All naphthalene detections were below the industrial RSL of 18 mg/kg.

The remaining seven PAHs that exceeded residential RSLs are grouped because of similar molecular structures, chemical properties, and similar mutagenic effects. Benzo(a)pyrene is used as a standard by which other mutagenic and carcinogenic PAHs are assessed. The concentrations of the seven PAHs are converted to BEQ concentrations based on their potential to cause cancer relative to benzo(a)pyrene. This conversion is accomplished by multiplying their detected concentration (or one-half their non-detect concentration) by a toxicity factor called the benzo(a)pyrene toxic equivalency factor or TEF (TEFs are listed to the right). The calculated TEF concentrations for each sample are then summed to determine the sample's BEQ concentration. The BEQ calculations for the seven PAHs that exceeded residential RSLs are presented in Appendix C. The results are assessed by comparing BEQ values to the soil residential and industrial RSLs of 0.015 mg/kg and 0.21 mg/kg, respectively, for benzo(a)pyrene. BEQ results were also compared to the benzo(a)pyrene for NSA Mid-South soil background concentration of 0.565 mg/kg (U.S. EPA Memorandum October 9, 1997). Because the NSA Mid-South background concentration exceeds both the residential and industrial RSLs, the background concentration is the primary screening value for the purpose of discussing the nature and extent of contamination. Figures 5-4 through 5-6 show BEQ soil results for both sites.

BAP Toxicity Equivalency Factors for PAHs Exceeding Residential RSLs at UXOs 1 and 2

Compound	TEF
Benzo(a)pyrene	1
Benzo(a)anthracene	0.1
Benzo(b)fluoranthene	0.1
Benzo(k)fluoranthene	0.01
Chrysene	0.001
Dibenz(a,h)anthracene	1
Indeno(1,2,3-cd)pyrene	0.1
Other PAHs	0

UXO 1 Pistol Range BEQ Soil Results

Figure 5-4 presents BEQ results at UXO 1 for surface and subsurface soil. Table 5-2 lists the individual PAH detections at UXO 1. Nine of 11 surface-soil samples exceeded the background BEQ concentration (0.565 mg/kg), four of which were composite samples collected at the former Pistol Range firing lines. The remaining BEQ exceedances were found along the backside berm toe where the following results were detected: PRSB13 (5.24 mg/kg), PRSB14 (2.48 mg/kg), PRSB15 (1.02 mg/kg), PRSB17 (1.49 mg/kg) and PRSB18 (1.05 mg/kg).

Figure 5-4 illustrates where subsurface soil samples had BEQ concentrations exceeding background. BEQ ranged from 0.581 mg/kg (PRSB06, 9 to 10 feet bgs) to 104 mg/kg (PRSB01, 12 to 14 feet bgs). Most exceedances were generally within the upper 10 feet of the berm material, although the maximum subsurface detection at the Pistol R5nge was the 104 mg/kg found in the sample collected from 12 to 14 feet bgs in PRSB01.

UXO 2 Trap/Skeet Ranges BEQ Results

Figures 5-5 and 5-6 present the UXO 2 Trap/Skeet Ranges surface and subsurface-soil results, respectively. Table 5-3 lists the individual PAH detections at the UXO 2 Trap/Skeet Ranges. BEQ sample results exceed the 0.565 mg/kg background in 54 s urface and 17 subsurface soil samples collected from the Trap/Skeet Ranges. As shown on the figures, the distribution of exceedances is consistent with the expected clay pigeon fall zone, which is generally 60 to 75 yards from the shooting stations.[7] The most elevated BEQ concentrations in both surface and subsurface soil are in the central and southern portion of the UXO 2, and concentrations exceeded 100 mg/kg in four surface-soil samples in the central portion of UXO 2 (Figure 5-5) : SRSB38 (251 mg/kg), SRSB35 (193 mg/kg), SRSB31 (173 mg/kg), and SRSB28 (163 mg/kg).

PAHs are also in asphalt and the area with BEQ results exceeding background includes sample locations beneath the asphalt parking lot of the Commissary, in the northern area of Trap/Skeet Range #2, and adjacent to the parking area west of the former Trap/Skeet Range #1. The presence of BEQ at concentrations exceeding background along the western line of samples is also likely attributed to asphalt given that the areas are outside of where clay pigeon debris would be expected.

Figure 5-6 shows the BEQ footprint in subsurface soil is significantly smaller. The most elevated subsurface exceedances were noted at locations SRSB57 (175 mg/kg), SRSB26 (83.3 mg/kg), SRSB35 (41.9 mg/kg), and SRSB59 (29.8 mg/kg).

5.3 Summary of Nature and Extent

Lead concentrations in soil are primarily limited to the surface-soil with only a few exceptions. No lead shot was observed in soil samples collected from the UXO 2 Trap/Skeet Ranges, but bullet fragments were visible on the surface and at depth during the completion of hand-auger borings and trenching in the UXO 1 Pistol Range berm therefore, there is a potential that lead data is biased high.

[7] http://www.shooting-academy.com/media/Lead%20Pollution%20at%20Shooting%20Ranges%20Explained%20July%202012.pdf

Clay pigeon fragments were visible in surface soil to a distance of approximately 350 feet to the east of the former launching stations at the UXO 2 Trap/Skeet Ranges #1 and #2 and were noted to have accumulated on the sides of the UXO 1 Pistol Range berm. The observed density of clay pigeon fragments decreased with depth. Few or no clay pigeon fragments were observed in soil samples collected west of the UXO 2 Trap/Skeet Range launch stations. The distribution of PAHs (reported as BEQ) is within the expected clay pigeon target landing area (Shooting Academy, 2012) and generally corresponds with a maximum distance of 75 yards out from the Trap/Skeet launching stations and similarly as to lead, any pigeon fragment debris within the collected soil samples may have a high-biased contribution to the reported PAH soil data.

The CSM presented in the SAP (Resolution Consultants, 2012) and re-presented in Figure 5-7 remains generally accurate for both sites. Refinements to the CSM resulting from the RFI data include the following:

(1) UXO 1 Pistol Range berm — Lead concentrations exceeding the PALs are predominately in surface soil of the berm backstop and are isolated only to a few locations in the berm interior. BEQ concentrations exceeding background (0.565 mg/kg) are prevalent in both surface and subsurface soil of the berm.

(2) Soil below the berm's natural grade (12 to 14 feet below the top of berm) also contains lead and BEQ exceeding the PALs likely as a result of the former trap and skeet range operations preceding berm construction.

(3) The horizontal extent of lead and BEQ soil contamination at UXO 2 is generally confined to the expected areas identified in the SI, with the highest concentrations in the former lead shot fall areas (200 to 400 feet from the shooting stations) and target landing areas (50 to 200 feet from the shooting stations). Soil sampling at the Midway RV Park indicated lead impacts are confined to surface soil in the southwest corner of the Park where 668 mg/kg lead was detected at location SRSB22 (Figure 5-2) while subsurface lead concentrations were below the 400 mg/kg PAL (Figure 5-3) at the RV Park.

(4) The RFI data indicates most of the lead and PAH impacts are limited to the surface soil interval which is consistent with the contaminant and soil properties controlling contaminant mobility (discussed further in the Section 6 - Fate and Transport).

(5) Lead was not found to be present in concentrations exceeding PALs in soil in the newly sampled areas north of Polaris Drive and west of the UXO 2 Trap/Skeet Ranges shooting stations, parallel to Singleton Avenue. BEQ is present in soil at concentrations exceeding background west of the shooting stations; however, the presence of BEQ is likely the result of asphalt contamination associated with the parking areas and assumed unrelated to the former range operations.

(6) Surface and subsurface soil in drainage areas contain BEQ and lead in concentrations exceeding the PALs. However, the concentration distribution in soil does not indicate the ditches are accumulation/collection points for BEQ and lead runoff from the site. More likely soil/sediment in these features has been impacted from past operations of the former ranges.

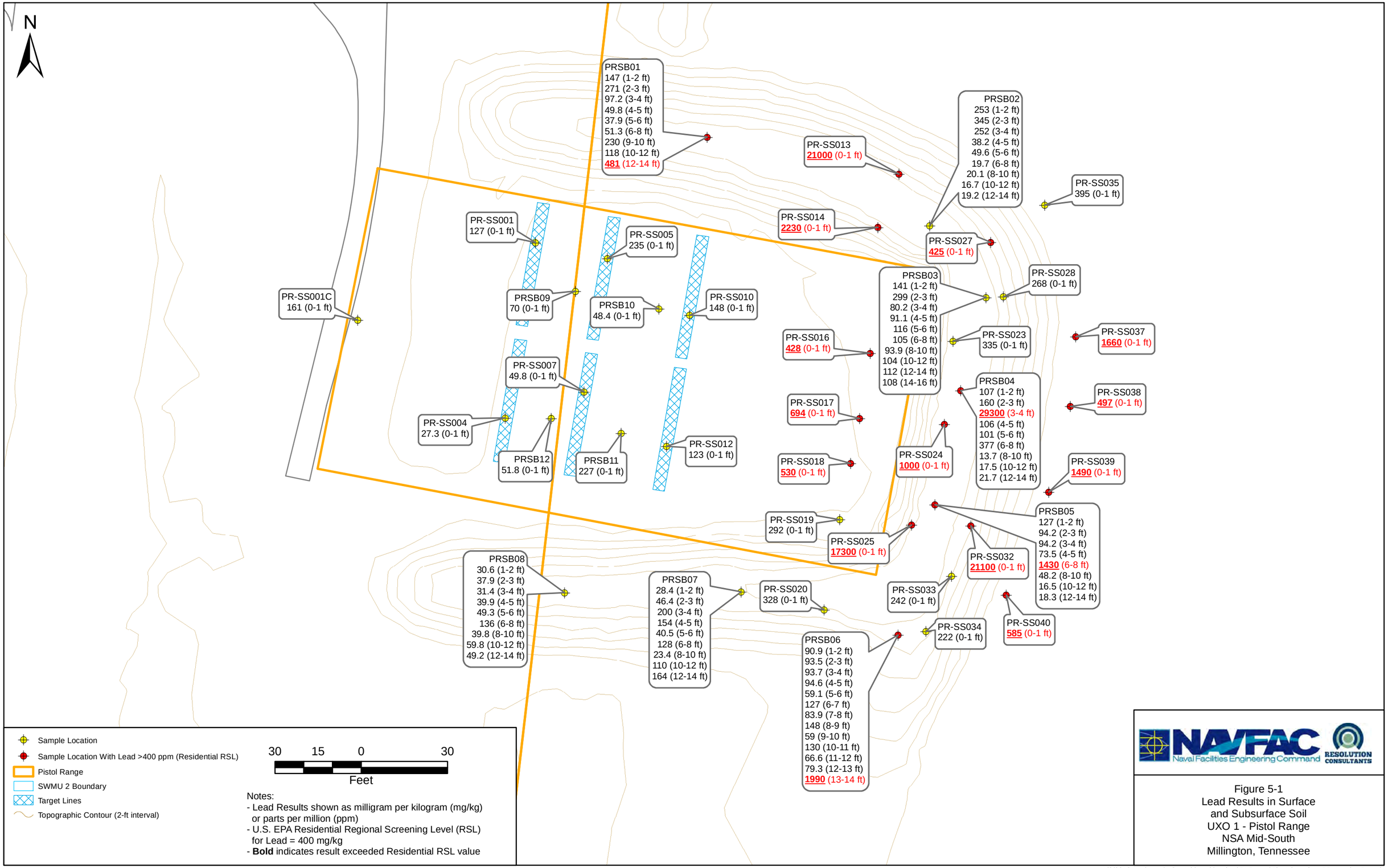
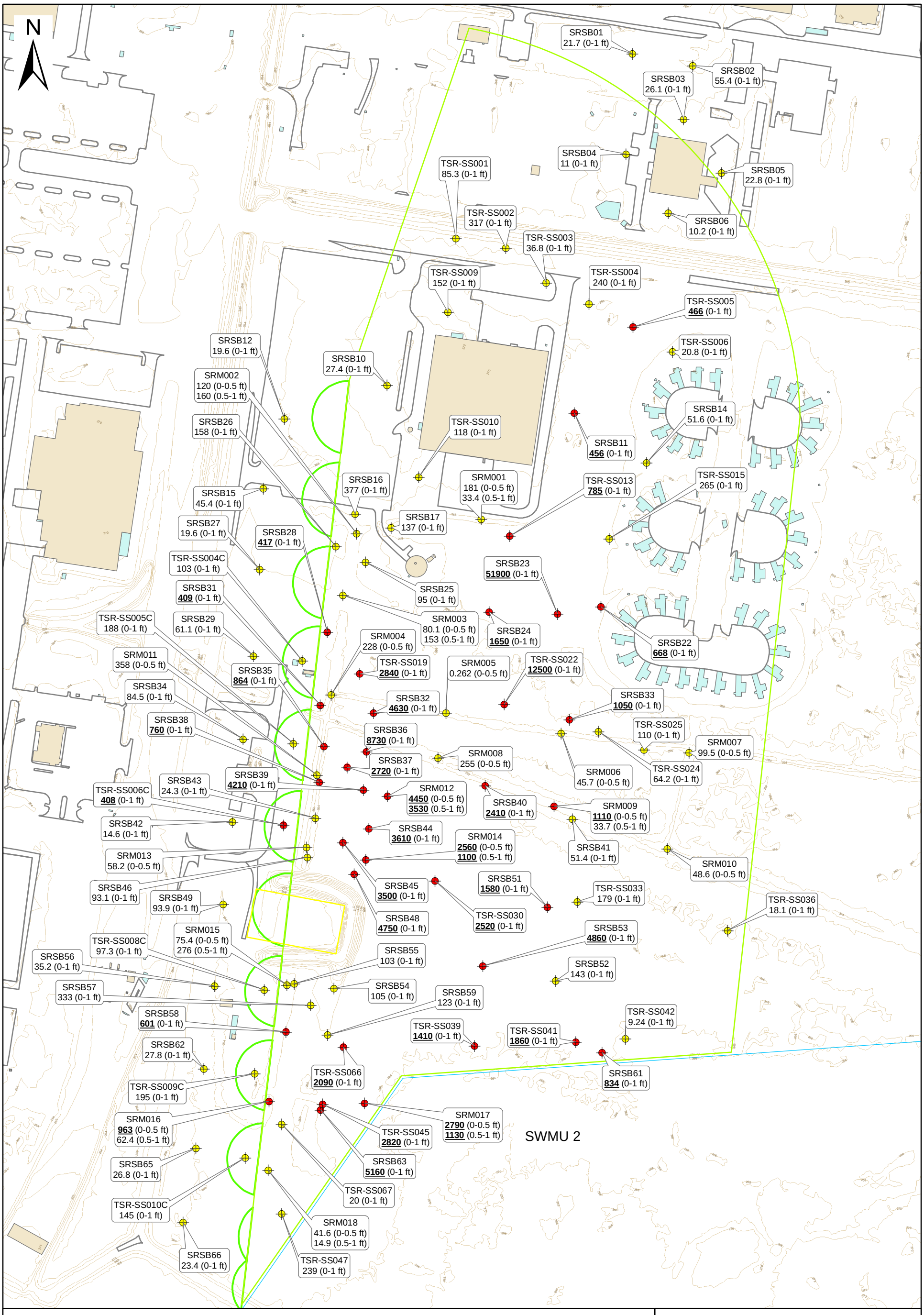


Figure 5-1
Lead Results in Surface and Subsurface Soil
UXO 1 - Pistol Range
NSA Mid-South
Millington, Tennessee

11/8/2013 X:\Navy\NSA_Midsouth\project\RI Report\Fig 4-3 UXO 1_PR_Lead_NR.mxd



Sample Location

Sample Location With Lead >400 ppm (Residential RSL)

Topographic Contour (2-ft interval)

Range

Pistol Range

Trap Skeet Range

Firing Line

SWMU 2 Boundary

Structures

200 100 0 200

Feet

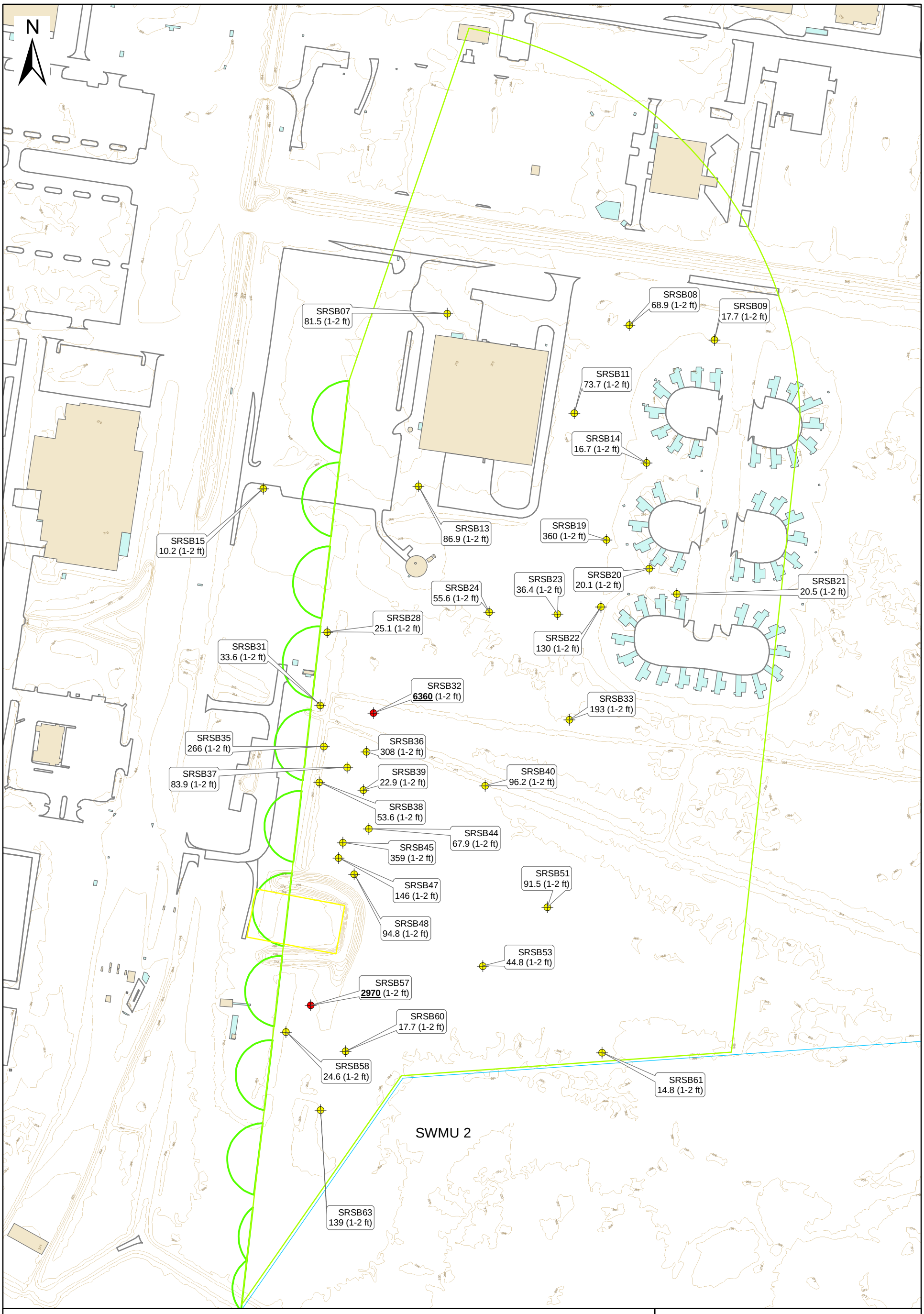
Notes:
- Lead Results shown as milligram per kilogram (mg/kg) or parts per million (ppm)
- U.S. EPA Residential Regional Screening Level (RSL) for Lead = 400 mg/kg
- **Bold** indicates result exceeded Residential RSL value
- TSR - SI Sample Designation
- SRS - RFI Sample Designation

NAVFAC Naval Facilities Engineering Command

RESOLUTION CONSULTANTS

Figure 5-2
Lead in Surface Soil
UXO 2 - Trap/Skeet Ranges #1 and #2
NSA Mid-South
Millington, Tennessee

11/8/2013 X:\Navy\NSA_Midsouth\project\RI Report\Fig 4-1 UXO Lead Contour Surface_NR.mxd



Sample Locations

Sample Locations With Lead >400 ppm (Residential RSL)

Topographic Contour (2-ft interval)

Range

Pistol Range

Trap Skeet Range

Firing Line

Structures

SWMU 2 Boundary

200 100 0 200

Feet

Notes:
- Lead Results shown as milligram per kilogram (mg/kg) or Parts per million (ppm)
- U.S. EPA Residential Regional Screening Level (RSL) for Lead = 400 mg/kg
- **Bold** indicates result exceeded Residential RSL value
- TSR - SI Sample Designation
- SRS - RFI Sample Designation

NAVFAC Naval Facilities Engineering Command

RESOLUTION CONSULTANTS

Figure 5-3
Lead in Subsurface Soil
UXO 2 - Trap/Skeet Ranges #1 and #2
NSA Mid-South
Millington, Tennessee

11/8/2013 X:\Navy\NSA_Midsouth\project\RI Report\Fig 4-2 UXO Lead Contour Subsurface_NR.mxd

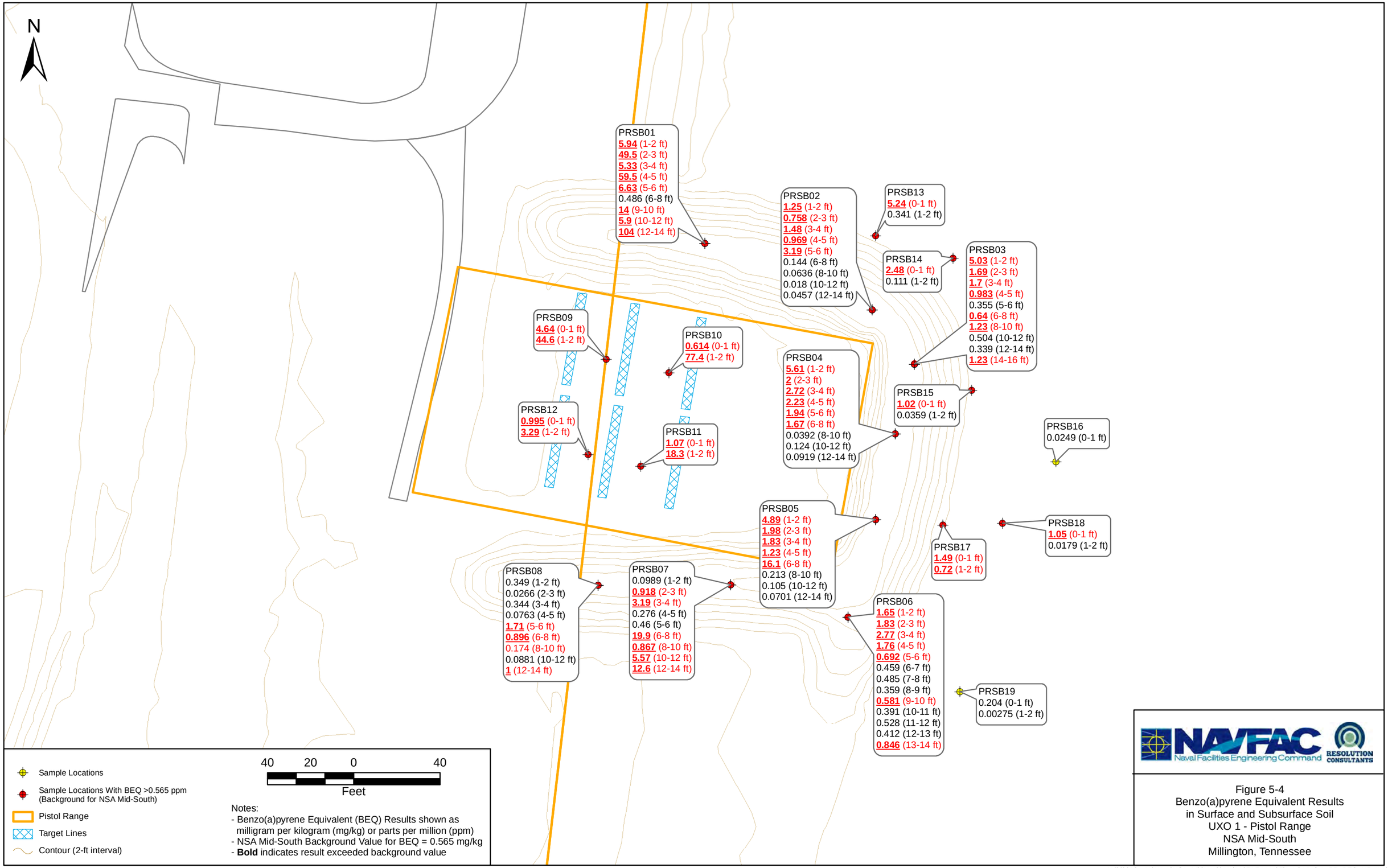
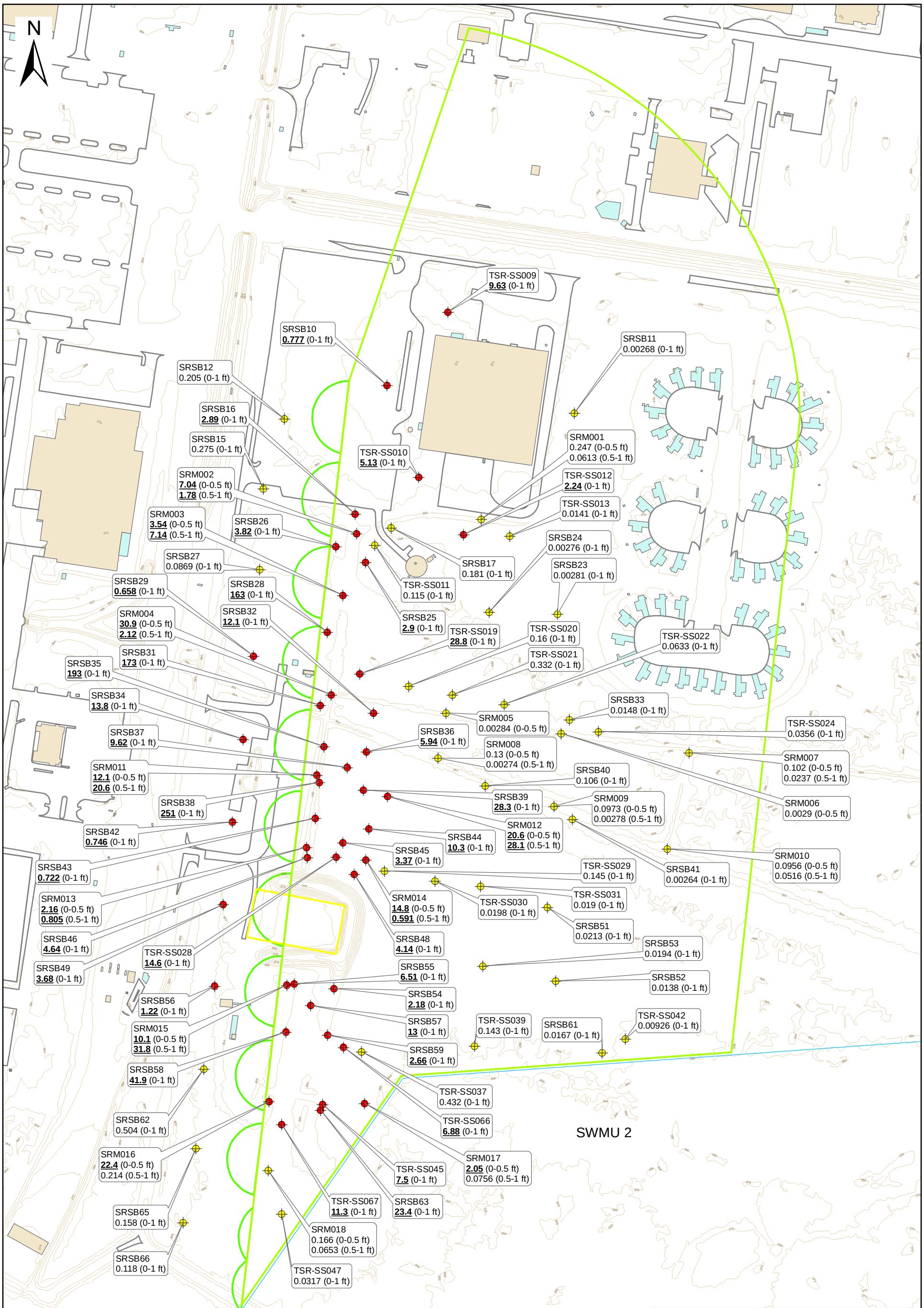


Figure 5-4
Benzo(a)pyrene Equivalent Results
in Surface and Subsurface Soil
UXO 1 - Pistol Range
NSA Mid-South
Millington, Tennessee

11/8/2013 X:\Navy\NSA_Midsouth\project\RI Report\Fig 4-6 UXO 1_PR_BEQ_NR.mxd



Sample Locations

Sample Locations With BEQ >0.565 ppm (Background for NSA Mid-South)

Topographic Contour (2-ft interval)

Range

Pistol Range

Trap Skeet Range

Firing Line

Structures

SWMU 2 Boundary

200 100 0 200

Feet

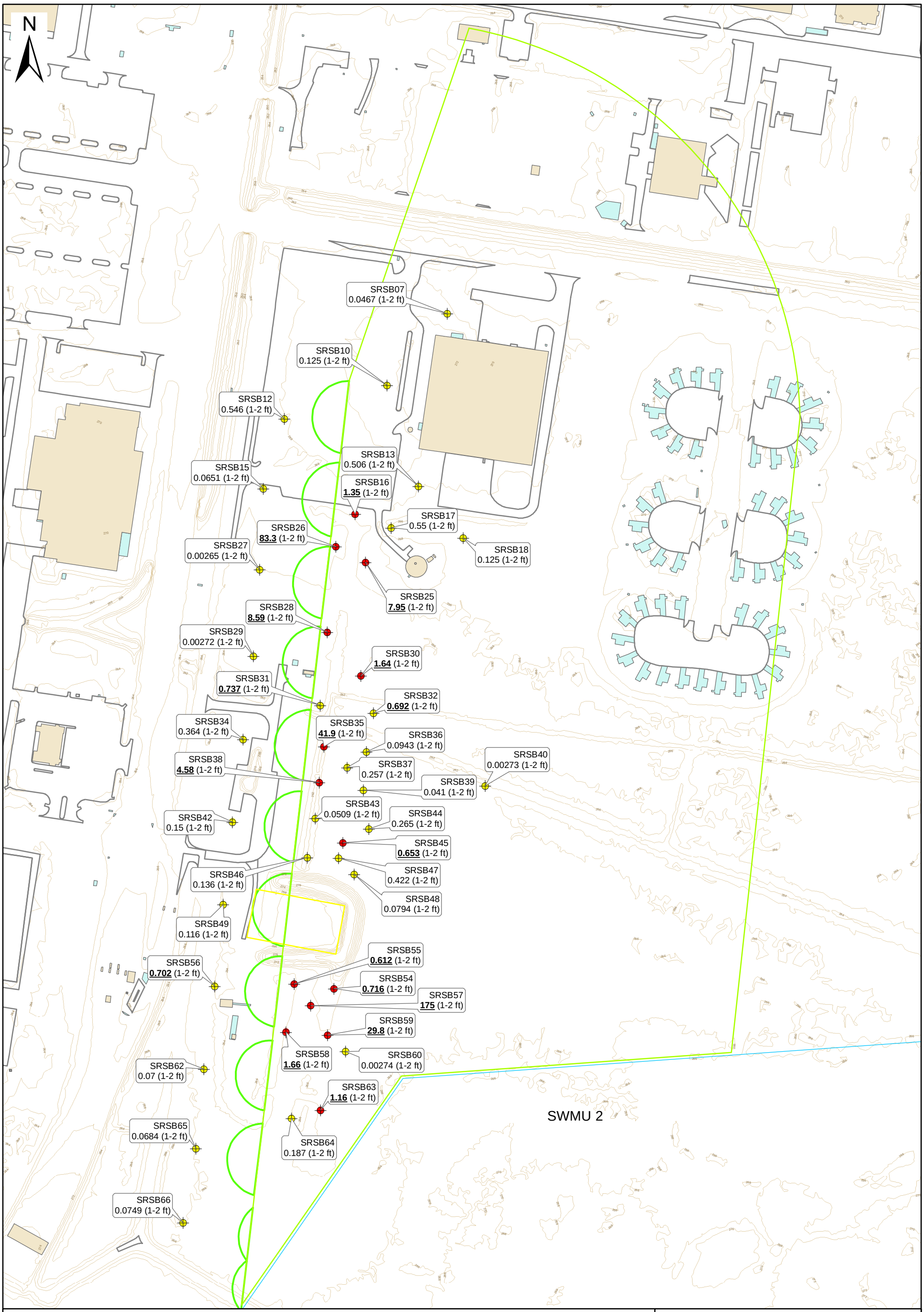
Notes;
- Benzo(a)pyrene Equivalent (BEQ) Results shown as milligram per kilogram (mg/kg) or parts per million (ppm)
- NSA Mid-South Background Value for BEQ = 0.565 mg/kg
- **Bold** indicates result exceeded background value
- TSR indicates SI sample designation
- SRS indicates RFI sample designation

NAVFAC Naval Facilities Engineering Command

RESOLUTION CONSULTANTS

Figure 5-5
Benzo(a)pyrene Equivalent in Surface Soil
UXO 2 - Trap/Skeet Ranges #1 and #2
NSA Mid-South
Millington, Tennessee

11/8/2013 X:\Navy\NSA_Midsouth\project\RI Report\Fig 4-4 UXO BEQ Contour Surface_NR.mxd



Sample Locations

Sample Locations With BEQ >0.565 ppm (Background for NSA Mid-South)

Topographic Contour (2-ft interval)

Range

Pistol Range

Trap Skeet Range

Firing Line

Structures

SWMU 2 Boundary

200 100 0 200

Feet

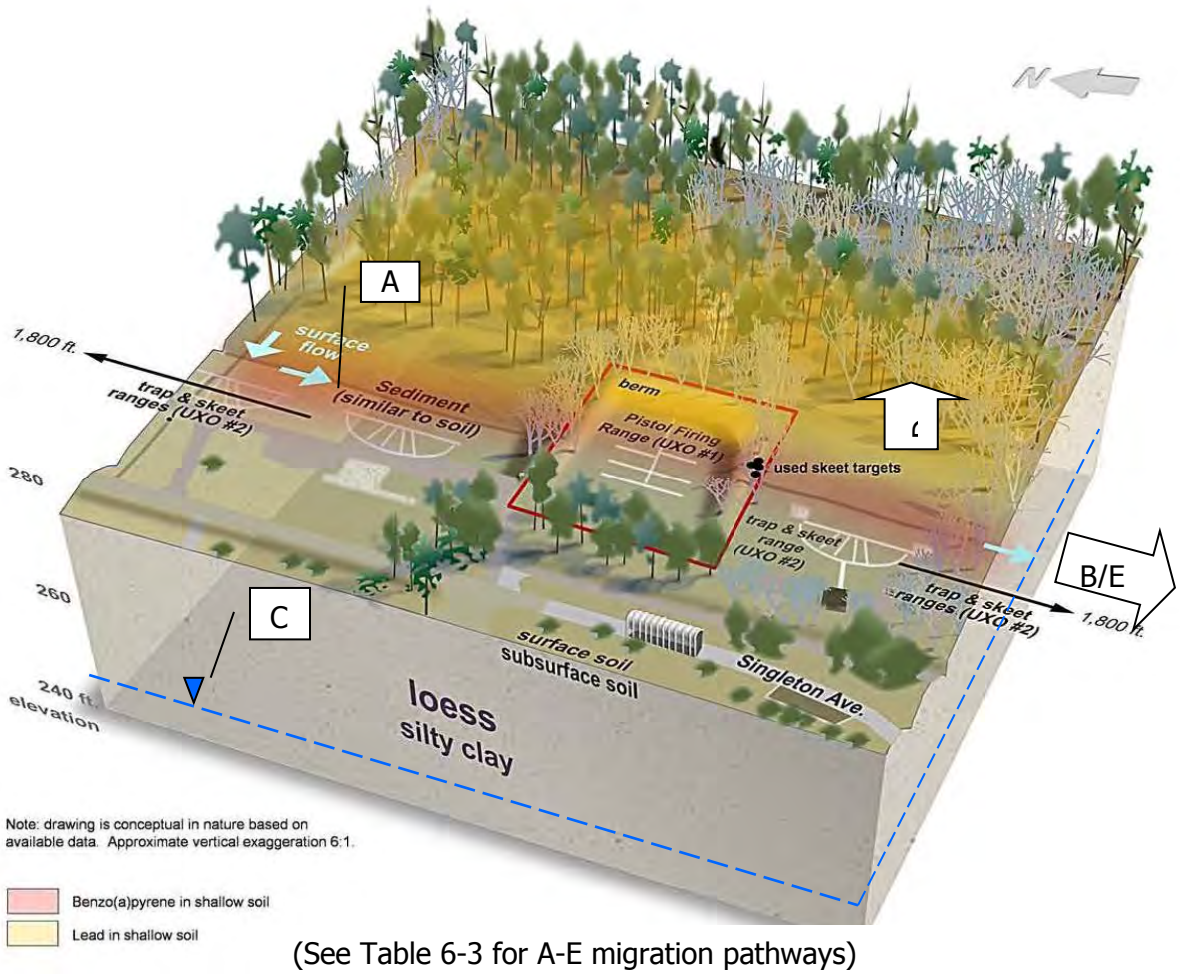
Notes:
- Benzo(a)pyrene Equivalent (BEQ) Results shown as milligram per kilogram (mg/kg) or parts per million (ppm)
- NSA Mid-South Background Value for BEQ = 0.565 mg/kg
- **Bold** indicates result exceeded background value
- TSR indicates SI sample designation
- SRS indicates RFI sample designation

NAVFAC Naval Facilities Engineering Command

RESOLUTION CONSULTANTS

Figure 5-6
Benzo(a)pyrene Equivalent in Subsurface Soil
UXO 2 - Trap/Skeet Ranges #1 and #2
NSA Mid-South
Millington, Tennessee

11/8/2013 X:\Navy\NSA_Midsouth\project\RI Report\Fig 4-5 UXO BEQ Contour Subsurface_NR.mxd



(See Table 6-3 for A-E migration pathways)

Human Health Exposure Media	
Receptor Scenarios	**Media Evaluated for Each Scenario**
Residential	Sediment & Surface Soil (combined; evaluate with soil exposure models)
Site Worker	Subsurface Soil
Construction Worker	
Recreation	

Figure 5-7 Conceptual Site Model

Table 5-2
UXO 1 Pistol Range Soil Analytical Results (RFI and SI Data)
NSA Mid-South
Millington, Tennessee

CAS_NO	Parameter	Surface/ Subsurface Background	Res RSL	Ind RSL	MidSouth MRP PR PRSB01 PRSSB01002 3/14/2013 2	MidSouth MRP PR PRSB01 PRSSB01003 3/14/2013 3	MidSouth MRP PR PRSB01 PRSSB01004 3/14/2013 4	MidSouth MRP PR PRSB01 PRSSB01005 3/14/2013 5	MidSouth MRP PR PRSB01 PRSSB01006 3/14/2013 6	MidSouth MRP PR PRSB01 PRSSB01008 3/13/2013 8	MidSouth MRP PR PRSB01 PRSSB01010 3/13/2013 10	MidSouth MRP PR PRSB01 PRSSB01012 3/13/2013 12	MidSouth MRP PR PRSB01 PRSSB01014 3/13/2013 14	MidSouth MRP PR PRSB02 PRSSB02002 3/14/2013 2	MidSouth MRP PR PRSB02 PRSSB02003 3/14/2013 3	MidSouth MRP PR PRSB02 PRSSB02004 3/14/2013 4
7439-92-1	Lead	26.03/19.7	400	800	147	271	97.2	49.8	37.9	51.3	230	118	**481**	253	345	252
	BEQ				**5.94**	**49.5**	**5.33**	**59.5**	**6.63**	**0.486**	**14**	**5.9**	**104**	**1.25**	**0.758**	**1.48**
56-55-3	Benzo(a)anthracene		0.148	2.11	**1.76**	**23.4**	**2.38**	**25.6**	**2.59**	**0.228**	**5.56**	**2.72**	**62.2**	**0.758**	**0.347**	**0.795**
50-32-8	Benzo(a)pyrene	0.565	0.015	0.211	**4.26** J	**35** J	**3.85** J	**43** J	**4.74** J	**0.39**	**10.4**	**4.74**	**84**	**1.01**	**0.619**	**1.2**
205-99-2	Benzo(b)fluoranthene		0.148	2.11	**3.97**	**31.7**	**4.52**	**45.4**	**4.88**	**0.478**	**12.1**	**5.73**	**99.7**	**1.14**	**0.745**	**1.42**
207-08-9	Benzo(k)flouranthene		3440.511	21.095	2.05	20.6	1.93	17.2	2.52	0.245	4.37	2.19	37.4	0.68	0.359	0.86
218-01-9	Chrysene		14.762	210.95	2.54	**22.4**	3.05	**26**	3.35	0.365	7.33	3.96	**66.8**	0.778	0.5	0.874
53-70-3	Dibenz(a,h)anthracene		0.015	0.211	**0.732**	**5.72**	**0.511**	**6.11**	**0.695**	0.00112 U	**1.19**	0.011 U	0.06 U	0.00115 U	0.00119 U	0.00119 U
193-39-5	Indeno(1,2,3,-cd)pyrene		0.148	2.11	**3.48**	**30**	**2.55**	**30.7**	**4.17**	**0.215**	**6.05**	**2.8**	**36.6**	**0.39**	**0.243**	**0.441**
83-32-9	Acenaphthene		3440.511	33003.23	0.14	2.61	0.137	2.99	0.167	0.00123 U	0.376	0.18	3.87	0.0462	0.0215	0.0393
208-96-8	Acenaphthylene		3440.511	33003.23	0.00158 U	0.0161 U	0.00317 U	0.0152 U	0.00291 U	0.0144	0.0189	0.00728 U	0.0794 U	0.00152 U	0.00158 U	0.00157 U
120-12-7	Anthracene		17202.56	165016.1	0.11	4.62	0.265	4.11	0.297	0.0364	0.868	0.283	8.8	0.0998	0.0447	0.0763
191-24-2	Benzo(g,h,i)perylene		1720.256	16501.62	3.71	29.7	2.89	31.4	4.55	0.205	6.14	3.31	34.9	0.347	0.229	0.397
206-44-0	Fluorathene		2293.674	22002.15	1.98	38.4	3.19	39	3.31	0.339	10.2	3.74	89.7	1.16	0.536	0.995
86-73-7	Fluorene		2293.674	22002.15	0.0199	0.841	0.0413	1.22	0.0479	0.00046 U	0.142	0.0105 J	1.06	0.0117	0.00049 U	0.00386
90-12-0	1-Methylnaphthalene		15.642	53.109	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA
91-57-6	2-Methylnaphthalene		229.367	2200.215	0.0139	0.152	0.0277	0.248	0.0224	0.00079 U	0.042	0.00388 U	0.517	0.00081 U	0.00084 U	0.00084 U
91-20-3	Naphthalene		3.569	17.987	0.0426	0.353	0.116	0.91	0.105	0.00042 U	0.158	0.12	1.87	0.0212	0.0183	0.0169
85-01-8	Phenanthrene		1720.256	16501.62	0.494	19.1	1.2	17	1.19	0.0704	3.88	1.05	33.6	0.46	0.177	0.309
129-00-0	Pyrene		1720.256	16501.62	1.84	29	2.9	28.6	2.85	0.329	6.15	3.08	68.7	0.792	0.398	0.674

CAS_NO	Parameter	Surface/ Subsurface Background	Res RSL	Ind RSL	MidSouth MRP PR PRSB06 PRSSB06009 3/12/2013 9	MidSouth MRP PR PRSB06 PRSSB06010 3/12/2013 10	MidSouth MRP PR PRSB06 PRSSB06011 3/12/2013 11	MidSouth MRP PR PRSB06 PRSSB06012 3/12/2013 12	MidSouth MRP PR PRSB06 PRSSB06013 3/12/2013 13	MidSouth MRP PR PRSB06 PRSSB06014 3/12/2013 14	MidSouth MRP PR PRSB07 PRSSB07002 3/12/2013 2	MidSouth MRP PR PRSB07 PRSSB07003 3/12/2013 3	MidSouth MRP PR PRSB07 PRSSB07004 3/12/2013 4	MidSouth MRP PR PRSB07 PRSSB07005 3/12/2013 5	MidSouth MRP PR PRSB07 PRSSB07006 3/12/2013 6	MidSouth MRP PR PRSB07 PRSSB07008 3/13/2013 8
7439-92-1	Lead	26.03/19.7	400	800	148	59	130	66.6	79.3	**1990**	28.4	46.4	200	154	40.5	128
	BEQ	0.565			**0.359**	**0.581**	**0.391**	**0.528**	**0.412**	**0.846**	**0.0989**	**0.918**	**3.19**	**0.276**	**0.46**	**19.9**
56-55-3	Benzo(a)anthracene		0.148	2.11	**0.166**	**0.247**	**0.193**	**0.273**	**0.22**	**0.423**	0.0477	**0.331**	**1.32**	0.145	**0.192**	**7.08**
50-32-8	Benzo(a)pyrene	0.565	0.015	0.211	**0.256**	**0.416**	**0.279**	**0.376**	**0.294**	**0.602**	**0.071**	**0.644**	**2.3**	**0.194**	**0.326**	**14.5**
205-99-2	Benzo(b)fluoranthene		0.148	2.11	**0.299**	**0.464**	**0.328**	**0.458**	**0.344**	**0.696**	0.0834	**0.743**	**2.3**	**0.225**	**0.388**	**16.2**
207-08-9	Benzo(k)flouranthene		3440.511	21.095	0.131	0.207	0.149	0.18	0.152	0.29	0.0437	0.304	0.938	0.0888	0.151	7.45
218-01-9	Chrysene		14.762	210.95	0.229	0.354	0.263	0.352	0.284	0.56	0.0591	0.489	1.96	0.206	0.292	9.55
53-70-3	Dibenz(a,h)anthracene		0.015	0.211	**0.0357**	**0.0591**	**0.0378**	**0.0503**	**0.039**	**0.0839**	0.00947	**0.105**	**0.35**	**0.0299**	**0.0481**	**1.92**
193-39-5	Indeno(1,2,3,-cd)pyrene		0.148	2.11	**0.192**	**0.321**	**0.205**	**0.265**	**0.211**	**0.443**	0.0486	**0.58**	**1.71**	0.142	**0.257**	**10.5**
83-32-9	Acenaphthene		3440.511	33003.23	0.0112	0.0175	0.0143	0.0184	0.0192	0.0294	0.00136 U	0.0201 J	0.0739	0.0105	0.013	0.545
208-96-8	Acenaphthylene		3440.511	33003.23	0.00162 U	0.00161 U	0.00164 U	0.00162 U	0.00784	0.00165 U	0.00164 U	0.00159 U	0.0016 U	0.00158 U	0.00159 U	0.0266
120-12-7	Anthracene		17202.56	165016.1	0.0251	0.0341	0.041	0.058	0.0471	0.0872	0.0048	0.0293	0.222	0.016	0.0215	1
191-24-2	Benzo(g,h,i)perylene		1720.256	16501.62	0.227	0.383	0.238	0.31	0.247	0.51	0.0537	0.677	2.39	0.175	0.296	12.1
206-44-0	Fluorathene		2293.674	22002.15	0.248	0.353	0.335	0.463	0.391	0.71	0.0498	0.369	2.02	0.172	0.261	11
86-73-7	Fluorene		2293.674	22002.15	0.00051 U	0.0005 U	0.00051 U	0.0005 U	0.0005 U	0.00428	0.00051 U	0.0005 U	0.0243	0.00049 U	0.0376	0.196
90-12-0	1-Methylnaphthalene		15.642	53.109	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA
91-57-6	2-Methylnaphthalene		229.367	2200.215	0.00087 U	0.00086 U	0.00087 U	0.00086 U	0.00086 U	0.00378	0.00087 U	0.00085 U	0.00842	0.00084 U	0.00085 U	0.0631
91-20-3	Naphthalene		3.569	17.987	0.00046 U	0.00647	0.00046 U	0.0116	0.00777	0.0139	0.00046 U	0.0114	0.0296	0.00045 U	0.00785	0.257
85-01-8	Phenanthrene		1720.256	16501.62	0.0934	0.121	0.151	0.221	0.168	0.342	0.012	0.104	0.942	0.0573	0.078	4.25
129-00-0	Pyrene		1720.256	16501.62	0.231	0.305	0.289	0.389	0.333	0.613	0.0436	0.376	1.24	0.162	0.251	8.09

CAS_NO	Parameter	Surface/ Subsurface Background	Res RSL	Ind RSL	MidSouth MRP PR PR-SS001 PR-SS001-0001 2/24/2010 1	MidSouth MRP PR PR-SS001C PR-SSC01-0001 2/24/2010 1	MidSouth MRP PR PR-SS004 PR-SS004-0001 2/24/2010 1	MidSouth MRP PR PR-SS005 PR-SS005-0001 2/24/2010 1	MidSouth MRP PR PR-SS007 PR-SS007-0001 2/24/2010 1	MidSouth MRP PR PR-SS010 PR-SS010-0001 2/24/2010 1	MidSouth MRP PR PR-SS012 PR-SS012-0001 2/24/2010 1	MidSouth MRP PR PR-SS013 PR-SS013-0001 2/24/2010 1	MidSouth MRP PR PR-SS014 PR-SS014-0001 2/24/2010 1	MidSouth MRP PR PR-SS016 PR-SS016-0001 2/24/2010 1	MidSouth MRP PR PR-SS017 PR-SS017-0001 2/24/2010 1	MidSouth MRP PR PR-SS018 PR-SS018-0001 2/24/2010 1
7439-92-1	Lead	26.03/19.7	400	800	127	161	27.3	235	49.8	148	123	**21000**	**2230**	**428**	**694** J	**530**

Notes: All units milligrams per kilogram (mg/kg) or parts per million (ppm)
U = not detected
J = Estimated
NLA = no laboratory analysis for parameter

Bold indicates exceeded residential U.S. Enviornmental Protection Agency (USEPA) Regional Screening Level (RSL)
Underline indicates exceeded industrial USEPA RSL
Shading indicates exceeded NSA Mid-South site-specific background concentration

Table 5-2
UXO 1 Pistol Range Soil Analytical Results (RFI and SI Data)
NSA Mid-South
Millington, Tennessee

CAS_NO	Parameter	Surface/ Subsurface Background	Res RSL	Ind RSL	MidSouth MRP PR PRSB02 PRSSB02005 3/14/2013 5	MidSouth MRP PR PRSB02 PRSSB02006 3/14/2013 6	MidSouth MRP PR PRSB02 PRSSB02008 3/13/2013 8	MidSouth MRP PR PRSB02 PRSSB02010 3/13/2013 10	MidSouth MRP PR PRSB02 PRSSB02012 3/13/2013 12	MidSouth MRP PR PRSB02 PRSSB02014 3/13/2013 14	MidSouth MRP PR PRSB03 PRSSB03002 3/14/2013 2	MidSouth MRP PR PRSB03 PRSSB03003 3/14/2013 3	MidSouth MRP PR PRSB03 PRSSB03004 3/14/2013 4	MidSouth MRP PR PRSB03 PRSSB03005 3/14/2013 5	MidSouth MRP PR PRSB03 PRSSB03006 3/14/2013 6	MidSouth MRP PR PRSB03 PRSSB03008 3/12/2013 8
				End Depth												
7439-92-1	Lead	26.03/19.7	400	800	38.2	49.6 J	19.7	20.1	16.7	19.2	141	299	80.2	91.1	116	105
	BEQ				**0.969**	**3.19**	**0.144**	**0.0636**	**0.018**	**0.0457**	**5.03**	**1.69**	**1.7**	**0.983**	**0.355**	**0.64**
56-55-3	Benzo(a)anthracene		0.148	2.11	**0.414**	**0.947** J	0.0809	0.0342	0.0123	0.0272	**3.42**	**0.994**	**0.853**	**0.302**	**0.201**	**0.36**
50-32-8	Benzo(a)pyrene	0.565	0.015	0.211	**0.794**	**2.3** J	**0.114**	**0.0497**	0.0118	**0.0341**	**4.06**	**1.38**	**1.39**	**0.69**	**0.287**	**0.453**
205-99-2	Benzo(b)fluoranthene		0.148	2.11	**0.976**	**2.66** J	0.122	0.0577	0.0279	0.0519	**4.33**	**1.47**	**1.58**	**0.722**	**0.338**	**0.554**
207-08-9	Benzo(k)flouranthene		3440.511	21.095	0.481	1.08 J	0.068	0.032	0.00695	0.0174	2.66	0.939	0.869	0.339	0.175	0.207
218-01-9	Chrysene		14.762	210.95	0.615	1.26 J	0.113	0.0391	0.0152	0.0344	3.35	1.06	1.18	0.436	0.219	0.447
53-70-3	Dibenz(a,h)anthracene		0.015	0.211	0.0012 U	**0.334** J	0.00118 U	0.00118 U	0.00122 U	0.0012 U	0.00584 U	0.00119 U	0.0012 U	**0.12**	0.00122 U	**0.0602**
193-39-5	Indeno(1,2,3,-cd)pyrene		0.148	2.11	**0.29**	**1.88** J	0.0725	0.0314	0.00785	0.0225	**1.57**	**0.547**	**0.51**	**0.664**	0.105	**0.332**
83-32-9	Acenaphthene		3440.511	33003.23	0.0262	0.0593 J	0.00129 U	0.0013 U	0.00134 U	0.00132 U	0.863	0.0544	0.0567	0.0189	0.00134 U	0.0224
208-96-8	Acenaphthylene		3440.511	33003.23	0.0123	0.0157	0.0138	0.00157 U	0.00161 U	0.00159 U	0.00772 U	0.00158 U	0.00158 U	0.00561	0.00161 U	0.00163 U
120-12-7	Anthracene		17202.56	165016.1	0.0465	0.0866	0.0143	0.00452	0.00033 U	0.00437	0.845	0.118	0.103	0.0509	0.0242	0.0692
191-24-2	Benzo(g,h,i)perylene		1720.256	16501.62	0.265	2.28 J	0.081	0.0376	0.00922	0.0244	1.47	0.486	0.472	0.8	0.103	0.37
206-44-0	Fluorathene		2293.674	22002.15	0.581	1.25 J	0.175	0.0444	0.0204	0.0515	6.32	1.44	1.28	0.434	0.287	0.637
86-73-7	Fluorene		2293.674	22002.15	0.00179 J	0.0131	0.00048 U	0.00049 U	0.0005 U	0.00049 U	0.43	0.0139	0.0152	0.0005 U	0.0005 U	0.00051 U
90-12-0	1-Methylnaphthalene		15.642	53.109	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA
91-57-6	2-Methylnaphthalene		229.367	2200.215	0.00085 U	0.0106	0.00083 U	0.00083 U	0.00086 U	0.00085 U	0.105	0.00765	0.00084 U	0.00086 U	0.00086 U	0.00087 U
91-20-3	Naphthalene		3.569	17.987	0.0151	0.0343 J	0.00044 U	0.00044 U	0.00046 U	0.00045 U	0.472	0.0293	0.0335	0.00812	0.00691	0.0111
85-01-8	Phenanthrene		1720.256	16501.62	0.184	0.381	0.0546	0.0142	0.0081	0.0198	3.74	0.533	0.481	0.184	0.0926	0.271
129-00-0	Pyrene		1720.256	16501.62	0.396	1.15 J	0.138	0.039	0.0166	0.0442	4.47	1.04	0.98	0.428	0.203	0.525

CAS_NO	Parameter	Surface/ Subsurface Background	Res RSL	Ind RSL	MidSouth MRP PR PRSB07 PRSSB07010 3/13/2013 10	MidSouth MRP PR PRSB07 PRSSB07012 3/13/2013 12	MidSouth MRP PR PRSB07 PRSSB07014 3/13/2013 14	MidSouth MRP PR PRSB08 PRSSB0802 3/11/2013 2	MidSouth MRP PR PRSB08 PRSSB0803 3/11/2013 3	MidSouth MRP PR PRSB08 PRSSB0804 3/11/2013 4	MidSouth MRP PR PRSB08 PRSSB0805 3/11/2013 5	MidSouth MRP PR PRSB08 PRSSB0806 3/11/2013 6	MidSouth MRP PR PRSB08 PRSSB08008 3/13/2013 8	MidSouth MRP PR PRSB08 PRSSB08010 3/13/2013 10	MidSouth MRP PR PRSB08 PRSSB08012 3/13/2013 12	MidSouth MRP PR PRSB08 PRSSB08014 3/13/2013 14
				End Depth												
7439-92-1	Lead	26.03/19.7	400	800	23.4	110	164	30.6	37.9	31.4	39.9	49.3	136	39.8	59.8	49.2
	BEQ	0.565			**0.867**	**5.57**	**12.6**	**0.349**	**0.0266**	**0.344**	**0.0763**	**1.71**	**0.896**	**0.174**	**0.0881**	**1**
56-55-3	Benzo(a)anthracene		0.148	2.11	**0.287**	**2.1**	**6.32**	**0.2**	0.0144	**0.197**	0.0514	**0.787**	**0.348**	0.0635	0.0468	**0.37**
50-32-8	Benzo(a)pyrene	0.565	0.015	0.211	**0.619**	**4.02**	**9.06**	**0.254**	**0.0175**	**0.249**	**0.0504**	**1.22**	**0.621**	**0.118**	**0.0557**	**0.702**
205-99-2	Benzo(b)fluoranthene		0.148	2.11	**0.662**	**4.75**	**10.9**	**0.546**	0.0493	**0.542**	0.0987	**1.33**	**0.753**	**0.16**	0.111	**0.83**
207-08-9	Benzo(k)flouranthene		3440.511	21.095	0.257	1.98	4.58	0.248	0.0153	0.238	0.0359	0.598	0.252	0.075	0.0427	0.321
218-01-9	Chrysene		14.762	210.95	0.426	2.73	7.64	0.319	0.0291	0.287	0.0591	1.11	0.458	0.106	0.0714	0.533
53-70-3	Dibenz(a,h)anthracene		0.015	0.211	**0.0958**	**0.547**	**1.2**	0.00122 U	0.00122 U	0.00121 U	0.0067	**0.173**	**0.107**	**0.0207**	0.0108	**0.114**
193-39-5	Indeno(1,2,3,-cd)pyrene		0.148	2.11	**0.541**	**2.92**	**6.14**	**0.159**	0.0127	**0.168**	0.0375	**0.938**	**0.551**	0.118	0.0536	**0.611**
83-32-9	Acenaphthene		3440.511	33003.23	0.0187	0.134	0.474	0.00135 U	0.00134 U	0.00133 U	0.00133 U	0.0567	0.0178	0.00133 U	0.00122 U	0.0276
208-96-8	Acenaphthylene		3440.511	33003.23	0.00159 U	0.0209	0.015 U	0.0265	0.00161 U	0.0232	0.00159 U	0.00157 U	0.00159 U	0.00959	0.00887	0.0141
120-12-7	Anthracene		17202.56	165016.1	0.0208	0.378	1.84	0.0502	0.00033 U	0.0367	0.0103	0.159	0.0267	0.0138	0.0141	0.0504
191-24-2	Benzo(g,h,i)perylene		1720.256	16501.62	0.613	3.52	7.04	0.152	0.0137	0.159	0.0415	1.11	0.617	0.123	0.0531	0.685
206-44-0	Fluorathene		2293.674	22002.15	0.277	3.8	13.4	0.212	0.0129	0.14	0.0535	1.32	0.312	0.0626	0.0345	0.407
86-73-7	Fluorene		2293.674	22002.15	0.00049 U	0.0135 J	0.205	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0181	0.00049 U	0.0005 U	0.00046 U	0.0005 U
90-12-0	1-Methylnaphthalene		15.642	53.109	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA
91-57-6	2-Methylnaphthalene		229.367	2200.215	0.00085 U	0.0213	0.0765	0.00086 U	0.00086 U	0.00085 U	0.00085 U	0.00909	0.00085 U	0.00085 U	0.00078 U	0.00086 U
91-20-3	Naphthalene		3.569	17.987	0.0119	0.0709	0.192	0.00046 U	0.00046 U	0.00045 U	0.00045 U	0.0373	0.0042	0.00045 U	0.00042 U	0.0138
85-01-8	Phenanthrene		1720.256	16501.62	0.0687	1.43	6.65	0.011	0.00058 U	0.00058 U	0.022	0.59	0.0804	0.0122	0.00459	0.123
129-00-0	Pyrene		1720.256	16501.62	0.282	2.64	9.32	0.274	0.0182	0.212	0.066	1.13	0.322	0.0704	0.0466	0.411

CAS_NO	Parameter	Surface/ Subsurface Background	Res RSL	Ind RSL	MidSouth MRP PR PR-SS019 PR-SS019-0001 2/24/2010 1	MidSouth MRP PR PR-SS020 PR-SS020-0001 2/24/2010 1	MidSouth MRP PR PR-SS023 PR-SS023-0001 2/24/2010 1	MidSouth MRP PR PR-SS024 PR-SS024-0001 2/24/2010 1	MidSouth MRP PR PR-SS025 PR-SS025-0001 2/24/2010 1	MidSouth MRP PR PR-SS027 PR-SS027-0001 2/24/2010 1	MidSouth MRP PR PR-SS028 PR-SS028-0001 2/24/2010 1	MidSouth MRP PR PR-SS032 PR-SS032-0001 2/24/2010 1	MidSouth MRP PR PR-SS033 PR-SS033-0001 2/24/2010 1	MidSouth MRP PR PR-SS034 PR-SS034-0001 2/24/2010 1	MidSouth MRP PR PR-SS035 PR-SS035-0001 2/24/2010 1	MidSouth MRP PR PR-SS037 PR-SS037-0001 2/24/2010 1
				End Depth												
7439-92-1	Lead	26.03/19.7	400	800	292	328	335	**1000** J	**17300** J	**425**	268	**21100** J	242	222	395	**1660**

Notes: All units milligrams per kilogram (mg/kg) or parts per million (ppm)
U = not detected
J = Estimated
NLA = no laboratory analysis for parameter

Table 5-2
UXO 1 Pistol Range Soil Analytical Results (RFI and SI Data)
NSA Mid-South
Millington, Tennessee

CAS_NO	Parameter	Surface/ Subsurface Background	Res RSL	Ind RSL	MidSouth MRP PR PRSB03 PRSSB03010 3/12/2013 10	MidSouth MRP PR PRSB03 PRSSB03012 3/12/2013 12	MidSouth MRP PR PRSB03 PRSSB03014 3/12/2013 14	MidSouth MRP PR PRSB03 PRSSB03016 3/12/2013 16	MidSouth MRP PR PRSB04 PRSSB04002 3/12/2013 2	MidSouth MRP PR PRSB04 PRSSB04003 3/12/2013 3	MidSouth MRP PR PRSB04 PRSSB04004 3/12/2013 4	MidSouth MRP PR PRSB04 PRSSB04005 3/12/2013 5	MidSouth MRP PR PRSB04 PRSSB04006 3/12/2013 6	MidSouth MRP PR PRSB04 PRSSB04008 3/13/2013 8	MidSouth MRP PR PRSB04 PRSSB04010 3/13/2013 10	MidSouth MRP PR PRSB04 PRSSB04012 3/13/2013 12
7439-92-1	Lead	26.03/19.7	400	800	93.9	104	112	108	107	160	**29300**	106	101	377	13.7	17.5
	BEQ				**1.23**	**0.504**	**0.339**	**1.23**	**5.61**	**2**	**2.72**	**2.23**	**1.94**	**1.67**	**0.0392**	**0.124**
56-55-3	Benzo(a)anthracene		0.148	2.11	**0.736**	**0.208**	**0.169**	**0.518**	**2.24**	**1.26**	**1.61**	**0.922**	**0.935**	**1.24**	0.0249	0.0589
50-32-8	Benzo(a)pyrene	0.565	0.015	0.211	**0.868**	**0.361**	**0.241**	**0.87**	**4.11**	**1.41**	**1.89**	**1.57**	**1.37**	**1.19**	**0.0264**	**0.0981**
205-99-2	Benzo(b)fluoranthene		0.148	2.11	**1.01**	**0.395**	**0.277**	**0.985**	**4.04**	**1.47**	**2.12**	**1.64**	**1.44**	**1.28**	0.0397	0.107
207-08-9	Benzo(k)flouranthene		3440.511	21.095	0.409	0.185	0.122	0.397	1.93	0.76	0.855	0.735	0.649	0.597	0.016	0.0618
218-01-9	Chrysene		14.762	210.95	0.905	0.312	0.23 J	0.702	3.08	1.5	1.89	1.22	1.21	1.38	0.0257	0.0897
53-70-3	Dibenz(a,h)anthracene		0.015	0.211	**0.12**	**0.0522**	**0.034**	**0.138**	**0.562**	**0.204**	**0.297**	**0.264**	**0.211**	**0.15**	0.004	0.00121 U
193-39-5	Indeno(1,2,3,-cd)pyrene		0.148	2.11	**0.619**	**0.285**	**0.184** J	**0.68**	**2.84**	**1.02**	**1.5**	**1.33**	**1.09**	**0.755**	0.0214	0.0752
83-32-9	Acenaphthene		3440.511	33003.23	0.0542	0.018	0.0135	0.025	0.159	0.101	0.121	0.0508	0.0575	0.114	0.00131 U	0.00133 U
208-96-8	Acenaphthylene		3440.511	33003.23	0.00162 U	0.00803	0.00683	0.00559	0.0125	0.0123	0.0075	0.00158 U	0.00153 U	0.0114	0.0108	0.00159 U
120-12-7	Anthracene		17202.56	165016.1	0.191	0.0365	0.0316 J	0.0438	0.315	0.352	0.428	0.108	0.166	0.346	0.00758	0.00889
191-24-2	Benzo(g,h,i)perylene		1720.256	16501.62	0.671	0.34	0.215 J	0.742	2.97	1.06	1.59	1.46	1.15	0.721	0.0258	0.0896
206-44-0	Fluorathene		2293.674	22002.15	1.49	0.32	0.295 J	0.595	3.35	2.86	2.99	1.14	1.41	2.95	0.0338	0.111
86-73-7	Fluorene		2293.674	22002.15	0.0204	0.00051 U	0.00051 U	0.00051 U	0.0379	0.0657	0.0785	0.0122	0.0192	0.0565	0.00049 U	0.0005 U
90-12-0	1-Methylnaphthalene		15.642	53.109	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA
91-57-6	2-Methylnaphthalene		229.367	2200.215	0.00826	0.00489	0.00087 U	0.00454	0.0256	0.0164	0.019	0.00705	0.00953	0.0357	0.00084 U	0.00085 U
91-20-3	Naphthalene		3.569	17.987	0.0259	0.00822	0.00601	0.0146	0.117	0.0467	0.0483	0.025	0.0308	0.088	0.00045 U	0.00045 U
85-01-8	Phenanthrene		1720.256	16501.62	0.742	0.128	0.114 J	0.158	1.16	1.51	1.82	0.479	0.643	1.57	0.0107	0.0385
129-00-0	Pyrene		1720.256	16501.62	1.11	0.268	0.241	0.514	2.49	1.94	2.67	1.07	1.21	2.16	0.0306	0.097

CAS_NO	Parameter	Surface/ Subsurface Background	Res RSL	Ind RSL	MidSouth MRP PR PRSB09 PRSSB0901 3/11/2013 1	MidSouth MRP PR PRSB09 PRSSB0902 3/11/2013 2	MidSouth MRP PR PRSB10 PRSSB1001 3/11/2013 1	MidSouth MRP PR PRSB10 PRSSB1002 3/11/2013 2	MidSouth MRP PR PRSB11 PRSSB1101 3/11/2013 1	MidSouth MRP PR PRSB11 PRSSB1102 3/11/2013 2	MidSouth MRP PR PRSB12 PRSSB1201 3/11/2013 1	MidSouth MRP PR PRSB12 PRSSB1202 3/11/2013 2	MidSouth MRP PR PRSB13 PRSSB13001 3/14/2013 1	MidSouth MRP PR PRSB13 PRSSB13002 3/14/2013 2	MidSouth MRP PR PRSB14 PRSSB14001 3/14/2013 1	MidSouth MRP PR PRSB14 PRSSB14002 3/14/2013 2
7439-92-1	Lead	26.03/19.7	400	800	70		48.4		227		51.8					
	BEQ	0.565			**4.64**	**44.6**	**0.614**	**77.4**	**1.07**	**18.3**	**0.995**	**3.29**	**5.24**	**0.341**	**2.48**	**0.111**
56-55-3	Benzo(a)anthracene		0.148	2.11	**2.92** J	**14.4**	**0.359** J	**26.7**	**0.538** J	**8.93** J	**0.52** J	**1.75** J	**1.68**	0.112	**0.597**	0.0346
50-32-8	Benzo(a)pyrene	0.565	0.015	0.211	**3.54**	**32.4**	**0.465**	**55**	**0.822**	**11.1**	**0.753**	**2.52**	**3.88** J	**0.24** J	**1.78** J	**0.0806**
205-99-2	Benzo(b)fluoranthene		0.148	2.11	**4.91** J	**31.7**	**0.637** J	**63.2**	**1.23** J	**15.9** J	**1.19** J	**3.64** J	**3.73**	**0.26**	**1.63**	0.0919
207-08-9	Benzo(k)flouranthene		3440.511	21.095	1.86	14.8	0.289	22.2	0.375	5.06	0.32	1.23	1.79	0.11	0.655	0.0379
218-01-9	Chrysene		14.762	210.95	2.9 J	**19**	0.35 J	**36.8**	0.608 J	9.37 J	0.558 J	1.86 J	2.18	0.157	0.781	0.051
53-70-3	Dibenz(a,h)anthracene		0.015	0.211	0.00121 U	**5**	0.00123 U	**8.9**	0.00122 U	**3.7**	0.0012 U	0.0012 U	**0.538**	**0.0414**	**0.305**	0.0109
193-39-5	Indeno(1,2,3,-cd)pyrene		0.148	2.11	**2.99**	**24.5**	**0.445**	**42.9**	**0.685**	**9.27**	**0.663**	**2.19**	**2.63**	**0.214**	**1.68**	0.0641
83-32-9	Acenaphthene		3440.511	33003.23	0.125 J	1.11	0.00136 UJ	2.12	0.00134 UJ	0.397 J	0.00132 UJ	0.0488 J	0.075	0.0106	0.15	0.00133 U
208-96-8	Acenaphthylene		3440.511	33003.23	0.0377	0.0156 U	0.0568	0.0157 U	0.0234	0.0117	0.0111	0.00159 U	0.00475	0.00161 U	0.00159 U	0.0016 U
120-12-7	Anthracene		17202.56	165016.1	0.314	1.52	0.0777	3.06	0.0708	0.877	0.0383	0.134	0.103	0.0206	0.0475	0.00767
191-24-2	Benzo(g,h,i)perylene		1720.256	16501.62	3.01	24.5	0.452	45	0.78	9.19	0.686	2.24	2.6	0.227	1.67	0.0718
206-44-0	Fluorathene		2293.674	22002.15	4.17	19.4	0.423	39.5	0.647	12.8	0.454	1.83	1.88	0.185	0.684	0.0283
86-73-7	Fluorene		2293.674	22002.15	0.0531	0.238	0.00051 U	0.678	0.0005 U	0.154	0.00049 U	0.0224	0.0118	0.0005 U	0.00049 U	0.0005 U
90-12-0	1-Methylnaphthalene		15.642	53.109	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA
91-57-6	2-Methylnaphthalene		229.367	2200.215	0.0201	0.143	0.00087 U	0.249	0.00086 U	0.0725	0.00084 U	0.00085 U	0.012	0.00086 U	0.00655	0.00085 U
91-20-3	Naphthalene		3.569	17.987	0.0569	0.481	0.00046 U	1.06	0.0117	0.292	0.00045 U	0.0389	0.0364	0.00252 J	0.0123	0.00046 U
85-01-8	Phenanthrene		1720.256	16501.62	1.49	5.82	0.157	13.5	0.2	4.04	0.121	0.506	0.447	0.0748	0.196	0.00865
129-00-0	Pyrene		1720.256	16501.62	3.34	15.8	0.36	31.7	0.591	10.1	0.448	1.6	1.61	0.15	0.611	0.0333

CAS_NO	Parameter	Surface/ Subsurface Background	Res RSL	Ind RSL	MidSouth MRP PR PR-SS038 PR-SS038-0001 2/24/2010 1	MidSouth MRP PR PR-SS039 PR-SS039-0001 2/24/2010 1	MidSouth MRP PR PR-SS040 PR-SS040-0001 2/24/2010 1
7439-92-1	Lead	26.03/19.7	400	800	**497**	**1490** J	**585** J

Notes: All units milligrams per kilogram (mg/kg) or parts per million (ppm)
U = not detected
J = Estimated
NLA = no laboratory analysis for parameter

Table 5-2
UXO 1 Pistol Range Soil Analytical Results (RFI and SI Data)
NSA Mid-South
Millington, Tennessee

CAS_NO	Parameter	Surface/ Subsurface Background	Res RSL	Ind RSL	MidSouth MRP PR PRSB04 PRSSB04014 3/13/2013 14	MidSouth MRP PR PRSB05 PRSSB05002 3/12/2013 2	MidSouth MRP PR PRSB05 PRSSB05003 3/12/2013 3	MidSouth MRP PR PRSB05 PRSSB05004 3/12/2013 4	MidSouth MRP PR PRSB05 PRSSB05005 3/12/2013 5	MidSouth MRP PR PRSB05 PRSSB05008 3/13/2013 8	MidSouth MRP PR PRSB05 PRSSB05010 3/13/2013 10	MidSouth MRP PR PRSB05 PRSSB05012 3/13/2013 12	MidSouth MRP PR PRSB05 PRSSB05014 3/13/2013 14	MidSouth MRP PR PRSB06 PRSSB06002 3/12/2013 2	MidSouth MRP PR PRSB06 PRSSB06003 3/12/2013 3	MidSouth MRP PR PRSB06 PRSSB06004 3/12/2013 4
				Range Location Sample ID Date End Depth												
7439-92-1	Lead	26.03/19.7	400	800	21.7	127	94.2 J	94.2	73.5	**1430**	48.2	16.5	18.3	90.9	93.5	93.7
	BEQ				**0.0919**	**4.89**	**1.98**	**1.83**	**1.23**	**16.1**	**0.213**	**0.105**	**0.0701**	**1.65**	**1.83**	**2.77**
56-55-3	Benzo(a)anthracene		0.148	2.11	0.0608	**3.15**	**1.02**	**0.913**	**0.553**	**4.78**	0.0873	0.119	0.0491	**0.792**	**1.01** J	**1.31**
50-32-8	Benzo(a)pyrene	0.565	0.015	0.211	**0.0698**	**3.4**	**1.38**	**1.31**	**0.874**	**11.6**	**0.15**	**0.0747**	**0.0488**	**1.19**	**1.28** J	**1.94**
205-99-2	Benzo(b)fluoranthene		0.148	2.11	0.0913	**4.13**	**1.57**	**1.54**	**1.02**	**13.5**	**0.17**	0.109	0.0601	**1.32**	**1.37** J	**2.08**
207-08-9	Benzo(k)flouranthene		3440.511	21.095	0.0331	1.51	0.655	0.771	0.392	5.51	0.0759	0.0561	0.0298	0.641	0.594 J	1.02
218-01-9	Chrysene		14.762	210.95	0.0622	3.3	1.3	1.12	0.698	6.98	0.13	0.137	0.0451	1.13	1.29 J	1.77
53-70-3	Dibenz(a,h)anthracene		0.015	0.211	0.00119 U	**0.489**	**0.218**	**0.162**	**0.121**	**1.68**	**0.0232**	0.00241 U	0.00632	**0.153**	**0.2** J	**0.31**
193-39-5	Indeno(1,2,3,-cd)pyrene		0.148	2.11	0.0525	**2.56**	**1.12**	**0.998**	**0.684**	**8.91**	0.131	0.0445	0.0375	**0.837**	**1.03** J	**1.74**
83-32-9	Acenaphthene		3440.511	33003.23	0.00131 U	0.266	0.102	0.0602	0.0302	0.27	0.0013 U	0.011	0.00133 U	0.0587	0.0921 J	0.103
208-96-8	Acenaphthylene		3440.511	33003.23	0.0106	0.0147	0.0109	0.00587	0.00955	0.0393	0.0139	0.025	0.0218	0.00156 U	0.00159 U	0.00609
120-12-7	Anthracene		17202.56	165016.1	0.00901	0.655	0.167	0.174	0.0818	0.427	0.0156	0.0487	0.0107	0.147	0.196 J	0.201
191-24-2	Benzo(g,h,i)perylene		1720.256	16501.62	0.0558	2.79	1.21	1.12	0.813	10.5	0.156	0.0523	0.0396	0.973	1.1 J	1.88
206-44-0	Fluorathene		2293.674	22002.15	0.111	6.1	1.67	1.68	0.864	5.65	0.133	0.319	0.0859	1.35	1.67 J	1.92
86-73-7	Fluorene		2293.674	22002.15	0.00049 U	0.119	0.0406	0.0189	0.00454	0.00452 U	0.00049 U	0.0005 U	0.0005 U	0.0185	0.0351 J	0.0402
90-12-0	1-Methylnaphthalene		15.642	53.109	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA
91-57-6	2-Methylnaphthalene		229.367	2200.215	0.00084 U	0.031	0.0202	0.00999	0.00418	0.0415	0.00083 U	0.00085 U	0.00425 U	0.0102	0.014	0.0134
91-20-3	Naphthalene		3.569	17.987	0.00045 U	0.101	0.0625	0.0337	0.0147	0.139	0.00044 U	0.00045 U	0.00227 U	0.0418	0.0498 J	0.045
85-01-8	Phenanthrene		1720.256	16501.62	0.0367	2.76	0.741	0.641	0.303	1.57	0.0416	0.181	0.016	0.549	0.855 J	0.909
129-00-0	Pyrene		1720.256	16501.62	0.093	3.12	1.31	0.881	0.744	4.8	0.109	0.229	0.0634	1.11	1.41 J	1.93

CAS_NO	Parameter	Surface/ Subsurface Background	Res RSL	Ind RSL	MidSouth MRP PR PRSB15 PRSSB15001 3/14/2013 1	MidSouth MRP PR PRSB15 PRSSB15002 3/14/2013 2	MidSouth MRP PR PRSB16 PRSSB16001 3/14/2013 1	MidSouth MRP PR PRSB17 PRSSB17001 3/14/2013 1	MidSouth MRP PR PRSB17 PRSSB17002 3/14/2013 2	MidSouth MRP PR PRSB18 PRSSB18001 3/14/2013 1	MidSouth MRP PR PRSB18 PRSSB18002 3/14/2013 2	MidSouth MRP PR PRSB19 PRSSB19001 3/15/2013 1	MidSouth MRP PR PRSB19 PRSSB19002 3/15/2013 2
				Range Location Sample ID Date End Depth									
7439-92-1	Lead	26.03/19.7	400	800									
	BEQ	0.565			**1.02**	**0.0359**	**0.0249**	**1.49**	**0.72**	**1.05**	**0.0179**	**0.204**	**0.00275**
56-55-3	Benzo(a)anthracene		0.148	2.11	**0.384**	0.0179	0.0116	**0.566**	**0.395**	**0.59**	0.00805	0.0575	0.00194 U
50-32-8	Benzo(a)pyrene	0.565	0.015	0.211	**0.727** J	**0.0245**	**0.0163** J	**1.07** J	**0.521**	**0.763** J	0.0113 J	**0.147** J	0.00039 U
205-99-2	Benzo(b)fluoranthene		0.148	2.11	**0.808**	0.0408	0.0319	**1.15**	**0.656**	**0.738**	0.0272	**0.158**	0.00124 U
207-08-9	Benzo(k)flouranthene		3440.511	21.095	0.301	0.0161	0.00967	0.44	0.256	0.483	0.00567	0.064	0.00049 U
218-01-9	Chrysene		14.762	210.95	0.477	0.0295	0.0137	0.712	0.486	0.619	0.0134	0.0854	0.0014 U
53-70-3	Dibenz(a,h)anthracene		0.015	0.211	**0.115**	0.00357 J	0.00268 J	**0.157**	**0.0573**	**0.0991**	0.00197 J	**0.0223**	0.00125 U
193-39-5	Indeno(1,2,3,-cd)pyrene		0.148	2.11	**0.583**	0.018	0.0146	**0.828**	**0.339**	**0.51**	0.0108	0.124	0.00053 U
83-32-9	Acenaphthene		3440.511	33003.23	0.0239	0.00135 U	0.0014 U	0.0326	0.0289	0.035	0.00136 U	0.00138 U	0.00137 U
208-96-8	Acenaphthylene		3440.511	33003.23	0.0016 U	0.00162 U	0.00168 U	0.00595	0.0346	0.0016 U	0.00163 U	0.00166 U	0.00165 U
120-12-7	Anthracene		17202.56	165016.1	0.0735	0.00475	0.0039	0.111	0.0942	0.164	0.00147 J	0.00457	0.00034 U
191-24-2	Benzo(g,h,i)perylene		1720.256	16501.62	0.608	0.0211	0.018	0.854	0.401	0.477	0.0115	0.138	0.00075 U
206-44-0	Fluorathene		2293.674	22002.15	0.659	0.028	0.0125	1.06	1	1.43	0.00921	0.06	0.00046 U
86-73-7	Fluorene		2293.674	22002.15	0.0005 U	0.00051 U	0.00052 U	0.0059	0.0162	0.0129	0.00051 U	0.00052 U	0.00051 U
90-12-0	1-Methylnaphthalene		15.642	53.109	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA
91-57-6	2-Methylnaphthalene		229.367	2200.215	0.00085 U	0.00087 U	0.0009 U	0.00442	0.00895	0.00771	0.00087 U	0.00088 U	0.00088 U
91-20-3	Naphthalene		3.569	17.987	0.0127	0.00046 U	0.00048 U	0.0178	0.016	0.0207	0.00046 U	0.00047 U	0.00047 U
85-01-8	Phenanthrene		1720.256	16501.62	0.291	0.0145	0.00568	0.432	0.613	0.659	0.00437	0.0149	0.0006 U
129-00-0	Pyrene		1720.256	16501.62	0.512	0.0264	0.0108	0.792	0.76	1.05	0.00691	0.0561	0.00069 U

CAS_NO	Parameter	Surface/ Subsurface Background	Res RSL	Ind RSL
				Range Location Sample ID Date End Depth
7439-92-1	Lead	26.03/19.7	400	800

Notes: All units milligrams per kilogram (mg/kg) or parts per million (ppm)
U = not detected
J = Estimated
NLA = no laboratory analysis for parameter

Table 5-3
UXO 2 Trap/Skeet Ranges Soil Analytical Results (RFI and SI Data)
NSA Mid-South
Millington, Tennessee

CAS_NO	Parameter	Surface/ Subsurface Background	Res RSL	Ind RSL	MidSouth MRP TSR SRM001 SRM00100 2/27/2013 0.5	MidSouth MRP TSR SRM001 SRM00101 2/27/2013 1	MidSouth MRP TSR SRM002 SRM00200 2/27/2013 0.5	MidSouth MRP TSR SRM002 SRM00201 2/27/2013 1	MidSouth MRP TSR SRM003 SRM00300 2/27/2013 0.5	MidSouth MRP TSR SRM003 SRM00301 2/27/2013 1	MidSouth MRP TSR SRM004 SRM00400 2/28/2013 0.5	MidSouth MRP TSR SRM004 SRM00401 2/28/2013 1	MidSouth MRP TSR SRM005 SRM00500 3/1/2013 0.5	MidSouth MRP TSR SRM006 SRM00600 3/1/2013 0.5	MidSouth MRP TSR SRM007 SRM00700 3/1/2013 0.5	MidSouth MRP TSR SRM007 SRM00701 3/1/2013 1	MidSouth MRP TSR SRM008 SRM00800 3/1/2013 0.5
7439-92-1	Lead	26.03/19.7	400	800	181	33.4	120	160	80.1	153	228		0.0701 U	45.7	99.5		255
	BEQ				**0.247**	**0.0613**	**7.04**	**1.78**	**3.54**	**7.14**	**30.9**	**2.12**	**0.00284**	**0.0029**	**0.102**	**0.0237**	**0.13**
56-55-3	Benzo(a)anthracene		0.148	2.11	0.0989 J	0.00194 U	**2.36**	**0.711**	**1.58**	**2.72**	**19.3**	**1.46**	0.002 U	0.00205 U	0.0447	0.0133	0.0707
50-32-8	Benzo(a)pyrene	0.565	0.015	0.211	**0.145**	**0.025**	**4.53**	**1.17**	**2.44**	**4.9**	**21.7**	**1.45**	0.0004 U	0.00041 U	**0.0499**	**0.0173**	**0.0651**
205-99-2	Benzo(b)fluoranthene		0.148	2.11	**0.253**	0.0861	**7.02**	**1.78**	**2.96**	**8.04**	**28.1**	**1.76**	0.00129 U	0.00132 U	0.123	0.023	0.14
207-08-9	Benzo(k)flouranthene		3440.51	21.095	0.0922	0.0365	2.04	0.48	1.34	2.43	14	0.835	0.00051 U	0.00052 U	0.0496	0.0135	0.0606
218-01-9	Chrysene		14.762	210.95	0.081	0.0014 U	3.2	0.879	1.79	3.28	**18.2**	1.24	0.00144 U	0.00148 U	0.0284	0.015	0.0452
53-70-3	Dibenz(a,h)anthracene		0.015	0.211	**0.0487**	**0.0241**	**1.02**	**0.234**	**0.424**	**0.807**	**2.69**	**0.207**	0.00129 U	0.00132 U	**0.0299**	0.00122 U	**0.037**
193-39-5	Indeno(1,2,3,-cd)pyrene		0.148	2.11	**0.168**	0.0307	**5.24**	**1.2**	**2.1**	**3.31**	**16.5**	**1.34**	0.00055 U	0.00056 U	0.0534	0.0136	0.0667
83-32-9	Acenaphthene		3440.51	33003.23	0.00141 U	0.00137 U	0.0788	0.0282	0.0602	0.134	0.796	0.153	0.00142 U	0.00145 U	0.00147 U	0.00134 U	0.00141 U
208-96-8	Acenaphthylene		3440.51	33003.23	0.00169 U	0.00165 U	0.0161 U	0.00159 U	0.00171 U	0.00166 U	0.0175 U	0.00175 U	0.0017 U	0.00175 U	0.00177 U	0.00161 U	0.00169 U
120-12-7	Anthracene		17202.6	165016.1	0.0027 J	0.00034 U	0.0983	0.0293	0.0787	0.156	2.25	0.38	0.00035 U	0.00036 U	0.00347 J	0.00033 U	0.00429
191-24-2	Benzo(g,h,i)perylene		1720.26	16501.62	0.191	0.00622	6	1.44	2.27	3.53	17.3	1.38	0.00077 U	0.00079 U	0.0291	0.0165	0.046
206-44-0	Fluorathene		2293.67	22002.15	0.0581	0.00046 U	2.08	0.502	1.16	2.3	23.9	1.82	0.00048 U	0.00049 U	0.0305	0.0127	0.0469
86-73-7	Fluorene		2293.67	22002.15	0.00053 U	0.00051 U	0.0419	0.0108	0.0266	0.057	0.399	0.103	0.00053 U	0.00054 U	0.00055 U	0.0005 U	0.00053 U
90-12-0	1-Methylnaphthalene		15.642	53.109	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA
91-57-6	2-Methylnaphthalene		229.367	2200.215	0.0009 U	0.00088 U	0.0209 J	0.00621	0.0128	0.0257	0.142	0.0111	0.00091 U	0.00093 U	0.00094 U	0.00086 U	0.0009 U
91-20-3	Naphthalene		3.569	17.987	0.00185 J	0.00047 U	0.122	0.0279	0.052	0.107	0.459	0.0334	0.00048 U	0.0005 U	0.0005 U	0.00046 U	0.00048 U
85-01-8	Phenanthrene		1720.26	16501.62	0.011	0.0006 U	0.377	0.111	0.308	0.655	9.45	1.27	0.00062 U	0.00063 U	0.0139	0.00058 U	0.011
129-00-0	Pyrene		1720.26	16501.62	0.0575	0.00069 U	2.08	0.71	1.61	2.7	20.9	1.77	0.00072 U	0.00074 U	0.0272	0.0151	0.0425

CAS_NO	Parameter	Surface/ Subsurface Background	Res RSL	Ind RSL	MidSouth MRP TSR SRSB37 SRSSB3701 2/28/2013 1	MidSouth MRP TSR SRSB37 SRSSB3702 2/28/2013 2	MidSouth MRP TSR SRSB38 SRSSB3801 2/28/2013 1	MidSouth MRP TSR SRSB38 SRSSB3802 2/28/2013 2	MidSouth MRP TSR SRSB39 SRSSB3901 2/28/2013 1	MidSouth MRP TSR SRSB39 SRSSB3902 2/28/2013 2	MidSouth MRP TSR SRSB40 SRSSB4001 3/1/2013 1	MidSouth MRP TSR SRSB40 SRSSB4002 3/1/2013 2	MidSouth MRP TSR SRSB41 SRSSB4101 3/1/2013 1	MidSouth MRP TSR SRSB42 SRSSB4201 2/26/2013 1	MidSouth MRP TSR SRSB42 SRSSB4202 2/26/2013 2	MidSouth MRP TSR SRSB43 SRSSB4301 2/28/2013 1	MidSouth MRP TSR SRSB43 SRSSB4302 2/28/2013 2
7439-92-1	Lead	26.03/19.7	400	800	**2720**	83.9	**760**	53.6	**4210**	22.9	**2410**	96.2	51.4	14.6		24.3	
	BEQ				**9.62**	**0.257**	**251**	**4.58**	**28.3**	**0.041**	**0.106**	**0.00273**	**0.00264**	**0.746**	**0.15**	**0.722**	**0.0509**
56-55-3	Benzo(a)anthracene		0.148	2.11	**3.34**	0.103	**196**	**2.66**	**10.8**	0.014	0.05	0.00193 U	0.00187 U	0.0816	0.0651	**0.352**	0.0235
50-32-8	Benzo(a)pyrene	0.565	0.015	0.211	**6.61**	**0.19**	**170**	**3.37**	**19.2**	**0.0311**	**0.0727**	0.00039 U	0.00038 U	**0.326**	**0.0801**	**0.478**	**0.0335**
205-99-2	Benzo(b)fluoranthene		0.148	2.11	**7.62**	**0.261**	**233**	**3.71**	**25.7**	0.0487	0.124	0.00124 U	0.0012 U	**1.03**	**0.166**	**0.781**	0.0591
207-08-9	Benzo(k)flouranthene		3440.51	21.095	3.95	0.106	114	2.25	7.39	0.0179	0.0383	0.00049 U	0.00047 U	0.41	0.0627	0.235	0.0231
218-01-9	Chrysene		14.762	210.95	4.03	0.136	**184**	3.08	12.9	0.0187	0.0586	0.00139 U	0.00135 U	0.0696	0.0514	0.396	0.0246
53-70-3	Dibenz(a,h)anthracene		0.015	0.211	**1.22**	**0.0175**	**24.2**	**0.328**	**3.52**	0.00126 U	0.00946	0.00124 U	0.0012 U	**0.268**	**0.037**	**0.0904**	0.00582
193-39-5	Indeno(1,2,3,-cd)pyrene		0.148	2.11	**6.5**	0.115	**122**	**2.22**	**18.2**	0.0205	0.0612	0.00053 U	0.00051 U	**0.365**	0.0916	**0.376**	0.0304
83-32-9	Acenaphthene		3440.51	33003.23	0.5	0.00138 U	9.14	0.158	1.17	0.00139 U	0.00138 U	0.00137 U	0.00132 U	0.00147 U	0.00148 U	0.025	0.00136 U
208-96-8	Acenaphthylene		3440.51	33003.23	0.00164 U	0.00165 U	0.0168 U	0.0165 U	0.0168 U	0.00167 U	0.00166 U	0.00164 U	0.00159 U	0.00177 U	0.00178 U	0.00164 U	0.00163 U
120-12-7	Anthracene		17202.6	165016.1	0.304	0.0099	42.9	0.507	0.615	0.00202 J	0.00431	0.00034 U	0.00033 U	0.00617	0.00432	0.0428	0.00186 J
191-24-2	Benzo(g,h,i)perylene		1720.26	16501.62	7.42	0.137	128	2.7	19.6	0.0264	0.0665	0.00075 U	0.00072 U	0.113	0.0763	0.416	0.0366
206-44-0	Fluorathene		2293.67	22002.15	3.67	0.0795	402	3.47	9.86	0.0113	0.0537	0.00046 U	0.00044 U	0.0757	0.0601	0.501	0.0195
86-73-7	Fluorene		2293.67	22002.15	0.0717	0.00051 U	6.22	0.0873	0.156	0.00052 U	0.00052 U	0.00051 U	0.0005 U	0.00055 U	0.00056 U	0.00682	0.00051 U
90-12-0	1-Methylnaphthalene		15.642	53.109	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA
91-57-6	2-Methylnaphthalene		229.367	2200.215	0.0299	0.00088 U	2.25	0.00881 U	0.0863	0.00089 U	0.00088 U	0.00088 U	0.00085 U	0.00094 U	0.00095 U	0.00087 U	0.00087 U
91-20-3	Naphthalene		3.569	17.987	0.0513	0.00047 U	**6.77**	0.00469 U	0.2	0.00048 U	0.00047 U	0.00047 U	0.00045 U	0.0005 U	0.00051 U	0.00843	0.00046 U
85-01-8	Phenanthrene		1720.26	16501.62	1.2	0.0148	200	2.11	2.09	0.0057	0.0146	0.00059 U	0.00058 U	0.0188	0.0185	0.169	0.00902
129-00-0	Pyrene		1720.26	16501.62	2.47	0.125	297	3.91	9.72	0.0179	0.0493	0.00069 U	0.00067 U	0.0475	0.045	0.43	0.0247

Notes: All units milligrams per kilogram (mg/kg) or parts per million (ppm)
U = not detected
J = Estimated
NLA = no laboratory analysis for parameter

Bold indicates exceeded residential U.S. Enviornmental Protection Agency (USEPA) Regional Screening Level (RSL)
Underline indicates exceeded industrial USEPA RSL
Shading indicates exceeded NSA Mid-South site-specific background concentration
Subsurface soil analyses do not exist for locations where surface soil data was below the PAL for PAHs and lead.

Table 5-3
UXO 2 Trap/Skeet Ranges Soil Analytical Results (RFI and SI Data)
NSA Mid-South
Millington, Tennessee

CAS_NO	Parameter	Surface/ Subsurface Background	Res RSL	Ind RSL	MidSouth MRP TSR SRM008 SRM00801 3/1/2013 1	MidSouth MRP TSR SRM009 SRM00900 3/1/2013 0.5	MidSouth MRP TSR SRM009 SRM00901 3/1/2013 1	MidSouth MRP TSR SRM010 SRM01000 3/1/2013 0.5	MidSouth MRP TSR SRM010 SRM01001 3/1/2013 1	MidSouth MRP TSR SRM011 SRM01100 2/28/2013 0.5	MidSouth MRP TSR SRM011 SRM01101 2/28/2013 1	MidSouth MRP TSR SRM012 SRM01200 2/28/2013 0.5	MidSouth MRP TSR SRM012 SRM01201 2/28/2013 1	MidSouth MRP TSR SRM013 SRM01300 2/28/2013 0.5	MidSouth MRP TSR SRM013 SRM01301 2/28/2013 1	MidSouth MRP TSR SRM014 SRM01400 2/28/2013 0.5	MidSouth MRP TSR SRM014 SRM01401 2/28/2013 1
	Range Location Sample ID Date End Depth																
7439-92-1	Lead	26.03/19.7	400	800		1110	33.7	48.6		358 J		4450	3530	58.2		2560	1100
	BEQ				0.00274	0.0973	0.00278	0.0956	0.0516	12.1	20.6	20.6	28.1	2.16	0.805	14.8	0.591
56-55-3	Benzo(a)anthracene		0.148	2.11	0.00193 U	0.0447	0.00197 U	0.0428	0.0238	8.49 J	20.4	8.35	15.4	1.18	0.493	9.76	0.247
50-32-8	Benzo(a)pyrene	0.565	0.015	0.211	0.00039 U	0.0447	0.0004 U	0.0457	0.0401	8.34 J	13.7	14.4	19	1.5	0.541	10.4	0.406
205-99-2	Benzo(b)fluoranthene		0.148	2.11	0.00124 U	0.114	0.00126 U	0.118	0.0486	11.6 J	17.4	17	22.1	1.83	0.687	14.1	0.494
207-08-9	Benzo(k)flouranthene		3440.51	21.095	0.00049 U	0.0491	0.0005 U	0.0483	0.0298	5.04 J	8.86	8.81	11.3	0.865	0.311	7	0.221
218-01-9	Chrysene		14.762	210.95	0.00139 U	0.0197	0.00142 U	0.0173	0.0309	7.41 J	17.2	8.71	14	1.11	0.465	9.26	0.253
53-70-3	Dibenz(a,h)anthracene		0.015	0.211	0.00124 U	0.031	0.00126 U	0.0283	0.00129 U	1.04 J	1.96	2.15	3.29	0.219	0.0881	1.17	0.0649
193-39-5	Indeno(1,2,3,-cd)pyrene		0.148	2.11	0.00053 U	0.0526	0.00054 U	0.0498	0.0257	6.28 J	10.9	14.3	19.2	1.31	0.544	7.68	0.432
83-32-9	Acenaphthene		3440.51	33003.23	0.00137 U	0.00142 U	0.00139 U	0.00144 U	0.00142 U	0.398 J	0.846	0.526	0.0271 U	0.041	0.0237	0.55	0.00999
208-96-8	Acenaphthylene		3440.51	33003.23	0.00165 U	0.00171 U	0.00167 U	0.00173 U	0.00171 U	0.0195 U	0.0173 U	0.0164 U	0.0325 U	0.00509	0.00177 U	0.0162 U	0.00164 U
120-12-7	Anthracene		17202.6	165016.1	0.00034 U	0.00281 J	0.00034 U	0.00174 J	0.00035 U	1.75 J	6.32	0.458	1.17	0.108	0.0809	1.16	0.0113
191-24-2	Benzo(g,h,i)perylene		1720.26	16501.62	0.00075 U	0.03	0.00076 U	0.0272	0.0325	6.4 J	9.9	15.2	21.1	1.34	0.581	7.94	0.495
206-44-0	Fluorathene		2293.67	22002.15	0.00046 U	0.0211	0.00047 U	0.017	0.0228	13.6 J	41.8	6.01	15	1.27	0.611	16.2	0.173
86-73-7	Fluorene		2293.67	22002.15	0.00051 U	0.00053 U	0.00052 U	0.00054 U	0.00053 U	0.328 J	0.702	0.097	0.0101 U	0.019	0.014	0.181	0.00412
90-12-0	1-Methylnaphthalene		15.642	53.109	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA
91-57-6	2-Methylnaphthalene		229.367	2200.215	0.00088 U	0.00091 U	0.00089 U	0.00092 U	0.00091 U	0.0913	0.221	0.0586	0.161	0.0095	0.00517	0.0805	0.00088 U
91-20-3	Naphthalene		3.569	17.987	0.00047 U	0.00049 U	0.00048 U	0.00049 U	0.00049 U	0.166 J	0.739	0.134	0.309	0.0254	0.0147	0.138	0.00047 U
85-01-8	Phenanthrene		1720.26	16501.62	0.0006 U	0.00838	0.00061 U	0.00587	0.00062 U	6.8 J	24.6	1.69	6.74	0.451	0.324	6.13	0.05
129-00-0	Pyrene		1720.26	16501.62	0.00069 U	0.0188	0.0007 U	0.0158	0.0279	10.4 J	23.9	6.44	18.2	1.14	0.578	12.9	0.211

CAS_NO	Parameter	Surface/ Subsurface Background	Res RSL	Ind RSL	MidSouth MRP TSR SRSB44 SRSSB4401 2/28/2013 1	MidSouth MRP TSR SRSB44 SRSSB4402 2/28/2013 2	MidSouth MRP TSR SRSB45 SRSSB4501 2/28/2013 1	MidSouth MRP TSR SRSB45 SRSSB4502 2/28/2013 2	MidSouth MRP TSR SRSB46 SRSSB4601 2/28/2013 1	MidSouth MRP TSR SRSB46 SRSSB4602 2/28/2013 2	MidSouth MRP TSR SRSB47 SRSSB4702 2/28/2013 2	MidSouth MRP TSR SRSB48 SRSSB4801 2/28/2013 1	MidSouth MRP TSR SRSB48 SRSSB4802 2/28/2013 2	MidSouth MRP TSR SRSB49 SRSSB4901 2/26/2013 1	MidSouth MRP TSR SRSB49 SRSSB4902 2/26/2013 2	MidSouth MRP TSR SRSB51 SRSSB5101 3/1/2013 1	MidSouth MRP TSR SRSB51 SRSSB5102 3/1/2013 2
	Range Location Sample ID Date End Depth																
7439-92-1	Lead	26.03/19.7	400	800	3610	67.9	3500	359	93.1		146	4750	94.8	93.9		1580	91.5
	BEQ				10.3	0.265	3.37	0.653	4.64	0.136	0.422	4.14	0.0794	3.68	0.116	0.0213	NLA
56-55-3	Benzo(a)anthracene		0.148	2.11	4.4	0.0738 J	1.45	0.283	2.36	0.0636	0.158	1.85	0.0325	1.68	0.0562	0.00978	NLA
50-32-8	Benzo(a)pyrene	0.565	0.015	0.211	7.12	0.187 J	2.28	0.448	3.27	0.0928	0.27	2.84	0.0536	2.34	0.0609	0.0138	NLA
205-99-2	Benzo(b)fluoranthene		0.148	2.11	8.19	0.22 J	3.37	0.571	3.92	0.139	0.416	3.41	0.0955	3.9	0.129	0.0391	NLA
207-08-9	Benzo(k)flouranthene		3440.51	21.095	2.98	0.0967 J	0.955	0.314	2.17	0.0507	0.141	1.87	0.0288	1.34	0.0523	0.00658	NLA
218-01-9	Chrysene		14.762	210.95	4.9	0.104 J	1.71	0.324	2.46	0.074	0.176	1.83	0.0383	1.98	0.0335	0.0122	NLA
53-70-3	Dibenz(a,h)anthracene		0.015	0.211	1.24	0.0289 J	0.398	0.0712	0.45	0.0138	0.0659	0.482	0.00749	0.562	0.0295	0.00155 J	NLA
193-39-5	Indeno(1,2,3,-cd)pyrene		0.148	2.11	6.6	0.183 J	1.97	0.45	2.68	0.0828	0.267	2.74	0.0522	2.01	0.0661	0.00977	NLA
83-32-9	Acenaphthene		3440.51	33003.23	0.48	0.0246 J	0.0704	0.00906	0.111	0.00138 U	0.027	0.0432	0.00136 U	0.0619	0.0013 U	0.00148 U	NLA
208-96-8	Acenaphthylene		3440.51	33003.23	0.00167 U	0.00167 U	0.00168 U	0.00163 U	0.00469	0.00166 U	0.00162 U	0.00339 J	0.00163 U	0.0111	0.00157 U	0.00178 U	NLA
120-12-7	Anthracene		17202.6	165016.1	0.262	0.0061 J	0.118	0.0118	0.123	0.00891	0.0104	0.067	0.00364 J	0.229	0.00439	0.00037 U	NLA
191-24-2	Benzo(g,h,i)perylene		1720.26	16501.62	7.4	0.22 J	2.33	0.522	2.94	0.0989	0.272	3.1	0.0638	2.03	0.044	0.0111	NLA
206-44-0	Fluorathene		2293.67	22002.15	4.35	0.048 J	1.51	0.205	1.72	0.0719	0.162	1.27	0.0273	2.98	0.0404	0.0103	NLA
86-73-7	Fluorene		2293.67	22002.15	0.0846	0.00382 J	0.0215	0.00051 U	0.0492	0.00052 U	0.00051 U	0.0172	0.00051 U	0.035	0.00049 U	0.00055 U	NLA
90-12-0	1-Methylnaphthalene		15.642	53.109	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA
91-57-6	2-Methylnaphthalene		229.367	2200.215	0.0476	0.00089 U	0.00948	0.00087 U	0.0264	0.00088 U	0.00086 U	0.00895	0.00087 U	0.011	0.00083 U	0.00095 U	NLA
91-20-3	Naphthalene		3.569	17.987	0.0875	0.00047 U	0.0301	0.00514	0.108	0.00047 U	0.00455	0.0362	0.00046 U	0.0327	0.00044 U	0.00051 U	NLA
85-01-8	Phenanthrene		1720.26	16501.62	1.14	0.0185 J	0.472	0.0486	0.509	0.0351	0.045	0.337	0.0156	1.06	0.0128	0.00558	NLA
129-00-0	Pyrene		1720.26	16501.62	4.08	0.0826 J	1.51	0.235	2.21	0.0883	0.145	1.46	0.0376	1.45	0.0314	0.0104	NLA

Notes: All units milligrams per kilogram (mg/kg) or parts per million (ppm
U = not detected
J = Estimated
NLA = no laboratory analysis for parameter

Subsurface soil analyses do not exist for locations where surface soil data was below the PAL for PAHs and lead.

Table 5-3
UXO 2 Trap/Skeet Ranges Soil Analytical Results (RFI and SI Data)
NSA Mid-South
Millington, Tennessee

CAS_NO	Parameter	Surface/ Subsurface Background	Res RSL	Ind RSL	MidSouth MRP TSR SRM015 SRM01500 2/26/2013 0.5	MidSouth MRP TSR SRM015 SRM01501 2/26/2013 1	MidSouth MRP TSR SRM016 SRM01600 2/26/2013 0.5	MidSouth MRP TSR SRM016 SRM01601 2/26/2013 1	MidSouth MRP TSR SRM017 SRM01700 2/26/2013 0.5	MidSouth MRP TSR SRM017 SRM01701 2/26/2013 1	MidSouth MRP TSR SRM018 SRM01800 2/26/2013 0.5	MidSouth MRP TSR SRM018 SRM01801 2/26/2013 1	MidSouth MRP TSR SRSB01 SRSSB0101 2/27/2013 1	MidSouth MRP TSR SRSB02 SRSSB0201 2/27/2013 1	MidSouth MRP TSR SRSB03 SRSSB0301 2/27/2013 1	MidSouth MRP TSR SRSB04 SRSSB0401 2/27/2013 1	MidSouth MRP TSR SRSB05 SRSSB0501 3/6/2013 1
	Range Location Sample ID Date End Depth																
7439-92-1	Lead	26.03/19.7	400	800	75.4	276	**963**	62.4	**2790**	**1130**	41.6	14.9	21.7	55.4 J	26.1	11 J	22.8
	BEQ				**10.1**	**31.8**	**22.4**	**0.214**	**2.05**	**0.0756**	**0.166**	**0.0653**	NLA	NLA	NLA	NLA	NLA
56-55-3	Benzo(a)anthracene		0.148	2.11	**6.25**	**18**	**14**	0.0803	**1.57**	0.0386	0.0922	0.0303	NLA	NLA	NLA	NLA	NLA
50-32-8	Benzo(a)pyrene	0.565	0.015	0.211	**6.97**	**21.6**	**14.9**	**0.124**	**1.31**	**0.0328**	**0.0918**	**0.0259**	NLA	NLA	NLA	NLA	NLA
205-99-2	Benzo(b)fluoranthene		0.148	2.11	**7.31**	**26.3**	**21.3**	**0.231**	**1.98**	0.0979	**0.183**	0.0881	NLA	NLA	NLA	NLA	NLA
207-08-9	Benzo(k)flouranthene		3440.51	21.095	2.15	10.1	5.67	0.0746	0.638	0.0395	0.0776	0.0366	NLA	NLA	NLA	NLA	NLA
218-01-9	Chrysene		14.762	210.95	7.08	**20.3**	**14.9**	0.0787	1.6	0.0133	0.0621	0.00588	NLA	NLA	NLA	NLA	NLA
53-70-3	Dibenz(a,h)anthracene		0.015	0.211	**1.33**	**4.01**	**2.65**	**0.0428**	**0.259**	**0.0251**	**0.0371**	**0.0242**	NLA	NLA	NLA	NLA	NLA
193-39-5	Indeno(1,2,3,-cd)pyrene		0.148	2.11	**4.64**	**16.7**	**12.7**	**0.153**	**1.19**	0.0369	0.0919	0.0303	NLA	NLA	NLA	NLA	NLA
83-32-9	Acenaphthene		3440.51	33003.23	0.249	0.678	0.653	0.00131 U	0.0802	0.00136 U	0.00653	0.00135 U	NLA	NLA	NLA	NLA	NLA
208-96-8	Acenaphthylene		3440.51	33003.23	0.0168 U	0.0171 U	0.019 U	0.00157 U	0.00172 U	0.00163 U	0.00175 U	0.00163 U	NLA	NLA	NLA	NLA	NLA
120-12-7	Anthracene		17202.6	165016.1	0.378	2.69	2.08	0.00356 J	0.465	0.00341 J	0.0135	0.00033 U	NLA	NLA	NLA	NLA	NLA
191-24-2	Benzo(g,h,i)perylene		1720.26	16501.62	6.43	17.5	13.5	0.154	1.32	0.0133	0.0831	0.00652	NLA	NLA	NLA	NLA	NLA
206-44-0	Fluorathene		2293.67	22002.15	7.06	26.3	21.7	0.052	2.86	0.0201	0.0768	0.00422	NLA	NLA	NLA	NLA	NLA
86-73-7	Fluorene		2293.67	22002.15	0.0952	0.366	0.278	0.00049 U	0.0703	0.00051 U	0.00452	0.00051 U	NLA	NLA	NLA	NLA	NLA
90-12-0	1-Methylnaphthalene		15.642	53.109		NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA
91-57-6	2-Methylnaphthalene		229.367	2200.215	0.0498	0.13	0.106	0.00084 U	0.0165	0.00087 U	0.00093 U	0.00087 U	NLA	NLA	NLA	NLA	NLA
91-20-3	Naphthalene		3.569	17.987	0.0471	0.478	0.391	0.00692	0.0498	0.00046 U	0.0005 U	0.00046 U	NLA	NLA	NLA	NLA	NLA
85-01-8	Phenanthrene		1720.26	16501.62	2.73	10.3	8.27	0.0124	1.87	0.0114	0.045	0.00059 U	NLA	NLA	NLA	NLA	NLA
129-00-0	Pyrene		1720.26	16501.62	6.97	17.6	16.4	0.0523	2.7	0.0249	0.097	0.00673	NLA	NLA	NLA	NLA	NLA

CAS_NO	Parameter	Surface/ Subsurface Background	Res RSL	Ind RSL	MidSouth MRP TSR SRSB52 SRSSB5201 3/1/2013 1	MidSouth MRP TSR SRSB53 SRSSB5301 3/1/2013 1	MidSouth MRP TSR SRSB53 SRSSB5302 3/1/2013 2	MidSouth MRP TSR SRSB54 SRSSB5401 2/25/2013 1	MidSouth MRP TSR SRSB54 SRSSB5402 2/25/2013 2	MidSouth MRP TSR SRSB55 SRSSB5501 2/25/2013 1	MidSouth MRP TSR SRSB55 SRSSB5502 2/25/2013 2	MidSouth MRP TSR SRSB56 SRSSB5601 2/25/2013 1	MidSouth MRP TSR SRSB56 SRSSB5602 2/25/2013 2	MidSouth MRP TSR SRSB57 SRSSB5701 2/25/2013 1	MidSouth MRP TSR SRSB57 SRSSB5702 2/25/2013 2	MidSouth MRP TSR SRSB58 SRSSB5801 2/25/2013 1	MidSouth MRP TSR SRSB58 SRSSB5802 2/25/2013 2
	Range Location Sample ID Date End Depth																
7439-92-1	Lead	26.03/19.7	400	800	143	**4860**	44.8	105		103		35.2		333	**2970**	**601**	24.6
	BEQ				**0.0138**	**0.0194**	NLA	**2.18**	**0.716**	**6.51**	**0.612**	**1.22**	**0.702**	**13**	**175**	**41.9**	**1.66**
56-55-3	Benzo(a)anthracene		0.148	2.11	0.00555	0.00663	NLA	**1.34**	**0.389**	**4.16**	**0.36**	**0.657**	**0.339**	**7.05**	**129**	**23**	**0.616**
50-32-8	Benzo(a)pyrene	0.565	0.015	0.211	0.00826	0.0128	NLA	**1.53**	**0.464**	**4.5**	**0.404**	**0.784**	**0.466**	**8.47**	**118**	**28.4**	**1.03**
205-99-2	Benzo(b)fluoranthene		0.148	2.11	0.0303	0.0361	NLA	**1.91**	**0.717**	**6.36**	**0.507**	**1.17**	**0.745**	**13.3**	**160**	**27.5**	**1.17**
207-08-9	Benzo(k)flouranthene		3440.51	21.095	0.00336 J	0.00721	NLA	0.718	0.242	2.09	0.173	0.335	0.231	3.51	76.3	11.3	0.461
218-01-9	Chrysene		14.762	210.95	0.00774	0.00893	NLA	1.49	0.444	3.94	0.434	0.73	0.407	7.87	**110**	**30.8**	0.717
53-70-3	Dibenz(a,h)anthracene		0.015	0.211	0.00129 U	0.00136 J	NLA	**0.223**	**0.0975**	**0.687**	**0.0886**	**0.171**	**0.0761**	**1.66**	**18.8**	**6.3**	**0.397**
193-39-5	Indeno(1,2,3,-cd)pyrene		0.148	2.11	0.0054	0.00897	NLA	**0.925**	**0.412**	**2.43**	**0.308**	**0.784**	**0.483**	**7.52**	**84**	**19.9**	**0.489**
83-32-9	Acenaphthene		3440.51	33003.23	0.00142 U	0.00137 U	NLA	0.0483	0.0179	0.12	0.009	0.0215	0.0104	0.245	6.3	0.525	0.00136 U
208-96-8	Acenaphthylene		3440.51	33003.23	0.00171 U	0.00165 U	NLA	0.00477	0.00829	0.00164 U	0.00163 U	0.0182	0.0317	0.0499	0.0159 U	0.0167 U	0.00164 U
120-12-7	Anthracene		17202.6	165016.1	0.00035 U	0.00034 U	NLA	0.201	0.0548	0.571	0.0534	0.128	0.0609	0.811	20.8	1.19	0.04
191-24-2	Benzo(g,h,i)perylene		1720.26	16501.62	0.00541	0.0107	NLA	0.987	0.46	2.99	0.379	0.908	0.563	8.92	94.8	29	0.766
206-44-0	Fluorathene		2293.67	22002.15	0.00693	0.00837	NLA	1.95	0.522	5.48	0.529	0.879	0.502	10.4	216	16.5	0.204
86-73-7	Fluorene		2293.67	22002.15	0.00053 U	0.00051 U	NLA	0.0296	0.0094	0.0699	0.00557	0.015	0.0062	0.144	4.27	0.248	0.00596
90-12-0	1-Methylnaphthalene		15.642	53.109			NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA
91-57-6	2-Methylnaphthalene		229.367	2200.215	0.00091 U	0.00088 U	NLA	0.0104	0.00365	0.0305	0.00087 U	0.00773	0.00086 U	0.0677	1.25	0.262	0.00792
91-20-3	Naphthalene		3.569	17.987	0.00049 U	0.00047 U	NLA	0.0332	0.0127	0.0714	0.00844	0.0116	0.00621	0.188	**4.01**	0.396	0.00184 J
85-01-8	Phenanthrene		1720.26	16501.62	0.00062 U	0.00456	NLA	0.924	0.21	2.53	0.218	0.459	0.14	3.73	92.5	6.14	0.214
129-00-0	Pyrene		1720.26	16501.62	0.00578	0.0101	NLA	1.71	0.593	3.7	0.418	0.951	0.425	8.06	156	20.7	0.73

Notes: All units milligrams per kilogram (mg/kg) or parts per million (ppm
U = not detected
J = Estimated
NLA = no laboratory analysis for parameter

Subsurface soil analyses do not exist for locations where surface soil data was below the PAL for PAHs and lead.

Table 5-3
UXO 2 Trap/Skeet Ranges Soil Analytical Results (RFI and SI Data)
NSA Mid-South
Millington, Tennessee

CAS_NO	Parameter	Surface/ Subsurface Background	Res RSL	Ind RSL	MidSouth MRP TSR SRSB06 SRSSB0601 3/6/2013 1	MidSouth MRP TSR SRSB07 SRSSB0702 3/5/2013 2	MidSouth MRP TSR SRSB08 SRSSB0802 3/5/2013 2	MidSouth MRP TSR SRSB09 SRSSB0902 3/5/2013 2	MidSouth MRP TSR SRSB10 SRSSB1001 3/6/2013 1	MidSouth MRP TSR SRSB10 SRSSB1002 3/6/2013 2	MidSouth MRP TSR SRSB11 SRSSB1101 3/5/2013 1	MidSouth MRP TSR SRSB11 SRSSB1102 3/5/2013 2	MidSouth MRP TSR SRSB12 SRSSB1201 3/6/2013 1	MidSouth MRP TSR SRSB12 SRSSB1202 3/6/2013 2	MidSouth MRP TSR SRSB13 SRSSB1302 2/27/2013 2	MidSouth MRP TSR SRSB14 SRSSB1401 3/5/2013 1	MidSouth MRP TSR SRSB14 SRSSB1402 3/5/2013 2
7439-92-1	Lead	26.03/19.7	400	800	10.2	81.5	68.9	17.7	27.4		**456** J	73.7	19.6		86.9	51.6	16.7
	BEQ				NLA	**0.0467**	NLA	NLA	**0.777**	**0.125**	**0.00268**	NLA	**0.205**	**0.546**	**0.506**	NLA	NLA
56-55-3	Benzo(a)anthracene		0.148	2.11	NLA	0.021 J	NLA	NLA	**0.341** J	0.0721	0.0019 UJ	NLA	0.0969 J	**0.244**	**0.183**	NLA	NLA
50-32-8	Benzo(a)pyrene	0.565	0.015	0.211	NLA	**0.0358**	NLA	NLA	**0.597**	**0.0858**	0.00038 U	NLA	**0.148**	**0.424**	**0.334**	NLA	NLA
205-99-2	Benzo(b)fluoranthene		0.148	2.11	NLA	0.0449 J	NLA	NLA	**0.8** J	**0.171**	0.00122 UJ	NLA	**0.209** J	**0.541**	**0.499**	NLA	NLA
207-08-9	Benzo(k)flouranthene		3440.51	21.095	NLA	0.0223	NLA	NLA	0.337	0.0543	0.00048 U	NLA	0.0949	0.22	0.15	NLA	NLA
218-01-9	Chrysene		14.762	210.95	NLA	0.0269 J	NLA	NLA	0.48 J	0.106	0.00137 UJ	NLA	0.133 J	0.344	0.234	NLA	NLA
53-70-3	Dibenz(a,h)anthracene		0.015	0.211	NLA	0.00115 U	NLA	NLA	0.0118 U	0.00581 U	0.00122 U	NLA	0.0117 U	0.00608 U	**0.0713**	NLA	NLA
193-39-5	Indeno(1,2,3,-cd)pyrene		0.148	2.11	NLA	0.0283	NLA	NLA	**0.492**	0.0835	0.00052 U	NLA	0.13	**0.346**	**0.307**	NLA	NLA
83-32-9	Acenaphthene		3440.51	33003.23	NLA	0.00126 UJ	NLA	NLA	0.00648 UJ	0.0064 U	0.00134 UJ	NLA	0.00646 UJ	0.00669 U	0.00688	NLA	NLA
208-96-8	Acenaphthylene		3440.51	33003.23	NLA	0.00152 U	NLA	NLA	0.00778 U	0.00769 U	0.00161 U	NLA	0.00777 U	0.00804 U	0.00157 U	NLA	NLA
120-12-7	Anthracene		17202.6	165016.1	NLA	0.00031 U	NLA	NLA	0.0016 U	0.00158 U	0.00033 U	NLA	0.00159 U	0.00165 U	0.00735	NLA	NLA
191-24-2	Benzo(g,h,i)perylene		1720.26	16501.62	NLA	0.0343	NLA	NLA	0.535	0.0968	0.00073 U	NLA	0.157	0.371	0.344	NLA	NLA
206-44-0	Fluorathene		2293.67	22002.15	NLA	0.0153	NLA	NLA	0.392	0.071	0.00045 U	NLA	0.0831	0.223	0.133	NLA	NLA
86-73-7	Fluorene		2293.67	22002.15	NLA	0.00047 U	NLA	NLA	0.00242 U	0.00239 U	0.0005 U	NLA	0.00242 U	0.00251 U	0.00386	NLA	NLA
90-12-0	1-Methylnaphthalene		15.642	53.109	NLA		NLA	NLA				NLA				NLA	NLA
91-57-6	2-Methylnaphthalene		229.367	2200.215	NLA	0.00081 U	NLA	NLA	0.00415 U	0.0041 U	0.00086 U	NLA	0.00414 U	0.00429 U	0.00084 U	NLA	NLA
91-20-3	Naphthalene		3.569	17.987	NLA	0.00043 U	NLA	NLA	0.00221 U	0.00218 U	0.00046 U	NLA	0.00221 U	0.00228 U	0.00646	NLA	NLA
85-01-8	Phenanthrene		1720.26	16501.62	NLA	0.00055 U	NLA	NLA	0.00282 U	0.00278 U	0.00058 U	NLA	0.00281 U	0.00291 U	0.0295	NLA	NLA
129-00-0	Pyrene		1720.26	16501.62	NLA	0.0196	NLA	NLA	0.355	0.0678	0.00068 U	NLA	0.0807	0.232	0.17	NLA	NLA

CAS_NO	Parameter	Surface/ Subsurface Background	Res RSL	Ind RSL	MidSouth MRP TSR SRSB59 SRSSB5901 2/25/2013 1	MidSouth MRP TSR SRSB59 SRSSB5902 2/25/2013 2	MidSouth MRP TSR SRSB60 SRSSB6002 2/25/2013 2	MidSouth MRP TSR SRSB61 SRSSB6101 3/1/2013 1	MidSouth MRP TSR SRSB61 SRSSB6102 3/1/2013 2	MidSouth MRP TSR SRSB62 SRSSB6201 2/25/2013 1	MidSouth MRP TSR SRSB62 SRSSB6202 2/25/2013 2	MidSouth MRP TSR SRSB63 SRSSB6301 2/26/2013 1	MidSouth MRP TSR SRSB63 SRSSB6302 2/26/2013 2	MidSouth MRP TSR SRSB64 SRSSB6402 2/25/2013 2	MidSouth MRP TSR SRSB65 SRSSB6501 2/25/2013 1	MidSouth MRP TSR SRSB65 SRSSB6502 2/25/2013 2	MidSouth MRP TSR SRSB66 SRSSB6601 2/25/2013 1
7439-92-1	Lead	26.03/19.7	400	800	123		17.7 J	**834**	14.8	27.8		**5160**	139		26.8		23.4
	BEQ				**2.66**	**29.8**	**0.00274**	**0.0167**	NLA	**0.504**	**0.07**	23.4 0	1.16 0	0.187 0	0.158 0	**0.0684**	**0.118**
56-55-3	Benzo(a)anthracene		0.148	2.11	**1.47**	**23.3**	0.00193 U	0.00697	NLA	**0.316**	0.034	**16.2**	**0.868**	0.0904	0.0705	0.0307	0.0587 J
50-32-8	Benzo(a)pyrene	0.565	0.015	0.211	**1.82**	**20.2**	0.00039 U	0.0105	NLA	**0.315**	**0.0294**	**15.5**	**0.763**	**0.106**	**0.0852**	**0.0279**	**0.06** J
205-99-2	Benzo(b)fluoranthene		0.148	2.11	**2.31**	**25.2**	0.00124 U	0.0332	NLA	**0.505**	0.0901	**22.2**	**1.11**	**0.197**	**0.164**	0.09	0.138 J
207-08-9	Benzo(k)flouranthene		3440.51	21.095	0.834	11.5	0.00049 U	0.00387	NLA	0.146	0.0389	7.12	0.344	0.0715	0.0624	0.0387	0.0559 J
218-01-9	Chrysene		14.762	210.95	1.63	**24.6**	0.00139 U	0.00762	NLA	0.305	0.00861	**16.7**	0.876	0.0837	0.0567	0.00624	0.0431 J
53-70-3	Dibenz(a,h)anthracene		0.015	0.211	**0.319**	**3.23**	0.00124 U	0.00128 U	NLA	**0.0736**	**0.0244**	**2.75**	**0.143**	**0.0399**	**0.0394**	**0.0248**	**0.0318** J
193-39-5	Indeno(1,2,3,-cd)pyrene		0.148	2.11	**1.37**	**13.7**	0.00053 U	0.00797	NLA	**0.314**	0.0342	**12.1**	**0.566**	0.111	0.0948	0.0328	0.0622 J
83-32-9	Acenaphthene		3440.51	33003.23	0.049	1.27	0.00137 U	0.00141 U	NLA	0.0121	0.00133 U	0.681	0.0455	0.00138 U	0.00137 U	0.00138 U	0.00141 UJ
208-96-8	Acenaphthylene		3440.51	33003.23	0.00471	0.0158 U	0.00164 U	0.00169 U	NLA	0.0135	0.0016 U	0.0169 U	0.00165 U	0.00165 U	0.00164 U	0.00166 U	0.0017 UJ
120-12-7	Anthracene		17202.6	165016.1	0.163	6.06	0.00034 U	0.00035 U	NLA	0.0669	0.00205 J	3.28	0.24	0.00921	0.00728	0.00034 U	0.00412 J
191-24-2	Benzo(g,h,i)perylene		1720.26	16501.62	1.42	13	0.00075 U	0.00857	NLA	0.329	0.0122	12.1	0.534	0.101	0.0987	0.00759	0.0543 J
206-44-0	Fluorathene		2293.67	22002.15	2.1	52.4	0.00046 U	0.00559	NLA	0.485	0.0165	31.8	2.11	0.103	0.0587	0.0047	0.0401 J
86-73-7	Fluorene		2293.67	22002.15	0.0255	1.09	0.00051 U	0.00053 U	NLA	0.00805	0.0005 U	0.553	0.0333	0.00051 U	0.00051 U	0.00051 U	0.00053 UJ
90-12-0	1-Methylnaphthalene		15.642	53.109	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA
91-57-6	2-Methylnaphthalene		229.367	2200.215	0.00875	0.291	0.00088 U	0.0009 U	NLA	0.00646	0.00085 U	0.132	0.0199	0.00088 U	0.00088 U	0.00088 U	0.0009 UJ
91-20-3	Naphthalene		3.569	17.987	0.0292	0.917	0.00047 U	0.00048 U	NLA	0.00842	0.00045 U	0.395	0.0506	0.00047 U	0.00047 U	0.00047 U	0.00048 UJ
85-01-8	Phenanthrene		1720.26	16501.62	0.741	25.7	0.0006 U	0.00061 U	NLA	0.251	0.00472	14.3	0.951	0.0369	0.0246	0.0006 U	0.0171 J
129-00-0	Pyrene		1720.26	16501.62	1.55	33.2	0.00069 U	0.00619	NLA	0.467	0.0124	22	1.3	0.082	0.0685	0.0043	0.0587 J

Notes: All units milligrams per kilogram (mg/kg) or parts per million (ppm
U = not detected
J = Estimated
NLA = no laboratory analysis for parameter

Subsurface soil analyses do not exist for locations where surface soil data was below the PAL for PAHs and lead.

Table 5-3
UXO 2 Trap/Skeet Ranges Soil Analytical Results (RFI and SI Data)
NSA Mid-South
Millington, Tennessee

CAS_NO	Parameter	Surface/ Subsurface Background	Res RSL	Ind RSL	MidSouth MRP TSR SRSB15 SRSSB1501 2/26/2013 1	MidSouth MRP TSR SRSB15 SRSSB1502 2/26/2013 2	MidSouth MRP TSR SRSB16 SRSSB1601 2/26/2013 1	MidSouth MRP TSR SRSB16 SRSSB1602 2/26/2013 2	MidSouth MRP TSR SRSB17 SRSSB1701 2/26/2013 1	MidSouth MRP TSR SRSB17 SRSSB1702 2/26/2013 2	MidSouth MRP TSR SRSB18 SRSSB1802 2/27/2013 2	MidSouth MRP TSR SRSB19 SRSSB1902 3/5/2013 2	MidSouth MRP TSR SRSB20 SRSSB2002 3/5/2013 2	MidSouth MRP TSR SRSB21 SRSSB2102 3/5/2013 2	MidSouth MRP TSR SRSB22 SRSSB2201 3/5/2013 1	MidSouth MRP TSR SRSB22 SRSSB2202 3/5/2013 2	MidSouth MRP TSR SRSB23 SRSSB2301 3/5/2013 1
7439-92-1	Lead	26.03/19.7	400	800	45.4	10.2	377		137			360 J	20.1 J	20.5	**668** J	130	**51900** J
	BEQ				**0.275**	**0.0651**	**2.89**	**1.35**	**0.181**	**0.55**	**0.125**	NLA	NLA	NLA	NLA	NLA	**0.00281**
56-55-3	Benzo(a)anthracene		0.148	2.11	0.103	0.0298	**1.39**	**0.53**	0.0681	**0.231**	0.0541 J	NLA	NLA	NLA	NLA	NLA	0.00198 UJ
50-32-8	Benzo(a)pyrene	0.565	0.015	0.211	**0.169**	**0.0266**	**1.89**	**0.933**	**0.103**	**0.372**	**0.0676**	NLA	NLA	NLA	NLA	NLA	0.0004 U
205-99-2	Benzo(b)fluoranthene		0.148	2.11	**0.298**	0.0859	**2.53**	**1.27**	**0.194**	**0.601**	0.143	NLA	NLA	NLA	NLA	NLA	0.00127 UJ
207-08-9	Benzo(k)flouranthene		3440.51	21.095	0.0993	0.0366	0.906	0.575	0.0736	0.197	0.0548	NLA	NLA	NLA	NLA	NLA	0.0005 U
218-01-9	Chrysene		14.762	210.95	0.113	0.0059	1.75	0.631	0.0655	0.279	0.042	NLA	NLA	NLA	NLA	NLA	0.00143 UJ
53-70-3	Dibenz(a,h)anthracene		0.015	0.211	**0.0479**	**0.0234**	**0.413**	**0.149**	**0.0398**	**0.0652**	**0.0313**	NLA	NLA	NLA	NLA	NLA	0.00127 U
193-39-5	Indeno(1,2,3,-cd)pyrene		0.148	2.11	**0.165**	0.0319	**1.85**	**0.817**	0.113	**0.274**	0.0628	NLA	NLA	NLA	NLA	NLA	0.00054 U
83-32-9	Acenaphthene		3440.51	33003.23	0.00128 U	0.00364	0.0832	0.0177	0.0014 U	0.00871	0.00137 U	NLA	NLA	NLA	NLA	NLA	0.0014 UJ
208-96-8	Acenaphthylene		3440.51	33003.23	0.00154 U	0.00362	0.00179 U	0.00154 U	0.00169 U	0.00165 U	0.00165 U	NLA	NLA	NLA	NLA	NLA	0.00169 U
120-12-7	Anthracene		17202.6	165016.1	0.00421	0.00232 J	0.18	0.0182	0.00234 J	0.0115	0.00177 J	NLA	NLA	NLA	NLA	NLA	0.00035 U
191-24-2	Benzo(g,h,i)perylene		1720.26	16501.62	0.186	0.00991	2.06	0.997	0.11	0.311	0.042	NLA	NLA	NLA	NLA	NLA	0.00077 U
206-44-0	Fluorathene		2293.67	22002.15	0.0631	0.00542	2	0.374	0.039	0.169	0.0244	NLA	NLA	NLA	NLA	NLA	0.00047 U
86-73-7	Fluorene		2293.67	22002.15	0.00048 U	0.00251 J	0.0528	0.00656	0.00052 U	0.00051 U	0.00051 U	NLA	NLA	NLA	NLA	NLA	0.00052 U
90-12-0	1-Methylnaphthalene		15.642	53.109								NLA	NLA	NLA	NLA	NLA	NLA
91-57-6	2-Methylnaphthalene		229.367	2200.215	0.00082 U	0.00375	0.0106	0.00475	0.0009 U	0.00088 U	0.00088 U	NLA	NLA	NLA	NLA	NLA	0.0009 U
91-20-3	Naphthalene		3.569	17.987	0.00044 U	0.00044 U	0.0292	0.0174	0.00048 U	0.00735	0.00047 U	NLA	NLA	NLA	NLA	NLA	0.00048 U
85-01-8	Phenanthrene		1720.26	16501.62	0.017	0.00442	0.745	0.0738	0.00724	0.0461	0.00604	NLA	NLA	NLA	NLA	NLA	0.00061 U
129-00-0	Pyrene		1720.26	16501.62	0.0948	0.008	1.56	0.583	0.0389	0.276	0.0288	NLA	NLA	NLA	NLA	NLA	0.00071 U

CAS_NO	Parameter	Surface/ Subsurface Background	Res RSL	Ind RSL	MidSouth MRP TSR SRSB66 SRSSB6602 2/25/2013 2	MidSouth MRP TSR TSR-SS001 TSR-SS001-0001 3/2/2010 1	MidSouth MRP TSR TSR-SS002 TSR-SS002-0001 3/2/2010 1	MidSouth MRP TSR TSR-SS003 TSR-SS003-0001 3/2/2010 1	MidSouth MRP TSR TSR-SS004 TSR-SS004-0001 3/2/2010 1	MidSouth MRP TSR TSR-SS004C TSR-SS04C-0001 3/3/2010 1	MidSouth MRP TSR TSR-SS005 TSR-SS005-0001 3/2/2010 1	MidSouth MRP TSR TSR-SS005C TSR-SS05C-0001 3/3/2010 1	MidSouth MRP TSR TSR-SS006 TSR-SS006-0001 3/2/2010 1	MidSouth MRP TSR TSR-SS006C TSR-SS06C-0001 3/3/2010 1	MidSouth MRP TSR TSR-SS008C TSR-SS08C-0001 3/3/2010 1	MidSouth MRP TSR TSR-SS009 TSR-SS009-0001 3/2/2010 1	MidSouth MRP TSR TSR-SS009C TSR-SS09C-0001 3/3/2010 1
7439-92-1	Lead	26.03/19.7	400	800		85.3 J	317 J	36.8 J	240 J	103	**466** J	188	20.8 J	**408**	97.3	152 J	195
	BEQ				**0.0749**	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	**9.63**	NLA
56-55-3	Benzo(a)anthracene		0.148	2.11	0.0363	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	**5**	NLA
50-32-8	Benzo(a)pyrene	0.565	0.015	0.211	**0.0314**	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	**6.15**	NLA
205-99-2	Benzo(b)fluoranthene		0.148	2.11	0.0968	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	**8.79**	NLA
207-08-9	Benzo(k)flouranthene		3440.51	21.095	0.0411	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	2.65	NLA
218-01-9	Chrysene		14.762	210.95	0.01	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	6.28	NLA
53-70-3	Dibenz(a,h)anthracene		0.015	0.211	**0.026**	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	**1.65**	NLA
193-39-5	Indeno(1,2,3,-cd)pyrene		0.148	2.11	0.0377	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	**4.17**	NLA
83-32-9	Acenaphthene		3440.51	33003.23	0.00142 U	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	0.196	NLA
208-96-8	Acenaphthylene		3440.51	33003.23	0.0017 U	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	0.00464 J	NLA
120-12-7	Anthracene		17202.6	165016.1	0.00222 J	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	0.377	NLA
191-24-2	Benzo(g,h,i)perylene		1720.26	16501.62	0.0131	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	3.72	NLA
206-44-0	Fluorathene		2293.67	22002.15	0.0161	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	4.72	NLA
86-73-7	Fluorene		2293.67	22002.15	0.00053 U	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	0.137	NLA
90-12-0	1-Methylnaphthalene		15.642	53.109	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	0.0225	NLA
91-57-6	2-Methylnaphthalene		229.367	2200.215	0.00091 U	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	0.0221	NLA
91-20-3	Naphthalene		3.569	17.987	0.00048 U	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	0.0345	NLA
85-01-8	Phenanthrene		1720.26	16501.62	0.00766	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	1.75	NLA
129-00-0	Pyrene		1720.26	16501.62	0.0117	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	NLA	4.81	NLA

Notes: All units milligrams per kilogram (mg/kg) or parts per million (ppm
U = not detected
J = Estimated
NLA = no laboratory analysis for parameter

Table 5-3
UXO 2 Trap/Skeet Ranges Soil Analytical Results (RFI and SI Data)
NSA Mid-South
Millington, Tennessee

CAS_NO	Parameter	Surface/ Subsurface Background	Res RSL	Ind RSL	MidSouth MRP TSR SRSB23 SRSSB2302 3/5/2013 2	MidSouth MRP TSR SRSB24 SRSSB2401 3/5/2013 1	MidSouth MRP TSR SRSB24 SRSSB2402 3/5/2013 2	MidSouth MRP TSR SRSB25 SRSSB2501 2/26/2013 1	MidSouth MRP TSR SRSB25 SRSSB2502 2/26/2013 2	MidSouth MRP TSR SRSB26 SRSSB2601 2/26/2013 1	MidSouth MRP TSR SRSB26 SRSSB2602 2/26/2013 2	MidSouth MRP TSR SRSB27 SRSSB2701 2/26/2013 1	MidSouth MRP TSR SRSB27 SRSSB2702 2/26/2013 2	MidSouth MRP TSR SRSB28 SRSSB2801 2/28/2013 1	MidSouth MRP TSR SRSB28 SRSSB2802 2/28/2013 2	MidSouth MRP TSR SRSB29 SRSSB2901 2/26/2013 1	MidSouth MRP TSR SRSB29 SRSSB2902 2/26/2013 2
				Range Location Sample ID Date End Depth													
7439-92-1	Lead	26.03/19.7	400	800	36.4	**1650** J	55.6 J	95		158		19.6		**417**	25.1	61.1	
	BEQ				NLA	**0.00276**	NLA	**2.9**	**7.95**	**3.82**	**83.3**	**0.0869**	**0.00265**	**163**	**8.59**	**0.658**	**0.00272**
56-55-3	Benzo(a)anthracene		0.148	2.11	NLA	0.00195 UJ	NLA	**1.19**	**5.31**	**1.38**	**33.1**	0.0392	0.00187 U	**76.6**	**3.03**	**0.307**	0.00192 U
50-32-8	Benzo(a)pyrene	0.565	0.015	0.211	NLA	0.00039 U	NLA	**1.78**	**5.22**	**2.53**	**55.7**	**0.0402**	0.00038 U	**101**	**6.07**	**0.416**	0.00039 U
205-99-2	Benzo(b)fluoranthene		0.148	2.11	NLA	0.00125 UJ	NLA	**2.86**	**8.12**	**3.13**	**67.6**	0.106	0.0012 U	**142**	**8.04**	**0.725**	0.00123 U
207-08-9	Benzo(k)flouranthene		3440.51	21.095	NLA	0.00049 U	NLA	1.02	2.44	1.28	25	0.0449	0.00047 U	51.2	3.36	0.184	0.00048 U
218-01-9	Chrysene		14.762	210.95	NLA	0.00141 UJ	NLA	1.04	5.71	1.86	**42.4**	0.0153	0.00135 U	**77.1**	3.95	0.322	0.00138 U
53-70-3	Dibenz(a,h)anthracene		0.015	0.211	NLA	0.00125 U	NLA	**0.508**	**0.949**	**0.554**	**12.9**	**0.0269**	0.00121 U	**30.9**	**0.831**	**0.0935**	0.00123 U
193-39-5	Indeno(1,2,3,-cd)pyrene		0.148	2.11	NLA	0.00053 U	NLA	**1.92**	**4.04**	**2.68**	**43.1**	0.0479	0.00051 U	**87.2**	**5.47**	**0.428**	0.00052 U
83-32-9	Acenaphthene		3440.51	33003.23	NLA	0.00138 UJ	NLA	0.0131 U	0.265	0.0353	1.25	0.00137 U	0.00133 U	3.29	0.106	0.00868	0.00136 U
208-96-8	Acenaphthylene		3440.51	33003.23	NLA	0.00166 U	NLA	0.0157 U	0.0157 U	0.00158 U	0.0158 U	0.00165 U	0.00159 U	0.0157 U	0.016 U	0.00168 U	0.00163 U
120-12-7	Anthracene		17202.6	165016.1	NLA	0.00034 U	NLA	0.036	1.42	0.0423	1.18	0.00195 J	0.00033 U	5.58	0.154	0.0267	0.00034 U
191-24-2	Benzo(g,h,i)perylene		1720.26	16501.62	NLA	0.00075 U	NLA	2.14	4.06	3.12	46	0.0277	0.00072 U	97.2	6.44	0.514	0.00074 U
206-44-0	Fluorathene		2293.67	22002.15	NLA	0.00046 U	NLA	0.738	11.2	1.17	31.2	0.0167	0.00044 U	76.1	2.44	0.321	0.00046 U
86-73-7	Fluorene		2293.67	22002.15	NLA	0.00052 U	NLA	0.0049 U	0.228	0.0125	0.503	0.00051 U	0.0005 U	1.66	0.0482	0.00379 J	0.00051 U
90-12-0	1-Methylnaphthalene		15.642	53.109	NLA		NLA										
91-57-6	2-Methylnaphthalene		229.367	2200.215	NLA	0.00088 U	NLA	0.00838 U	0.0782	0.00789	0.28	0.00088 U	0.00085 U	0.744	0.0085 U	0.00089 U	0.00087 U
91-20-3	Naphthalene		3.569	17.987	NLA	0.00047 U	NLA	0.043	0.284	0.0281	1.28	0.00047 U	0.00045 U	3.15	0.056	0.00603	0.00046 U
85-01-8	Phenanthrene		1720.26	16501.62	NLA	0.0006 U	NLA	0.12	5.56	0.173	5.44	0.00618	0.00058 U	24.9	0.581	0.13	0.00059 U
129-00-0	Pyrene		1720.26	16501.62	NLA	0.0007 U	NLA	0.727	7.73	1.15	28.2	0.0142	0.00067 U	68.6	2.62	0.423	0.00069 U

CAS_NO	Parameter	Surface/ Subsurface Background	Res RSL	Ind RSL	MidSouth MRP TSR TSR-SS010 TSR-SS010-0001 3/2/2010 1	MidSouth MRP TSR TSR-SS010C TSR-SS10C-0001 3/3/2010 1	MidSouth MRP TSR TSR-SS011 TSR-SS011-0001 3/2/2010 1	MidSouth MRP TSR TSR-SS012 TSR-SS012-0001 3/2/2010 1	MidSouth MRP TSR TSR-SS013 TSR-SS013-0001 3/2/2010 1	MidSouth MRP TSR TSR-SS015 TSR-SS015-0001 3/2/2010 1	MidSouth MRP TSR TSR-SS019 TSR-SS019-0001 2/28/2010 1	MidSouth MRP TSR TSR-SS020 TSR-SS020-0001 2/28/2010 1	MidSouth MRP TSR TSR-SS021 TSR-SS021-0001 2/28/2010 1	MidSouth MRP TSR TSR-SS022 TSR-SS022-0001 2/28/2010 1	MidSouth MRP TSR TSR-SS024 TSR-SS024-0001 2/28/2010 1	MidSouth MRP TSR TSR-SS025 TSR-SS025-0001 2/28/2010 1	MidSouth MRP TSR TSR-SS028 TSR-SS028-0001 2/28/2010 1
				Range Location Sample ID Date End Depth													
7439-92-1	Lead	26.03/19.7	400	800	118 J	145			**785** J	265 J	**2840** J			**12500** J	64.2 J	110 J	
	BEQ				**5.13**	NLA	**0.115**	**2.24**	**0.0141**	NLA	**28.8**	**0.16**	**0.332**	**0.0633**	**0.0356**	NAL	14.6 0
56-55-3	Benzo(a)anthracene		0.148	2.11	**2.31**	NLA	0.0486	**0.966**	0.00149 U	NLA	**14.2**	0.0868	**0.153**	0.0347	0.00179 U	NAL	**7.14**
50-32-8	Benzo(a)pyrene	0.565	0.015	0.211	**3.46**	NLA	**0.0767**	**1.54**	0.00817	NLA	**19.3**	**0.108**	**0.23**	**0.0462**	**0.0251**	NAL	**9.39**
205-99-2	Benzo(b)fluoranthene		0.148	2.11	**4.62**	NLA	0.105	**2.08**	0.0138	NLA	**24**	**0.158**	**0.327**	0.0667	0.0327	NAL	**12.8**
207-08-9	Benzo(k)flouranthene		3440.51	21.095	1.55	NLA	0.0351	0.657	0.0046 J	NLA	7.22	0.0532	0.105	0.022	0.0117	NAL	3.79
218-01-9	Chrysene		14.762	210.95	3.09	NLA	0.0673	1.36	0.0089	NLA	**18.7**	0.113	0.215	0.0472	0.0245	NAL	8.58
53-70-3	Dibenz(a,h)anthracene		0.015	0.211	**0.701**	NLA	**0.0161**	**0.273**	0.00149 U	NLA	**3.94**	**0.0192**	**0.0371**	0.00142 U	0.00179 U	NAL	**2.51**
193-39-5	Indeno(1,2,3,-cd)pyrene		0.148	2.11	**2.58**	NLA	0.063	**1.13**	0.00149 U	NLA	**16.9**	0.0753	**0.158**	0.0313	0.0215	NAL	**6.76**
83-32-9	Acenaphthene		3440.51	33003.23	0.0381	NLA	0.00167 U	0.0174 J	0.00149 U	NLA	0.276	0.00204 J	0.0039 J	0.00142 U	0.00179 U	NAL	0.145
208-96-8	Acenaphthylene		3440.51	33003.23	0.00394 U	NLA	0.00167 U	0.00375 U	0.00149 U	NLA	0.00535 J	0.00146 U	0.00175 U	0.00142 U	0.00179 U	NAL	0.00401 J
120-12-7	Anthracene		17202.6	165016.1	0.0512	NLA	0.00167 U	0.0289	0.00149 U	NLA	0.521	0.00573 J	0.00684 J	0.00319 J	0.00179 U	NAL	0.461
191-24-2	Benzo(g,h,i)perylene		1720.26	16501.62	2.4	NLA	0.0618	1.03	0.00149 U	NLA	16.1	0.0675	0.146	0.029	0.0216	NAL	6.07
206-44-0	Fluorathene		2293.67	22002.15	1.51	NLA	0.0372	0.681	0.00957	NLA	10.2	0.0964	0.148	0.0438	0.0203	NAL	6.09
86-73-7	Fluorene		2293.67	22002.15	0.0154 J	NLA	0.00167 U	0.00794 J	0.00149 U	NLA	0.125	0.00146 U	0.0023 J	0.00142 U	0.00179 U	NAL	0.105
90-12-0	1-Methylnaphthalene		15.642	53.109	0.00956 J	NLA	0.00167 U	0.00517 J	0.00149 U	NLA	0.0567	0.00146 U	0.00175 U	0.00142 U	0.00179 U	NAL	0.0237
91-57-6	2-Methylnaphthalene		229.367	2200.215	0.00859 J	NLA	0.00167 U	0.0044 J	0.00149 U	NLA	0.0608	0.00146 U	0.00175 U	0.00142 U	0.00179 U	NAL	0.028
91-20-3	Naphthalene		3.569	17.987	0.0271	NLA	0.00167 U	0.0141 J	0.00149 U	NLA	0.22	0.00146 U	0.00175 U	0.00142 U	0.00179 U	NAL	0.0899
85-01-8	Phenanthrene		1720.26	16501.62	0.218	NLA	0.00885	0.122	0.0038 J	NLA	2.15	0.0283	0.0382	0.014	0.00644 J	NAL	2
129-00-0	Pyrene		1720.26	16501.62	1.78	NLA	0.0415	0.784	0.00896	NLA	10.9	0.0949	0.153	0.0429	0.0195	NAL	6.16

Notes: All units milligrams per kilogram (mg/kg) or parts per million (ppm
U = not detected
J = Estimated
NLA = no laboratory analysis for parameter

Table 5-3
UXO 2 Trap/Skeet Ranges Soil Analytical Results (RFI and SI Data)
NSA Mid-South
Millington, Tennessee

CAS_NO	Parameter	Surface/ Subsurface Background	Res RSL	Range Ind RSL	MidSouth MRP TSR	MidSouth MRP TSR	MidSouth MRP TSR	MidSouth MRP TSR	MidSouth MRP TSR	MidSouth MRP TSR	MidSouth MRP TSR	MidSouth MRP TSR	MidSouth MRP TSR	MidSouth MRP TSR	MidSouth MRP TSR	MidSouth MRP TSR	MidSouth MRP TSR
				Location	SRSB30	SRSB31	SRSB31	SRSB32	SRSB32	SRSB33	SRSB33	SRSB34	SRSB34	SRSB35	SRSB35	SRSB36	SRSB36
				Sample ID	SRSSB3002	SRSSB3101	SRSSB3102	SRSSB3201	SRSSB3202	SRSSB3301	SRSSB3302	SRSSB3401	SRSSB3402	SRSSB3501	SRSSB3502	SRSSB3601	SRSSB3602
				Date	2/28/2013	2/28/2013	2/28/2013	2/28/2013	2/28/2013	3/1/2013	3/1/2013	2/26/2013	2/26/2013	2/28/2013	2/28/2013	2/28/2013	2/28/2013
				End Depth	2	1	2	1	2	1	2	1	2	1	2	1	2
7439-92-1	Lead	26.03/19.7	400	800		**409**	33.6	**4630**	**6360**	**1050** J	193	84.5		**864**	266 J	**8730**	308
	BEQ				**1.64**	**173**	**0.737**	**12.1**	**0.692**	**0.0148**	NLA	**13.8**	**0.364**	**193**	**41.9**	**5.94**	**0.0943**
56-55-3	Benzo(a)anthracene		0.148	2.11	**0.772**	**96.4**	**0.428**	**5.3**	**0.287**	0.00496	NLA	**6.86**	**0.166**	**116**	**21**	**2.43**	0.0402
50-32-8	Benzo(a)pyrene	0.565	0.015	0.211	**1.12**	**118**	**0.509**	**8.45**	**0.479**	0.00913	NLA	**9.2**	**0.228**	**131**	**28.4**	**3.93**	**0.0677**
205-99-2	Benzo(b)fluoranthene		0.148	2.11	**1.86**	**156**	**0.676**	**10.5**	**0.675**	0.0308	NLA	**14.6**	**0.366**	**180**	**32.7**	**6.09**	0.113
207-08-9	Benzo(k)flouranthene		3440.51	21.095	0.474	54.4	0.321	4.97	0.252	0.00356 J	NLA	4.13	0.122	67	18.1	1.98	0.0425
218-01-9	Chrysene		14.762	210.95	0.881	**103**	0.424	6.32	0.384	0.00647	NLA	8.08	0.191	**128**	**21.2**	2.75	0.0521
53-70-3	Dibenz(a,h)anthracene		0.015	0.211	**0.167**	**19.7**	**0.0694**	**1.34**	**0.0712**	0.00124 U	NLA	**1.6**	**0.0591**	**21.5**	**5.04**	**0.768**	0.0061
193-39-5	Indeno(1,2,3,-cd)pyrene		0.148	2.11	**0.808**	**94.6**	**0.443**	**6.88**	**0.426**	0.00708	NLA	**7.93**	**0.222**	**105**	**28.7**	**3.64**	0.0466
83-32-9	Acenaphthene		3440.51	33003.23	0.0319	6.06	0.0156	0.226	0.0113	0.00137 U	NLA	0.219	0.00544	5.76	0.773	0.108	0.00139 U
208-96-8	Acenaphthylene		3440.51	33003.23	0.00162 U	0.0162 U	0.00168 U	0.00348 U	0.00165 U	0.00165 U	NLA	0.0166 U	0.00167 U	0.016 U	0.0168 U	0.00165 U	0.00168 U
120-12-7	Anthracene		17202.6	165016.1	0.0545 J	11.5	0.0506	0.315	0.0252	0.00034 U	NLA	0.748	0.0171	20.1	1.6	0.18	0.00709
191-24-2	Benzo(g,h,i)perylene		1720.26	16501.62	0.889	103	0.504	7.31	0.537	0.00699	NLA	9.61	0.229	114	32	4.08	0.0512
206-44-0	Fluorathene		2293.67	22002.15	0.96 J	125	0.483	5.94	0.282	0.00616	NLA	9.62	0.215	187	19.2	2.38	0.0326
86-73-7	Fluorene		2293.67	22002.15	0.0131	2.47	0.00926	0.0873	0.00543	0.00051 U	NLA	0.106	0.00052 U	3.25	0.334	0.0322	0.00052 U
90-12-0	1-Methylnaphthalene		15.642	53.109							NLA						
91-57-6	2-Methylnaphthalene		229.367	2200.215	0.00596	0.895	0.00089 U	0.0426	0.00088 U	0.00088 U	NLA	0.0456	0.00089 U	0.93	0.127	0.0161	0.00089 U
91-20-3	Naphthalene		3.569	17.987	0.0167	2.57	0.0132	0.199	0.00765	0.00047 U	NLA	0.144	0.00047 U	2.45	0.581	0.0534	0.00048 U
85-01-8	Phenanthrene		1720.26	16501.62	0.269 J	44.9	0.215	1.41	0.102	0.0006 U	NLA	3.15	0.0708	78.6	6.53	0.842	0.0129
129-00-0	Pyrene		1720.26	16501.62	0.91	109	0.497	5.22	0.318	0.00565	NLA	8.48	0.159	152	14.8	2.48	0.0534

CAS_NO	Parameter	Surface/ Subsurface Background	Res RSL	Range Ind RSL	MidSouth MRP TSR	MidSouth MRP TSR	MidSouth MRP TSR	MidSouth MRP TSR	MidSouth MRP TSR	MidSouth MRP TSR	MidSouth MRP TSR	MidSouth MRP TSR	MidSouth MRP TSR	MidSouth MRP TSR	MidSouth MRP TSR	MidSouth MRP TSR	MidSouth MRP TSR
				Location	TSR-SS029	TSR-SS030	TSR-SS031	TSR-SS033	TSR-SS036	TSR-SS037	TSR-SS039	TSR-SS041	TSR-SS042	TSR-SS045	TSR-SS047	TSR-SS066	TSR-SS067
				Sample ID	TSR-SS029-0001	TSR-SS030-0001	TSR-SS031-0001	TSR-SS033-0001	TSR-SS036-0001	TSR-SS037-0001	TSR-SS039-0001	TSR-SS041-0001	TSR-SS042-0001	TSR-SS045-0001	TSR-SS047-0001	TSR-SS066-0001	TSR-SS067-0001
				Date	2/28/2010	2/28/2010	2/28/2010	2/28/2010	2/28/2010	2/27/2010	2/27/2010	2/27/2010	2/28/2010	2/28/2010	2/27/2010	3/2/2010	3/2/2010
				End Depth	1	1	1	1	1	1	1	1	1	1	1	1	1
7439-92-1	Lead	26.03/19.7	400	800		**2520** J		179 J	18.1 J		**1410** J	**1860** J	9.24 J	**2820** J	239 J	**2090** J	20 J
	BEQ				**0.145**	**0.0198**	**0.019**	NLA	NLA	**0.432**	**0.143**	NLA		**7.5**	**0.0317**	**6.88**	**11.3**
56-55-3	Benzo(a)anthracene		0.148	2.11	0.0726	0.00182 U	0.00161 U	NLA	NLA	**0.241**	0.0694	NLA	0.00154 U	**5.63**	0.0247	**5.04**	**8.54**
50-32-8	Benzo(a)pyrene	0.565	0.015	0.211	**0.0988**	0.0125	0.0122	NLA	NLA	**0.295**	**0.0981**	NLA	0.00401 J	**5.07**	**0.022**	**4.42**	**7.65**
205-99-2	Benzo(b)fluoranthene		0.148	2.11	0.135	0.0173	0.0187	NLA	NLA	**0.413**	0.137	NLA	0.00577 J	**6.87**	0.0312	**5.67**	**9.09**
207-08-9	Benzo(k)flouranthene		3440.51	21.095	0.0457	0.00666 J	0.00694 J	NLA	NLA	0.145	0.0458	NLA	0.00154 U	2.32	0.0106	1.82	3.13
218-01-9	Chrysene		14.762	210.95	0.094	0.013	0.0151	NLA	NLA	0.307	0.0911	NLA	0.00543 J	6.22	0.0285	5.56	9.96
53-70-3	Dibenz(a,h)anthracene		0.015	0.211	**0.017**	0.00182 U	0.00161 U	NLA	NLA	**0.0502**	**0.0163**	NLA	0.00154 U	**0.835**	0.00146 U	**1.04**	**1.37**
193-39-5	Indeno(1,2,3,-cd)pyrene		0.148	2.11	0.0743	0.00182 U	0.00161 U	NLA	NLA	**0.201**	0.0698	NLA	0.00154 U	**3.17**	0.00146 U	**3.27**	**4.65**
83-32-9	Acenaphthene		3440.51	33003.23	0.00213 J	0.00182 U	0.00161 U	NLA	NLA	0.00454 J	0.0024 J	NLA	0.00154 U	0.12	0.00146 U	0.117	0.167
208-96-8	Acenaphthylene		3440.51	33003.23	0.00149 U	0.00182 U	0.00161 U	NLA	NLA	0.00178 U	0.0017 U	NLA	0.00154 U	0.00521 J	0.00146 U	0.00431 U	0.00418 U
120-12-7	Anthracene		17202.6	165016.1	0.00149 U	0.00182 U	0.00161 U	NLA	NLA	0.0152	0.00443 J	NLA	0.00154 U	0.692	0.00442 J	0.585	0.852
191-24-2	Benzo(g,h,i)perylene		1720.26	16501.62	0.0707	0.00182 U	0.00161 U	NLA	NLA	0.185	0.0659	NLA	0.00154 U	2.72	0.00146 U	2.97	4.49
206-44-0	Fluorathene		2293.67	22002.15	0.0709	0.0121	0.0165	NLA	NLA	0.255	0.0694	NLA	0.00642 J	7.81	0.0404	6.36	9.41
86-73-7	Fluorene		2293.67	22002.15	0.00158 J	0.00182 U	0.00161 U	NLA	NLA	0.00323 J	0.0017 U	NLA	0.00154 U	0.101	0.00146 U	0.103	0.123
90-12-0	1-Methylnaphthalene		15.642	53.109	0.00149 U	0.00182 U	0.00161 U	NLA	NLA	0.00178 U	0.0017 U	NLA	0.00154 U	0.0183 J	0.00146 U	0.0207 J	0.0291
91-57-6	2-Methylnaphthalene		229.367	2200.215	0.00149 U	0.00182 U	0.00161 U	NLA	NLA	0.00191 J	0.0017 U	NLA	0.00154 U	0.0229	0.00146 U	0.0253	0.0414
91-20-3	Naphthalene		3.569	17.987	0.00149 U	0.00182 U	0.00161 U	NLA	NLA	0.00178 U	0.0017 U	NLA	0.00154 U	0.0651	0.00146 U	0.0873	0.109
85-01-8	Phenanthrene		1720.26	16501.62	0.021	0.00471 J	0.00661 J	NLA	NLA	0.072	0.0193	NLA	0.00291 J	2.99	0.0171	2.63	3.91
129-00-0	Pyrene		1720.26	16501.62	0.0723	0.0113	0.0151	NLA	NLA	0.247	0.07	NLA	0.00582 J	6.98	0.0354	5.69	9.35

Notes: All units milligrams per kilogram (mg/kg) or parts per million (ppm
U = not detected
J = Estimated
NLA = no laboratory analysis for parameter

6.0 CONTAMINANT FATE AND TRANSPORT

An evaluation of the environmental fate and transport of site-related contaminants is important in determining the potential for exposure to the contaminants. This section assesses the ability of site-related contaminants to become mobile or change in the environment, based on their chemical and physical properties and the processes that govern their interaction with environmental media.

Macroscopic physical characteristics of the site such as climate, hydrology, topography, and geology determine weathering and erosional transport processes. Site-related contaminants that have the potential to remain in solid form within the erosional surfaces of sites UXO 1 and 2 include clay pigeon fragments and lead shot. The transport of these materials under average climatic events associated with Millington Tennessee is not likely due to the relatively low surface grades at UXO 1 and 2 and the energy required for overcoming the inertial forces on these solid materials at the surface. In the event that minor amounts of erosional transport did occur historically at UXO 1 and 2, the potential for these materials to be re-deposited within the site storm water conveyances is high due to the mass of these materials and the tendency for these materials to drop out of suspension wherever surface flows are reduced (i.e. where storm water is detained). As previously indicated in Nature and Extent (Section 5) of this report, the concentration and distribution of lead and PAHs at UXO 1 and 2 does not indicate the ditches are accumulation/collection points for site contaminants. The rest of this section addresses the transport of chemical contaminants that have the potential to emanate from the solid contaminants deposited at the surface of UXO 1 and 2.

Characteristics of site soil and the chemical and physical properties of the contaminants, affect the processes of infiltration, advection, diffusion, dispersion, erosion, and volatilization that move chemical contaminants between or within media. A discussion of fate and transport will help to identify pathways and potential receptors that may be impacted by chemical contaminant movement in the environment.

6.1 Site Contaminants Summary

The chemicals of potential concern that had at least one sample result exceeding the PALs (EPA residential soil RSLs) for surface and/or subsurface soils (as shown in Table 5-1) are carried forward as site contaminants in this fate and transport discussion. The chemicals of potential concern reported at concentrations below the PALs are not carried forward as site contaminants. A summary of the site contaminants, in each media, was provided in Section 5 and the chemicals identified as site contaminants for soil are shown in Table 6-1.

Table 6-1
Site Contaminants Exceeding PALs — Soil

	Surface and Subsurface Soil
Metals	
Lead	X
Polycyclic Aromatic Compounds	
Naphthalene	X
Benzo(a)pyrene Equivalents	
Benzo(a)anthracene	X
Benzo(a)pyrene	X
Benzo(b)fluoranthene	X
Benzo(k)fluoranthene	X
Chrysene	X
Dibenz(a,h)anthracene	X
Indeno(1,2,3-cd)pyrene	X

6.2 Contaminant Characteristics Affecting Transport

The mobility and persistence of the chemicals of concern at the site are determined by their physical, chemical, and biological interaction with the environment. Mobility is the potential for a chemical to migrate from a site and persistence is a measure of how long a chemical will remain in the environment. Numerous chemical and physical properties of both the contaminant and its surrounding media are used to evaluate fate and transport mechanisms. In general, chemicals that are soluble, volatile, or leachable tend to be mobile. Mobile chemicals are likely to be released and transported from the source and are not persistent, while persistent chemicals tend to remain localized in the source area and are resistant to chemical and biological degradation reactions. Sorption, solubility, volatilization, degradation, transformation, and bioaccumulation are considered the most important processes affecting mobility and persistence.

6.3 Contaminant Transport

This section describes the potential release mechanisms and pathways for movement of contaminants at the site. In general, the following forms of transportation are viable:

- Migration upward (volatilization, air entrainment)
- Migration downward (leaching)
- Migration laterally (surface runoff and erosion)
- Degradation/transformation
- Residence onsite as persistent contaminants

Compounds with similar chemical and physical properties display similar fate and transport behavior. T herefore, the fate and transport characteristics of chemicals that exceed screening criteria are discussed as groups (i.e., PAHs and lead) in the subsections below.

6.3.1 Polycyclic Aromatic Hydrocarbon Contaminant Transport

The chemical and physical properties with the greatest influence on the fate and transport of PAHs are solubility, vapor pressure, and organic carbon/water partitioning coefficient.

Typical PAHs Fate and Transport Characteristics:

- PAHs tend to adsorb to soil particles
- PAHs tend to be relatively immobile in the environment
- PAH movement often occurs by colloidal suspension
- PAHs exhibit greater mobility when coupled with "carrier" compounds

PAHs have high molecular weights; wide-ranging vapor pressures, solubilities and Henry's law constants; moderate to high densities; and generally high organic carbon-water partitioning coefficients. Overall, PAHs are expected to be relatively immobile in soils and diffuse only slightly to groundwater or surface water once released onto or below land surface.

An evaluation of site-wide soil sample PAH analysis results and co-located samples of PAH SPLP analysis data was performed utilizing the concept of BEQ. Sample results for PAH in soil were converted to BEQ in units of mg/kg, then the results were ranked in order from greatest to least, and compared to the benzo(a)pyrene residential RSL (0.015 mg/kg) and industrial RSL (0.21 mg/kg). Sample results from SPLP analysis of PAH in soil was also converted to BEQ in units of µg/L and compared against the maximum contaminant level (MCL) for benzo(a)pyrene (0.2 µg/L) and the corresponding soil sample result in BEQ (mg/kg). The SPLP data comparison with the MCL was to conservatively gauge (with no consideration for attenuation/dilution of leachable mass that may migrate to groundwater) the leachability potential of the contaminant mass in soil.

There were four of 18 samples where the SPLP BEQ results were greater than 0.2 µg/L, with soil BEQ results ranging from 18.3 mg/kg to 193 mg/kg and SPLP BEQ results ranging from 0.27 µg/L to 5.09 µg/L. For the 18 soil samples analyzed for both total PAHs in soil and SPLP of PAHs, the range of values for BEQ in soil was 0.9 mg/kg to 251 mg/kg with SPLP BEQ results

ranging from 0.06 µg/L to 5.09 µg/L. The full range of the 240 soil sample results for PAHs reported in BEQ is 0.002 mg/kg to 251 mg/kg. The SPLP results were compared to the MCL for benzo(a)pyrene in drinking water of 0.2 ppb. However, the highest BEQ value (251 mg/kg) is associated with an SPLP BEQ result of 0.07 µg/L, indicating there is not a direct correlation between leachable BEQ and total BEQ mass in soil.

A rank order analysis is presented in the following figures and indicates that 25 out of 240 soil samples (or 10 percent) have BEQ concentrations high enough to anticipate some mobilization based on the SPLP data results (Figure 6-1). However, out of those 25 soil samples there is a 50 percent passing rate (SPLP BEQ result less than the MCL of 0.2 µg/L) on leachability based on eight SPLP sample results (Figure 6-2).

In addition to the above SPLP comparative analysis in BEQ, an evaluation of associated soil total organic content (TOC) was performed and a corresponding TOC fraction of between 2 percent and 22.5 percent could be associated with SPLP analysis results for PAHs reported as BEQ to fall below the MCL for benzo(a)pyrene. So, the amount of TOC present may be the an indicator for whether or not the SPLP results might fall below the MCL where corresponding BEQ soil levels are above 16 mg/kg. For purposes of this assessment however, a threshold concentration was established at 16 mg/kg for PAHs (reported as BEQ) to be the indicator for where soil concentrations could be sufficiently elevated to produce groundwater concentrations of PAHs (reported as BEQ) above the respective MCL for benzo(a)pyrene (Figure 6-2). For comparative purposes, both the residential RSL of 0.015 mg/kg and the industrial RSL of 0.21 mg/kg are well below the site-specific threshold concentration of 16 mg/kg for benzo(a)pyrene, so the majority of the soil samples reported for PAHs (215 out of 240, or about 90 percent) are protective of the groundwater ingestion pathway when site-specific SPLP data for PAHs are considered.

6.3.2 Lead Contaminant Transport

In soil, lead strongly complexes to organic materials and adsorbs to inorganic solids. The mobility of lead in soil is affected by soil type, pH, TOC, CEC, the form of lead (e.g., free ion or hydroxide complex), and the presence of metal oxides, aluminum silicates, and carbonates. Lead compounds may be transformed in the environment to other lead compounds. Generally, the mobility of lead is naturally low, especially in clay and silty clay soils. The potential for mobility increases with decreasing pH and CEC, and in sandy, loamy sand, and sandy loam soils (Domenico & Schwartz 1998).

Because it is strongly adsorbed to soil, lead is generally retained in the upper layers of soil and does not leach appreciably into the subsoil and groundwater. Conditions that induce leaching are the presence of oxidized lead in soil at concentrations that either approach or exceed the CEC of the soil, the presence of materials in soil that are capable of forming soluble chelates with lead, and a decrease in the pH of the leaching solution. In soil with high organic-matter content and a pH of 6 to 8, lead may form insoluble organic lead complexes. If the soil has less organic matter at the same pH, hydrous lead oxide complexes may form or lead may precipitate with carbonate or phosphate ions. At a pH of 4 to 6, the organic lead complexes become soluble and may leach out (ATSDR, 2007).

The pH values in site surface-soil range from 5.5 to 7.8, with CEC ranging from 12.3 to 30.2 milliequivalent of hydrogen (MEQ) per 100 grams (g), and organic content fraction ranging from 0.007 to 0.2. There were two surface samples in the UXO 2 Trap/Skeet Range area with pH results slightly below (5.53 and 5.96) the desired 6 to 8 range for high organic-matter content soils . The remaining surface samples measured for pH had results in the 6 to 8 range, so lead leaching is expected to be inhibited in site surface-soils. The relative immobility of lead is also supported by the site data as shown in the comparison of lead in surface and subsurface soil (Figures 5-1 through 5-3). The concentration difference between the first and second foot is approximately an order of magnitude (10x) in some places, indicating the significant buffering capacity of site soils.

The pH values of soil within the UXO 1 Pistol Range berm vary from 6.0 to 8.3, with CEC ranging from 2.7 to 24.0 MEQ/100g, and organic content fraction ranging from 0.004 to 0.02, so lead leaching is expected to be inhibited in these fill soils as well. However, the construction materials and operational function of the berm and surrounding area could have attributed to higher than expected lead concentrations at depth within the berm.

6.4 Contaminant Persistence

Persistence is the measure of how long a chemical will exist in the environment before it degrades or transforms, either chemically or biologically, into some other chemical. Some of the factors that affect the persistence of a chemical include the state of the chemical, the availability of the chemical, exposure to sunlight, oxygen availability, the types and quantities of microorganisms present, availability of nutrients, temperature, pH, as well as the presence of other chemicals which may inhibit or enhance degradation. Usually, persistence is expressed in terms of a chemical half-life and can be on the order of days, weeks, or years.

Because of the many complex factors that may affect persistence, the actual rate of chemical degradation is very difficult to predict for a given chemical at a given site, especially without the benefit of any degradation data collected from site-specific field studies. However, a qualitative evaluation of the potential for degradation of a chemical can be made based on the results of literature review, laboratory, and/or field studies conducted previously at other locations. Such a qualitative evaluation was conducted for site contaminants, and the results are summarized in Table 6-2. In this table, the degradation potential for each site contaminant is indicated for the following two environmental media categories:

- Aquatic Degradation — A chemical released to surface waters or sediment may degrade by such processes as photolysis, hydrolysis, oxidation, and/or biodegradation

- Terrestrial Degradation — A chemical released to soil, groundwater, or sediment may degrade by such processes as hydrolysis, oxidation, and/or biodegradation

As indicated in Table 6-2, of all the site contaminants, lead has the least potential to degrade in all media; therefore, lead will likely persist the longest within the site environment. In fact, under ordinary conditions lead will persist indefinitely (for all practical purposes). Other chemicals found at the sites that also have low degradation potential include benzo(k)fluoranthene, chrysene, and indeno(1,2,3-cd)pyrene. All of the former UXO 1 and 2 site contaminants generally have low to moderate potentials for degradation (ATDSR 2007).

Table 6-2
Estimated Degradation Potential for Site Contaminants

Analyte	Terrestrial Degradation Potential
Metals	
Lead	Low
Polycyclic Aromatic Hydrocarbons	
2-Methylnaphthalene	Moderate
Acenaphthene	Moderate
Acenaphthylene	Moderate
Anthracene	Low/Moderate
Benzo(a)anthracene	Low/Moderate
Benzo(a)pyrene	Low/Moderate
Benzo(b)fluoranthene	Low/Moderate
Benzo(g,h,i)perylene	Low/Moderate
Benzo(k)fluoranthene	Low
Chrysene	Low
Dibenz(a,h)anthracene	Low/Moderate
Fluoranthene	Low/Moderate
Fluorene	Moderate

Table 6-2
Estimated Degradation Potential for Site Contaminants

Analyte	Terrestrial Degradation Potential
Indeno(1,2,3-cd)pyrene	Low
Naphthalene	Moderate
Phenanthrene	Moderate
Pyrene	Low/Moderate

Notes:
Qualitative evaluations presented in this table were based on information obtained from the following sources:
1) Agency for Toxic Substances and Disease Registry (ATSDR) at http://www.atsdr.cdc.gov/
2) *Handbook of Environmental Degradation Rates*, P.H Howard, R. S. Boethling, W. F, Jarvis, W. M. Meylan, and E. M. Michalenkoet, Lewis Publishers, 1991
3) Fate and Exposure Data for Organic Chemicals, P.H Howard, Lewis Publishers, 1989 — 1997
Hazardous Substances Databank at http://toxnet.nlm.nih.gov/

6.5 Site Fate and Transport Evaluation

Based on the site history and presumed period during which contaminants may have been released in conjunction with the UXO 1 and 2, fate and transport processes are anticipated to occur or have already occurred onsite. UXO 2 historically operated from the mid-1940s to 2005. PAH concentrations detected in site samples reflect any degradation and/or volatilization that have occurred since initial releases or possible transfer to other media. Residual levels are expected to reflect the relatively recalcitrant fractions that are adsorbed to soil particles and are relatively immobile. Lead has the lowest mobility and the least potential to degrade in all media and therefore will likely persist longer in the environment compared to PAHs. Both PAHs and lead may enter the food chain via direct ingestion or uptake by plants and soil/sediment fauna.

Table 6-3 and Figure 5-7 summarize the potential contaminant migration pathways based on soil as contaminant source media.

Table 6-3
Summary of Potential Migration Pathways
Source Medium → To Receptor Media Receptor

Source	Soil	Depositional Soils from Storm Water Run Off	Surface Water	Groundwater	Air
Soil	Not applicable	(A) Complete, but soil erosion inhibited by site vegetation	(B) Complete, but not valid (impact not occurring under current conditions)	(C) Complete, but not valid (impact not likely under current conditions)	(D) Complete, but limited — soil erosion inhibited and contaminants have low volatility
Sediment	Not applicable	Not applicable	(E) Complete, but not valid (impact not occurring under current conditions)	Not applicable	Not applicable

6.6 Summary of Potential Migration Pathways

6.6.1 Soil to Sediment

The primary mechanism for the transport of soil contaminants to sediment would be via erosion of surface soil and transport of PAHs sorbed to the soil particles or direct physical movement of clay pigeon pieces by wind/water. The site is relatively flat, well vegetated, and composed of relatively permeable soil. These factors would encourage infiltration as opposed to surface runoff and erosion that could promote migration of surface soil contaminants to the drainage ditches. With relatively little potential for dramatic runoff and erosion events, it is unlikely impacted soil or sediment would reach Big Creek which is approximately 700 feet south of UXOs 1 and 2.

6.6.2 Soil to Air

Some lighter PAHs (molecular weights less than 200 grams per mole and Henry's Law Constants greater than $1X10^{-5}$ atmospheres-cubic meter per mole) could conceivably volatilize from moist soils, but would be expected to be attenuated via soil sorption. The northern two-thirds of UXO 2 has not been used as a Trap/Skeet Range since the mid-1990s, thus it is likely that the volatile PAH fractions have dissipated from that area. The remaining PAH mass would be expected to be tightly bound to the soil matrix (or bound within clay pigeon fragments at the surface) and less susceptible to volatilization.

Fugitive dust generation represents another means by which soil contaminants can become airborne. There is little or no activity to dislodge soil into air for wind-borne transport at the sites. In addition vegetative cover (grasses, native flowers, turf grass, and trees) would be expected to mitigate dust suspension; however, the pathway remains viable, but limited.

6.6.3 Sediment to Surface Water

Drainage ditches carry surface water runoff from the site that eventually discharges to Big Creek, south of NSA Mid-South. In the absence of heavy precipitation events, there is no significant flow in the drainage ditches, thus little to no energy is available to move significant amounts of surface materials or soils that may contain PAHs or lead. Identified contaminants (PAHs and lead) would be expected to associate with solids rather than be present in dissolved form in the water column. Based on available information, there is no indication that this pathway has a substantive effect on contaminant transport and therefore is not valid for this site.

6.7 Fate and Transport Summary and Conclusions

A number of potential fate and transport pathways were identified for UXO 1 and 2. Based upon investigative results and site characteristics, the degree to which each could affect the movement, transformation or persistence of identified contaminants was evaluated. Under current conditions, the following fate and/or transport processes are considered potentially significant.

- Soil contaminant migration to sediment via surface soil erosion, although erosion is inhibited by the presence of vegetation and the relatively flat topography.

- Soil to air transfer of PAHs and lead through fugitive dust generation, although wind erosion is inhibited by the presence of vegetation.

- Lead tends to have moderate to low mobility; however, in environments where pH is less than 5 (i.e., acidic conditions), most metals can become mobile. Overall site soil pH values ranged from 5.5 to 8.3 and site sediment pH values ranged from 5.5 to 7.8, indicating lead is likely immobile.

  Most sample locations not associated with the Pistol Range containment berm and collected 1 to 2 feet bgs had total lead results below the PAL screening value. This suggests the subsurface soil in the UXO 1 & UXO 2 areas are not experiencing conditions associated with lead migration even though the SPLP data in the surface samples collected in these areas seem to suggest otherwise.

Total lead and BEQ results generally show a significant decrease in concentration with depth at UXOs 1 and 2. This is expected considering that the source was a solid material (i.e. clay pigeons and lead shot) released directly to the ground surface. The factors detailed above would also cause any dissolved (or otherwise transferred) lead and BEQ to bind to surface soil and inhibit significant migration of contaminants from surface to subsurface soil.

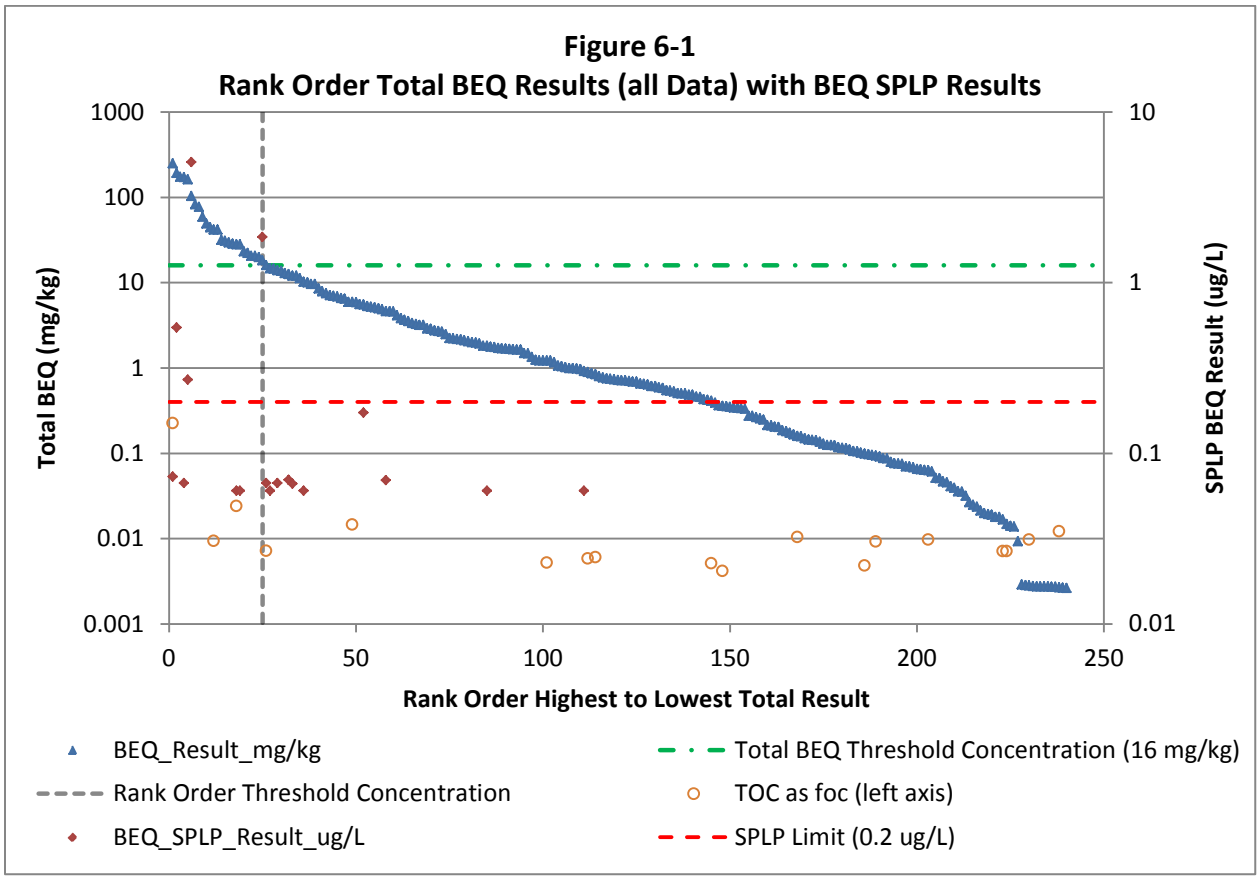


Figure 6-1
Rank Order Total BEQ Results (all Data) with BEQ SPLP Results
Total BEQ (mg/kg)
SPLP BEQ Result (ug/L)
1000
100
10
1
0.1
0.01
0.001
10
1
0.1
0.01
0
50
100
150
200
250
Rank Order Highest to Lowest Total Result
BEQ_Result_mg/kg
Total BEQ Threshold Concentration (16 mg/kg)
Rank Order Threshold Concentration
TOC as foc (left axis)
BEQ_SPLP_Result_ug/L
SPLP Limit (0.2 ug/L)

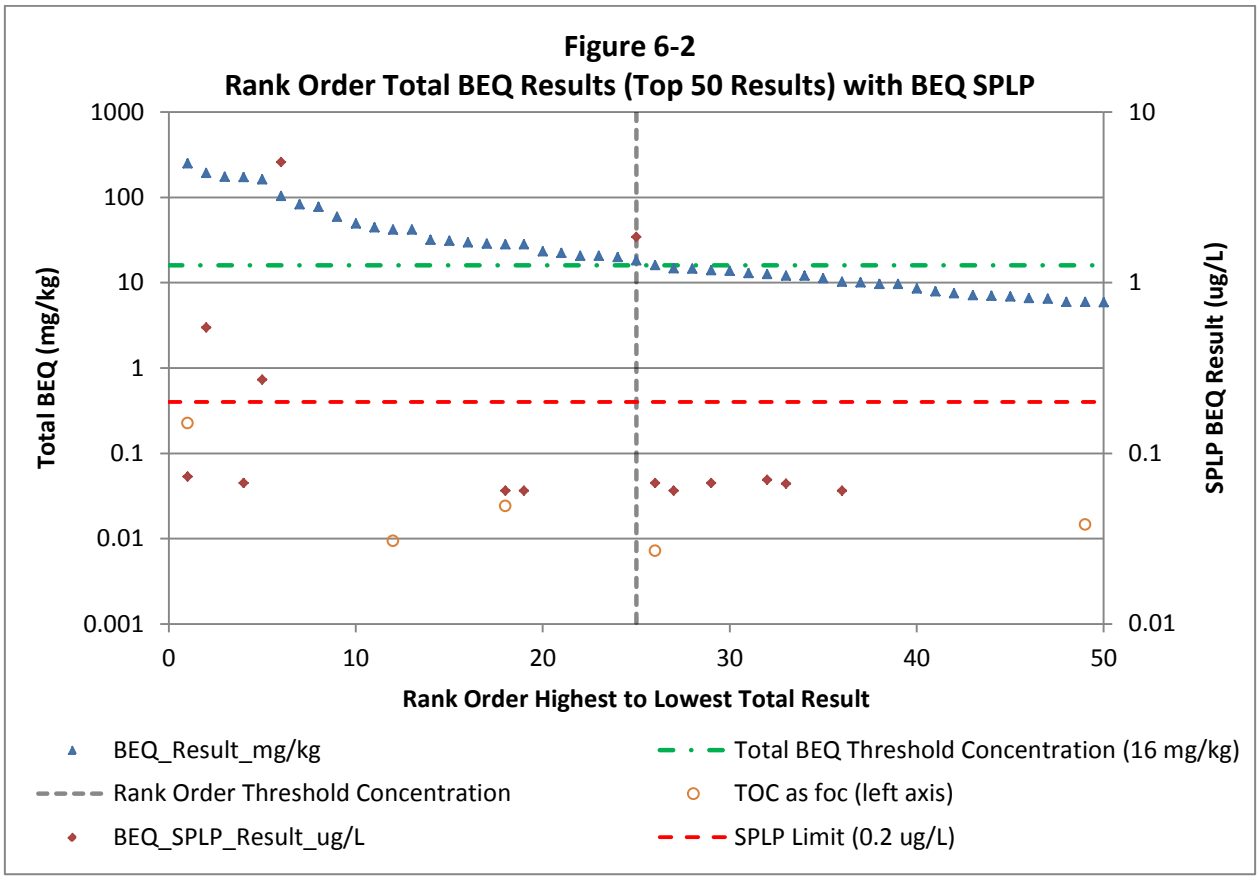


Figure 6-2
Rank Order Total BEQ Results (Top 50 Results) with BEQ SPLP
Total BEQ (mg/kg)
SPLP BEQ Result (ug/L)
1000
100
10
1
0.1
0.01
0.001
10
1
0.1
0.01
0
10
20
30
40
50
Rank Order Highest to Lowest Total Result
BEQ_Result_mg/kg
Total BEQ Threshold Concentration (16 mg/kg)
Rank Order Threshold Concentration
TOC as foc (left axis)
BEQ_SPLP_Result_ug/L
SPLP Limit (0.2 ug/L)

7.0 HUMAN HEALTH RISK ASSESSMENT SUMMARY

The purpose of the Human Health Risk Assessment (HHRA) is to assess the potential human-health effects associated with past releases of lead and PAHs at NSA Mid-South UXOs 1 and 2 under current and anticipated future land use scenarios. The HHRA was performed in accordance with U.S. EPA Risk Assessment Guidance for Superfund (RAGS) Parts A, B, D, E, and F (U.S. EPA 1989, 1991c, 2001, 2004a, and 2009a) assuming that no action has been or would be taken to control or eliminate contaminant releases. Findings will be used as part of the rationale for risk management decisions at this site. This section summarizes the HHRA, which is presented in detail in Appendix D.

The HHRA process is divided into six steps:

- Data Compilation and Evaluation
- Exposure Assessment
- Toxicity Assessment
- Risk Characterization
- Uncertainty Analysis
- Risk Summary

Subsequent to the HHRA, remediation goal options (RGOs) were developed for chemicals identified as COCs to inform risk management decisions.

7.1 Data Compilation and Evaluation

The HHRA evaluated surface (0-1 ft bgs) and subsurface (1-2 ft bgs) soil data collected as part of the 2010 SI (Tt 2010) and 2013 RFI sampling event. Sediment data, collected from a wet weather conveyance onsite, were combined with surface soil data for evaluation due to the typically dry nature of the conveyance and similarity in exposure conditions of these two media. Surface water is not present onsite. Groundwater was removed as a potential medium of concern based on TDEC knowledge of regional groundwater traits and Partnering Team agreements (see Appendix D).

Chemicals of Potential Concern (COPCs) were identified by comparing site data to conservative media-specific screening levels. S creening levels were U.S. EPA RSLs based on residential land use. Chemicals with maximum detected concentrations exceeding RSLs were identified as COPCs. Benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, fluoranthene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, pyrene, and lead were identified as COPCs in surface soil.

Benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, naphthalene, and lead were identified as COPCs in subsurface soil.

COPCs were carried in to the next steps of the HHRA process: exposure assessment, toxicity assessment, and risk characterization. In accordance with federal risk assessment guidance (U.S. EPA 1993a and U.S. EPA 2000), the potential cumulative impact of seven carcinogenic PAHs (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene) was evaluated by calculating BEQ for each soil sample. As discussed in Section 5.2, BEQ is a weighted sum of carcinogenic PAHs based on their potency relative to benzo(a)pyrene. In subsequent steps of the HHRA, these seven PAHs are treated as a single COPC ("BEQ") reflecting their cumulative effects. The remaining PAHs were evaluated individually.

7.2 Exposure Assessment

The location, demographics, and physical characteristics of the site are detailed in Sections 1 through 3. Based on the conceptual site model (Figure 5-7), the following receptors/exposure pathways were identified: hypothetical recreational users (child and adult), site workers, hypothetical construction (excavation) workers, and hypothetical site residents. For each receptor, three exposure routes were identified: incidental ingestion of COPCs in soil, dermal contact with COPCs in soil, and inhalation of COPCs in particulates from soil. Exposure assessment is the means by which the exposure of a r eceptor to COPCs in the environment is translated into the concentration that is likely to be found in the receptor's body. Exposure assumptions (e.g., body weight, ingestion and inhalation rates, and exposure durations) for each receptor are provided in Appendix D. Exposure point concentrations were upper confidence limits of mean soil concentrations calculated with U.S. EPA ProUCL software (v.4.1; U.S. EPA 2007a). Exposures to lead were characterized for a child resident using U.S. EPA's Integrated Exposure Uptake Biokinetic Model for Lead (IEUBK) (U.S. EPA 2007), and adult receptors were evaluated using U.S. EPA's adult lead model (U.S. EPA 2003). Details of the exposure calculations are provided in Appendix D.

7.3 Toxicity Assessment

The purpose of the toxicity assessment is to evaluate the potential for COPCs to cause adverse health effects and provide an estimate of the relationship between the magnitude of exposure and the probability (or severity) of the effect. From this analysis, toxicity values are derived that allow for estimation of non-carcinogenic hazard or carcinogenic risk as a function of

exposure. Cancer and non-cancer effects are assessed separately, although some chemicals may cause both types of effects. The primary source of toxicity values used in this assessment was U.S. EPA's Integrated Risk Information System (U.S. EPA 2009c). COPC-specific toxicity information is presented in Appendix D.

7.4 Risk Characterization

Risk characterization combines the outputs of the exposure and toxicity assessments to estimate the potential for adverse effects in the exposed populations. The output of risk characterization provides the key elements for risk management and supports remedial decision-making. Non-carcinogenic and carcinogenic risks are predicted and evaluated separately. Potential risk from lead exposure is also evaluated separately.

For non-cancer effects (systemic toxicants), acceptable exposure levels represent exposure that would not result in adverse effects during a lifetime or part of a lifetime, incorporating an adequate margin of safety (U.S. EPA 1994). The metric for non-cancer effects is a Hazard Quotient (HQ) calculated by dividing chronic daily exposure estimates by a toxicity-based reference dose (i.e., concentration representative of acceptable exposure level). HQs for each chemical in each exposure pathway are summed to obtain the hazard index (HI), which allows assessment of the overall potential for non-carcinogenic health effects (U.S. EPA 1989). Adverse health effects can occur when the HI exceeds 1.0, and this threshold is used to identify COCs.

Potential risks associated with exposures to carcinogenic chemicals are assessed by computing the increased probability of an individual developing cancer during his or her lifetime. Incremental lifetime cancer risks in excess of the normal rate of cancer incidence were calculated using the output of the exposure assessment (chronic daily intake) in combination with cancer slope factors and inhalation unit risk (see Appendix D). The total incremental lifetime cancer risks for an individual was calculated as the sum for all relevant exposure routes and pathways (i.e., oral, dermal, inhalation). Cancer risk estimates were compared to the U.S. EPA target risk range of 1E-6 to 1E-4, or 1 in 1 million to 1 in 10,000. COCs based on cancer risk are identified by first comparing the cumulative risk estimate for the land use scenario to U.S. EPA's upper bound acceptable excess risk range of 1 in 10,000 (1E-4). If the cumulative risk estimate exceeds U.S. EPA's threshold of 1E-4, COCs are identified as those chemicals contributing at least 1E-6 risk to the total risk.

In accordance with RAGS, lead risk characterization is based on a separate endpoint, the probability that the blood lead level threshold will exceed 10 micrograms per deciliter (µg/dL). As previously discussed, lead was evaluated using U.S. EPA's IEUBK and adult lead models, which estimate blood lead levels of receptors exposed to lead-contaminated media as well as the probability that the blood lead concentration, will exceed 10 µg/dL. U.S. EPA's threshold is a 5 percent or greater probability that the blood lead level will be greater than 10 µg/dL (U.S. EPA 2007). Consequently, when lead models predict greater than a 5 percent probability that blood lead levels would exceed 10 µg/dL, lead is characterized as a COC for those exposure conditions.

Table 7-1 summarizes the risk estimates for non-cancer effects (Adult and Child HIs), cancer risk, and lead models. Results are presented for hypothetical recreational, site worker, hypothetical excavation worker, and hypothetical residential scenarios with surface soil and subsurface soil exposures.

Table 7-1
Summary of Risk Estimates for Lead and PAHs

			Non-Carcinogenic Chemicals		Carcinogenic Chemicals	Lead
Land Use Scenario	**Medium**	**Exposure Unit and Group**	**Child HI**	**Adult HI**	**Cancer Risk**	**U.S. EPA Lead Model Probability**
Recreational	Soil	Surface	7.1E-3	8.8E-4	**4.9E-4**	1.7%
	Soil	Subsurface	8.7E-6	2.8E-6	**2.7E-4**	0.6%
Composite Site Worker	Soil	Surface	NA	4.4E-3	**1.6E-4**	**7.7%**
	Soil	Subsurface	NA	5.7E-5	9.0E-5	1.4%
Excavation Worker	Soil	Surface	NA	7.6E-4	1.3E-6	0.6%
	Soil	Subsurface	NA	5.0E-6	7.1E-7	0.4%
Residential	Soil	Surface	3.7E-2	8.1E-3	**2.3E-3**	**70%**
	Soil	Subsurface	2.6E-4	2.3E-4	**1.3E-3**	**7.7%**

Notes:
NA = Not applicable
HI = Hazard index (non-cancer)
PAH = Polycyclic Aromatic Hydrocarbons
U.S. EPA = United States Environmental Protection Agency
Highlight and **bold** indicates chemicals of concern were identified
Detailed documentation and calculations are in Appendix D

As indicated on the table, non-carcinogenic risks were acceptable (HI < 1.0) for each of the exposure scenarios. As such, no COCs were identified for non-carcinogenic risk.

Cancer risk exceeded the U.S. EPA's acceptable risk threshold of 1E-4 in surface and subsurface soil for the following exposures: 1) recreational, (2) site worker, and (3) residential. Chemicals that contributed more than 1E-6 to the total risk for each scenario were identified as COCs. Based on this evaluation, BEQ was identified as a COC in surface and subsurface soil for hypothetical recreational scenario, in surface soil for the site worker scenario, and in surface and subsurface soil for the hypothetical residential scenario.

Lead models indicated a greater than 5 percent probability of blood lead concentrations exceeding 10 µg/dL for site worker exposures to surface soil, and residential exposures to both surface and subsurface soil. Lead was identified as a COC in these scenarios.

7.5 Uncertainty Analysis

Inherent in any risk evaluation are uncertainties related to the data used, exposure assessment assumptions and process, toxicological values applied, and the general characterization framework. Appendix D summarizes some of the primary sources of uncertainty and variability related to the HHRA and identifies the nature of any biases that may result (i.e., anticipated over or under estimation of risk).

7.6 Risk Summary

Potential human health risk from exposure to surface and subsurface soil in the NSA Mid-South UXOs 1 and 2 areas was evaluated for several land use scenarios and receptors: hypothetical recreational users, site workers, hypothetical construction/excavation workers, and hypothetical site residents, as described in the exposure assessment based on the CSM for this site. In accordance with the NCP and U.S. EPA Office of Solid Waste and Emergency Response (OSWER) Directive 9355.0-30, excess carcinogenic risk between the ranges of 1E-6 and 1E-4 is within U.S. EPA's acceptable excess risk range and generally does not warrant further action (U.S. EPA 1994 and 1991b). Acceptable exposure levels for non-cancer effects represent concentration levels that would not result in adverse effects during a lifetime or part of a lifetime, incorporating an adequate margin of safety (40 CFR 300.430). This is represented by U.S. EPA's HI threshold of 1.0 for non-cancer effects. Soil lead was evaluated using U.S. EPA's lead models, a target blood lead level of 10 µg/dL, and a probability threshold of 5 percent, in accordance with U.S. EPA's IEUBK guidance.

BEQ and lead in surface and subsurface soil presented risk in excess of the acceptable ranges/thresholds noted above and were identified as COCs. BEQ, which is evaluated for carcinogenic risk, was identified as a COC for the hypothetical residential and recreational scenario in both surface and subsurface soil. In the site worker scenario, BEQ was identified as a COC in surface soil and was not identified as a COC in subsurface soil. BEQ was not identified as a COC in the excavation worker scenario in either surface or subsurface soil.

Lead was identified as a COC based on U.S. EPA's IEUBK model and the estimated probability that a blood lead level would exceed 10 µg/dL. Lead was identified as a COC in both surface and subsurface soil for the hypothetical residential scenario. In the site worker scenario, lead was identified as a COC in surface soil and was not identified as a COC in subsurface soil. Lead was not identified as a COC in the excavation worker or recreational user scenarios in either surface or subsurface soil.

Table 7-2 summarizes COCs, land use scenarios, and depth intervals.

Table 7-2
Chemicals of Concern and Land Use Scenarios

	BEQ in Soil		Lead in Soil	
Parameter	**Surface**	**Subsurface**	**Surface**	**Subsurface**
Hypothetical Recreational	X	X	—	—
Site Worker	X	—	X	—
Hypothetical Excavation Worker	—	—	—	—
Hypothetical Site Resident	X	X	X	X

Notes:
X = COC identified for the depth interval and receptor based on risk characterization
— = COC not identified for the depth interval and receptor based on risk characterization
BEQ = Carcinogenic PAHs evaluated as benzo(a)pyrene equivalents

7.7 Remedial Goal Options

Remedial goals are soil concentrations representing acceptable risk to a specified receptor. RGOs were developed for BEQ and lead for those exposure scenarios in which these chemicals were identified as COCs. RGOs for BEQ were calculated using target cancer risks of 1E-6, 1E-5, and 1E-4 (1E-4 based value shown in Table 7-3) and the exposure scenarios identified in the HHRA (Appendix D). The RGO is the soil concentration of a given COC below which estimated risk to human health for a given exposure scenario is acceptable.

For lead, RGOs were developed using U.S. EPA's lead models, a probability of 5 percent, a target blood lead level of 10 µg/dL, and the exposure scenarios identified in the HHRA (Appendix D). The lead RGO is the soil concentration below which exposures are acceptable (i.e., lead exposure with a less than 5 percent likelihood of resulting in blood lead levels of 10 µg/dL).

Table 7-3 presents RGOs that were developed for each COC and exposure scenario identified in Table 7-2.

Table 7-3
Remedial Goal Option Summary

	BEQ in Soil (1E-4 Risk)		Lead in Soil (IEUBK)	
Receptor	**Surface**	**Subsurface**	**Surface**	**Subsurface**
Hypothetical Recreational	6.9	6.9	—	—
Site Worker	21.1	—	1,235	—
Hypothetical Site Resident	1.5	1.5	418	418

Notes:

— = No COC identified at the corresponding depth interval for receptor
BEQ = Carcinogenic PAHs evaluated as benzo(a)pyrene equivalents
RGO = Remedial goal options in mg/kg for COCs identified at the depth interval and for the receptor above
IEUBK = Integrated Exposure Uptake Biokinetic Model for Lead

8.0 SUMMARY OF RESULTS

Nature and Extent of Lead and PAHs

The RFI data indicate the distribution of lead and PAH impacts are consistent with the operations of the former Trap/Skeet and Pistol Ranges. Lead concentrations in soil are primarily limited to the surface-soil interval with only a few exceptions; however, PAHs are present in both surface and subsurface soil.

At the Pistol Range berm, lead exceeding the PAL occurs predominately in the uppermost 1 foot of soil; in subsurface soil, PAL exceedances are isolated to a few locations in the berm interior. However, PAH concentrations exceeding the NSA Mid-South background (0.565 mg/kg) are prevalent in surface and subsurface soil, and beneath the pre-berm natural grade, likely resulting from the trap and skeet range operations preceding berm construction.

The horizontal extent of lead and PAH soil contamination at UXO 2 is confined to the areas identified in the SI and coincides with the shot- and target-fall zones with the highest concentrations in areas closest to the shooting stations. Soil sampling at the Midway RV Park, the only area where a quasi-residential use is ongoing, indicates lead impacts are isolated to the southwest corner of the Park. However, no subsurface lead impacts were identified nor were BEQ concentrations detected above background in surface soil at the Park.

Soil in the newly sampled areas north of Polaris Drive and west of the Trap/Skeet Ranges shooting stations (parallel to Singleton Avenue) were found to be free of lead impacts. West of the shooting stations, BEQ is present in soil in concentrations exceeding background; however, this is likely the result of the sampling locations being near asphalt parking areas and consequently unrelated to the former range operations.

No lead shot was observed in soil samples collected from the UXO 2 Trap/Skeet Ranges, but bullet fragments were visible on the surface and at depth during the completion of hand-auger borings and trenching in the UXO 1 Pistol Range berm. Therefore, there is potential that lead data are biased high. This is particularly true at sampling locations SRSB23 and TSR-SS022, west and southwest of the Midway RV Park, where lead concentrations were 51,900 mg/kg and 12,500 mg/kg, respectively.

The comparisons of soil from the wet weather conveyances to that across the site indicate that the drainage ditches are not accumulation/collection points for site runoff, but were probably impacted by operations of the former Trap/Skeet ranges.

Fate and Transport

The fate and transport evaluation concluded contaminant migration from soil to sediment via surface-soil erosion and to air through fugitive dust generation were the most likely transport pathways for lead and PAHs; however, the relatively flat topography and well-established vegetation at the site appear to be inhibiting their transport.

Site-Wide Risk

Human health risk from soil and sediment was evaluated in Appendix D and summarized in Section 7 of this RFI report. The HHRA characterized risks for several land-use scenarios and receptors: h ypothetical recreational users, site workers, hypothetical construction/excavation workers, and hypothetical site residents. As part of this evaluation, risks were characterized, and BEQ and lead were identified as COCs in soil and sediment as a result of their contribution to risk on a site-wide basis.

Table 8-1
Chemicals of Concern and Land Use Scenarios

Receptor	BEQ in Soil		Lead in Soil	
	Surface	Subsurface	Surface	Subsurface
Hypothetical Recreational	X	X	—	—
Site Worker	X	—	X	—
Hypothetical Excavation Worker	—	—	—	—
Hypothetical Site Resident	X	X	X	X

Notes:
X = COC identified for the depth interval and receptor based on site-wide risk characterization
— = COC not identified for the depth interval and receptor based on site-wide risk characterization
BEQ = Carcinogenic PAHs evaluated as benzo(a)pyrene equivalents

BEQ was identified as a CO C for the hypothetical residential and recreational scenarios in both surface and subsurface soil. In the site worker scenario, BEQ was identified as a COC in surface soil, but was not identified as a COC in subsurface soil. BEQ was not identified as a COC in the excavation worker scenario in either surface or subsurface soil.

Lead was identified as a COC in both surface and subsurface soil for the hypothetical residential scenario. In the site worker scenario, lead was identified as a COC in surface soil but was not identified as a COC in subsurface soil. Lead was not identified as a COC in the excavation worker or recreational user scenarios in either surface or subsurface soil.

Spatial Distribution of COCs

RGOs were developed for COCs as part of the risk assessment process and were used to evaluate COC distributions under the land-use scenario alternatives. The RGOs are soil concentrations below which risk to a given receptor is acceptable. Acceptable risk is achieved when the mean site-wide concentration of the COC is less than the RGO. The upper confidence limit of the site mean is the remedial target because this value represents a r easonable maximum exposure to site contaminants (U.S. EPA 1989). RGOs used in this evaluation were based on 1E-4 target risk for BEQ and a 5 percent probability of exceeding 10 µg/dL blood lead concentrations per U.S. EPA's lead model.

UXO 2

Figures 8-1 and 8-2 illustrate lead and PAH surface-soil concentrations relative to RGOs for residential, site worker, and recreational land-use scenarios at UXO 2 and show where risk management and/or corrective measures may be warranted.

Residential Reuse Scenario — In surface soil, residential land use would require addressing most of the site in the wooded areas southwest and west of the RV Park and open field areas for both lead and BEQ (Figures 8-1 and 8-2). Concentrations in the Midway RV Park generally are less than the corresponding residential RGOs in surface soil for both BEQ (1.5 mg/kg) and lead (418 mg/kg), with the exception of the southwest corner of the park where lead was reported at 688 mg/kg. Similarly, the reported concentrations in samples collected north of Polaris Drive were less than corresponding RGOs.

As discussed previously in Sections 5 and 6, the relative immobility of the contaminants results in the subsurface soil interval (1-2 feet) being relatively absent of lead. Figure 8-3 shows only two sampling locations where reuse is unacceptable for a residential reuse due to lead; Figure 8-4 indicates nine sampling locations where BEQ concentrations are above the residential RGO.

Site Worker Reuse Scenario — As noted in Table 8-1, lead and BEQ are COCs for the site worker scenario only in surface soil. As shown on Figures 8-1 and 8-2, the areas where lead RGOs are

exceeded are similar to those identified for residential land use; however, the areas identified for BEQ exceedances are smaller and limited to the open fields in the central and southern portions of the Trap/Skeet Ranges #1 and #2. Surface soil concentrations reported in the RV Park, the Commissary, and samples north of Polaris Drive are less than the corresponding site worker RGOs for both BEQ (21.1 mg/kg) and lead (1,235 mg/kg).

Excavation Worker Reuse Scenario — As noted in Table 8-1 and shown on Figures 8-1 through 8-4, lead and BEQ are not COCs for surface or subsurface soil under a hypothetical excavation worker scenario.

Recreational Reuse Scenario — As noted on Table 8-1 and shown on Figure 8-1, lead is not a COC under a recreational land use scenario; therefore, the footprint of acceptable recreational reuse is driven by BEQ. The recreational RGO for BEQ (6.9 mg/kg) is more conservative than the RGO for site workers (21.1 mg/kg); therefore, as indicated on Figure 8-2, a slightly larger risk management area exists in surface soil (25 sample locations) for a recreational reuse compared to site worker use (12 sample locations).

UXO 1

Figures 8-5 and 8-6 illustrate lead and BEQ analytical, respectively, in surface and subsurface soil at UXO 1; the color coding indicates where the RGOs for residential, recreational, and site worker reuse scenarios are exceeded. There were no exceedances of the excavation site worker scenario.

The contaminant distribution is similar to UXO 2. As noted on Figure 8-5, the residential RGO for lead is exceeded predominately in surface soil, with only four exceptions (sample locations PRSB01, PRSB04, PRSB05, and PRSB06). Three of these four subsurface locations also exceed the site worker RGO for lead (1,235 mg/kg). As discussed in Section 5, Nature and Extent, and also noted on Figure 8-5, elevated lead concentrations between 12 to 14 feet bgs (sample locations PRSB01 and PRSB06) coincide with the natural ground surface beneath the berm, and indicate that if the berm were to be removed, subsurface soil in areas below the berm would still pose a risk under the evaluated reuse scenarios. Figure 8-6 illustrates that BEQ also exceeds the residential, recreational, and site worker RGOs at multiple depth intervals.

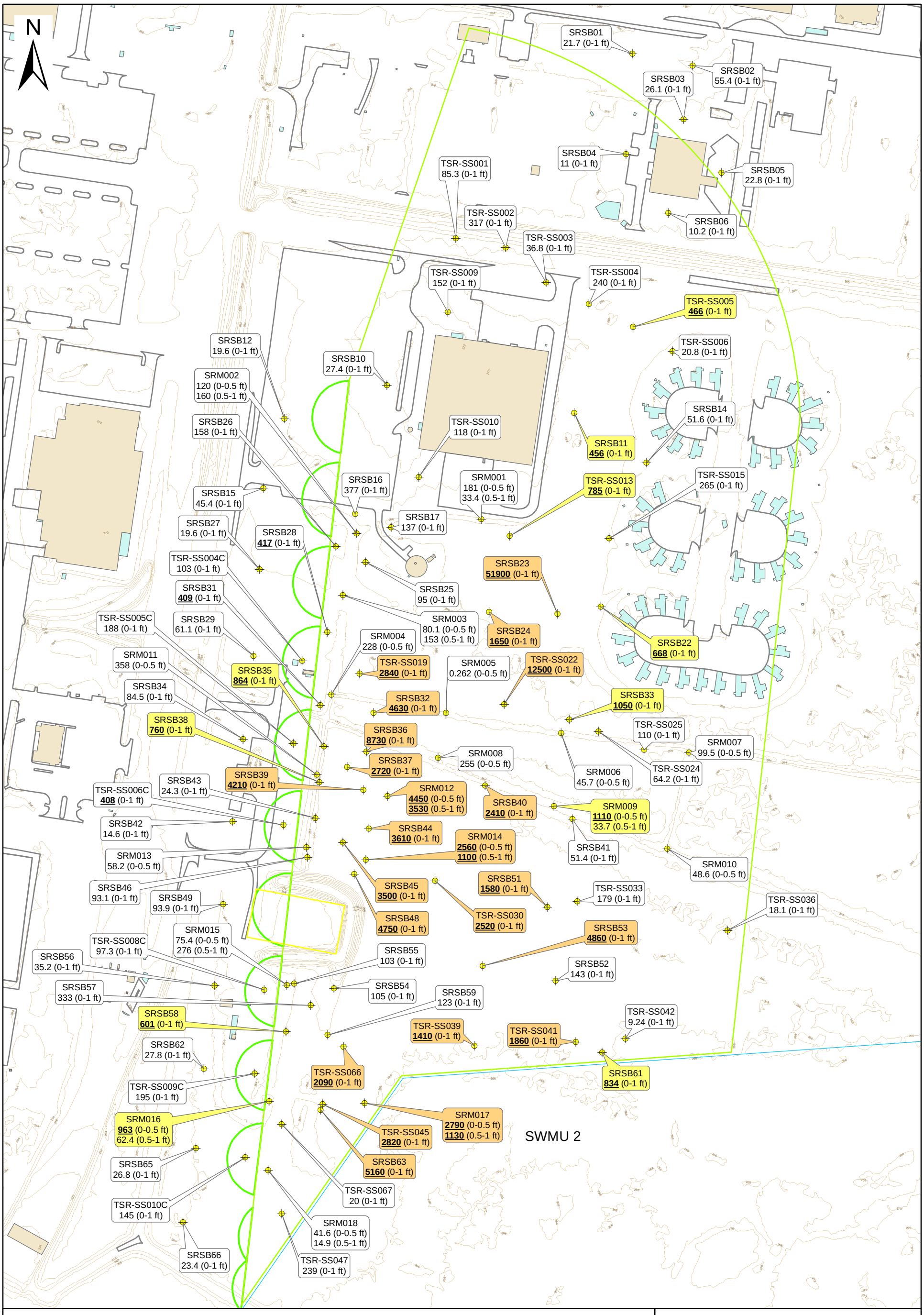
Recommendations and Conclusions

- The SI recommended a 1-foot surface-soil scrape of the berm face to remove elevated lead. However, given that PAHs in subsurface soil will continue to pose a risk, a limited soil-removal action is not recommended for the berm.

- The clay pigeon accumulation areas along the sides of the Pistol Range berm may be an ongoing source of PAHs in soil; therefore, consideration of capping or removing soil in these areas should be considered as part of future corrective measures for the site.

- Additional soil sampling is recommended in the area of UXO 2 sample locations SRSB23 and TSR-SS022, west and southwest of the Midway RV Park, to determine whether the elevated lead concentrations (51,900 and 12,500 mg/kg, respectively) are representative of soil conditions or are biased high because of metallic lead in the previously collected soil samples.

- The Base's master development plan (AECOM 2010) has no redevelopment identified for UXOs 1 and 2 and no immediate risk to human health exists at either site. Therefore, a combination of land use controls that restrict redevelopment, coupled with exposure reductions to high concentration PAH and lead areas is recommended for corrective measures evaluation. Mowing of fields along the western portion of the UXO 2 and inside the UXO 1 berm should be discontinued, due to the potential site worker exposure risk associated with contaminants entrained in fugitive dust emissions during dry times of the year. As an alternative, the Base may consider selective planting of native grasses that do not require mowing.



Sample Locations
Topographic Contour (2-ft interval)
Lead > Site Resident RGO (418 ppm)
Lead > Site Worker RGO (1,235 ppm)
Lead not a COC under a Recreational Reuse Scenario

Range
Pistol Range
Trap Skeet Range
Firing Line
SWMU 2 Boundary
Structures

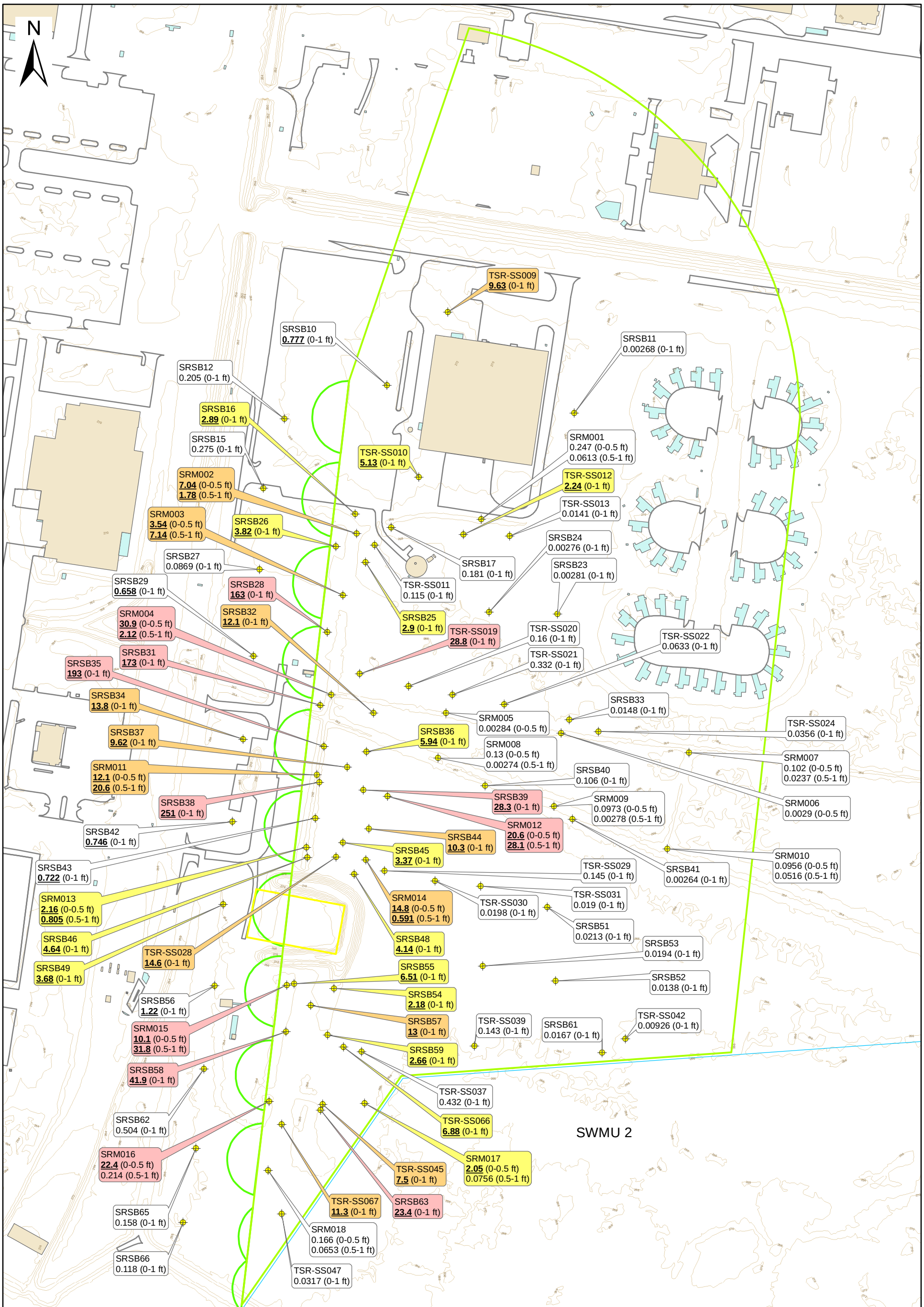
200 100 0 200
Feet

Notes:
- Lead Results shown as milligram per kilogram (mg/kg) or parts per million (ppm)
- U.S. EPA Residential Regional Screening Level (RSL) for Lead = 400 mg/kg
- U.S. EPA Industrial RSL for Lead = 800 mg/kg
- **Bold** indicates result exceeded Residential RSL value
- TSR - SI Sample Designation
- SRS - RFI Sample Designation

NAVFAC Naval Facilities Engineering Command
RESOLUTION CONSULTANTS

Figure 8-1
Lead in Surface Soil
Exceeding RGOs
UXO 2 - Trap/Skeet Ranges #1 and #2
NSA Mid-South
Millington, Tennessee

11/8/2013 X:\Navy\NSA_Midsouth\project\RI Report\Fig 8-1 UXO Lead Contour Surface_BL_v2.mxd



Sample Location
Topographic Contour (2-ft interval)
BEQ > Site Resident RGO (1.5 ppm)
BEQ > Recreational RGO (6.9 ppm)
BEQ > Site Worker RGO (21.1 ppm)

Range
Pistol Range
Trap Skeet Range
Firing Line
Structures
SWMU 2 Boundary

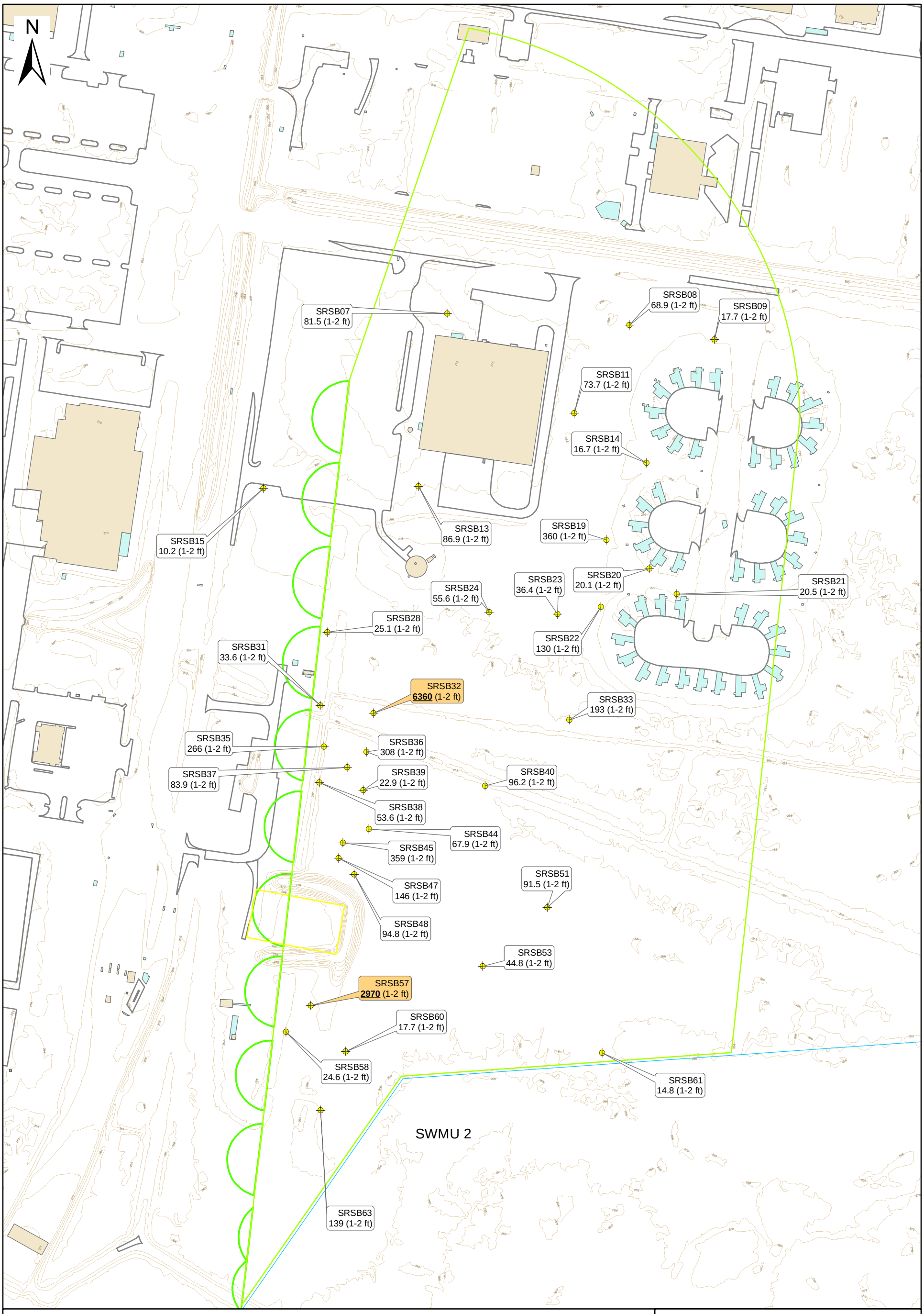
200 100 0 200
Feet

Notes;
- Benzo(a)pyrene Equivalent (BEQ) Results shown as milligram per kilogram (mg/kg) or parts per million (ppm)
- NSA Mid-South Background Value for BEQ = 0.565 mg/kg
- **Bold** indicates result exceeded background value
- TSR indicates SI sample designation
- SRS indicates RFI sample designation

NAVFAC Naval Facilities Engineering Command
RESOLUTION CONSULTANTS

Figure 8-2
Benzo(a)pyrene Equivalent in Surface Soil Exceeding RGOs
UXO 2 - Trap/Skeet Ranges #1 and #2
NSA Mid-South
Millington, Tennessee

11/8/2013 X:\Navy\NSA_Midsouth\project\RI Report\Fig 8-2 UXO BEQ Contour Surface_BL.mxd



Sample Locations

Topographic Contour (2-ft interval)

Lead > Site Resident RGO (418 ppm)

Lead > Site Worker RGO (1,235 ppm)

Lead not a COC under a Recreational Reuse Scenario

Range

Pistol Range

Trap Skeet Range

Firing Line

Structures

SWMU 2 Boundary

200 100 0 200

Feet

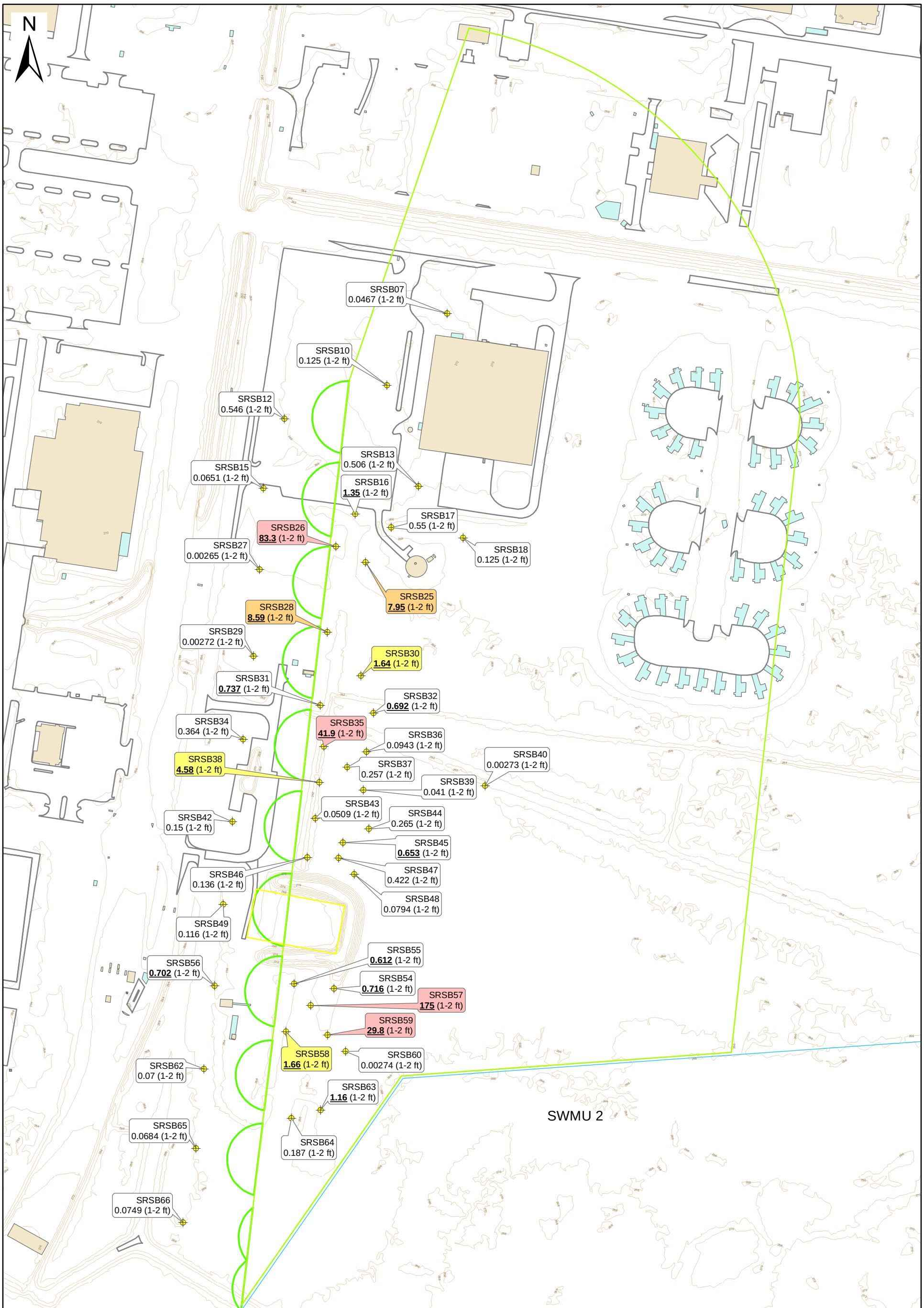
Notes:
- Lead Results shown as milligram per kilogram (mg/kg) or Parts per million (ppm)
- U.S. EPA Residential Regional Screening Level (RSL) for Lead = 400 mg/kg
- U.S. EPA Industrial RSL for Lead = 800 mg/kg
- **Bold** indicates result exceeded Residential RSL value
- TSR - SI Sample Designation
- SRS - RFI Sample Designation

NAVFAC Naval Facilities Engineering Command

RESOLUTION CONSULTANTS

Figure 8-3
Lead in Subsurface Soil
Exceeding RGOs
UXO 2 - Trap/Skeet Ranges #1 and #2
NSA Mid-South
Millington, Tennessee

11/8/2013 X:\Navy\NSA_Midsouth\project\RI Report\Fig 8-3 UXO Lead Contour Subsurface_BL.mxd



Sample Location
Topographic Contour (2-ft interval)
BEQ > Site Resident RGO (1.5 ppm)
BEQ > Recreational RGO (6.9 ppm)
BEQ > Site Worker RGO (21.1 ppm)

Range
Pistol Range
Trap Skeet Range
Firing Line
Structures
SWMU 2 Boundary

200 100 0 200
Feet

Notes:
- Benzo(a)pyrene Equivalent (BEQ) Results shown as milligram per kilogram (mg/kg) or parts per million (ppm)
- NSA Mid-South Background Value for BEQ = 0.565 mg/kg
- **Bold** indicates result exceeded background value
- TSR indicates SI sample designation
- SRS indicates RFI sample designation

NAVFAC Naval Facilities Engineering Command
RESOLUTION CONSULTANTS

Figure 8-4
Benzo(a)pyrene Equivalent in Subsurface Soil Exceeding RGOs
UXO 2 - Trap/Skeet Ranges #1 and #2
NSA Mid-South
Millington, Tennessee

11/8/2013 X:\Navy\NSA_Midsouth\project\RI Report\Fig 8-4 UXO BEQ Contour Subsurface_BL.mxd

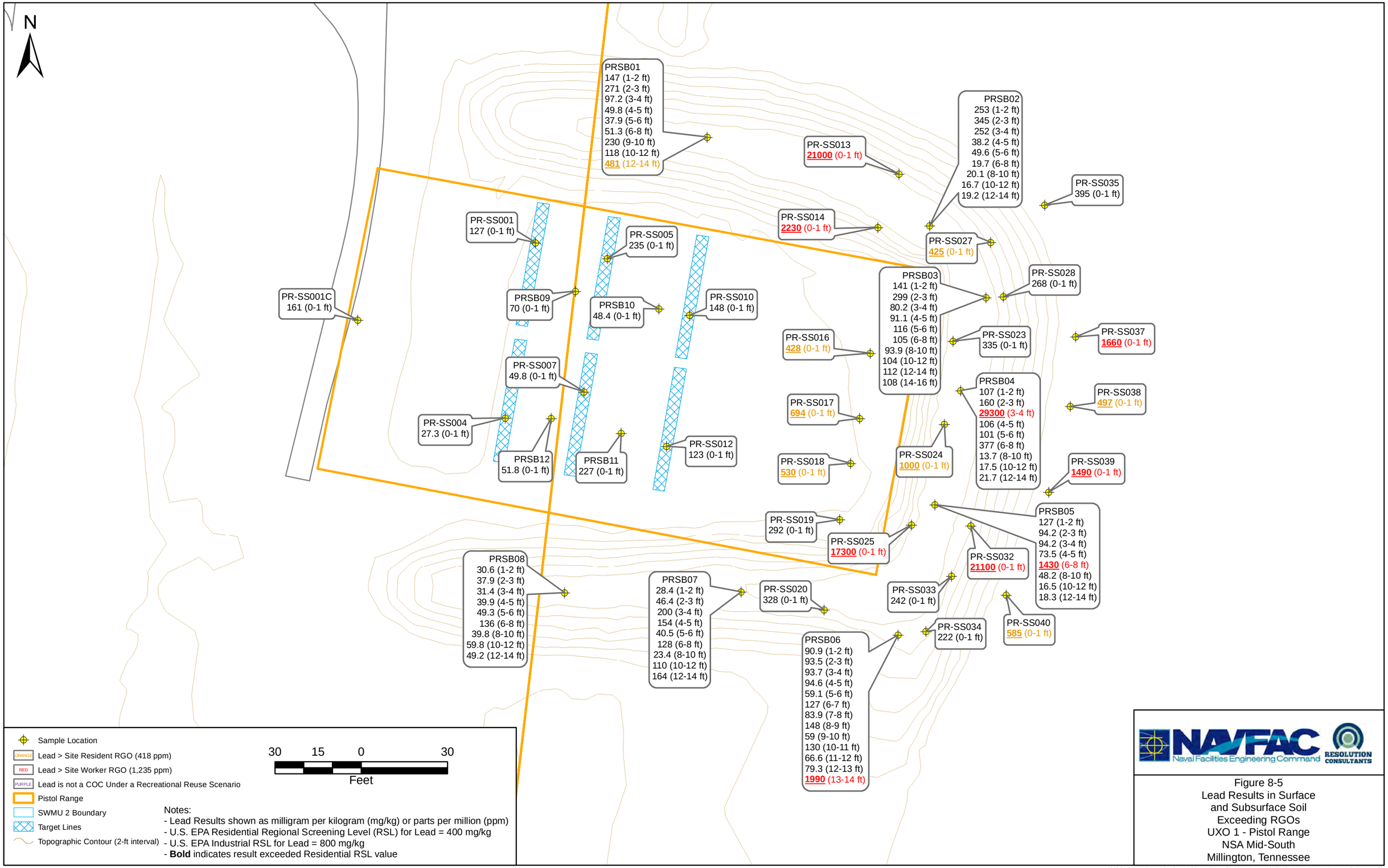


Figure 8-5
Lead Results in Surface and Subsurface Soil Exceeding RGOs
UXO 1 - Pistol Range
NSA Mid-South
Millington, Tennessee

11/8/2013 X:\Navy\NSA_Midsouth\project\RI Report\Fig 8-5 UXO 1_PR_Lead_BL.mxd

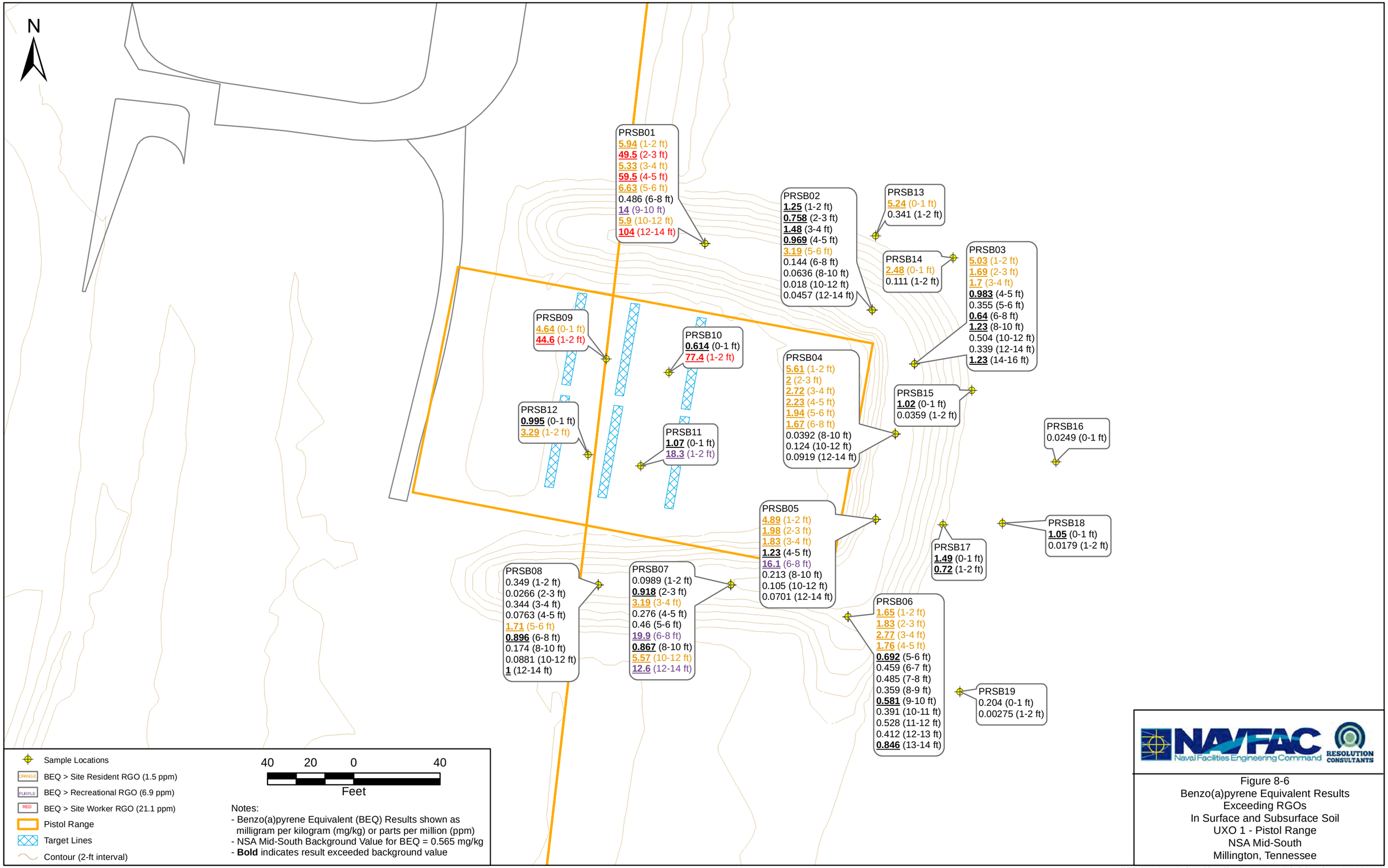


Figure 8-6
Benzo(a)pyrene Equivalent Results
Exceeding RGOs
In Surface and Subsurface Soil
UXO 1 - Pistol Range
NSA Mid-South
Millington, Tennessee

11/8/2013 X:\Navy\NSA_Midsouth\project\RI Report\Fig 8-6 UXO 1_PR_BEQ.mxd

9.0 REFERENCES

AECOM. *Naval Support Activity Mid-South Master Plan*; Millington, Tennessee; Final Report (AECOM 2012). (October 2012)

EnSafe/Allen & Hoshall. *Technical Memorandum — Assemblies A through D Background Reference Concentrations;* NSA Memphis, Millington Tennessee (EnSafe/Allen & Hoshall, 1996). (September 1996).

EnSafe. *Technical Memorandum — Distribution of Benzo(a)pyrene equivalent Concentrations at NSA Memphis* (EnSafe, 1997). (September 1997)

Malcolm Pirnie. *Preliminary Assessment*, Naval Support Activity Mid-South Millington, Tennessee. (August 2005).

Resolution Consultants. *Final Sampling and Analysis Plan, UXO 1 and UXO 2 (formerly AOC 1) Naval Support Activity, Mid-South, Millington, Tennessee* (Resolution Consultants, 2012). (December 2012).

Tetra Tech NUS, Inc. Wetland Survey. (2001).

Tetra Tech NUS, Inc. *Site Investigation Report for Munitions Response Program Site Inspections at NAVFAC Midwest and BRAC Program Management Office Southeast Munitions Response Sites and Areas of Concern*, Naval Support Activity Mid-South Millington, Tennessee. (September 2010).

U.S. Department of Defense. *Department of Defense Quality Systems Manual for Environmental Laboratories*, Version 4.2. (October 2010).

U.S. Department of Energy. *Oak Ridge National Laboratory Risk Assessment Information System,* U.S. Department of Energy, Office of Environmental Management, Oak Ridge Operations Office through a contract between Bechtel Jacobs Company LLC. and the University of Tennessee: (on-line database — http://risk.lsd.ornl.gov/). (2009).

U.S. Environmental Protection Agency. *Guidelines for Carcinogen Risk Assessment. Risk Assessment Forum*. Federal Register 51(185):33992-34003. (September 1986).

— *Risk Assessment Guidance for Superfund Volume I — Human Health Evaluation Manual (Part A) Interim Final*. EPA/540/1-89/002. (December 1989)

— *Risk Assessment Guidance for Superfund, Volume I: H uman Health Evaluation Manual, Supplemental Guidance, Standard Default Exposure Factors*, *Interim Final*. OSWER (Office of Solid Waste and Emergency Response) Directive 9285.6-03. (March 1991a).

— *Role of the Baseline Risk Assessment in Superfund Remedy Selections.* OSWER Directive 9355.0-30. (April 1991b)

— *Risk Assessment Guidance for Superfund Volume I — Human Health Evaluation Manual (Part B — Development of Risk-Based Preliminary Remediation Goals) Interim*. EPA/540/R092/003. (December 1991c)

— *Calculating the Concentration Term- Supplemental Guidance to RAGS*. OSWER #PB92-963373. (May 1992)

— *Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons.* EPA/600/R-93/089. (July 1993a)

— *National Oil and Hazardous Substances Pollution Contingency Plan.* Final Rule. 59 Federal Register 47384. (September 1994)

— Contract Laboratory Program National Functional Guidelines for Organic Data Review, U.S. Environmental Protection Agency. (October 1999)

— Supplemental Guidance to RAGS: Region 4 Bulletins, Human Health Risk Assessment Bulletins. EPA Region 4, originally published November 1995, Web site version last updated May 2000 (currently under revision). http://www.epa.gov/region4/superfund/programs/riskassess/healtbul.html (2000)

— *Risk Assessment Guidance for Superfund Volume I — Human Health Evaluation Manual (Part D — Standardized Planning, Reporting and Review of Superfund Risk Assessments) Final*. Publication# 9285.7-01D. (December 2001).

— *Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil*, EPA-540-R-03-001. (January 2003).

— *Risk Assessment Guidance for Superfund Volume I — Human Health Evaluation Manual (Part E — Supplemental Guidance for Dermal Risk Assessment) Final*. EPA/540/R/99/005. (July 2004a)

— *National Functional Guidelines for Inorganic Data Review*. OSWER Directive 9240.1-45, EPA 540/R-04/004. (October 2004b).

— *Guidelines for Carcinogen Risk Assessment*. EPA/630/P -03/001F. (March 2005b)

U.S. EPA. *User's Guide for the Integrated Exposure Uptake Biokinetic Model for Lead in Children (IEUBK) Windows,* U.S. EPA 9285.7-42, prepared by Syracuse Research Corporation, 6225 Running Ridge Road, North Syracuse, New York 13212. (2007).

— *ProUCL Version 4.00.04* (April 2007a).
(on-line. http://www.epa.gov/nerlesd1/tsc/ TSC_form.htm).

— *Integrated Risk Information System Database for Risk Assessment* (on-line database (2009c) — http://www.epa.gov/iris/index.html).

— *Risk Assessment Guidance for Superfund Volume I — Human Health Evaluation Manual (Part F, Supplemental Guidance for Inhalation Risk Assessment) Final*. EPA-540-R-070-002 OSWER 9285.7-82. (January 2009a).

— *Risk Assessment Guidance for Superfund Volume I — Human Health Evaluation Manual (Part E — Supplemental Guidance for Dermal Risk Assessment) Final*. EPA/540/R/99/005. (July 2004a)

U.S. EPA. Region 9 Regional Screening Levels November 2012. Retrieved from: http://www.epa.gov/region9/superfund/prg/ (2012)

U.S. Navy. *Tiered Human Health Risk Assessment,* U.S. Environmental Protection Agency, 2002.

World Health Organization. *Environmental Health Criteria 202, Selected Non-heterocyclic Polycyclic Aromatic Hydrocarbons*. Available at http://www.inchem.org/documents/ehc/ehc/ehc202.htm as of Nov 22, 2002. (1998)

Appendix A
Field Notes, EOD Trip Log Report and Record Keeping

EXPLOSIVE ORDNANCE INCIDENT REPORT For use of this form, see FM 4-30.5; the proponent agency is TRADOC.	1. UNIT NUMBER 723-30-13	2. CONTROL NUMBER 184-035-13	3. UNUSUAL ☐ 4. ROUTINE ☑

SECTION A: INITIAL INFORMATION

5. DATE/TIME REPORTED	9. INCIDENT LOCATION	11. ITEM(S) REPORTED
181325MAR2013	Range 47 GRID 16S BE 3930412941 Naval Support Activity Mid-South	1ea unknown 20mm
6. REPORTED BY Larry Proctor		
7. PHONE NUMBER (901) 874-7385	**10. POINT OF CONTACT** Larry Proctor	
8. ADDRESS Naval Support Activity Mid-South		

SECTION B: ACTION BY EOD

12. PERSONNEL DISPATCHED	13. DATE/TIME	14. TRAVEL DATA	15. WORK HOURS
SSG Throop, Timothy N. SPC Jon, La Foy P. SPC Clinton, Vandiver	A. DPRT 181500MAR2013 B. ARR 181820MAR2013 C. COMPL 182250MAR2013	A. AIR: FLYING TIME N/A B. VEH: MILEAGE	A. TRAVEL 3hr 20min B. INCIDENT 30min

16. CONFIRMED IDENTIFICATION	17. DISPOSITION
M55A2 TP-20mm projectile x1	Turned in to QASAS as scrap

18. INCIDENT NARRATIVE (INCLUDE ALL SIGNIFICANT DETAILS AND PROBLEMS)

On 181325MAR2013, the EOD Team Leader was contacted regarding a 20mm projectile located at Naval Support Acivity Mid-South. The EOD Team arrived on scene at 181820MAR13. Mr. Proctor, the POC, informed the Team Leader that the projectile was found by local contractors during an enviromental survey. The EOD Team Leader located the reported item and positively identified it as a M55A2 TP 20mm projectile (projectile only, no cartridge case). No explosive hazards were found.

Class V Used: NONE

GP POC: N/A

BN POC: MAJ Bailey, Christopher R. (910) 366-1901

CO POC: SSG Throop, Timothy N. (615) 891-0382

SIR: NO

SECTION C: AUTHENTICATION

19. NAME AND GRADE AND SIGNATURE OF UNIT COMMANDER	20. TELEPHONE NO.	21. DATE *(YYYYMMDD)*
RYAN E. MILLER, CPT, OD MILLER.RYAN.E.12919448	270-412-8665	20130320

REQUEST FOR AN EXPLOSIVES SAFETY SUBMISSION DETERMINATION

Site name/number, Activity, City, State and ZIP code:	AOC 1 and UXO 1 Small Arms Ranges Naval Support Activity (NSA) Mid-South Millington, Tennessee	Date submitted:	July 2, 2012
Project manager: Contact information	Benjamin Simes Navy RPM 847.688.2600 x 320 benjamin.simes@navy.mil	EOD/UXO contractor: Contact information	Rick Swahn UXO Manager Resolution Consultants 675 N. Washington Street Suite #300 Alexandria, VA 22314 (703) 706-0170 rick.swahn@aecom.com

Site history: Briefly describe past MEC or MPPEH use at the site

Naval Support Activity (NSA) Mid-South is located in the town of Millington in Shelby County, Tennessee, approximately 20 miles north of Memphis. The facility encompasses 1,600 acres and serves as one of the largest inland Navy installations in the world. A brief description of each site is as follows.

Former Trap/Skeet Ranges #1 and #2 (AOC-1) consist of approximately 79 acres, located near the southern border of the installation, adjacent to the former Pistol Range. The ranges were built around 1943, with Trap/Skeet Range #1 having an unrecorded closure date sometime after World War II and Trap/Skeet Range #2 closing in 2005. Property records indicate that the range had a firing line, skeet office and armory, two clay pigeon storage buildings, an ammunition storage building, Instruction Building, and shooting stations and targets.

Pistol Range UXO-1 consists of approximately 0.5 acres from the firing line to a containment berm located behind the former target areas. The Pistol Range was constructed after 1948 within the trap/skeet range and was in use until 1994. Property records indicate that the range consisted of a U-shaped berm approximately 10 to 15 feet tall and approximately 600 feet in length, shooting stations, targets, and an armory. The firing line maintained 16 firing positions, and five target lines.

MEC or MPPEH known or suspected to be present: Quantity, type/nomenclature, and condition

AOC-1: Munitions used consisted of small arms, primarily lead shot from 12- and 20-gauge shotgun shells

UXO-1: Munitions used consisted of small arms, reportedly 0.22 caliber, 0.30 caliber, 9 mm, 0.38 caliber, and 0.45 caliber. While not authorized to be fired at the site, two 40-mm rifle grenade riot control training rounds were found at the base of the berm during the PA/SI site walk. One of the training rounds was black and was positively identified as an inert powder barricade round No. 3401. The other training round was tan with a red/orange cap and was positively identified as a ferret round. According to Bob McConnie, the weapons officer of NSA Mid-South, both rounds were determined to have been expended and were properly disposed of.

Work task/project being proposed: Briefly describe proposed work; identify encumbering ESQD arcs	Trap and Skeet Range (AOC-1) and the Pistol Range (UXO-1) will be investigated through the collection and analysis of soil, sediment, surface water, and potentially groundwater samples. Proposed activities to aid in the collection of environmental samples include vegetation clearing, trenching, drilling, and hand-auguring. • Vegetation clearing activities are proposed for the soil berm at UXO-1. • Trenching activities (down to 5 feet below ground surface) will be confined to UXO-1 site and associated berm. • Drilling and hand auguring activities (down to 15 feet below ground surface) will take place within the site boundaries of AOC-1 and UXO-1. • Shallow soil samples (0-1 foot below ground surface and on the berm) will be collected within and outside of the site boundaries using hand held tools. Because the 40-mm rifle grenade rounds were found at the base of the UXO 1 berm, a UXO-qualified technician will be onsite during investigation activities there to provide anomaly avoidance services to field personnel. UXO/MEC avoidance services are not proposed for AOC-1 because this area was used as a trap/skeet range. If potential UXO or UXO is encountered, personnel will evacuate the area, the location and description of the munition will be recorded, the responsible Explosives Safety officer, the Navy RPM, NSA Mid-South POC, and NOSSA will be notified. EOD response will be coordinated. Neither range is encumbered by any ESQD arc. Project Start Date: March 2013
Likelihood of encountering MEC or MPPEH: Low, medium or high	The likelihood of encountering MEC or MPPEH is low based on the historical usage of the sites as a skeet/trap range and a pistol range and the types of small arms ammunition used at the sites. Although two, expended rifle grenade riot grenades were found at the pistol range, available site documentation suggests theses rounds were anomalous.

DEPARTMENT OF THE NAVY
NAVAL ORDNANCE SAFETY AND SECURITY ACTIVITY
FARRAGUT HALL
3817 STRAUSS AVENUE, SUITE 108
INDIAN HEAD, MD 20640-5151

8020
Ser N49/1246
20 July 12

From: Commanding Officer, Naval Ordnance Safety and Security Activity
To: Commanding Officer, Naval Facilities Engineering Command, Midwest (EV)

Subj: EXPLOSIVES SAFETY SUBMISSION DETERMINATION REQUEST FOR TRAP AND SKEET RANGE (AOC 1) AND PISTOL RANGE (UXO 1) AT NAVAL SUPPORT ACTIVITY MID-SOUTH, MILLINGTON, TENNESSEE

Ref: (a) E-mail NAVFAC MW (EV) Mr. B. Simes/NOSSA (N49) Mr. D. Murray of 11 Jul 12 (w/encl)
(b) NOSSAINST 8020.15C
(c) NAVSEA OP 5, Volume 1, Seventh Revision, Change 10

1. As requested by reference (a), the Naval Ordnance Safety and Security Activity (NOSSA) reviewed the subject Explosives Safety Submission (ESS) Determination Request (DR) in accordance with references (b) and (c). Based on the information provided, NOSSA has determined that an ESS is not required to collect soil, sediment, surface water, and potentially groundwater samples using hand-auger, drill, and/or trench in the Trap and Skeet Range (AOC 1) and the Pistol Range (UXO 1) at Naval Support Activity Mid-South, Millington, Tennessee.

2. As outlined in your request, we understand that the likelihood of encountering Munitions and Explosives of Concern (MEC) and/or Material Potentially Presenting an Explosive Hazard (MPPEH) during the proposed project has been determined to be low and that the following conditions apply:

a. The enclosure to reference (a) reported that the likelihood of encountering MEC/MPPEH is low because only small arms ammunition was reportedly used in both ranges. Although two expended riot control rifle grenades were found at the Pistol Range (UXO 1), available site documentation suggests these rounds were anomalous.

b. A UXO-qualified technician will be on site at the Pistol Range (UXO 1) during investigation activities as a conservative measure to provide anomaly avoidance support to field personnel. Anomaly avoidance support will not be provided during field work at the Trap and Skeet Range (AOC 1).

c. The site is outside of all existing explosives safety quantity distance arcs.

3. If surface MEC or MPPEH is discovered on the site while employing anomaly avoidance techniques, the item will be avoided and its location and description will be reported to the cognizant Explosive Safety Officer and the Navy Project Manager. An emergency response from the cognizant Explosive Ordnance Disposal detachment will be requested, if appropriate.

4. The NOSSA point of contact for this ESS DR response is Mr. Douglas Murray, who can be contacted at DSN 354-5630 or commercial at 301-744-5630.

TAMMY K. SCHIRF
By direction

Copy to:
CNO (N411C2; N452)
COMNAVFACENGCOM (ENV3)
NAVSUPPACT MID SOUTH MILLINGTON (ESO)
NOSSA ESSOLANT (N5L; N5L3; N5L5)

Projects (continued)

2/25/2013 001

J Matthews / P. Snyder

0830 - Leave office

0900 - Onsite

0920 - on location SB068 -
SP/AP complete - HS tailgate
complete -
Coordinated w/ R. Methvin
Regarding accessing perimeter
Road -

0945 - Begin Sampling @ SB066

1003 - Sampled SRSSB6601

1005 - Sampled SRSSB6602

1032 - Sampled SRSSB6501

1033 - Sampled SRSSB6501

Both samples four inches of
top soil organic silty loam.
4-24 inches brown silty
clay. moist + soft low plasticity

1118 - Sampled SRSSB6201

1119 - Sampled SRSSB6202

Brick fragment in soil.

2/25/13

P. Snyder / J. Matthews

1140 Sampled SRSSB5601

1141 Sampled SRSSB5602

Pb / PAH

3-4 inches organic top soil.

4-24 inches silty clay, soft, slightly moist, low plasticity

steel wire in soil

1150 - Leave site for lunch

1250 Back onsite

1335 Sampled SRSSB5501 - 1331

SRSSB5502 - 1332

Pb / PAH

Silty Clay - organic - Clay

Pidgeon Frag - none visible in sample, Stiff Clay

1350 Sampled SRSSB5801

1351 Sampled SRSSB5802

Pb / PAH

Silty Clay - organic. Clay

pidgeon frag. in soil but none visible in sample.

2/25/13

P. Snyder / J. Matthews

1412 Sampled SRSSB5701 1409

SRSSB5702 1410

Pb / PAH → Fewer clay pidgeon frag. but contained black to steel gray fragments.

1433 Sampled SRSSB5401 1428

SRSSB5402 1429

Pb / PAH → Fewer clay pidgeon frag. Silty Clay. Top 2" organic. Stiff slightly moist 4-24"

1453 Sampled SRSSB5901 1449

SRSSB5902 1450

Pb / PAH → Very few clay pidgeon frag. Silty clay top 2" organic. Slightly moist 4-24"

1522 Sampled SRSSB6402 1519

PAH only - Silty clay top 2" organic. Stiff 4-24". Slightly moist

1802 Sampled SRSSB6002 1559

Few clay pidgeon frag. Soft 4-24". Top 2" organic silty clay. Slightly moist.

2/25/13
P. Snyder / J. Matthews

1015 EnSafe leaving site.

2/26/13
P. Snyder / J. Matthews

0850 EnSafe onsite delay trying to access field office.
0920 Onsite at sampling location
0935 Begin sampling at location SRSSB65.
0956 Sampled SRSSB6301 0952
SRSSB6302 0953
2" organic top soil. 4-24" moist silty clay. Pb/PAH
1018 Sampled SRM01800 1015
SRM01801 1016
2" organic top soil. ~~[illegible]~~ 2-12" moist silty clay. Pb/PAH
Swell slightly moist/moist
1042 Sampled SRM01700 1038
SRM01701 1039
2" organic top soil. 2-12" moist silty clay. Pb/PAH
Slightly moist
Facility utility locator spoke with us.

2/26/13
P. Snyder / Joe Matthews.

1054 Sampled SRM01500 1050
SRM01501 1051
Contained frag. of clay pidgeon and saturated. 2" organic top soil. 2-12" silty clay. Pb/PAH. Some clay pidgeon in sample. 2" of water.

1108 Sampled SRM01600 1105
SRM01601 1106
2" organic top soil, 2-12" silty clay. Pb/PAH. Some black frag. in soil and sample. Soil saturated. 4" of water. Heavy rains 2/25/13 at night.

1136 Sampled SRSSB4901 1133
SRSSB4902 1134
1/2" organic top soil. 4-24" silty clay moist. Pb/PAH

2/26/13
P. Snyder / J. Matthews

1146 - Break for lunch
1246

1253 Begin sampling at SRSSB43.
1350 Sampled SRSSB4201 1309
SRSSB4202 1310
SRSSB3401 1319
SRSSB3402 1320
SRSSB2901 1332
SRSSB2902 1333
All samples were approx. 2" of organic top soil. 4-24" of moist silty clay. SRSSB42 contained approx. 2" of water on the surface All Pb/PAH.

1440 Sampled SRSSB1501 1416
SRSSB1502 1417 Dup. MS/MSD
SRSSB2701 1435
SRSSB2702 1436
2" org. top soil. 4-24" sl. moist clayey silt. Pb/PAH

2/26/13
P. Snyder / J. Matthews

1502 Sampled SRSSB2601 1456
SRSSB2602 1457
2" org. top soil. 4-24" clayey silt. Some clay pidgeon frag. after approx. 1 foot. Slightly moist.

1520 Sampled SRSSB2501 1516
SRSSB2502 1517
2" org. top soil. 4-24" clayey silt. Some clay pidgeon frag. after approx. 8 inches. Slightly moist

1540 Sampled SRSSB1601 1534
SRSSB1602 1535
2" org. top soil. 4-24" clayey silt. First hole, hit metal wire at approx. 9 inches. Moved back and began second hole for SRSSB16. Pb/PAH slightly moist. Contained some pea gravel and sand.

2/26/13
P. Snyder / J. Matthews

1610 Sampled SRSSB1701 ~~1406~~ 1606
SRSSB1702 ~~1407~~ 1607
2" org. top soil. 4-24" slightly moist clayey silt. Moved hole location approx. 3' SE of original due to excessive pine roots upon drilling. Pb/PAH.

1630 offsite.

010 2/27/2013 wed
P. Snyder / J. Matthews
0840 on site to office to unload & secure sampling containers. JM
0850 - Met w/ Rachael Mellin Environmental w/ Base. Started decon water Drum. JM
0915 - @ Commissary to finish sediment sample in this area. JM
1007 Sampled SRM00100 1003
SRM00101 1004
2" org. top soil. 2-12" saturated clayey silt. Approx. 4" of water on top. Pb/PAH
1019 Sampled SRM00200 1014
SRM00201 1015
2" org. top soil. 2-12" moist clayey silt. No water on top of surface. Small black frag. rare in 12" soil and sample. Pb/PAH

2/27/13 011
P. Snyder / J. Matthews

1030 Sampled SRM00300 1026
SRM00301 1027
2" org. top soil. 2-12" sandy clayey silt. Pb/PAH. Saturated. Approx. ½"-1" of water on surface. Few clay pidgeon frag. in soil and sample at 6-12."
1048 Sampled SRSSB1302 1046
2" org. top soil. 4-24" clayey silt. Pb/PAH. Slightly moist. Large gravel from 6-24."
1102 Sampled SRSSB1802 1100
2" org. top soil. 4-24" clayey silt. PAH only. Slightly moist. Org. hole ran into metal line, so moved north approx. 1 ft. for sample.
1105 - Dropped keys off at Mill.
1150 airport. Made trip to Kroger for sample ice, water, and baggies.

2/27/13

P. Snyder / J. Matthews

1150 - Break for lunch
1250

1250 - Packing current samples
1325 into two coolers.

1424 Sampled SRSSB0101 1338
SRSSB0102 1339
SRSSB0201 1416 MS/MSD + Dup
SRSSB0202 1417

2" org. top soil. 4-24" slightly moist clayey silt. Lead only for both locations. Hit possible old PVC pipe at SRSSB0201 at approx. 12." Moved south 6" for 24" hole and sample

1439 Sampled SRSSB0301 1434
SRSSB0302 1435

2" org. top soil. 4-24" slightly moist clayey silt. Lead only. Roots in hole.

2/27/13

P. Snyder / J. Matthews

1456 Sampled SRSSB0401 1451
SRSSB0402 1452

2" org. top soil. 4-24" slightly moist clayey silt. Gravel. Lead only. Rare clay pidgeon fragments in soil from 12-24."

1500 - Getting ice for samples and
1615 dumping decon water in drums

1520 EnSafe off base

1545 - Packing and shipping samples

2/28/13

P. Snyder / J. Matthews

0831 EnSafe onsite at base.

0905 Sampled SRSSB3701 0856
SRSSB3702 0857
2" org. top soil. 4-24" slightly moist silty clay. Some clay pidgeon frag. in 0-12" soil and sample. Pb/PAH.

0919 Sampled SRSSB3901 0914
SRSSB3902 0915
2" org. top soil. 4-24" slightly moist silty clay. Some clay pidgeon frag. in 0-12" soil and sample. Pb/PAH

0931 Sampled SRSSB3601 0926
SRSSB3602 0927
2" org. top soil. 4-24" slightly moist silty clay. More clay starting at approx. 18". Rare clay pidgeon frag. in 0-12" soil. Pb/PAH

2/28/13

P. Snyder / J. Matthews

0952 Sampled SRSSB3801 0945
SRSSB3802 0946
2" org. top soil. 4-24" slightly moist silty clay. 18-24" clay. 30% clay pidgeon frag. in 0-12" soil matrix. Few frag. in 12-24" soil and sample. Pb/PAH. Pidgeon frag. in 0-12" sample.

1013 Sampled SRSSB3501 1006
SRSSB3502 1007
2" org. top soil. 4-24" slightly moist silty clay. 18-24" clay. 40% clay pidgeon frag. in 12-24" of soil matrix decreasing with depth. Frag. in samples. Pb/PAH

1050 Sampled SRSSB3201 1025
SRSSB3202 1026
2" org. top soil. 4-24" slightly moist clayey silt. Few pidgeon frag. in soil and sample from 0-12". Pb/PAH

2/28/13
P. Snyder / J. Matthews

1053 Sampled SRSSB3101 1043
SRSSB3102 1044
1½" org. top soil. 4-24" slightly moist silty clay. 20% clay pidgeon frag. in soil matrix from 0-12." Pidgeon in soil and sample Pb/PAH

1100 Equipment blank taken
EB20130228A Pb/PAH

1120 Sampled SRSSB3002 1117 Dup MS/MSD
2" org. top soil. 4-24" clayey silt, Rare pidgeon frag. in 1st foot. None in second foot. PAH only.

1144 Sampled SRSSB2801 1139
SRSSB2802 1140
1½" org. top soil. 4-24" clayey silt. 20% clay pidgeon frag. in 2-12" soil matrix and sample. Rare pidgeon frag from 12-24." Surrounding ground contains excessive clay pidgeon fragments.

2/28/13
P. Snyder / J. Matthews

1200 – 1300 Break for lunch.

1326 Sampled SRSSB4401 1320
SRSSB4402 1321
1½" org. top soil. 4-24" clayey silt. Slightly moist. Rare clay pidgeon fragments in 2-12" soil and sample. Pb/PAH

1343 Sampled SRSSB4301 1337
SRSSB4302 1338
1" org. top soil. 4-24" slightly moist silty clay. Pb/PAH. No visualization of clay pidgeon.

1402 Sampled SRSSB4501 1358
SRSSB4502 1359
2" org. top soil. 4-24" slightly moist clayey silt. Rare clay pidgeon fragments in 0-12" interval. Pb/PAH.

2/28/13
P. Snyder / J. Matthews

1426 Sampled SRSSB4702 1421
2" org. top soil. 4-24" slightly mosit clayey silt. Only one clay pidgeon fragment found near surface. Pb/PAH

1444 Sampled SRSSB4601 1440
SRSSB4602 1441
½" org. top soil. 2-24" slightly moist silty clay. No clay pidgeon fragments were seen. Pb/PAH

1512 Sampled SRSSB4801 1505
SRSSB4802 1506
2" org top soil. 4-24" slightly moist clayey silt. More clay with depth. Rare pidgeon frag. in 2-12" interval. Pb/PAH

2/28/13
P. Snyder / J. Matthews

1529 Sampled SRM01200 1524
SRM01201 1525
1½" org. top soil. 2-12" clayey silt. Rare pidgeon frag. at both intervals. Pb/PAH.

1544 Sampled SRM01400 1539
SRM01401 1540
½" org. top soil. 2-12" clayey silt. Rare pidgeon frag. in first interval. Pb/PAH

1421 Sampled SRM00400 1555
SRM00401 1556
SRM01100 1614 Dup./MS/MSD
SRM01101 1615
4" org. top soil 4-12" saturated clayey silt. Clay pidgeon frag. in sample and soil as well as on ground around both sample locations. Pb/PAH Approx. ½" of water on surface.

2/28/13
P. Snyder / J. Matthews

1635 Sampled SRM01300 1631
SRM01301 1632
3" org. top soil. 2-12" saturated clayey silt. Pb/PAH. No clay pidgeon fragments seen. Approx. 2" of water on surface.

1649 Equipment Blank done
EB20130228B Pb/PAH

1655 En Safe off base

3/1/13
P. Snyder / J. Matthews

0830 Onsite at base

0905 Begin sampling prep.

0942 Sampled SRM01000 0936
SRM01001 0937
SRM00700 0938
SRM00701 0939
½" org. top soil. 2-12" clayey silt. Both moist. Pb/PAH. Rare pidgeon fragments in 0-6" interval of SRM00700. No water on the surface at either location.

1004 Sampled SRM00600 0958
SRM00601 0959
1½" org. top. soil. 2-12" saturated clayey silt. No clay pidgeon present. Pb/PAH. Approx. 2" water on surface
Sampled SRM00900 0959
SRM00901 1000
½" org. top soil. 2-12" moist clayey silt. No clay pidgeon. Pb/PAH. No standing water on the surface.

3/1/2013 Fri

J. Matthews / P. Snyder

1015 Sampled Seed

SRM00500 1010 Pb/PAH

SRM00501 1011 Pb/PAH

Silty clay. Bury, moved to Saturated. 2" standing water

~~1027 Sampled SRM00800 1020~~

~~SRM00801 1021 Pb/PAH~~

~~3" org. top soil. 2-12" slightly moist clayey silt. No pidgeon. No standing water.~~

wrong location

1109 Sampled SRSSB6101 1100 Pb/PAH

SRSSB6102 1101

2" org. top soil. 4-24" moist clayey silt. No pidgeon.

1138 Sampled SRSSB5301 1130 Pb/PAH

SRSSB5302 1131

½" org. top soil. 4-24" slightly moist clayey silt. No pidgeon.

1153 Equipment Blank taken

EB20130301A Pb/PAH

P. Snyder / J. Matthews

1159 Sampled SRSSB3301 1154 Dup/MS/MSD

SRSSB3302 1155

1½" org. top soil. 4-24" moist silty clay. No pidgeon. Pb/PAH

1215 - Break for lunch

1315

1318 - Prepping coolers with ice.

1340

1401 Sampled SRSSB5201 1353

SRSSB5202 1354

4" org. top soil. 4-24" silty clay Slightly moist. No pidgeon. Pb/PAH.

1424 Sampled SRSSB5101 1416

SRSSB5102 1417

4" org. top soil. 4-24" silty clay. Slightly moist. No pidgeon. Pb/PAH.

1448 Sampled SRSSB4101 1443

SRSSB4102 1444

2" org. top soil. 4-24" slightly moist clayey silt. No pidgeon. Pb/PAH

3/1/13

P. Snyder / J. Matthews

1513 Sampled SRSSB4001 1510
SRSSB4002 1511
2" org. top soil. 4-24" slightly moist silty clay. No pidgeon. Pb/PAH

1533 Sampled SRM00800 1528
SRM00801 1529
1½" org. top soil. 2-12" slightly moist clay. No pidgeon. Pb/PAH.
Re-sampled from 1027 due to sampling wrong location initially.

9 of 20 for next EB. + MS/MSD.

1600 EnSafe off base.

3/5/13

P. Snyder / ~~J. Matthews~~
C. Coleman

0950 EnSafe on base

1025 Begin sample prep for remaining locations.

1119 Sampled SRSSB2401 1116 Pb/PAH
SRSSB2402 1117
2" org. top soil. 4-24" slightly moist. No pidgeon. Silty clay. Heavy rains prior to sampling.

1144 Sampled SRSSB2301 1139 Pb/PAH
SRSSB2302 1140
2" org. top soil. 4-24" slightly moist silty clay. No pidgeon.

1212 Sampled SRSSB2201 1207 Pb/PAH
SRSSB2202 1208
½" org. top. soil. 2-24" slightly moist clayey silt. No pidgeon. Approx. ¼" water on surface.

1230 - Break for lunch.
1300

3/5/13

P. Snyder / C. Coleman.

1329 Sampled SRSSB1402 1324
1½" org. top soil. 4-24" slightly moist clayey silt. No pidgeon. Lead only.

1350 Sampled SRSSB2002 1347
½" org. top soil. 4-24" slightly moist silty clay. No pidgeon. Lead only. Large number of roots. Had to change hole locations twice.

1409 Sampled SRSSB2102 1359
1" org. top soil. 4-24" slightly moist silty clay. No pidgeon. Lead only. Black substance in soil.

1512 Sampled SRSSB1401 1422 Lead Only
SRSSB1402 1423
2" org. top soil. 4-24" slightly moist clayey silt. Rare pidgeon in 1st interval.
Sampled SRSSB1101 1505 Pb/PAH Dup. + MS/MSD
SRSSB1102 1506
1½" org. top soil. 4-24" slightly moist silty clay. No pidgeon.

3/5/13

P. Snyder / C. Coleman

1523 Equipment blank taken.
FB20130305A Pb/PAH.

1538 Sampled SRSSB0902 1536 Lead only.
1" org. top soil. 2-24" slightly moist. clayey silt. No pidgeon.

1559 Sampled SRSSB0802 1553 Lead only
1" org. top soil. 2-24" slightly moist clayey silt. No pidgeon. Some pebbles.

1621 Sampled SRSSB0702 1619 Pb/PAH
1" org. top soil. 2-24" slightly moist clayey silt. No pidgeon. Small to large pebbles (fill).

1640 En Safe off base.

3/6/13

P. Snyder / ~~J. Matthews~~
C. Coleman

0850 EnSafe on base.
0854 Complete SWAP
0859 Begin sampling prep.
0926 Sampled SRSSB0601 0923 Lead
SRSSB0602 0924 Only
½" org. top soil. 2-24" slightly moist silty clay with some sand in 2nd interval. Black rubbery frag. in 2nd interval but no pidgeon.
1024 Sampled SRSSB0501 1017 Lead
SRSSB0502 1018 Only
6" asphalt. 0-24" of soil slightly moist clayey silt. gray in color. No pidgeon.
1138 Sampled SRSSB1001 1128 Pb/PAH
SRSSB1002 1129
6" asphalt. 0-24" of soil slightly moist clayey silt. ~~Mil~~ Small amount of grey soil. No pidgeon. Some black frag. in soil & sample most likely asphalt chips.

3/6/13

P. Snyder / C. Coleman

1145 - 1245 Break for lunch
1245 - 1310 Lowe's to purchase asphalt patch
1359 Sampled SRSSB1201 1349 Pb/PAH
SRSSB1202 1350
Approx. 7" asphalt. 0-24" of soil was slightly moist clayey silt. Bottom 20-24" was gray. Rare pidgeon frag. in 1st interval. Some asphalt chips in soil and sample.
1400 - 1522 Asphalt patching of 3 ~~asph~~ soil sampling locations in asphalt and packing ice and samples in cooler.
1528 EnSafe off base

3/11/13

P. Snyder / J. Matthews

0844 EnSafe onsite
0900 At work location
0910 P. Snyder, J. Matthews, Forrest Malone, Jeff Fleming. → Tailgate meeting
0957 J. Flemming beginning to operate equipment and dig trenches. Clear brush
1119 Sampled PRSSB01101 1055 Pb/PAH
PRSSB01102 1105
1" org top soil. 2-24" slightly moist to moist clayey silt. Clay pidgeon in soil and sample of second interval. Gravel.
1145 Sampled PRSSB01201 1135 Pb/PAH
PRSSB01202 1140
1" org top soil. 2-24" slightly moist to moist clayey silt. Clay pidgeon in soil of both intervals. Gravel
1215 - Break for lunch.
1315

3/11/13

P. Snyder / J. Matthews

1411 Sampled PRSSB1001 1403 Pb/PAH
PRSSB1002 1407
1" org. top soil. 2-24" slightly moist to moist clayey silt. Numerous gravel. Clay pidgeon in 2nd interval.
1453 Sampled PRSSB0901 1449 Pb/PAH
PRSSB0902 1451
1" org top soil. 2-24" slightly moist clayey silt with gravel. Multiple clay pidgeon frag. in 2nd interval.
1620. Sampled PRSSB0802 1550
PRSSB0803 1553
PRSSB0804 1556
PRSSB0805 1610
PRSSB0806 1614
Pb/PAH
3" numerous clay pidgeon. ~~Rare~~ Few pidgeon to 18." Clayey silt slightly moist. 3" org. location on top of berm.

3/12/13

P. Snyder / J. Matthews

0853 EnSafe on base.

0856 Tailgate safety meeting and SWAP

0911 Track begins clearing trees.

0918 Prep for soil sampling.

0926 Begin sample location PRSSB07

1001 Sampled PRSSB07002 0935
PRSSB07003 0937
PRSSB07004 0941
PRSSB07005 0947
PRSSB07006 0952
Pb/PAH

2" org. 4"-6' slightly moist clayey silt. Clay pidgeon frag. rare in 3 & 4 foot intervals. Some gravel. ½" to 1".

1134 Sampled PRSSB0602 1100
PRSSB0603 1105
PRSSB0604 1115
PRSSB0605 1116
PRSSB0606 1117
Pb/PAH

3/12/13

P. Snyder / J. Matthews

1134 2" org. 4"-6' slightly moist clayey silt. No pidgeon. seen. Glass fragment found. Some gravel ½" to 1"

1150 - Break for lunch.
1250

1306 Equipment Blank taken
EB20130312A Pb/PAH

1343 Sampled PRSSB05002 1322
PRSSB05003 1324
PRSSB05004 1326
PRSSB05005 1336
Pb/PAH

2" org. 4"-5' dry clayey silt. Rare pidgeon frag. from 1-2'. Stopped at 5' due to obstruction. Will get 6' sample with excavator. Some gravel.

3/12/13

P. Snyder / J. Matthews

1554 Sampled Trench 6 & 3

06007	1419
06008	1426
06009	1434
06010	1436
06011	1444
06012	1447
06013	1457
06014	1502
03008	1532
03010	1534
03012	1536
03014	1538
03016	1546

PB/PAH

Rare Clay pidgeon at various depths in both trenches. Large piece of concrete in Trench 3. Slightly moist to dry clayey silt at all depths.

3/12/13

P. Snyder / J. Matthews

1643 Sampled PRSS304002 1621

04003	1623
04004	1627
04005	1630
04006	1633

PB/PAH

2" org. 4"-6' slightly moist to dry clayey silt. Some large gravel at various depths.

1709 Equipment Blank
EB20130312B PB/PAH

1714 En Route off base

3/13/13

P. Snyder / J. Matthews

0830 En Safe on base.

0835 Placing new drum in staging area.

0843 Arrived at work location. Jeff, Joe, and Preston onsite.

0848 Completed SWAP

0914 Eric Allen onsite

1054 Sampled Trench 8

PRSS1308008	1033	Pb/PAH
08010	1035	
08012	1037	
08014	1039	

8' to 14' clayey silt slightly moist to dry near base. 50 cal. bullet found. Some gravel throughout. Some wood throughout

1126 Sampled Trench 7

PRSS1307008	1116	Pb/PAH
07010	1118	
07012	1120	
07014	1122	

3/13/13

P. Snyder / J. Matthews

1126 Cont'd

8' to 14' clayey silt slightly moist to dry near base. Some gravel throughout. Rare clay pidgeon from 10' to 14' and some asphalt from 12' to 14'

1150 - 1250 Break for lunch.

1250 - 1350 Complications attempting to get UXO tech on to base.

1428 Sampled Trench 5

PRSS1305008	1407	Pb/PAH
05010	1409	
05012	1411	
05014	1413	

8' to 14' clayey silt slightly moist to dry near base. Rare frag. of concrete and asphalt throughout. 45 cal. slugs near middle of berm. Asphalt from 10' to 12'

3/13/13

P. Snyder / J. Matthews

1504 Sampled Trench 4

PRSSB04008	1448
04010	1450
04012	1452
04014	1454

Pb / PAH

8' to 14' clayey silt slightly moist to dry near base. 45 cal. slugs from 3' to 6' below top of berm and 22 cal. slugs up 9' high on the berm. Gravel from 10' to 12' and a frag. of glass from 12' to 14'. No pidgeon.

1535 Sampled Trench 2

PRSSB02008	1520
02010	1522
02012	1524
02014	1526

Pb / PAH

6' to 14' clayey silt slightly moist to dry near base. Bullet slugs from 6' to 12' from base of berm. Concrete and asphalt frag. No pidgeon.

3/13/13

P. Snyder / J. Matthews

1554 Sampled Trench 1

PRSSB01008	1530
01010	1533
01012	1535
01014	1545

Pb / PAH

6' to 14' clayey silt slightly moist to dry near base. 10' to 14' contained brick, asphalt, and bullet slugs as well as multiple clay pidgeon frag.

1640 Pack samples and leave base.

1708 Arrive back at office.

3/14/13

P. Snyder / J. Matthews

0840 EnSafe on base
0840 - Gathering supplies from
0900 storage unit.
0909 Completed SWAP
0918 Begin prep for sampling.
1031 Sampled PRSSB03002 0954
PRSSB03003 1001
PRSSB03004 1005
PRSSB03005 1008
PRSSB03006 1010
PB / PAH
2" org. 4"-6' slightly moist clayey silt. Clay pidgeon frag. rare to some throughout. Some gravel up to 2."
1137 Sampled PRSSB02002 1058
PRSSB02003 1101
PRSSB02004 1111
PRSSB02005 1115
PRSSB02006 1125
Equip. Blank EB20130314A 1132
PB / PAH

3/14/13

P. Snyder / J. Matthews

1137 Cont'd:
2" org. 4"-6' slightly moist clayey silt. Several 45 cal. slugs from 1' to 4' from top of berm. Rare to some clay pidgeon throughout. Some asphalt and gravel as well.
1146 - Break for lunch.
1246
1332 Sampled PRSSB01002 1303
PRSSB01003 1305
PRSSB01004 1307
PRSSB01005 1319
PRSSB01006 1324
PB / PAH
2" org. 4"-6' slightly moist clayey silt to dry near 6'. Rare to some clay pidgeon throughout. First two feet contained asphalt and some gravel.

3/14/13

P. Snyder / J. Matthews

1454 Sampled PRSSB14001 1446 PAH
PRSSB14002 1448 Pb/PAH
2" org. top soil. 4-24" slightly moist clayey silt. Rare clay pidgeon near surface.

Sampled PRSSB13001 1426 PAH
PRSSB13002 1430 Pb/PAH
2" org. top soil. 4-24" slightly moist clayey silt. No pidgeon. Moved sample near berm instead of designated location.

1513 Sampled PRSSB15001 1505 PAH
PRSSB15002 1507 Pb/PAH
2" org. top soil. 4-24" slightly moist clayey silt. No pidgeon.

1523 Sampled PRSSB16001 1520 PAH
PRSSB16002 1522 Pb/PAH
2" org. top soil. 4-24" slightly moist clayey silt. Tough. No pidgeon.

3/14/13

P. Snyder / J. Matthews

1537 Sampled PRSSB17001 1530 PAH
PRSSB17002 1532 Pb/PAH
2" org. top soil. 4-24" slightly moist clayey silt. No pidgeon. Rare asphalt and gravel throughout.

1601 Sampled PRSSB18001 1555 PAH
PRSSB18002 1557 Pb/PAH
2" org. top soil. Org. at 6." 4-24" slightly moist clayey silt. Rare pidgeon throughout.

3/15/13

P. Snyder / J. Matthews

0820 EnSate on base. UXO tech onsite as well

0833 Tailgate safety and SWAP completed.

0838 Prep for sampling.

0855 Sampled PRSSB19001 0851 PAH
PRSSB19002 0853 PH/PAH

Org. down to six inches. 4-24" clayey silt slightly moist. No pidgeon.

0912 Decon equipment and begin screening of berm.

1008 UXO tech finished sweeping berm and offsite.

1008 - 1026 Disposing off decon water in drums

1026 - 1105 Unloading equipment into base office and packing samples.

1107 EnSate off base.

Blank

Appendix B
Data Validation Summary Laboratory Analytical Report

VALIDATION SUMMARY

This report summarizes data review findings for samples collected at Naval Support Activity Mid-South in Millington, Tennessee in accordance with the following Sampling and Analysis Plan (SAP):

- *Final Sampling and Analysis Plan, UXO 1 and UXO 2 (formerly AOC 1), Naval Support Activity Mid-South, Millington, Tennessee,* Resolution Consultants, December 2012.

Data were evaluated independently from the laboratory to assess data quality. Samples discussed in this report were collected between February 25, 2013 and March 15, 2013 and were submitted to Gulf Coast Analytical Laboratories, Inc. (GCAL) in Baton Rouge, Louisiana. Tina Cantwell, senior chemist from Resolution Consultants, reviewed the data packages reported for these samples. The quality assurance criteria used to assess all data were established by the analytical methods and were consistent with the measurement performance criteria provided in the project's Sampling and Analysis Plan and relevant standards in the following guidance documents:

- *Department of Defense Quality Systems Manual for Environmental Laboratories*, Version 4.2, October 2010
- *U.S. Environmental Protection Agency (USEPA) Contract Laboratory Program National Functional Guidelines for Organic Data Review*, October 1999
- *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review*, October 2004

Validation was performed on the soil and sediment samples from GCAL sample delivery groups (SDGs) 213022817, 213030421, 213030750, 213031417, and 213031808, summarized in Attachment A, Table A-1. Samples discussed in this report were analyzed and reported as definitive data and quality control (QC) summary information was submitted for data review. When the QC parameters did not fall within the specific method or data review guidelines, the data evaluator annotated or "flagged" the corresponding compounds. The flags used during data review are provided in Attachment B, Table B-1. The data review consisted of reviewing the following parameters:

*	Data completeness	Laboratory blanks
*	Sample receipt and preservation	Equipment blanks
	Holding times	Surrogate recoveries
*	Instrument tuning	Matrix spike/matrix spike duplicates (MS/MSDs)
	Initial calibration	Laboratory control samples (LCS)
*	Continuing calibration verification	Field duplicate precision
	Internal standards	Metals serial dilutions

An asterisk (*) above indicates that all criteria were met. Data which were acceptable, as indicated with an asterisk (*) above, will not be discussed further in the following sections.

Holding Times

All samples were analyzed within holding times except as shown on Table 1. Samples and analytes identified in Table 1 were qualified as estimated "J", indicating potential low result bias.

Table 1
Holding Time Outliers

SDG	Fraction	Sample	Sample Date	Leach Date	Prep Date	Date Analyzed	Holding Time	Days Past Hold Time	Flags
213031417	SPLP PAH	PRSSB01010	3/13/2013	4/9/2013	4/15/2013	4/16/2013	27	13 (Leach)	J+/-
213031417	SPLP PAH	PRSSB01014	3/13/2013	4/9/2013	4/15/2013	4/16/2013	27	13 (Leach)	J+/-
213031417	SPLP PAH	PRSSB05002	3/12/2013	4/9/2013	4/15/2013	4/16/2013	28	14 (Leach)	J+/-
213031417	SPLP PAH	PRSSB05008	3/13/2013	4/11/2013	4/15/2013	4/16/2013	29	15 (Leach)	J+/-*
213031417	SPLP PAH	PRSSB06003	3/12/2013	4/9/2013	4/15/2013	4/16/2013	28	14 (Leach)	J+/-
213031417	SPLP PAH	PRSSB07003	3/12/2013	4/17/2013	4/18/2013	4/19/2013	36	22 (Leach)	J+/-*
213031417	SPLP PAH	PRSSB07012	3/13/2013	4/9/2013	4/15/2013	4/16/2013	27	13 (Leach)	J+/-
213031417	SPLP PAH	PRSSB07014	3/13/2013	4/9/2013	4/15/2013	4/16/2013	27	13 (Leach)	J+/-
213031417	SPLP PAH	PRSSB0901	3/11/2013	4/9/2013	4/15/2013	4/16/2013	29	15 (Leach)	J+/-*
213031417	SPLP PAH	PRSSB1102	3/11/2013	4/9/2013	4/15/2013	4/16/2013	29	15 (Leach)	J+/-*
213030421	SPLP PAH	SRM01100	2/28/2013	4/9/2013	4/15/2013	4/16/2013	40	26 (Leach)	J+/-*
213030421	SPLP PAH	SRM01201	2/28/2013	4/9/2013	4/15/2013	4/16/2013	40	26 (Leach)	J+/-*
213030421	SPLP PAH	SRM01400	2/28/2013	4/9/2013	4/15/2013	4/16/2013	40	26 (Leach)	J+/-*
213030421	SPLP PAH	SRSSB2801	2/28/2013	4/9/2013	4/15/2013	4/16/2013	40	26 (Leach)	J+/-*
213030421	SPLP PAH	SRSSB3101	2/28/2013	4/9/2013	4/15/2013	4/16/2013	40	26 (Leach)	J+/-*
213030421	SPLP PAH	SRSSB3501	2/28/2013	4/9/2013	4/15/2013	4/16/2013	40	26 (Leach)	J+/-*
213030421	SPLP PAH	SRSSB3801	2/28/2013	4/9/2013	4/16/2013	4/18/2013	40	26 (Leach)	J+/-*
213030421	SPLP PAH	SRSSB3901	2/28/2013	4/9/2013	4/15/2013	4/16/2013	40	26 (Leach)	J+/-*
213030421	SPLP PAH	SRSSB4401	2/28/2013	4/9/2013	4/16/2013	4/18/2013	40	26 (Leach)	J+/-*
213022817	PAH	SRSSB6601	2/25/2013	NA	3/7/2013	3/8/2013	10	3 (Prep)	J+/-
213031417	TOC	PRSSB05005	3/12/2013	NA	NA	4/15/2013	34	6 (Analysis)	J+/-
213031417	TOC	PRSSB05008	3/13/2013	NA	NA	4/15/2013	33	5 (Analysis)	J+/-
213031417	TOC	PRSSB06009	3/12/2013	NA	NA	4/15/2013	34	6 (Analysis)	J+/-
213031417	TOC	PRSSB06013	3/12/2013	NA	NA	4/15/2013	34	6 (Analysis)	J+/-
213031417	TOC	PRSSB06014	3/12/2013	NA	NA	4/15/2013	34	6 (Analysis)	J+/-
213031417	TOC	PRSSB07002	3/12/2013	NA	NA	4/15/2013	34	6 (Analysis)	J+/-
213031417	TOC	PRSSB08008	3/13/2013	NA	NA	4/15/2013	33	5 (Analysis)	J+/-
213031417	TOC	PRSSB0802	3/11/2013	NA	NA	4/15/2013	35	7 (Analysis)	J+/-
213030750	TOC	SRSSB1101	3/5/2013	NA	NA	4/15/2013	41	13 (Analysis)	J+/-
213030750	TOC	SRSSB2301	3/5/2013	NA	NA	4/15/2013	41	13 (Analysis)	J+/-
213030421	TOC	SRSSB3301	3/1/2013	NA	NA	4/15/2013	45	17 (Analysis)	J+/-
213030421	TOC	SRSSB3502	2/28/2013	NA	NA	4/15/2013	46	18 (Analysis)	J+/-
213030421	TOC	SRSSB3601	2/28/2013	NA	NA	4/15/2013	46	18 (Analysis)	J+/-
213030421	TOC	SRSSB3602	2/28/2013	NA	NA	4/15/2013	46	18 (Analysis)	J+/-
213030421	TOC	SRSSB3801	2/28/2013	NA	NA	4/15/2013	46	18 (Analysis)	J+/-
213030421	TOC	SRSSB3901	2/28/2013	NA	NA	4/15/2013	46	18 (Analysis)	J+/-
213030421	TOC	SRSSB6101	3/1/2013	NA	NA	4/15/2013	45	17 (Analysis)	J+/-

Notes:
SDG = Sample delivery group
SPLP = Synthetic Precipitation Leaching Procedure
PAH = Polynuclear aromatic hydrocarbons
TOC = Total organic carbon
\- = Not applicable
J+/- = Positive and undetected results were qualified estimated due to potential low result bias.
* = Although holding times exceeded twice the holding time requirement, results were qualified as estimated based on the end use of the data for qualitative purposes.

Initial Calibration

For polynuclear aromatic hydrocarbon (PAH) compounds had initial calibration outliers above the <15 relative percent difference (%RSD) acceptance criteria, as shown in Table 2. Compounds were qualified as estimated in associated samples, as indicated in Table 2.

Table 2
Initial Calibration Outliers

Sample Delivery Group:	**213030750**		**213031417**	
Calibration Date:	**3/18/2013**		**3/18/2013**	
Lab File ID:	**i3145-i3155**		**i3145-i3155**	
	%RSD	**Flag**	**%RSD**	**Flag**
Acenaphthene	16.475	J+/-	16.475	J+/-
Benzo(a)anthracene	16.602	J+/-	16.602	J+/-
Benzo(b) fluoranthene	22.36	J+/-	22.36	J+/-
Chrysene	15.064	J+/-	15.064	J+/-
Associated Samples:	SRSSB2401 SRSSB1101 SRCSB1101 SRSSB0702 SRSSB1001 SRSSB1201 SRSSB1001DL SRSSB1201DL SRSSB2301		PRSSB1101 PRSSB1102 PRSSB1201 PRSSB1202 PRSSB1001 PRSSB0901 PRSSB1102DL	

Notes:
%RSD = Percent relative standard deviation (limit <15%)
J+/- = Positive and undetected results were qualified estimated
DL = Diluted sample

Internal Standards

Internal standard (IS) compounds are added to samples to check the stability of the instrument's sensitivity and response during each analytical PAH run. IS ar ea counts for samples and blanks should not vary more than a factor of two (-50% to +100%) from the associated calibration standard. If an IS area count is outside this window, flags are applied during data validation. Tables 3 shows PAH IS area outliers and flags applied.

Table 3
Internal Standard Area Outliers

SDG	Sample ID	Internal Standard	12 Hour Standard Area	Area Limits	Sample Area	Area % (Limits 50-200)	Flags
213022817	SRM00301	Perylene-d12	265,839	531,678 – 132,919.5	613,764	231	J
213022817	SRSSB4201	Perylene-d12	437,219	874,438 – 218,609.5	986,997	226	J
213022817	SRSSB4901	Perylene-d12	437,219	874,438 – 218,609.5	992,758	227	J
213022817	SRSSB5501	Perylene-d12	437,219	874,438 – 218,609.5	1,078,631	247	J
213022817	SRSSB5702	Perylene-d12	414,023	828,046 – 207,011.5	961,183	232	J
213022817	SRSSB5801	Perylene-d12	414,023	828,046 – 207,011.5	882,984	213	J
213022817	SRSSB5802	Perylene-d12	265,839	531,678 – 132,919.5	647,333	244	J
213030421	SRSSB3101	Perylene-d12	265,839	531,678 – 132,919.5	579,367	218	J
213030421	SRSSB3201	Perylene-d12	281,131	562,262 – 140,565.5	591,134	210	J
213030421	SRSSB3501	Perylene-d12	265,839	531,678 – 132,919.5	577,282	217	J
213030421	SRSSB3601	Perylene-d12	265,839	531,678 – 132,919.5	590,226	222	J
213030421	SRSSB3701	Perylene-d12	265,839	531,678 – 132,919.5	804,141	302	J

Table 3
Internal Standard Area Outliers

SDG	Sample ID	Internal Standard	12 Hour Standard Area	Area Limits	Sample Area	Area % (Limits 50-200)	Flags
213030421	SRSSB3801	Perylene-d12	265,839	531,678 – 132,919.5	723,464	272	J
213030750	SRSSB1001	Perylene-d12	67,065	134,130 – 33,532.5	160,547	239	J
213030750	SRSSB1201	Perylene-d12	67,065	134,130 – 33,532.5	176,926	264	J
213031417	PRCSB06003	Perylene-d12	121,086	242,172 – 60,543	248,104	205	J
213031417	PRSSB01012	Perylene-d12	225,060	450,120 – 112,530	463,170	206	J
213031417	PRSSB05002	Perylene-d12	121,086	242,172 – 60,543	303,511	251	J
213031417	PRSSB05004	Perylene-d12	146,683	293,366 – 73,341.5	325,489	222	J
213031417	PRSSB05008	Perylene-d12	136,544	273,088 – 68,272	378,501	277	J
213031417	PRSSB05012	Perylene-d12	136,544	273,088 – 68,272	291,571	214	J
213031417	PRSSB07004	Perylene-d12	121,086	242,172 – 60,543	338,940	280	J
213031417	PRSSB07008	Perylene-d12	136,544	273,088 – 68,272	310,708	228	J
213031417	PRSSB07012	Perylene-d12	136,544	273,088 – 68,272	312,209	229	J
213031417	PRSSB07014	Perylene-d12	136,544	273,088 – 68,272	317,078	232	J
213031417	PRSSB05014	Naphthalene-d8	178,985	357,970 – 89,492.5	64,901	36	J
213030421	SRM01201	Acenaphthene-d10	55,456	110,912 – 27,728	132,111	238	J

Notes:
SDG = Sample delivery group
J = Positive and undetected results flagged estimated.
Only compounds associated with internal standards were qualified. Compounds associated with internal standards are as follows:
Perylene-d12: Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(g,h,i)perylene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, and Indeno(1,2,3-cd)pyrene
Naphthalene-d8: 2-Methylnaphthalene and Naphthalene
Acenaphthene-d10: Acenaphthylene, Acenaphthene, Fluorene

Blanks

Laboratory blanks were analyzed with samples to assess contamination imparted by sample preparation and/or analysis. Ten equipment rinsate blanks were collected in the field during this sampling effort. Samples were flagged in accordance with *Functional Guidelines* where detections were not believed to be site-related. During data review, a sample result was not considered positive unless the analytes' concentration in the sample exceeded five times the amount in **any** blank. Because blank samples may not be prepared using the same sample weight, volume, or dilution, these variables were considered when using these blank criteria.

Samples qualified due to blank outliers are shown in Table 4. Three results were qualified due to equipment blank outliers; however, based on reviewer judgment, these results were qualified as estimated, instead as undetected as recommended by Functional Guidelines. Therefore, lead in SRSSB0401 and benzo(a)anthracene in SRM00100 and SRSSB1802 represents worst-case concentrations.

Laboratory method blank 1169305-LB contained lead at a concentration of 290 milligrams per kilogram, which was above the limit of quantitation. Several samples had concentrations below five times the blank level when sample weights, volumes, and dilution factors were taken into

consideration and the laboratory was asked to re-digest and re-analyze the following samples for lead: SRSSB0501, SRSSB0601, SRSSB0702, SRSSB0802, SRSSB0902, SRSSB1001, SRSSB1201, SRSSB1401, SRSSB1402, SRSSB2002, and SRSSB2102. All but SRSSB2002 were re-analyzed and re-reported and the original results are not used for interpretation. SRSSB2002 and the remaining samples associated with laboratory method blank 1169305-LB were qualified as estimated, based on reviewer judgment, and the lead results represent worst-case concentrations.

Table 4
Blank Outliers

SDG	Blank ID	Blank Type	Analyte	Blank Result	Unadjusted Action Level (a)	Flags
213030421	EB20130228A	Equipment	Lead	0.49 µg/L	98 µg/kg	SRSSB0401 was flagged J, potential high bias
213022817	EB20130227B	Equipment	Benzo(a) anthracene	0.664 µg/L	99.6 µg/kg	SRM00100 and SRSSB1802 were flagged J, potential high bias
213030750	1169305-LB	Laboratory Method	Lead	290 µg/kg	1450 µg/kg	SRCSB1101, SRSSB1101, SRSSB1902, SRSSB2002, SRSSB2201, SRSSB2301, SRSSB2401 were flagged J, potential high bias

Notes:
(a) = Unadjusted action levels are presented; levels were adjusted for individual sample weights, volumes, and/or dilution factors.
SDG = Sample delivery group
µg/L = Micrograms per liter
µg/kg = Micrograms per kilogram
J = Estimated

Surrogate Recoveries

Surrogates provide information needed to assess the accuracy of analyses. Known amounts of surrogate compounds, or compounds which are not likely to be found in the actual samples, are added to each PAH sample to check for accuracy. If surrogate percent recoveries are close to the known concentrations, the reported target compound concentrations are assumed to be accurate.

Several samples had only one surrogate compound with a percent recovery (%R) above control limits and no qualification transpired when only one surrogate compound was outside QC limits per Functional Guidelines.

Two surrogates were outside control limits in sample SRSSB4402. As shown on Table 5, all positive PAH results were qualified as estimated, due to potential high result bias.

Table 5
Surrogate Outliers

Sample Delivery Group	Sample	Analyte	%R	%R Limits	Flags
213030421	SRSSB4402	2-Fluorobiphenyl	110	45-105	J+, potential high bias
		Nitrobenzene-d5	130	35-100	

Notes:
%R = Percent recovery
J+ = Positive results were flagged estimated due to potential high result bias.

Matrix Spike/Matrix Spike Duplicates

Several site investigative samples were used by the laboratory for MS/MSD analyses, as shown on Table 6. Table 7 shows the outliers, potential result bias, and flags applied due to MS/MSDs outside QC limits. No flags were applied when the native sample result was greater than four times the spike level; therefore, these instances are not summarized in Table 7.

Table 6
Spiked Samples

Spiked Samples	Analysis
PRSSB05003, SRSSB0201, SRSSB2402, SRSSB3502	Lead
SRSSB3002	PAHs
PRSSB02006, PRSSB03014, PRSSB04010, SRM01100, SRSSB1101, SRSSB1502, SRSSB6002	Lead, PAHs
SRSSB3301	Lead, PAHs, SPLP Lead, TOC
PRSSB06003	Lead, PAHs, SPLP PAHs
PRSSB07002	SPLP Lead

Notes:
PAHs = Polynuclear aromatic hydrocarbons
SPLP = Synthetic Precipitation Leaching Procedure
TOC = Total organic carbon

Table 7
Matrix Spike/Matrix Spike Duplicate Outliers

SDG	Spiked Sample	Analyte	MS %R	MSD %R	%R Limits	RPD	RPD Limit	Flags
213022817	SRSSB0201	Lead	-1020*	779*	80-120	85*	20	J — poor precision
213022817	SRSSB6002	Lead	394*	-40*	80-120	49*	20	J — poor precision
213030421	SRSSB3301	Lead	13800*	35200*	80-120	33*	20	J — poor precision
213030421	SRSSB3502	Lead	-4330*	-2000*	80-120	32*	20	J — poor precision
213030750	SRSSB1101	Lead	723*	10700*	80-120	41*	20	J — poor precision
213030750	SRSSB2402	Lead	6470	-926*	80-120	147*	20	J — poor precision
213031417	PRSSB05003	Lead	3120*	87	80-120	54*	20	J — poor precision
213031808	PRSSB02006	Lead	-491*	871*	80-120	59*	20	J — poor precision

Table 7
Matrix Spike/Matrix Spike Duplicate Outliers

SDG	Spiked Sample	Analyte	MS %R	MSD %R	%R Limits	RPD	RPD Limit	Flags
213030421	SRM01100	Anthracene	63	46*	55-110	20	30	J+/-, potential low bias
213030421	SRM01100	Benzo[b]fluoranthene	-16*	66	45-120	32*	30	J — poor precision
213030421	SRM01100	Fluoranthene	21*	-58*	55-115	31*	30	J — poor precision
213030421	SRM01100	Phenanthrene	54	-16*	50-115	45*	30	J — poor precision
213031417	PRSSB03014	Benzo[g,h,i]perylene	118	130*	40-125	10	30	J+, potential high bias
213031417	PRSSB03014	Chrysene	99	116	55-110	15	30	J+, potential high bias
213031417	PRSSB03014	Fluoranthene	103	137*	55-115	27	30	J+, potential high bias
213031417	PRSSB03014	Indeno[1,2,3-cd]pyrene	122	131*	45-125	7	30	J+, potential high bias
213031417	PRSSB06003	Benzo[g,h,i]perylene	128*	127*	40-125	0.8	30	J+, potential high bias
213031417	PRSSB06003	Dibenz(a,h)anthracene	115	127*	40-125	9	30	J+, potential high bias
213031417	PRSSB06003	Indeno[1,2,3-cd]pyrene	120	127*	45-125	5	30	J+, potential high bias
213031808	PRSSB02006	Benzo[a]pyrene	115*	106	55-110	5	30	J+, potential high bias
213031808	PRSSB02006	Benzo[g,h,i]perylene	137*	127*	40-125	5	30	J+, potential high bias
213031808	PRSSB02006	Dibenz(a,h)anthracene	165*	158*	40-125	3	30	J+, potential high bias
213031808	PRSSB02006	Indeno[1,2,3-cd]pyrene	154*	145*	45-125	4	30	J+, potential high bias

Notes:
SDG = Sample delivery group
MS = Matrix spike
MSD = Matrix spike duplicate
%R = Percent recovery
RPD = Relative percent difference
* = Outside control limits
J+ = Positive results were flagged estimated due to potential high result bias
J = Estimated
J+/- = Positive and undetected results flagged estimated due to potential low result bias.

Laboratory Control Samples

LCS results are used to monitor the overall performance and accuracy of each step during analysis, including sample preparation. Benzo(a)pyrene had %Rs above the control limits, as shown on Table 8. Results associated with outlying %Rs were qualified as indicated in this table.

LCS 1182868 was duplicated to assess precision. Acenaphthene had a RPD above the control limit, and associated sample PRSSB07003 was qualified as shown on Table 9.

Table 8
Laboratory Control Sample Recovery Outliers

SDG	LCS	Analyte	LCS %R	LCSD %R	Limits	Associated Samples	Flags
213031808	1172753-BS	Benzo[a]pyrene	127*	119*	55-110	PRCSB02006, PRSSB01002, PRSSB01003, PRSSB01004, PRSSB01005, PRSSB01006, PRSSB02006, PRSSB13001, PRSSB13002, PRSSB14001, PRSSB15001, PRSSB16001, PRSSB17001, PRSSB18001, PRSSB18002, PRSSB19001	J+, potential high bias

Notes:
SDG = Sample delivery group
LCS = Laboratory control sample
LCSD = Laboratory control sample duplicate
%R = Percent recovery
* = Outside control limits
J+ = Positive results were flagged estimated due to potential high result bias

Table 9
Laboratory Control Sample Precision Outliers

SDG	Spiked Sample	Analyte	LCS Result (µg/kg)	LCSD Result (µg/kg)	RPD	RPD Limits	Associated Samples	Flags
213031417	1182868-BSD	Acenaphthene	30.1	21	36*	30	PRSSB07003	J — potential poor precision

Notes:
SDG = Sample delivery group
LCS = Laboratory control sample
LCSD = Laboratory control sample duplicate
RPD = Relative percent difference
* = Outside control limits
J = Estimated

Field Duplicate Precision

Several samples were duplicated in the field to assess precision, as shown on Table 10. Field duplicate samples were evaluated for precision and those with calculated RPDs greater than 50 (soil and sediment) were qualified as estimated, as shown in Table 11.

Table 10
Field Duplicate Samples

Sample Delivery Group	Sample/Duplicate	Method
213031808	PRSSB02006/PRCSB02006	Lead, PAHs
213031417	PRSSB03014/PRCSB03014	Lead, PAHs
213031417	PRSSB04010/PRCSB04010	Lead, PAHs
213031417	PRSSB06003/PRCSB06003	Lead, PAHs
213030421	SRM01100/SRN01100	Lead, PAHs
213022817	SRSSB0201/SRCSB0201	Lead

Table 10
Field Duplicate Samples

Sample Delivery Group	Sample/Duplicate	Method
213030750	SRSSB1101/SRCSB1101	Lead, PAHs
213022817	SRSSB1502/SRCSB1502	Lead, PAHs
213030421	SRSSB3002/SRCSB3002	PAH
213030421	SRSSB3301/SRCSB3301	Lead, PAHs
213022817	SRSSB6002/SRCSB6002	Lead, PAHs

Notes:
PAHs = Polynuclear aromatic hydrocarbons

Table 11
Field Duplicate Outliers

SDG	Sample / Duplicate		Sample Result (µg/kg)	Duplicate Result (µg/kg)	RPD	RPD Limit	Flags
213030421	SRM01100 / SRN01100	Lead	358000	143000	85.8	50	J Both
213022817	SRSSB6002 / SRCSB6002	Lead	17700	49800	95.1	50	J Both
213031808	PRSSB02006 / PRCSB02006	Pyrene	1150	608	61.7	50	J Both
213031808	PRSSB02006 / PRCSB02006	Benzo[g,h,i]perylene	2280	1060	73.1	50	J Both
213031808	PRSSB02006 / PRCSB02006	Indeno[1,2,3-cd]pyrene	1880	908	69.7	50	J Both
213031808	PRSSB02006 / PRCSB02006	Benzo[b]fluoranthene	2660	1090	83.7	50	J Both
213031808	PRSSB02006 / PRCSB02006	Fluoranthene	1250	667	60.8	50	J Both
213031808	PRSSB02006 / PRCSB02006	Benzo[k]fluoranthene	1080	488	75.5	50	J Both
213031808	PRSSB02006 / PRCSB02006	Chrysene	1260	595	71.7	50	J Both
213031808	PRSSB02006 / PRCSB02006	Benzo[a]pyrene	2300	1020	77.1	50	J Both
213031808	PRSSB02006 / PRCSB02006	Dibenz(a,h)anthracene	334	163	68.8	50	J Both
213031808	PRSSB02006 / PRCSB02006	Benzo[a]anthracene	947	430	75.1	50	J Both
213031808	PRSSB02006 / PRCSB02006	Acenaphthene	59.3	27.4	73.6	50	J Both
213031808	PRSSB02006 / PRCSB02006	Naphthalene	34.3	18.9	57.9	50	J Both
213031417	PRSSB03014 / PRCSB03014	Anthracene	31.6	54.2	52.7	50	J Both
213031417	PRSSB03014 / PRCSB03014	Phenanthrene	114	199	54.3	50	J Both
213031417	PRSSB06003 / PRCSB06003	Anthracene	196	1390	151	50	J Both
213031417	PRSSB06003 / PRCSB06003	Pyrene	1410	7780	139	50	J Both
213031417	PRSSB06003 / PRCSB06003	Benzo[g,h,i]perylene	1100	4050	115	50	J Both
213031417	PRSSB06003 / PRCSB06003	Indeno[1,2,3-cd]pyrene	1030	3990	118	50	J Both
213031417	PRSSB06003 / PRCSB06003	Benzo[b]fluoranthene	1370	6200	128	50	J Both
213031417	PRSSB06003 / PRCSB06003	Fluoranthene	1670	11400	149	50	J Both
213031417	PRSSB06003 / PRCSB06003	Benzo[k]fluoranthene	594	2930	133	50	J Both
213031417	PRSSB06003 / PRCSB06003	Chrysene	1290	6540	134	50	J Both
213031417	PRSSB06003 / PRCSB06003	Benzo[a]pyrene	1280	5520	125	50	J Both
213031417	PRSSB06003 / PRCSB06003	Dibenz(a,h)anthracene	200	821	122	50	J Both
213031417	PRSSB06003 / PRCSB06003	Benzo[a]anthracene	1010	6140	144	50	J Both
213031417	PRSSB06003 / PRCSB06003	Acenaphthene	92.1	386	123	50	J Both
213031417	PRSSB06003 / PRCSB06003	Phenanthrene	855	6010	150	50	J Both
213031417	PRSSB06003 / PRCSB06003	Fluorene	35.1	214	144	50	J Both
213031417	PRSSB06003 / PRCSB06003	Naphthalene	49.8	196	119	50	J Both

Table 11
Field Duplicate Outliers

SDG	Sample / Duplicate		Sample Result (µg/kg)	Duplicate Result (µg/kg)	RPD	RPD Limit	Flags
213030421	SRM01100 / SRN01100	Anthracene	1750	282	145	50	J Both
213030421	SRM01100 / SRN01100	Pyrene	10400	3060	109	50	J Both
213030421	SRM01100 / SRN01100	Benzo[b]fluoranthene	11600	5940	64.5	50	J Both
213030421	SRM01100 / SRN01100	Fluoranthene	13600	3340	121	50	J Both
213030421	SRM01100 / SRN01100	Benzo[k]fluoranthene	5040	2370	72.1	50	J Both
213030421	SRM01100 / SRN01100	Chrysene	7410	3610	69	50	J Both
213030421	SRM01100 / SRN01100	Benzo[a]anthracene	8490	3950	73	50	J Both
213030421	SRM01100 / SRN01100	Acenaphthene	398	680	52.3	50	J Both
213030421	SRM01100 / SRN01100	Phenanthrene	6800	1180	141	50	J Both
213030421	SRM01100 / SRN01100	Fluorene	328	71.5	128	50	J Both
213030421	SRSSB3002 / SRCSB3002	Anthracene	54.5	28.1	63.9	50	J Both
213030421	SRSSB3002 / SRCSB3002	Fluoranthene	960	550	54.3	50	J Both
213030421	SRSSB3002 / SRCSB3002	Phenanthrene	269	122	75.2	50	J Both

Notes:
SDG = Sample delivery group
µg/kg = Micrograms per kilogram
RPD = Relative percent difference
* = Outside control limits
J = Estimated

Overall Assessment

The February 2013 Naval Support Activity Mid-South soil and sediment data were reviewed independently from the laboratory to assess data quality. Analytes outside individual QC criteria were flagged during this evaluation. No results were rejected and values that were flagged as estimated during data review may be biased high or low, but the results are usable for its intended purpose, according to USEPA guidelines. Table 12 shows final data review qualifiers used to describe results and how they should be interpreted by the end data user. Attachment B provides final results after data review.

Table 12
Result Flagging Codes

Data Qualifier	Qualifier Definition	Interpret Result As a Detection?	Result Usable?	Potential Result Bias
no qualifier	Acceptable	Yes	Yes	None expected
U	Undetected	No	Yes	None expected
J	Estimated	Yes	Yes	High or Low
UJ	Undetected and Estimated	No	Yes	High or Low
R, UR	Rejected	No	No	Unspecified

Attachment A
Sample and Analysis Summary

Table A-1
Sample and Analysis Summary
NSA Mid-South — February 2013

SDG	Lab ID	Location	Sample ID	Sample Date	Sample Type	Lead (6020A)	PAHs (8270D SIM)	SPLP Lead (1312-6010B)	SPLP PAHs 1312-8270D	TOC (9060A)
213022817	21302281701	SRSB66	SRSSB6601	2/25/2013	Soil	X	X			
213022817	21302281702	SRSB66	SRSSB6602	2/25/2013	Soil		X			
213022817	21302281703	SRSB65	SRSSB6501	2/25/2013	Soil	X	X			
213022817	21302281704	SRSB65	SRSSB6502	2/25/2013	Soil		X			
213022817	21302281705	SRSB62	SRSSB6201	2/25/2013	Soil	X	X			
213022817	21302281706	SRSB62	SRSSB6202	2/25/2013	Soil		X			
213022817	21302281707	SRSB56	SRSSB5601	2/25/2013	Soil	X	X			
213022817	21302281708	SRSB56	SRSSB5602	2/25/2013	Soil		X			
213022817	21302281709	SRSB55	SRSSB5501	2/25/2013	Soil	X	X			
213022817	21302281710	SRSB55	SRSSB5502	2/25/2013	Soil		X			
213022817	21302281711	SRSB58	SRSSB5801	2/25/2013	Soil	X	X			
213022817	21302281712	SRSB58	SRSSB5802	2/25/2013	Soil	X	X			
213022817	21302281713	SRSB57	SRSSB5701	2/25/2013	Soil	X	X			
213022817	21302281714	SRSB57	SRSSB5702	2/25/2013	Soil	X	X			
213022817	21302281715	SRSB54	SRSSB5401	2/25/2013	Soil	X	X			
213022817	21302281716	SRSB54	SRSSB5402	2/25/2013	Soil		X			
213022817	21302281717	SRSB59	SRSSB5901	2/25/2013	Soil	X	X			
213022817	21302281718	SRSB59	SRSSB5902	2/25/2013	Soil		X			
213022817	21302281719	SRSB64	SRSSB6402	2/25/2013	Soil		X			
213022817	21302281720	SRSB63	SRSSB6301	2/26/2013	Soil	X	X			
213022817	21302281721	SRSB60	SRCSB6002	2/25/2013	Soil Dup of SRSSB6002	X	X			
213022817	21302281722	SRSB60	SRSSB6002	2/25/2013	Soil	X	X			
213022817	21302281725	SRSB63	SRSSB6302	2/26/2013	Soil	X	X			
213022817	21302281726	SRSB49	SRSSB4901	2/26/2013	Soil	X	X			
213022817	21302281727	SRSB49	SRSSB4902	2/26/2013	Soil		X			
213022817	21302281728	SRSB42	SRSSB4201	2/26/2013	Soil	X	X			
213022817	21302281729	SRSB42	SRSSB4202	2/26/2013	Soil		X			
213022817	21302281730	SRSB34	SRSSB3401	2/26/2013	Soil	X	X			
213022817	21302281731	SRSB34	SRSSB3402	2/26/2013	Soil		X			
213022817	21302281732	SRSB29	SRSSB2901	2/26/2013	Soil	X	X			
213022817	21302281733	SRSB29	SRSSB2902	2/26/2013	Soil		X			

Table A-1 (Continued)
Sample and Analysis Summary
NSA Mid-South — February 2013

SDG	Lab ID	Location	Sample ID	Sample Date	Sample Type	Lead (6020A)	PAHs (8270D SIM)	SPLP Lead (1312-6010B)	SPLP PAHs 1312-8270D	TOC (9060A)
213022817	21302281734	SRSB15	SRSSB1501	2/26/2013	Soil	X	X			
213022817	21302281735	SRSB15	SRSSB1502	2/26/2013	Soil	X	X			
213022817	21302281738	SRM018	SRM01800	2/26/2013	Sediment	X	X			
213022817	21302281739	SRM018	SRM01801	2/26/2013	Sediment	X	X			
213022817	21302281740	SRM017	SRM01700	2/26/2013	Sediment	X	X			
213022817	21302281741	SRM017	SRM01701	2/26/2013	Sediment	X	X			
213022817	21302281742	SRM015	SRM01500	2/26/2013	Sediment	X	X			
213022817	21302281743	SRM015	SRM01501	2/26/2013	Sediment	X	X			
213022817	21302281744	SRM016	SRM01600	2/26/2013	Sediment	X	X			
213022817	21302281745	SRM016	SRM01601	2/26/2013	Sediment	X	X			
213022817	21302281746	SRM001	SRM00100	2/27/2013	Sediment	X	X			
213022817	21302281747	SRM001	SRM00101	2/27/2013	Sediment	X	X			
213022817	21302281748	SRM002	SRM00200	2/27/2013	Sediment	X	X			
213022817	21302281749	SRSB15	SRCSB1502	2/26/2013	Soil Dup of SRSSB1502	X	X			
213022817	21302281750	SRSB27	SRSSB2701	2/26/2013	Soil	X	X			
213022817	21302281751	SRSB27	SRSSB2702	2/26/2013	Soil		X			
213022817	21302281752	SRSB26	SRSSB2601	2/26/2013	Soil	X	X			
213022817	21302281753	SRSB26	SRSSB2602	2/26/2013	Soil		X			
213022817	21302281754	SRSB25	SRSSB2501	2/26/2013	Soil	X	X			
213022817	21302281755	SRSB25	SRSSB2502	2/26/2013	Soil		X			
213022817	21302281756	SRSB16	SRSSB1601	2/26/2013	Soil	X	X			
213022817	21302281757	SRSB16	SRSSB1602	2/26/2013	Soil		X			
213022817	21302281758	SRSB17	SRSSB1701	2/26/2013	Soil	X	X			
213022817	21302281759	SRSB17	SRSSB1702	2/26/2013	Soil		X			
213022817	21302281760	SRM002	SRM00201	2/27/2013	Sediment	X	X			
213022817	21302281761	SRM003	SRM00300	2/27/2013	Sediment	X	X			
213022817	21302281762	SRM003	SRM00301	2/27/2013	Sediment	X	X			
213022817	21302281763	BLANK	EB20130227A	2/27/2013	Equipment blank	X	X			
213022817	21302281764	BLANK	EB20130227B	2/27/2013	Equipment blank	X	X			
213022817	21302281765	SRSB13	SRSSB1302	2/27/2013	Soil	X	X			
213022817	21302281766	SRSB18	SRSSB1802	2/27/2013	Soil		X			
213022817	21302281767	SRSB01	SRSSB0101	2/27/2013	Soil	X				
213022817	21302281769	SRSB02	SRSSB0201	2/27/2013	Soil	X				
213022817	21302281772	SRSB02	SRCSB0201	2/27/2013	Soil Dup of SRSSB0201	X				

Table A-1 (Continued)
Sample and Analysis Summary
NSA Mid-South — February 2013

SDG	Lab ID	Location	Sample ID	Sample Date	Sample Type	Lead (6020A)	PAHs (8270D SIM)	SPLP Lead (1312-6010B)	SPLP PAHs 1312-8270D	TOC (9060A)
213022817	21302281774	SRSB03	SRSSB0301	2/27/2013	Soil	X				
213022817	21302281776	SRSB04	SRSSB0401	2/27/2013	Soil	X				
213030421	21303042101	SRSB37	SRSSB3701	2/28/2013	Soil	X	X			
213030421	21303042102	SRSB37	SRSSB3702	2/28/2013	Soil	X	X			
213030421	21303042103	SRSB39	SRSSB3901	2/28/2013	Soil	X	X	X	X	X
213030421	21303042104	SRSB39	SRSSB3902	2/28/2013	Soil	X	X			
213030421	21303042105	SRSB36	SRSSB3601	2/28/2013	Soil	X	X	X		X
213030421	21303042106	SRSB36	SRSSB3602	2/28/2013	Soil	X	X	X		X
213030421	21303042107	SRSB38	SRSSB3801	2/28/2013	Soil	X	X	X	X	X
213030421	21303042108	SRSB38	SRSSB3802	2/28/2013	Soil	X	X			
213030421	21303042109	SRSB35	SRSSB3501	2/28/2013	Soil	X	X		X	
213030421	21303042110	SRSB35	SRSSB3502	2/28/2013	Soil	X	X	X		X
213030421	21303042111	SRSB32	SRSSB3201	2/28/2013	Soil	X	X			
213030421	21303042112	SRSB32	SRSSB3202	2/28/2013	Soil	X	X			
213030421	21303042113	SRSB31	SRSSB3101	2/28/2013	Soil	X	X		X	
213030421	21303042114	SRSB31	SRSSB3102	2/28/2013	Soil	X	X			
213030421	21303042115	SRSB30	SRSSB3002	2/28/2013	Soil		X			
213030421	21303042118	SRSB30	SRCSB3002	2/28/2013	Soil Dup of SRSSB3002		X			
213030421	21303042119	SRSB28	SRSSB2801	2/28/2013	Soil	X	X		X	
213030421	21303042120	SRSB28	SRSSB2802	2/28/2013	Soil	X	X			
213030421	21303042121	SRSB44	SRSSB4401	2/28/2013	Soil	X	X	X	X	
213030421	21303042122	SRSB44	SRSSB4402	2/28/2013	Soil	X	X			
213030421	21303042123	SRSB43	SRSSB4301	2/28/2013	Soil	X	X			
213030421	21303042124	SRSB43	SRSSB4302	2/28/2013	Soil		X			
213030421	21303042125	BLANK	EB20130228A	2/28/2013	Equipment blank	X	X			
213030421	21303042126	BLANK	EB20130228B	2/28/2013	Equipment blank	X	X			
213030421	21303042127	BLANK	EB20130301A	3/1/2013	Equipment blank	X	X			
213030421	21303042128	SRSB45	SRSSB4501	2/28/2013	Soil	X	X			
213030421	21303042129	SRSB45	SRSSB4502	2/28/2013	Soil	X	X			
213030421	21303042130	SRSB47	SRSSB4702	2/28/2013	Soil	X	X			
213030421	21303042131	SRSB46	SRSSB4601	2/28/2013	Soil	X	X			
213030421	21303042132	SRSB46	SRSSB4602	2/28/2013	Soil		X			
213030421	21303042133	SRSB48	SRSSB4801	2/28/2013	Soil	X	X			
213030421	21303042134	SRSB48	SRSSB4802	2/28/2013	Soil	X	X			
213030421	21303042135	SRSB61	SRSSB6101	3/1/2013	Soil	X	X	X		X

Table A-1 (Continued)
Sample and Analysis Summary
NSA Mid-South — February 2013

SDG	Lab ID	Location	Sample ID	Sample Date	Sample Type	Lead (6020A)	PAHs (8270D SIM)	SPLP Lead (1312-6010B)	SPLP PAHs 1312-8270D	TOC (9060A)
213030421	21303042136	SRSB61	SRSSB6102	3/1/2013	Soil	X				
213030421	21303042137	SRSB53	SRSSB5301	3/1/2013	Soil	X	X			
213030421	21303042138	SRSB53	SRSSB5302	3/1/2013	Soil	X				
213030421	21303042139	SRM004	SRM00400	2/28/2013	Sediment	X	X			
213030421	21303042140	SRM004	SRM00401	2/28/2013	Sediment		X			
213030421	21303042141	SRM012	SRM01200	2/28/2013	Sediment	X	X			
213030421	21303042142	SRM012	SRM01201	2/28/2013	Sediment	X	X		X	
213030421	21303042143	SRM014	SRM01400	2/28/2013	Sediment	X	X		X	
213030421	21303042144	SRM014	SRM01401	2/28/2013	Sediment	X	X			
213030421	21303042145	SRM011	SRM01100	2/28/2013	Sediment	X	X			
213030421	21303042148	SRM011	SRM01100	2/28/2013	Sediment				X	
213030421	21303042148	SRM011	SRN01100	2/28/2013	Sediment Dup of SRM01100	X	X			
213030421	21303042149	SRM011	SRM01101	2/28/2013	Sediment		X			
213030421	21303042150	SRM013	SRM01300	2/28/2013	Sediment	X	X			
213030421	21303042151	SRM013	SRM01301	2/28/2013	Sediment		X			
213030421	21303042152	SRSB33	SRSSB3301	3/1/2013	Soil	X	X	X		X
213030421	21303042155	SRSB33	SRCSB3301	3/1/2013	Soil Dup of SRSSB3301	X	X			
213030421	21303042156	SRSB33	SRSSB3302	3/1/2013	Soil	X				
213030421	21303042157	SRSB52	SRSSB5201	3/1/2013	Soil	X	X			
213030421	21303042159	SRSB51	SRSSB5101	3/1/2013	Soil	X	X			
213030421	21303042160	SRSB51	SRSSB5102	3/1/2013	Soil	X				
213030421	21303042161	SRSB41	SRSSB4101	3/1/2013	Soil	X	X			
213030421	21303042163	SRSB40	SRSSB4001	3/1/2013	Soil	X	X			
213030421	21303042164	SRSB40	SRSSB4002	3/1/2013	Soil	X	X			
213030421	21303042165	SRM010	SRM01000	3/1/2013	Sediment	X	X			
213030421	21303042166	SRM010	SRM01001	3/1/2013	Sediment		X			
213030421	21303042167	SRM007	SRM00700	3/1/2013	Sediment	X	X			
213030421	21303042168	SRM007	SRM00701	3/1/2013	Sediment		X			
213030421	21303042169	SRM006	SRM00600	3/1/2013	Sediment	X	X			
213030421	21303042171	SRM009	SRM00900	3/1/2013	Sediment	X	X			
213030421	21303042172	SRM009	SRM00901	3/1/2013	Sediment	X	X			
213030421	21303042173	SRM005	SRM00500	3/1/2013	Sediment	X	X			
213030421	21303042175	SRM008	SRM00800	3/1/2013	Sediment	X	X			
213030421	21303042176	SRM008	SRM00801	3/1/2013	Sediment		X			
213030750	21303075001	SRSB24	SRSSB2401	3/5/2013	Soil	X	X			

Table A-1 (Continued)
Sample and Analysis Summary
NSA Mid-South — February 2013

SDG	Lab ID	Location	Sample ID	Sample Date	Sample Type	Lead (6020A)	PAHs (8270D SIM)	SPLP Lead (1312-6010B)	SPLP PAHs 1312-8270D	TOC (9060A)
213030750	21303075002	SRSB24	SRSSB2402	3/5/2013	Soil	X				
213030750	21303075003	SRSB23	SRSSB2301	3/5/2013	Soil	X	X	X		X
213030750	21303075004	SRSB23	SRSSB2302	3/5/2013	Soil	X				
213030750	21303075005	SRSB22	SRSSB2201	3/5/2013	Soil	X				
213030750	21303075006	SRSB22	SRSSB2202	3/5/2013	Soil	X				
213030750	21303075007	SRSB19	SRSSB1902	3/5/2013	Soil	X				
213030750	21303075008	SRSB20	SRSSB2002	3/5/2013	Soil	X				
213030750	21303075009	SRSB21	SRSSB2102	3/5/2013	Soil	X				
213030750	21303075010	SRSB14	SRSSB1401	3/5/2013	Soil	X				
213030750	21303075011	SRSB14	SRSSB1402	3/5/2013	Soil	X				
213030750	21303075012	SRSB11	SRSSB1101	3/5/2013	Soil	X	X			
213030750	21303075015	SRSB11	SRCSB1101	3/5/2013	Soil Dup of SRSSB1101	X	X			
213030750	21303075015	SRSB11	SRSSB1101	3/5/2013	Soil			X		X
213030750	21303075016	SRSB11	SRSSB1102	3/5/2013	Soil	X				
213030750	21303075017	SRSB09	SRSSB0902	3/5/2013	Soil	X				
213030750	21303075018	SRSB08	SRSSB0802	3/5/2013	Soil	X				
213030750	21303075019	SRSB07	SRSSB0702	3/5/2013	Soil	X	X			
213030750	21303075020	SRSB06	SRSSB0601	3/6/2013	Soil	X				
213030750	21303075022	SRSB05	SRSSB0501	3/6/2013	Soil	X				
213030750	21303075024	SRSB10	SRSSB1001	3/6/2013	Soil	X	X			
213030750	21303075025	SRSB10	SRSSB1002	3/6/2013	Soil		X			
213030750	21303075026	SRSB12	SRSSB1201	3/6/2013	Soil	X	X			
213030750	21303075027	BLANK	EB20130305A	3/5/2013	Equipment blank	X	X			
213030750	21303075028	SRSB12	SRSSB1202	3/6/2013	Soil		X			
213031417	21303141701	PRSB11	PRSSB1101	3/11/2013	Soil	X	X			
213031417	21303141702	PRSB11	PRSSB1102	3/11/2013	Soil		X		X	
213031417	21303141703	PRSB12	PRSSB1201	3/11/2013	Soil	X	X			
213031417	21303141704	PRSB12	PRSSB1202	3/11/2013	Soil		X			
213031417	21303141705	PRSB10	PRSSB1001	3/11/2013	Soil	X	X			
213031417	21303141706	PRSB10	PRSSB1002	3/11/2013	Soil		X			
213031417	21303141707	PRSB09	PRSSB0901	3/11/2013	Soil	X	X		X	
213031417	21303141708	PRSB09	PRSSB0902	3/11/2013	Soil		X			
213031417	21303141709	PRSB08	PRSSB0802	3/11/2013	Soil	X	X	X		X
213031417	21303141710	PRSB08	PRSSB0803	3/11/2013	Soil	X	X			
213031417	21303141711	PRSB08	PRSSB0804	3/11/2013	Soil	X	X			

Table A-1 (Continued)
Sample and Analysis Summary
NSA Mid-South — February 2013

SDG	Lab ID	Location	Sample ID	Sample Date	Sample Type	Lead (6020A)	PAHs (8270D SIM)	SPLP Lead (1312-6010B)	SPLP PAHs 1312-8270D	TOC (9060A)
213031417	21303141712	PRSB08	PRSSB0805	3/11/2013	Soil	X	X			
213031417	21303141713	PRSB08	PRSSB0806	3/11/2013	Soil	X	X			
213031417	21303141714	PRSB06	PRSSB06002	3/12/2013	Soil	X	X			
213031417	21303141715	PRSB06	PRSSB06003	3/12/2013	Soil	X	X		X	
213031417	21303141718	PRSB06	PRSSB06004	3/12/2013	Soil	X	X			
213031417	21303141719	PRSB06	PRSSB06005	3/12/2013	Soil	X	X			
213031417	21303141720	PRSB06	PRSSB06006	3/12/2013	Soil	X	X			
213031417	21303141721	PRSB07	PRSSB07002	3/12/2013	Soil	X	X	X		X
213031417	21303141722	PRSB07	PRSSB07003	3/12/2013	Soil	X	X		X	
213031417	21303141723	PRSB07	PRSSB07004	3/12/2013	Soil	X	X			
213031417	21303141724	PRSB07	PRSSB07005	3/12/2013	Soil	X	X			
213031417	21303141725	PRSB07	PRSSB07006	3/12/2013	Soil	X	X			
213031417	21303141726	PRSB06	PRCSB06003	3/12/2013	Soil Dup of PRSSB06003	X	X			
213031417	21303141727	BLANK	EB20130312A	3/12/2013	Equipment blank	X	X			
213031417	21303141728	PRSB05	PRSSB05002	3/12/2013	Soil	X	X		X	
213031417	21303141729	PRSB05	PRSSB05003	3/12/2013	Soil	X	X			
213031417	21303141730	PRSB05	PRSSB05004	3/12/2013	Soil	X	X			
213031417	21303141731	PRSB05	PRSSB05005	3/12/2013	Soil	X	X	X		X
213031417	21303141732	PRSB06	PRSSB06007	3/12/2013	Soil	X	X			
213031417	21303141733	PRSB06	PRSSB06008	3/12/2013	Soil	X	X			
213031417	21303141734	PRSB06	PRSSB06009	3/12/2013	Soil	X	X	X		X
213031417	21303141735	PRSB06	PRSSB06010	3/12/2013	Soil	X	X			
213031417	21303141736	PRSB06	PRSSB06011	3/12/2013	Soil	X	X			
213031417	21303141737	PRSB06	PRSSB06012	3/12/2013	Soil	X	X			
213031417	21303141738	PRSB06	PRSSB06013	3/12/2013	Soil	X	X	X		X
213031417	21303141739	PRSB06	PRSSB06014	3/12/2013	Soil	X	X	X		X
213031417	21303141740	PRSB03	PRSSB03008	3/12/2013	Soil	X	X			
213031417	21303141741	PRSB03	PRSSB03010	3/12/2013	Soil	X	X			
213031417	21303141742	PRSB03	PRSSB03012	3/12/2013	Soil	X	X			
213031417	21303141743	PRSB03	PRSSB03014	3/12/2013	Soil	X	X			
213031417	21303141746	PRSB03	PRCSB03014	3/12/2013	Soil Dup of PRSSB03014	X	X			
213031417	21303141747	PRSB03	PRSSB03016	3/12/2013	Soil	X	X			
213031417	21303141748	PRSB04	PRSSB04002	3/12/2013	Soil	X	X			
213031417	21303141749	PRSB04	PRSSB04003	3/12/2013	Soil	X	X			
213031417	21303141750	PRSB04	PRSSB04004	3/12/2013	Soil	X	X			

Table A-1 (Continued)
Sample and Analysis Summary
NSA Mid-South — February 2013

SDG	Lab ID	Location	Sample ID	Sample Date	Sample Type	Lead (6020A)	PAHs (8270D SIM)	SPLP Lead (1312-6010B)	SPLP PAHs 1312-8270D	TOC (9060A)
213031417	21303141751	PRSB04	PRSSB04005	3/12/2013	Soil	X	X			
213031417	21303141752	PRSB04	PRSSB04006	3/12/2013	Soil	X	X			
213031417	21303141753	BLANK	EB20130312B	3/12/2013	Equipment blank	X	X			
213031417	21303141754	PRSB08	PRSSB08008	3/13/2013	Soil	X	X	X		X
213031417	21303141755	PRSB08	PRSSB08010	3/13/2013	Soil	X	X			
213031417	21303141756	PRSB08	PRSSB08012	3/13/2013	Soil	X	X			
213031417	21303141757	PRSB08	PRSSB08014	3/13/2013	Soil	X	X			
213031417	21303141758	PRSB07	PRSSB07008	3/13/2013	Soil	X	X			
213031417	21303141759	PRSB07	PRSSB07010	3/13/2013	Soil	X	X			
213031417	21303141760	PRSB07	PRSSB07012	3/13/2013	Soil	X	X		X	
213031417	21303141761	PRSB07	PRSSB07014	3/13/2013	Soil	X	X		X	
213031417	21303141762	PRSB05	PRSSB05008	3/13/2013	Soil	X	X	X	X	X
213031417	21303141763	PRSB05	PRSSB05010	3/13/2013	Soil	X	X			
213031417	21303141764	PRSB05	PRSSB05012	3/13/2013	Soil	X	X			
213031417	21303141765	PRSB05	PRSSB05014	3/13/2013	Soil	X	X			
213031417	21303141766	PRSB04	PRSSB04008	3/13/2013	Soil	X	X			
213031417	21303141767	PRSB04	PRSSB04010	3/13/2013	Soil	X	X			
213031417	21303141770	PRSB04	PRCSB04010	3/13/2013	Soil Dup of PRSSB04010	X	X			
213031417	21303141771	PRSB04	PRSSB04012	3/13/2013	Soil	X	X			
213031417	21303141772	PRSB04	PRSSB04014	3/13/2013	Soil	X	X			
213031417	21303141773	BLANK	EB20130313A	3/13/2013	Equipment blank	X	X			
213031417	21303141774	PRSB02	PRSSB02008	3/13/2013	Soil	X	X			
213031417	21303141775	PRSB02	PRSSB02010	3/13/2013	Soil	X	X			
213031417	21303141776	PRSB02	PRSSB02012	3/13/2013	Soil	X	X			
213031417	21303141777	PRSB02	PRSSB02014	3/13/2013	Soil	X	X			
213031417	21303141778	PRSB01	PRSSB01008	3/13/2013	Soil	X	X			
213031417	21303141779	PRSB01	PRSSB01010	3/13/2013	Soil	X	X	X	X	
213031417	21303141780	PRSB01	PRSSB01012	3/13/2013	Soil	X	X			
213031417	21303141781	PRSB01	PRSSB01014	3/13/2013	Soil	X	X	X	X	
213031808	21303180801	PRSB03	PRSSB03002	3/14/2013	Soil	X	X			
213031808	21303180802	PRSB03	PRSSB03003	3/14/2013	Soil	X	X			
213031808	21303180803	PRSB03	PRSSB03004	3/14/2013	Soil	X	X			
213031808	21303180804	PRSB03	PRSSB03005	3/14/2013	Soil	X	X			
213031808	21303180805	PRSB03	PRSSB03006	3/14/2013	Soil	X	X			
213031808	21303180806	PRSB02	PRSSB02002	3/14/2013	Soil	X	X			

Table A-1 (Continued)
Sample and Analysis Summary
NSA Mid-South — February 2013

SDG	Lab ID	Location	Sample ID	Sample Date	Sample Type	Lead (6020A)	PAHs (8270D SIM)	SPLP Lead (1312-6010B)	SPLP PAHs 1312-8270D	TOC (9060A)
213031808	21303180807	PRSB02	PRSSB02003	3/14/2013	Soil	X	X			
213031808	21303180808	PRSB02	PRSSB02004	3/14/2013	Soil	X	X			
213031808	21303180809	PRSB02	PRSSB02005	3/14/2013	Soil	X	X			
213031808	21303180810	PRSB02	PRSSB02006	3/14/2013	Soil	X	X			
213031808	21303180813	PRSB02	PRCSB02006	3/14/2013	Soil Dup of PRSSB02006	X	X			
213031808	21303180814	BLANK	EB20130314A	3/14/2013	Equipment blank	X	X			
213031808	21303180815	PRSB01	PRSSB01002	3/14/2013	Soil	X	X			
213031808	21303180816	PRSB01	PRSSB01003	3/14/2013	Soil	X	X			
213031808	21303180817	PRSB01	PRSSB01004	3/14/2013	Soil	X	X			
213031808	21303180818	PRSB01	PRSSB01005	3/14/2013	Soil	X	X			
213031808	21303180819	PRSB01	PRSSB01006	3/14/2013	Soil	X	X			
213031808	21303180820	PRSB13	PRSSB13001	3/14/2013	Soil		X			
213031808	21303180821	PRSB13	PRSSB13002	3/14/2013	Soil		X			
213031808	21303180822	PRSB14	PRSSB14001	3/14/2013	Soil		X			
213031808	21303180823	PRSB14	PRSSB14002	3/14/2013	Soil		X			
213031808	21303180824	PRSB15	PRSSB15001	3/14/2013	Soil		X			
213031808	21303180825	PRSB15	PRSSB15002	3/14/2013	Soil		X			
213031808	21303180826	PRSB16	PRSSB16001	3/14/2013	Soil		X			
213031808	21303180828	PRSB17	PRSSB17001	3/14/2013	Soil		X			
213031808	21303180829	PRSB17	PRSSB17002	3/14/2013	Soil		X			
213031808	21303180830	PRSB18	PRSSB18001	3/14/2013	Soil		X			
213031808	21303180831	PRSB18	PRSSB18002	3/14/2013	Soil		X			
213031808	21303180832	PRSB19	PRSSB19001	3/15/2013	Soil		X			
213031808	21303180833	PRSB19	PRSSB19002	3/15/2013	Soil		X			

Notes:

X = Sample was analyzed for the method indicated in the column header.
PAHs = Polynuclear aromatic hydrocarbons
SPLP = Synthetic precipitation leaching procedure
TOC = Total organic carbon
Dup = Duplicate

Attachment B
Final Results After Data Review

Table B-1
Final Interpreted Qualifiers

Final Qualifier (Qual)	Definition
U	**Undetected** — The parameter was analyzed but not detected or was found in a sample, but at a concentration less than five times the blank concentration for other constituents; the associated value presented is the detection limit (DL).
J	**Estimated Value** — One or more QC parameters were outside control limits.
UJ	**Undetected and Estimated** — The parameter was analyzed but not detected at concentrations above the listed DL; the DL is estimated because one QC parameter was outside of control limits.
D	**Diluted** — Sample was diluted to report the value on-scale.
R/UR	**Rejected/Unusable Data** — One or more QC parameters grossly exceeded control limits.

Table B-2
Validator Reason Codes

Reason Code (RC)	Reason Code Description
a	Tracer recovery (radiochemical data only)
be	Equipment blank contamination
bf	Field blank contamination
bl	Laboratory blank contamination
bm	Missing Blank Information
bt	Trip blank contamination
c	Calibration issue
cl	Clean-up standard recovery
cp	Insufficient in growth (radiochemical data only)
cr	Chromatographic resolution
d	Reporting limit raised due to chromatographic interference
e	Ether interference
ej	Above calibration range; result estimated
fd	Field duplicate RPDs
g	Cromatographic pattern match issue
h	Holding times
i	Internal standard areas
ii	Injection internal standard area or retention time exceedance
k	Estimated Maximum Possible Concentrations
l	LCS recoveries
lc	Labeled compound recovery
ld	Laboratory duplicate RPDs (matrix duplicate, MSD, LCSD)
m	Matrix spike recovery
nb	Negative laboratory blank contamination
p	Chemical preservation issue
pe	Post Extraction Spike
q	Quantitation issue
r	Dual column RPD
rp	Re-extraction precision issue [PAHs only]
rt	SIM ions not within + 2 seconds
s	Surrogate recovery
sp	Sample preparation issue
su	Evidence of ion suppression
t	Temperature Preservation Issue
u	High combined sample result uncertainty (radiochemical data only)
v	Compound identification issue
x	Low % solids
y	Serial dilution results
z	ICS results

Table B-3
Total Lead Results After Data Review
NSA Mid-South — February 2013

		Sample Delivery Group	213022817			213022817			213022817			213022817			213022817			213022817		
		Lab ID	21302281701			21302281703			21302281705			21302281707			21302281709			21302281711		
		Sample ID	SRSSB6601			SRSSB6501			SRSSB6201			SRSSB5601			SRSSB5501			SRSSB5801		
		Sample Date	2/25/2013			2/25/2013			2/25/2013			2/25/2013			2/25/2013			2/25/2013		
		Matrix	Soil			Soil			Soil			Soil			Soil			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
LEAD	7439-92-1	UG_KG	23400			26800			27800			35200			103000			601000		

		Sample Delivery Group	213022817			213022817			213022817			213022817			213022817			213022817		
		Lab ID	21302281712			21302281713			21302281714			21302281715			21302281717			21302281720		
		Sample ID	SRSSB5802			SRSSB5701			SRSSB5702			SRSSB5401			SRSSB5901			SRSSB6301		
		Sample Date	2/25/2013			2/25/2013			2/25/2013			2/25/2013			2/25/2013			2/26/2013		
		Matrix	Soil			Soil			Soil			Soil			Soil			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
LEAD	7439-92-1	UG_KG	24600			333000			2970000			105000			123000			5160000		

		Sample Delivery Group	213022817			213022817			213022817			213022817			213022817			213022817		
		Lab ID	21302281721			21302281722			21302281725			21302281726			21302281728			21302281730		
		Sample ID	SRCSB6002			SRSSB6002			SRSSB6302			SRSSB4901			SRSSB4201			SRSSB3401		
		Sample Date	2/25/2013			2/25/2013			2/26/2013			2/26/2013			2/26/2013			2/26/2013		
		Matrix	Soil Dup			Soil			Soil			Soil			Soil			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
LEAD	7439-92-1	UG_KG	49800	J	fd	17700	J	fd,ld	139000			93900			14600			84500		

		Sample Delivery Group	213022817			213022817			213022817			213022817			213022817			213022817		
		Lab ID	21302281732			21302281734			21302281735			21302281738			21302281739			21302281740		
		Sample ID	SRSSB2901			SRSSB1501			SRSSB1502			SRM01800			SRM01801			SRM01700		
		Sample Date	2/26/2013			2/26/2013			2/26/2013			2/26/2013			2/26/2013			2/26/2013		
		Matrix	Soil			Soil			Soil			Sediment			Sediment			Sediment		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
LEAD	7439-92-1	UG_KG	61100			45400			10200			41600			14900			2790000		

Table B-3 (Continued)
Total Lead Results After Data Review
NSA Mid-South — February 2013

		Sample Delivery Group	213022817			213022817			213022817			213022817			213022817			213022817		
		Lab ID	21302281741			21302281742			21302281743			21302281744			21302281745			21302281746		
		Sample ID	SRM01701			SRM01500			SRM01501			SRM01600			SRM01601			SRM00100		
		Sample Date	2/26/2013			2/26/2013			2/26/2013			2/26/2013			2/26/2013			2/27/2013		
		Matrix	Sediment			Sediment			Sediment			Sediment			Sediment			Sediment		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
LEAD	7439-92-1	UG_KG	1130000			75400			276000			963000			62400			181000		

		Sample Delivery Group	213022817			213022817			213022817			213022817			213022817			213022817		
		Lab ID	21302281747			21302281748			21302281749			21302281750			21302281752			21302281754		
		Sample ID	SRM00101			SRM00200			SRCSB1502			SRSSB2701			SRSSB2601			SRSSB2501		
		Sample Date	2/27/2013			2/27/2013			2/26/2013			2/26/2013			2/26/2013			2/26/2013		
		Matrix	Sediment			Sediment			Soil Dup			Soil			Soil			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
LEAD	7439-92-1	UG_KG	33400			120000			14700			19600			158000			95000		

		Sample Delivery Group	213022817			213022817			213022817			213022817			213022817			213022817		
		Lab ID	21302281756			21302281758			21302281760			21302281761			21302281762			21302281765		
		Sample ID	SRSSB1601			SRSSB1701			SRM00201			SRM00300			SRM00301			SRSSB1302		
		Sample Date	2/26/2013			2/26/2013			2/27/2013			2/27/2013			2/27/2013			2/27/2013		
		Matrix	Soil			Soil			Sediment			Sediment			Sediment			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
LEAD	7439-92-1	UG_KG	377000			137000			160000			80100			153000			86900		

		Sample Delivery Group	213022817			213022817			213022817			213022817			213022817			213030421		
		Lab ID	21302281767			21302281769			21302281772			21302281774			21302281776			21303042101		
		Sample ID	SRSSB0101			SRSSB0201			SRCSB0201			SRSSB0301			SRSSB0401			SRSSB3701		
		Sample Date	2/27/2013			2/27/2013			2/27/2013			2/27/2013			2/27/2013			2/28/2013		
		Matrix	Soil			Soil			Soil Dup			Soil			Soil			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
LEAD	7439-92-1	UG_KG	21700			55400	J	ld,y	40700			26100			11000	J	bf	2720000		

Table B-3 (Continued)
Total Lead Results After Data Review
NSA Mid-South — February 2013

		Sample Delivery Group	213030421			213030421			213030421			213030421			213030421			213030421		
		Lab ID	21303042102			21303042103			21303042104			21303042105			21303042106			21303042107		
		Sample ID	SRSSB3702			SRSSB3901			SRSSB3902			SRSSB3601			SRSSB3602			SRSSB3801		
		Sample Date	2/28/2013			2/28/2013			2/28/2013			2/28/2013			2/28/2013			2/28/2013		
		Matrix	Soil			Soil			Soil			Soil			Soil			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
LEAD	7439-92-1	UG_KG	83900			4210000			22900			8730000			308000			760000		

		Sample Delivery Group	213030421			213030421			213030421			213030421			213030421			213030421		
		Lab ID	21303042108			21303042109			21303042110			21303042111			21303042112			21303042113		
		Sample ID	SRSSB3802			SRSSB3501			SRSSB3502			SRSSB3201			SRSSB3202			SRSSB3101		
		Sample Date	2/28/2013			2/28/2013			2/28/2013			2/28/2013			2/28/2013			2/28/2013		
		Matrix	Soil			Soil			Soil			Soil			Soil			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
LEAD	7439-92-1	UG_KG	53600			864000			266000	J	ld,y	4630000			6360000			409000		

		Sample Delivery Group	213030421			213030421			213030421			213030421			213030421			213030421		
		Lab ID	21303042114			21303042119			21303042120			21303042121			21303042122			21303042123		
		Sample ID	SRSSB3102			SRSSB2801			SRSSB2802			SRSSB4401			SRSSB4402			SRSSB4301		
		Sample Date	2/28/2013			2/28/2013			2/28/2013			2/28/2013			2/28/2013			2/28/2013		
		Matrix	Soil			Soil			Soil			Soil			Soil			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
LEAD	7439-92-1	UG_KG	33600			417000			25100			3610000			67900			24300		

		Sample Delivery Group	213030421			213030421			213030421			213030421			213030421			213030421		
		Lab ID	21303042128			21303042129			21303042130			21303042131			21303042133			21303042134		
		Sample ID	SRSSB4501			SRSSB4502			SRSSB4702			SRSSB4601			SRSSB4801			SRSSB4802		
		Sample Date	2/28/2013			2/28/2013			2/28/2013			2/28/2013			2/28/2013			2/28/2013		
		Matrix	Soil			Soil			Soil			Soil			Soil			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
LEAD	7439-92-1	UG_KG	3500000			359000			146000			93100			4750000			94800		

Table B-3 (Continued)
Total Lead Results After Data Review
NSA Mid-South — February 2013

		Sample Delivery Group	213030421			213030421			213030421			213030421			213030421			213030421		
		Lab ID	21303042135			21303042136			21303042137			21303042138			21303042139			21303042141		
		Sample ID	SRSSB6101			SRSSB6102			SRSSB5301			SRSSB5302			SRM00400			SRM01200		
		Sample Date	3/1/2013			3/1/2013			3/1/2013			3/1/2013			2/28/2013			2/28/2013		
		Matrix	Soil			Soil			Soil			Soil			Sediment			Sediment		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
LEAD	7439-92-1	UG_KG	834000			14800			4860000			44800			228000			4450000		

		Sample Delivery Group	213030421			213030421			213030421			213030421			213030421			213030421		
		Lab ID	21303042142			21303042143			21303042144			21303042145			21303042148			21303042150		
		Sample ID	SRM01201			SRM01400			SRM01401			SRM01100			SRN01100			SRM01300		
		Sample Date	2/28/2013			2/28/2013			2/28/2013			2/28/2013			2/28/2013			2/28/2013		
		Matrix	Sediment			Sediment			Sediment			Sediment			Sediment Dup			Sediment		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
LEAD	7439-92-1	UG_KG	3530000			2560000			1100000			358000	J	fd	143000	J	fd	58200		

		Sample Delivery Group	213030421			213030421			213030421			213030421			213030421			213030421		
		Lab ID	21303042152			21303042155			21303042156			21303042157			21303042159			21303042160		
		Sample ID	SRSSB3301			SRCSB3301			SRSSB3302			SRSSB5201			SRSSB5101			SRSSB5102		
		Sample Date	3/1/2013			3/1/2013			3/1/2013			3/1/2013			3/1/2013			3/1/2013		
		Matrix	Soil			Soil Dup			Soil			Soil			Soil			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
LEAD	7439-92-1	UG_KG	1050000	J	ld	1750000			193000			143000			1580000			91500		

		Sample Delivery Group	213030421			213030421			213030421			213030421			213030421			213030421		
		Lab ID	21303042161			21303042163			21303042164			21303042165			21303042167			21303042169		
		Sample ID	SRSSB4101			SRSSB4001			SRSSB4002			SRM01000			SRM00700			SRM00600		
		Sample Date	3/1/2013			3/1/2013			3/1/2013			3/1/2013			3/1/2013			3/1/2013		
		Matrix	Soil			Soil			Soil			Sediment			Sediment			Sediment		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
LEAD	7439-92-1	UG_KG	51400			2410000			96200			48600			99500			45700		

Table B-3 (Continued)
Total Lead Results After Data Review
NSA Mid-South — February 2013

		Sample Delivery Group	213030421			213030421			213030421			213030421			213030750			213030750		
		Lab ID	21303042171			21303042172			21303042173			21303042175			21303075001			21303075002		
		Sample ID	SRM00900			SRM00901			SRM00500			SRM00800			SRSSB2401			SRSSB2402		
		Sample Date	3/1/2013			3/1/2013			3/1/2013			3/1/2013			3/5/2013			3/5/2013		
		Matrix	Sediment			Sediment			Sediment			Sediment			Soil			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
LEAD	7439-92-1	UG_KG	1110000			33700			262	U		255000			1650000	J	bl	55600	J	ld

		Sample Delivery Group	213030750			213030750			213030750			213030750			213030750			213030750		
		Lab ID	21303075003			21303075004			21303075005			21303075006			21303075007			21303075008		
		Sample ID	SRSSB2301			SRSSB2302			SRSSB2201			SRSSB2202			SRSSB1902			SRSSB2002		
		Sample Date	3/5/2013			3/5/2013			3/5/2013			3/5/2013			3/5/2013			3/5/2013		
		Matrix	Soil			Soil			Soil			Soil			Soil			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
LEAD	7439-92-1	UG_KG	5.19E+07	J	bl	36400			668000	J	bl	130000			360000	J	bl	20100	J	bl

		Sample Delivery Group	213030750			213030750			213030750			213030750			213030750			213030750		
		Lab ID	21303075009			21303075010			21303075011			21303075012			21303075015			21303075016		
		Sample ID	SRSSB2102			SRSSB1401			SRSSB1402			SRSSB1101			SRCSB1101			SRSSB1102		
		Sample Date	3/5/2013			3/5/2013			3/5/2013			3/5/2013			3/5/2013			3/5/2013		
		Matrix	Soil			Soil			Soil			Soil			Soil Dup			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
LEAD	7439-92-1	UG_KG	20500			51600			16700			456000	J	ld,bl	477000	J	bl	73700		

		Sample Delivery Group	213030750			213030750			213030750			213030750			213030750			213030750		
		Lab ID	21303075017			21303075018			21303075019			21303075020			21303075022			21303075024		
		Sample ID	SRSSB0902			SRSSB0802			SRSSB0702			SRSSB0601			SRSSB0501			SRSSB1001		
		Sample Date	3/5/2013			3/5/2013			3/5/2013			3/6/2013			3/6/2013			3/6/2013		
		Matrix	Soil			Soil			Soil			Soil			Soil			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
LEAD	7439-92-1	UG_KG	17700			68900			81500			10200			22800			27400		

Table B-3 (Continued)
Total Lead Results After Data Review
NSA Mid-South — February 2013

		Sample Delivery Group	213030750			213031417			213031417			213031417			213031417			213031417		
		Lab ID	21303075026			21303141701			21303141703			21303141705			21303141707			21303141709		
		Sample ID	SRSSB1201			PRSSB1101			PRSSB1201			PRSSB1001			PRSSB0901			PRSSB0802		
		Sample Date	3/6/2013			3/11/2013			3/11/2013			3/11/2013			3/11/2013			3/11/2013		
		Matrix	Soil			Soil			Soil			Soil			Soil			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
LEAD	7439-92-1	UG_KG	19600			227000			51800			48400			70000			30600		

		Sample Delivery Group	213031417			213031417			213031417			213031417			213031417			213031417		
		Lab ID	21303141710			21303141711			21303141712			21303141713			21303141714			21303141715		
		Sample ID	PRSSB0803			PRSSB0804			PRSSB0805			PRSSB0806			PRSSB06002			PRSSB06003		
		Sample Date	3/11/2013			3/11/2013			3/11/2013			3/11/2013			3/12/2013			3/12/2013		
		Matrix	Soil			Soil			Soil			Soil			Soil			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
LEAD	7439-92-1	UG_KG	37900			31400			39900			49300			90900			93500		

		Sample Delivery Group	213031417			213031417			213031417			213031417			213031417			213031417		
		Lab ID	21303141718			21303141719			21303141720			21303141721			21303141722			21303141723		
		Sample ID	PRSSB06004			PRSSB06005			PRSSB06006			PRSSB07002			PRSSB07003			PRSSB07004		
		Sample Date	3/12/2013			3/12/2013			3/12/2013			3/12/2013			3/12/2013			3/12/2013		
		Matrix	Soil			Soil			Soil			Soil			Soil			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
LEAD	7439-92-1	UG_KG	93700			94600			59100			28400			46400			200000		

		Sample Delivery Group	213031417			213031417			213031417			213031417			213031417			213031417		
		Lab ID	21303141724			21303141725			21303141726			21303141728			21303141729			21303141730		
		Sample ID	PRSSB07005			PRSSB07006			PRCSB06003			PRSSB05002			PRSSB05003			PRSSB05004		
		Sample Date	3/12/2013			3/12/2013			3/12/2013			3/12/2013			3/12/2013			3/12/2013		
		Matrix	Soil			Soil			Soil Dup			Soil			Soil			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
LEAD	7439-92-1	UG_KG	154000			40500			130000			127000			94200	J	Id	94200		

Table B-3 (Continued)
Total Lead Results After Data Review
NSA Mid-South — February 2013

		Sample Delivery Group	213031417			213031417			213031417			213031417			213031417			213031417		
		Lab ID	21303141731			21303141732			21303141733			21303141734			21303141735			21303141736		
		Sample ID	PRSSB05005			PRSSB06007			PRSSB06008			PRSSB06009			PRSSB06010			PRSSB06011		
		Sample Date	3/12/2013			3/12/2013			3/12/2013			3/12/2013			3/12/2013			3/12/2013		
		Matrix	Soil			Soil			Soil			Soil			Soil			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
LEAD	7439-92-1	UG_KG	73500			127000			83900			148000			59000			130000		

		Sample Delivery Group	213031417			213031417			213031417			213031417			213031417			213031417		
		Lab ID	21303141737			21303141738			21303141739			21303141740			21303141741			21303141742		
		Sample ID	PRSSB06012			PRSSB06013			PRSSB06014			PRSSB03008			PRSSB03010			PRSSB03012		
		Sample Date	3/12/2013			3/12/2013			3/12/2013			3/12/2013			3/12/2013			3/12/2013		
		Matrix	Soil			Soil			Soil			Soil			Soil			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
LEAD	7439-92-1	UG_KG	66600			79300			1990000			105000			93900			104000		

		Sample Delivery Group	213031417			213031417			213031417			213031417			213031417			213031417		
		Lab ID	21303141743			21303141746			21303141747			21303141748			21303141749			21303141750		
		Sample ID	PRSSB03014			PRCSB03014			PRSSB03016			PRSSB04002			PRSSB04003			PRSSB04004		
		Sample Date	3/12/2013			3/12/2013			3/12/2013			3/12/2013			3/12/2013			3/12/2013		
		Matrix	Soil			Soil Dup			Soil			Soil			Soil			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
LEAD	7439-92-1	UG_KG	112000			109000			108000			107000			160000			2.93E+07		

		Sample Delivery Group	213031417			213031417			213031417			213031417			213031417			213031417		
		Lab ID	21303141751			21303141752			21303141754			21303141755			21303141756			21303141757		
		Sample ID	PRSSB04005			PRSSB04006			PRSSB08008			PRSSB08010			PRSSB08012			PRSSB08014		
		Sample Date	3/12/2013			3/12/2013			3/13/2013			3/13/2013			3/13/2013			3/13/2013		
		Matrix	Soil			Soil			Soil			Soil			Soil			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
LEAD	7439-92-1	UG_KG	106000			101000			136000			39800			59800			49200		

Table B-3 (Continued)
Total Lead Results After Data Review
NSA Mid-South — February 2013

		Sample Delivery Group	213031417			213031417			213031417			213031417			213031417			213031417		
		Lab ID	21303141758			21303141759			21303141760			21303141761			21303141762			21303141763		
		Sample ID	PRSSB07008			PRSSB07010			PRSSB07012			PRSSB07014			PRSSB05008			PRSSB05010		
		Sample Date	3/13/2013			3/13/2013			3/13/2013			3/13/2013			3/13/2013			3/13/2013		
		Matrix	Soil			Soil			Soil			Soil			Soil			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
LEAD	7439-92-1	UG_KG	128000			23400			110000			164000			1430000			48200		

		Sample Delivery Group	213031417			213031417			213031417			213031417			213031417			213031417		
		Lab ID	21303141764			21303141765			21303141766			21303141767			21303141770			21303141771		
		Sample ID	PRSSB05012			PRSSB05014			PRSSB04008			PRSSB04010			PRCSB04010			PRSSB04012		
		Sample Date	3/13/2013			3/13/2013			3/13/2013			3/13/2013			3/13/2013			3/13/2013		
		Matrix	Soil			Soil			Soil			Soil			Soil Dup			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
LEAD	7439-92-1	UG_KG	16500			18300			377000			13700			10900			17500		

		Sample Delivery Group	213031417			213031417			213031417			213031417			213031417			213031417		
		Lab ID	21303141772			21303141774			21303141775			21303141776			21303141777			21303141778		
		Sample ID	PRSSB04014			PRSSB02008			PRSSB02010			PRSSB02012			PRSSB02014			PRSSB01008		
		Sample Date	3/13/2013			3/13/2013			3/13/2013			3/13/2013			3/13/2013			3/13/2013		
		Matrix	Soil			Soil			Soil			Soil			Soil			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
LEAD	7439-92-1	UG_KG	21700			19700			20100			16700			19200			51300		

		Sample Delivery Group	213031417			213031417			213031417			213031808			213031808			213031808		
		Lab ID	21303141779			21303141780			21303141781			21303180801			21303180802			21303180803		
		Sample ID	PRSSB01010			PRSSB01012			PRSSB01014			PRSSB03002			PRSSB03003			PRSSB03004		
		Sample Date	3/13/2013			3/13/2013			3/13/2013			3/14/2013			3/14/2013			3/14/2013		
		Matrix	Soil			Soil			Soil			Soil			Soil			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
LEAD	7439-92-1	UG_KG	230000			118000			481000			141000			299000			80200		

Table B-3 (Continued)
Total Lead Results After Data Review
NSA Mid-South — February 2013

		Sample Delivery Group	213031808			213031808			213031808			213031808			213031808			213031808		
		Lab ID	21303180804			21303180805			21303180806			21303180807			21303180808			21303180809		
		Sample ID	PRSSB03005			PRSSB03006			PRSSB02002			PRSSB02003			PRSSB02004			PRSSB02005		
		Sample Date	3/14/2013			3/14/2013			3/14/2013			3/14/2013			3/14/2013			3/14/2013		
		Matrix	Soil			Soil			Soil			Soil			Soil			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
LEAD	7439-92-1	UG_KG	91100			116000			253000			345000			252000			38200		

		Sample Delivery Group	213031808			213031808			213031808			213031808			213031808			213031808		
		Lab ID	21303180810			21303180813			21303180815			21303180816			21303180817			21303180818		
		Sample ID	PRSSB02006			PRCSB02006			PRSSB01002			PRSSB01003			PRSSB01004			PRSSB01005		
		Sample Date	3/14/2013			3/14/2013			3/14/2013			3/14/2013			3/14/2013			3/14/2013		
		Matrix	Soil			Soil Dup			Soil			Soil			Soil			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
LEAD	7439-92-1	UG_KG	49600	J	ld	63900			147000			271000			97200			49800		

		Sample Delivery Group	213031808		
		Lab ID	21303180819		
		Sample ID	PRSSB01006		
		Sample Date	3/14/2013		
		Matrix	Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC
LEAD	7439-92-1	UG_KG	37900		

Notes:

UG_KG = Micrograms per kilogram
Qual = Final qualifier (Refer to Table B-1)
RC = Reason code (Refer to Table B-2

Table B-4
Polynuclear Aromatic Hydrocarbon Results After Data Review
NSA Mid-South — February 2013

		Sample Delivery Group	213022817			213022817			213022817			213022817			213022817			213022817		
		Lab ID	21302281701			21302281702			21302281703			21302281704			21302281705			21302281706		
		Sample ID	SRSSB6601			SRSSB6602			SRSSB6501			SRSSB6502			SRSSB6201			SRSSB6202		
		Sample Date	2/25/2013			2/25/2013			2/25/2013			2/25/2013			2/25/2013			2/25/2013		
		Matrix	Soil			Soil			Soil			Soil			Soil			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
2-METHYLNAPHTHALENE	91-57-6	UG_KG	3.24	UJ	h	3.25	U		3.14	U		3.16	U		6.46			3.05	U	
ACENAPHTHENE	83-32-9	UG_KG	2.14	UJ	h	2.15	U		2.07	U		2.08	U		12.1			2.01	U	
ACENAPHTHYLENE	208-96-8	UG_KG	2.14	UJ	h	2.15	U		2.07	U		2.08	U		13.5			2.01	U	
ANTHRACENE	120-12-7	UG_KG	4.12	J	h	2.22	J		7.28			2.08	U		66.9			2.05	J	
BENZO[A]ANTHRACENE	56-55-3	UG_KG	58.7	J	h	36.3			70.5			30.7			316			34		
BENZO[A]PYRENE	50-32-8	UG_KG	60	J	h	31.4			85.2			27.9			315			29.4		
BENZO[B]FLUORANTHENE	205-99-2	UG_KG	138	J	h	96.8			164			90			505			90.1		
BENZO[G,H,I]PERYLENE	191-24-2	UG_KG	54.3	J	h	13.1			98.7			7.59			329			12.2		
BENZO[K]FLUORANTHENE	207-08-9	UG_KG	55.9	J	h	41.1			62.4			38.7			146			38.9		
CHRYSENE	218-01-9	UG_KG	43.1	J	h	10			56.7			6.24			305			8.61		
DIBENZ[A,H]ANTHRACENE	53-70-3	UG_KG	31.8	J	h	26			39.4			24.8			73.6			24.4		
FLUORANTHENE	206-44-0	UG_KG	40.1	J	h	16.1			58.7			4.7			485			16.5		
FLUORENE	86-73-7	UG_KG	2.14	UJ	h	2.15	U		2.07	U		2.08	U		8.05			2.01	U	
INDENO[1,2,3-CD]PYRENE	193-39-5	UG_KG	62.2	J	h	37.7			94.8			32.8			314			34.2		
NAPHTHALENE	91-20-3	UG_KG	3.24	UJ	h	3.25	U		3.14	U		3.16	U		8.42			3.05	U	
PHENANTHRENE	85-01-8	UG_KG	17.1	J	h	7.66			24.6			2.08	U		251			4.72		
PYRENE	129-00-0	UG_KG	58.7	J	h	11.7			68.5			4.3			467			12.4		

		Sample Delivery Group	213022817			213022817			213022817			213022817			213022817			213022817		
		Lab ID	21302281707			21302281708			21302281709			21302281710			21302281711			21302281712		
		Sample ID	SRSSB5601			SRSSB5602			SRSSB5501			SRSSB5502			SRSSB5801			SRSSB5802		
		Sample Date	2/25/2013			2/25/2013			2/25/2013			2/25/2013			2/25/2013			2/25/2013		
		Matrix	Soil			Soil			Soil			Soil			Soil			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
2-METHYLNAPHTHALENE	91-57-6	UG_KG	7.73			3.07	U		30.5			3.12	U		262			7.92		
ACENAPHTHENE	83-32-9	UG_KG	21.5			10.4			120			9			525			2.06	U	
ACENAPHTHYLENE	208-96-8	UG_KG	18.2			31.7			2.07	U		2.06	U		21	U		2.06	U	
ANTHRACENE	120-12-7	UG_KG	128			60.9			571			53.4			1190			40		
BENZO[A]ANTHRACENE	56-55-3	UG_KG	657			339			4160			360			23000			616		
BENZO[A]PYRENE	50-32-8	UG_KG	784			466			4500			404			28400			1030		
BENZO[B]FLUORANTHENE	205-99-2	UG_KG	1170			745			6360			507			27500			1170		
BENZO[G,H,I]PERYLENE	191-24-2	UG_KG	908			563			2990			379			29000			766		
BENZO[K]FLUORANTHENE	207-08-9	UG_KG	335			231			2090			173			11300			461		
CHRYSENE	218-01-9	UG_KG	730			407			3940			434			30800			717		
DIBENZ[A,H]ANTHRACENE	53-70-3	UG_KG	171			76.1			687			88.6			6300			397		
FLUORANTHENE	206-44-0	UG_KG	879			502			5480			529			16500			204		
FLUORENE	86-73-7	UG_KG	15			6.2			69.9			5.57			248			5.96		
INDENO[1,2,3-CD]PYRENE	193-39-5	UG_KG	784			483			2430			308			19900			489		
NAPHTHALENE	91-20-3	UG_KG	11.6			6.21			71.4			8.44			396			1.84	J	
PHENANTHRENE	85-01-8	UG_KG	459			140			2530			218			6140			214		
PYRENE	129-00-0	UG_KG	951			425			3700			418			20700			730		

Table B-4 (Continued)
Polynuclear Aromatic Hydrocarbon Results After Data Review
NSA Mid-South — February 2013

		Sample Delivery Group	213022817			213022817			213022817			213022817			213022817			213022817		
		Lab ID	21302281713			21302281714			21302281715			21302281716			21302281717			21302281718		
		Sample ID	SRSSB5701			SRSSB5702			SRSSB5401			SRSSB5402			SRSSB5901			SRSSB5902		
		Sample Date	2/25/2013			2/25/2013			2/25/2013			2/25/2013			2/25/2013			2/25/2013		
		Matrix	Soil			Soil			Soil			Soil			Soil			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
2-METHYLNAPHTHALENE	91-57-6	UG_KG	67.7			1250			10.4			3.65			8.75			291		
ACENAPHTHENE	83-32-9	UG_KG	245			6300			48.3			17.9			49			1270		
ACENAPHTHYLENE	208-96-8	UG_KG	49.9			20.1	U		4.77			8.29			4.71			19.9	U	
ANTHRACENE	120-12-7	UG_KG	811			20800			201			54.8			163			6060		
BENZO[A]ANTHRACENE	56-55-3	UG_KG	7050			129000			1340			389			1470			23300		
BENZO[A]PYRENE	50-32-8	UG_KG	8470			118000			1530			464			1820			20200		
BENZO[B]FLUORANTHENE	205-99-2	UG_KG	13300			160000			1910			717			2310			25200		
BENZO[G,H,I]PERYLENE	191-24-2	UG_KG	8920			94800			987			460			1420			13000		
BENZO[K]FLUORANTHENE	207-08-9	UG_KG	3510			76300			718			242			834			11500		
CHRYSENE	218-01-9	UG_KG	7870			110000			1490			444			1630			24600		
DIBENZ[A,H]ANTHRACENE	53-70-3	UG_KG	1660			18800			223			97.5			319			3230		
FLUORANTHENE	206-44-0	UG_KG	10400			216000			1950			522			2100			52400		
FLUORENE	86-73-7	UG_KG	144			4270			29.6			9.4			25.5			1090		
INDENO[1,2,3-CD]PYRENE	193-39-5	UG_KG	7520			84000			925			412			1370			13700		
NAPHTHALENE	91-20-3	UG_KG	188			4010			33.2			12.7			29.2			917		
PHENANTHRENE	85-01-8	UG_KG	3730			92500			924			210			741			25700		
PYRENE	129-00-0	UG_KG	8060			156000			1710			593			1550			33200		

		Sample Delivery Group	213022817			213022817			213022817			213022817			213022817			213022817		
		Lab ID	21302281719			21302281720			21302281721			21302281722			21302281725			21302281726		
		Sample ID	SRSSB6402			SRSSB6301			SRCSB6002			SRSSB6002			SRSSB6302			SRSSB4901		
		Sample Date	2/25/2013			2/26/2013			2/25/2013			2/25/2013			2/26/2013			2/26/2013		
		Matrix	Soil			Soil			Soil Dup			Soil			Soil			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
2-METHYLNAPHTHALENE	91-57-6	UG_KG	3.16	U		132			3.14	U		3.14	U		19.9			11		
ACENAPHTHENE	83-32-9	UG_KG	2.08	U		681			2.08	U		2.07	U		45.5			61.9		
ACENAPHTHYLENE	208-96-8	UG_KG	2.08	U		21.3	U		2.08	U		2.07	U		2.08	U		11.1		
ANTHRACENE	120-12-7	UG_KG	9.21			3280			4.42			2.07	U		240			229		
BENZO[A]ANTHRACENE	56-55-3	UG_KG	90.4			16200			49.6			2.07	U		868			1680		
BENZO[A]PYRENE	50-32-8	UG_KG	106			15500			40.9			2.07	U		763			2340		
BENZO[B]FLUORANTHENE	205-99-2	UG_KG	197			22200			106			2.07	U		1110			3900		
BENZO[G,H,I]PERYLENE	191-24-2	UG_KG	101			12100			18.7			3.14	U		534			2030		
BENZO[K]FLUORANTHENE	207-08-9	UG_KG	71.5			7120			44.7			2.07	U		344			1340		
CHRYSENE	218-01-9	UG_KG	83.7			16700			22.4			3.14	U		876			1980		
DIBENZ[A,H]ANTHRACENE	53-70-3	UG_KG	39.9			2750			26.8			2.65	U		143			562		
FLUORANTHENE	206-44-0	UG_KG	103			31800			41.3			2.07	U		2110			2980		
FLUORENE	86-73-7	UG_KG	2.08	U		553			2.08	U		2.07	U		33.3			35		
INDENO[1,2,3-CD]PYRENE	193-39-5	UG_KG	111			12100			42.6			3.14	U		566			2010		
NAPHTHALENE	91-20-3	UG_KG	3.16	U		395			3.14	U		3.14	U		50.6			32.7		
PHENANTHRENE	85-01-8	UG_KG	36.9			14300			17.9			2.07	U		951			1060		
PYRENE	129-00-0	UG_KG	82			22000			30.4			2.07	U		1300			1450		

Table B-4 (Continued)
Polynuclear Aromatic Hydrocarbon Results After Data Review
NSA Mid-South — February 2013

		Sample Delivery Group	213022817			213022817			213022817			213022817			213022817			213022817		
		Lab ID	21302281727			21302281728			21302281729			21302281730			21302281731			21302281732		
		Sample ID	SRSSB4902			SRSSB4201			SRSSB4202			SRSSB3401			SRSSB3402			SRSSB2901		
		Sample Date	2/26/2013			2/26/2013			2/26/2013			2/26/2013			2/26/2013			2/26/2013		
		Matrix	Soil			Soil			Soil			Soil			Soil			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
2-METHYLNAPHTHALENE	91-57-6	UG_KG	2.99	U		3.38	U		3.4	U		45.6			3.19	U		3.2	U	
ACENAPHTHENE	83-32-9	UG_KG	1.97	U		2.23	U		2.24	U		219			5.44			8.68		
ACENAPHTHYLENE	208-96-8	UG_KG	1.97	U		2.23	U		2.24	U		21	U		2.1	U		2.11	U	
ANTHRACENE	120-12-7	UG_KG	4.39			6.17			4.32			748			17.1			26.7		
BENZO[A]ANTHRACENE	56-55-3	UG_KG	56.2			81.6			65.1			6860			166			307		
BENZO[A]PYRENE	50-32-8	UG_KG	60.9			326			80.1			9200			228			416		
BENZO[B]FLUORANTHENE	205-99-2	UG_KG	129			1030			166			14600			366			725		
BENZO[G,H,I]PERYLENE	191-24-2	UG_KG	44			113			76.3			9610			229			514		
BENZO[K]FLUORANTHENE	207-08-9	UG_KG	52.3			410			62.7			4130			122			184		
CHRYSENE	218-01-9	UG_KG	33.5			69.6			51.4			8080			191			322		
DIBENZ[A,H]ANTHRACENE	53-70-3	UG_KG	29.5			268			37			1600			59.1			93.5		
FLUORANTHENE	206-44-0	UG_KG	40.4			75.7			60.1			9620			215			321		
FLUORENE	86-73-7	UG_KG	1.97	U		2.23	U		2.24	U		106			2.1	U		3.79	J	
INDENO[1,2,3-CD]PYRENE	193-39-5	UG_KG	66.1			365			91.6			7930			222			428		
NAPHTHALENE	91-20-3	UG_KG	2.99	U		3.38	U		3.4	U		144			3.19	U		6.03		
PHENANTHRENE	85-01-8	UG_KG	12.8			18.8			18.5			3150			70.8			130		
PYRENE	129-00-0	UG_KG	31.4			47.5			45			8480			159			423		

		Sample Delivery Group	213022817			213022817			213022817			213022817			213022817			213022817		
		Lab ID	21302281733			21302281734			21302281735			21302281738			21302281739			21302281740		
		Sample ID	SRSSB2902			SRSSB1501			SRSSB1502			SRM01800			SRM01801			SRM01700		
		Sample Date	2/26/2013			2/26/2013			2/26/2013			2/26/2013			2/26/2013			2/26/2013		
		Matrix	Soil			Soil			Soil			Sediment			Sediment			Sediment		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
2-METHYLNAPHTHALENE	91-57-6	UG_KG	3.11	U		2.94	U		3.75			3.34	U		3.1	U		16.5		
ACENAPHTHENE	83-32-9	UG_KG	2.06	U		1.94	U		3.64			6.53			2.05	U		80.2		
ACENAPHTHYLENE	208-96-8	UG_KG	2.06	U		1.94	U		3.62			2.2	U		2.05	U		2.16	U	
ANTHRACENE	120-12-7	UG_KG	2.06	U		4.21			2.32	J		13.5			2.05	U		465		
BENZO[A]ANTHRACENE	56-55-3	UG_KG	2.06	U		103			29.8			92.2			30.3			1570		
BENZO[A]PYRENE	50-32-8	UG_KG	2.06	U		169			26.6			91.8			25.9			1310		
BENZO[B]FLUORANTHENE	205-99-2	UG_KG	2.06	U		298			85.9			183			88.1			1980		
BENZO[G,H,I]PERYLENE	191-24-2	UG_KG	3.11	U		186			9.91			83.1			6.52			1320		
BENZO[K]FLUORANTHENE	207-08-9	UG_KG	2.06	U		99.3			36.6			77.6			36.6			638		
CHRYSENE	218-01-9	UG_KG	3.11	U		113			5.9			62.1			5.88			1600		
DIBENZ[A,H]ANTHRACENE	53-70-3	UG_KG	2.63	U		47.9			23.4			37.1			24.2			259		
FLUORANTHENE	206-44-0	UG_KG	2.06	U		63.1			5.42			76.8			4.22			2860		
FLUORENE	86-73-7	UG_KG	2.06	U		1.94	U		2.51	J		4.52			2.05	U		70.3		
INDENO[1,2,3-CD]PYRENE	193-39-5	UG_KG	3.11	U		165			31.9			91.9			30.3			1190		
NAPHTHALENE	91-20-3	UG_KG	3.11	U		2.94	U		2.95	U		3.34	U		3.1	U		49.8		
PHENANTHRENE	85-01-8	UG_KG	2.06	U		17			4.42			45			2.05	U		1870		
PYRENE	129-00-0	UG_KG	2.06	U		94.8			8			97			6.73			2700		

Table B-4 (Continued)
Polynuclear Aromatic Hydrocarbon Results After Data Review
NSA Mid-South — February 2013

		Sample Delivery Group	213022817			213022817			213022817			213022817			213022817			213022817		
		Lab ID	21302281741			21302281742			21302281743			21302281744			21302281745			21302281746		
		Sample ID	SRM01701			SRM01500			SRM01501			SRM01600			SRM01601			SRM00100		
		Sample Date	2/26/2013			2/26/2013			2/26/2013			2/26/2013			2/26/2013			2/27/2013		
		Matrix	Sediment			Sediment			Sediment			Sediment			Sediment			Sediment		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
2-METHYLNAPHTHALENE	91-57-6	UG_KG	3.12	U		49.8			130			106			2.99	U		3.22	U	
ACENAPHTHENE	83-32-9	UG_KG	2.06	U		249			678			653			1.98	U		2.13	U	
ACENAPHTHYLENE	208-96-8	UG_KG	2.06	U		21.2	U		21.5	U		23.9	U		1.98	U		2.13	U	
ANTHRACENE	120-12-7	UG_KG	3.41	J		378			2690			2080			3.56	J		2.7	J	
BENZO[A]ANTHRACENE	56-55-3	UG_KG	38.6			6250			18000			14000			80.3			98.9	J	bf
BENZO[A]PYRENE	50-32-8	UG_KG	32.8			6970			21600			14900			124			145		
BENZO[B]FLUORANTHENE	205-99-2	UG_KG	97.9			7310			26300			21300			231			253		
BENZO[G,H,I]PERYLENE	191-24-2	UG_KG	13.3			6430			17500			13500			154			191		
BENZO[K]FLUORANTHENE	207-08-9	UG_KG	39.5			2150			10100			5670			74.6			92.2		
CHRYSENE	218-01-9	UG_KG	13.3			7080			20300			14900			78.7			81		
DIBENZ[A,H]ANTHRACENE	53-70-3	UG_KG	25.1			1330			4010			2650			42.8			48.7		
FLUORANTHENE	206-44-0	UG_KG	20.1			7060			26300			21700			52			58.1		
FLUORENE	86-73-7	UG_KG	2.06	U		95.2			366			278			1.98	U		2.13	U	
INDENO[1,2,3-CD]PYRENE	193-39-5	UG_KG	36.9			4640			16700			12700			153			168		
NAPHTHALENE	91-20-3	UG_KG	3.12	U		47.1			478			391			6.92			1.85	J	
PHENANTHRENE	85-01-8	UG_KG	11.4			2730			10300			8270			12.4			11		
PYRENE	129-00-0	UG_KG	24.9			6970			17600			16400			52.3			57.5		

		Sample Delivery Group	213022817			213022817			213022817			213022817			213022817			213022817		
		Lab ID	21302281747			21302281748			21302281749			21302281750			21302281751			21302281752		
		Sample ID	SRM00101			SRM00200			SRCSB1502			SRSSB2701			SRSSB2702			SRSSB2601		
		Sample Date	2/27/2013			2/27/2013			2/26/2013			2/26/2013			2/26/2013			2/26/2013		
		Matrix	Sediment			Sediment			Soil Dup			Soil			Soil			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
2-METHYLNAPHTHALENE	91-57-6	UG_KG	3.14	U		20.9	J		2.96	U		3.14	U		3.04	U		7.89		
ACENAPHTHENE	83-32-9	UG_KG	2.07	U		78.8			1.95	U		2.08	U		2.01	U		35.3		
ACENAPHTHYLENE	208-96-8	UG_KG	2.07	U		20.3	U		1.95	U		2.08	U		2.01	U		1.99	U	
ANTHRACENE	120-12-7	UG_KG	2.07	U		98.3			1.95	U		1.95	J		2.01	U		42.3		
BENZO[A]ANTHRACENE	56-55-3	UG_KG	2.07	U		2360			31.6			39.2			2.01	U		1380		
BENZO[A]PYRENE	50-32-8	UG_KG	25			4530			29.6			40.2			2.01	U		2530		
BENZO[B]FLUORANTHENE	205-99-2	UG_KG	86.1			7020			89.6			106			2.01	U		3130		
BENZO[G,H,I]PERYLENE	191-24-2	UG_KG	6.22			6000			14.8			27.7			3.04	U		3120		
BENZO[K]FLUORANTHENE	207-08-9	UG_KG	36.5			2040			38			44.9			2.01	U		1280		
CHRYSENE	218-01-9	UG_KG	3.14	U		3200			8.56			15.3			3.04	U		1860		
DIBENZ[A,H]ANTHRACENE	53-70-3	UG_KG	24.1			1020			23.9			26.9			2.57	U		554		
FLUORANTHENE	206-44-0	UG_KG	2.07	U		2080			8.36			16.7			2.01	U		1170		
FLUORENE	86-73-7	UG_KG	2.07	U		41.9			1.95	U		2.08	U		2.01	U		12.5		
INDENO[1,2,3-CD]PYRENE	193-39-5	UG_KG	30.7			5240			35.4			47.9			3.04	U		2680		
NAPHTHALENE	91-20-3	UG_KG	3.14	U		122			2.96	U		3.14	U		3.04	U		28.1		
PHENANTHRENE	85-01-8	UG_KG	2.07	U		377			1.95	U		6.18			2.01	U		173		
PYRENE	129-00-0	UG_KG	2.07	U		2080			7.33			14.2			2.01	U		1150		

Table B-4 (Continued)
Polynuclear Aromatic Hydrocarbon Results After Data Review
NSA Mid-South — February 2013

		Sample Delivery Group	213022817			213022817			213022817			213022817			213022817			213022817		
		Lab ID	21302281753			21302281754			21302281755			21302281756			21302281757			21302281758		
		Sample ID	SRSSB2602			SRSSB2501			SRSSB2502			SRSSB1601			SRSSB1602			SRSSB1701		
		Sample Date	2/26/2013			2/26/2013			2/26/2013			2/26/2013			2/26/2013			2/26/2013		
		Matrix	Soil			Soil			Soil			Soil			Soil			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
2-METHYLNAPHTHALENE	91-57-6	UG_KG	280			30	U		78.2			10.6			4.75			3.22	U	
ACENAPHTHENE	83-32-9	UG_KG	1250			19.8	U		265			83.2			17.7			2.12	U	
ACENAPHTHYLENE	208-96-8	UG_KG	19.9	U		19.8	U		19.7	U		2.26	U		1.94	U		2.12	U	
ANTHRACENE	120-12-7	UG_KG	1180			36			1420			180			18.2			2.34	J	
BENZO[A]ANTHRACENE	56-55-3	UG_KG	33100			1190			5310			1390			530			68.1		
BENZO[A]PYRENE	50-32-8	UG_KG	55700			1780			5220			1890			933			103		
BENZO[B]FLUORANTHENE	205-99-2	UG_KG	67600			2860			8120			2530			1270			194		
BENZO[G,H,I]PERYLENE	191-24-2	UG_KG	46000			2140			4060			2060			997			110		
BENZO[K]FLUORANTHENE	207-08-9	UG_KG	25000			1020			2440			906			575			73.6		
CHRYSENE	218-01-9	UG_KG	42400			1040			5710			1750			631			65.5		
DIBENZ[A,H]ANTHRACENE	53-70-3	UG_KG	12900			508			949			413			149			39.8		
FLUORANTHENE	206-44-0	UG_KG	31200			738			11200			2000			374			39		
FLUORENE	86-73-7	UG_KG	503			19.8	U		228			52.8			6.56			2.12	U	
INDENO[1,2,3-CD]PYRENE	193-39-5	UG_KG	43100			1920			4040			1850			817			113		
NAPHTHALENE	91-20-3	UG_KG	1280			43			284			29.2			17.4			3.22	U	
PHENANTHRENE	85-01-8	UG_KG	5440			120			5560			745			73.8			7.24		
PYRENE	129-00-0	UG_KG	28200			727			7730			1560			583			38.9		

		Sample Delivery Group	213022817			213022817			213022817			213022817			213022817			213022817		
		Lab ID	21302281759			21302281760			21302281761			21302281762			21302281765			21302281766		
		Sample ID	SRSSB1702			SRM00201			SRM00300			SRM00301			SRSSB1302			SRSSB1802		
		Sample Date	2/26/2013			2/27/2013			2/27/2013			2/27/2013			2/27/2013			2/27/2013		
		Matrix	Soil			Sediment			Sediment			Sediment			Soil			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
2-METHYLNAPHTHALENE	91-57-6	UG_KG	3.15	U		6.21			12.8			25.7			3	U		3.15	U	
ACENAPHTHENE	83-32-9	UG_KG	8.71			28.2			60.2			134			6.88			2.08	U	
ACENAPHTHYLENE	208-96-8	UG_KG	2.08	U		2.01	U		2.15	U		2.09	U		1.98	U		2.08	U	
ANTHRACENE	120-12-7	UG_KG	11.5			29.3			78.7			156			7.35			1.77	J	
BENZO[A]ANTHRACENE	56-55-3	UG_KG	231			711			1580			2720			183			54.1	J	bf
BENZO[A]PYRENE	50-32-8	UG_KG	372			1170			2440			4900			334			67.6		
BENZO[B]FLUORANTHENE	205-99-2	UG_KG	601			1780			2960			8040			499			143		
BENZO[G,H,I]PERYLENE	191-24-2	UG_KG	311			1440			2270			3530			344			42		
BENZO[K]FLUORANTHENE	207-08-9	UG_KG	197			480			1340			2430			150			54.8		
CHRYSENE	218-01-9	UG_KG	279			879			1790			3280			234			42		
DIBENZ[A,H]ANTHRACENE	53-70-3	UG_KG	65.2			234			424			807			71.3			31.3		
FLUORANTHENE	206-44-0	UG_KG	169			502			1160			2300			133			24.4		
FLUORENE	86-73-7	UG_KG	2.08	U		10.8			26.6			57			3.86			2.08	U	
INDENO[1,2,3-CD]PYRENE	193-39-5	UG_KG	274			1200			2100			3310			307			62.8		
NAPHTHALENE	91-20-3	UG_KG	7.35			27.9			52			107			6.46			3.15	U	
PHENANTHRENE	85-01-8	UG_KG	46.1			111			308			655			29.5			6.04		
PYRENE	129-00-0	UG_KG	276			710			1610			2700			170			28.8		

Table B-4 (Continued)
Polynuclear Aromatic Hydrocarbon Results After Data Review
NSA Mid-South — February 2013

		Sample Delivery Group	213030421			213030421			213030421			213030421			213030421			213030421		
		Lab ID	21303042101			21303042102			21303042103			21303042104			21303042105			21303042106		
		Sample ID	SRSSB3701			SRSSB3702			SRSSB3901			SRSSB3902			SRSSB3601			SRSSB3602		
		Sample Date	2/28/2013			2/28/2013			2/28/2013			2/28/2013			2/28/2013			2/28/2013		
		Matrix	Soil			Soil			Soil			Soil			Soil			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
2-METHYLNAPHTHALENE	91-57-6	UG_KG	29.9			3.16	U		86.3			3.19	U		16.1			3.2	U	
ACENAPHTHENE	83-32-9	UG_KG	500			2.08	U		1170			2.11	U		108			2.11	U	
ACENAPHTHYLENE	208-96-8	UG_KG	2.07	U		2.08	U		21.1	U		2.11	U		2.08	U		2.11	U	
ANTHRACENE	120-12-7	UG_KG	304			9.9			615			2.02	J		180			7.09		
BENZO[A]ANTHRACENE	56-55-3	UG_KG	3340			103			10800			14			2430			40.2		
BENZO[A]PYRENE	50-32-8	UG_KG	6610			190			19200			31.1			3930			67.7		
BENZO[B]FLUORANTHENE	205-99-2	UG_KG	7620			261			25700			48.7			6090			113		
BENZO[G,H,I]PERYLENE	191-24-2	UG_KG	7420			137			19600			26.4			4080			51.2		
BENZO[K]FLUORANTHENE	207-08-9	UG_KG	3950			106			7390			17.9			1980			42.5		
CHRYSENE	218-01-9	UG_KG	4030			136			12900			18.7			2750			52.1		
DIBENZ[A,H]ANTHRACENE	53-70-3	UG_KG	1220			17.5			3520			2.69	U		768			6.1		
FLUORANTHENE	206-44-0	UG_KG	3670			79.5			9860			11.3			2380			32.6		
FLUORENE	86-73-7	UG_KG	71.7			2.08	U		156			2.11	U		32.2			2.11	U	
INDENO[1,2,3-CD]PYRENE	193-39-5	UG_KG	6500			115			18200			20.5			3640			46.6		
NAPHTHALENE	91-20-3	UG_KG	51.3			3.16	U		200			3.19	U		53.4			3.2	U	
PHENANTHRENE	85-01-8	UG_KG	1200			14.8			2090			5.7			842			12.9		
PYRENE	129-00-0	UG_KG	2470			125			9720			17.9			2480			53.4		

		Sample Delivery Group	213030421			213030421			213030421			213030421			213030421			213030421		
		Lab ID	21303042107			21303042108			21303042109			21303042110			21303042111			21303042112		
		Sample ID	SRSSB3801			SRSSB3802			SRSSB3501			SRSSB3502			SRSSB3201			SRSSB3202		
		Sample Date	2/28/2013			2/28/2013			2/28/2013			2/28/2013			2/28/2013			2/28/2013		
		Matrix	Soil			Soil			Soil			Soil			Soil			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
2-METHYLNAPHTHALENE	91-57-6	UG_KG	2250			31.5	U		930			127			42.6			3.16	U	
ACENAPHTHENE	83-32-9	UG_KG	9140			158			5760			773			226			11.3		
ACENAPHTHYLENE	208-96-8	UG_KG	21.1	U		20.8	U		20.2	U		21.2	U		4.38	U		2.08	U	
ANTHRACENE	120-12-7	UG_KG	42900			507			20100			1600			315			25.2		
BENZO[A]ANTHRACENE	56-55-3	UG_KG	196000			2660			116000			21000			5300			287		
BENZO[A]PYRENE	50-32-8	UG_KG	170000			3370			131000			28400			8450			479		
BENZO[B]FLUORANTHENE	205-99-2	UG_KG	233000			3710			180000			32700			10500			675		
BENZO[G,H,I]PERYLENE	191-24-2	UG_KG	128000			2700			114000			32000			7310			537		
BENZO[K]FLUORANTHENE	207-08-9	UG_KG	114000			2250			67000			18100			4970			252		
CHRYSENE	218-01-9	UG_KG	184000			3080			128000			21200			6320			384		
DIBENZ[A,H]ANTHRACENE	53-70-3	UG_KG	24200			328			21500			5040			1340			71.2		
FLUORANTHENE	206-44-0	UG_KG	402000			3470			187000			19200			5940			282		
FLUORENE	86-73-7	UG_KG	6220			87.3			3250			334			87.3			5.43		
INDENO[1,2,3-CD]PYRENE	193-39-5	UG_KG	122000			2220			105000			28700			6880			426		
NAPHTHALENE	91-20-3	UG_KG	6770			31.5	U		2450			581			199			7.65		
PHENANTHRENE	85-01-8	UG_KG	200000			2110			78600			6530			1410			102		
PYRENE	129-00-0	UG_KG	297000			3910			152000			14800			5220			318		

Table B-4 (Continued)
Polynuclear Aromatic Hydrocarbon Results After Data Review
NSA Mid-South — February 2013

		Sample Delivery Group	213030421			213030421			213030421			213030421			213030421			213030421		
		Lab ID	21303042113			21303042114			21303042115			21303042118			21303042119			21303042120		
		Sample ID	SRSSB3101			SRSSB3102			SRSSB3002			SRCSB3002			SRSSB2801			SRSSB2802		
		Sample Date	2/28/2013			2/28/2013			2/28/2013			2/28/2013			2/28/2013			2/28/2013		
		Matrix	Soil			Soil			Soil			Soil Dup			Soil			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
2-METHYLNAPHTHALENE	91-57-6	UG_KG	895			3.2	U		5.96			3.47	J		744			30.4	U	
ACENAPHTHENE	83-32-9	UG_KG	6060			15.6			31.9			17.9			3290			106		
ACENAPHTHYLENE	208-96-8	UG_KG	20.5	U		2.11	U		2.04	U		1.99	U		19.7	U		20.1	U	
ANTHRACENE	120-12-7	UG_KG	11500			50.6			54.5	J	fd	28.1	J	fd	5580			154		
BENZO[A]ANTHRACENE	56-55-3	UG_KG	96400			428			772			598			76600			3030		
BENZO[A]PYRENE	50-32-8	UG_KG	118000			509			1120			1010			101000			6070		
BENZO[B]FLUORANTHENE	205-99-2	UG_KG	156000			676			1860			1600			142000			8040		
BENZO[G,H,I]PERYLENE	191-24-2	UG_KG	103000			504			889			842			97200			6440		
BENZO[K]FLUORANTHENE	207-08-9	UG_KG	54400			321			474			436			51200			3360		
CHRYSENE	218-01-9	UG_KG	103000			424			881			709			77100			3950		
DIBENZ[A,H]ANTHRACENE	53-70-3	UG_KG	19700			69.4			167			154			30900			831		
FLUORANTHENE	206-44-0	UG_KG	125000			483			960	J	fd	550	J	fd	76100			2440		
FLUORENE	86-73-7	UG_KG	2470			9.26			13.1			8.37			1660			48.2		
INDENO[1,2,3-CD]PYRENE	193-39-5	UG_KG	94600			443			808			788			87200			5470		
NAPHTHALENE	91-20-3	UG_KG	2570			13.2			16.7			13.1			3150			56		
PHENANTHRENE	85-01-8	UG_KG	44900			215			269	J	fd	122	J	fd	24900			581		
PYRENE	129-00-0	UG_KG	109000			497			910			565			68600			2620		

		Sample Delivery Group	213030421			213030421			213030421			213030421			213030421			213030421		
		Lab ID	21303042121			21303042122			21303042123			21303042124			21303042128			21303042129		
		Sample ID	SRSSB4401			SRSSB4402			SRSSB4301			SRSSB4302			SRSSB4501			SRSSB4502		
		Sample Date	2/28/2013			2/28/2013			2/28/2013			2/28/2013			2/28/2013			2/28/2013		
		Matrix	Soil			Soil			Soil			Soil			Soil			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
2-METHYLNAPHTHALENE	91-57-6	UG_KG	47.6			3.19	U		3.12	U		3.11	U		9.48			3.12	U	
ACENAPHTHENE	83-32-9	UG_KG	480			24.6	J	s	25			2.06	U		70.4			9.06		
ACENAPHTHYLENE	208-96-8	UG_KG	2.1	U		2.1	U		2.06	U		2.06	U		2.12	U		2.06	U	
ANTHRACENE	120-12-7	UG_KG	262			6.1	J	s	42.8			1.86	J		118			11.8		
BENZO[A]ANTHRACENE	56-55-3	UG_KG	4400			73.8	J	s	352			23.5			1450			283		
BENZO[A]PYRENE	50-32-8	UG_KG	7120			187	J	s	478			33.5			2280			448		
BENZO[B]FLUORANTHENE	205-99-2	UG_KG	8190			220	J	s	781			59.1			3370			571		
BENZO[G,H,I]PERYLENE	191-24-2	UG_KG	7400			220	J	s	416			36.6			2330			522		
BENZO[K]FLUORANTHENE	207-08-9	UG_KG	2980			96.7	J	s	235			23.1			955			314		
CHRYSENE	218-01-9	UG_KG	4900			104	J	s	396			24.6			1710			324		
DIBENZ[A,H]ANTHRACENE	53-70-3	UG_KG	1240			28.9	J	s	90.4			5.82			398			71.2		
FLUORANTHENE	206-44-0	UG_KG	4350			48	J	s	501			19.5			1510			205		
FLUORENE	86-73-7	UG_KG	84.6			3.82	J	s	6.82			2.06	U		21.5			2.06	U	
INDENO[1,2,3-CD]PYRENE	193-39-5	UG_KG	6600			183	J	s	376			30.4			1970			450		
NAPHTHALENE	91-20-3	UG_KG	87.5			3.19	U		8.43			3.11	U		30.1			5.14		
PHENANTHRENE	85-01-8	UG_KG	1140			18.5	J	s	169			9.02			472			48.6		
PYRENE	129-00-0	UG_KG	4080			82.6	J	s	430			24.7			1510			235		

Table B-4 (Continued)
Polynuclear Aromatic Hydrocarbon Results After Data Review
NSA Mid-South — February 2013

		Sample Delivery Group	213030421			213030421			213030421			213030421			213030421			213030421		
		Lab ID	21303042130			21303042131			21303042132			21303042133			21303042134			21303042135		
		Sample ID	SRSSB4702			SRSSB4601			SRSSB4602			SRSSB4801			SRSSB4802			SRSSB6101		
		Sample Date	2/28/2013			2/28/2013			2/28/2013			2/28/2013			2/28/2013			3/1/2013		
		Matrix	Soil			Soil			Soil			Soil			Soil			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
2-METHYLNAPHTHALENE	91-57-6	UG_KG	3.09	U		26.4			3.17	U		8.95			3.11	U		3.23	U	
ACENAPHTHENE	83-32-9	UG_KG	27			111			2.09	U		43.2			2.05	U		2.13	U	
ACENAPHTHYLENE	208-96-8	UG_KG	2.04	U		4.69			2.09	U		3.39	J		2.05	U		2.13	U	
ANTHRACENE	120-12-7	UG_KG	10.4			123			8.91			67			3.64	J		2.13	U	
BENZO[A]ANTHRACENE	56-55-3	UG_KG	158			2360			63.6			1850			32.5			6.97		
BENZO[A]PYRENE	50-32-8	UG_KG	270			3270			92.8			2840			53.6			10.5		
BENZO[B]FLUORANTHENE	205-99-2	UG_KG	416			3920			139			3410			95.5			33.2		
BENZO[G,H,I]PERYLENE	191-24-2	UG_KG	272			2940			98.9			3100			63.8			8.57		
BENZO[K]FLUORANTHENE	207-08-9	UG_KG	141			2170			50.7			1870			28.8			3.87		
CHRYSENE	218-01-9	UG_KG	176			2460			74			1830			38.3			7.62		
DIBENZ[A,H]ANTHRACENE	53-70-3	UG_KG	65.9			450			13.8			482			7.49			2.73	U	
FLUORANTHENE	206-44-0	UG_KG	162			1720			71.9			1270			27.3			5.59		
FLUORENE	86-73-7	UG_KG	2.04	U		49.2			2.09	U		17.2			2.05	U		2.13	U	
INDENO[1,2,3-CD]PYRENE	193-39-5	UG_KG	267			2680			82.8			2740			52.2			7.97		
NAPHTHALENE	91-20-3	UG_KG	4.55			108			3.17	U		36.2			3.11	U		3.23	U	
PHENANTHRENE	85-01-8	UG_KG	45			509			35.1			337			15.6			2.13	U	
PYRENE	129-00-0	UG_KG	145			2210			88.3			1460			37.6			6.19		

		Sample Delivery Group	213030421			213030421			213030421			213030421			213030421			213030421		
		Lab ID	21303042137			21303042139			21303042140			21303042141			21303042142			21303042143		
		Sample ID	SRSSB5301			SRM00400			SRM00401			SRM01200			SRM01201			SRM01400		
		Sample Date	3/1/2013			2/28/2013			2/28/2013			2/28/2013			2/28/2013			2/28/2013		
		Matrix	Soil			Sediment			Sediment			Sediment			Sediment			Sediment		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
2-METHYLNAPHTHALENE	91-57-6	UG_KG	3.15	U		142			11.1			58.6			161			80.5		
ACENAPHTHENE	83-32-9	UG_KG	2.08	U		796			153			526			41	U		550		
ACENAPHTHYLENE	208-96-8	UG_KG	2.08	U		22.1	U		2.2	U		20.7	U		41	U		20.4	U	
ANTHRACENE	120-12-7	UG_KG	2.08	U		2250			380			458			1170			1160		
BENZO[A]ANTHRACENE	56-55-3	UG_KG	6.63			19300			1460			8350			15400			9760		
BENZO[A]PYRENE	50-32-8	UG_KG	12.8			21700			1450			14400			19000			10400		
BENZO[B]FLUORANTHENE	205-99-2	UG_KG	36.1			28100			1760			17000			22100			14100		
BENZO[G,H,I]PERYLENE	191-24-2	UG_KG	10.7			17300			1380			15200			21100			7940		
BENZO[K]FLUORANTHENE	207-08-9	UG_KG	7.21			14000			835			8810			11300			7000		
CHRYSENE	218-01-9	UG_KG	8.93			18200			1240			8710			14000			9260		
DIBENZ[A,H]ANTHRACENE	53-70-3	UG_KG	1.36	J		2690			207			2150			3290			1170		
FLUORANTHENE	206-44-0	UG_KG	8.37			23900			1820			6010			15000			16200		
FLUORENE	86-73-7	UG_KG	2.08	U		399			103			97			41	U		181		
INDENO[1,2,3-CD]PYRENE	193-39-5	UG_KG	8.97			16500			1340			14300			19200			7680		
NAPHTHALENE	91-20-3	UG_KG	3.15	U		459			33.4			134			309			138		
PHENANTHRENE	85-01-8	UG_KG	4.56			9450			1270			1690			6740			6130		
PYRENE	129-00-0	UG_KG	10.1			20900			1770			6440			18200			12900		

Table B-4 (Continued)
Polynuclear Aromatic Hydrocarbon Results After Data Review
NSA Mid-South — February 2013

		Sample Delivery Group	213030421			213030421			213030421			213030421			213030421			213030421		
		Lab ID	21303042144			21303042145			21303042148			21303042149			21303042150			21303042151		
		Sample ID	SRM01401			SRM01100			SRN01100			SRM01101			SRM01300			SRM01301		
		Sample Date	2/28/2013			2/28/2013			2/28/2013			2/28/2013			2/28/2013			2/28/2013		
		Matrix	Sediment			Sediment			Sediment Dup			Sediment			Sediment			Sediment		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
2-METHYLNAPHTHALENE	91-57-6	UG_KG	3.13	U		91.3			45.5			221			9.5			5.17		
ACENAPHTHENE	83-32-9	UG_KG	9.99			398	J	fd	680	J	fd	846			41			23.7		
ACENAPHTHYLENE	208-96-8	UG_KG	2.07	U		24.5	U		2.6	U		21.7	U		5.09			2.22	U	
ANTHRACENE	120-12-7	UG_KG	11.3			1750	J	fd,m	282	J	fd	6320			108			80.9		
BENZO[A]ANTHRACENE	56-55-3	UG_KG	247			8490	J	fd	3950	J	fd	20400			1180			493		
BENZO[A]PYRENE	50-32-8	UG_KG	406			8340	J	fd	5730	J	fd	13700			1500			541		
BENZO[B]FLUORANTHENE	205-99-2	UG_KG	494			11600	J	fd,ld	5940	J	fd	17400			1830			687		
BENZO[G,H,I]PERYLENE	191-24-2	UG_KG	495			6400	J	fd	3990	J	fd	9900			1340			581		
BENZO[K]FLUORANTHENE	207-08-9	UG_KG	221			5040	J	fd	2370	J	fd	8860			865			311		
CHRYSENE	218-01-9	UG_KG	253			7410	J	fd	3610	J	fd	17200			1110			465		
DIBENZ[A,H]ANTHRACENE	53-70-3	UG_KG	64.9			1040	J	fd	902	J	fd	1960			219			88.1		
FLUORANTHENE	206-44-0	UG_KG	173			13600	J	fd,ld	3340	J	fd	41800			1270			611		
FLUORENE	86-73-7	UG_KG	4.12			328	J	fd	71.5	J	fd	702			19			14		
INDENO[1,2,3-CD]PYRENE	193-39-5	UG_KG	432			6280	J	fd	4540	J	fd	10900			1310			544		
NAPHTHALENE	91-20-3	UG_KG	3.13	U		166	J	fd	72.7	J	fd	739			25.4			14.7		
PHENANTHRENE	85-01-8	UG_KG	50			6800	J	fd,ld	1180	J	fd	24600			451			324		
PYRENE	129-00-0	UG_KG	211			10400	J	fd	3060	J	fd	23900			1140			578		

		Sample Delivery Group	213030421			213030421			213030421			213030421			213030421			213030421		
		Lab ID	21303042152			21303042155			21303042157			21303042159			21303042161			21303042163		
		Sample ID	SRSSB3301			SRCSB3301			SRSSB5201			SRSSB5101			SRSSB4101			SRSSB4001		
		Sample Date	3/1/2013			3/1/2013			3/1/2013			3/1/2013			3/1/2013			3/1/2013		
		Matrix	Soil			Soil Dup			Soil			Soil			Soil			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
2-METHYLNAPHTHALENE	91-57-6	UG_KG	3.14	U		3.15	U		3.27	U		3.39	U		3.04	U		3.17	U	
ACENAPHTHENE	83-32-9	UG_KG	2.07	U		2.08	U		2.16	U		2.24	U		2	U		2.09	U	
ACENAPHTHYLENE	208-96-8	UG_KG	2.07	U		2.08	U		2.16	U		2.24	U		2	U		2.09	U	
ANTHRACENE	120-12-7	UG_KG	2.07	U		2.08	U		2.16	U		2.24	U		2	U		4.31		
BENZO[A]ANTHRACENE	56-55-3	UG_KG	4.96			5.57			5.55			9.78			2	U		50		
BENZO[A]PYRENE	50-32-8	UG_KG	9.13			8.54			8.26			13.8			2	U		72.7		
BENZO[B]FLUORANTHENE	205-99-2	UG_KG	30.8			29.9			30.3			39.1			2	U		124		
BENZO[G,H,I]PERYLENE	191-24-2	UG_KG	6.99			5.94			5.41			11.1			3.04	U		66.5		
BENZO[K]FLUORANTHENE	207-08-9	UG_KG	3.56	J		3.64	J		3.36	J		6.58			2	U		38.3		
CHRYSENE	218-01-9	UG_KG	6.47			7.35			7.74			12.2			3.04	U		58.6		
DIBENZ[A,H]ANTHRACENE	53-70-3	UG_KG	2.65	U		2.66	U		2.76	U		1.55	J		2.56	U		9.46		
FLUORANTHENE	206-44-0	UG_KG	6.16			5.88			6.93			10.3			2	U		53.7		
FLUORENE	86-73-7	UG_KG	2.07	U		2.08	U		2.16	U		2.24	U		2	U		2.09	U	
INDENO[1,2,3-CD]PYRENE	193-39-5	UG_KG	7.08			5.01			5.4			9.77			3.04	U		61.2		
NAPHTHALENE	91-20-3	UG_KG	3.14	U		3.15	U		3.27	U		3.39	U		3.04	U		3.17	U	
PHENANTHRENE	85-01-8	UG_KG	2.07	U		2.08	U		2.16	U		5.58			2	U		14.6		
PYRENE	129-00-0	UG_KG	5.65			5.23			5.78			10.4			2	U		49.3		

Table B-4 (Continued)
Polynuclear Aromatic Hydrocarbon Results After Data Review
NSA Mid-South — February 2013

		Sample Delivery Group	213030421			213030421			213030421			213030421			213030421			213030421		
		Lab ID	21303042164			21303042165			21303042166			21303042167			21303042168			21303042169		
		Sample ID	SRSSB4002			SRM01000			SRM01001			SRM00700			SRM00701			SRM00600		
		Sample Date	3/1/2013			3/1/2013			3/1/2013			3/1/2013			3/1/2013			3/1/2013		
		Matrix	Soil			Sediment			Sediment			Sediment			Sediment			Sediment		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
2-METHYLNAPHTHALENE	91-57-6	UG_KG	3.13	U		3.31	U		3.27	U		3.38	U		3.07	U		3.33	U	
ACENAPHTHENE	83-32-9	UG_KG	2.07	U		2.18	U		2.16	U		2.23	U		2.03	U		2.2	U	
ACENAPHTHYLENE	208-96-8	UG_KG	2.07	U		2.18	U		2.16	U		2.23	U		2.03	U		2.2	U	
ANTHRACENE	120-12-7	UG_KG	2.07	U		1.74	J		2.16	U		3.47	J		2.03	U		2.2	U	
BENZO[A]ANTHRACENE	56-55-3	UG_KG	2.07	U		42.8			23.8			44.7			13.3			2.2	U	
BENZO[A]PYRENE	50-32-8	UG_KG	2.07	U		45.7			40.1			49.9			17.3			2.2	U	
BENZO[B]FLUORANTHENE	205-99-2	UG_KG	2.07	U		118			48.6			123			23			2.2	U	
BENZO[G,H,I]PERYLENE	191-24-2	UG_KG	3.13	U		27.2			32.5			29.1			16.5			3.33	U	
BENZO[K]FLUORANTHENE	207-08-9	UG_KG	2.07	U		48.3			29.8			49.6			13.5			2.2	U	
CHRYSENE	218-01-9	UG_KG	3.13	U		17.3			30.9			28.4			15			3.33	U	
DIBENZ[A,H]ANTHRACENE	53-70-3	UG_KG	2.64	U		28.3			2.76	U		29.9			2.59	U		2.81	U	
FLUORANTHENE	206-44-0	UG_KG	2.07	U		17			22.8			30.5			12.7			2.2	U	
FLUORENE	86-73-7	UG_KG	2.07	U		2.18	U		2.16	U		2.23	U		2.03	U		2.2	U	
INDENO[1,2,3-CD]PYRENE	193-39-5	UG_KG	3.13	U		49.8			25.7			53.4			13.6			3.33	U	
NAPHTHALENE	91-20-3	UG_KG	3.13	U		3.31	U		3.27	U		3.38	U		3.07	U		3.33	U	
PHENANTHRENE	85-01-8	UG_KG	2.07	U		5.87			2.16	U		13.9			2.03	U		2.2	U	
PYRENE	129-00-0	UG_KG	2.07	U		15.8			27.9			27.2			15.1			2.2	U	

		Sample Delivery Group	213030421			213030421			213030421			213030421			213030421			213030750		
		Lab ID	21303042171			21303042172			21303042173			21303042175			21303042176			21303075001		
		Sample ID	SRM00900			SRM00901			SRM00500			SRM00800			SRM00801			SRSSB2401		
		Sample Date	3/1/2013			3/1/2013			3/1/2013			3/1/2013			3/1/2013			3/5/2013		
		Matrix	Sediment			Sediment			Sediment			Sediment			Sediment			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
2-METHYLNAPHTHALENE	91-57-6	UG_KG	3.27	U		3.19	U		3.25	U		3.23	U		3.14	U		3.16	U	
ACENAPHTHENE	83-32-9	UG_KG	2.16	U		2.11	U		2.15	U		2.13	U		2.07	U		2.09	UJ	c
ACENAPHTHYLENE	208-96-8	UG_KG	2.16	U		2.11	U		2.15	U		2.13	U		2.07	U		2.09	U	
ANTHRACENE	120-12-7	UG_KG	2.81	J		2.11	U		2.15	U		4.29			2.07	U		2.09	U	
BENZO[A]ANTHRACENE	56-55-3	UG_KG	44.7			2.11	U		2.15	U		70.7			2.07	U		2.09	UJ	c
BENZO[A]PYRENE	50-32-8	UG_KG	44.7			2.11	U		2.15	U		65.1			2.07	U		2.09	U	
BENZO[B]FLUORANTHENE	205-99-2	UG_KG	114			2.11	U		2.15	U		140			2.07	U		2.09	UJ	c
BENZO[G,H,I]PERYLENE	191-24-2	UG_KG	30			3.19	U		3.25	U		46			3.14	U		3.16	U	
BENZO[K]FLUORANTHENE	207-08-9	UG_KG	49.1			2.11	U		2.15	U		60.6			2.07	U		2.09	U	
CHRYSENE	218-01-9	UG_KG	19.7			3.19	U		3.25	U		45.2			3.14	U		3.16	UJ	c
DIBENZ[A,H]ANTHRACENE	53-70-3	UG_KG	31			2.69	U		2.75	U		37			2.65	U		2.67	U	
FLUORANTHENE	206-44-0	UG_KG	21.1			2.11	U		2.15	U		46.9			2.07	U		2.09	U	
FLUORENE	86-73-7	UG_KG	2.16	U		2.11	U		2.15	U		2.13	U		2.07	U		2.09	U	
INDENO[1,2,3-CD]PYRENE	193-39-5	UG_KG	52.6			3.19	U		3.25	U		66.7			3.14	U		3.16	U	
NAPHTHALENE	91-20-3	UG_KG	3.27	U		3.19	U		3.25	U		3.23	U		3.14	U		3.16	U	
PHENANTHRENE	85-01-8	UG_KG	8.38			2.11	U		2.15	U		11			2.07	U		2.09	U	
PYRENE	129-00-0	UG_KG	18.8			2.11	U		2.15	U		42.5			2.07	U		2.09	U	

Table B-4 (Continued)
Polynuclear Aromatic Hydrocarbon Results After Data Review
NSA Mid-South — February 2013

		Sample Delivery Group	213030750			213030750			213030750			213030750			213030750			213030750		
		Lab ID	21303075003			21303075012			21303075015			21303075019			21303075024			21303075025		
		Sample ID	SRSSB2301			SRSSB1101			SRCSB1101			SRSSB0702			SRSSB1001			SRSSB1002		
		Sample Date	3/5/2013			3/5/2013			3/5/2013			3/5/2013			3/6/2013			3/6/2013		
		Matrix	Soil			Soil			Soil Dup			Soil			Soil			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
2-METHYLNAPHTHALENE	91-57-6	UG_KG	3.22	U		3.08	U		3.1	U		2.9	U		14.9	U		14.7	U	
ACENAPHTHENE	83-32-9	UG_KG	2.12	UJ	c	2.03	UJ	c	2.04	UJ	c	1.91	UJ	c	9.8	UJ	c	9.68	U	
ACENAPHTHYLENE	208-96-8	UG_KG	2.12	U		2.03	U		2.04	U		1.91	U		9.8	U		9.68	U	
ANTHRACENE	120-12-7	UG_KG	2.12	U		2.03	U		2.04	U		1.91	U		9.8	U		9.68	U	
BENZO[A]ANTHRACENE	56-55-3	UG_KG	2.12	UJ	c	2.03	UJ	c	2.04	UJ	c	21	J	c	341	J	c	72.1		
BENZO[A]PYRENE	50-32-8	UG_KG	2.12	U		2.03	U		2.04	U		35.8			597			85.8		
BENZO[B]FLUORANTHENE	205-99-2	UG_KG	2.12	UJ	c	2.03	UJ	c	2.04	UJ	c	44.9	J	c	800	J	c	171		
BENZO[G,H,I]PERYLENE	191-24-2	UG_KG	3.22	U		3.08	U		3.1	U		34.3			535			96.8		
BENZO[K]FLUORANTHENE	207-08-9	UG_KG	2.12	U		2.03	U		2.04	U		22.3			337			54.3		
CHRYSENE	218-01-9	UG_KG	3.22	UJ	c	3.08	UJ	c	3.1	UJ	c	26.9	J	c	480	J	c	106		
DIBENZ[A,H]ANTHRACENE	53-70-3	UG_KG	2.72	U		2.6	U		2.61	U		2.45	U		25.1	U		12.4	U	
FLUORANTHENE	206-44-0	UG_KG	2.12	U		2.03	U		2.04	U		15.3			392			71		
FLUORENE	86-73-7	UG_KG	2.12	U		2.03	U		2.04	U		1.91	U		9.8	U		9.68	U	
INDENO[1,2,3-CD]PYRENE	193-39-5	UG_KG	3.22	U		3.08	U		3.1	U		28.3			492			83.5		
NAPHTHALENE	91-20-3	UG_KG	3.22	U		3.08	U		3.1	U		2.9	U		14.9	U		14.7	U	
PHENANTHRENE	85-01-8	UG_KG	2.12	U		2.03	U		2.04	U		1.91	U		9.8	U		9.68	U	
PYRENE	129-00-0	UG_KG	2.12	U		2.03	U		2.04	U		19.6			355			67.8		

		Sample Delivery Group	213030750			213030750			213031417			213031417			213031417			213031417		
		Lab ID	21303075026			21303075028			21303141701			21303141702			21303141703			21303141704		
		Sample ID	SRSSB1201			SRSSB1202			PRSSB1101			PRSSB1102			PRSSB1201			PRSSB1202		
		Sample Date	3/6/2013			3/6/2013			3/11/2013			3/11/2013			3/11/2013			3/11/2013		
		Matrix	Soil			Soil			Soil			Soil			Soil			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
2-METHYLNAPHTHALENE	91-57-6	UG_KG	14.8	U		15.4	U		3.08	U		72.5			3.02	U		3.03	U	
ACENAPHTHENE	83-32-9	UG_KG	9.78	UJ	c	10.1	U		2.03	UJ	c	397	J	c	1.99	UJ	c	48.8	J	c
ACENAPHTHYLENE	208-96-8	UG_KG	9.78	U		10.1	U		23.4			11.7			11.1			2	U	
ANTHRACENE	120-12-7	UG_KG	9.78	U		10.1	U		70.8			877			38.3			134		
BENZO[A]ANTHRACENE	56-55-3	UG_KG	96.9	J	c	244			538	J	c	8930	J	c	520	J	c	1750	J	c
BENZO[A]PYRENE	50-32-8	UG_KG	148			424			822			11100			753			2520		
BENZO[B]FLUORANTHENE	205-99-2	UG_KG	209	J	c	541			1230	J	c	15900	J	c	1190	J	c	3640	J	c
BENZO[G,H,I]PERYLENE	191-24-2	UG_KG	157			371			780			9190			686			2240		
BENZO[K]FLUORANTHENE	207-08-9	UG_KG	94.9			220			375			5060			320			1230		
CHRYSENE	218-01-9	UG_KG	133	J	c	344			608	J	c	9370	J	c	558	J	c	1860	J	c
DIBENZ[A,H]ANTHRACENE	53-70-3	UG_KG	25	U		13	U		2.6	U		3700			2.55	U		2.56	U	
FLUORANTHENE	206-44-0	UG_KG	83.1			223			647			12800			454			1830		
FLUORENE	86-73-7	UG_KG	9.78	U		10.1	U		2.03	U		154			1.99	U		22.4		
INDENO[1,2,3-CD]PYRENE	193-39-5	UG_KG	130			346			685			9270			663			2190		
NAPHTHALENE	91-20-3	UG_KG	14.8	U		15.4	U		11.7			292			3.02	U		38.9		
PHENANTHRENE	85-01-8	UG_KG	9.78	U		10.1	U		200			4040			121			506		
PYRENE	129-00-0	UG_KG	80.7			232			591			10100			448			1600		

Table B-4 (Continued)
Polynuclear Aromatic Hydrocarbon Results After Data Review
NSA Mid-South — February 2013

		Sample Delivery Group	213031417			213031417			213031417			213031417			213031417			213031417		
		Lab ID	21303141705			21303141706			21303141707			21303141708			21303141709			21303141710		
		Sample ID	PRSSB1001			PRSSB1002			PRSSB0901			PRSSB0902			PRSSB0802			PRSSB0803		
		Sample Date	3/11/2013			3/11/2013			3/11/2013			3/11/2013			3/11/2013			3/11/2013		
		Matrix	Soil			Soil			Soil			Soil			Soil			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
2-METHYLNAPHTHALENE	91-57-6	UG_KG	3.12	U		249			20.1			143			3.09	U		3.08	U	
ACENAPHTHENE	83-32-9	UG_KG	2.06	UJ	c	2120			125	J	c	1110			2.04	U		2.03	U	
ACENAPHTHYLENE	208-96-8	UG_KG	56.8			19.8	U		37.7			19.6	U		26.5			2.03	U	
ANTHRACENE	120-12-7	UG_KG	77.7			3060			314			1520			50.2			2.03	U	
BENZO[A]ANTHRACENE	56-55-3	UG_KG	359	J	c	26700			2920	J	c	14400			200			14.4		
BENZO[A]PYRENE	50-32-8	UG_KG	465			55000			3540			32400			254			17.5		
BENZO[B]FLUORANTHENE	205-99-2	UG_KG	637	J	c	63200			4910	J	c	31700			546			49.3		
BENZO[G,H,I]PERYLENE	191-24-2	UG_KG	452			45000			3010			24500			152			13.7		
BENZO[K]FLUORANTHENE	207-08-9	UG_KG	289			22200			1860			14800			248			15.3		
CHRYSENE	218-01-9	UG_KG	350	J	c	36800			2900	J	c	19000			319			29.1		
DIBENZ[A,H]ANTHRACENE	53-70-3	UG_KG	2.63	U		8900			2.59	U		5000			2.6	U		2.6	U	
FLUORANTHENE	206-44-0	UG_KG	423			39500			4170			19400			212			12.9		
FLUORENE	86-73-7	UG_KG	2.06	U		678			53.1			238			2.04	U		2.03	U	
INDENO[1,2,3-CD]PYRENE	193-39-5	UG_KG	445			42900			2990			24500			159			12.7		
NAPHTHALENE	91-20-3	UG_KG	3.12	U		1060			56.9			481			3.09	U		3.08	U	
PHENANTHRENE	85-01-8	UG_KG	157			13500			1490			5820			11			2.03	U	
PYRENE	129-00-0	UG_KG	360			31700			3340			15800			274			18.2		

		Sample Delivery Group	213031417			213031417			213031417			213031417			213031417			213031417		
		Lab ID	21303141711			21303141712			21303141713			21303141714			21303141715			21303141718		
		Sample ID	PRSSB0804			PRSSB0805			PRSSB0806			PRSSB06002			PRSSB06003			PRSSB06004		
		Sample Date	3/11/2013			3/11/2013			3/11/2013			3/12/2013			3/12/2013			3/12/2013		
		Matrix	Soil			Soil			Soil			Soil			Soil			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
2-METHYLNAPHTHALENE	91-57-6	UG_KG	3.05	U		3.04	U		9.09			10.2			14			13.4		
ACENAPHTHENE	83-32-9	UG_KG	2.01	U		2.01	U		56.7			58.7			92.1	J	fd	103		
ACENAPHTHYLENE	208-96-8	UG_KG	23.2			2.01	U		1.97	U		1.97	U		2	U		6.09		
ANTHRACENE	120-12-7	UG_KG	36.7			10.3			159			147			196	J	fd	201		
BENZO[A]ANTHRACENE	56-55-3	UG_KG	197			51.4			787			792			1010	J	fd	1310		
BENZO[A]PYRENE	50-32-8	UG_KG	249			50.4			1220			1190			1280	J	fd	1940		
BENZO[B]FLUORANTHENE	205-99-2	UG_KG	542			98.7			1330			1320			1370	J	fd	2080		
BENZO[G,H,I]PERYLENE	191-24-2	UG_KG	159			41.5			1110			973			1100	J	fd,m	1880		
BENZO[K]FLUORANTHENE	207-08-9	UG_KG	238			35.9			598			641			594	J	fd	1020		
CHRYSENE	218-01-9	UG_KG	287			59.1			1110			1130			1290	J	fd	1770		
DIBENZ[A,H]ANTHRACENE	53-70-3	UG_KG	2.58	U		6.7			173			153			200	J	fd,m	310		
FLUORANTHENE	206-44-0	UG_KG	140			53.5			1320			1350			1670	J	fd	1920		
FLUORENE	86-73-7	UG_KG	2.01	U		2.01	U		18.1			18.5			35.1	J	fd	40.2		
INDENO[1,2,3-CD]PYRENE	193-39-5	UG_KG	168			37.5			938			837			1030	J	fd,m	1740		
NAPHTHALENE	91-20-3	UG_KG	3.05	U		3.04	U		37.3			41.8			49.8	J	fd	45		
PHENANTHRENE	85-01-8	UG_KG	2.01	U		22			590			549			855	J	fd	909		
PYRENE	129-00-0	UG_KG	212			66			1130			1110			1410	J	fd	1930		

Table B-4 (Continued)
Polynuclear Aromatic Hydrocarbon Results After Data Review
NSA Mid-South — February 2013

		Sample Delivery Group	213031417			213031417			213031417			213031417			213031417			213031417		
		Lab ID	21303141719			21303141720			21303141721			21303141722			21303141723			21303141724		
		Sample ID	PRSSB06005			PRSSB06006			PRSSB07002			PRSSB07003			PRSSB07004			PRSSB07005		
		Sample Date	3/12/2013			3/12/2013			3/12/2013			3/12/2013			3/12/2013			3/12/2013		
		Matrix	Soil			Soil			Soil			Soil			Soil			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
2-METHYLNAPHTHALENE	91-57-6	UG_KG	10.3			4.95			3.12	U		3.04	U		8.42			3.02	U	
ACENAPHTHENE	83-32-9	UG_KG	78			23.1			2.06	U		20.1	J	fd	73.9			10.5		
ACENAPHTHYLENE	208-96-8	UG_KG	2.01	U		1.98	U		2.06	U		2.01	U		2.01	U		1.99	U	
ANTHRACENE	120-12-7	UG_KG	210			58.2			4.8			29.3			222			16		
BENZO[A]ANTHRACENE	56-55-3	UG_KG	1010			340			47.7			331			1320			145		
BENZO[A]PYRENE	50-32-8	UG_KG	1280			486			71			644			2300			194		
BENZO[B]FLUORANTHENE	205-99-2	UG_KG	1350			585			83.4			743			2300			225		
BENZO[G,H,I]PERYLENE	191-24-2	UG_KG	772			444			53.7			677			2390			175		
BENZO[K]FLUORANTHENE	207-08-9	UG_KG	610			231			43.7			304			938			88.8		
CHRYSENE	218-01-9	UG_KG	1320			436			59.1			489			1960			206		
DIBENZ[A,H]ANTHRACENE	53-70-3	UG_KG	160			72.4			9.47			105			350			29.9		
FLUORANTHENE	206-44-0	UG_KG	1880			577			49.8			369			2020			172		
FLUORENE	86-73-7	UG_KG	34.6			1.98	U		2.06	U		2.01	U		24.3			1.99	U	
INDENO[1,2,3-CD]PYRENE	193-39-5	UG_KG	783			386			48.6			580			1710			142		
NAPHTHALENE	91-20-3	UG_KG	36.1			13.2			3.12	U		11.4			29.6			3.02	U	
PHENANTHRENE	85-01-8	UG_KG	928			223			12			104			942			57.3		
PYRENE	129-00-0	UG_KG	1410			456			43.6			376			1240			162		

		Sample Delivery Group	213031417			213031417			213031417			213031417			213031417			213031417		
		Lab ID	21303141725			21303141726			21303141728			21303141729			21303141730			21303141731		
		Sample ID	PRSSB07006			PRCSB06003			PRSSB05002			PRSSB05003			PRSSB05004			PRSSB05005		
		Sample Date	3/12/2013			3/12/2013			3/12/2013			3/12/2013			3/12/2013			3/12/2013		
		Matrix	Soil			Soil Dup			Soil			Soil			Soil			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
2-METHYLNAPHTHALENE	91-57-6	UG_KG	3.03	U		53.2			31			20.2			9.99			4.18		
ACENAPHTHENE	83-32-9	UG_KG	13			386	J	fd	266			102			60.2			30.2		
ACENAPHTHYLENE	208-96-8	UG_KG	2	U		1.99	U		14.7			10.9			5.87			9.55		
ANTHRACENE	120-12-7	UG_KG	21.5			1390	J	fd	655			167			174			81.8		
BENZO[A]ANTHRACENE	56-55-3	UG_KG	192			6140	J	fd	3150			1020			913			553		
BENZO[A]PYRENE	50-32-8	UG_KG	326			5520	J	fd	3400			1380			1310			874		
BENZO[B]FLUORANTHENE	205-99-2	UG_KG	388			6200	J	fd	4130			1570			1540			1020		
BENZO[G,H,I]PERYLENE	191-24-2	UG_KG	296			4050	J	fd	2790			1210			1120			813		
BENZO[K]FLUORANTHENE	207-08-9	UG_KG	151			2930	J	fd	1510			655			771			392		
CHRYSENE	218-01-9	UG_KG	292			6540	J	fd	3300			1300			1120			698		
DIBENZ[A,H]ANTHRACENE	53-70-3	UG_KG	48.1			821	J	fd	489			218			162			121		
FLUORANTHENE	206-44-0	UG_KG	261			11400	J	fd	6100			1670			1680			864		
FLUORENE	86-73-7	UG_KG	37.6			214	J	fd	119			40.6			18.9			4.54		
INDENO[1,2,3-CD]PYRENE	193-39-5	UG_KG	257			3990	J	fd	2560			1120			998			684		
NAPHTHALENE	91-20-3	UG_KG	7.85			196	J	fd	101			62.5			33.7			14.7		
PHENANTHRENE	85-01-8	UG_KG	78			6010	J	fd	2760			741			641			303		
PYRENE	129-00-0	UG_KG	251			7780	J	fd	3120			1310			881			744		

Table B-4 (Continued)
Polynuclear Aromatic Hydrocarbon Results After Data Review
NSA Mid-South — February 2013

		Sample Delivery Group	213031417			213031417			213031417			213031417			213031417			213031417		
		Lab ID	21303141732			21303141733			21303141734			21303141735			21303141736			21303141737		
		Sample ID	PRSSB06007			PRSSB06008			PRSSB06009			PRSSB06010			PRSSB06011			PRSSB06012		
		Sample Date	3/12/2013			3/12/2013			3/12/2013			3/12/2013			3/12/2013			3/12/2013		
		Matrix	Soil			Soil			Soil			Soil			Soil			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
2-METHYLNAPHTHALENE	91-57-6	UG_KG	3.13	U		3.11	U		3.1	U		3.06	U		3.13	U		3.08	U	
ACENAPHTHENE	83-32-9	UG_KG	15			17.8			11.2			17.5			14.3			18.4		
ACENAPHTHYLENE	208-96-8	UG_KG	2.07	U		2.05	U		2.04	U		2.02	U		2.06	U		2.04	U	
ANTHRACENE	120-12-7	UG_KG	44			57.3			25.1			34.1			41			58		
BENZO[A]ANTHRACENE	56-55-3	UG_KG	226			260			166			247			193			273		
BENZO[A]PYRENE	50-32-8	UG_KG	325			344			256			416			279			376		
BENZO[B]FLUORANTHENE	205-99-2	UG_KG	376			398			299			464			328			458		
BENZO[G,H,I]PERYLENE	191-24-2	UG_KG	296			294			227			383			238			310		
BENZO[K]FLUORANTHENE	207-08-9	UG_KG	160			178			131			207			149			180		
CHRYSENE	218-01-9	UG_KG	301			348			229			354			263			352		
DIBENZ[A,H]ANTHRACENE	53-70-3	UG_KG	47.1			47.5			35.7			59.1			37.8			50.3		
FLUORANTHENE	206-44-0	UG_KG	376			463			248			353			335			463		
FLUORENE	86-73-7	UG_KG	2.07	U		2.05	U		2.04	U		2.02	U		2.06	U		2.04	U	
INDENO[1,2,3-CD]PYRENE	193-39-5	UG_KG	251			252			192			321			205			265		
NAPHTHALENE	91-20-3	UG_KG	8.66			9.29			3.1	U		6.47			3.13	U		11.6		
PHENANTHRENE	85-01-8	UG_KG	159			210			93.4			121			151			221		
PYRENE	129-00-0	UG_KG	327			400			231			305			289			389		

		Sample Delivery Group	213031417			213031417			213031417			213031417			213031417			213031417		
		Lab ID	21303141738			21303141739			21303141740			21303141741			21303141742			21303141743		
		Sample ID	PRSSB06013			PRSSB06014			PRSSB03008			PRSSB03010			PRSSB03012			PRSSB03014		
		Sample Date	3/12/2013			3/12/2013			3/12/2013			3/12/2013			3/12/2013			3/12/2013		
		Matrix	Soil			Soil			Soil			Soil			Soil			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
2-METHYLNAPHTHALENE	91-57-6	UG_KG	3.07	U		3.78			3.1	U		8.26			4.89			3.12	U	
ACENAPHTHENE	83-32-9	UG_KG	19.2			29.4			22.4			54.2			18			13.5		
ACENAPHTHYLENE	208-96-8	UG_KG	7.84			2.07	U		2.05	U		2.04	U		8.03			6.83		
ANTHRACENE	120-12-7	UG_KG	47.1			87.2			69.2			191			36.5			31.6	J	fd
BENZO[A]ANTHRACENE	56-55-3	UG_KG	220			423			360			736			208			169		
BENZO[A]PYRENE	50-32-8	UG_KG	294			602			453			868			361			241		
BENZO[B]FLUORANTHENE	205-99-2	UG_KG	344			696			554			1010			395			277		
BENZO[G,H,I]PERYLENE	191-24-2	UG_KG	247			510			370			671			340			215	J	m
BENZO[K]FLUORANTHENE	207-08-9	UG_KG	152			290			207			409			185			122		
CHRYSENE	218-01-9	UG_KG	284			560			447			905			312			230	J	m
DIBENZ[A,H]ANTHRACENE	53-70-3	UG_KG	39			83.9			60.2			120			52.2			34		
FLUORANTHENE	206-44-0	UG_KG	391			710			637			1490			320			295	J	m
FLUORENE	86-73-7	UG_KG	2.03	U		4.28			2.05	U		20.4			2.05	U		2.06	U	
INDENO[1,2,3-CD]PYRENE	193-39-5	UG_KG	211			443			332			619			285			184	J	m
NAPHTHALENE	91-20-3	UG_KG	7.77			13.9			11.1			25.9			8.22			6.01		
PHENANTHRENE	85-01-8	UG_KG	168			342			271			742			128			114	J	fd
PYRENE	129-00-0	UG_KG	333			613			525			1110			268			241		

Table B-4 (Continued)
Polynuclear Aromatic Hydrocarbon Results After Data Review
NSA Mid-South — February 2013

		Sample Delivery Group	213031417			213031417			213031417			213031417			213031417			213031417		
		Lab ID	21303141746			21303141747			21303141748			21303141749			21303141750			21303141751		
		Sample ID	PRCSB03014			PRSSB03016			PRSSB04002			PRSSB04003			PRSSB04004			PRSSB04005		
		Sample Date	3/12/2013			3/12/2013			3/12/2013			3/12/2013			3/12/2013			3/12/2013		
		Matrix	Soil Dup			Soil			Soil			Soil			Soil			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
2-METHYLNAPHTHALENE	91-57-6	UG_KG	3.1	U		4.54			25.6			16.4			19			7.05		
ACENAPHTHENE	83-32-9	UG_KG	18.9			25			159			101			121			50.8		
ACENAPHTHYLENE	208-96-8	UG_KG	7.58			5.59			12.5			12.3			7.5			1.99	U	
ANTHRACENE	120-12-7	UG_KG	54.2	J	fd	43.8			315			352			428			108		
BENZO[A]ANTHRACENE	56-55-3	UG_KG	255			518			2240			1260			1610			922		
BENZO[A]PYRENE	50-32-8	UG_KG	341			870			4110			1410			1890			1570		
BENZO[B]FLUORANTHENE	205-99-2	UG_KG	388			985			4040			1470			2120			1640		
BENZO[G,H,I]PERYLENE	191-24-2	UG_KG	306			742			2970			1060			1590			1460		
BENZO[K]FLUORANTHENE	207-08-9	UG_KG	170			397			1930			760			855			735		
CHRYSENE	218-01-9	UG_KG	337			702			3080			1500			1890			1220		
DIBENZ[A,H]ANTHRACENE	53-70-3	UG_KG	49.6			138			562			204			297			264		
FLUORANTHENE	206-44-0	UG_KG	478			595			3350			2860			2990			1140		
FLUORENE	86-73-7	UG_KG	2.04	U		2.07	U		37.9			65.7			78.5			12.2		
INDENO[1,2,3-CD]PYRENE	193-39-5	UG_KG	266			680			2840			1020			1500			1330		
NAPHTHALENE	91-20-3	UG_KG	5			14.6			117			46.7			48.3			25		
PHENANTHRENE	85-01-8	UG_KG	199	J	fd	158			1160			1510			1820			479		
PYRENE	129-00-0	UG_KG	379			514			2490			1940			2670			1070		

		Sample Delivery Group	213031417			213031417			213031417			213031417			213031417			213031417		
		Lab ID	21303141752			21303141754			21303141755			21303141756			21303141757			21303141758		
		Sample ID	PRSSB04006			PRSSB08008			PRSSB08010			PRSSB08012			PRSSB08014			PRSSB07008		
		Sample Date	3/12/2013			3/13/2013			3/13/2013			3/13/2013			3/13/2013			3/13/2013		
		Matrix	Soil			Soil			Soil			Soil			Soil			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
2-METHYLNAPHTHALENE	91-57-6	UG_KG	9.53			3.03	U		3.05	U		2.81	U		3.08	U		63.1		
ACENAPHTHENE	83-32-9	UG_KG	57.5			17.8			2.01	U		1.85	U		27.6			545		
ACENAPHTHYLENE	208-96-8	UG_KG	1.93	U		2	U		9.59			8.87			14.1			26.6		
ANTHRACENE	120-12-7	UG_KG	166			26.7			13.8			14.1			50.4			1000		
BENZO[A]ANTHRACENE	56-55-3	UG_KG	935			348			63.5			46.8			370			7080		
BENZO[A]PYRENE	50-32-8	UG_KG	1370			621			118			55.7			702			14500		
BENZO[B]FLUORANTHENE	205-99-2	UG_KG	1440			753			160			111			830			16200		
BENZO[G,H,I]PERYLENE	191-24-2	UG_KG	1150			617			123			53.1			685			12100		
BENZO[K]FLUORANTHENE	207-08-9	UG_KG	649			252			75			42.7			321			7450		
CHRYSENE	218-01-9	UG_KG	1210			458			106			71.4			533			9550		
DIBENZ[A,H]ANTHRACENE	53-70-3	UG_KG	211			107			20.7			10.8			114			1920		
FLUORANTHENE	206-44-0	UG_KG	1410			312			62.6			34.5			407			11000		
FLUORENE	86-73-7	UG_KG	19.2			2	U		2.01	U		1.85	U		2.03	U		196		
INDENO[1,2,3-CD]PYRENE	193-39-5	UG_KG	1090			551			118			53.6			611			10500		
NAPHTHALENE	91-20-3	UG_KG	30.8			4.2			3.05	U		2.81	U		13.8			257		
PHENANTHRENE	85-01-8	UG_KG	643			80.4			12.2			4.59			123			4250		
PYRENE	129-00-0	UG_KG	1210			322			70.4			46.6			411			8090		

Table B-4 (Continued)
Polynuclear Aromatic Hydrocarbon Results After Data Review
NSA Mid-South — February 2013

		Sample Delivery Group	213031417			213031417			213031417			213031417			213031417			213031417		
		Lab ID	21303141759			21303141760			21303141761			21303141762			21303141763			21303141764		
		Sample ID	PRSSB07010			PRSSB07012			PRSSB07014			PRSSB05008			PRSSB05010			PRSSB05012		
		Sample Date	3/13/2013			3/13/2013			3/13/2013			3/13/2013			3/13/2013			3/13/2013		
		Matrix	Soil			Soil			Soil			Soil			Soil			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
2-METHYLNAPHTHALENE	91-57-6	UG_KG	3.03	U		21.3			76.5			41.5			2.99	U		3.05	U	
ACENAPHTHENE	83-32-9	UG_KG	18.7			134			474			270			1.97	U		11		
ACENAPHTHYLENE	208-96-8	UG_KG	2	U		20.9			19	U		39.3			13.9			25		
ANTHRACENE	120-12-7	UG_KG	20.8			378			1840			427			15.6			48.7		
BENZO[A]ANTHRACENE	56-55-3	UG_KG	287			2100			6320			4780			87.3			119		
BENZO[A]PYRENE	50-32-8	UG_KG	619			4020			9060			11600			150			74.7		
BENZO[B]FLUORANTHENE	205-99-2	UG_KG	662			4750			10900			13500			170			109		
BENZO[G,H,I]PERYLENE	191-24-2	UG_KG	613			3520			7040			10500			156			52.3		
BENZO[K]FLUORANTHENE	207-08-9	UG_KG	257			1980			4580			5510			75.9			56.1		
CHRYSENE	218-01-9	UG_KG	426			2730			7640			6980			130			137		
DIBENZ[A,H]ANTHRACENE	53-70-3	UG_KG	95.8			547			1200			1680			23.2			5.14	U	
FLUORANTHENE	206-44-0	UG_KG	277			3800			13400			5650			133			319		
FLUORENE	86-73-7	UG_KG	2	U		13.5	J		205			18.3	U		1.97	U		2.01	U	
INDENO[1,2,3-CD]PYRENE	193-39-5	UG_KG	541			2920			6140			8910			131			44.5		
NAPHTHALENE	91-20-3	UG_KG	11.9			70.9			192			139			2.99	U		3.05	U	
PHENANTHRENE	85-01-8	UG_KG	68.7			1430			6650			1570			41.6			181		
PYRENE	129-00-0	UG_KG	282			2640			9320			4800			109			229		

		Sample Delivery Group	213031417			213031417			213031417			213031417			213031417			213031417		
		Lab ID	21303141765			21303141766			21303141767			21303141770			21303141771			21303141772		
		Sample ID	PRSSB05014			PRSSB04008			PRSSB04010			PRCSB04010			PRSSB04012			PRSSB04014		
		Sample Date	3/13/2013			3/13/2013			3/13/2013			3/13/2013			3/13/2013			3/13/2013		
		Matrix	Soil			Soil			Soil			Soil Dup			Soil			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
2-METHYLNAPHTHALENE	91-57-6	UG_KG	15.2	U		35.7			3	U		3.04	U		3.04	U		3.01	U	
ACENAPHTHENE	83-32-9	UG_KG	2.01	U		114			1.98	U		2.01	U		2.01	U		1.99	U	
ACENAPHTHYLENE	208-96-8	UG_KG	21.8			11.4			10.8			6.82			2.01	U		10.6		
ANTHRACENE	120-12-7	UG_KG	10.7			346			7.58			4.7			8.89			9.01		
BENZO[A]ANTHRACENE	56-55-3	UG_KG	49.1			1240			24.9			15			58.9			60.8		
BENZO[A]PYRENE	50-32-8	UG_KG	48.8			1190			26.4			17.9			98.1			69.8		
BENZO[B]FLUORANTHENE	205-99-2	UG_KG	60.1			1280			39.7			32.9			107			91.3		
BENZO[G,H,I]PERYLENE	191-24-2	UG_KG	39.6			721			25.8			16			89.6			55.8		
BENZO[K]FLUORANTHENE	207-08-9	UG_KG	29.8			597			16			10.4			61.8			33.1		
CHRYSENE	218-01-9	UG_KG	45.1			1380			25.7			21.9			89.7			62.2		
DIBENZ[A,H]ANTHRACENE	53-70-3	UG_KG	6.32			150			4			2.68	J		2.57	U		2.54	U	
FLUORANTHENE	206-44-0	UG_KG	85.9			2950			33.8			24			111			111		
FLUORENE	86-73-7	UG_KG	2.01	U		56.5			1.98	U		2.01	U		2.01	U		1.99	U	
INDENO[1,2,3-CD]PYRENE	193-39-5	UG_KG	37.5			755			21.4			14.9			75.2			52.5		
NAPHTHALENE	91-20-3	UG_KG	15.2	U		88			3	U		3.04	U		3.04	U		3.01	U	
PHENANTHRENE	85-01-8	UG_KG	16			1570			10.7			7.82			38.5			36.7		
PYRENE	129-00-0	UG_KG	63.4			2160			30.6			20.2			97			93		

Table B-4 (Continued)
Polynuclear Aromatic Hydrocarbon Results After Data Review
NSA Mid-South — February 2013

		Sample Delivery Group	213031417			213031417			213031417			213031417			213031417			213031417		
		Lab ID	21303141774			21303141775			21303141776			21303141777			21303141778			21303141779		
		Sample ID	PRSSB02008			PRSSB02010			PRSSB02012			PRSSB02014			PRSSB01008			PRSSB01010		
		Sample Date	3/13/2013			3/13/2013			3/13/2013			3/13/2013			3/13/2013			3/13/2013		
		Matrix	Soil			Soil			Soil			Soil			Soil			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
2-METHYLNAPHTHALENE	91-57-6	UG_KG	2.97	U		2.99	U		3.07	U		3.04	U		2.83	U		42		
ACENAPHTHENE	83-32-9	UG_KG	1.96	U		1.97	U		2.03	U		2	U		1.87	U		376		
ACENAPHTHYLENE	208-96-8	UG_KG	13.8			1.97	U		2.03	U		2	U		14.4			18.9		
ANTHRACENE	120-12-7	UG_KG	14.3			4.52			2.03	U		4.37			36.4			868		
BENZO[A]ANTHRACENE	56-55-3	UG_KG	80.9			34.2			12.3			27.2			228			5560		
BENZO[A]PYRENE	50-32-8	UG_KG	114			49.7			11.8			34.1			390			10400		
BENZO[B]FLUORANTHENE	205-99-2	UG_KG	122			57.7			27.9			51.9			478			12100		
BENZO[G,H,I]PERYLENE	191-24-2	UG_KG	81			37.6			9.22			24.4			205			6140		
BENZO[K]FLUORANTHENE	207-08-9	UG_KG	68			32			6.95			17.4			245			4370		
CHRYSENE	218-01-9	UG_KG	113			39.1			15.2			34.4			365			7330		
DIBENZ[A,H]ANTHRACENE	53-70-3	UG_KG	2.51	U		2.52	U		2.59	U		2.56	U		2.39	U		1190		
FLUORANTHENE	206-44-0	UG_KG	175			44.4			20.4			51.5			339			10200		
FLUORENE	86-73-7	UG_KG	1.96	U		1.97	U		2.03	U		2	U		1.87	U		142		
INDENO[1,2,3-CD]PYRENE	193-39-5	UG_KG	72.5			31.4			7.85			22.5			215			6050		
NAPHTHALENE	91-20-3	UG_KG	2.97	U		2.99	U		3.07	U		3.04	U		2.83	U		158		
PHENANTHRENE	85-01-8	UG_KG	54.6			14.2			8.1			19.8			70.4			3880		
PYRENE	129-00-0	UG_KG	138			39			16.6			44.2			329			6150		

		Sample Delivery Group	213031417			213031417			213031808			213031808			213031808			213031808		
		Lab ID	21303141780			21303141781			21303180801			21303180802			21303180803			21303180804		
		Sample ID	PRSSB01012			PRSSB01014			PRSSB03002			PRSSB03003			PRSSB03004			PRSSB03005		
		Sample Date	3/13/2013			3/13/2013			3/14/2013			3/14/2013			3/14/2013			3/14/2013		
		Matrix	Soil			Soil			Soil			Soil			Soil			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
2-METHYLNAPHTHALENE	91-57-6	UG_KG	13.9	U		517			105			7.65			3.02	U		3.07	U	
ACENAPHTHENE	83-32-9	UG_KG	180			3870			863			54.4			56.7			18.9		
ACENAPHTHYLENE	208-96-8	UG_KG	9.17	U		100	U		9.73	U		1.98	U		1.99	U		5.61		
ANTHRACENE	120-12-7	UG_KG	283			8800			845			118			103			50.9		
BENZO[A]ANTHRACENE	56-55-3	UG_KG	2720			62200			3420			994			853			302		
BENZO[A]PYRENE	50-32-8	UG_KG	4740			84000			4060			1380			1390			690		
BENZO[B]FLUORANTHENE	205-99-2	UG_KG	5730			99700			4330			1470			1580			722		
BENZO[G,H,I]PERYLENE	191-24-2	UG_KG	3310			34900			1470			486			472			800		
BENZO[K]FLUORANTHENE	207-08-9	UG_KG	2190			37400			2660			939			869			339		
CHRYSENE	218-01-9	UG_KG	3960			66800			3350			1060			1180			436		
DIBENZ[A,H]ANTHRACENE	53-70-3	UG_KG	23.4	U		128	U		12.4	U		2.54	U		2.55	U		120		
FLUORANTHENE	206-44-0	UG_KG	3740			89700			6320			1440			1280			434		
FLUORENE	86-73-7	UG_KG	10.5	J		1060			430			13.9			15.2			2.03	U	
INDENO[1,2,3-CD]PYRENE	193-39-5	UG_KG	2800			36600			1570			547			510			664		
NAPHTHALENE	91-20-3	UG_KG	120			1870			472			29.3			33.5			8.12		
PHENANTHRENE	85-01-8	UG_KG	1050			33600			3740			533			481			184		
PYRENE	129-00-0	UG_KG	3080			68700			4470			1040			980			428		

Table B-4 (Continued)
Polynuclear Aromatic Hydrocarbon Results After Data Review
NSA Mid-South — February 2013

		Sample Delivery Group	213031808			213031808			213031808			213031808			213031808			213031808		
		Lab ID	21303180805			21303180806			21303180807			21303180808			21303180809			21303180810		
		Sample ID	PRSSB03006			PRSSB02002			PRSSB02003			PRSSB02004			PRSSB02005			PRSSB02006		
		Sample Date	3/14/2013			3/14/2013			3/14/2013			3/14/2013			3/14/2013			3/14/2013		
		Matrix	Soil			Soil			Soil			Soil			Soil			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
2-METHYLNAPHTHALENE	91-57-6	UG_KG	3.07	U		2.9	U		3.01	U		3.01	U		3.04	U		10.6		
ACENAPHTHENE	83-32-9	UG_KG	2.03	U		46.2			21.5			39.3			26.2			59.3	J	fd
ACENAPHTHYLENE	208-96-8	UG_KG	2.03	U		1.92	U		1.99	U		1.98	U		12.3			15.7		
ANTHRACENE	120-12-7	UG_KG	24.2			99.8			44.7			76.3			46.5			86.6		
BENZO[A]ANTHRACENE	56-55-3	UG_KG	201			758			347			795			414			947	J	fd
BENZO[A]PYRENE	50-32-8	UG_KG	287			1010			619			1200			794			2300	J	fd,m,l
BENZO[B]FLUORANTHENE	205-99-2	UG_KG	338			1140			745			1420			976			2660	J	fd
BENZO[G,H,I]PERYLENE	191-24-2	UG_KG	103			347			229			397			265			2280	J	fd,m
BENZO[K]FLUORANTHENE	207-08-9	UG_KG	175			680			359			860			481			1080	J	fd
CHRYSENE	218-01-9	UG_KG	219			778			500			874			615			1260	J	fd
DIBENZ[A,H]ANTHRACENE	53-70-3	UG_KG	2.59	U		2.45	U		2.54	U		2.54	U		2.56	U		334	J	fd,m
FLUORANTHENE	206-44-0	UG_KG	287			1160			536			995			581			1250	J	fd
FLUORENE	86-73-7	UG_KG	2.03	U		11.7			1.99	U		3.86			1.79	J		13.1		
INDENO[1,2,3-CD]PYRENE	193-39-5	UG_KG	105			390			243			441			290			1880	J	fd,m
NAPHTHALENE	91-20-3	UG_KG	6.91			21.2			18.3			16.9			15.1			34.3	J	fd
PHENANTHRENE	85-01-8	UG_KG	92.6			460			177			309			184			381		
PYRENE	129-00-0	UG_KG	203			792			398			674			396			1150	J	fd

		Sample Delivery Group	213031808			213031808			213031808			213031808			213031808			213031808		
		Lab ID	21303180813			21303180815			21303180816			21303180817			21303180818			21303180819		
		Sample ID	PRCSB02006			PRSSB01002			PRSSB01003			PRSSB01004			PRSSB01005			PRSSB01006		
		Sample Date	3/14/2013			3/14/2013			3/14/2013			3/14/2013			3/14/2013			3/14/2013		
		Matrix	Soil Dup			Soil			Soil			Soil			Soil			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
2-METHYLNAPHTHALENE	91-57-6	UG_KG	8.57			13.9			152			27.7			248			22.4		
ACENAPHTHENE	83-32-9	UG_KG	27.4	J	fd	140			2610			137			2990			167		
ACENAPHTHYLENE	208-96-8	UG_KG	18			1.99	U		20.2	U		3.99	U		19.1	U		3.67	U	
ANTHRACENE	120-12-7	UG_KG	68			110			4620			265			4110			297		
BENZO[A]ANTHRACENE	56-55-3	UG_KG	430	J	fd	1760			23400			2380			25600			2590		
BENZO[A]PYRENE	50-32-8	UG_KG	1020	J	fd,l	4260	J	l	35000	J	l	3850	J	l	43000	J	l	4740	J	l
BENZO[B]FLUORANTHENE	205-99-2	UG_KG	1090	J	fd	3970			31700			4520			45400			4880		
BENZO[G,H,I]PERYLENE	191-24-2	UG_KG	1060	J	fd	3710			29700			2890			31400			4550		
BENZO[K]FLUORANTHENE	207-08-9	UG_KG	488	J	fd	2050			20600			1930			17200			2520		
CHRYSENE	218-01-9	UG_KG	595	J	fd	2540			22400			3050			26000			3350		
DIBENZ[A,H]ANTHRACENE	53-70-3	UG_KG	163	J	fd	732			5720			511			6110			695		
FLUORANTHENE	206-44-0	UG_KG	667	J	fd	1980			38400			3190			39000			3310		
FLUORENE	86-73-7	UG_KG	2.48	J		19.9			841			41.3			1220			47.9		
INDENO[1,2,3-CD]PYRENE	193-39-5	UG_KG	908	J	fd	3480			30000			2550			30700			4170		
NAPHTHALENE	91-20-3	UG_KG	18.9	J	fd	42.6			353			116			910			105		
PHENANTHRENE	85-01-8	UG_KG	247			494			19100			1200			17000			1190		
PYRENE	129-00-0	UG_KG	608	J	fd	1840			29000			2900			28600			2850		

Table B-4 (Continued)
Polynuclear Aromatic Hydrocarbon Results After Data Review
NSA Mid-South — February 2013

		Sample Delivery Group	213031808			213031808			213031808			213031808			213031808			213031808		
		Lab ID	21303180820			21303180821			21303180822			21303180823			21303180824			21303180825		
		Sample ID	PRSSB13001			PRSSB13002			PRSSB14001			PRSSB14002			PRSSB15001			PRSSB15002		
		Sample Date	3/14/2013			3/14/2013			3/14/2013			3/14/2013			3/14/2013			3/14/2013		
		Matrix	Soil			Soil			Soil			Soil			Soil			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
2-METHYLNAPHTHALENE	91-57-6	UG_KG	12			3.07	U		6.55			3.06	U		3.05	U		3.1	U	
ACENAPHTHENE	83-32-9	UG_KG	75			10.6			150			2.02	U		23.9			2.05	U	
ACENAPHTHYLENE	208-96-8	UG_KG	4.75			2.03	U		2	U		2.02	U		2.01	U		2.05	U	
ANTHRACENE	120-12-7	UG_KG	103			20.6			47.5			7.67			73.5			4.75		
BENZO[A]ANTHRACENE	56-55-3	UG_KG	1680			112			597			34.6			384			17.9		
BENZO[A]PYRENE	50-32-8	UG_KG	3880	J	I	240	J	I	1780	J	I	80.6			727	J	I	24.5		
BENZO[B]FLUORANTHENE	205-99-2	UG_KG	3730			260			1630			91.9			808			40.8		
BENZO[G,H,I]PERYLENE	191-24-2	UG_KG	2600			227			1670			71.8			608			21.1		
BENZO[K]FLUORANTHENE	207-08-9	UG_KG	1790			110			655			37.9			301			16.1		
CHRYSENE	218-01-9	UG_KG	2180			157			781			51			477			29.5		
DIBENZ[A,H]ANTHRACENE	53-70-3	UG_KG	538			41.4			305			10.9			115			3.57	J	
FLUORANTHENE	206-44-0	UG_KG	1880			185			684			28.3			659			28		
FLUORENE	86-73-7	UG_KG	11.8			2.03	U		2	U		2.02	U		2.01	U		2.05	U	
INDENO[1,2,3-CD]PYRENE	193-39-5	UG_KG	2630			214			1680			64.1			583			18		
NAPHTHALENE	91-20-3	UG_KG	36.4			2.52	J		12.3			3.06	U		12.7			3.1	U	
PHENANTHRENE	85-01-8	UG_KG	447			74.8			196			8.65			291			14.5		
PYRENE	129-00-0	UG_KG	1610			150			611			33.3			512			26.4		

		Sample Delivery Group	213031808			213031808			213031808			213031808			213031808			213031808		
		Lab ID	21303180826			21303180828			21303180829			21303180830			21303180831			21303180832		
		Sample ID	PRSSB16001			PRSSB17001			PRSSB17002			PRSSB18001			PRSSB18002			PRSSB19001		
		Sample Date	3/14/2013			3/14/2013			3/14/2013			3/14/2013			3/14/2013			3/15/2013		
		Matrix	Soil			Soil			Soil			Soil			Soil			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
2-METHYLNAPHTHALENE	91-57-6	UG_KG	3.21	U		4.42			8.95			7.71			3.11	U		3.17	U	
ACENAPHTHENE	83-32-9	UG_KG	2.12	U		32.6			28.9			35			2.06	U		2.09	U	
ACENAPHTHYLENE	208-96-8	UG_KG	2.12	U		5.95			34.6			2.01	U		2.06	U		2.09	U	
ANTHRACENE	120-12-7	UG_KG	3.9			111			94.2			164			1.47	J		4.57		
BENZO[A]ANTHRACENE	56-55-3	UG_KG	11.6			566			395			590			8.05			57.5		
BENZO[A]PYRENE	50-32-8	UG_KG	16.3	J	I	1070	J	I	521			763	J	I	11.3	J	I	147	J	I
BENZO[B]FLUORANTHENE	205-99-2	UG_KG	31.9			1150			656			738			27.2			158		
BENZO[G,H,I]PERYLENE	191-24-2	UG_KG	18			854			401			477			11.5			138		
BENZO[K]FLUORANTHENE	207-08-9	UG_KG	9.67			440			256			483			5.67			64		
CHRYSENE	218-01-9	UG_KG	13.7			712			486			619			13.4			85.4		
DIBENZ[A,H]ANTHRACENE	53-70-3	UG_KG	2.68	J		157			57.3			99.1			1.97	J		22.3		
FLUORANTHENE	206-44-0	UG_KG	12.5			1060			1000			1430			9.21			60		
FLUORENE	86-73-7	UG_KG	2.12	U		5.9			16.2			12.9			2.06	U		2.09	U	
INDENO[1,2,3-CD]PYRENE	193-39-5	UG_KG	14.6			828			339			510			10.8			124		
NAPHTHALENE	91-20-3	UG_KG	3.21	U		17.8			16			20.7			3.11	U		3.17	U	
PHENANTHRENE	85-01-8	UG_KG	5.68			432			613			659			4.37			14.9		
PYRENE	129-00-0	UG_KG	10.8			792			760			1050			6.91			56.1		

Table B-4 (Continued)
Polynuclear Aromatic Hydrocarbon Results After Data Review
NSA Mid-South — February 2013

		Sample Delivery Group	213031808		
		Lab ID	21303180833		
		Sample ID	PRSSB19002		
		Sample Date	3/15/2013		
		Matrix	Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC
2-METHYLNAPHTHALENE	91-57-6	UG_KG	3.15	U	
ACENAPHTHENE	83-32-9	UG_KG	2.08	U	
ACENAPHTHYLENE	208-96-8	UG_KG	2.08	U	
ANTHRACENE	120-12-7	UG_KG	2.08	U	
BENZO[A]ANTHRACENE	56-55-3	UG_KG	2.08	U	
BENZO[A]PYRENE	50-32-8	UG_KG	2.08	U	
BENZO[B]FLUORANTHENE	205-99-2	UG_KG	2.08	U	
BENZO[G,H,I]PERYLENE	191-24-2	UG_KG	3.15	U	
BENZO[K]FLUORANTHENE	207-08-9	UG_KG	2.08	U	
CHRYSENE	218-01-9	UG_KG	3.15	U	
DIBENZ[A,H]ANTHRACENE	53-70-3	UG_KG	2.66	U	
FLUORANTHENE	206-44-0	UG_KG	2.08	U	
FLUORENE	86-73-7	UG_KG	2.08	U	
INDENO[1,2,3-CD]PYRENE	193-39-5	UG_KG	3.15	U	
NAPHTHALENE	91-20-3	UG_KG	3.15	U	
PHENANTHRENE	85-01-8	UG_KG	2.08	U	
PYRENE	129-00-0	UG_KG	2.08	U	

Notes:

UG_KG = Micrograms per kilogram
Qual = Final qualifier (Refer to Table B-1)
RC = Reason code (Refer to Table B-2

Table B-5
Synthetic Precipitation Leaching Procedure Lead Results After Data Review
NSA Mid-South — February 2013

		Sample Delivery Group	213030421			213030421			213030421			213030421			213030421			213030421			213030421		
		Lab ID	21303042103			21303042105			21303042106			21303042107			21303042110			21303042121			21303042135		
		Sample ID	SRSSB3901			SRSSB3601			SRSSB3602			SRSSB3801			SRSSB3502			SRSSB4401			SRSSB6101		
		Sample Date	2/28/2013			2/28/2013			2/28/2013			2/28/2013			2/28/2013			2/28/2013			3/1/2013		
		Matrix	Soil			Soil			Soil			Soil			Soil			Soil			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
SPLP LEAD	7439-92-1	MG_L	0.0038	U		3			0.043			0.0039	J		0.1			6.05			0.13		

		Sample Delivery Group	213030421			213030750			213030750			213031417			213031417			213031417			213031417		
		Lab ID	21303042152			21303075003			21303075015			21303141709			21303141721			21303141731			21303141734		
		Sample ID	SRSSB3301			SRSSB2301			SRSSB1101			PRSSB0802			PRSSB07002			PRSSB05005			PRSSB06009		
		Sample Date	3/1/2013			3/5/2013			3/5/2013			3/11/2013			3/12/2013			3/12/2013			3/12/2013		
		Matrix	Soil			Soil			Soil			Soil			Soil			Soil			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
SPLP LEAD	7439-92-1	MG_L	2.24			0.78			0.23			0.042			0.014	J		0.091			0.055		

		Sample Delivery Group	213031417			213031417			213031417			213031417			213031417			213031417		
		Lab ID	21303141738			21303141739			21303141754			21303141762			21303141779			21303141781		
		Sample ID	PRSSB06013			PRSSB06014			PRSSB08008			PRSSB05008			PRSSB01010			PRSSB01014		
		Sample Date	3/12/2013			3/12/2013			3/13/2013			3/13/2013			3/13/2013			3/13/2013		
		Matrix	Soil			Soil			Soil			Soil			Soil			Soil		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
SPLP LEAD	7439-92-1	MG_L	0.031			0.13			0.034			0.39			0.035			0.76		

Notes:

SPLP = Synthetic Precipitation Leaching Procedure
MG_L = Milligrams per liter
Qual = Final qualifier (Refer to Table B-1)
RC = Reason code (Refer to Table B-2

Table B-6
Synthetic Precipitation Leaching Procedure Polynuclear Aromatic Hydrocarbon Results After Data Review
NSA Mid-South — February 2013

		Sample Delivery Group	213030421			213030421			213030421			213030421			213030421			213030421		
		Lab ID	21303042103			21303042107			21303042109			21303042113			21303042119			21303042121		
		Sample ID	SRSSB3901			SRSSB3801			SRSSB3501			SRSSB3101			SRSSB2801			SRSSB4401		
		Sample Date	2/28/2013			2/28/2013			2/28/2013			2/28/2013			2/28/2013			2/28/2013		
		Matrix	Soil			Soil			Soil			Soil			Soil			Soil		
Analyte (SPLP PAHs)	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
2-METHYLNAPHTHALENE	91-57-6	UG_L	0.1	UJ	h	0.148	J	h	0.063	J	h	0.175	J	h	0.426	J	h	0.1	UJ	h
ACENAPHTHENE	83-32-9	UG_L	0.05	UJ	h	0.313	J	h	0.794	J	h	0.398	J	h	0.158	J	h	0.05	UJ	h
ACENAPHTHYLENE	208-96-8	UG_L	0.1	UJ	h	0.1	UJ	h	0.1	UJ	h	0.1	UJ	h	0.1	UJ	h	0.1	UJ	h
ANTHRACENE	120-12-7	UG_L	0.05	UJ	h	0.33	J	h	0.243	J	h	0.193	J	h	0.05	UJ	h	0.05	UJ	h
BENZO[A]ANTHRACENE	56-55-3	UG_L	0.1	UJ	h	0.174	J	h	0.394	J	h	0.114	J	h	0.196	J	h	0.1	UJ	h
BENZO[A]PYRENE	50-32-8	UG_L	0.05	UJ	h	0.05	UJ	h	0.4	J	h	0.05	UJ	h	0.21	J	h	0.05	UJ	h
BENZO[B]FLUORANTHENE	205-99-2	UG_L	0.05	UJ	h	0.05	UJ	h	0.05	UJ	h	0.05	UJ	h	0.05	UJ	h	0.05	UJ	h
BENZO[G,H,I]PERYLENE	191-24-2	UG_L	0.05	UJ	h	0.05	UJ	h	0.357	J	h	0.05	UJ	h	0.171	J	h	0.05	UJ	h
BENZO[K]FLUORANTHENE	207-08-9	UG_L	0.05	UJ	h	0.05	UJ	h	0.291	J	h	0.05	UJ	h	0.134	J	h	0.05	UJ	h
CHRYSENE	218-01-9	UG_L	0.05	UJ	h	0.383	J	h	0.74	J	h	0.337	J	h	0.417	J	h	0.05	UJ	h
DIBENZ[A,H]ANTHRACENE	53-70-3	UG_L	0.05	UJ	h	0.05	UJ	h	0.073	J	h	0.05	UJ	h	0.05	UJ	h	0.05	UJ	h
FLUORANTHENE	206-44-0	UG_L	0.05	UJ	h	0.849	J	h	1.04	J	h	0.604	J	h	0.166	J	h	0.05	UJ	h
FLUORENE	86-73-7	UG_L	0.1	UJ	h	0.146	J	h	0.249	J	h	0.16	J	h	0.101	J	h	0.1	UJ	h
INDENO[1,2,3-CD]PYRENE	193-39-5	UG_L	0.05	UJ	h	0.05	UJ	h	0.277	J	h	0.05	UJ	h	0.11	J	h	0.05	UJ	h
NAPHTHALENE	91-20-3	UG_L	0.05	UJ	h	0.399	J	h	0.134	J	h	0.839	J	h	0.766	J	h	0.05	UJ	h
PHENANTHRENE	85-01-8	UG_L	0.05	UJ	h	1.92	J	h	0.269	J	h	1.32	J	h	0.157	J	h	0.05	UJ	h
PYRENE	129-00-0	UG_L	0.05	UJ	h	0.56	J	h	0.947	J	h	0.462	J	h	0.196	J	h	0.05	UJ	h

Table B-6 (Continued)
Synthetic Precipitation Leaching Procedure Polynuclear Aromatic Hydrocarbon Results After Data Review
NSA Mid-South — February 2013

		Sample Delivery Group	213030421			213030421			213030421			213031417			213031417			213031417		
		Lab ID	21303042142			21303042143			21303042148			21303141702			21303141707			21303141715		
		Sample ID	SRM01201			SRM01400			SRM01100			PRSSB1102			PRSSB0901			PRSSB06003		
		Sample Date	2/28/2013			2/28/2013			2/28/2013			3/11/2013			3/11/2013			3/12/2013		
		Matrix	Sediment			Sediment			Sediment			Soil			Soil			Soil		
Analyte (SPLP PAHs)	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
2-METHYLNAPHTHALENE	91-57-6	UG_L	0.1	UJ	h	0.489	J	h	0.133	J	h	0.1	UJ	h	0.587	J	h	0.666	J	h
ACENAPHTHENE	83-32-9	UG_L	0.05	UJ	h	0.05	UJ	h	0.05	UJ	h	0.05	UJ	h	0.05	UJ	h	0.05	UJ	h
ACENAPHTHYLENE	208-96-8	UG_L	0.1	UJ	h	0.1	UJ	h	0.1	UJ	h	0.1	UJ	h	0.1	UJ	h	0.1	UJ	h
ANTHRACENE	120-12-7	UG_L	0.05	UJ	h	0.05	UJ	h	0.072	J	h	0.041	J	h	0.05	UJ	h	0.05	UJ	h
BENZO[A]ANTHRACENE	56-55-3	UG_L	0.1	UJ	h	0.1	UJ	h	0.109	J	h	0.875	J	h	0.14	J	h	0.1	UJ	h
BENZO[A]PYRENE	50-32-8	UG_L	0.05	UJ	h	0.05	UJ	h	0.05	UJ	h	1.42	J	h	0.05	UJ	h	0.05	UJ	h
BENZO[B]FLUORANTHENE	205-99-2	UG_L	0.05	UJ	h	0.05	UJ	h	0.05	UJ	h	0.97	J	h	0.05	UJ	h	0.05	UJ	h
BENZO[G,H,I]PERYLENE	191-24-2	UG_L	0.05	UJ	h	0.05	UJ	h	0.05	UJ	h	1.28	J	h	0.05	UJ	h	0.05	UJ	h
BENZO[K]FLUORANTHENE	207-08-9	UG_L	0.05	UJ	h	0.05	UJ	h	0.05	UJ	h	1.14	J	h	0.05	UJ	h	0.05	UJ	h
CHRYSENE	218-01-9	UG_L	0.05	UJ	h	0.05	UJ	h	0.329	J	h	1.42	J	h	0.377	J	h	0.05	UJ	h
DIBENZ[A,H]ANTHRACENE	53-70-3	UG_L	0.05	UJ	h	0.05	UJ	h	0.05	UJ	h	0.142	J	h	0.05	UJ	h	0.05	UJ	h
FLUORANTHENE	206-44-0	UG_L	0.05	UJ	h	0.05	UJ	h	0.141	J	h	0.949	J	h	0.174	J	h	0.05	UJ	h
FLUORENE	86-73-7	UG_L	0.1	UJ	h	0.1	UJ	h	0.1	UJ	h	0.1	UJ	h	0.1	UJ	h	0.12	J	h
INDENO[1,2,3-CD]PYRENE	193-39-5	UG_L	0.05	UJ	h	0.05	UJ	h	0.05	UJ	h	0.987	J	h	0.05	UJ	h	0.05	UJ	h
NAPHTHALENE	91-20-3	UG_L	0.05	UJ	h	0.477	J	h	0.064	J	h	0.05	UJ	h	0.73	J	h	1.21	J	h
PHENANTHRENE	85-01-8	UG_L	0.05	UJ	h	0.05	UJ	h	0.141	J	h	0.201	J	h	0.139	J	h	0.158	J	h
PYRENE	129-00-0	UG_L	0.05	UJ	h	0.05	UJ	h	0.121	J	h	1.04	J	h	0.157	J	h	0.05	UJ	h

Table B-6 (Continued)
Synthetic Precipitation Leaching Procedure Polynuclear Aromatic Hydrocarbon Results After Data Review
NSA Mid-South — February 2013

		Sample Delivery Group	213031417			213031417			213031417			213031417			213031417			213031417		
		Lab ID	21303141722			21303141728			21303141760			21303141761			21303141762			21303141779		
		Sample ID	PRSSB07003			PRSSB05002			PRSSB07012			PRSSB07014			PRSSB05008			PRSSB01010		
		Sample Date	3/12/2013			3/12/2013			3/13/2013			3/13/2013			3/13/2013			3/13/2013		
		Matrix	Soil			Soil			Soil			Soil			Soil			Soil		
Analyte (SPLP PAHs)	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
2-METHYLNAPHTHALENE	91-57-6	UG_L	0.1	UJ	h	1.47	J	h	0.127	J	h	0.142	J	h	0.281	J	h	0.762	J	h
ACENAPHTHENE	83-32-9	UG_L	0.05	UJ	h	0.05	UJ	h	0.05	UJ	h	0.05	UJ	h	0.05	UJ	h	0.19	J	h
ACENAPHTHYLENE	208-96-8	UG_L	0.1	UJ	h	0.1	UJ	h	0.1	UJ	h	0.1	UJ	h	0.1	UJ	h	0.1	UJ	h
ANTHRACENE	120-12-7	UG_L	0.05	UJ	h	0.049	J	h	0.05	UJ	h	0.073	J	h	0.146	J	h	0.149	J	h
BENZO[A]ANTHRACENE	56-55-3	UG_L	0.1	UJ	h	0.129	J	h	0.174	J	h	0.142	J	h	0.113	J	h	0.112	J	h
BENZO[A]PYRENE	50-32-8	UG_L	0.05	UJ	h	0.05	UJ	h	0.116	J	h	0.05	UJ	h	0.05	UJ	h	0.05	UJ	h
BENZO[B]FLUORANTHENE	205-99-2	UG_L	0.05	UJ	h	0.05	UJ	h	0.05	UJ	h	0.05	UJ	h	0.05	UJ	h	0.05	UJ	h
BENZO[G,H,I]PERYLENE	191-24-2	UG_L	0.05	UJ	h	0.05	UJ	h	0.118	J	h	0.05	UJ	h	0.05	UJ	h	0.05	UJ	h
BENZO[K]FLUORANTHENE	207-08-9	UG_L	0.05	UJ	h	0.05	UJ	h	0.102	J	h	0.05	UJ	h	0.05	UJ	h	0.05	UJ	h
CHRYSENE	218-01-9	UG_L	0.05	UJ	h	0.359	J	h	0.395	J	h	0.35	J	h	0.346	J	h	0.343	J	h
DIBENZ[A,H]ANTHRACENE	53-70-3	UG_L	0.05	UJ	h	0.05	UJ	h	0.05	UJ	h	0.05	UJ	h	0.05	UJ	h	0.05	UJ	h
FLUORANTHENE	206-44-0	UG_L	0.05	UJ	h	0.164	J	h	0.149	J	h	0.19	J	h	0.119	J	h	0.118	J	h
FLUORENE	86-73-7	UG_L	0.1	UJ	h	0.1	UJ	h	0.1	UJ	h	0.1	UJ	h	0.136	J	h	0.246	J	h
INDENO[1,2,3-CD]PYRENE	193-39-5	UG_L	0.05	UJ	h	0.05	UJ	h	0.11	J	h	0.05	UJ	h	0.05	UJ	h	0.05	UJ	h
NAPHTHALENE	91-20-3	UG_L	0.05	UJ	h	0.543	J	h	0.455	J	h	0.888	J	h	1.19	J	h	1.76	J	h
PHENANTHRENE	85-01-8	UG_L	0.05	UJ	h	0.29	J	h	0.144	J	h	0.265	J	h	0.283	J	h	0.514	J	h
PYRENE	129-00-0	UG_L	0.05	UJ	h	0.162	J	h	0.153	J	h	0.154	J	h	0.088	J	h	0.109	J	h

Table B-6 (Continued)
Synthetic Precipitation Leaching Procedure Polynuclear Aromatic Hydrocarbon Results After Data Review
NSA Mid-South — February 2013

		Sample Delivery Group	213031417		
		Lab ID	21303141781		
		Sample ID	PRSSB01014		
		Sample Date	3/13/2013		
		Matrix	Soil		
Analyte (SPLP PAHs)	**CAS No**	**Units**	Result	Qual	RC
2-METHYLNAPHTHALENE	91-57-6	UG_L	0.1	UJ	h
ACENAPHTHENE	83-32-9	UG_L	0.05	UJ	h
ACENAPHTHYLENE	208-96-8	UG_L	0.1	UJ	h
ANTHRACENE	120-12-7	UG_L	0.092	J	h
BENZO[A]ANTHRACENE	56-55-3	UG_L	1.9	J	h
BENZO[A]PYRENE	50-32-8	UG_L	3.76	J	h
BENZO[B]FLUORANTHENE	205-99-2	UG_L	3.84	J	h
BENZO[G,H,I]PERYLENE	191-24-2	UG_L	3.55	J	h
BENZO[K]FLUORANTHENE	207-08-9	UG_L	2.39	J	h
CHRYSENE	218-01-9	UG_L	2.71	J	h
DIBENZ[A,H]ANTHRACENE	53-70-3	UG_L	0.457	J	h
FLUORANTHENE	206-44-0	UG_L	1.67	J	h
FLUORENE	86-73-7	UG_L	0.1	UJ	h
INDENO[1,2,3-CD]PYRENE	193-39-5	UG_L	2.77	J	h
NAPHTHALENE	91-20-3	UG_L	0.05	UJ	h
PHENANTHRENE	85-01-8	UG_L	0.265	J	h
PYRENE	129-00-0	UG_L	1.98	J	h

Notes:

SPLP = Synthetic Precipitation Leaching Procedure
UG_L = Micrograms per liter
Qual = Final qualifier (Refer to Table B-1)
RC = Reason code (Refer to Table B-2

Table B-7
Total Organic Carbon Results After Data Review
NSA Mid-South — February 2013

		Sample Delivery Group	213030421			213030421			213030421			213030421			213030421			213030421		
		Lab ID	21303042103			21303042105			21303042106			21303042107			21303042110			21303042135		
		Sample ID	SRSSB3901			SRSSB3601			SRSSB3602			SRSSB3801			SRSSB3502			SRSSB6101		
		Sample Date	41333			41333			41333			41333			41333			41334		
		Sample Type	N			N			N			N			N			N		
		Matrix	SO			SO			SO			SO			SO			SO		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
TOTAL ORGANIC CARBON	-28	MG_KG	24100	J	h	14600	J	h	9200	J	h	225000	J	h	9410	J	h	7120	J	h

		Sample Delivery Group	213030421			213030750			213030750			213031417			213031417			213031417		
		Lab ID	21303042152			21303075003			21303075015			21303141709			21303141721			21303141731		
		Sample ID	SRSSB3301			SRSSB2301			SRSSB1101			PRSSB0802			PRSSB07002			PRSSB05005		
		Sample Date	41334			41338			41338			41344			41345			41345		
		Sample Type	N			N			N			N			N			N		
		Matrix	SO			SO			SO			SO			SO			SO		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
TOTAL ORGANIC CARBON	-28	MG_KG	7140	J	h	9710	J	h	12100	J	h	4190	J	h	4830	J	h	5230	J	h

		Sample Delivery Group	213031417			213031417			213031417			213031417			213031417		
		Lab ID	21303141734			21303141738			21303141739			21303141754			21303141762		
		Sample ID	PRSSB06009			PRSSB06013			PRSSB06014			PRSSB08008			PRSSB05008		
		Sample Date	41345			41345			41345			41346			41346		
		Sample Type	N			N			N			N			N		
		Matrix	SO			SO			SO			SO			SO		
Analyte	**CAS No**	**Units**	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
TOTAL ORGANIC CARBON	-28	MG_KG	4150	J	h	5140	J	h	6020	J	h	5810	J	h	7190	J	h

Notes:

MG_KG = Milligrams per kilogram
Qual = Final qualifier (Refer to Table B-1)
RC = Reason code (Refer to Table B-2

LABORATORY ANALYTICAL REPORTS
FROM
GULF COAST ANALYTICAL LABORATORIES, INC.

Report Date 04/23/2013
GCAL Report 213022817

Report Date 04/23/2013
GCAL Report 213030421

Report Date 04/23/2013
GCAL Report 213030750

Report Date 04/23/2013
GCAL Report 213031417

Report Date 04/23/2013
GCAL Report 213031808

(Submitted Under Separate Cover)

Appendix C
Benzo(a)pyrene Equivalent Calculations

Appendix C
Benzo(a)pyrene Equivalent Calculations for Surface Soil
UXO 1 and 2 NSA Mid-South

Range	Location	Sample ID	Interval (feet)	Parameter	Result (mg/kg)	Q	BEF	BEF Result (mg/kg)	BEQ Value (mg/kg)	Benzo(a)pyrene Residential RSL (mg/kg)	Benzo(a)pyrene Industrial RSL (mg/kg)	BEQ Background (ppm)
MidSouth MRP PR	PRSB09	PRSSB0901	0 - 1	BENZO[A]ANTHRACENE	2.92	J	0.1	0.292				
MidSouth MRP PR	PRSB09	PRSSB0901	0 - 1	BENZO[A]PYRENE	3.54		1	3.54				
MidSouth MRP PR	PRSB09	PRSSB0901	0 - 1	BENZO[B]FLUORANTHENE	4.91	J	0.1	0.491				
MidSouth MRP PR	PRSB09	PRSSB0901	0 - 1	BENZO[K]FLUORANTHENE	1.86		0.01	0.0186				
MidSouth MRP PR	PRSB09	PRSSB0901	0 - 1	CHRYSENE	2.9	J	0.001	0.0029				
MidSouth MRP PR	PRSB09	PRSSB0901	0 - 1	DIBENZ[A,H]ANTHRACENE	0.00259	U	1	0.001295				
MidSouth MRP PR	PRSB09	PRSSB0901	0 - 1	INDENO[1,2,3-CD]PYRENE	2.99		0.1	0.299	**4.64**	0.015	0.21	0.565
MidSouth MRP PR	PRSB10	PRSSB1001	0 - 1	BENZO[A]ANTHRACENE	0.359	J	0.1	0.0359				
MidSouth MRP PR	PRSB10	PRSSB1001	0 - 1	BENZO[A]PYRENE	0.465		1	0.465				
MidSouth MRP PR	PRSB10	PRSSB1001	0 - 1	BENZO[B]FLUORANTHENE	0.637	J	0.1	0.0637				
MidSouth MRP PR	PRSB10	PRSSB1001	0 - 1	BENZO[K]FLUORANTHENE	0.289		0.01	0.00289				
MidSouth MRP PR	PRSB10	PRSSB1001	0 - 1	CHRYSENE	0.35	J	0.001	0.00035				
MidSouth MRP PR	PRSB10	PRSSB1001	0 - 1	DIBENZ[A,H]ANTHRACENE	0.00263	U	1	0.001315				
MidSouth MRP PR	PRSB10	PRSSB1001	0 - 1	INDENO[1,2,3-CD]PYRENE	0.445		0.1	0.0445	**0.614**	0.015	0.21	0.565
MidSouth MRP PR	PRSB11	PRSSB1101	0 - 1	BENZO[A]ANTHRACENE	0.538	J	0.1	0.0538				
MidSouth MRP PR	PRSB11	PRSSB1101	0 - 1	BENZO[A]PYRENE	0.822		1	0.822				
MidSouth MRP PR	PRSB11	PRSSB1101	0 - 1	BENZO[B]FLUORANTHENE	1.23	J	0.1	0.123				
MidSouth MRP PR	PRSB11	PRSSB1101	0 - 1	BENZO[K]FLUORANTHENE	0.375		0.01	0.00375				
MidSouth MRP PR	PRSB11	PRSSB1101	0 - 1	CHRYSENE	0.608	J	0.001	0.000608				
MidSouth MRP PR	PRSB11	PRSSB1101	0 - 1	DIBENZ[A,H]ANTHRACENE	0.0026	U	1	0.0013				
MidSouth MRP PR	PRSB11	PRSSB1101	0 - 1	INDENO[1,2,3-CD]PYRENE	0.685		0.1	0.0685	**1.07**	0.015	0.21	0.565
MidSouth MRP PR	PRSB12	PRSSB1201	0 - 1	BENZO[A]ANTHRACENE	0.52	J	0.1	0.052				
MidSouth MRP PR	PRSB12	PRSSB1201	0 - 1	BENZO[A]PYRENE	0.753		1	0.753				
MidSouth MRP PR	PRSB12	PRSSB1201	0 - 1	BENZO[B]FLUORANTHENE	1.19	J	0.1	0.119				
MidSouth MRP PR	PRSB12	PRSSB1201	0 - 1	BENZO[K]FLUORANTHENE	0.32		0.01	0.0032				
MidSouth MRP PR	PRSB12	PRSSB1201	0 - 1	CHRYSENE	0.558	J	0.001	0.000558				
MidSouth MRP PR	PRSB12	PRSSB1201	0 - 1	DIBENZ[A,H]ANTHRACENE	0.00255	U	1	0.001275				
MidSouth MRP PR	PRSB12	PRSSB1201	0 - 1	INDENO[1,2,3-CD]PYRENE	0.663		0.1	0.0663	**0.995**	0.015	0.21	0.565
MidSouth MRP PR	PRSB13	PRSSB13001	0 - 1	BENZO[A]ANTHRACENE	1.68		0.1	0.168				
MidSouth MRP PR	PRSB13	PRSSB13001	0 - 1	BENZO[A]PYRENE	3.88	J	1	3.88				
MidSouth MRP PR	PRSB13	PRSSB13001	0 - 1	BENZO[B]FLUORANTHENE	3.73		0.1	0.373				
MidSouth MRP PR	PRSB13	PRSSB13001	0 - 1	BENZO[K]FLUORANTHENE	1.79		0.01	0.0179				
MidSouth MRP PR	PRSB13	PRSSB13001	0 - 1	CHRYSENE	2.18		0.001	0.00218				
MidSouth MRP PR	PRSB13	PRSSB13001	0 - 1	DIBENZ[A,H]ANTHRACENE	0.538		1	0.538				
MidSouth MRP PR	PRSB13	PRSSB13001	0 - 1	INDENO[1,2,3-CD]PYRENE	2.63		0.1	0.263	**5.24**	0.015	0.21	0.565
MidSouth MRP PR	PRSB14	PRSSB14001	0 - 1	BENZO[A]ANTHRACENE	0.597		0.1	0.0597				
MidSouth MRP PR	PRSB14	PRSSB14001	0 - 1	BENZO[A]PYRENE	1.78	J	1	1.78				
MidSouth MRP PR	PRSB14	PRSSB14001	0 - 1	BENZO[B]FLUORANTHENE	1.63		0.1	0.163				
MidSouth MRP PR	PRSB14	PRSSB14001	0 - 1	BENZO[K]FLUORANTHENE	0.655		0.01	0.00655				
MidSouth MRP PR	PRSB14	PRSSB14001	0 - 1	CHRYSENE	0.781		0.001	0.000781				
MidSouth MRP PR	PRSB14	PRSSB14001	0 - 1	DIBENZ[A,H]ANTHRACENE	0.305		1	0.305				
MidSouth MRP PR	PRSB14	PRSSB14001	0 - 1	INDENO[1,2,3-CD]PYRENE	1.68		0.1	0.168	**2.48**	0.015	0.21	0.565
MidSouth MRP PR	PRSB15	PRSSB15001	0 - 1	BENZO[A]ANTHRACENE	0.384		0.1	0.0384				
MidSouth MRP PR	PRSB15	PRSSB15001	0 - 1	BENZO[A]PYRENE	0.727	J	1	0.727				
MidSouth MRP PR	PRSB15	PRSSB15001	0 - 1	BENZO[B]FLUORANTHENE	0.808		0.1	0.0808				
MidSouth MRP PR	PRSB15	PRSSB15001	0 - 1	BENZO[K]FLUORANTHENE	0.301		0.01	0.00301				
MidSouth MRP PR	PRSB15	PRSSB15001	0 - 1	CHRYSENE	0.477		0.001	0.000477				
MidSouth MRP PR	PRSB15	PRSSB15001	0 - 1	DIBENZ[A,H]ANTHRACENE	0.115		1	0.115				
MidSouth MRP PR	PRSB15	PRSSB15001	0 - 1	INDENO[1,2,3-CD]PYRENE	0.583		0.1	0.0583	**1.02**	0.015	0.21	0.565
MidSouth MRP PR	PRSB16	PRSSB16001	0 - 1	BENZO[A]ANTHRACENE	0.0116		0.1	0.00116				
MidSouth MRP PR	PRSB16	PRSSB16001	0 - 1	BENZO[A]PYRENE	0.0163	J	1	0.0163				
MidSouth MRP PR	PRSB16	PRSSB16001	0 - 1	BENZO[B]FLUORANTHENE	0.0319		0.1	0.00319				
MidSouth MRP PR	PRSB16	PRSSB16001	0 - 1	BENZO[K]FLUORANTHENE	0.00967		0.01	0.0000967				
MidSouth MRP PR	PRSB16	PRSSB16001	0 - 1	CHRYSENE	0.0137		0.001	0.0000137				
MidSouth MRP PR	PRSB16	PRSSB16001	0 - 1	DIBENZ[A,H]ANTHRACENE	0.00268	J	1	0.00268				
MidSouth MRP PR	PRSB16	PRSSB16001	0 - 1	INDENO[1,2,3-CD]PYRENE	0.0146		0.1	0.00146	0.0249	0.015	0.21	0.565
MidSouth MRP PR	PRSB17	PRSSB17001	0 - 1	BENZO[A]ANTHRACENE	0.566		0.1	0.0566				
MidSouth MRP PR	PRSB17	PRSSB17001	0 - 1	BENZO[A]PYRENE	1.07	J	1	1.07				
MidSouth MRP PR	PRSB17	PRSSB17001	0 - 1	BENZO[B]FLUORANTHENE	1.15		0.1	0.115				
MidSouth MRP PR	PRSB17	PRSSB17001	0 - 1	BENZO[K]FLUORANTHENE	0.44		0.01	0.0044				
MidSouth MRP PR	PRSB17	PRSSB17001	0 - 1	CHRYSENE	0.712		0.001	0.000712				
MidSouth MRP PR	PRSB17	PRSSB17001	0 - 1	DIBENZ[A,H]ANTHRACENE	0.157		1	0.157				
MidSouth MRP PR	PRSB17	PRSSB17001	0 - 1	INDENO[1,2,3-CD]PYRENE	0.828		0.1	0.0828	**1.49**	0.015	0.21	0.565
MidSouth MRP PR	PRSB18	PRSSB18001	0 - 1	BENZO[A]ANTHRACENE	0.59		0.1	0.059				
MidSouth MRP PR	PRSB18	PRSSB18001	0 - 1	BENZO[A]PYRENE	0.763	J	1	0.763				

Appendix C
Benzo(a)pyrene Equivalent Calculations for Surface Soil
UXO 1 and 2 NSA Mid-South

Range	Location	Sample ID	Interval (feet)	Parameter	Result (mg/kg)	Q	BEF	BEF Result (mg/kg)	BEQ Value (mg/kg)	Benzo(a)pyrene Residential RSL (mg/kg)	Benzo(a)pyrene Industrial RSL (mg/kg)	BEQ Background (ppm)
MidSouth MRP PR	PRSB18	PRSSB18001	0 - 1	BENZO[B]FLUORANTHENE	0.738		0.1	0.0738				
MidSouth MRP PR	PRSB18	PRSSB18001	0 - 1	BENZO[K]FLUORANTHENE	0.483		0.01	0.00483				
MidSouth MRP PR	PRSB18	PRSSB18001	0 - 1	CHRYSENE	0.619		0.001	0.000619				
MidSouth MRP PR	PRSB18	PRSSB18001	0 - 1	DIBENZ[A,H]ANTHRACENE	0.0991		1	0.0991				
MidSouth MRP PR	PRSB18	PRSSB18001	0 - 1	INDENO[1,2,3-CD]PYRENE	0.51		0.1	0.051	**1.05**	0.015	0.21	0.565
MidSouth MRP PR	PRSB19	PRSSB19001	0 - 1	BENZO[A]ANTHRACENE	0.0575		0.1	0.00575				
MidSouth MRP PR	PRSB19	PRSSB19001	0 - 1	BENZO[A]PYRENE	0.147	J	1	0.147				
MidSouth MRP PR	PRSB19	PRSSB19001	0 - 1	BENZO[B]FLUORANTHENE	0.158		0.1	0.0158				
MidSouth MRP PR	PRSB19	PRSSB19001	0 - 1	BENZO[K]FLUORANTHENE	0.064		0.01	0.00064				
MidSouth MRP PR	PRSB19	PRSSB19001	0 - 1	CHRYSENE	0.0854		0.001	0.0000854				
MidSouth MRP PR	PRSB19	PRSSB19001	0 - 1	DIBENZ[A,H]ANTHRACENE	0.0223		1	0.0223				
MidSouth MRP PR	PRSB19	PRSSB19001	0 - 1	INDENO[1,2,3-CD]PYRENE	0.124		0.1	0.0124	0.204	0.015	0.21	0.565
MidSouth MRP TSR	SRM001	SRM00100	0 - 0.5	BENZO[A]ANTHRACENE	0.0989	J	0.1	0.00989				
MidSouth MRP TSR	SRM001	SRM00100	0 - 0.5	BENZO[A]PYRENE	0.145		1	0.145				
MidSouth MRP TSR	SRM001	SRM00100	0 - 0.5	BENZO[B]FLUORANTHENE	0.253		0.1	0.0253				
MidSouth MRP TSR	SRM001	SRM00100	0 - 0.5	BENZO[K]FLUORANTHENE	0.0922		0.01	0.000922				
MidSouth MRP TSR	SRM001	SRM00100	0 - 0.5	CHRYSENE	0.081		0.001	0.000081				
MidSouth MRP TSR	SRM001	SRM00100	0 - 0.5	DIBENZ[A,H]ANTHRACENE	0.0487		1	0.0487				
MidSouth MRP TSR	SRM001	SRM00100	0 - 0.5	INDENO[1,2,3-CD]PYRENE	0.168		0.1	0.0168	0.247	0.015	0.21	0.565
MidSouth MRP TSR	SRM001	SRM00101	0.5 - 1	BENZO[A]ANTHRACENE	0.00207	U	0.1	0.0001035				
MidSouth MRP TSR	SRM001	SRM00101	0.5 - 1	BENZO[A]PYRENE	0.025		1	0.025				
MidSouth MRP TSR	SRM001	SRM00101	0.5 - 1	BENZO[B]FLUORANTHENE	0.0861		0.1	0.00861				
MidSouth MRP TSR	SRM001	SRM00101	0.5 - 1	BENZO[K]FLUORANTHENE	0.0365		0.01	0.000365				
MidSouth MRP TSR	SRM001	SRM00101	0.5 - 1	CHRYSENE	0.00314	U	0.001	0.00000157				
MidSouth MRP TSR	SRM001	SRM00101	0.5 - 1	DIBENZ[A,H]ANTHRACENE	0.0241		1	0.0241				
MidSouth MRP TSR	SRM001	SRM00101	0.5 - 1	INDENO[1,2,3-CD]PYRENE	0.0307		0.1	0.00307	0.0613	0.015	0.21	0.565
MidSouth MRP TSR	SRM002	SRM00200	0 - 0.5	BENZO[A]ANTHRACENE	2.36		0.1	0.236				
MidSouth MRP TSR	SRM002	SRM00200	0 - 0.5	BENZO[A]PYRENE	4.53		1	4.53				
MidSouth MRP TSR	SRM002	SRM00200	0 - 0.5	BENZO[B]FLUORANTHENE	7.02		0.1	0.702				
MidSouth MRP TSR	SRM002	SRM00200	0 - 0.5	BENZO[K]FLUORANTHENE	2.04		0.01	0.0204				
MidSouth MRP TSR	SRM002	SRM00200	0 - 0.5	CHRYSENE	3.2		0.001	0.0032				
MidSouth MRP TSR	SRM002	SRM00200	0 - 0.5	DIBENZ[A,H]ANTHRACENE	1.02		1	1.02				
MidSouth MRP TSR	SRM002	SRM00200	0 - 0.5	INDENO[1,2,3-CD]PYRENE	5.24		0.1	0.524	**7.04**	0.015	0.21	0.565
MidSouth MRP TSR	SRM002	SRM00201	0.5 - 1	BENZO[A]ANTHRACENE	0.711		0.1	0.0711				
MidSouth MRP TSR	SRM002	SRM00201	0.5 - 1	BENZO[A]PYRENE	1.17		1	1.17				
MidSouth MRP TSR	SRM002	SRM00201	0.5 - 1	BENZO[B]FLUORANTHENE	1.78		0.1	0.178				
MidSouth MRP TSR	SRM002	SRM00201	0.5 - 1	BENZO[K]FLUORANTHENE	0.48		0.01	0.0048				
MidSouth MRP TSR	SRM002	SRM00201	0.5 - 1	CHRYSENE	0.879		0.001	0.000879				
MidSouth MRP TSR	SRM002	SRM00201	0.5 - 1	DIBENZ[A,H]ANTHRACENE	0.234		1	0.234				
MidSouth MRP TSR	SRM002	SRM00201	0.5 - 1	INDENO[1,2,3-CD]PYRENE	1.2		0.1	0.12	**1.78**	0.015	0.21	0.565
MidSouth MRP TSR	SRM003	SRM00300	0 - 0.5	BENZO[A]ANTHRACENE	1.58		0.1	0.158				
MidSouth MRP TSR	SRM003	SRM00300	0 - 0.5	BENZO[A]PYRENE	2.44		1	2.44				
MidSouth MRP TSR	SRM003	SRM00300	0 - 0.5	BENZO[B]FLUORANTHENE	2.96		0.1	0.296				
MidSouth MRP TSR	SRM003	SRM00300	0 - 0.5	BENZO[K]FLUORANTHENE	1.34		0.01	0.0134				
MidSouth MRP TSR	SRM003	SRM00300	0 - 0.5	CHRYSENE	1.79		0.001	0.00179				
MidSouth MRP TSR	SRM003	SRM00300	0 - 0.5	DIBENZ[A,H]ANTHRACENE	0.424		1	0.424				
MidSouth MRP TSR	SRM003	SRM00300	0 - 0.5	INDENO[1,2,3-CD]PYRENE	2.1		0.1	0.21	**3.54**	0.015	0.21	0.565
MidSouth MRP TSR	SRM003	SRM00301	0.5 - 1	BENZO[A]ANTHRACENE	2.72		0.1	0.272				
MidSouth MRP TSR	SRM003	SRM00301	0.5 - 1	BENZO[A]PYRENE	4.9		1	4.9				
MidSouth MRP TSR	SRM003	SRM00301	0.5 - 1	BENZO[B]FLUORANTHENE	8.04		0.1	0.804				
MidSouth MRP TSR	SRM003	SRM00301	0.5 - 1	BENZO[K]FLUORANTHENE	2.43		0.01	0.0243				
MidSouth MRP TSR	SRM003	SRM00301	0.5 - 1	CHRYSENE	3.28		0.001	0.00328				
MidSouth MRP TSR	SRM003	SRM00301	0.5 - 1	DIBENZ[A,H]ANTHRACENE	0.807		1	0.807				
MidSouth MRP TSR	SRM003	SRM00301	0.5 - 1	INDENO[1,2,3-CD]PYRENE	3.31		0.1	0.331	**7.14**	0.015	0.21	0.565
MidSouth MRP TSR	SRM004	SRM00400	0 - 0.5	BENZO[A]ANTHRACENE	19.3		0.1	1.93				
MidSouth MRP TSR	SRM004	SRM00400	0 - 0.5	BENZO[A]PYRENE	21.7		1	21.7				
MidSouth MRP TSR	SRM004	SRM00400	0 - 0.5	BENZO[B]FLUORANTHENE	28.1		0.1	2.81				
MidSouth MRP TSR	SRM004	SRM00400	0 - 0.5	BENZO[K]FLUORANTHENE	14		0.01	0.14				
MidSouth MRP TSR	SRM004	SRM00400	0 - 0.5	CHRYSENE	18.2		0.001	0.0182				
MidSouth MRP TSR	SRM004	SRM00400	0 - 0.5	DIBENZ[A,H]ANTHRACENE	2.69		1	2.69				
MidSouth MRP TSR	SRM004	SRM00400	0 - 0.5	INDENO[1,2,3-CD]PYRENE	16.5		0.1	1.65	**30.9**	0.015	0.21	0.565
MidSouth MRP TSR	SRM004	SRM00401	0.5 - 1	BENZO[A]ANTHRACENE	1.46		0.1	0.146				
MidSouth MRP TSR	SRM004	SRM00401	0.5 - 1	BENZO[A]PYRENE	1.45		1	1.45				
MidSouth MRP TSR	SRM004	SRM00401	0.5 - 1	BENZO[B]FLUORANTHENE	1.76		0.1	0.176				
MidSouth MRP TSR	SRM004	SRM00401	0.5 - 1	BENZO[K]FLUORANTHENE	0.835		0.01	0.00835				

Appendix C
Benzo(a)pyrene Equivalent Calculations for Surface Soil
UXO 1 and 2 NSA Mid-South

Range	Location	Sample ID	Interval (feet)	Parameter	Result (mg/kg)	Q	BEF	BEF Result (mg/kg)	BEQ Value (mg/kg)	Benzo(a)pyrene Residential RSL (mg/kg)	Benzo(a)pyrene Industrial RSL (mg/kg)	BEQ Background (ppm)
MidSouth MRP TSR	SRM004	SRM00401	0.5 - 1	CHRYSENE	1.24		0.001	0.00124				
MidSouth MRP TSR	SRM004	SRM00401	0.5 - 1	DIBENZ[A,H]ANTHRACENE	0.207		1	0.207				
MidSouth MRP TSR	SRM004	SRM00401	0.5 - 1	INDENO[1,2,3-CD]PYRENE	1.34		0.1	0.134	**2.12**	0.015	0.21	0.565
MidSouth MRP TSR	SRM005	SRM00500	0 - 0.5	BENZO[A]ANTHRACENE	0.00215	U	0.1	0.0001075				
MidSouth MRP TSR	SRM005	SRM00500	0 - 0.5	BENZO[A]PYRENE	0.00215	U	1	0.001075				
MidSouth MRP TSR	SRM005	SRM00500	0 - 0.5	BENZO[B]FLUORANTHENE	0.00215	U	0.1	0.0001075				
MidSouth MRP TSR	SRM005	SRM00500	0 - 0.5	BENZO[K]FLUORANTHENE	0.00215	U	0.01	0.00001075				
MidSouth MRP TSR	SRM005	SRM00500	0 - 0.5	CHRYSENE	0.00325	U	0.001	0.000001625				
MidSouth MRP TSR	SRM005	SRM00500	0 - 0.5	DIBENZ[A,H]ANTHRACENE	0.00275	U	1	0.001375				
MidSouth MRP TSR	SRM005	SRM00500	0 - 0.5	INDENO[1,2,3-CD]PYRENE	0.00325	U	0.1	0.0001625	0.00284	0.015	0.21	0.565
MidSouth MRP TSR	SRM006	SRM00600	0 - 0.5	BENZO[A]ANTHRACENE	0.0022	U	0.1	0.00011				
MidSouth MRP TSR	SRM006	SRM00600	0 - 0.5	BENZO[A]PYRENE	0.0022	U	1	0.0011				
MidSouth MRP TSR	SRM006	SRM00600	0 - 0.5	BENZO[B]FLUORANTHENE	0.0022	U	0.1	0.00011				
MidSouth MRP TSR	SRM006	SRM00600	0 - 0.5	BENZO[K]FLUORANTHENE	0.0022	U	0.01	0.000011				
MidSouth MRP TSR	SRM006	SRM00600	0 - 0.5	CHRYSENE	0.00333	U	0.001	0.000001665				
MidSouth MRP TSR	SRM006	SRM00600	0 - 0.5	DIBENZ[A,H]ANTHRACENE	0.00281	U	1	0.001405				
MidSouth MRP TSR	SRM006	SRM00600	0 - 0.5	INDENO[1,2,3-CD]PYRENE	0.00333	U	0.1	0.0001665	0.0029	0.015	0.21	0.565
MidSouth MRP TSR	SRM007	SRM00700	0 - 0.5	BENZO[A]ANTHRACENE	0.0447		0.1	0.00447				
MidSouth MRP TSR	SRM007	SRM00700	0 - 0.5	BENZO[A]PYRENE	0.0499		1	0.0499				
MidSouth MRP TSR	SRM007	SRM00700	0 - 0.5	BENZO[B]FLUORANTHENE	0.123		0.1	0.0123				
MidSouth MRP TSR	SRM007	SRM00700	0 - 0.5	BENZO[K]FLUORANTHENE	0.0496		0.01	0.000496				
MidSouth MRP TSR	SRM007	SRM00700	0 - 0.5	CHRYSENE	0.0284		0.001	0.0000284				
MidSouth MRP TSR	SRM007	SRM00700	0 - 0.5	DIBENZ[A,H]ANTHRACENE	0.0299		1	0.0299				
MidSouth MRP TSR	SRM007	SRM00700	0 - 0.5	INDENO[1,2,3-CD]PYRENE	0.0534		0.1	0.00534	0.102	0.015	0.21	0.565
MidSouth MRP TSR	SRM007	SRM00701	0.5 - 1	BENZO[A]ANTHRACENE	0.0133		0.1	0.00133				
MidSouth MRP TSR	SRM007	SRM00701	0.5 - 1	BENZO[A]PYRENE	0.0173		1	0.0173				
MidSouth MRP TSR	SRM007	SRM00701	0.5 - 1	BENZO[B]FLUORANTHENE	0.023		0.1	0.0023				
MidSouth MRP TSR	SRM007	SRM00701	0.5 - 1	BENZO[K]FLUORANTHENE	0.0135		0.01	0.000135				
MidSouth MRP TSR	SRM007	SRM00701	0.5 - 1	CHRYSENE	0.015		0.001	0.000015				
MidSouth MRP TSR	SRM007	SRM00701	0.5 - 1	DIBENZ[A,H]ANTHRACENE	0.00259	U	1	0.001295				
MidSouth MRP TSR	SRM007	SRM00701	0.5 - 1	INDENO[1,2,3-CD]PYRENE	0.0136		0.1	0.00136	0.0237	0.015	0.21	0.565
MidSouth MRP TSR	SRM008	SRM00800	0 - 0.5	BENZO[A]ANTHRACENE	0.0707		0.1	0.00707				
MidSouth MRP TSR	SRM008	SRM00800	0 - 0.5	BENZO[A]PYRENE	0.0651		1	0.0651				
MidSouth MRP TSR	SRM008	SRM00800	0 - 0.5	BENZO[B]FLUORANTHENE	0.14		0.1	0.014				
MidSouth MRP TSR	SRM008	SRM00800	0 - 0.5	BENZO[K]FLUORANTHENE	0.0606		0.01	0.000606				
MidSouth MRP TSR	SRM008	SRM00800	0 - 0.5	CHRYSENE	0.0452		0.001	0.0000452				
MidSouth MRP TSR	SRM008	SRM00800	0 - 0.5	DIBENZ[A,H]ANTHRACENE	0.037		1	0.037				
MidSouth MRP TSR	SRM008	SRM00800	0 - 0.5	INDENO[1,2,3-CD]PYRENE	0.0667		0.1	0.00667	0.13	0.015	0.21	0.565
MidSouth MRP TSR	SRM008	SRM00801	0.5 - 1	BENZO[A]ANTHRACENE	0.00207	U	0.1	0.0001035				
MidSouth MRP TSR	SRM008	SRM00801	0.5 - 1	BENZO[A]PYRENE	0.00207	U	1	0.001035				
MidSouth MRP TSR	SRM008	SRM00801	0.5 - 1	BENZO[B]FLUORANTHENE	0.00207	U	0.1	0.0001035				
MidSouth MRP TSR	SRM008	SRM00801	0.5 - 1	BENZO[K]FLUORANTHENE	0.00207	U	0.01	0.00001035				
MidSouth MRP TSR	SRM008	SRM00801	0.5 - 1	CHRYSENE	0.00314	U	0.001	0.00000157				
MidSouth MRP TSR	SRM008	SRM00801	0.5 - 1	DIBENZ[A,H]ANTHRACENE	0.00265	U	1	0.001325				
MidSouth MRP TSR	SRM008	SRM00801	0.5 - 1	INDENO[1,2,3-CD]PYRENE	0.00314	U	0.1	0.000157	0.00274	0.015	0.21	0.565
MidSouth MRP TSR	SRM009	SRM00900	0 - 0.5	BENZO[A]ANTHRACENE	0.0447		0.1	0.00447				
MidSouth MRP TSR	SRM009	SRM00900	0 - 0.5	BENZO[A]PYRENE	0.0447		1	0.0447				
MidSouth MRP TSR	SRM009	SRM00900	0 - 0.5	BENZO[B]FLUORANTHENE	0.114		0.1	0.0114				
MidSouth MRP TSR	SRM009	SRM00900	0 - 0.5	BENZO[K]FLUORANTHENE	0.0491		0.01	0.000491				
MidSouth MRP TSR	SRM009	SRM00900	0 - 0.5	CHRYSENE	0.0197		0.001	0.0000197				
MidSouth MRP TSR	SRM009	SRM00900	0 - 0.5	DIBENZ[A,H]ANTHRACENE	0.031		1	0.031				
MidSouth MRP TSR	SRM009	SRM00900	0 - 0.5	INDENO[1,2,3-CD]PYRENE	0.0526		0.1	0.00526	0.0973	0.015	0.21	0.565
MidSouth MRP TSR	SRM009	SRM00901	0.5 - 1	BENZO[A]ANTHRACENE	0.00211	U	0.1	0.0001055				
MidSouth MRP TSR	SRM009	SRM00901	0.5 - 1	BENZO[A]PYRENE	0.00211	U	1	0.001055				
MidSouth MRP TSR	SRM009	SRM00901	0.5 - 1	BENZO[B]FLUORANTHENE	0.00211	U	0.1	0.0001055				
MidSouth MRP TSR	SRM009	SRM00901	0.5 - 1	BENZO[K]FLUORANTHENE	0.00211	U	0.01	0.00001055				
MidSouth MRP TSR	SRM009	SRM00901	0.5 - 1	CHRYSENE	0.00319	U	0.001	0.000001595				
MidSouth MRP TSR	SRM009	SRM00901	0.5 - 1	DIBENZ[A,H]ANTHRACENE	0.00269	U	1	0.001345				
MidSouth MRP TSR	SRM009	SRM00901	0.5 - 1	INDENO[1,2,3-CD]PYRENE	0.00319	U	0.1	0.0001595	0.00278	0.015	0.21	0.565
MidSouth MRP TSR	SRM010	SRM01000	0 - 0.5	BENZO[A]ANTHRACENE	0.0428		0.1	0.00428				
MidSouth MRP TSR	SRM010	SRM01000	0 - 0.5	BENZO[A]PYRENE	0.0457		1	0.0457				
MidSouth MRP TSR	SRM010	SRM01000	0 - 0.5	BENZO[B]FLUORANTHENE	0.118		0.1	0.0118				
MidSouth MRP TSR	SRM010	SRM01000	0 - 0.5	BENZO[K]FLUORANTHENE	0.0483		0.01	0.000483				
MidSouth MRP TSR	SRM010	SRM01000	0 - 0.5	CHRYSENE	0.0173		0.001	0.0000173				
MidSouth MRP TSR	SRM010	SRM01000	0 - 0.5	DIBENZ[A,H]ANTHRACENE	0.0283		1	0.0283				

Appendix C
Benzo(a)pyrene Equivalent Calculations for Surface Soil
UXO 1 and 2 NSA Mid-South

Range	Location	Sample ID	Interval (feet)	Parameter	Result (mg/kg)	Q	BEF	BEF Result (mg/kg)	BEQ Value (mg/kg)	Benzo(a)pyrene Residential RSL (mg/kg)	Benzo(a)pyrene Industrial RSL (mg/kg)	BEQ Background (ppm)
MidSouth MRP TSR	SRM010	SRM01000	0 - 0.5	INDENO[1,2,3-CD]PYRENE	0.0498		0.1	0.00498	0.0956	0.015	0.21	0.565
MidSouth MRP TSR	SRM010	SRM01001	0.5 - 1	BENZO[A]ANTHRACENE	0.0238		0.1	0.00238				
MidSouth MRP TSR	SRM010	SRM01001	0.5 - 1	BENZO[A]PYRENE	0.0401		1	0.0401				
MidSouth MRP TSR	SRM010	SRM01001	0.5 - 1	BENZO[B]FLUORANTHENE	0.0486		0.1	0.00486				
MidSouth MRP TSR	SRM010	SRM01001	0.5 - 1	BENZO[K]FLUORANTHENE	0.0298		0.01	0.000298				
MidSouth MRP TSR	SRM010	SRM01001	0.5 - 1	CHRYSENE	0.0309		0.001	0.0000309				
MidSouth MRP TSR	SRM010	SRM01001	0.5 - 1	DIBENZ[A,H]ANTHRACENE	0.00276	U	1	0.00138				
MidSouth MRP TSR	SRM010	SRM01001	0.5 - 1	INDENO[1,2,3-CD]PYRENE	0.0257		0.1	0.00257	0.0516	0.015	0.21	0.565
MidSouth MRP TSR	SRM011	SRM01100	0 - 0.5	BENZO[A]ANTHRACENE	8.49	J	0.1	0.849				
MidSouth MRP TSR	SRM011	SRM01100	0 - 0.5	BENZO[A]PYRENE	8.34	J	1	8.34				
MidSouth MRP TSR	SRM011	SRM01100	0 - 0.5	BENZO[B]FLUORANTHENE	11.6	J	0.1	1.16				
MidSouth MRP TSR	SRM011	SRM01100	0 - 0.5	BENZO[K]FLUORANTHENE	5.04	J	0.01	0.0504				
MidSouth MRP TSR	SRM011	SRM01100	0 - 0.5	CHRYSENE	7.41	J	0.001	0.00741				
MidSouth MRP TSR	SRM011	SRM01100	0 - 0.5	DIBENZ[A,H]ANTHRACENE	1.04	J	1	1.04				
MidSouth MRP TSR	SRM011	SRM01100	0 - 0.5	INDENO[1,2,3-CD]PYRENE	6.28	J	0.1	0.628	**12.1**	0.015	0.21	0.565
MidSouth MRP TSR	SRM011	SRM01101	0.5 - 1	BENZO[A]ANTHRACENE	20.4		0.1	2.04				
MidSouth MRP TSR	SRM011	SRM01101	0.5 - 1	BENZO[A]PYRENE	13.7		1	13.7				
MidSouth MRP TSR	SRM011	SRM01101	0.5 - 1	BENZO[B]FLUORANTHENE	17.4		0.1	1.74				
MidSouth MRP TSR	SRM011	SRM01101	0.5 - 1	BENZO[K]FLUORANTHENE	8.86		0.01	0.0886				
MidSouth MRP TSR	SRM011	SRM01101	0.5 - 1	CHRYSENE	17.2		0.001	0.0172				
MidSouth MRP TSR	SRM011	SRM01101	0.5 - 1	DIBENZ[A,H]ANTHRACENE	1.96		1	1.96				
MidSouth MRP TSR	SRM011	SRM01101	0.5 - 1	INDENO[1,2,3-CD]PYRENE	10.9		0.1	1.09	**20.6**	0.015	0.21	0.565
MidSouth MRP TSR	SRM012	SRM01200	0 - 0.5	BENZO[A]ANTHRACENE	8.35		0.1	0.835				
MidSouth MRP TSR	SRM012	SRM01200	0 - 0.5	BENZO[A]PYRENE	14.4		1	14.4				
MidSouth MRP TSR	SRM012	SRM01200	0 - 0.5	BENZO[B]FLUORANTHENE	17		0.1	1.7				
MidSouth MRP TSR	SRM012	SRM01200	0 - 0.5	BENZO[K]FLUORANTHENE	8.81		0.01	0.0881				
MidSouth MRP TSR	SRM012	SRM01200	0 - 0.5	CHRYSENE	8.71		0.001	0.00871				
MidSouth MRP TSR	SRM012	SRM01200	0 - 0.5	DIBENZ[A,H]ANTHRACENE	2.15		1	2.15				
MidSouth MRP TSR	SRM012	SRM01200	0 - 0.5	INDENO[1,2,3-CD]PYRENE	14.3		0.1	1.43	**20.6**	0.015	0.21	0.565
MidSouth MRP TSR	SRM012	SRM01201	0.5 - 1	BENZO[A]ANTHRACENE	15.4		0.1	1.54				
MidSouth MRP TSR	SRM012	SRM01201	0.5 - 1	BENZO[A]PYRENE	19		1	19				
MidSouth MRP TSR	SRM012	SRM01201	0.5 - 1	BENZO[B]FLUORANTHENE	22.1		0.1	2.21				
MidSouth MRP TSR	SRM012	SRM01201	0.5 - 1	BENZO[K]FLUORANTHENE	11.3		0.01	0.113				
MidSouth MRP TSR	SRM012	SRM01201	0.5 - 1	CHRYSENE	14		0.001	0.014				
MidSouth MRP TSR	SRM012	SRM01201	0.5 - 1	DIBENZ[A,H]ANTHRACENE	3.29		1	3.29				
MidSouth MRP TSR	SRM012	SRM01201	0.5 - 1	INDENO[1,2,3-CD]PYRENE	19.2		0.1	1.92	**28.1**	0.015	0.21	0.565
MidSouth MRP TSR	SRM013	SRM01300	0 - 0.5	BENZO[A]ANTHRACENE	1.18		0.1	0.118				
MidSouth MRP TSR	SRM013	SRM01300	0 - 0.5	BENZO[A]PYRENE	1.5		1	1.5				
MidSouth MRP TSR	SRM013	SRM01300	0 - 0.5	BENZO[B]FLUORANTHENE	1.83		0.1	0.183				
MidSouth MRP TSR	SRM013	SRM01300	0 - 0.5	BENZO[K]FLUORANTHENE	0.865		0.01	0.00865				
MidSouth MRP TSR	SRM013	SRM01300	0 - 0.5	CHRYSENE	1.11		0.001	0.00111				
MidSouth MRP TSR	SRM013	SRM01300	0 - 0.5	DIBENZ[A,H]ANTHRACENE	0.219		1	0.219				
MidSouth MRP TSR	SRM013	SRM01300	0 - 0.5	INDENO[1,2,3-CD]PYRENE	1.31		0.1	0.131	**2.16**	0.015	0.21	0.565
MidSouth MRP TSR	SRM013	SRM01301	0.5 - 1	BENZO[A]ANTHRACENE	0.493		0.1	0.0493				
MidSouth MRP TSR	SRM013	SRM01301	0.5 - 1	BENZO[A]PYRENE	0.541		1	0.541				
MidSouth MRP TSR	SRM013	SRM01301	0.5 - 1	BENZO[B]FLUORANTHENE	0.687		0.1	0.0687				
MidSouth MRP TSR	SRM013	SRM01301	0.5 - 1	BENZO[K]FLUORANTHENE	0.311		0.01	0.00311				
MidSouth MRP TSR	SRM013	SRM01301	0.5 - 1	CHRYSENE	0.465		0.001	0.000465				
MidSouth MRP TSR	SRM013	SRM01301	0.5 - 1	DIBENZ[A,H]ANTHRACENE	0.0881		1	0.0881				
MidSouth MRP TSR	SRM013	SRM01301	0.5 - 1	INDENO[1,2,3-CD]PYRENE	0.544		0.1	0.0544	**0.805**	0.015	0.21	0.565
MidSouth MRP TSR	SRM014	SRM01400	0 - 0.5	BENZO[A]ANTHRACENE	9.76		0.1	0.976				
MidSouth MRP TSR	SRM014	SRM01400	0 - 0.5	BENZO[A]PYRENE	10.4		1	10.4				
MidSouth MRP TSR	SRM014	SRM01400	0 - 0.5	BENZO[B]FLUORANTHENE	14.1		0.1	1.41				
MidSouth MRP TSR	SRM014	SRM01400	0 - 0.5	BENZO[K]FLUORANTHENE	7		0.01	0.07				
MidSouth MRP TSR	SRM014	SRM01400	0 - 0.5	CHRYSENE	9.26		0.001	0.00926				
MidSouth MRP TSR	SRM014	SRM01400	0 - 0.5	DIBENZ[A,H]ANTHRACENE	1.17		1	1.17				
MidSouth MRP TSR	SRM014	SRM01400	0 - 0.5	INDENO[1,2,3-CD]PYRENE	7.68		0.1	0.768	**14.8**	0.015	0.21	0.565
MidSouth MRP TSR	SRM014	SRM01401	0.5 - 1	BENZO[A]ANTHRACENE	0.247		0.1	0.0247				
MidSouth MRP TSR	SRM014	SRM01401	0.5 - 1	BENZO[A]PYRENE	0.406		1	0.406				
MidSouth MRP TSR	SRM014	SRM01401	0.5 - 1	BENZO[B]FLUORANTHENE	0.494		0.1	0.0494				
MidSouth MRP TSR	SRM014	SRM01401	0.5 - 1	BENZO[K]FLUORANTHENE	0.221		0.01	0.00221				
MidSouth MRP TSR	SRM014	SRM01401	0.5 - 1	CHRYSENE	0.253		0.001	0.000253				
MidSouth MRP TSR	SRM014	SRM01401	0.5 - 1	DIBENZ[A,H]ANTHRACENE	0.0649		1	0.0649				
MidSouth MRP TSR	SRM014	SRM01401	0.5 - 1	INDENO[1,2,3-CD]PYRENE	0.432		0.1	0.0432	**0.591**	0.015	0.21	0.565
MidSouth MRP TSR	SRM015	SRM01500	0 - 0.5	BENZO[A]ANTHRACENE	6.25		0.1	0.625				

Appendix C
Benzo(a)pyrene Equivalent Calculations for Surface Soil
UXO 1 and 2 NSA Mid-South

Range	Location	Sample ID	Interval (feet)	Parameter	Result (mg/kg)	Q	BEF	BEF Result (mg/kg)	BEQ Value (mg/kg)	Benzo(a)pyrene Residential RSL (mg/kg)	Benzo(a)pyrene Industrial RSL (mg/kg)	BEQ Background (ppm)
MidSouth MRP TSR	SRM015	SRM01500	0 - 0.5	BENZO[A]PYRENE	6.97		1	6.97				
MidSouth MRP TSR	SRM015	SRM01500	0 - 0.5	BENZO[B]FLUORANTHENE	7.31		0.1	0.731				
MidSouth MRP TSR	SRM015	SRM01500	0 - 0.5	BENZO[K]FLUORANTHENE	2.15		0.01	0.0215				
MidSouth MRP TSR	SRM015	SRM01500	0 - 0.5	CHRYSENE	7.08		0.001	0.00708				
MidSouth MRP TSR	SRM015	SRM01500	0 - 0.5	DIBENZ[A,H]ANTHRACENE	1.33		1	1.33				
MidSouth MRP TSR	SRM015	SRM01500	0 - 0.5	INDENO[1,2,3-CD]PYRENE	4.64		0.1	0.464	**10.1**	0.015	0.21	0.565
MidSouth MRP TSR	SRM015	SRM01501	0.5 - 1	BENZO[A]ANTHRACENE	18		0.1	1.8				
MidSouth MRP TSR	SRM015	SRM01501	0.5 - 1	BENZO[A]PYRENE	21.6		1	21.6				
MidSouth MRP TSR	SRM015	SRM01501	0.5 - 1	BENZO[B]FLUORANTHENE	26.3		0.1	2.63				
MidSouth MRP TSR	SRM015	SRM01501	0.5 - 1	BENZO[K]FLUORANTHENE	10.1		0.01	0.101				
MidSouth MRP TSR	SRM015	SRM01501	0.5 - 1	CHRYSENE	20.3		0.001	0.0203				
MidSouth MRP TSR	SRM015	SRM01501	0.5 - 1	DIBENZ[A,H]ANTHRACENE	4.01		1	4.01				
MidSouth MRP TSR	SRM015	SRM01501	0.5 - 1	INDENO[1,2,3-CD]PYRENE	16.7		0.1	1.67	**31.8**	0.015	0.21	0.565
MidSouth MRP TSR	SRM016	SRM01600	0 - 0.5	BENZO[A]ANTHRACENE	14		0.1	1.4				
MidSouth MRP TSR	SRM016	SRM01600	0 - 0.5	BENZO[A]PYRENE	14.9		1	14.9				
MidSouth MRP TSR	SRM016	SRM01600	0 - 0.5	BENZO[B]FLUORANTHENE	21.3		0.1	2.13				
MidSouth MRP TSR	SRM016	SRM01600	0 - 0.5	BENZO[K]FLUORANTHENE	5.67		0.01	0.0567				
MidSouth MRP TSR	SRM016	SRM01600	0 - 0.5	CHRYSENE	14.9		0.001	0.0149				
MidSouth MRP TSR	SRM016	SRM01600	0 - 0.5	DIBENZ[A,H]ANTHRACENE	2.65		1	2.65				
MidSouth MRP TSR	SRM016	SRM01600	0 - 0.5	INDENO[1,2,3-CD]PYRENE	12.7		0.1	1.27	**22.4**	0.015	0.21	0.565
MidSouth MRP TSR	SRM016	SRM01601	0.5 - 1	BENZO[A]ANTHRACENE	0.0803		0.1	0.00803				
MidSouth MRP TSR	SRM016	SRM01601	0.5 - 1	BENZO[A]PYRENE	0.124		1	0.124				
MidSouth MRP TSR	SRM016	SRM01601	0.5 - 1	BENZO[B]FLUORANTHENE	0.231		0.1	0.0231				
MidSouth MRP TSR	SRM016	SRM01601	0.5 - 1	BENZO[K]FLUORANTHENE	0.0746		0.01	0.000746				
MidSouth MRP TSR	SRM016	SRM01601	0.5 - 1	CHRYSENE	0.0787		0.001	0.0000787				
MidSouth MRP TSR	SRM016	SRM01601	0.5 - 1	DIBENZ[A,H]ANTHRACENE	0.0428		1	0.0428				
MidSouth MRP TSR	SRM016	SRM01601	0.5 - 1	INDENO[1,2,3-CD]PYRENE	0.153		0.1	0.0153	0.214	0.015	0.21	0.565
MidSouth MRP TSR	SRM017	SRM01700	0 - 0.5	BENZO[A]ANTHRACENE	1.57	J	0.1	0.157				
MidSouth MRP TSR	SRM017	SRM01700	0 - 0.5	BENZO[A]PYRENE	1.31	J	1	1.31				
MidSouth MRP TSR	SRM017	SRM01700	0 - 0.5	BENZO[B]FLUORANTHENE	1.98	J	0.1	0.198				
MidSouth MRP TSR	SRM017	SRM01700	0 - 0.5	BENZO[K]FLUORANTHENE	0.638	J	0.01	0.00638				
MidSouth MRP TSR	SRM017	SRM01700	0 - 0.5	CHRYSENE	1.6	J	0.001	0.0016				
MidSouth MRP TSR	SRM017	SRM01700	0 - 0.5	DIBENZ[A,H]ANTHRACENE	0.259	J	1	0.259				
MidSouth MRP TSR	SRM017	SRM01700	0 - 0.5	INDENO[1,2,3-CD]PYRENE	1.19	J	0.1	0.119	**2.05**	0.015	0.21	0.565
MidSouth MRP TSR	SRM017	SRM01701	0.5 - 1	BENZO[A]ANTHRACENE	0.0386		0.1	0.00386				
MidSouth MRP TSR	SRM017	SRM01701	0.5 - 1	BENZO[A]PYRENE	0.0328		1	0.0328				
MidSouth MRP TSR	SRM017	SRM01701	0.5 - 1	BENZO[B]FLUORANTHENE	0.0979		0.1	0.00979				
MidSouth MRP TSR	SRM017	SRM01701	0.5 - 1	BENZO[K]FLUORANTHENE	0.0395		0.01	0.000395				
MidSouth MRP TSR	SRM017	SRM01701	0.5 - 1	CHRYSENE	0.0133		0.001	0.0000133				
MidSouth MRP TSR	SRM017	SRM01701	0.5 - 1	DIBENZ[A,H]ANTHRACENE	0.0251		1	0.0251				
MidSouth MRP TSR	SRM017	SRM01701	0.5 - 1	INDENO[1,2,3-CD]PYRENE	0.0369		0.1	0.00369	0.0756	0.015	0.21	0.565
MidSouth MRP TSR	SRM018	SRM01800	0 - 0.5	BENZO[A]ANTHRACENE	0.0922		0.1	0.00922				
MidSouth MRP TSR	SRM018	SRM01800	0 - 0.5	BENZO[A]PYRENE	0.0918		1	0.0918				
MidSouth MRP TSR	SRM018	SRM01800	0 - 0.5	BENZO[B]FLUORANTHENE	0.183		0.1	0.0183				
MidSouth MRP TSR	SRM018	SRM01800	0 - 0.5	BENZO[K]FLUORANTHENE	0.0776		0.01	0.000776				
MidSouth MRP TSR	SRM018	SRM01800	0 - 0.5	CHRYSENE	0.0621		0.001	0.0000621				
MidSouth MRP TSR	SRM018	SRM01800	0 - 0.5	DIBENZ[A,H]ANTHRACENE	0.0371		1	0.0371				
MidSouth MRP TSR	SRM018	SRM01800	0 - 0.5	INDENO[1,2,3-CD]PYRENE	0.0919		0.1	0.00919	0.166	0.015	0.21	0.565
MidSouth MRP TSR	SRM018	SRM01801	0.5 - 1	BENZO[A]ANTHRACENE	0.0303		0.1	0.00303				
MidSouth MRP TSR	SRM018	SRM01801	0.5 - 1	BENZO[A]PYRENE	0.0259		1	0.0259				
MidSouth MRP TSR	SRM018	SRM01801	0.5 - 1	BENZO[B]FLUORANTHENE	0.0881		0.1	0.00881				
MidSouth MRP TSR	SRM018	SRM01801	0.5 - 1	BENZO[K]FLUORANTHENE	0.0366		0.01	0.000366				
MidSouth MRP TSR	SRM018	SRM01801	0.5 - 1	CHRYSENE	0.00588		0.001	0.00000588				
MidSouth MRP TSR	SRM018	SRM01801	0.5 - 1	DIBENZ[A,H]ANTHRACENE	0.0242		1	0.0242				
MidSouth MRP TSR	SRM018	SRM01801	0.5 - 1	INDENO[1,2,3-CD]PYRENE	0.0303		0.1	0.00303	0.0653	0.015	0.21	0.565
MidSouth MRP TSR	SRSB10	SRSSB1001	0 - 1	BENZO[A]ANTHRACENE	0.341	J	0.1	0.0341				
MidSouth MRP TSR	SRSB10	SRSSB1001	0 - 1	BENZO[A]PYRENE	0.597		1	0.597				
MidSouth MRP TSR	SRSB10	SRSSB1001	0 - 1	BENZO[B]FLUORANTHENE	0.8	J	0.1	0.08				
MidSouth MRP TSR	SRSB10	SRSSB1001	0 - 1	BENZO[K]FLUORANTHENE	0.337		0.01	0.00337				
MidSouth MRP TSR	SRSB10	SRSSB1001	0 - 1	CHRYSENE	0.48	J	0.001	0.00048				
MidSouth MRP TSR	SRSB10	SRSSB1001	0 - 1	DIBENZ[A,H]ANTHRACENE	0.0251	U	1	0.01255				
MidSouth MRP TSR	SRSB10	SRSSB1001	0 - 1	INDENO[1,2,3-CD]PYRENE	0.492		0.1	0.0492	**0.777**	0.015	0.21	0.565
MidSouth MRP TSR	SRSB11	SRSSB1101	0 - 1	BENZO[A]ANTHRACENE	0.00203	UJ	0.1	0.0001015				
MidSouth MRP TSR	SRSB11	SRSSB1101	0 - 1	BENZO[A]PYRENE	0.00203	U	1	0.001015				
MidSouth MRP TSR	SRSB11	SRSSB1101	0 - 1	BENZO[B]FLUORANTHENE	0.00203	UJ	0.1	0.0001015				

Appendix C
Benzo(a)pyrene Equivalent Calculations for Surface Soil
UXO 1 and 2 NSA Mid-South

Range	Location	Sample ID	Interval (feet)	Parameter	Result (mg/kg)	Q	BEF	BEF Result (mg/kg)	BEQ Value (mg/kg)	Benzo(a)pyrene Residential RSL (mg/kg)	Benzo(a)pyrene Industrial RSL (mg/kg)	BEQ Background (ppm)
MidSouth MRP TSR	SRSB11	SRSSB1101	0 - 1	BENZO[K]FLUORANTHENE	0.00203	U	0.01	0.00001015				
MidSouth MRP TSR	SRSB11	SRSSB1101	0 - 1	CHRYSENE	0.00308	UJ	0.001	0.00000154				
MidSouth MRP TSR	SRSB11	SRSSB1101	0 - 1	DIBENZ[A,H]ANTHRACENE	0.0026	U	1	0.0013				
MidSouth MRP TSR	SRSB11	SRSSB1101	0 - 1	INDENO[1,2,3-CD]PYRENE	0.00308	U	0.1	0.000154	0.00268	0.015	0.21	0.565
MidSouth MRP TSR	SRSB12	SRSSB1201	0 - 1	BENZO[A]ANTHRACENE	0.0969	J	0.1	0.00969				
MidSouth MRP TSR	SRSB12	SRSSB1201	0 - 1	BENZO[A]PYRENE	0.148		1	0.148				
MidSouth MRP TSR	SRSB12	SRSSB1201	0 - 1	BENZO[B]FLUORANTHENE	0.209	J	0.1	0.0209				
MidSouth MRP TSR	SRSB12	SRSSB1201	0 - 1	BENZO[K]FLUORANTHENE	0.0949		0.01	0.000949				
MidSouth MRP TSR	SRSB12	SRSSB1201	0 - 1	CHRYSENE	0.133	J	0.001	0.000133				
MidSouth MRP TSR	SRSB12	SRSSB1201	0 - 1	DIBENZ[A,H]ANTHRACENE	0.025	U	1	0.0125				
MidSouth MRP TSR	SRSB12	SRSSB1201	0 - 1	INDENO[1,2,3-CD]PYRENE	0.13		0.1	0.013	0.205	0.015	0.21	0.565
MidSouth MRP TSR	SRSB15	SRSSB1501	0 - 1	BENZO[A]ANTHRACENE	0.103		0.1	0.0103				
MidSouth MRP TSR	SRSB15	SRSSB1501	0 - 1	BENZO[A]PYRENE	0.169		1	0.169				
MidSouth MRP TSR	SRSB15	SRSSB1501	0 - 1	BENZO[B]FLUORANTHENE	0.298		0.1	0.0298				
MidSouth MRP TSR	SRSB15	SRSSB1501	0 - 1	BENZO[K]FLUORANTHENE	0.0993		0.01	0.000993				
MidSouth MRP TSR	SRSB15	SRSSB1501	0 - 1	CHRYSENE	0.113		0.001	0.000113				
MidSouth MRP TSR	SRSB15	SRSSB1501	0 - 1	DIBENZ[A,H]ANTHRACENE	0.0479		1	0.0479				
MidSouth MRP TSR	SRSB15	SRSSB1501	0 - 1	INDENO[1,2,3-CD]PYRENE	0.165		0.1	0.0165	0.275	0.015	0.21	0.565
MidSouth MRP TSR	SRSB16	SRSSB1601	0 - 1	BENZO[A]ANTHRACENE	1.39		0.1	0.139				
MidSouth MRP TSR	SRSB16	SRSSB1601	0 - 1	BENZO[A]PYRENE	1.89		1	1.89				
MidSouth MRP TSR	SRSB16	SRSSB1601	0 - 1	BENZO[B]FLUORANTHENE	2.53		0.1	0.253				
MidSouth MRP TSR	SRSB16	SRSSB1601	0 - 1	BENZO[K]FLUORANTHENE	0.906		0.01	0.00906				
MidSouth MRP TSR	SRSB16	SRSSB1601	0 - 1	CHRYSENE	1.75		0.001	0.00175				
MidSouth MRP TSR	SRSB16	SRSSB1601	0 - 1	DIBENZ[A,H]ANTHRACENE	0.413		1	0.413				
MidSouth MRP TSR	SRSB16	SRSSB1601	0 - 1	INDENO[1,2,3-CD]PYRENE	1.85		0.1	0.185	**2.89**	0.015	0.21	0.565
MidSouth MRP TSR	SRSB17	SRSSB1701	0 - 1	BENZO[A]ANTHRACENE	0.0681		0.1	0.00681				
MidSouth MRP TSR	SRSB17	SRSSB1701	0 - 1	BENZO[A]PYRENE	0.103		1	0.103				
MidSouth MRP TSR	SRSB17	SRSSB1701	0 - 1	BENZO[B]FLUORANTHENE	0.194		0.1	0.0194				
MidSouth MRP TSR	SRSB17	SRSSB1701	0 - 1	BENZO[K]FLUORANTHENE	0.0736		0.01	0.000736				
MidSouth MRP TSR	SRSB17	SRSSB1701	0 - 1	CHRYSENE	0.0655		0.001	0.0000655				
MidSouth MRP TSR	SRSB17	SRSSB1701	0 - 1	DIBENZ[A,H]ANTHRACENE	0.0398		1	0.0398				
MidSouth MRP TSR	SRSB17	SRSSB1701	0 - 1	INDENO[1,2,3-CD]PYRENE	0.113		0.1	0.0113	0.181	0.015	0.21	0.565
MidSouth MRP TSR	SRSB23	SRSSB2301	0 - 1	BENZO[A]ANTHRACENE	0.00212	UJ	0.1	0.000106				
MidSouth MRP TSR	SRSB23	SRSSB2301	0 - 1	BENZO[A]PYRENE	0.00212	U	1	0.00106				
MidSouth MRP TSR	SRSB23	SRSSB2301	0 - 1	BENZO[B]FLUORANTHENE	0.00212	UJ	0.1	0.000106				
MidSouth MRP TSR	SRSB23	SRSSB2301	0 - 1	BENZO[K]FLUORANTHENE	0.00212	U	0.01	0.0000106				
MidSouth MRP TSR	SRSB23	SRSSB2301	0 - 1	CHRYSENE	0.00322	UJ	0.001	0.00000161				
MidSouth MRP TSR	SRSB23	SRSSB2301	0 - 1	DIBENZ[A,H]ANTHRACENE	0.00272	U	1	0.00136				
MidSouth MRP TSR	SRSB23	SRSSB2301	0 - 1	INDENO[1,2,3-CD]PYRENE	0.00322	U	0.1	0.000161	0.00281	0.015	0.21	0.565
MidSouth MRP TSR	SRSB24	SRSSB2401	0 - 1	BENZO[A]ANTHRACENE	0.00209	UJ	0.1	0.0001045				
MidSouth MRP TSR	SRSB24	SRSSB2401	0 - 1	BENZO[A]PYRENE	0.00209	U	1	0.001045				
MidSouth MRP TSR	SRSB24	SRSSB2401	0 - 1	BENZO[B]FLUORANTHENE	0.00209	UJ	0.1	0.0001045				
MidSouth MRP TSR	SRSB24	SRSSB2401	0 - 1	BENZO[K]FLUORANTHENE	0.00209	U	0.01	0.00001045				
MidSouth MRP TSR	SRSB24	SRSSB2401	0 - 1	CHRYSENE	0.00316	UJ	0.001	0.00000158				
MidSouth MRP TSR	SRSB24	SRSSB2401	0 - 1	DIBENZ[A,H]ANTHRACENE	0.00267	U	1	0.001335				
MidSouth MRP TSR	SRSB24	SRSSB2401	0 - 1	INDENO[1,2,3-CD]PYRENE	0.00316	U	0.1	0.000158	0.00276	0.015	0.21	0.565
MidSouth MRP TSR	SRSB25	SRSSB2501	0 - 1	BENZO[A]ANTHRACENE	1.19		0.1	0.119				
MidSouth MRP TSR	SRSB25	SRSSB2501	0 - 1	BENZO[A]PYRENE	1.78		1	1.78				
MidSouth MRP TSR	SRSB25	SRSSB2501	0 - 1	BENZO[B]FLUORANTHENE	2.86		0.1	0.286				
MidSouth MRP TSR	SRSB25	SRSSB2501	0 - 1	BENZO[K]FLUORANTHENE	1.02		0.01	0.0102				
MidSouth MRP TSR	SRSB25	SRSSB2501	0 - 1	CHRYSENE	1.04		0.001	0.00104				
MidSouth MRP TSR	SRSB25	SRSSB2501	0 - 1	DIBENZ[A,H]ANTHRACENE	0.508		1	0.508				
MidSouth MRP TSR	SRSB25	SRSSB2501	0 - 1	INDENO[1,2,3-CD]PYRENE	1.92		0.1	0.192	**2.9**	0.015	0.21	0.565
MidSouth MRP TSR	SRSB26	SRSSB2601	0 - 1	BENZO[A]ANTHRACENE	1.38		0.1	0.138				
MidSouth MRP TSR	SRSB26	SRSSB2601	0 - 1	BENZO[A]PYRENE	2.53		1	2.53				
MidSouth MRP TSR	SRSB26	SRSSB2601	0 - 1	BENZO[B]FLUORANTHENE	3.13		0.1	0.313				
MidSouth MRP TSR	SRSB26	SRSSB2601	0 - 1	BENZO[K]FLUORANTHENE	1.28		0.01	0.0128				
MidSouth MRP TSR	SRSB26	SRSSB2601	0 - 1	CHRYSENE	1.86		0.001	0.00186				
MidSouth MRP TSR	SRSB26	SRSSB2601	0 - 1	DIBENZ[A,H]ANTHRACENE	0.554		1	0.554				
MidSouth MRP TSR	SRSB26	SRSSB2601	0 - 1	INDENO[1,2,3-CD]PYRENE	2.68		0.1	0.268	**3.82**	0.015	0.21	0.565
MidSouth MRP TSR	SRSB27	SRSSB2701	0 - 1	BENZO[A]ANTHRACENE	0.0392		0.1	0.00392				
MidSouth MRP TSR	SRSB27	SRSSB2701	0 - 1	BENZO[A]PYRENE	0.0402		1	0.0402				
MidSouth MRP TSR	SRSB27	SRSSB2701	0 - 1	BENZO[B]FLUORANTHENE	0.106		0.1	0.0106				
MidSouth MRP TSR	SRSB27	SRSSB2701	0 - 1	BENZO[K]FLUORANTHENE	0.0449		0.01	0.000449				
MidSouth MRP TSR	SRSB27	SRSSB2701	0 - 1	CHRYSENE	0.0153		0.001	0.0000153				

Appendix C
Benzo(a)pyrene Equivalent Calculations for Surface Soil
UXO 1 and 2 NSA Mid-South

Range	Location	Sample ID	Interval (feet)	Parameter	Result (mg/kg)	Q	BEF	BEF Result (mg/kg)	BEQ Value (mg/kg)	Benzo(a)pyrene Residential RSL (mg/kg)	Benzo(a)pyrene Industrial RSL (mg/kg)	BEQ Background (ppm)
MidSouth MRP TSR	SRSB27	SRSSB2701	0 - 1	DIBENZ[A,H]ANTHRACENE	0.0269		1	0.0269				
MidSouth MRP TSR	SRSB27	SRSSB2701	0 - 1	INDENO[1,2,3-CD]PYRENE	0.0479		0.1	0.00479	0.0869	0.015	0.21	0.565
MidSouth MRP TSR	SRSB28	SRSSB2801	0 - 1	BENZO[A]ANTHRACENE	76.6		0.1	7.66				
MidSouth MRP TSR	SRSB28	SRSSB2801	0 - 1	BENZO[A]PYRENE	101		1	101				
MidSouth MRP TSR	SRSB28	SRSSB2801	0 - 1	BENZO[B]FLUORANTHENE	142		0.1	14.2				
MidSouth MRP TSR	SRSB28	SRSSB2801	0 - 1	BENZO[K]FLUORANTHENE	51.2		0.01	0.512				
MidSouth MRP TSR	SRSB28	SRSSB2801	0 - 1	CHRYSENE	77.1		0.001	0.0771				
MidSouth MRP TSR	SRSB28	SRSSB2801	0 - 1	DIBENZ[A,H]ANTHRACENE	30.9		1	30.9				
MidSouth MRP TSR	SRSB28	SRSSB2801	0 - 1	INDENO[1,2,3-CD]PYRENE	87.2		0.1	8.72	**163**	0.015	0.21	0.565
MidSouth MRP TSR	SRSB29	SRSSB2901	0 - 1	BENZO[A]ANTHRACENE	0.307		0.1	0.0307				
MidSouth MRP TSR	SRSB29	SRSSB2901	0 - 1	BENZO[A]PYRENE	0.416		1	0.416				
MidSouth MRP TSR	SRSB29	SRSSB2901	0 - 1	BENZO[B]FLUORANTHENE	0.725		0.1	0.0725				
MidSouth MRP TSR	SRSB29	SRSSB2901	0 - 1	BENZO[K]FLUORANTHENE	0.184		0.01	0.00184				
MidSouth MRP TSR	SRSB29	SRSSB2901	0 - 1	CHRYSENE	0.322		0.001	0.000322				
MidSouth MRP TSR	SRSB29	SRSSB2901	0 - 1	DIBENZ[A,H]ANTHRACENE	0.0935		1	0.0935				
MidSouth MRP TSR	SRSB29	SRSSB2901	0 - 1	INDENO[1,2,3-CD]PYRENE	0.428		0.1	0.0428	**0.658**	0.015	0.21	0.565
MidSouth MRP TSR	SRSB31	SRSSB3101	0 - 1	BENZO[A]ANTHRACENE	96.4		0.1	9.64				
MidSouth MRP TSR	SRSB31	SRSSB3101	0 - 1	BENZO[A]PYRENE	118		1	118				
MidSouth MRP TSR	SRSB31	SRSSB3101	0 - 1	BENZO[B]FLUORANTHENE	156		0.1	15.6				
MidSouth MRP TSR	SRSB31	SRSSB3101	0 - 1	BENZO[K]FLUORANTHENE	54.4		0.01	0.544				
MidSouth MRP TSR	SRSB31	SRSSB3101	0 - 1	CHRYSENE	103		0.001	0.103				
MidSouth MRP TSR	SRSB31	SRSSB3101	0 - 1	DIBENZ[A,H]ANTHRACENE	19.7		1	19.7				
MidSouth MRP TSR	SRSB31	SRSSB3101	0 - 1	INDENO[1,2,3-CD]PYRENE	94.6		0.1	9.46	**173**	0.015	0.21	0.565
MidSouth MRP TSR	SRSB32	SRSSB3201	0 - 1	BENZO[A]ANTHRACENE	5.3		0.1	0.53				
MidSouth MRP TSR	SRSB32	SRSSB3201	0 - 1	BENZO[A]PYRENE	8.45		1	8.45				
MidSouth MRP TSR	SRSB32	SRSSB3201	0 - 1	BENZO[B]FLUORANTHENE	10.5		0.1	1.05				
MidSouth MRP TSR	SRSB32	SRSSB3201	0 - 1	BENZO[K]FLUORANTHENE	4.97		0.01	0.0497				
MidSouth MRP TSR	SRSB32	SRSSB3201	0 - 1	CHRYSENE	6.32		0.001	0.00632				
MidSouth MRP TSR	SRSB32	SRSSB3201	0 - 1	DIBENZ[A,H]ANTHRACENE	1.34		1	1.34				
MidSouth MRP TSR	SRSB32	SRSSB3201	0 - 1	INDENO[1,2,3-CD]PYRENE	6.88		0.1	0.688	**12.1**	0.015	0.21	0.565
MidSouth MRP TSR	SRSB33	SRSSB3301	0 - 1	BENZO[A]ANTHRACENE	0.00496		0.1	0.000496				
MidSouth MRP TSR	SRSB33	SRSSB3301	0 - 1	BENZO[A]PYRENE	0.00913		1	0.00913				
MidSouth MRP TSR	SRSB33	SRSSB3301	0 - 1	BENZO[B]FLUORANTHENE	0.0308		0.1	0.00308				
MidSouth MRP TSR	SRSB33	SRSSB3301	0 - 1	BENZO[K]FLUORANTHENE	0.00356	J	0.01	0.0000356				
MidSouth MRP TSR	SRSB33	SRSSB3301	0 - 1	CHRYSENE	0.00647		0.001	0.00000647				
MidSouth MRP TSR	SRSB33	SRSSB3301	0 - 1	DIBENZ[A,H]ANTHRACENE	0.00265	U	1	0.001325				
MidSouth MRP TSR	SRSB33	SRSSB3301	0 - 1	INDENO[1,2,3-CD]PYRENE	0.00708		0.1	0.000708	0.0148	0.015	0.21	0.565
MidSouth MRP TSR	SRSB34	SRSSB3401	0 - 1	BENZO[A]ANTHRACENE	6.86		0.1	0.686				
MidSouth MRP TSR	SRSB34	SRSSB3401	0 - 1	BENZO[A]PYRENE	9.2		1	9.2				
MidSouth MRP TSR	SRSB34	SRSSB3401	0 - 1	BENZO[B]FLUORANTHENE	14.6		0.1	1.46				
MidSouth MRP TSR	SRSB34	SRSSB3401	0 - 1	BENZO[K]FLUORANTHENE	4.13		0.01	0.0413				
MidSouth MRP TSR	SRSB34	SRSSB3401	0 - 1	CHRYSENE	8.08		0.001	0.00808				
MidSouth MRP TSR	SRSB34	SRSSB3401	0 - 1	DIBENZ[A,H]ANTHRACENE	1.6		1	1.6				
MidSouth MRP TSR	SRSB34	SRSSB3401	0 - 1	INDENO[1,2,3-CD]PYRENE	7.93		0.1	0.793	**13.8**	0.015	0.21	0.565
MidSouth MRP TSR	SRSB35	SRSSB3501	0 - 1	BENZO[A]ANTHRACENE	116		0.1	11.6				
MidSouth MRP TSR	SRSB35	SRSSB3501	0 - 1	BENZO[A]PYRENE	131		1	131				
MidSouth MRP TSR	SRSB35	SRSSB3501	0 - 1	BENZO[B]FLUORANTHENE	180		0.1	18				
MidSouth MRP TSR	SRSB35	SRSSB3501	0 - 1	BENZO[K]FLUORANTHENE	67		0.01	0.67				
MidSouth MRP TSR	SRSB35	SRSSB3501	0 - 1	CHRYSENE	128		0.001	0.128				
MidSouth MRP TSR	SRSB35	SRSSB3501	0 - 1	DIBENZ[A,H]ANTHRACENE	21.5		1	21.5				
MidSouth MRP TSR	SRSB35	SRSSB3501	0 - 1	INDENO[1,2,3-CD]PYRENE	105		0.1	10.5	**193**	0.015	0.21	0.565
MidSouth MRP TSR	SRSB36	SRSSB3601	0 - 1	BENZO[A]ANTHRACENE	2.43		0.1	0.243				
MidSouth MRP TSR	SRSB36	SRSSB3601	0 - 1	BENZO[A]PYRENE	3.93		1	3.93				
MidSouth MRP TSR	SRSB36	SRSSB3601	0 - 1	BENZO[B]FLUORANTHENE	6.09		0.1	0.609				
MidSouth MRP TSR	SRSB36	SRSSB3601	0 - 1	BENZO[K]FLUORANTHENE	1.98		0.01	0.0198				
MidSouth MRP TSR	SRSB36	SRSSB3601	0 - 1	CHRYSENE	2.75		0.001	0.00275				
MidSouth MRP TSR	SRSB36	SRSSB3601	0 - 1	DIBENZ[A,H]ANTHRACENE	0.768		1	0.768				
MidSouth MRP TSR	SRSB36	SRSSB3601	0 - 1	INDENO[1,2,3-CD]PYRENE	3.64		0.1	0.364	**5.94**	0.015	0.21	0.565
MidSouth MRP TSR	SRSB37	SRSSB3701	0 - 1	BENZO[A]ANTHRACENE	3.34		0.1	0.334				
MidSouth MRP TSR	SRSB37	SRSSB3701	0 - 1	BENZO[A]PYRENE	6.61		1	6.61				
MidSouth MRP TSR	SRSB37	SRSSB3701	0 - 1	BENZO[B]FLUORANTHENE	7.62		0.1	0.762				
MidSouth MRP TSR	SRSB37	SRSSB3701	0 - 1	BENZO[K]FLUORANTHENE	3.95		0.01	0.0395				
MidSouth MRP TSR	SRSB37	SRSSB3701	0 - 1	CHRYSENE	4.03		0.001	0.00403				
MidSouth MRP TSR	SRSB37	SRSSB3701	0 - 1	DIBENZ[A,H]ANTHRACENE	1.22		1	1.22				
MidSouth MRP TSR	SRSB37	SRSSB3701	0 - 1	INDENO[1,2,3-CD]PYRENE	6.5		0.1	0.65	**9.62**	0.015	0.21	0.565

Appendix C
Benzo(a)pyrene Equivalent Calculations for Surface Soil
UXO 1 and 2 NSA Mid-South

Range	Location	Sample ID	Interval (feet)	Parameter	Result (mg/kg)	Q	BEF	BEF Result (mg/kg)	BEQ Value (mg/kg)	Benzo(a)pyrene Residential RSL (mg/kg)	Benzo(a)pyrene Industrial RSL (mg/kg)	BEQ Background (ppm)
MidSouth MRP TSR	SRSB38	SRSSB3801	0 - 1	BENZO[A]ANTHRACENE	196		0.1	19.6				
MidSouth MRP TSR	SRSB38	SRSSB3801	0 - 1	BENZO[A]PYRENE	170		1	170				
MidSouth MRP TSR	SRSB38	SRSSB3801	0 - 1	BENZO[B]FLUORANTHENE	233		0.1	23.3				
MidSouth MRP TSR	SRSB38	SRSSB3801	0 - 1	BENZO[K]FLUORANTHENE	114		0.01	1.14				
MidSouth MRP TSR	SRSB38	SRSSB3801	0 - 1	CHRYSENE	184		0.001	0.184				
MidSouth MRP TSR	SRSB38	SRSSB3801	0 - 1	DIBENZ[A,H]ANTHRACENE	24.2		1	24.2				
MidSouth MRP TSR	SRSB38	SRSSB3801	0 - 1	INDENO[1,2,3-CD]PYRENE	122		0.1	12.2	**251**	0.015	0.21	0.565
MidSouth MRP TSR	SRSB39	SRSSB3901	0 - 1	BENZO[A]ANTHRACENE	10.8		0.1	1.08				
MidSouth MRP TSR	SRSB39	SRSSB3901	0 - 1	BENZO[A]PYRENE	19.2		1	19.2				
MidSouth MRP TSR	SRSB39	SRSSB3901	0 - 1	BENZO[B]FLUORANTHENE	25.7		0.1	2.57				
MidSouth MRP TSR	SRSB39	SRSSB3901	0 - 1	BENZO[K]FLUORANTHENE	7.39		0.01	0.0739				
MidSouth MRP TSR	SRSB39	SRSSB3901	0 - 1	CHRYSENE	12.9		0.001	0.0129				
MidSouth MRP TSR	SRSB39	SRSSB3901	0 - 1	DIBENZ[A,H]ANTHRACENE	3.52		1	3.52				
MidSouth MRP TSR	SRSB39	SRSSB3901	0 - 1	INDENO[1,2,3-CD]PYRENE	18.2		0.1	1.82	**28.3**	0.015	0.21	0.565
MidSouth MRP TSR	SRSB40	SRSSB4001	0 - 1	BENZO[A]ANTHRACENE	0.05		0.1	0.005				
MidSouth MRP TSR	SRSB40	SRSSB4001	0 - 1	BENZO[A]PYRENE	0.0727		1	0.0727				
MidSouth MRP TSR	SRSB40	SRSSB4001	0 - 1	BENZO[B]FLUORANTHENE	0.124		0.1	0.0124				
MidSouth MRP TSR	SRSB40	SRSSB4001	0 - 1	BENZO[K]FLUORANTHENE	0.0383		0.01	0.000383				
MidSouth MRP TSR	SRSB40	SRSSB4001	0 - 1	CHRYSENE	0.0586		0.001	0.0000586				
MidSouth MRP TSR	SRSB40	SRSSB4001	0 - 1	DIBENZ[A,H]ANTHRACENE	0.00946		1	0.00946				
MidSouth MRP TSR	SRSB40	SRSSB4001	0 - 1	INDENO[1,2,3-CD]PYRENE	0.0612		0.1	0.00612	0.106	0.015	0.21	0.565
MidSouth MRP TSR	SRSB41	SRSSB4101	0 - 1	BENZO[A]ANTHRACENE	0.002	U	0.1	0.0001				
MidSouth MRP TSR	SRSB41	SRSSB4101	0 - 1	BENZO[A]PYRENE	0.002	U	1	0.001				
MidSouth MRP TSR	SRSB41	SRSSB4101	0 - 1	BENZO[B]FLUORANTHENE	0.002	U	0.1	0.0001				
MidSouth MRP TSR	SRSB41	SRSSB4101	0 - 1	BENZO[K]FLUORANTHENE	0.002	U	0.01	0.00001				
MidSouth MRP TSR	SRSB41	SRSSB4101	0 - 1	CHRYSENE	0.00304	U	0.001	0.00000152				
MidSouth MRP TSR	SRSB41	SRSSB4101	0 - 1	DIBENZ[A,H]ANTHRACENE	0.00256	U	1	0.00128				
MidSouth MRP TSR	SRSB41	SRSSB4101	0 - 1	INDENO[1,2,3-CD]PYRENE	0.00304	U	0.1	0.000152	0.00264	0.015	0.21	0.565
MidSouth MRP TSR	SRSB42	SRSSB4201	0 - 1	BENZO[A]ANTHRACENE	0.0816		0.1	0.00816				
MidSouth MRP TSR	SRSB42	SRSSB4201	0 - 1	BENZO[A]PYRENE	0.326		1	0.326				
MidSouth MRP TSR	SRSB42	SRSSB4201	0 - 1	BENZO[B]FLUORANTHENE	1.03		0.1	0.103				
MidSouth MRP TSR	SRSB42	SRSSB4201	0 - 1	BENZO[K]FLUORANTHENE	0.41		0.01	0.0041				
MidSouth MRP TSR	SRSB42	SRSSB4201	0 - 1	CHRYSENE	0.0696		0.001	0.0000696				
MidSouth MRP TSR	SRSB42	SRSSB4201	0 - 1	DIBENZ[A,H]ANTHRACENE	0.268		1	0.268				
MidSouth MRP TSR	SRSB42	SRSSB4201	0 - 1	INDENO[1,2,3-CD]PYRENE	0.365		0.1	0.0365	**0.746**	0.015	0.21	0.565
MidSouth MRP TSR	SRSB43	SRSSB4301	0 - 1	BENZO[A]ANTHRACENE	0.352		0.1	0.0352				
MidSouth MRP TSR	SRSB43	SRSSB4301	0 - 1	BENZO[A]PYRENE	0.478		1	0.478				
MidSouth MRP TSR	SRSB43	SRSSB4301	0 - 1	BENZO[B]FLUORANTHENE	0.781		0.1	0.0781				
MidSouth MRP TSR	SRSB43	SRSSB4301	0 - 1	BENZO[K]FLUORANTHENE	0.235		0.01	0.00235				
MidSouth MRP TSR	SRSB43	SRSSB4301	0 - 1	CHRYSENE	0.396		0.001	0.000396				
MidSouth MRP TSR	SRSB43	SRSSB4301	0 - 1	DIBENZ[A,H]ANTHRACENE	0.0904		1	0.0904				
MidSouth MRP TSR	SRSB43	SRSSB4301	0 - 1	INDENO[1,2,3-CD]PYRENE	0.376		0.1	0.0376	**0.722**	0.015	0.21	0.565
MidSouth MRP TSR	SRSB44	SRSSB4401	0 - 1	BENZO[A]ANTHRACENE	4.4		0.1	0.44				
MidSouth MRP TSR	SRSB44	SRSSB4401	0 - 1	BENZO[A]PYRENE	7.12		1	7.12				
MidSouth MRP TSR	SRSB44	SRSSB4401	0 - 1	BENZO[B]FLUORANTHENE	8.19		0.1	0.819				
MidSouth MRP TSR	SRSB44	SRSSB4401	0 - 1	BENZO[K]FLUORANTHENE	2.98		0.01	0.0298				
MidSouth MRP TSR	SRSB44	SRSSB4401	0 - 1	CHRYSENE	4.9		0.001	0.0049				
MidSouth MRP TSR	SRSB44	SRSSB4401	0 - 1	DIBENZ[A,H]ANTHRACENE	1.24		1	1.24				
MidSouth MRP TSR	SRSB44	SRSSB4401	0 - 1	INDENO[1,2,3-CD]PYRENE	6.6		0.1	0.66	**10.3**	0.015	0.21	0.565
MidSouth MRP TSR	SRSB45	SRSSB4501	0 - 1	BENZO[A]ANTHRACENE	1.45		0.1	0.145				
MidSouth MRP TSR	SRSB45	SRSSB4501	0 - 1	BENZO[A]PYRENE	2.28		1	2.28				
MidSouth MRP TSR	SRSB45	SRSSB4501	0 - 1	BENZO[B]FLUORANTHENE	3.37		0.1	0.337				
MidSouth MRP TSR	SRSB45	SRSSB4501	0 - 1	BENZO[K]FLUORANTHENE	0.955		0.01	0.00955				
MidSouth MRP TSR	SRSB45	SRSSB4501	0 - 1	CHRYSENE	1.71		0.001	0.00171				
MidSouth MRP TSR	SRSB45	SRSSB4501	0 - 1	DIBENZ[A,H]ANTHRACENE	0.398		1	0.398				
MidSouth MRP TSR	SRSB45	SRSSB4501	0 - 1	INDENO[1,2,3-CD]PYRENE	1.97		0.1	0.197	**3.37**	0.015	0.21	0.565
MidSouth MRP TSR	SRSB46	SRSSB4601	0 - 1	BENZO[A]ANTHRACENE	2.36		0.1	0.236				
MidSouth MRP TSR	SRSB46	SRSSB4601	0 - 1	BENZO[A]PYRENE	3.27		1	3.27				
MidSouth MRP TSR	SRSB46	SRSSB4601	0 - 1	BENZO[B]FLUORANTHENE	3.92		0.1	0.392				
MidSouth MRP TSR	SRSB46	SRSSB4601	0 - 1	BENZO[K]FLUORANTHENE	2.17		0.01	0.0217				
MidSouth MRP TSR	SRSB46	SRSSB4601	0 - 1	CHRYSENE	2.46		0.001	0.00246				
MidSouth MRP TSR	SRSB46	SRSSB4601	0 - 1	DIBENZ[A,H]ANTHRACENE	0.45		1	0.45				
MidSouth MRP TSR	SRSB46	SRSSB4601	0 - 1	INDENO[1,2,3-CD]PYRENE	2.68		0.1	0.268	**4.64**	0.015	0.21	0.565
MidSouth MRP TSR	SRSB48	SRSSB4801	0 - 1	BENZO[A]ANTHRACENE	1.85		0.1	0.185				
MidSouth MRP TSR	SRSB48	SRSSB4801	0 - 1	BENZO[A]PYRENE	2.84		1	2.84				

Appendix C
Benzo(a)pyrene Equivalent Calculations for Surface Soil
UXO 1 and 2 NSA Mid-South

Range	Location	Sample ID	Interval (feet)	Parameter	Result (mg/kg)	Q	BEF	BEF Result (mg/kg)	BEQ Value (mg/kg)	Benzo(a)pyrene Residential RSL (mg/kg)	Benzo(a)pyrene Industrial RSL (mg/kg)	BEQ Background (ppm)
MidSouth MRP TSR	SRSB48	SRSSB4801	0 - 1	BENZO[B]FLUORANTHENE	3.41		0.1	0.341				
MidSouth MRP TSR	SRSB48	SRSSB4801	0 - 1	BENZO[K]FLUORANTHENE	1.87		0.01	0.0187				
MidSouth MRP TSR	SRSB48	SRSSB4801	0 - 1	CHRYSENE	1.83		0.001	0.00183				
MidSouth MRP TSR	SRSB48	SRSSB4801	0 - 1	DIBENZ[A,H]ANTHRACENE	0.482		1	0.482				
MidSouth MRP TSR	SRSB48	SRSSB4801	0 - 1	INDENO[1,2,3-CD]PYRENE	2.74		0.1	0.274	**4.14**	0.015	0.21	0.565
MidSouth MRP TSR	SRSB49	SRSSB4901	0 - 1	BENZO[A]ANTHRACENE	1.68		0.1	0.168				
MidSouth MRP TSR	SRSB49	SRSSB4901	0 - 1	BENZO[A]PYRENE	2.34		1	2.34				
MidSouth MRP TSR	SRSB49	SRSSB4901	0 - 1	BENZO[B]FLUORANTHENE	3.9		0.1	0.39				
MidSouth MRP TSR	SRSB49	SRSSB4901	0 - 1	BENZO[K]FLUORANTHENE	1.34		0.01	0.0134				
MidSouth MRP TSR	SRSB49	SRSSB4901	0 - 1	CHRYSENE	1.98		0.001	0.00198				
MidSouth MRP TSR	SRSB49	SRSSB4901	0 - 1	DIBENZ[A,H]ANTHRACENE	0.562		1	0.562				
MidSouth MRP TSR	SRSB49	SRSSB4901	0 - 1	INDENO[1,2,3-CD]PYRENE	2.01		0.1	0.201	**3.68**	0.015	0.21	0.565
MidSouth MRP TSR	SRSB51	SRSSB5101	0 - 1	BENZO[A]ANTHRACENE	0.00978		0.1	0.000978				
MidSouth MRP TSR	SRSB51	SRSSB5101	0 - 1	BENZO[A]PYRENE	0.0138		1	0.0138				
MidSouth MRP TSR	SRSB51	SRSSB5101	0 - 1	BENZO[B]FLUORANTHENE	0.0391		0.1	0.00391				
MidSouth MRP TSR	SRSB51	SRSSB5101	0 - 1	BENZO[K]FLUORANTHENE	0.00658		0.01	0.0000658				
MidSouth MRP TSR	SRSB51	SRSSB5101	0 - 1	CHRYSENE	0.0122		0.001	0.0000122				
MidSouth MRP TSR	SRSB51	SRSSB5101	0 - 1	DIBENZ[A,H]ANTHRACENE	0.00155	J	1	0.00155				
MidSouth MRP TSR	SRSB51	SRSSB5101	0 - 1	INDENO[1,2,3-CD]PYRENE	0.00977		0.1	0.000977	0.0213	0.015	0.21	0.565
MidSouth MRP TSR	SRSB52	SRSSB5201	0 - 1	BENZO[A]ANTHRACENE	0.00555		0.1	0.000555				
MidSouth MRP TSR	SRSB52	SRSSB5201	0 - 1	BENZO[A]PYRENE	0.00826		1	0.00826				
MidSouth MRP TSR	SRSB52	SRSSB5201	0 - 1	BENZO[B]FLUORANTHENE	0.0303		0.1	0.00303				
MidSouth MRP TSR	SRSB52	SRSSB5201	0 - 1	BENZO[K]FLUORANTHENE	0.00336	J	0.01	0.0000336				
MidSouth MRP TSR	SRSB52	SRSSB5201	0 - 1	CHRYSENE	0.00774		0.001	0.00000774				
MidSouth MRP TSR	SRSB52	SRSSB5201	0 - 1	DIBENZ[A,H]ANTHRACENE	0.00276	U	1	0.00138				
MidSouth MRP TSR	SRSB52	SRSSB5201	0 - 1	INDENO[1,2,3-CD]PYRENE	0.0054		0.1	0.00054	0.0138	0.015	0.21	0.565
MidSouth MRP TSR	SRSB53	SRSSB5301	0 - 1	BENZO[A]ANTHRACENE	0.00663		0.1	0.000663				
MidSouth MRP TSR	SRSB53	SRSSB5301	0 - 1	BENZO[A]PYRENE	0.0128		1	0.0128				
MidSouth MRP TSR	SRSB53	SRSSB5301	0 - 1	BENZO[B]FLUORANTHENE	0.0361		0.1	0.00361				
MidSouth MRP TSR	SRSB53	SRSSB5301	0 - 1	BENZO[K]FLUORANTHENE	0.00721		0.01	0.0000721				
MidSouth MRP TSR	SRSB53	SRSSB5301	0 - 1	CHRYSENE	0.00893		0.001	0.00000893				
MidSouth MRP TSR	SRSB53	SRSSB5301	0 - 1	DIBENZ[A,H]ANTHRACENE	0.00136	J	1	0.00136				
MidSouth MRP TSR	SRSB53	SRSSB5301	0 - 1	INDENO[1,2,3-CD]PYRENE	0.00897		0.1	0.000897	0.0194	0.015	0.21	0.565
MidSouth MRP TSR	SRSB54	SRSSB5401	0 - 1	BENZO[A]ANTHRACENE	1.34		0.1	0.134				
MidSouth MRP TSR	SRSB54	SRSSB5401	0 - 1	BENZO[A]PYRENE	1.53		1	1.53				
MidSouth MRP TSR	SRSB54	SRSSB5401	0 - 1	BENZO[B]FLUORANTHENE	1.91		0.1	0.191				
MidSouth MRP TSR	SRSB54	SRSSB5401	0 - 1	BENZO[K]FLUORANTHENE	0.718		0.01	0.00718				
MidSouth MRP TSR	SRSB54	SRSSB5401	0 - 1	CHRYSENE	1.49		0.001	0.00149				
MidSouth MRP TSR	SRSB54	SRSSB5401	0 - 1	DIBENZ[A,H]ANTHRACENE	0.223		1	0.223				
MidSouth MRP TSR	SRSB54	SRSSB5401	0 - 1	INDENO[1,2,3-CD]PYRENE	0.925		0.1	0.0925	**2.18**	0.015	0.21	0.565
MidSouth MRP TSR	SRSB55	SRSSB5501	0 - 1	BENZO[A]ANTHRACENE	4.16		0.1	0.416				
MidSouth MRP TSR	SRSB55	SRSSB5501	0 - 1	BENZO[A]PYRENE	4.5		1	4.5				
MidSouth MRP TSR	SRSB55	SRSSB5501	0 - 1	BENZO[B]FLUORANTHENE	6.36		0.1	0.636				
MidSouth MRP TSR	SRSB55	SRSSB5501	0 - 1	BENZO[K]FLUORANTHENE	2.09		0.01	0.0209				
MidSouth MRP TSR	SRSB55	SRSSB5501	0 - 1	CHRYSENE	3.94		0.001	0.00394				
MidSouth MRP TSR	SRSB55	SRSSB5501	0 - 1	DIBENZ[A,H]ANTHRACENE	0.687		1	0.687				
MidSouth MRP TSR	SRSB55	SRSSB5501	0 - 1	INDENO[1,2,3-CD]PYRENE	2.43		0.1	0.243	**6.51**	0.015	0.21	0.565
MidSouth MRP TSR	SRSB56	SRSSB5601	0 - 1	BENZO[A]ANTHRACENE	0.657		0.1	0.0657				
MidSouth MRP TSR	SRSB56	SRSSB5601	0 - 1	BENZO[A]PYRENE	0.784		1	0.784				
MidSouth MRP TSR	SRSB56	SRSSB5601	0 - 1	BENZO[B]FLUORANTHENE	1.17		0.1	0.117				
MidSouth MRP TSR	SRSB56	SRSSB5601	0 - 1	BENZO[K]FLUORANTHENE	0.335		0.01	0.00335				
MidSouth MRP TSR	SRSB56	SRSSB5601	0 - 1	CHRYSENE	0.73		0.001	0.00073				
MidSouth MRP TSR	SRSB56	SRSSB5601	0 - 1	DIBENZ[A,H]ANTHRACENE	0.171		1	0.171				
MidSouth MRP TSR	SRSB56	SRSSB5601	0 - 1	INDENO[1,2,3-CD]PYRENE	0.784		0.1	0.0784	**1.22**	0.015	0.21	0.565
MidSouth MRP TSR	SRSB57	SRSSB5701	0 - 1	BENZO[A]ANTHRACENE	7.05		0.1	0.705				
MidSouth MRP TSR	SRSB57	SRSSB5701	0 - 1	BENZO[A]PYRENE	8.47		1	8.47				
MidSouth MRP TSR	SRSB57	SRSSB5701	0 - 1	BENZO[B]FLUORANTHENE	13.3		0.1	1.33				
MidSouth MRP TSR	SRSB57	SRSSB5701	0 - 1	BENZO[K]FLUORANTHENE	3.51		0.01	0.0351				
MidSouth MRP TSR	SRSB57	SRSSB5701	0 - 1	CHRYSENE	7.87		0.001	0.00787				
MidSouth MRP TSR	SRSB57	SRSSB5701	0 - 1	DIBENZ[A,H]ANTHRACENE	1.66		1	1.66				
MidSouth MRP TSR	SRSB57	SRSSB5701	0 - 1	INDENO[1,2,3-CD]PYRENE	7.52		0.1	0.752	**13**	0.015	0.21	0.565
MidSouth MRP TSR	SRSB58	SRSSB5801	0 - 1	BENZO[A]ANTHRACENE	23		0.1	2.3				
MidSouth MRP TSR	SRSB58	SRSSB5801	0 - 1	BENZO[A]PYRENE	28.4		1	28.4				
MidSouth MRP TSR	SRSB58	SRSSB5801	0 - 1	BENZO[B]FLUORANTHENE	27.5		0.1	2.75				
MidSouth MRP TSR	SRSB58	SRSSB5801	0 - 1	BENZO[K]FLUORANTHENE	11.3		0.01	0.113				

Appendix C
Benzo(a)pyrene Equivalent Calculations for Surface Soil
UXO 1 and 2 NSA Mid-South

Range	Location	Sample ID	Interval (feet)	Parameter	Result (mg/kg)	Q	BEF	BEF Result (mg/kg)	BEQ Value (mg/kg)	Benzo(a)pyrene Residential RSL (mg/kg)	Benzo(a)pyrene Industrial RSL (mg/kg)	BEQ Background (ppm)
MidSouth MRP TSR	SRSB58	SRSSB5801	0 - 1	CHRYSENE	30.8		0.001	0.0308				
MidSouth MRP TSR	SRSB58	SRSSB5801	0 - 1	DIBENZ[A,H]ANTHRACENE	6.3		1	6.3				
MidSouth MRP TSR	SRSB58	SRSSB5801	0 - 1	INDENO[1,2,3-CD]PYRENE	19.9		0.1	1.99	**41.9**	0.015	0.21	0.565
MidSouth MRP TSR	SRSB59	SRSSB5901	0 - 1	BENZO[A]ANTHRACENE	1.47		0.1	0.147				
MidSouth MRP TSR	SRSB59	SRSSB5901	0 - 1	BENZO[A]PYRENE	1.82		1	1.82				
MidSouth MRP TSR	SRSB59	SRSSB5901	0 - 1	BENZO[B]FLUORANTHENE	2.31		0.1	0.231				
MidSouth MRP TSR	SRSB59	SRSSB5901	0 - 1	BENZO[K]FLUORANTHENE	0.834		0.01	0.00834				
MidSouth MRP TSR	SRSB59	SRSSB5901	0 - 1	CHRYSENE	1.63		0.001	0.00163				
MidSouth MRP TSR	SRSB59	SRSSB5901	0 - 1	DIBENZ[A,H]ANTHRACENE	0.319		1	0.319				
MidSouth MRP TSR	SRSB59	SRSSB5901	0 - 1	INDENO[1,2,3-CD]PYRENE	1.37		0.1	0.137	**2.66**	0.015	0.21	0.565
MidSouth MRP TSR	SRSB61	SRSSB6101	0 - 1	BENZO[A]ANTHRACENE	0.00697		0.1	0.000697				
MidSouth MRP TSR	SRSB61	SRSSB6101	0 - 1	BENZO[A]PYRENE	0.0105		1	0.0105				
MidSouth MRP TSR	SRSB61	SRSSB6101	0 - 1	BENZO[B]FLUORANTHENE	0.0332		0.1	0.00332				
MidSouth MRP TSR	SRSB61	SRSSB6101	0 - 1	BENZO[K]FLUORANTHENE	0.00387		0.01	0.0000387				
MidSouth MRP TSR	SRSB61	SRSSB6101	0 - 1	CHRYSENE	0.00762		0.001	0.00000762				
MidSouth MRP TSR	SRSB61	SRSSB6101	0 - 1	DIBENZ[A,H]ANTHRACENE	0.00273	U	1	0.001365				
MidSouth MRP TSR	SRSB61	SRSSB6101	0 - 1	INDENO[1,2,3-CD]PYRENE	0.00797		0.1	0.000797	0.0167	0.015	0.21	0.565
MidSouth MRP TSR	SRSB62	SRSSB6201	0 - 1	BENZO[A]ANTHRACENE	0.316		0.1	0.0316				
MidSouth MRP TSR	SRSB62	SRSSB6201	0 - 1	BENZO[A]PYRENE	0.315		1	0.315				
MidSouth MRP TSR	SRSB62	SRSSB6201	0 - 1	BENZO[B]FLUORANTHENE	0.505		0.1	0.0505				
MidSouth MRP TSR	SRSB62	SRSSB6201	0 - 1	BENZO[K]FLUORANTHENE	0.146		0.01	0.00146				
MidSouth MRP TSR	SRSB62	SRSSB6201	0 - 1	CHRYSENE	0.305		0.001	0.000305				
MidSouth MRP TSR	SRSB62	SRSSB6201	0 - 1	DIBENZ[A,H]ANTHRACENE	0.0736		1	0.0736				
MidSouth MRP TSR	SRSB62	SRSSB6201	0 - 1	INDENO[1,2,3-CD]PYRENE	0.314		0.1	0.0314	0.504	0.015	0.21	0.565
MidSouth MRP TSR	SRSB63	SRSSB6301	0 - 1	BENZO[A]ANTHRACENE	16.2		0.1	1.62				
MidSouth MRP TSR	SRSB63	SRSSB6301	0 - 1	BENZO[A]PYRENE	15.5		1	15.5				
MidSouth MRP TSR	SRSB63	SRSSB6301	0 - 1	BENZO[B]FLUORANTHENE	22.2		0.1	2.22				
MidSouth MRP TSR	SRSB63	SRSSB6301	0 - 1	BENZO[K]FLUORANTHENE	7.12		0.01	0.0712				
MidSouth MRP TSR	SRSB63	SRSSB6301	0 - 1	CHRYSENE	16.7		0.001	0.0167				
MidSouth MRP TSR	SRSB63	SRSSB6301	0 - 1	DIBENZ[A,H]ANTHRACENE	2.75		1	2.75				
MidSouth MRP TSR	SRSB63	SRSSB6301	0 - 1	INDENO[1,2,3-CD]PYRENE	12.1		0.1	1.21	**23.4**	0.015	0.21	0.565
MidSouth MRP TSR	SRSB65	SRSSB6501	0 - 1	BENZO[A]ANTHRACENE	0.0705		0.1	0.00705				
MidSouth MRP TSR	SRSB65	SRSSB6501	0 - 1	BENZO[A]PYRENE	0.0852		1	0.0852				
MidSouth MRP TSR	SRSB65	SRSSB6501	0 - 1	BENZO[B]FLUORANTHENE	0.164		0.1	0.0164				
MidSouth MRP TSR	SRSB65	SRSSB6501	0 - 1	BENZO[K]FLUORANTHENE	0.0624		0.01	0.000624				
MidSouth MRP TSR	SRSB65	SRSSB6501	0 - 1	CHRYSENE	0.0567		0.001	0.0000567				
MidSouth MRP TSR	SRSB65	SRSSB6501	0 - 1	DIBENZ[A,H]ANTHRACENE	0.0394		1	0.0394				
MidSouth MRP TSR	SRSB65	SRSSB6501	0 - 1	INDENO[1,2,3-CD]PYRENE	0.0948		0.1	0.00948	0.158	0.015	0.21	0.565
MidSouth MRP TSR	SRSB66	SRSSB6601	0 - 1	BENZO[A]ANTHRACENE	0.0587	J	0.1	0.00587				
MidSouth MRP TSR	SRSB66	SRSSB6601	0 - 1	BENZO[A]PYRENE	0.06	J	1	0.06				
MidSouth MRP TSR	SRSB66	SRSSB6601	0 - 1	BENZO[B]FLUORANTHENE	0.138	J	0.1	0.0138				
MidSouth MRP TSR	SRSB66	SRSSB6601	0 - 1	BENZO[K]FLUORANTHENE	0.0559	J	0.01	0.000559				
MidSouth MRP TSR	SRSB66	SRSSB6601	0 - 1	CHRYSENE	0.0431	J	0.001	0.0000431				
MidSouth MRP TSR	SRSB66	SRSSB6601	0 - 1	DIBENZ[A,H]ANTHRACENE	0.0318	J	1	0.0318				
MidSouth MRP TSR	SRSB66	SRSSB6601	0 - 1	INDENO[1,2,3-CD]PYRENE	0.0622	J	0.1	0.00622	0.118	0.015	0.21	0.565
MidSouth MRP TSR	TSR-SS009	TSR-SS009-0001	0 - 1	BENZO[A]ANTHRACENE	5		0.1	0.5				
MidSouth MRP TSR	TSR-SS009	TSR-SS009-0001	0 - 1	BENZO[A]PYRENE	6.15		1	6.15				
MidSouth MRP TSR	TSR-SS009	TSR-SS009-0001	0 - 1	BENZO[B]FLUORANTHENE	8.79		0.1	0.879				
MidSouth MRP TSR	TSR-SS009	TSR-SS009-0001	0 - 1	BENZO[K]FLUORANTHENE	2.65		0.01	0.0265				
MidSouth MRP TSR	TSR-SS009	TSR-SS009-0001	0 - 1	CHRYSENE	6.28		0.001	0.00628				
MidSouth MRP TSR	TSR-SS009	TSR-SS009-0001	0 - 1	DIBENZ[A,H]ANTHRACENE	1.65		1	1.65				
MidSouth MRP TSR	TSR-SS009	TSR-SS009-0001	0 - 1	INDENO[1,2,3-CD]PYRENE	4.17		0.1	0.417	**9.63**	0.015	0.21	0.565
MidSouth MRP TSR	TSR-SS010	TSR-SS010-0001	0 - 1	BENZO[A]ANTHRACENE	2.31		0.1	0.231				
MidSouth MRP TSR	TSR-SS010	TSR-SS010-0001	0 - 1	BENZO[A]PYRENE	3.46		1	3.46				
MidSouth MRP TSR	TSR-SS010	TSR-SS010-0001	0 - 1	BENZO[B]FLUORANTHENE	4.62		0.1	0.462				
MidSouth MRP TSR	TSR-SS010	TSR-SS010-0001	0 - 1	BENZO[K]FLUORANTHENE	1.55		0.01	0.0155				
MidSouth MRP TSR	TSR-SS010	TSR-SS010-0001	0 - 1	CHRYSENE	3.09		0.001	0.00309				
MidSouth MRP TSR	TSR-SS010	TSR-SS010-0001	0 - 1	DIBENZ[A,H]ANTHRACENE	0.701		1	0.701				
MidSouth MRP TSR	TSR-SS010	TSR-SS010-0001	0 - 1	INDENO[1,2,3-CD]PYRENE	2.58		0.1	0.258	**5.13**	0.015	0.21	0.565
MidSouth MRP TSR	TSR-SS011	TSR-SS011-0001	0 - 1	BENZO[A]ANTHRACENE	0.0486		0.1	0.00486				
MidSouth MRP TSR	TSR-SS011	TSR-SS011-0001	0 - 1	BENZO[A]PYRENE	0.0767		1	0.0767				
MidSouth MRP TSR	TSR-SS011	TSR-SS011-0001	0 - 1	BENZO[B]FLUORANTHENE	0.105		0.1	0.0105				
MidSouth MRP TSR	TSR-SS011	TSR-SS011-0001	0 - 1	BENZO[K]FLUORANTHENE	0.0351		0.01	0.000351				
MidSouth MRP TSR	TSR-SS011	TSR-SS011-0001	0 - 1	CHRYSENE	0.0673		0.001	0.0000673				
MidSouth MRP TSR	TSR-SS011	TSR-SS011-0001	0 - 1	DIBENZ[A,H]ANTHRACENE	0.0161		1	0.0161				

Appendix C
Benzo(a)pyrene Equivalent Calculations for Surface Soil
UXO 1 and 2 NSA Mid-South

Range	Location	Sample ID	Interval (feet)	Parameter	Result (mg/kg)	Q	BEF	BEF Result (mg/kg)	BEQ Value (mg/kg)	Benzo(a)pyrene Residential RSL (mg/kg)	Benzo(a)pyrene Industrial RSL (mg/kg)	BEQ Background (ppm)
MidSouth MRP TSR	TSR-SS011	TSR-SS011-0001	0 - 1	INDENO[1,2,3-CD]PYRENE	0.063		0.1	0.0063	0.115	0.015	0.21	0.565
MidSouth MRP TSR	TSR-SS012	TSR-SS012-0001	0 - 1	BENZO[A]ANTHRACENE	0.966		0.1	0.0966				
MidSouth MRP TSR	TSR-SS012	TSR-SS012-0001	0 - 1	BENZO[A]PYRENE	1.54		1	1.54				
MidSouth MRP TSR	TSR-SS012	TSR-SS012-0001	0 - 1	BENZO[B]FLUORANTHENE	2.08		0.1	0.208				
MidSouth MRP TSR	TSR-SS012	TSR-SS012-0001	0 - 1	BENZO[K]FLUORANTHENE	0.657		0.01	0.00657				
MidSouth MRP TSR	TSR-SS012	TSR-SS012-0001	0 - 1	CHRYSENE	1.36		0.001	0.00136				
MidSouth MRP TSR	TSR-SS012	TSR-SS012-0001	0 - 1	DIBENZ[A,H]ANTHRACENE	0.273		1	0.273				
MidSouth MRP TSR	TSR-SS012	TSR-SS012-0001	0 - 1	INDENO[1,2,3-CD]PYRENE	1.13		0.1	0.113	**2.24**	0.015	0.21	0.565
MidSouth MRP TSR	TSR-SS013	TSR-SS013-0001	0 - 1	BENZO[A]ANTHRACENE	0.00745	U	0.1	0.0003725				
MidSouth MRP TSR	TSR-SS013	TSR-SS013-0001	0 - 1	BENZO[A]PYRENE	0.00817		1	0.00817				
MidSouth MRP TSR	TSR-SS013	TSR-SS013-0001	0 - 1	BENZO[B]FLUORANTHENE	0.0138		0.1	0.00138				
MidSouth MRP TSR	TSR-SS013	TSR-SS013-0001	0 - 1	BENZO[K]FLUORANTHENE	0.0046	J	0.01	0.000046				
MidSouth MRP TSR	TSR-SS013	TSR-SS013-0001	0 - 1	CHRYSENE	0.0089		0.001	0.0000089				
MidSouth MRP TSR	TSR-SS013	TSR-SS013-0001	0 - 1	DIBENZ[A,H]ANTHRACENE	0.00745	U	1	0.003725				
MidSouth MRP TSR	TSR-SS013	TSR-SS013-0001	0 - 1	INDENO[1,2,3-CD]PYRENE	0.00745	U	0.1	0.0003725	0.0141	0.015	0.21	0.565
MidSouth MRP TSR	TSR-SS019	TSR-SS019-0001	0 - 1	BENZO[A]ANTHRACENE	14.2		0.1	1.42				
MidSouth MRP TSR	TSR-SS019	TSR-SS019-0001	0 - 1	BENZO[A]PYRENE	19.3		1	19.3				
MidSouth MRP TSR	TSR-SS019	TSR-SS019-0001	0 - 1	BENZO[B]FLUORANTHENE	24		0.1	2.4				
MidSouth MRP TSR	TSR-SS019	TSR-SS019-0001	0 - 1	BENZO[K]FLUORANTHENE	7.22		0.01	0.0722				
MidSouth MRP TSR	TSR-SS019	TSR-SS019-0001	0 - 1	CHRYSENE	18.7		0.001	0.0187				
MidSouth MRP TSR	TSR-SS019	TSR-SS019-0001	0 - 1	DIBENZ[A,H]ANTHRACENE	3.94		1	3.94				
MidSouth MRP TSR	TSR-SS019	TSR-SS019-0001	0 - 1	INDENO[1,2,3-CD]PYRENE	16.9		0.1	1.69	**28.8**	0.015	0.21	0.565
MidSouth MRP TSR	TSR-SS020	TSR-SS020-0001	0 - 1	BENZO[A]ANTHRACENE	0.0868		0.1	0.00868				
MidSouth MRP TSR	TSR-SS020	TSR-SS020-0001	0 - 1	BENZO[A]PYRENE	0.108		1	0.108				
MidSouth MRP TSR	TSR-SS020	TSR-SS020-0001	0 - 1	BENZO[B]FLUORANTHENE	0.158		0.1	0.0158				
MidSouth MRP TSR	TSR-SS020	TSR-SS020-0001	0 - 1	BENZO[K]FLUORANTHENE	0.0532		0.01	0.000532				
MidSouth MRP TSR	TSR-SS020	TSR-SS020-0001	0 - 1	CHRYSENE	0.113		0.001	0.000113				
MidSouth MRP TSR	TSR-SS020	TSR-SS020-0001	0 - 1	DIBENZ[A,H]ANTHRACENE	0.0192		1	0.0192				
MidSouth MRP TSR	TSR-SS020	TSR-SS020-0001	0 - 1	INDENO[1,2,3-CD]PYRENE	0.0753		0.1	0.00753	0.16	0.015	0.21	0.565
MidSouth MRP TSR	TSR-SS021	TSR-SS021-0001	0 - 1	BENZO[A]ANTHRACENE	0.153		0.1	0.0153				
MidSouth MRP TSR	TSR-SS021	TSR-SS021-0001	0 - 1	BENZO[A]PYRENE	0.23		1	0.23				
MidSouth MRP TSR	TSR-SS021	TSR-SS021-0001	0 - 1	BENZO[B]FLUORANTHENE	0.327		0.1	0.0327				
MidSouth MRP TSR	TSR-SS021	TSR-SS021-0001	0 - 1	BENZO[K]FLUORANTHENE	0.105		0.01	0.00105				
MidSouth MRP TSR	TSR-SS021	TSR-SS021-0001	0 - 1	CHRYSENE	0.215		0.001	0.000215				
MidSouth MRP TSR	TSR-SS021	TSR-SS021-0001	0 - 1	DIBENZ[A,H]ANTHRACENE	0.0371		1	0.0371				
MidSouth MRP TSR	TSR-SS021	TSR-SS021-0001	0 - 1	INDENO[1,2,3-CD]PYRENE	0.158		0.1	0.0158	**0.332**	0.015	0.21	0.565
MidSouth MRP TSR	TSR-SS022	TSR-SS022-0001	0 - 1	BENZO[A]ANTHRACENE	0.0347		0.1	0.00347				
MidSouth MRP TSR	TSR-SS022	TSR-SS022-0001	0 - 1	BENZO[A]PYRENE	0.0462		1	0.0462				
MidSouth MRP TSR	TSR-SS022	TSR-SS022-0001	0 - 1	BENZO[B]FLUORANTHENE	0.0667		0.1	0.00667				
MidSouth MRP TSR	TSR-SS022	TSR-SS022-0001	0 - 1	BENZO[K]FLUORANTHENE	0.022		0.01	0.00022				
MidSouth MRP TSR	TSR-SS022	TSR-SS022-0001	0 - 1	CHRYSENE	0.0472		0.001	0.0000472				
MidSouth MRP TSR	TSR-SS022	TSR-SS022-0001	0 - 1	DIBENZ[A,H]ANTHRACENE	0.00713	U	1	0.003565				
MidSouth MRP TSR	TSR-SS022	TSR-SS022-0001	0 - 1	INDENO[1,2,3-CD]PYRENE	0.0313		0.1	0.00313	0.0633	0.015	0.21	0.565
MidSouth MRP TSR	TSR-SS024	TSR-SS024-0001	0 - 1	BENZO[A]ANTHRACENE	0.00897	U	0.1	0.0004485				
MidSouth MRP TSR	TSR-SS024	TSR-SS024-0001	0 - 1	BENZO[A]PYRENE	0.0251		1	0.0251				
MidSouth MRP TSR	TSR-SS024	TSR-SS024-0001	0 - 1	BENZO[B]FLUORANTHENE	0.0327		0.1	0.00327				
MidSouth MRP TSR	TSR-SS024	TSR-SS024-0001	0 - 1	BENZO[K]FLUORANTHENE	0.0117		0.01	0.000117				
MidSouth MRP TSR	TSR-SS024	TSR-SS024-0001	0 - 1	CHRYSENE	0.0245		0.001	0.0000245				
MidSouth MRP TSR	TSR-SS024	TSR-SS024-0001	0 - 1	DIBENZ[A,H]ANTHRACENE	0.00897	U	1	0.004485				
MidSouth MRP TSR	TSR-SS024	TSR-SS024-0001	0 - 1	INDENO[1,2,3-CD]PYRENE	0.0215		0.1	0.00215	0.0356	0.015	0.21	0.565
MidSouth MRP TSR	TSR-SS028	TSR-SS028-0001	0 - 1	BENZO[A]ANTHRACENE	7.14		0.1	0.714				
MidSouth MRP TSR	TSR-SS028	TSR-SS028-0001	0 - 1	BENZO[A]PYRENE	9.39		1	9.39				
MidSouth MRP TSR	TSR-SS028	TSR-SS028-0001	0 - 1	BENZO[B]FLUORANTHENE	12.8		0.1	1.28				
MidSouth MRP TSR	TSR-SS028	TSR-SS028-0001	0 - 1	BENZO[K]FLUORANTHENE	3.79		0.01	0.0379				
MidSouth MRP TSR	TSR-SS028	TSR-SS028-0001	0 - 1	CHRYSENE	8.58		0.001	0.00858				
MidSouth MRP TSR	TSR-SS028	TSR-SS028-0001	0 - 1	DIBENZ[A,H]ANTHRACENE	2.51		1	2.51				
MidSouth MRP TSR	TSR-SS028	TSR-SS028-0001	0 - 1	INDENO[1,2,3-CD]PYRENE	6.76		0.1	0.676	**14.6**	0.015	0.21	0.565
MidSouth MRP TSR	TSR-SS029	TSR-SS029-0001	0 - 1	BENZO[A]ANTHRACENE	0.0726		0.1	0.00726				
MidSouth MRP TSR	TSR-SS029	TSR-SS029-0001	0 - 1	BENZO[A]PYRENE	0.0988		1	0.0988				
MidSouth MRP TSR	TSR-SS029	TSR-SS029-0001	0 - 1	BENZO[B]FLUORANTHENE	0.135		0.1	0.0135				
MidSouth MRP TSR	TSR-SS029	TSR-SS029-0001	0 - 1	BENZO[K]FLUORANTHENE	0.0457		0.01	0.000457				
MidSouth MRP TSR	TSR-SS029	TSR-SS029-0001	0 - 1	CHRYSENE	0.094		0.001	0.000094				
MidSouth MRP TSR	TSR-SS029	TSR-SS029-0001	0 - 1	DIBENZ[A,H]ANTHRACENE	0.017		1	0.017				
MidSouth MRP TSR	TSR-SS029	TSR-SS029-0001	0 - 1	INDENO[1,2,3-CD]PYRENE	0.0743		0.1	0.00743	0.145	0.015	0.21	0.565
MidSouth MRP TSR	TSR-SS030	TSR-SS030-0001	0 - 1	BENZO[A]ANTHRACENE	0.00911	U	0.1	0.0004555				

Appendix C
Benzo(a)pyrene Equivalent Calculations for Surface Soil
UXO 1 and 2 NSA Mid-South

Range	Location	Sample ID	Interval (feet)	Parameter	Result (mg/kg)	Q	BEF	BEF Result (mg/kg)	BEQ Value (mg/kg)	Benzo(a)pyrene Residential RSL (mg/kg)	Benzo(a)pyrene Industrial RSL (mg/kg)	BEQ Background (ppm)
MidSouth MRP TSR	TSR-SS030	TSR-SS030-0001	0 - 1	BENZO[A]PYRENE	0.0125		1	0.0125				
MidSouth MRP TSR	TSR-SS030	TSR-SS030-0001	0 - 1	BENZO[B]FLUORANTHENE	0.0173		0.1	0.00173				
MidSouth MRP TSR	TSR-SS030	TSR-SS030-0001	0 - 1	BENZO[K]FLUORANTHENE	0.00666	J	0.01	0.0000666				
MidSouth MRP TSR	TSR-SS030	TSR-SS030-0001	0 - 1	CHRYSENE	0.013		0.001	0.000013				
MidSouth MRP TSR	TSR-SS030	TSR-SS030-0001	0 - 1	DIBENZ[A,H]ANTHRACENE	0.00911	U	1	0.004555				
MidSouth MRP TSR	TSR-SS030	TSR-SS030-0001	0 - 1	INDENO[1,2,3-CD]PYRENE	0.00911	U	0.1	0.0004555	0.0198	0.015	0.21	0.565
MidSouth MRP TSR	TSR-SS031	TSR-SS031-0001	0 - 1	BENZO[A]ANTHRACENE	0.00807	U	0.1	0.0004035				
MidSouth MRP TSR	TSR-SS031	TSR-SS031-0001	0 - 1	BENZO[A]PYRENE	0.0122		1	0.0122				
MidSouth MRP TSR	TSR-SS031	TSR-SS031-0001	0 - 1	BENZO[B]FLUORANTHENE	0.0187		0.1	0.00187				
MidSouth MRP TSR	TSR-SS031	TSR-SS031-0001	0 - 1	BENZO[K]FLUORANTHENE	0.00694	J	0.01	0.0000694				
MidSouth MRP TSR	TSR-SS031	TSR-SS031-0001	0 - 1	CHRYSENE	0.0151		0.001	0.0000151				
MidSouth MRP TSR	TSR-SS031	TSR-SS031-0001	0 - 1	DIBENZ[A,H]ANTHRACENE	0.00807	U	1	0.004035				
MidSouth MRP TSR	TSR-SS031	TSR-SS031-0001	0 - 1	INDENO[1,2,3-CD]PYRENE	0.00807	U	0.1	0.0004035	0.019	0.015	0.21	0.565
MidSouth MRP TSR	TSR-SS037	TSR-SS037-0001	0 - 1	BENZO[A]ANTHRACENE	0.241		0.1	0.0241				
MidSouth MRP TSR	TSR-SS037	TSR-SS037-0001	0 - 1	BENZO[A]PYRENE	0.295		1	0.295				
MidSouth MRP TSR	TSR-SS037	TSR-SS037-0001	0 - 1	BENZO[B]FLUORANTHENE	0.413		0.1	0.0413				
MidSouth MRP TSR	TSR-SS037	TSR-SS037-0001	0 - 1	BENZO[K]FLUORANTHENE	0.145		0.01	0.00145				
MidSouth MRP TSR	TSR-SS037	TSR-SS037-0001	0 - 1	CHRYSENE	0.307		0.001	0.000307				
MidSouth MRP TSR	TSR-SS037	TSR-SS037-0001	0 - 1	DIBENZ[A,H]ANTHRACENE	0.0502		1	0.0502				
MidSouth MRP TSR	TSR-SS037	TSR-SS037-0001	0 - 1	INDENO[1,2,3-CD]PYRENE	0.201		0.1	0.0201	0.432	0.015	0.21	0.565
MidSouth MRP TSR	TSR-SS039	TSR-SS039-0001	0 - 1	BENZO[A]ANTHRACENE	0.0694		0.1	0.00694				
MidSouth MRP TSR	TSR-SS039	TSR-SS039-0001	0 - 1	BENZO[A]PYRENE	0.0981		1	0.0981				
MidSouth MRP TSR	TSR-SS039	TSR-SS039-0001	0 - 1	BENZO[B]FLUORANTHENE	0.137		0.1	0.0137				
MidSouth MRP TSR	TSR-SS039	TSR-SS039-0001	0 - 1	BENZO[K]FLUORANTHENE	0.0458		0.01	0.000458				
MidSouth MRP TSR	TSR-SS039	TSR-SS039-0001	0 - 1	CHRYSENE	0.0911		0.001	0.0000911				
MidSouth MRP TSR	TSR-SS039	TSR-SS039-0001	0 - 1	DIBENZ[A,H]ANTHRACENE	0.0163		1	0.0163				
MidSouth MRP TSR	TSR-SS039	TSR-SS039-0001	0 - 1	INDENO[1,2,3-CD]PYRENE	0.0698		0.1	0.00698	0.143	0.015	0.21	0.565
MidSouth MRP TSR	TSR-SS042	TSR-SS042-0001	0 - 1	BENZO[A]ANTHRACENE	0.00772	U	0.1	0.000386				
MidSouth MRP TSR	TSR-SS042	TSR-SS042-0001	0 - 1	BENZO[A]PYRENE	0.00401	J	1	0.00401				
MidSouth MRP TSR	TSR-SS042	TSR-SS042-0001	0 - 1	BENZO[B]FLUORANTHENE	0.00577	J	0.1	0.000577				
MidSouth MRP TSR	TSR-SS042	TSR-SS042-0001	0 - 1	BENZO[K]FLUORANTHENE	0.00772	U	0.01	0.0000386				
MidSouth MRP TSR	TSR-SS042	TSR-SS042-0001	0 - 1	CHRYSENE	0.00543	J	0.001	0.00000543				
MidSouth MRP TSR	TSR-SS042	TSR-SS042-0001	0 - 1	DIBENZ[A,H]ANTHRACENE	0.00772	U	1	0.00386				
MidSouth MRP TSR	TSR-SS042	TSR-SS042-0001	0 - 1	INDENO[1,2,3-CD]PYRENE	0.00772	U	0.1	0.000386	0.00926	0.015	0.21	0.565
MidSouth MRP TSR	TSR-SS045	TSR-SS045-0001	0 - 1	BENZO[A]ANTHRACENE	5.63		0.1	0.563				
MidSouth MRP TSR	TSR-SS045	TSR-SS045-0001	0 - 1	BENZO[A]PYRENE	5.07		1	5.07				
MidSouth MRP TSR	TSR-SS045	TSR-SS045-0001	0 - 1	BENZO[B]FLUORANTHENE	6.87		0.1	0.687				
MidSouth MRP TSR	TSR-SS045	TSR-SS045-0001	0 - 1	BENZO[K]FLUORANTHENE	2.32		0.01	0.0232				
MidSouth MRP TSR	TSR-SS045	TSR-SS045-0001	0 - 1	CHRYSENE	6.22		0.001	0.00622				
MidSouth MRP TSR	TSR-SS045	TSR-SS045-0001	0 - 1	DIBENZ[A,H]ANTHRACENE	0.835		1	0.835				
MidSouth MRP TSR	TSR-SS045	TSR-SS045-0001	0 - 1	INDENO[1,2,3-CD]PYRENE	3.17		0.1	0.317	**7.5**	0.015	0.21	0.565
MidSouth MRP TSR	TSR-SS047	TSR-SS047-0001	0 - 1	BENZO[A]ANTHRACENE	0.0247		0.1	0.00247				
MidSouth MRP TSR	TSR-SS047	TSR-SS047-0001	0 - 1	BENZO[A]PYRENE	0.022		1	0.022				
MidSouth MRP TSR	TSR-SS047	TSR-SS047-0001	0 - 1	BENZO[B]FLUORANTHENE	0.0312		0.1	0.00312				
MidSouth MRP TSR	TSR-SS047	TSR-SS047-0001	0 - 1	BENZO[K]FLUORANTHENE	0.0106		0.01	0.000106				
MidSouth MRP TSR	TSR-SS047	TSR-SS047-0001	0 - 1	CHRYSENE	0.0285		0.001	0.0000285				
MidSouth MRP TSR	TSR-SS047	TSR-SS047-0001	0 - 1	DIBENZ[A,H]ANTHRACENE	0.00731	U	1	0.003655				
MidSouth MRP TSR	TSR-SS047	TSR-SS047-0001	0 - 1	INDENO[1,2,3-CD]PYRENE	0.00731	U	0.1	0.0003655	0.0317	0.015	0.21	0.565
MidSouth MRP TSR	TSR-SS066	TSR-SS066-0001	0 - 1	BENZO[A]ANTHRACENE	5.04		0.1	0.504				
MidSouth MRP TSR	TSR-SS066	TSR-SS066-0001	0 - 1	BENZO[A]PYRENE	4.42		1	4.42				
MidSouth MRP TSR	TSR-SS066	TSR-SS066-0001	0 - 1	BENZO[B]FLUORANTHENE	5.67		0.1	0.567				
MidSouth MRP TSR	TSR-SS066	TSR-SS066-0001	0 - 1	BENZO[K]FLUORANTHENE	1.82		0.01	0.0182				
MidSouth MRP TSR	TSR-SS066	TSR-SS066-0001	0 - 1	CHRYSENE	5.56		0.001	0.00556				
MidSouth MRP TSR	TSR-SS066	TSR-SS066-0001	0 - 1	DIBENZ[A,H]ANTHRACENE	1.04		1	1.04				
MidSouth MRP TSR	TSR-SS066	TSR-SS066-0001	0 - 1	INDENO[1,2,3-CD]PYRENE	3.27		0.1	0.327	**6.88**	0.015	0.21	0.565
MidSouth MRP TSR	TSR-SS067	TSR-SS067-0001	0 - 1	BENZO[A]ANTHRACENE	8.54		0.1	0.854				
MidSouth MRP TSR	TSR-SS067	TSR-SS067-0001	0 - 1	BENZO[A]PYRENE	7.65		1	7.65				
MidSouth MRP TSR	TSR-SS067	TSR-SS067-0001	0 - 1	BENZO[B]FLUORANTHENE	9.09		0.1	0.909				
MidSouth MRP TSR	TSR-SS067	TSR-SS067-0001	0 - 1	BENZO[K]FLUORANTHENE	3.13		0.01	0.0313				
MidSouth MRP TSR	TSR-SS067	TSR-SS067-0001	0 - 1	CHRYSENE	9.96		0.001	0.00996				
MidSouth MRP TSR	TSR-SS067	TSR-SS067-0001	0 - 1	DIBENZ[A,H]ANTHRACENE	1.37		1	1.37				
MidSouth MRP TSR	TSR-SS067	TSR-SS067-0001	0 - 1	INDENO[1,2,3-CD]PYRENE	4.65		0.1	0.465	**11.3**	0.015	0.21	0.565

Appendix C
Benzo(a)pyrene Equivalent Calculations for Subsurface Soil
UXO 1 and 2 NSA Mid-South

Range	Location	Sample ID	Interval (feet)	Interval	Parameter	Result (mg/kg)	Q	BEF	BEF Result (mg/kg)	BEQ Value (mg/kg)	Benzo(a)pyrene Residential RSL (mg/kg)	Benzo(a)pyrene Industrial RSL (mg/kg)	BEQ Background (ppm)
MidSouth MRP PR	PRSB01	PRSSB01002	1 - 2	Subsurf	BENZO[A]ANTHRACENE	1.76		0.1	0.176				
MidSouth MRP PR	PRSB01	PRSSB01002	1 - 2	Subsurf	BENZO[A]PYRENE	4.26	J	1	4.26				
MidSouth MRP PR	PRSB01	PRSSB01002	1 - 2	Subsurf	BENZO[B]FLUORANTHENE	3.97		0.1	0.397				
MidSouth MRP PR	PRSB01	PRSSB01002	1 - 2	Subsurf	BENZO[K]FLUORANTHENE	2.05		0.01	0.0205				
MidSouth MRP PR	PRSB01	PRSSB01002	1 - 2	Subsurf	CHRYSENE	2.54		0.001	0.00254				
MidSouth MRP PR	PRSB01	PRSSB01002	1 - 2	Subsurf	DIBENZ[A,H]ANTHRACENE	0.732		1	0.732				
MidSouth MRP PR	PRSB01	PRSSB01002	1 - 2	Subsurf	INDENO[1,2,3-CD]PYRENE	3.48		0.1	0.348	**5.94**	0.015	0.21	0.565
MidSouth MRP PR	PRSB01	PRSSB01003	2 - 3	Subsurf	BENZO[A]ANTHRACENE	23.4		0.1	2.34				
MidSouth MRP PR	PRSB01	PRSSB01003	2 - 3	Subsurf	BENZO[A]PYRENE	35	J	1	35				
MidSouth MRP PR	PRSB01	PRSSB01003	2 - 3	Subsurf	BENZO[B]FLUORANTHENE	31.7		0.1	3.17				
MidSouth MRP PR	PRSB01	PRSSB01003	2 - 3	Subsurf	BENZO[K]FLUORANTHENE	20.6		0.01	0.206				
MidSouth MRP PR	PRSB01	PRSSB01003	2 - 3	Subsurf	CHRYSENE	22.4		0.001	0.0224				
MidSouth MRP PR	PRSB01	PRSSB01003	2 - 3	Subsurf	DIBENZ[A,H]ANTHRACENE	5.72		1	5.72				
MidSouth MRP PR	PRSB01	PRSSB01003	2 - 3	Subsurf	INDENO[1,2,3-CD]PYRENE	30		0.1	3	**49.5**	0.015	0.21	0.565
MidSouth MRP PR	PRSB01	PRSSB01004	3 - 4	Subsurf	BENZO[A]ANTHRACENE	2.38		0.1	0.238				
MidSouth MRP PR	PRSB01	PRSSB01004	3 - 4	Subsurf	BENZO[A]PYRENE	3.85	J	1	3.85				
MidSouth MRP PR	PRSB01	PRSSB01004	3 - 4	Subsurf	BENZO[B]FLUORANTHENE	4.52		0.1	0.452				
MidSouth MRP PR	PRSB01	PRSSB01004	3 - 4	Subsurf	BENZO[K]FLUORANTHENE	1.93		0.01	0.0193				
MidSouth MRP PR	PRSB01	PRSSB01004	3 - 4	Subsurf	CHRYSENE	3.05		0.001	0.00305				
MidSouth MRP PR	PRSB01	PRSSB01004	3 - 4	Subsurf	DIBENZ[A,H]ANTHRACENE	0.511		1	0.511				
MidSouth MRP PR	PRSB01	PRSSB01004	3 - 4	Subsurf	INDENO[1,2,3-CD]PYRENE	2.55		0.1	0.255	**5.33**	0.015	0.21	0.565
MidSouth MRP PR	PRSB01	PRSSB01005	4 - 5	Subsurf	BENZO[A]ANTHRACENE	25.6		0.1	2.56				
MidSouth MRP PR	PRSB01	PRSSB01005	4 - 5	Subsurf	BENZO[A]PYRENE	43	J	1	43				
MidSouth MRP PR	PRSB01	PRSSB01005	4 - 5	Subsurf	BENZO[B]FLUORANTHENE	45.4		0.1	4.54				
MidSouth MRP PR	PRSB01	PRSSB01005	4 - 5	Subsurf	BENZO[K]FLUORANTHENE	17.2		0.01	0.172				
MidSouth MRP PR	PRSB01	PRSSB01005	4 - 5	Subsurf	CHRYSENE	26		0.001	0.026				
MidSouth MRP PR	PRSB01	PRSSB01005	4 - 5	Subsurf	DIBENZ[A,H]ANTHRACENE	6.11		1	6.11				
MidSouth MRP PR	PRSB01	PRSSB01005	4 - 5	Subsurf	INDENO[1,2,3-CD]PYRENE	30.7		0.1	3.07	**59.5**	0.015	0.21	0.565
MidSouth MRP PR	PRSB01	PRSSB01006	5 - 6	Subsurf	BENZO[A]ANTHRACENE	2.59		0.1	0.259				
MidSouth MRP PR	PRSB01	PRSSB01006	5 - 6	Subsurf	BENZO[A]PYRENE	4.74	J	1	4.74				
MidSouth MRP PR	PRSB01	PRSSB01006	5 - 6	Subsurf	BENZO[B]FLUORANTHENE	4.88		0.1	0.488				
MidSouth MRP PR	PRSB01	PRSSB01006	5 - 6	Subsurf	BENZO[K]FLUORANTHENE	2.52		0.01	0.0252				
MidSouth MRP PR	PRSB01	PRSSB01006	5 - 6	Subsurf	CHRYSENE	3.35		0.001	0.00335				
MidSouth MRP PR	PRSB01	PRSSB01006	5 - 6	Subsurf	DIBENZ[A,H]ANTHRACENE	0.695		1	0.695				
MidSouth MRP PR	PRSB01	PRSSB01006	5 - 6	Subsurf	INDENO[1,2,3-CD]PYRENE	4.17		0.1	0.417	**6.63**	0.015	0.21	0.565
MidSouth MRP PR	PRSB01	PRSSB01008	6 - 8	Subsurf	BENZO[A]ANTHRACENE	0.228		0.1	0.0228				
MidSouth MRP PR	PRSB01	PRSSB01008	6 - 8	Subsurf	BENZO[A]PYRENE	0.39		1	0.39				
MidSouth MRP PR	PRSB01	PRSSB01008	6 - 8	Subsurf	BENZO[B]FLUORANTHENE	0.478		0.1	0.0478				
MidSouth MRP PR	PRSB01	PRSSB01008	6 - 8	Subsurf	BENZO[K]FLUORANTHENE	0.245		0.01	0.00245				
MidSouth MRP PR	PRSB01	PRSSB01008	6 - 8	Subsurf	CHRYSENE	0.365		0.001	0.000365				
MidSouth MRP PR	PRSB01	PRSSB01008	6 - 8	Subsurf	DIBENZ[A,H]ANTHRACENE	0.00239	U	1	0.001195				
MidSouth MRP PR	PRSB01	PRSSB01008	6 - 8	Subsurf	INDENO[1,2,3-CD]PYRENE	0.215		0.1	0.0215	0.486	0.015	0.21	0.565
MidSouth MRP PR	PRSB01	PRSSB01010	9 - 10	Subsurf	BENZO[A]ANTHRACENE	5.56	J	0.1	0.556				
MidSouth MRP PR	PRSB01	PRSSB01010	9 - 10	Subsurf	BENZO[A]PYRENE	10.4	J	1	10.4				
MidSouth MRP PR	PRSB01	PRSSB01010	9 - 10	Subsurf	BENZO[B]FLUORANTHENE	12.1	J	0.1	1.21				
MidSouth MRP PR	PRSB01	PRSSB01010	9 - 10	Subsurf	BENZO[K]FLUORANTHENE	4.37	J	0.01	0.0437				
MidSouth MRP PR	PRSB01	PRSSB01010	9 - 10	Subsurf	CHRYSENE	7.33	J	0.001	0.00733				
MidSouth MRP PR	PRSB01	PRSSB01010	9 - 10	Subsurf	DIBENZ[A,H]ANTHRACENE	1.19	J	1	1.19				
MidSouth MRP PR	PRSB01	PRSSB01010	9 - 10	Subsurf	INDENO[1,2,3-CD]PYRENE	6.05	J	0.1	0.605	**14**	0.015	0.21	0.565
MidSouth MRP PR	PRSB01	PRSSB01012	10 - 12	Subsurf	BENZO[A]ANTHRACENE	2.72		0.1	0.272				
MidSouth MRP PR	PRSB01	PRSSB01012	10 - 12	Subsurf	BENZO[A]PYRENE	4.74		1	4.74				
MidSouth MRP PR	PRSB01	PRSSB01012	10 - 12	Subsurf	BENZO[B]FLUORANTHENE	5.73		0.1	0.573				
MidSouth MRP PR	PRSB01	PRSSB01012	10 - 12	Subsurf	BENZO[K]FLUORANTHENE	2.19		0.01	0.0219				
MidSouth MRP PR	PRSB01	PRSSB01012	10 - 12	Subsurf	CHRYSENE	3.96		0.001	0.00396				
MidSouth MRP PR	PRSB01	PRSSB01012	10 - 12	Subsurf	DIBENZ[A,H]ANTHRACENE	0.0234	U	1	0.0117				
MidSouth MRP PR	PRSB01	PRSSB01012	10 - 12	Subsurf	INDENO[1,2,3-CD]PYRENE	2.8		0.1	0.28	**5.9**	0.015	0.21	0.565
MidSouth MRP PR	PRSB01	PRSSB01014	12 - 14	Subsurf	BENZO[A]ANTHRACENE	62.2		0.1	6.22				
MidSouth MRP PR	PRSB01	PRSSB01014	12 - 14	Subsurf	BENZO[A]PYRENE	84		1	84				
MidSouth MRP PR	PRSB01	PRSSB01014	12 - 14	Subsurf	BENZO[B]FLUORANTHENE	99.7		0.1	9.97				
MidSouth MRP PR	PRSB01	PRSSB01014	12 - 14	Subsurf	BENZO[K]FLUORANTHENE	37.4		0.01	0.374				
MidSouth MRP PR	PRSB01	PRSSB01014	12 - 14	Subsurf	CHRYSENE	66.8		0.001	0.0668				
MidSouth MRP PR	PRSB01	PRSSB01014	12 - 14	Subsurf	DIBENZ[A,H]ANTHRACENE	0.128	U	1	0.064				
MidSouth MRP PR	PRSB01	PRSSB01014	12 - 14	Subsurf	INDENO[1,2,3-CD]PYRENE	36.6		0.1	3.66				
MidSouth MRP PR	PRSB02	PRSSB02002	1 - 2	Subsurf	BENZO[A]ANTHRACENE	0.758		0.1	0.0758	**98.2**	0.015	0.21	0.565
MidSouth MRP PR	PRSB02	PRSSB02002	1 - 2	Subsurf	BENZO[A]PYRENE	1.01		1	1.01				
MidSouth MRP PR	PRSB02	PRSSB02002	1 - 2	Subsurf	BENZO[B]FLUORANTHENE	1.14		0.1	0.114				

Appendix C
Benzo(a)pyrene Equivalent Calculations for Subsurface Soil
UXO 1 and 2 NSA Mid-South

MidSouth MRP PR	PRSB02	PRSSB02002	1 - 2	Subsurf	BENZO[K]FLUORANTHENE	0.68	0.01	0.0068				
MidSouth MRP PR	PRSB02	PRSSB02002	1 - 2	Subsurf	CHRYSENE	0.778	0.001	0.000778				
MidSouth MRP PR	PRSB02	PRSSB02002	1 - 2	Subsurf	DIBENZ[A,H]ANTHRACENE	0.00245 U	1	0.001225				
MidSouth MRP PR	PRSB02	PRSSB02002	1 - 2	Subsurf	INDENO[1,2,3-CD]PYRENE	0.39	0.1	0.039	**1.25**	0.015	0.21	0.565
MidSouth MRP PR	PRSB02	PRSSB02003	2 - 3	Subsurf	BENZO[A]ANTHRACENE	0.347	0.1	0.0347				
MidSouth MRP PR	PRSB02	PRSSB02003	2 - 3	Subsurf	BENZO[A]PYRENE	0.619	1	0.619				
MidSouth MRP PR	PRSB02	PRSSB02003	2 - 3	Subsurf	BENZO[B]FLUORANTHENE	0.745	0.1	0.0745				
MidSouth MRP PR	PRSB02	PRSSB02003	2 - 3	Subsurf	BENZO[K]FLUORANTHENE	0.359	0.01	0.00359				
MidSouth MRP PR	PRSB02	PRSSB02003	2 - 3	Subsurf	CHRYSENE	0.5	0.001	0.0005				
MidSouth MRP PR	PRSB02	PRSSB02003	2 - 3	Subsurf	DIBENZ[A,H]ANTHRACENE	0.00254 U	1	0.00127				
MidSouth MRP PR	PRSB02	PRSSB02003	2 - 3	Subsurf	INDENO[1,2,3-CD]PYRENE	0.243	0.1	0.0243	**0.758**	0.015	0.21	0.565
MidSouth MRP PR	PRSB02	PRSSB02004	3 - 4	Subsurf	BENZO[A]ANTHRACENE	0.795	0.1	0.0795				
MidSouth MRP PR	PRSB02	PRSSB02004	3 - 4	Subsurf	BENZO[A]PYRENE	1.2	1	1.2				
MidSouth MRP PR	PRSB02	PRSSB02004	3 - 4	Subsurf	BENZO[B]FLUORANTHENE	1.42	0.1	0.142				
MidSouth MRP PR	PRSB02	PRSSB02004	3 - 4	Subsurf	BENZO[K]FLUORANTHENE	0.86	0.01	0.0086				
MidSouth MRP PR	PRSB02	PRSSB02004	3 - 4	Subsurf	CHRYSENE	0.874	0.001	0.000874				
MidSouth MRP PR	PRSB02	PRSSB02004	3 - 4	Subsurf	DIBENZ[A,H]ANTHRACENE	0.00254 U	1	0.00127				
MidSouth MRP PR	PRSB02	PRSSB02004	3 - 4	Subsurf	INDENO[1,2,3-CD]PYRENE	0.441	0.1	0.0441	**1.48**	0.015	0.21	0.565
MidSouth MRP PR	PRSB02	PRSSB02005	4 - 5	Subsurf	BENZO[A]ANTHRACENE	0.414	0.1	0.0414				
MidSouth MRP PR	PRSB02	PRSSB02005	4 - 5	Subsurf	BENZO[A]PYRENE	0.794	1	0.794				
MidSouth MRP PR	PRSB02	PRSSB02005	4 - 5	Subsurf	BENZO[B]FLUORANTHENE	0.976	0.1	0.0976				
MidSouth MRP PR	PRSB02	PRSSB02005	4 - 5	Subsurf	BENZO[K]FLUORANTHENE	0.481	0.01	0.00481				
MidSouth MRP PR	PRSB02	PRSSB02005	4 - 5	Subsurf	CHRYSENE	0.615	0.001	0.000615				
MidSouth MRP PR	PRSB02	PRSSB02005	4 - 5	Subsurf	DIBENZ[A,H]ANTHRACENE	0.00256 U	1	0.00128				
MidSouth MRP PR	PRSB02	PRSSB02005	4 - 5	Subsurf	INDENO[1,2,3-CD]PYRENE	0.29	0.1	0.029	**0.969**	0.015	0.21	0.565
MidSouth MRP PR	PRSB02	PRSSB02006	5 - 6	Subsurf	BENZO[A]ANTHRACENE	0.947 J	0.1	0.0947				
MidSouth MRP PR	PRSB02	PRSSB02006	5 - 6	Subsurf	BENZO[A]PYRENE	2.3 J	1	2.3				
MidSouth MRP PR	PRSB02	PRSSB02006	5 - 6	Subsurf	BENZO[B]FLUORANTHENE	2.66 J	0.1	0.266				
MidSouth MRP PR	PRSB02	PRSSB02006	5 - 6	Subsurf	BENZO[K]FLUORANTHENE	1.08 J	0.01	0.0108				
MidSouth MRP PR	PRSB02	PRSSB02006	5 - 6	Subsurf	CHRYSENE	1.26 J	0.001	0.00126				
MidSouth MRP PR	PRSB02	PRSSB02006	5 - 6	Subsurf	DIBENZ[A,H]ANTHRACENE	0.334 J	1	0.334				
MidSouth MRP PR	PRSB02	PRSSB02006	5 - 6	Subsurf	INDENO[1,2,3-CD]PYRENE	1.88 J	0.1	0.188	**3.19**	0.015	0.21	0.565
MidSouth MRP PR	PRSB02	PRSSB02008	6 - 8	Subsurf	BENZO[A]ANTHRACENE	0.0809	0.1	0.00809				
MidSouth MRP PR	PRSB02	PRSSB02008	6 - 8	Subsurf	BENZO[A]PYRENE	0.114	1	0.114				
MidSouth MRP PR	PRSB02	PRSSB02008	6 - 8	Subsurf	BENZO[B]FLUORANTHENE	0.122	0.1	0.0122				
MidSouth MRP PR	PRSB02	PRSSB02008	6 - 8	Subsurf	BENZO[K]FLUORANTHENE	0.068	0.01	0.00068				
MidSouth MRP PR	PRSB02	PRSSB02008	6 - 8	Subsurf	CHRYSENE	0.113	0.001	0.000113				
MidSouth MRP PR	PRSB02	PRSSB02008	6 - 8	Subsurf	DIBENZ[A,H]ANTHRACENE	0.00251 U	1	0.001255				
MidSouth MRP PR	PRSB02	PRSSB02008	6 - 8	Subsurf	INDENO[1,2,3-CD]PYRENE	0.0725	0.1	0.00725	0.144	0.015	0.21	0.565
MidSouth MRP PR	PRSB02	PRSSB02010	8 - 10	Subsurf	BENZO[A]ANTHRACENE	0.0342	0.1	0.00342				
MidSouth MRP PR	PRSB02	PRSSB02010	8 - 10	Subsurf	BENZO[A]PYRENE	0.0497	1	0.0497				
MidSouth MRP PR	PRSB02	PRSSB02010	8 - 10	Subsurf	BENZO[B]FLUORANTHENE	0.0577	0.1	0.00577				
MidSouth MRP PR	PRSB02	PRSSB02010	8 - 10	Subsurf	BENZO[K]FLUORANTHENE	0.032	0.01	0.00032				
MidSouth MRP PR	PRSB02	PRSSB02010	8 - 10	Subsurf	CHRYSENE	0.0391	0.001	0.0000391				
MidSouth MRP PR	PRSB02	PRSSB02010	8 - 10	Subsurf	DIBENZ[A,H]ANTHRACENE	0.00252 U	1	0.00126				
MidSouth MRP PR	PRSB02	PRSSB02010	8 - 10	Subsurf	INDENO[1,2,3-CD]PYRENE	0.0314	0.1	0.00314	0.0636	0.015	0.21	0.565
MidSouth MRP PR	PRSB02	PRSSB02012	10 - 12	Subsurf	BENZO[A]ANTHRACENE	0.0123	0.1	0.00123				
MidSouth MRP PR	PRSB02	PRSSB02012	10 - 12	Subsurf	BENZO[A]PYRENE	0.0118	1	0.0118				
MidSouth MRP PR	PRSB02	PRSSB02012	10 - 12	Subsurf	BENZO[B]FLUORANTHENE	0.0279	0.1	0.00279				
MidSouth MRP PR	PRSB02	PRSSB02012	10 - 12	Subsurf	BENZO[K]FLUORANTHENE	0.00695	0.01	0.0000695				
MidSouth MRP PR	PRSB02	PRSSB02012	10 - 12	Subsurf	CHRYSENE	0.0152	0.001	0.0000152				
MidSouth MRP PR	PRSB02	PRSSB02012	10 - 12	Subsurf	DIBENZ[A,H]ANTHRACENE	0.00259 U	1	0.001295				
MidSouth MRP PR	PRSB02	PRSSB02012	10 - 12	Subsurf	INDENO[1,2,3-CD]PYRENE	0.00785	0.1	0.000785	0.018	0.015	0.21	0.565
MidSouth MRP PR	PRSB02	PRSSB02014	12 - 14	Subsurf	BENZO[A]ANTHRACENE	0.0272	0.1	0.00272				
MidSouth MRP PR	PRSB02	PRSSB02014	12 - 14	Subsurf	BENZO[A]PYRENE	0.0341	1	0.0341				
MidSouth MRP PR	PRSB02	PRSSB02014	12 - 14	Subsurf	BENZO[B]FLUORANTHENE	0.0519	0.1	0.00519				
MidSouth MRP PR	PRSB02	PRSSB02014	12 - 14	Subsurf	BENZO[K]FLUORANTHENE	0.0174	0.01	0.000174				
MidSouth MRP PR	PRSB02	PRSSB02014	12 - 14	Subsurf	CHRYSENE	0.0344	0.001	0.0000344				
MidSouth MRP PR	PRSB02	PRSSB02014	12 - 14	Subsurf	DIBENZ[A,H]ANTHRACENE	0.00256 U	1	0.00128				
MidSouth MRP PR	PRSB02	PRSSB02014	12 - 14	Subsurf	INDENO[1,2,3-CD]PYRENE	0.0225	0.1	0.00225	0.0457	0.015	0.21	0.565
MidSouth MRP PR	PRSB03	PRSSB03002	1 - 2	Subsurf	BENZO[A]ANTHRACENE	3.42 J	0.1	0.342				
MidSouth MRP PR	PRSB03	PRSSB03002	1 - 2	Subsurf	BENZO[A]PYRENE	4.06 J	1	4.06				
MidSouth MRP PR	PRSB03	PRSSB03002	1 - 2	Subsurf	BENZO[B]FLUORANTHENE	4.33 J	0.1	0.433				
MidSouth MRP PR	PRSB03	PRSSB03002	1 - 2	Subsurf	BENZO[K]FLUORANTHENE	2.66 J	0.01	0.0266				
MidSouth MRP PR	PRSB03	PRSSB03002	1 - 2	Subsurf	CHRYSENE	3.35 J	0.001	0.00335				
MidSouth MRP PR	PRSB03	PRSSB03002	1 - 2	Subsurf	DIBENZ[A,H]ANTHRACENE	0.0124 U	1	0.0062				
MidSouth MRP PR	PRSB03	PRSSB03002	1 - 2	Subsurf	INDENO[1,2,3-CD]PYRENE	1.57 J	0.1	0.157	**5.03**	0.015	0.21	0.565
MidSouth MRP PR	PRSB03	PRSSB03003	2 - 3	Subsurf	BENZO[A]ANTHRACENE	0.994	0.1	0.0994				
MidSouth MRP PR	PRSB03	PRSSB03003	2 - 3	Subsurf	BENZO[A]PYRENE	1.38	1	1.38				

MidSouth MRP PR	PRSB03	PRSSB03003	2 - 3	Subsurf	BENZO[B]FLUORANTHENE	1.47	0.1	0.147				
MidSouth MRP PR	PRSB03	PRSSB03003	2 - 3	Subsurf	BENZO[K]FLUORANTHENE	0.939	0.01	0.00939				
MidSouth MRP PR	PRSB03	PRSSB03003	2 - 3	Subsurf	CHRYSENE	1.06	0.001	0.00106				
MidSouth MRP PR	PRSB03	PRSSB03003	2 - 3	Subsurf	DIBENZ[A,H]ANTHRACENE	0.00254 U	1	0.00127				
MidSouth MRP PR	PRSB03	PRSSB03003	2 - 3	Subsurf	INDENO[1,2,3-CD]PYRENE	0.547	0.1	0.0547	**1.69**	0.015	0.21	0.565
MidSouth MRP PR	PRSB03	PRSSB03004	3 - 4	Subsurf	BENZO[A]ANTHRACENE	0.853	0.1	0.0853				
MidSouth MRP PR	PRSB03	PRSSB03004	3 - 4	Subsurf	BENZO[A]PYRENE	1.39	1	1.39				
MidSouth MRP PR	PRSB03	PRSSB03004	3 - 4	Subsurf	BENZO[B]FLUORANTHENE	1.58	0.1	0.158				
MidSouth MRP PR	PRSB03	PRSSB03004	3 - 4	Subsurf	BENZO[K]FLUORANTHENE	0.869	0.01	0.00869				
MidSouth MRP PR	PRSB03	PRSSB03004	3 - 4	Subsurf	CHRYSENE	1.18	0.001	0.00118				
MidSouth MRP PR	PRSB03	PRSSB03004	3 - 4	Subsurf	DIBENZ[A,H]ANTHRACENE	0.00255 U	1	0.001275				
MidSouth MRP PR	PRSB03	PRSSB03004	3 - 4	Subsurf	INDENO[1,2,3-CD]PYRENE	0.51	0.1	0.051	**1.7**	0.015	0.21	0.565
MidSouth MRP PR	PRSB03	PRSSB03005	4 - 5	Subsurf	BENZO[A]ANTHRACENE	0.302 J	0.1	0.0302				
MidSouth MRP PR	PRSB03	PRSSB03005	4 - 5	Subsurf	BENZO[A]PYRENE	0.69 J	1	0.69				
MidSouth MRP PR	PRSB03	PRSSB03005	4 - 5	Subsurf	BENZO[B]FLUORANTHENE	0.722 J	0.1	0.0722				
MidSouth MRP PR	PRSB03	PRSSB03005	4 - 5	Subsurf	BENZO[K]FLUORANTHENE	0.339 J	0.01	0.00339				
MidSouth MRP PR	PRSB03	PRSSB03005	4 - 5	Subsurf	CHRYSENE	0.436 J	0.001	0.000436				
MidSouth MRP PR	PRSB03	PRSSB03005	4 - 5	Subsurf	DIBENZ[A,H]ANTHRACENE	0.12 J	1	0.12				
MidSouth MRP PR	PRSB03	PRSSB03005	4 - 5	Subsurf	INDENO[1,2,3-CD]PYRENE	0.664 J	0.1	0.0664	**0.983**	0.015	0.21	0.565
MidSouth MRP PR	PRSB03	PRSSB03006	5 - 6	Subsurf	BENZO[A]ANTHRACENE	0.201	0.1	0.0201				
MidSouth MRP PR	PRSB03	PRSSB03006	5 - 6	Subsurf	BENZO[A]PYRENE	0.287	1	0.287				
MidSouth MRP PR	PRSB03	PRSSB03006	5 - 6	Subsurf	BENZO[B]FLUORANTHENE	0.338	0.1	0.0338				
MidSouth MRP PR	PRSB03	PRSSB03006	5 - 6	Subsurf	BENZO[K]FLUORANTHENE	0.175	0.01	0.00175				
MidSouth MRP PR	PRSB03	PRSSB03006	5 - 6	Subsurf	CHRYSENE	0.219	0.001	0.000219				
MidSouth MRP PR	PRSB03	PRSSB03006	5 - 6	Subsurf	DIBENZ[A,H]ANTHRACENE	0.00259 U	1	0.001295				
MidSouth MRP PR	PRSB03	PRSSB03006	5 - 6	Subsurf	INDENO[1,2,3-CD]PYRENE	0.105	0.1	0.0105	0.355	0.015	0.21	0.565
MidSouth MRP PR	PRSB03	PRSSB03008	6 - 8	Subsurf	BENZO[A]ANTHRACENE	0.36	0.1	0.036				
MidSouth MRP PR	PRSB03	PRSSB03008	6 - 8	Subsurf	BENZO[A]PYRENE	0.453	1	0.453				
MidSouth MRP PR	PRSB03	PRSSB03008	6 - 8	Subsurf	BENZO[B]FLUORANTHENE	0.554	0.1	0.0554				
MidSouth MRP PR	PRSB03	PRSSB03008	6 - 8	Subsurf	BENZO[K]FLUORANTHENE	0.207	0.01	0.00207				
MidSouth MRP PR	PRSB03	PRSSB03008	6 - 8	Subsurf	CHRYSENE	0.447	0.001	0.000447				
MidSouth MRP PR	PRSB03	PRSSB03008	6 - 8	Subsurf	DIBENZ[A,H]ANTHRACENE	0.0602	1	0.0602				
MidSouth MRP PR	PRSB03	PRSSB03008	6 - 8	Subsurf	INDENO[1,2,3-CD]PYRENE	0.332	0.1	0.0332	**0.64**	0.015	0.21	0.565
MidSouth MRP PR	PRSB03	PRSSB03010	8 - 10	Subsurf	BENZO[A]ANTHRACENE	0.736	0.1	0.0736				
MidSouth MRP PR	PRSB03	PRSSB03010	8 - 10	Subsurf	BENZO[A]PYRENE	0.868	1	0.868				
MidSouth MRP PR	PRSB03	PRSSB03010	8 - 10	Subsurf	BENZO[B]FLUORANTHENE	1.01	0.1	0.101				
MidSouth MRP PR	PRSB03	PRSSB03010	8 - 10	Subsurf	BENZO[K]FLUORANTHENE	0.409	0.01	0.00409				
MidSouth MRP PR	PRSB03	PRSSB03010	8 - 10	Subsurf	CHRYSENE	0.905	0.001	0.000905				
MidSouth MRP PR	PRSB03	PRSSB03010	8 - 10	Subsurf	DIBENZ[A,H]ANTHRACENE	0.12	1	0.12				
MidSouth MRP PR	PRSB03	PRSSB03010	8 - 10	Subsurf	INDENO[1,2,3-CD]PYRENE	0.619	0.1	0.0619	**1.23**	0.015	0.21	0.565
MidSouth MRP PR	PRSB03	PRSSB03012	10 - 12	Subsurf	BENZO[A]ANTHRACENE	0.208	0.1	0.0208				
MidSouth MRP PR	PRSB03	PRSSB03012	10 - 12	Subsurf	BENZO[A]PYRENE	0.361	1	0.361				
MidSouth MRP PR	PRSB03	PRSSB03012	10 - 12	Subsurf	BENZO[B]FLUORANTHENE	0.395	0.1	0.0395				
MidSouth MRP PR	PRSB03	PRSSB03012	10 - 12	Subsurf	BENZO[K]FLUORANTHENE	0.185	0.01	0.00185				
MidSouth MRP PR	PRSB03	PRSSB03012	10 - 12	Subsurf	CHRYSENE	0.312	0.001	0.000312				
MidSouth MRP PR	PRSB03	PRSSB03012	10 - 12	Subsurf	DIBENZ[A,H]ANTHRACENE	0.0522	1	0.0522				
MidSouth MRP PR	PRSB03	PRSSB03012	10 - 12	Subsurf	INDENO[1,2,3-CD]PYRENE	0.285	0.1	0.0285	0.504	0.015	0.21	0.565
MidSouth MRP PR	PRSB03	PRSSB03014	12 - 14	Subsurf	BENZO[A]ANTHRACENE	0.169	0.1	0.0169				
MidSouth MRP PR	PRSB03	PRSSB03014	12 - 14	Subsurf	BENZO[A]PYRENE	0.241	1	0.241				
MidSouth MRP PR	PRSB03	PRSSB03014	12 - 14	Subsurf	BENZO[B]FLUORANTHENE	0.277	0.1	0.0277				
MidSouth MRP PR	PRSB03	PRSSB03014	12 - 14	Subsurf	BENZO[K]FLUORANTHENE	0.122	0.01	0.00122				
MidSouth MRP PR	PRSB03	PRSSB03014	12 - 14	Subsurf	CHRYSENE	0.23 J	0.001	0.00023				
MidSouth MRP PR	PRSB03	PRSSB03014	12 - 14	Subsurf	DIBENZ[A,H]ANTHRACENE	0.034	1	0.034				
MidSouth MRP PR	PRSB03	PRSSB03014	12 - 14	Subsurf	INDENO[1,2,3-CD]PYRENE	0.184 J	0.1	0.0184	0.339	0.015	0.21	0.565
MidSouth MRP PR	PRSB03	PRSSB03016	14 - 16	Subsurf	BENZO[A]ANTHRACENE	0.518	0.1	0.0518				
MidSouth MRP PR	PRSB03	PRSSB03016	14 - 16	Subsurf	BENZO[A]PYRENE	0.87	1	0.87				
MidSouth MRP PR	PRSB03	PRSSB03016	14 - 16	Subsurf	BENZO[B]FLUORANTHENE	0.985	0.1	0.0985				
MidSouth MRP PR	PRSB03	PRSSB03016	14 - 16	Subsurf	BENZO[K]FLUORANTHENE	0.397	0.01	0.00397				
MidSouth MRP PR	PRSB03	PRSSB03016	14 - 16	Subsurf	CHRYSENE	0.702	0.001	0.000702				
MidSouth MRP PR	PRSB03	PRSSB03016	14 - 16	Subsurf	DIBENZ[A,H]ANTHRACENE	0.138	1	0.138				
MidSouth MRP PR	PRSB03	PRSSB03016	14 - 16	Subsurf	INDENO[1,2,3-CD]PYRENE	0.68	0.1	0.068	**1.23**	0.015	0.21	0.565
MidSouth MRP PR	PRSB04	PRSSB04002	1 - 2	Subsurf	BENZO[A]ANTHRACENE	2.24	0.1	0.224				
MidSouth MRP PR	PRSB04	PRSSB04002	1 - 2	Subsurf	BENZO[A]PYRENE	4.11	1	4.11				
MidSouth MRP PR	PRSB04	PRSSB04002	1 - 2	Subsurf	BENZO[B]FLUORANTHENE	4.04	0.1	0.404				
MidSouth MRP PR	PRSB04	PRSSB04002	1 - 2	Subsurf	BENZO[K]FLUORANTHENE	1.93	0.01	0.0193				
MidSouth MRP PR	PRSB04	PRSSB04002	1 - 2	Subsurf	CHRYSENE	3.08	0.001	0.00308				
MidSouth MRP PR	PRSB04	PRSSB04002	1 - 2	Subsurf	DIBENZ[A,H]ANTHRACENE	0.562	1	0.562				
MidSouth MRP PR	PRSB04	PRSSB04002	1 - 2	Subsurf	INDENO[1,2,3-CD]PYRENE	2.84	0.1	0.284	**5.61**	0.015	0.21	0.565
MidSouth MRP PR	PRSB04	PRSSB04003	2 - 3	Subsurf	BENZO[A]ANTHRACENE	1.26	0.1	0.126				

MidSouth MRP PR	PRSB04	PRSSB04003	2 - 3	Subsurf	BENZO[A]PYRENE	1.41	1	1.41				
MidSouth MRP PR	PRSB04	PRSSB04003	2 - 3	Subsurf	BENZO[B]FLUORANTHENE	1.47	0.1	0.147				
MidSouth MRP PR	PRSB04	PRSSB04003	2 - 3	Subsurf	BENZO[K]FLUORANTHENE	0.76	0.01	0.0076				
MidSouth MRP PR	PRSB04	PRSSB04003	2 - 3	Subsurf	CHRYSENE	1.5	0.001	0.0015				
MidSouth MRP PR	PRSB04	PRSSB04003	2 - 3	Subsurf	DIBENZ[A,H]ANTHRACENE	0.204	1	0.204				
MidSouth MRP PR	PRSB04	PRSSB04003	2 - 3	Subsurf	INDENO[1,2,3-CD]PYRENE	1.02	0.1	0.102	**2**	0.015	0.21	0.565
MidSouth MRP PR	PRSB04	PRSSB04004	3 - 4	Subsurf	BENZO[A]ANTHRACENE	1.61	0.1	0.161				
MidSouth MRP PR	PRSB04	PRSSB04004	3 - 4	Subsurf	BENZO[A]PYRENE	1.89	1	1.89				
MidSouth MRP PR	PRSB04	PRSSB04004	3 - 4	Subsurf	BENZO[B]FLUORANTHENE	2.12	0.1	0.212				
MidSouth MRP PR	PRSB04	PRSSB04004	3 - 4	Subsurf	BENZO[K]FLUORANTHENE	0.855	0.01	0.00855				
MidSouth MRP PR	PRSB04	PRSSB04004	3 - 4	Subsurf	CHRYSENE	1.89	0.001	0.00189				
MidSouth MRP PR	PRSB04	PRSSB04004	3 - 4	Subsurf	DIBENZ[A,H]ANTHRACENE	0.297	1	0.297				
MidSouth MRP PR	PRSB04	PRSSB04004	3 - 4	Subsurf	INDENO[1,2,3-CD]PYRENE	1.5	0.1	0.15	**2.72**	0.015	0.21	0.565
MidSouth MRP PR	PRSB04	PRSSB04005	4 - 5	Subsurf	BENZO[A]ANTHRACENE	0.922 J	0.1	0.0922				
MidSouth MRP PR	PRSB04	PRSSB04005	4 - 5	Subsurf	BENZO[A]PYRENE	1.57 J	1	1.57				
MidSouth MRP PR	PRSB04	PRSSB04005	4 - 5	Subsurf	BENZO[B]FLUORANTHENE	1.64 J	0.1	0.164				
MidSouth MRP PR	PRSB04	PRSSB04005	4 - 5	Subsurf	BENZO[K]FLUORANTHENE	0.735 J	0.01	0.00735				
MidSouth MRP PR	PRSB04	PRSSB04005	4 - 5	Subsurf	CHRYSENE	1.22 J	0.001	0.00122				
MidSouth MRP PR	PRSB04	PRSSB04005	4 - 5	Subsurf	DIBENZ[A,H]ANTHRACENE	0.264 J	1	0.264				
MidSouth MRP PR	PRSB04	PRSSB04005	4 - 5	Subsurf	INDENO[1,2,3-CD]PYRENE	1.33 J	0.1	0.133	**2.23**	0.015	0.21	0.565
MidSouth MRP PR	PRSB04	PRSSB04006	5 - 6	Subsurf	BENZO[A]ANTHRACENE	0.935	0.1	0.0935				
MidSouth MRP PR	PRSB04	PRSSB04006	5 - 6	Subsurf	BENZO[A]PYRENE	1.37	1	1.37				
MidSouth MRP PR	PRSB04	PRSSB04006	5 - 6	Subsurf	BENZO[B]FLUORANTHENE	1.44	0.1	0.144				
MidSouth MRP PR	PRSB04	PRSSB04006	5 - 6	Subsurf	BENZO[K]FLUORANTHENE	0.649	0.01	0.00649				
MidSouth MRP PR	PRSB04	PRSSB04006	5 - 6	Subsurf	CHRYSENE	1.21	0.001	0.00121				
MidSouth MRP PR	PRSB04	PRSSB04006	5 - 6	Subsurf	DIBENZ[A,H]ANTHRACENE	0.211	1	0.211				
MidSouth MRP PR	PRSB04	PRSSB04006	5 - 6	Subsurf	INDENO[1,2,3-CD]PYRENE	1.09	0.1	0.109	**1.94**	0.015	0.21	0.565
MidSouth MRP PR	PRSB04	PRSSB04008	6 - 8	Subsurf	BENZO[A]ANTHRACENE	1.24	0.1	0.124				
MidSouth MRP PR	PRSB04	PRSSB04008	6 - 8	Subsurf	BENZO[A]PYRENE	1.19	1	1.19				
MidSouth MRP PR	PRSB04	PRSSB04008	6 - 8	Subsurf	BENZO[B]FLUORANTHENE	1.28	0.1	0.128				
MidSouth MRP PR	PRSB04	PRSSB04008	6 - 8	Subsurf	BENZO[K]FLUORANTHENE	0.597	0.01	0.00597				
MidSouth MRP PR	PRSB04	PRSSB04008	6 - 8	Subsurf	CHRYSENE	1.38	0.001	0.00138				
MidSouth MRP PR	PRSB04	PRSSB04008	6 - 8	Subsurf	DIBENZ[A,H]ANTHRACENE	0.15	1	0.15				
MidSouth MRP PR	PRSB04	PRSSB04008	6 - 8	Subsurf	INDENO[1,2,3-CD]PYRENE	0.755	0.1	0.0755	**1.67**	0.015	0.21	0.565
MidSouth MRP PR	PRSB04	PRSSB04010	8 - 10	Subsurf	BENZO[A]ANTHRACENE	0.0249	0.1	0.00249				
MidSouth MRP PR	PRSB04	PRSSB04010	8 - 10	Subsurf	BENZO[A]PYRENE	0.0264	1	0.0264				
MidSouth MRP PR	PRSB04	PRSSB04010	8 - 10	Subsurf	BENZO[B]FLUORANTHENE	0.0397	0.1	0.00397				
MidSouth MRP PR	PRSB04	PRSSB04010	8 - 10	Subsurf	BENZO[K]FLUORANTHENE	0.016	0.01	0.00016				
MidSouth MRP PR	PRSB04	PRSSB04010	8 - 10	Subsurf	CHRYSENE	0.0257	0.001	0.0000257				
MidSouth MRP PR	PRSB04	PRSSB04010	8 - 10	Subsurf	DIBENZ[A,H]ANTHRACENE	0.004	1	0.004				
MidSouth MRP PR	PRSB04	PRSSB04010	8 - 10	Subsurf	INDENO[1,2,3-CD]PYRENE	0.0214	0.1	0.00214	0.0392	0.015	0.21	0.565
MidSouth MRP PR	PRSB04	PRSSB04012	10 - 12	Subsurf	BENZO[A]ANTHRACENE	0.0589	0.1	0.00589				
MidSouth MRP PR	PRSB04	PRSSB04012	10 - 12	Subsurf	BENZO[A]PYRENE	0.0981	1	0.0981				
MidSouth MRP PR	PRSB04	PRSSB04012	10 - 12	Subsurf	BENZO[B]FLUORANTHENE	0.107	0.1	0.0107				
MidSouth MRP PR	PRSB04	PRSSB04012	10 - 12	Subsurf	BENZO[K]FLUORANTHENE	0.0618	0.01	0.000618				
MidSouth MRP PR	PRSB04	PRSSB04012	10 - 12	Subsurf	CHRYSENE	0.0897	0.001	0.0000897				
MidSouth MRP PR	PRSB04	PRSSB04012	10 - 12	Subsurf	DIBENZ[A,H]ANTHRACENE	0.00257 U	1	0.001285				
MidSouth MRP PR	PRSB04	PRSSB04012	10 - 12	Subsurf	INDENO[1,2,3-CD]PYRENE	0.0752	0.1	0.00752	0.124	0.015	0.21	0.565
MidSouth MRP PR	PRSB04	PRSSB04014	12 - 14	Subsurf	BENZO[A]ANTHRACENE	0.0608	0.1	0.00608				
MidSouth MRP PR	PRSB04	PRSSB04014	12 - 14	Subsurf	BENZO[A]PYRENE	0.0698	1	0.0698				
MidSouth MRP PR	PRSB04	PRSSB04014	12 - 14	Subsurf	BENZO[B]FLUORANTHENE	0.0913	0.1	0.00913				
MidSouth MRP PR	PRSB04	PRSSB04014	12 - 14	Subsurf	BENZO[K]FLUORANTHENE	0.0331	0.01	0.000331				
MidSouth MRP PR	PRSB04	PRSSB04014	12 - 14	Subsurf	CHRYSENE	0.0622	0.001	0.0000622				
MidSouth MRP PR	PRSB04	PRSSB04014	12 - 14	Subsurf	DIBENZ[A,H]ANTHRACENE	0.00254 U	1	0.00127				
MidSouth MRP PR	PRSB04	PRSSB04014	12 - 14	Subsurf	INDENO[1,2,3-CD]PYRENE	0.0525	0.1	0.00525	0.0919	0.015	0.21	0.565
MidSouth MRP PR	PRSB05	PRSSB05002	1 - 2	Subsurf	BENZO[A]ANTHRACENE	3.15 J	0.1	0.315				
MidSouth MRP PR	PRSB05	PRSSB05002	1 - 2	Subsurf	BENZO[A]PYRENE	3.4 J	1	3.4				
MidSouth MRP PR	PRSB05	PRSSB05002	1 - 2	Subsurf	BENZO[B]FLUORANTHENE	4.13 J	0.1	0.413				
MidSouth MRP PR	PRSB05	PRSSB05002	1 - 2	Subsurf	BENZO[K]FLUORANTHENE	1.51 J	0.01	0.0151				
MidSouth MRP PR	PRSB05	PRSSB05002	1 - 2	Subsurf	CHRYSENE	3.3 J	0.001	0.0033				
MidSouth MRP PR	PRSB05	PRSSB05002	1 - 2	Subsurf	DIBENZ[A,H]ANTHRACENE	0.489 J	1	0.489				
MidSouth MRP PR	PRSB05	PRSSB05002	1 - 2	Subsurf	INDENO[1,2,3-CD]PYRENE	2.56 J	0.1	0.256	**4.89**	0.015	0.21	0.565
MidSouth MRP PR	PRSB05	PRSSB05003	2 - 3	Subsurf	BENZO[A]ANTHRACENE	1.02 J	0.1	0.102				
MidSouth MRP PR	PRSB05	PRSSB05003	2 - 3	Subsurf	BENZO[A]PYRENE	1.38 J	1	1.38				
MidSouth MRP PR	PRSB05	PRSSB05003	2 - 3	Subsurf	BENZO[B]FLUORANTHENE	1.57 J	0.1	0.157				
MidSouth MRP PR	PRSB05	PRSSB05003	2 - 3	Subsurf	BENZO[K]FLUORANTHENE	0.655 J	0.01	0.00655				
MidSouth MRP PR	PRSB05	PRSSB05003	2 - 3	Subsurf	CHRYSENE	1.3 J	0.001	0.0013				
MidSouth MRP PR	PRSB05	PRSSB05003	2 - 3	Subsurf	DIBENZ[A,H]ANTHRACENE	0.218 J	1	0.218				
MidSouth MRP PR	PRSB05	PRSSB05003	2 - 3	Subsurf	INDENO[1,2,3-CD]PYRENE	1.12 J	0.1	0.112	**1.98**	0.015	0.21	0.565

MidSouth MRP PR	PRSB05	PRSSB05004	3 - 4	Subsurf	BENZO[A]ANTHRACENE	0.913 J	0.1	0.0913				
MidSouth MRP PR	PRSB05	PRSSB05004	3 - 4	Subsurf	BENZO[A]PYRENE	1.31	1	1.31				
MidSouth MRP PR	PRSB05	PRSSB05004	3 - 4	Subsurf	BENZO[B]FLUORANTHENE	1.54	0.1	0.154				
MidSouth MRP PR	PRSB05	PRSSB05004	3 - 4	Subsurf	BENZO[K]FLUORANTHENE	0.771	0.01	0.00771				
MidSouth MRP PR	PRSB05	PRSSB05004	3 - 4	Subsurf	CHRYSENE	1.12 J	0.001	0.00112				
MidSouth MRP PR	PRSB05	PRSSB05004	3 - 4	Subsurf	DIBENZ[A,H]ANTHRACENE	0.162	1	0.162				
MidSouth MRP PR	PRSB05	PRSSB05004	3 - 4	Subsurf	INDENO[1,2,3-CD]PYRENE	0.998	0.1	0.0998	**1.83**	0.015	0.21	0.565
MidSouth MRP PR	PRSB05	PRSSB05005	4 - 5	Subsurf	BENZO[A]ANTHRACENE	0.553	0.1	0.0553				
MidSouth MRP PR	PRSB05	PRSSB05005	4 - 5	Subsurf	BENZO[A]PYRENE	0.874	1	0.874				
MidSouth MRP PR	PRSB05	PRSSB05005	4 - 5	Subsurf	BENZO[B]FLUORANTHENE	1.02	0.1	0.102				
MidSouth MRP PR	PRSB05	PRSSB05005	4 - 5	Subsurf	BENZO[K]FLUORANTHENE	0.392	0.01	0.00392				
MidSouth MRP PR	PRSB05	PRSSB05005	4 - 5	Subsurf	CHRYSENE	0.698	0.001	0.000698				
MidSouth MRP PR	PRSB05	PRSSB05005	4 - 5	Subsurf	DIBENZ[A,H]ANTHRACENE	0.121	1	0.121				
MidSouth MRP PR	PRSB05	PRSSB05005	4 - 5	Subsurf	INDENO[1,2,3-CD]PYRENE	0.684	0.1	0.0684	**1.23**	0.015	0.21	0.565
MidSouth MRP PR	PRSB05	PRSSB05008	6 - 8	Subsurf	BENZO[A]ANTHRACENE	4.78	0.1	0.478				
MidSouth MRP PR	PRSB05	PRSSB05008	6 - 8	Subsurf	BENZO[A]PYRENE	11.6	1	11.6				
MidSouth MRP PR	PRSB05	PRSSB05008	6 - 8	Subsurf	BENZO[B]FLUORANTHENE	13.5	0.1	1.35				
MidSouth MRP PR	PRSB05	PRSSB05008	6 - 8	Subsurf	BENZO[K]FLUORANTHENE	5.51	0.01	0.0551				
MidSouth MRP PR	PRSB05	PRSSB05008	6 - 8	Subsurf	CHRYSENE	6.98	0.001	0.00698				
MidSouth MRP PR	PRSB05	PRSSB05008	6 - 8	Subsurf	DIBENZ[A,H]ANTHRACENE	1.68	1	1.68				
MidSouth MRP PR	PRSB05	PRSSB05008	6 - 8	Subsurf	INDENO[1,2,3-CD]PYRENE	8.91	0.1	0.891	**16.1**	0.015	0.21	0.565
MidSouth MRP PR	PRSB05	PRSSB05010	8 - 10	Subsurf	BENZO[A]ANTHRACENE	0.0873	0.1	0.00873				
MidSouth MRP PR	PRSB05	PRSSB05010	8 - 10	Subsurf	BENZO[A]PYRENE	0.15	1	0.15				
MidSouth MRP PR	PRSB05	PRSSB05010	8 - 10	Subsurf	BENZO[B]FLUORANTHENE	0.17	0.1	0.017				
MidSouth MRP PR	PRSB05	PRSSB05010	8 - 10	Subsurf	BENZO[K]FLUORANTHENE	0.0759	0.01	0.000759				
MidSouth MRP PR	PRSB05	PRSSB05010	8 - 10	Subsurf	CHRYSENE	0.13	0.001	0.00013				
MidSouth MRP PR	PRSB05	PRSSB05010	8 - 10	Subsurf	DIBENZ[A,H]ANTHRACENE	0.0232	1	0.0232				
MidSouth MRP PR	PRSB05	PRSSB05010	8 - 10	Subsurf	INDENO[1,2,3-CD]PYRENE	0.131	0.1	0.0131	0.213	0.015	0.21	0.565
MidSouth MRP PR	PRSB05	PRSSB05012	10 - 12	Subsurf	BENZO[A]ANTHRACENE	0.119	0.1	0.0119				
MidSouth MRP PR	PRSB05	PRSSB05012	10 - 12	Subsurf	BENZO[A]PYRENE	0.0747	1	0.0747				
MidSouth MRP PR	PRSB05	PRSSB05012	10 - 12	Subsurf	BENZO[B]FLUORANTHENE	0.109	0.1	0.0109				
MidSouth MRP PR	PRSB05	PRSSB05012	10 - 12	Subsurf	BENZO[K]FLUORANTHENE	0.0561	0.01	0.000561				
MidSouth MRP PR	PRSB05	PRSSB05012	10 - 12	Subsurf	CHRYSENE	0.137	0.001	0.000137				
MidSouth MRP PR	PRSB05	PRSSB05012	10 - 12	Subsurf	DIBENZ[A,H]ANTHRACENE	0.00514 U	1	0.00257				
MidSouth MRP PR	PRSB05	PRSSB05012	10 - 12	Subsurf	INDENO[1,2,3-CD]PYRENE	0.0445	0.1	0.00445	0.105	0.015	0.21	0.565
MidSouth MRP PR	PRSB05	PRSSB05014	12 - 14	Subsurf	BENZO[A]ANTHRACENE	0.0491 J	0.1	0.00491				
MidSouth MRP PR	PRSB05	PRSSB05014	12 - 14	Subsurf	BENZO[A]PYRENE	0.0488 J	1	0.0488				
MidSouth MRP PR	PRSB05	PRSSB05014	12 - 14	Subsurf	BENZO[B]FLUORANTHENE	0.0601 J	0.1	0.00601				
MidSouth MRP PR	PRSB05	PRSSB05014	12 - 14	Subsurf	BENZO[K]FLUORANTHENE	0.0298 J	0.01	0.000298				
MidSouth MRP PR	PRSB05	PRSSB05014	12 - 14	Subsurf	CHRYSENE	0.0451 J	0.001	0.0000451				
MidSouth MRP PR	PRSB05	PRSSB05014	12 - 14	Subsurf	DIBENZ[A,H]ANTHRACENE	0.00632 J	1	0.00632				
MidSouth MRP PR	PRSB05	PRSSB05014	12 - 14	Subsurf	INDENO[1,2,3-CD]PYRENE	0.0375 J	0.1	0.00375	0.0701	0.015	0.21	0.565
MidSouth MRP PR	PRSB06	PRSSB06002	1 - 2	Subsurf	BENZO[A]ANTHRACENE	0.792 J	0.1	0.0792				
MidSouth MRP PR	PRSB06	PRSSB06002	1 - 2	Subsurf	BENZO[A]PYRENE	1.19 J	1	1.19				
MidSouth MRP PR	PRSB06	PRSSB06002	1 - 2	Subsurf	BENZO[B]FLUORANTHENE	1.32 J	0.1	0.132				
MidSouth MRP PR	PRSB06	PRSSB06002	1 - 2	Subsurf	BENZO[K]FLUORANTHENE	0.641 J	0.01	0.00641				
MidSouth MRP PR	PRSB06	PRSSB06002	1 - 2	Subsurf	CHRYSENE	1.13 J	0.001	0.00113				
MidSouth MRP PR	PRSB06	PRSSB06002	1 - 2	Subsurf	DIBENZ[A,H]ANTHRACENE	0.153 J	1	0.153				
MidSouth MRP PR	PRSB06	PRSSB06002	1 - 2	Subsurf	INDENO[1,2,3-CD]PYRENE	0.837 J	0.1	0.0837	**1.65**	0.015	0.21	0.565
MidSouth MRP PR	PRSB06	PRSSB06003	2 - 3	Subsurf	BENZO[A]ANTHRACENE	1.01 J	0.1	0.101				
MidSouth MRP PR	PRSB06	PRSSB06003	2 - 3	Subsurf	BENZO[A]PYRENE	1.28 J	1	1.28				
MidSouth MRP PR	PRSB06	PRSSB06003	2 - 3	Subsurf	BENZO[B]FLUORANTHENE	1.37 J	0.1	0.137				
MidSouth MRP PR	PRSB06	PRSSB06003	2 - 3	Subsurf	BENZO[K]FLUORANTHENE	0.594 J	0.01	0.00594				
MidSouth MRP PR	PRSB06	PRSSB06003	2 - 3	Subsurf	CHRYSENE	1.29 J	0.001	0.00129				
MidSouth MRP PR	PRSB06	PRSSB06003	2 - 3	Subsurf	DIBENZ[A,H]ANTHRACENE	0.2 J	1	0.2				
MidSouth MRP PR	PRSB06	PRSSB06003	2 - 3	Subsurf	INDENO[1,2,3-CD]PYRENE	1.03 J	0.1	0.103	**1.83**	0.015	0.21	0.565
MidSouth MRP PR	PRSB06	PRSSB06004	3 - 4	Subsurf	BENZO[A]ANTHRACENE	1.31 J	0.1	0.131				
MidSouth MRP PR	PRSB06	PRSSB06004	3 - 4	Subsurf	BENZO[A]PYRENE	1.94 J	1	1.94				
MidSouth MRP PR	PRSB06	PRSSB06004	3 - 4	Subsurf	BENZO[B]FLUORANTHENE	2.08 J	0.1	0.208				
MidSouth MRP PR	PRSB06	PRSSB06004	3 - 4	Subsurf	BENZO[K]FLUORANTHENE	1.02 J	0.01	0.0102				
MidSouth MRP PR	PRSB06	PRSSB06004	3 - 4	Subsurf	CHRYSENE	1.77 J	0.001	0.00177				
MidSouth MRP PR	PRSB06	PRSSB06004	3 - 4	Subsurf	DIBENZ[A,H]ANTHRACENE	0.31 J	1	0.31				
MidSouth MRP PR	PRSB06	PRSSB06004	3 - 4	Subsurf	INDENO[1,2,3-CD]PYRENE	1.74 J	0.1	0.174	**2.77**	0.015	0.21	0.565
MidSouth MRP PR	PRSB06	PRSSB06005	4 - 5	Subsurf	BENZO[A]ANTHRACENE	1.01 J	0.1	0.101				
MidSouth MRP PR	PRSB06	PRSSB06005	4 - 5	Subsurf	BENZO[A]PYRENE	1.28 J	1	1.28				
MidSouth MRP PR	PRSB06	PRSSB06005	4 - 5	Subsurf	BENZO[B]FLUORANTHENE	1.35 J	0.1	0.135				
MidSouth MRP PR	PRSB06	PRSSB06005	4 - 5	Subsurf	BENZO[K]FLUORANTHENE	0.61 J	0.01	0.0061				
MidSouth MRP PR	PRSB06	PRSSB06005	4 - 5	Subsurf	CHRYSENE	1.32 J	0.001	0.00132				
MidSouth MRP PR	PRSB06	PRSSB06005	4 - 5	Subsurf	DIBENZ[A,H]ANTHRACENE	0.16 J	1	0.16				

MidSouth MRP PR	PRSB06	PRSSB06005	4 - 5	Subsurf	INDENO[1,2,3-CD]PYRENE	0.783 J	0.1	0.0783	**1.76**	0.015	0.21	0.565
MidSouth MRP PR	PRSB06	PRSSB06006	5 - 6	Subsurf	BENZO[A]ANTHRACENE	0.34	0.1	0.034				
MidSouth MRP PR	PRSB06	PRSSB06006	5 - 6	Subsurf	BENZO[A]PYRENE	0.486	1	0.486				
MidSouth MRP PR	PRSB06	PRSSB06006	5 - 6	Subsurf	BENZO[B]FLUORANTHENE	0.585	0.1	0.0585				
MidSouth MRP PR	PRSB06	PRSSB06006	5 - 6	Subsurf	BENZO[K]FLUORANTHENE	0.231	0.01	0.00231				
MidSouth MRP PR	PRSB06	PRSSB06006	5 - 6	Subsurf	CHRYSENE	0.436	0.001	0.000436				
MidSouth MRP PR	PRSB06	PRSSB06006	5 - 6	Subsurf	DIBENZ[A,H]ANTHRACENE	0.0724	1	0.0724				
MidSouth MRP PR	PRSB06	PRSSB06006	5 - 6	Subsurf	INDENO[1,2,3-CD]PYRENE	0.386	0.1	0.0386	**0.692**	0.015	0.21	0.565
MidSouth MRP PR	PRSB06	PRSSB06007	6 - 7	Subsurf	BENZO[A]ANTHRACENE	0.226	0.1	0.0226				
MidSouth MRP PR	PRSB06	PRSSB06007	6 - 7	Subsurf	BENZO[A]PYRENE	0.325	1	0.325				
MidSouth MRP PR	PRSB06	PRSSB06007	6 - 7	Subsurf	BENZO[B]FLUORANTHENE	0.376	0.1	0.0376				
MidSouth MRP PR	PRSB06	PRSSB06007	6 - 7	Subsurf	BENZO[K]FLUORANTHENE	0.16	0.01	0.0016				
MidSouth MRP PR	PRSB06	PRSSB06007	6 - 7	Subsurf	CHRYSENE	0.301	0.001	0.000301				
MidSouth MRP PR	PRSB06	PRSSB06007	6 - 7	Subsurf	DIBENZ[A,H]ANTHRACENE	0.0471	1	0.0471				
MidSouth MRP PR	PRSB06	PRSSB06007	6 - 7	Subsurf	INDENO[1,2,3-CD]PYRENE	0.251	0.1	0.0251	0.459	0.015	0.21	0.565
MidSouth MRP PR	PRSB06	PRSSB06008	7 - 8	Subsurf	BENZO[A]ANTHRACENE	0.26	0.1	0.026				
MidSouth MRP PR	PRSB06	PRSSB06008	7 - 8	Subsurf	BENZO[A]PYRENE	0.344	1	0.344				
MidSouth MRP PR	PRSB06	PRSSB06008	7 - 8	Subsurf	BENZO[B]FLUORANTHENE	0.398	0.1	0.0398				
MidSouth MRP PR	PRSB06	PRSSB06008	7 - 8	Subsurf	BENZO[K]FLUORANTHENE	0.178	0.01	0.00178				
MidSouth MRP PR	PRSB06	PRSSB06008	7 - 8	Subsurf	CHRYSENE	0.348	0.001	0.000348				
MidSouth MRP PR	PRSB06	PRSSB06008	7 - 8	Subsurf	DIBENZ[A,H]ANTHRACENE	0.0475	1	0.0475				
MidSouth MRP PR	PRSB06	PRSSB06008	7 - 8	Subsurf	INDENO[1,2,3-CD]PYRENE	0.252	0.1	0.0252	0.485	0.015	0.21	0.565
MidSouth MRP PR	PRSB06	PRSSB06009	8 - 9	Subsurf	BENZO[A]ANTHRACENE	0.166	0.1	0.0166				
MidSouth MRP PR	PRSB06	PRSSB06009	8 - 9	Subsurf	BENZO[A]PYRENE	0.256	1	0.256				
MidSouth MRP PR	PRSB06	PRSSB06009	8 - 9	Subsurf	BENZO[B]FLUORANTHENE	0.299	0.1	0.0299				
MidSouth MRP PR	PRSB06	PRSSB06009	8 - 9	Subsurf	BENZO[K]FLUORANTHENE	0.131	0.01	0.00131				
MidSouth MRP PR	PRSB06	PRSSB06009	8 - 9	Subsurf	CHRYSENE	0.229	0.001	0.000229				
MidSouth MRP PR	PRSB06	PRSSB06009	8 - 9	Subsurf	DIBENZ[A,H]ANTHRACENE	0.0357	1	0.0357				
MidSouth MRP PR	PRSB06	PRSSB06009	8 - 9	Subsurf	INDENO[1,2,3-CD]PYRENE	0.192	0.1	0.0192	0.359	0.015	0.21	0.565
MidSouth MRP PR	PRSB06	PRSSB06010	9 - 10	Subsurf	BENZO[A]ANTHRACENE	0.247	0.1	0.0247				
MidSouth MRP PR	PRSB06	PRSSB06010	9 - 10	Subsurf	BENZO[A]PYRENE	0.416	1	0.416				
MidSouth MRP PR	PRSB06	PRSSB06010	9 - 10	Subsurf	BENZO[B]FLUORANTHENE	0.464	0.1	0.0464				
MidSouth MRP PR	PRSB06	PRSSB06010	9 - 10	Subsurf	BENZO[K]FLUORANTHENE	0.207	0.01	0.00207				
MidSouth MRP PR	PRSB06	PRSSB06010	9 - 10	Subsurf	CHRYSENE	0.354	0.001	0.000354				
MidSouth MRP PR	PRSB06	PRSSB06010	9 - 10	Subsurf	DIBENZ[A,H]ANTHRACENE	0.0591	1	0.0591				
MidSouth MRP PR	PRSB06	PRSSB06010	9 - 10	Subsurf	INDENO[1,2,3-CD]PYRENE	0.321	0.1	0.0321	**0.581**	0.015	0.21	0.565
MidSouth MRP PR	PRSB06	PRSSB06011	10 - 11	Subsurf	BENZO[A]ANTHRACENE	0.193	0.1	0.0193				
MidSouth MRP PR	PRSB06	PRSSB06011	10 - 11	Subsurf	BENZO[A]PYRENE	0.279	1	0.279				
MidSouth MRP PR	PRSB06	PRSSB06011	10 - 11	Subsurf	BENZO[B]FLUORANTHENE	0.328	0.1	0.0328				
MidSouth MRP PR	PRSB06	PRSSB06011	10 - 11	Subsurf	BENZO[K]FLUORANTHENE	0.149	0.01	0.00149				
MidSouth MRP PR	PRSB06	PRSSB06011	10 - 11	Subsurf	CHRYSENE	0.263	0.001	0.000263				
MidSouth MRP PR	PRSB06	PRSSB06011	10 - 11	Subsurf	DIBENZ[A,H]ANTHRACENE	0.0378	1	0.0378				
MidSouth MRP PR	PRSB06	PRSSB06011	10 - 11	Subsurf	INDENO[1,2,3-CD]PYRENE	0.205	0.1	0.0205	0.391	0.015	0.21	0.565
MidSouth MRP PR	PRSB06	PRSSB06012	11 - 12	Subsurf	BENZO[A]ANTHRACENE	0.273	0.1	0.0273				
MidSouth MRP PR	PRSB06	PRSSB06012	11 - 12	Subsurf	BENZO[A]PYRENE	0.376	1	0.376				
MidSouth MRP PR	PRSB06	PRSSB06012	11 - 12	Subsurf	BENZO[B]FLUORANTHENE	0.458	0.1	0.0458				
MidSouth MRP PR	PRSB06	PRSSB06012	11 - 12	Subsurf	BENZO[K]FLUORANTHENE	0.18	0.01	0.0018				
MidSouth MRP PR	PRSB06	PRSSB06012	11 - 12	Subsurf	CHRYSENE	0.352	0.001	0.000352				
MidSouth MRP PR	PRSB06	PRSSB06012	11 - 12	Subsurf	DIBENZ[A,H]ANTHRACENE	0.0503	1	0.0503				
MidSouth MRP PR	PRSB06	PRSSB06012	11 - 12	Subsurf	INDENO[1,2,3-CD]PYRENE	0.265	0.1	0.0265	0.528	0.015	0.21	0.565
MidSouth MRP PR	PRSB06	PRSSB06013	12 - 13	Subsurf	BENZO[A]ANTHRACENE	0.22	0.1	0.022				
MidSouth MRP PR	PRSB06	PRSSB06013	12 - 13	Subsurf	BENZO[A]PYRENE	0.294	1	0.294				
MidSouth MRP PR	PRSB06	PRSSB06013	12 - 13	Subsurf	BENZO[B]FLUORANTHENE	0.344	0.1	0.0344				
MidSouth MRP PR	PRSB06	PRSSB06013	12 - 13	Subsurf	BENZO[K]FLUORANTHENE	0.152	0.01	0.00152				
MidSouth MRP PR	PRSB06	PRSSB06013	12 - 13	Subsurf	CHRYSENE	0.284	0.001	0.000284				
MidSouth MRP PR	PRSB06	PRSSB06013	12 - 13	Subsurf	DIBENZ[A,H]ANTHRACENE	0.039	1	0.039				
MidSouth MRP PR	PRSB06	PRSSB06013	12 - 13	Subsurf	INDENO[1,2,3-CD]PYRENE	0.211	0.1	0.0211	0.412	0.015	0.21	0.565
MidSouth MRP PR	PRSB06	PRSSB06014	13 - 14	Subsurf	BENZO[A]ANTHRACENE	0.423	0.1	0.0423				
MidSouth MRP PR	PRSB06	PRSSB06014	13 - 14	Subsurf	BENZO[A]PYRENE	0.602	1	0.602				
MidSouth MRP PR	PRSB06	PRSSB06014	13 - 14	Subsurf	BENZO[B]FLUORANTHENE	0.696	0.1	0.0696				
MidSouth MRP PR	PRSB06	PRSSB06014	13 - 14	Subsurf	BENZO[K]FLUORANTHENE	0.29	0.01	0.0029				
MidSouth MRP PR	PRSB06	PRSSB06014	13 - 14	Subsurf	CHRYSENE	0.56	0.001	0.00056				
MidSouth MRP PR	PRSB06	PRSSB06014	13 - 14	Subsurf	DIBENZ[A,H]ANTHRACENE	0.0839	1	0.0839				
MidSouth MRP PR	PRSB06	PRSSB06014	13 - 14	Subsurf	INDENO[1,2,3-CD]PYRENE	0.443	0.1	0.0443	**0.846**	0.015	0.21	0.565
MidSouth MRP PR	PRSB07	PRSSB07002	1 - 2	Subsurf	BENZO[A]ANTHRACENE	0.0477	0.1	0.00477				
MidSouth MRP PR	PRSB07	PRSSB07002	1 - 2	Subsurf	BENZO[A]PYRENE	0.071	1	0.071				
MidSouth MRP PR	PRSB07	PRSSB07002	1 - 2	Subsurf	BENZO[B]FLUORANTHENE	0.0834	0.1	0.00834				
MidSouth MRP PR	PRSB07	PRSSB07002	1 - 2	Subsurf	BENZO[K]FLUORANTHENE	0.0437	0.01	0.000437				
MidSouth MRP PR	PRSB07	PRSSB07002	1 - 2	Subsurf	CHRYSENE	0.0591	0.001	0.0000591				

MidSouth MRP PR	PRSB07	PRSSB07002	1 - 2	Subsurf	DIBENZ[A,H]ANTHRACENE	0.00947	1	0.00947				
MidSouth MRP PR	PRSB07	PRSSB07002	1 - 2	Subsurf	INDENO[1,2,3-CD]PYRENE	0.0486	0.1	0.00486	**0.0989**	0.015	0.21	0.565
MidSouth MRP PR	PRSB07	PRSSB07003	2 - 3	Subsurf	BENZO[A]ANTHRACENE	0.331 J	0.1	0.0331				
MidSouth MRP PR	PRSB07	PRSSB07003	2 - 3	Subsurf	BENZO[A]PYRENE	0.644 J	1	0.644				
MidSouth MRP PR	PRSB07	PRSSB07003	2 - 3	Subsurf	BENZO[B]FLUORANTHENE	0.743 J	0.1	0.0743				
MidSouth MRP PR	PRSB07	PRSSB07003	2 - 3	Subsurf	BENZO[K]FLUORANTHENE	0.304 J	0.01	0.00304				
MidSouth MRP PR	PRSB07	PRSSB07003	2 - 3	Subsurf	CHRYSENE	0.489 J	0.001	0.000489				
MidSouth MRP PR	PRSB07	PRSSB07003	2 - 3	Subsurf	DIBENZ[A,H]ANTHRACENE	0.105 J	1	0.105				
MidSouth MRP PR	PRSB07	PRSSB07003	2 - 3	Subsurf	INDENO[1,2,3-CD]PYRENE	0.58 J	0.1	0.058	**0.918**	0.015	0.21	0.565
MidSouth MRP PR	PRSB07	PRSSB07004	3 - 4	Subsurf	BENZO[A]ANTHRACENE	1.32	0.1	0.132				
MidSouth MRP PR	PRSB07	PRSSB07004	3 - 4	Subsurf	BENZO[A]PYRENE	2.3 J	1	2.3				
MidSouth MRP PR	PRSB07	PRSSB07004	3 - 4	Subsurf	BENZO[B]FLUORANTHENE	2.3 J	0.1	0.23				
MidSouth MRP PR	PRSB07	PRSSB07004	3 - 4	Subsurf	BENZO[K]FLUORANTHENE	0.938 J	0.01	0.00938				
MidSouth MRP PR	PRSB07	PRSSB07004	3 - 4	Subsurf	CHRYSENE	1.96	0.001	0.00196				
MidSouth MRP PR	PRSB07	PRSSB07004	3 - 4	Subsurf	DIBENZ[A,H]ANTHRACENE	0.35 J	1	0.35				
MidSouth MRP PR	PRSB07	PRSSB07004	3 - 4	Subsurf	INDENO[1,2,3-CD]PYRENE	1.71 J	0.1	0.171	**3.19**	0.015	0.21	0.565
MidSouth MRP PR	PRSB07	PRSSB07005	4 - 5	Subsurf	BENZO[A]ANTHRACENE	0.145	0.1	0.0145				
MidSouth MRP PR	PRSB07	PRSSB07005	4 - 5	Subsurf	BENZO[A]PYRENE	0.194	1	0.194				
MidSouth MRP PR	PRSB07	PRSSB07005	4 - 5	Subsurf	BENZO[B]FLUORANTHENE	0.225	0.1	0.0225				
MidSouth MRP PR	PRSB07	PRSSB07005	4 - 5	Subsurf	BENZO[K]FLUORANTHENE	0.0888	0.01	0.000888				
MidSouth MRP PR	PRSB07	PRSSB07005	4 - 5	Subsurf	CHRYSENE	0.206	0.001	0.000206				
MidSouth MRP PR	PRSB07	PRSSB07005	4 - 5	Subsurf	DIBENZ[A,H]ANTHRACENE	0.0299	1	0.0299				
MidSouth MRP PR	PRSB07	PRSSB07005	4 - 5	Subsurf	INDENO[1,2,3-CD]PYRENE	0.142	0.1	0.0142	0.276	0.015	0.21	0.565
MidSouth MRP PR	PRSB07	PRSSB07006	5 - 6	Subsurf	BENZO[A]ANTHRACENE	0.192 J	0.1	0.0192				
MidSouth MRP PR	PRSB07	PRSSB07006	5 - 6	Subsurf	BENZO[A]PYRENE	0.326 J	1	0.326				
MidSouth MRP PR	PRSB07	PRSSB07006	5 - 6	Subsurf	BENZO[B]FLUORANTHENE	0.388 J	0.1	0.0388				
MidSouth MRP PR	PRSB07	PRSSB07006	5 - 6	Subsurf	BENZO[K]FLUORANTHENE	0.151 J	0.01	0.00151				
MidSouth MRP PR	PRSB07	PRSSB07006	5 - 6	Subsurf	CHRYSENE	0.292 J	0.001	0.000292				
MidSouth MRP PR	PRSB07	PRSSB07006	5 - 6	Subsurf	DIBENZ[A,H]ANTHRACENE	0.0481 J	1	0.0481				
MidSouth MRP PR	PRSB07	PRSSB07006	5 - 6	Subsurf	INDENO[1,2,3-CD]PYRENE	0.257 J	0.1	0.0257	0.46	0.015	0.21	0.565
MidSouth MRP PR	PRSB07	PRSSB07008	6 - 8	Subsurf	BENZO[A]ANTHRACENE	7.08	0.1	0.708				
MidSouth MRP PR	PRSB07	PRSSB07008	6 - 8	Subsurf	BENZO[A]PYRENE	14.5	1	14.5				
MidSouth MRP PR	PRSB07	PRSSB07008	6 - 8	Subsurf	BENZO[B]FLUORANTHENE	16.2	0.1	1.62				
MidSouth MRP PR	PRSB07	PRSSB07008	6 - 8	Subsurf	BENZO[K]FLUORANTHENE	7.45	0.01	0.0745				
MidSouth MRP PR	PRSB07	PRSSB07008	6 - 8	Subsurf	CHRYSENE	9.55	0.001	0.00955				
MidSouth MRP PR	PRSB07	PRSSB07008	6 - 8	Subsurf	DIBENZ[A,H]ANTHRACENE	1.92	1	1.92				
MidSouth MRP PR	PRSB07	PRSSB07008	6 - 8	Subsurf	INDENO[1,2,3-CD]PYRENE	10.5	0.1	1.05	**19.9**	0.015	0.21	0.565
MidSouth MRP PR	PRSB07	PRSSB07010	8 - 10	Subsurf	BENZO[A]ANTHRACENE	0.287	0.1	0.0287				
MidSouth MRP PR	PRSB07	PRSSB07010	8 - 10	Subsurf	BENZO[A]PYRENE	0.619	1	0.619				
MidSouth MRP PR	PRSB07	PRSSB07010	8 - 10	Subsurf	BENZO[B]FLUORANTHENE	0.662	0.1	0.0662				
MidSouth MRP PR	PRSB07	PRSSB07010	8 - 10	Subsurf	BENZO[K]FLUORANTHENE	0.257	0.01	0.00257				
MidSouth MRP PR	PRSB07	PRSSB07010	8 - 10	Subsurf	CHRYSENE	0.426	0.001	0.000426				
MidSouth MRP PR	PRSB07	PRSSB07010	8 - 10	Subsurf	DIBENZ[A,H]ANTHRACENE	0.0958	1	0.0958				
MidSouth MRP PR	PRSB07	PRSSB07010	8 - 10	Subsurf	INDENO[1,2,3-CD]PYRENE	0.541	0.1	0.0541	**0.867**	0.015	0.21	0.565
MidSouth MRP PR	PRSB07	PRSSB07012	10 - 12	Subsurf	BENZO[A]ANTHRACENE	2.1	0.1	0.21				
MidSouth MRP PR	PRSB07	PRSSB07012	10 - 12	Subsurf	BENZO[A]PYRENE	4.02	1	4.02				
MidSouth MRP PR	PRSB07	PRSSB07012	10 - 12	Subsurf	BENZO[B]FLUORANTHENE	4.75	0.1	0.475				
MidSouth MRP PR	PRSB07	PRSSB07012	10 - 12	Subsurf	BENZO[K]FLUORANTHENE	1.98	0.01	0.0198				
MidSouth MRP PR	PRSB07	PRSSB07012	10 - 12	Subsurf	CHRYSENE	2.73	0.001	0.00273				
MidSouth MRP PR	PRSB07	PRSSB07012	10 - 12	Subsurf	DIBENZ[A,H]ANTHRACENE	0.547	1	0.547				
MidSouth MRP PR	PRSB07	PRSSB07012	10 - 12	Subsurf	INDENO[1,2,3-CD]PYRENE	2.92	0.1	0.292	**5.57**	0.015	0.21	0.565
MidSouth MRP PR	PRSB07	PRSSB07014	12 - 14	Subsurf	BENZO[A]ANTHRACENE	6.32	0.1	0.632				
MidSouth MRP PR	PRSB07	PRSSB07014	12 - 14	Subsurf	BENZO[A]PYRENE	9.06	1	9.06				
MidSouth MRP PR	PRSB07	PRSSB07014	12 - 14	Subsurf	BENZO[B]FLUORANTHENE	10.9	0.1	1.09				
MidSouth MRP PR	PRSB07	PRSSB07014	12 - 14	Subsurf	BENZO[K]FLUORANTHENE	4.58	0.01	0.0458				
MidSouth MRP PR	PRSB07	PRSSB07014	12 - 14	Subsurf	CHRYSENE	7.64	0.001	0.00764				
MidSouth MRP PR	PRSB07	PRSSB07014	12 - 14	Subsurf	DIBENZ[A,H]ANTHRACENE	1.2	1	1.2				
MidSouth MRP PR	PRSB07	PRSSB07014	12 - 14	Subsurf	INDENO[1,2,3-CD]PYRENE	6.14	0.1	0.614	**12.6**	0.015	0.21	0.565
MidSouth MRP PR	PRSB08	PRSSB08002	1 - 2	Subsurf	BENZO[A]ANTHRACENE	0.2 J	0.1	0.02				
MidSouth MRP PR	PRSB08	PRSSB08002	1 - 2	Subsurf	BENZO[A]PYRENE	0.254 J	1	0.254				
MidSouth MRP PR	PRSB08	PRSSB08002	1 - 2	Subsurf	BENZO[B]FLUORANTHENE	0.546 J	0.1	0.0546				
MidSouth MRP PR	PRSB08	PRSSB08002	1 - 2	Subsurf	BENZO[K]FLUORANTHENE	0.248 J	0.01	0.00248				
MidSouth MRP PR	PRSB08	PRSSB08002	1 - 2	Subsurf	CHRYSENE	0.319 J	0.001	0.000319				
MidSouth MRP PR	PRSB08	PRSSB08002	1 - 2	Subsurf	DIBENZ[A,H]ANTHRACENE	0.0026 U	1	0.0013				
MidSouth MRP PR	PRSB08	PRSSB08002	1 - 2	Subsurf	INDENO[1,2,3-CD]PYRENE	0.159 J	0.1	0.0159	0.349	0.015	0.21	0.565
MidSouth MRP PR	PRSB08	PRSSB08003	2 - 3	Subsurf	BENZO[A]ANTHRACENE	0.0144	0.1	0.00144				
MidSouth MRP PR	PRSB08	PRSSB08003	2 - 3	Subsurf	BENZO[A]PYRENE	0.0175	1	0.0175				
MidSouth MRP PR	PRSB08	PRSSB08003	2 - 3	Subsurf	BENZO[B]FLUORANTHENE	0.0493	0.1	0.00493				
MidSouth MRP PR	PRSB08	PRSSB08003	2 - 3	Subsurf	BENZO[K]FLUORANTHENE	0.0153	0.01	0.000153				

MidSouth MRP PR	PRSB08	PRSSB08003	2 - 3	Subsurf	CHRYSENE	0.0291	0.001	0.0000291				
MidSouth MRP PR	PRSB08	PRSSB08003	2 - 3	Subsurf	DIBENZ[A,H]ANTHRACENE	0.0026 U	1	0.0013				
MidSouth MRP PR	PRSB08	PRSSB08003	2 - 3	Subsurf	INDENO[1,2,3-CD]PYRENE	0.0127	0.1	0.00127	0.0266	0.015	0.21	0.565
MidSouth MRP PR	PRSB08	PRSSB08004	3 - 4	Subsurf	BENZO[A]ANTHRACENE	0.197 J	0.1	0.0197				
MidSouth MRP PR	PRSB08	PRSSB08004	3 - 4	Subsurf	BENZO[A]PYRENE	0.249 J	1	0.249				
MidSouth MRP PR	PRSB08	PRSSB08004	3 - 4	Subsurf	BENZO[B]FLUORANTHENE	0.542 J	0.1	0.0542				
MidSouth MRP PR	PRSB08	PRSSB08004	3 - 4	Subsurf	BENZO[K]FLUORANTHENE	0.238 J	0.01	0.00238				
MidSouth MRP PR	PRSB08	PRSSB08004	3 - 4	Subsurf	CHRYSENE	0.287 J	0.001	0.000287				
MidSouth MRP PR	PRSB08	PRSSB08004	3 - 4	Subsurf	DIBENZ[A,H]ANTHRACENE	0.00258 U	1	0.00129				
MidSouth MRP PR	PRSB08	PRSSB08004	3 - 4	Subsurf	INDENO[1,2,3-CD]PYRENE	0.168 J	0.1	0.0168	0.344	0.015	0.21	0.565
MidSouth MRP PR	PRSB08	PRSSB08005	4 - 5	Subsurf	BENZO[A]ANTHRACENE	0.0514 J	0.1	0.00514				
MidSouth MRP PR	PRSB08	PRSSB08005	4 - 5	Subsurf	BENZO[A]PYRENE	0.0504 J	1	0.0504				
MidSouth MRP PR	PRSB08	PRSSB08005	4 - 5	Subsurf	BENZO[B]FLUORANTHENE	0.0987 J	0.1	0.00987				
MidSouth MRP PR	PRSB08	PRSSB08005	4 - 5	Subsurf	BENZO[K]FLUORANTHENE	0.0359 J	0.01	0.000359				
MidSouth MRP PR	PRSB08	PRSSB08005	4 - 5	Subsurf	CHRYSENE	0.0591 J	0.001	0.0000591				
MidSouth MRP PR	PRSB08	PRSSB08005	4 - 5	Subsurf	DIBENZ[A,H]ANTHRACENE	0.0067 J	1	0.0067				
MidSouth MRP PR	PRSB08	PRSSB08005	4 - 5	Subsurf	INDENO[1,2,3-CD]PYRENE	0.0375 J	0.1	0.00375	0.0763	0.015	0.21	0.565
MidSouth MRP PR	PRSB08	PRSSB08006	5 - 6	Subsurf	BENZO[A]ANTHRACENE	0.787 J	0.1	0.0787				
MidSouth MRP PR	PRSB08	PRSSB08006	5 - 6	Subsurf	BENZO[A]PYRENE	1.22 J	1	1.22				
MidSouth MRP PR	PRSB08	PRSSB08006	5 - 6	Subsurf	BENZO[B]FLUORANTHENE	1.33 J	0.1	0.133				
MidSouth MRP PR	PRSB08	PRSSB08006	5 - 6	Subsurf	BENZO[K]FLUORANTHENE	0.598 J	0.01	0.00598				
MidSouth MRP PR	PRSB08	PRSSB08006	5 - 6	Subsurf	CHRYSENE	1.11 J	0.001	0.00111				
MidSouth MRP PR	PRSB08	PRSSB08006	5 - 6	Subsurf	DIBENZ[A,H]ANTHRACENE	0.173 J	1	0.173				
MidSouth MRP PR	PRSB08	PRSSB08006	5 - 6	Subsurf	INDENO[1,2,3-CD]PYRENE	0.938 J	0.1	0.0938	**1.71**	0.015	0.21	0.565
MidSouth MRP PR	PRSB08	PRSSB08008	6 - 8	Subsurf	BENZO[A]ANTHRACENE	0.348	0.1	0.0348				
MidSouth MRP PR	PRSB08	PRSSB08008	6 - 8	Subsurf	BENZO[A]PYRENE	0.621	1	0.621				
MidSouth MRP PR	PRSB08	PRSSB08008	6 - 8	Subsurf	BENZO[B]FLUORANTHENE	0.753	0.1	0.0753				
MidSouth MRP PR	PRSB08	PRSSB08008	6 - 8	Subsurf	BENZO[K]FLUORANTHENE	0.252	0.01	0.00252				
MidSouth MRP PR	PRSB08	PRSSB08008	6 - 8	Subsurf	CHRYSENE	0.458	0.001	0.000458				
MidSouth MRP PR	PRSB08	PRSSB08008	6 - 8	Subsurf	DIBENZ[A,H]ANTHRACENE	0.107	1	0.107				
MidSouth MRP PR	PRSB08	PRSSB08008	6 - 8	Subsurf	INDENO[1,2,3-CD]PYRENE	0.551	0.1	0.0551	**0.896**	0.015	0.21	0.565
MidSouth MRP PR	PRSB08	PRSSB08010	8 - 10	Subsurf	BENZO[A]ANTHRACENE	0.0635 J	0.1	0.00635				
MidSouth MRP PR	PRSB08	PRSSB08010	8 - 10	Subsurf	BENZO[A]PYRENE	0.118 J	1	0.118				
MidSouth MRP PR	PRSB08	PRSSB08010	8 - 10	Subsurf	BENZO[B]FLUORANTHENE	0.16 J	0.1	0.016				
MidSouth MRP PR	PRSB08	PRSSB08010	8 - 10	Subsurf	BENZO[K]FLUORANTHENE	0.075 J	0.01	0.00075				
MidSouth MRP PR	PRSB08	PRSSB08010	8 - 10	Subsurf	CHRYSENE	0.106 J	0.001	0.000106				
MidSouth MRP PR	PRSB08	PRSSB08010	8 - 10	Subsurf	DIBENZ[A,H]ANTHRACENE	0.0207 J	1	0.0207				
MidSouth MRP PR	PRSB08	PRSSB08010	8 - 10	Subsurf	INDENO[1,2,3-CD]PYRENE	0.118 J	0.1	0.0118	0.174	0.015	0.21	0.565
MidSouth MRP PR	PRSB08	PRSSB08012	10 - 12	Subsurf	BENZO[A]ANTHRACENE	0.0468	0.1	0.00468				
MidSouth MRP PR	PRSB08	PRSSB08012	10 - 12	Subsurf	BENZO[A]PYRENE	0.0557	1	0.0557				
MidSouth MRP PR	PRSB08	PRSSB08012	10 - 12	Subsurf	BENZO[B]FLUORANTHENE	0.111	0.1	0.0111				
MidSouth MRP PR	PRSB08	PRSSB08012	10 - 12	Subsurf	BENZO[K]FLUORANTHENE	0.0427	0.01	0.000427				
MidSouth MRP PR	PRSB08	PRSSB08012	10 - 12	Subsurf	CHRYSENE	0.0714	0.001	0.0000714				
MidSouth MRP PR	PRSB08	PRSSB08012	10 - 12	Subsurf	DIBENZ[A,H]ANTHRACENE	0.0108	1	0.0108				
MidSouth MRP PR	PRSB08	PRSSB08012	10 - 12	Subsurf	INDENO[1,2,3-CD]PYRENE	0.0536	0.1	0.00536	0.0881	0.015	0.21	0.565
MidSouth MRP PR	PRSB08	PRSSB08014	12 - 14	Subsurf	BENZO[A]ANTHRACENE	0.37 J	0.1	0.037				
MidSouth MRP PR	PRSB08	PRSSB08014	12 - 14	Subsurf	BENZO[A]PYRENE	0.702 J	1	0.702				
MidSouth MRP PR	PRSB08	PRSSB08014	12 - 14	Subsurf	BENZO[B]FLUORANTHENE	0.83 J	0.1	0.083				
MidSouth MRP PR	PRSB08	PRSSB08014	12 - 14	Subsurf	BENZO[K]FLUORANTHENE	0.321 J	0.01	0.00321				
MidSouth MRP PR	PRSB08	PRSSB08014	12 - 14	Subsurf	CHRYSENE	0.533 J	0.001	0.000533				
MidSouth MRP PR	PRSB08	PRSSB08014	12 - 14	Subsurf	DIBENZ[A,H]ANTHRACENE	0.114 J	1	0.114				
MidSouth MRP PR	PRSB08	PRSSB08014	12 - 14	Subsurf	INDENO[1,2,3-CD]PYRENE	0.611 J	0.1	0.0611	**1**	0.015	0.21	0.565
MidSouth MRP PR	PRSB09	PRSSB0902	1 - 2	Subsurf	BENZO[A]ANTHRACENE	14.4	0.1	1.44				
MidSouth MRP PR	PRSB09	PRSSB0902	1 - 2	Subsurf	BENZO[A]PYRENE	32.4	1	32.4				
MidSouth MRP PR	PRSB09	PRSSB0902	1 - 2	Subsurf	BENZO[B]FLUORANTHENE	31.7	0.1	3.17				
MidSouth MRP PR	PRSB09	PRSSB0902	1 - 2	Subsurf	BENZO[K]FLUORANTHENE	14.8	0.01	0.148				
MidSouth MRP PR	PRSB09	PRSSB0902	1 - 2	Subsurf	CHRYSENE	19	0.001	0.019				
MidSouth MRP PR	PRSB09	PRSSB0902	1 - 2	Subsurf	DIBENZ[A,H]ANTHRACENE	5	1	5				
MidSouth MRP PR	PRSB09	PRSSB0902	1 - 2	Subsurf	INDENO[1,2,3-CD]PYRENE	24.5	0.1	2.45	**44.6**	0.015	0.21	0.565
MidSouth MRP PR	PRSB10	PRSSB1002	1 - 2	Subsurf	BENZO[A]ANTHRACENE	26.7	0.1	2.67				
MidSouth MRP PR	PRSB10	PRSSB1002	1 - 2	Subsurf	BENZO[A]PYRENE	55	1	55				
MidSouth MRP PR	PRSB10	PRSSB1002	1 - 2	Subsurf	BENZO[B]FLUORANTHENE	63.2	0.1	6.32				
MidSouth MRP PR	PRSB10	PRSSB1002	1 - 2	Subsurf	BENZO[K]FLUORANTHENE	22.2	0.01	0.222				
MidSouth MRP PR	PRSB10	PRSSB1002	1 - 2	Subsurf	CHRYSENE	36.8	0.001	0.0368				
MidSouth MRP PR	PRSB10	PRSSB1002	1 - 2	Subsurf	DIBENZ[A,H]ANTHRACENE	8.9	1	8.9				
MidSouth MRP PR	PRSB10	PRSSB1002	1 - 2	Subsurf	INDENO[1,2,3-CD]PYRENE	42.9	0.1	4.29	**77.4**	0.015	0.21	0.565
MidSouth MRP PR	PRSB11	PRSSB1102	1 - 2	Subsurf	BENZO[A]ANTHRACENE	8.93 J	0.1	0.893				
MidSouth MRP PR	PRSB11	PRSSB1102	1 - 2	Subsurf	BENZO[A]PYRENE	11.1	1	11.1				
MidSouth MRP PR	PRSB11	PRSSB1102	1 - 2	Subsurf	BENZO[B]FLUORANTHENE	15.9 J	0.1	1.59				

MidSouth MRP PR	PRSB11	PRSSB1102	1 - 2	Subsurf	BENZO[K]FLUORANTHENE	5.06	0.01	0.0506				
MidSouth MRP PR	PRSB11	PRSSB1102	1 - 2	Subsurf	CHRYSENE	9.37 J	0.001	0.00937				
MidSouth MRP PR	PRSB11	PRSSB1102	1 - 2	Subsurf	DIBENZ[A,H]ANTHRACENE	3.7	1	3.7				
MidSouth MRP PR	PRSB11	PRSSB1102	1 - 2	Subsurf	INDENO[1,2,3-CD]PYRENE	9.27	0.1	0.927	**18.3**	0.015	0.21	0.565
MidSouth MRP PR	PRSB12	PRSSB1202	1 - 2	Subsurf	BENZO[A]ANTHRACENE	1.75 J	0.1	0.175				
MidSouth MRP PR	PRSB12	PRSSB1202	1 - 2	Subsurf	BENZO[A]PYRENE	2.52	1	2.52				
MidSouth MRP PR	PRSB12	PRSSB1202	1 - 2	Subsurf	BENZO[B]FLUORANTHENE	3.64 J	0.1	0.364				
MidSouth MRP PR	PRSB12	PRSSB1202	1 - 2	Subsurf	BENZO[K]FLUORANTHENE	1.23	0.01	0.0123				
MidSouth MRP PR	PRSB12	PRSSB1202	1 - 2	Subsurf	CHRYSENE	1.86 J	0.001	0.00186				
MidSouth MRP PR	PRSB12	PRSSB1202	1 - 2	Subsurf	DIBENZ[A,H]ANTHRACENE	0.00256 U	1	0.00128				
MidSouth MRP PR	PRSB12	PRSSB1202	1 - 2	Subsurf	INDENO[1,2,3-CD]PYRENE	2.19	0.1	0.219	**3.29**	0.015	0.21	0.565
MidSouth MRP PR	PRSB13	PRSSB13002	1 - 2	Subsurf	BENZO[A]ANTHRACENE	0.112 J	0.1	0.0112				
MidSouth MRP PR	PRSB13	PRSSB13002	1 - 2	Subsurf	BENZO[A]PYRENE	0.24 J	1	0.24				
MidSouth MRP PR	PRSB13	PRSSB13002	1 - 2	Subsurf	BENZO[B]FLUORANTHENE	0.26 J	0.1	0.026				
MidSouth MRP PR	PRSB13	PRSSB13002	1 - 2	Subsurf	BENZO[K]FLUORANTHENE	0.11 J	0.01	0.0011				
MidSouth MRP PR	PRSB13	PRSSB13002	1 - 2	Subsurf	CHRYSENE	0.157 J	0.001	0.000157				
MidSouth MRP PR	PRSB13	PRSSB13002	1 - 2	Subsurf	DIBENZ[A,H]ANTHRACENE	0.0414 J	1	0.0414				
MidSouth MRP PR	PRSB13	PRSSB13002	1 - 2	Subsurf	INDENO[1,2,3-CD]PYRENE	0.214 J	0.1	0.0214	0.341	0.015	0.21	0.565
MidSouth MRP PR	PRSB14	PRSSB14002	1 - 2	Subsurf	BENZO[A]ANTHRACENE	0.0346	0.1	0.00346				
MidSouth MRP PR	PRSB14	PRSSB14002	1 - 2	Subsurf	BENZO[A]PYRENE	0.0806	1	0.0806				
MidSouth MRP PR	PRSB14	PRSSB14002	1 - 2	Subsurf	BENZO[B]FLUORANTHENE	0.0919	0.1	0.00919				
MidSouth MRP PR	PRSB14	PRSSB14002	1 - 2	Subsurf	BENZO[K]FLUORANTHENE	0.0379	0.01	0.000379				
MidSouth MRP PR	PRSB14	PRSSB14002	1 - 2	Subsurf	CHRYSENE	0.051	0.001	0.000051				
MidSouth MRP PR	PRSB14	PRSSB14002	1 - 2	Subsurf	DIBENZ[A,H]ANTHRACENE	0.0109	1	0.0109				
MidSouth MRP PR	PRSB14	PRSSB14002	1 - 2	Subsurf	INDENO[1,2,3-CD]PYRENE	0.0641	0.1	0.00641	0.111	0.015	0.21	0.565
MidSouth MRP PR	PRSB15	PRSSB15002	1 - 2	Subsurf	BENZO[A]ANTHRACENE	0.0179	0.1	0.00179				
MidSouth MRP PR	PRSB15	PRSSB15002	1 - 2	Subsurf	BENZO[A]PYRENE	0.0245	1	0.0245				
MidSouth MRP PR	PRSB15	PRSSB15002	1 - 2	Subsurf	BENZO[B]FLUORANTHENE	0.0408	0.1	0.00408				
MidSouth MRP PR	PRSB15	PRSSB15002	1 - 2	Subsurf	BENZO[K]FLUORANTHENE	0.0161	0.01	0.000161				
MidSouth MRP PR	PRSB15	PRSSB15002	1 - 2	Subsurf	CHRYSENE	0.0295	0.001	0.0000295				
MidSouth MRP PR	PRSB15	PRSSB15002	1 - 2	Subsurf	DIBENZ[A,H]ANTHRACENE	0.00357 J	1	0.00357				
MidSouth MRP PR	PRSB15	PRSSB15002	1 - 2	Subsurf	INDENO[1,2,3-CD]PYRENE	0.018	0.1	0.0018	0.0359	0.015	0.21	0.565
MidSouth MRP PR	PRSB17	PRSSB17002	1 - 2	Subsurf	BENZO[A]ANTHRACENE	0.395	0.1	0.0395				
MidSouth MRP PR	PRSB17	PRSSB17002	1 - 2	Subsurf	BENZO[A]PYRENE	0.521	1	0.521				
MidSouth MRP PR	PRSB17	PRSSB17002	1 - 2	Subsurf	BENZO[B]FLUORANTHENE	0.656	0.1	0.0656				
MidSouth MRP PR	PRSB17	PRSSB17002	1 - 2	Subsurf	BENZO[K]FLUORANTHENE	0.256	0.01	0.00256				
MidSouth MRP PR	PRSB17	PRSSB17002	1 - 2	Subsurf	CHRYSENE	0.486	0.001	0.000486				
MidSouth MRP PR	PRSB17	PRSSB17002	1 - 2	Subsurf	DIBENZ[A,H]ANTHRACENE	0.0573	1	0.0573				
MidSouth MRP PR	PRSB17	PRSSB17002	1 - 2	Subsurf	INDENO[1,2,3-CD]PYRENE	0.339	0.1	0.0339	**0.72**	0.015	0.21	0.565
MidSouth MRP PR	PRSB18	PRSSB18002	1 - 2	Subsurf	BENZO[A]ANTHRACENE	0.00805	0.1	0.000805				
MidSouth MRP PR	PRSB18	PRSSB18002	1 - 2	Subsurf	BENZO[A]PYRENE	0.0113 J	1	0.0113				
MidSouth MRP PR	PRSB18	PRSSB18002	1 - 2	Subsurf	BENZO[B]FLUORANTHENE	0.0272	0.1	0.00272				
MidSouth MRP PR	PRSB18	PRSSB18002	1 - 2	Subsurf	BENZO[K]FLUORANTHENE	0.00567	0.01	0.0000567				
MidSouth MRP PR	PRSB18	PRSSB18002	1 - 2	Subsurf	CHRYSENE	0.0134	0.001	0.0000134				
MidSouth MRP PR	PRSB18	PRSSB18002	1 - 2	Subsurf	DIBENZ[A,H]ANTHRACENE	0.00197 J	1	0.00197				
MidSouth MRP PR	PRSB18	PRSSB18002	1 - 2	Subsurf	INDENO[1,2,3-CD]PYRENE	0.0108	0.1	0.00108	0.0179	0.015	0.21	0.565
MidSouth MRP PR	PRSB19	PRSSB19002	1 - 2	Subsurf	BENZO[A]ANTHRACENE	0.00208 U	0.1	0.000104				
MidSouth MRP PR	PRSB19	PRSSB19002	1 - 2	Subsurf	BENZO[A]PYRENE	0.00208 U	1	0.00104				
MidSouth MRP PR	PRSB19	PRSSB19002	1 - 2	Subsurf	BENZO[B]FLUORANTHENE	0.00208 U	0.1	0.000104				
MidSouth MRP PR	PRSB19	PRSSB19002	1 - 2	Subsurf	BENZO[K]FLUORANTHENE	0.00208 U	0.01	0.0000104				
MidSouth MRP PR	PRSB19	PRSSB19002	1 - 2	Subsurf	CHRYSENE	0.00315 U	0.001	0.000001575				
MidSouth MRP PR	PRSB19	PRSSB19002	1 - 2	Subsurf	DIBENZ[A,H]ANTHRACENE	0.00266 U	1	0.00133				
MidSouth MRP PR	PRSB19	PRSSB19002	1 - 2	Subsurf	INDENO[1,2,3-CD]PYRENE	0.00315 U	0.1	0.0001575	0.00275	0.015	0.21	0.565
MidSouth MRP TSR	SRSB07	SRSSB0702	1 - 2	Subsurf	BENZO[A]ANTHRACENE	0.021 J	0.1	0.0021				
MidSouth MRP TSR	SRSB07	SRSSB0702	1 - 2	Subsurf	BENZO[A]PYRENE	0.0358	1	0.0358				
MidSouth MRP TSR	SRSB07	SRSSB0702	1 - 2	Subsurf	BENZO[B]FLUORANTHENE	0.0449 J	0.1	0.00449				
MidSouth MRP TSR	SRSB07	SRSSB0702	1 - 2	Subsurf	BENZO[K]FLUORANTHENE	0.0223	0.01	0.000223				
MidSouth MRP TSR	SRSB07	SRSSB0702	1 - 2	Subsurf	CHRYSENE	0.0269 J	0.001	0.0000269				
MidSouth MRP TSR	SRSB07	SRSSB0702	1 - 2	Subsurf	DIBENZ[A,H]ANTHRACENE	0.00245 U	1	0.001225				
MidSouth MRP TSR	SRSB07	SRSSB0702	1 - 2	Subsurf	INDENO[1,2,3-CD]PYRENE	0.0283	0.1	0.00283	0.0467	0.015	0.21	0.565
MidSouth MRP TSR	SRSB10	SRSSB1002	1 - 2	Subsurf	BENZO[A]ANTHRACENE	0.0721 J	0.1	0.00721				
MidSouth MRP TSR	SRSB10	SRSSB1002	1 - 2	Subsurf	BENZO[A]PYRENE	0.0858 J	1	0.0858				
MidSouth MRP TSR	SRSB10	SRSSB1002	1 - 2	Subsurf	BENZO[B]FLUORANTHENE	0.171 J	0.1	0.0171				
MidSouth MRP TSR	SRSB10	SRSSB1002	1 - 2	Subsurf	BENZO[K]FLUORANTHENE	0.0543 J	0.01	0.000543				
MidSouth MRP TSR	SRSB10	SRSSB1002	1 - 2	Subsurf	CHRYSENE	0.106 J	0.001	0.000106				
MidSouth MRP TSR	SRSB10	SRSSB1002	1 - 2	Subsurf	DIBENZ[A,H]ANTHRACENE	0.0124 U	1	0.0062				
MidSouth MRP TSR	SRSB10	SRSSB1002	1 - 2	Subsurf	INDENO[1,2,3-CD]PYRENE	0.0835 J	0.1	0.00835	0.125	0.015	0.21	0.565
MidSouth MRP TSR	SRSB12	SRSSB1202	1 - 2	Subsurf	BENZO[A]ANTHRACENE	0.244	0.1	0.0244				
MidSouth MRP TSR	SRSB12	SRSSB1202	1 - 2	Subsurf	BENZO[A]PYRENE	0.424	1	0.424				

MidSouth MRP TSR	SRSB12	SRSSB1202	1 - 2	Subsurf	BENZO[B]FLUORANTHENE	0.541	0.1	0.0541				
MidSouth MRP TSR	SRSB12	SRSSB1202	1 - 2	Subsurf	BENZO[K]FLUORANTHENE	0.22	0.01	0.0022				
MidSouth MRP TSR	SRSB12	SRSSB1202	1 - 2	Subsurf	CHRYSENE	0.344	0.001	0.000344				
MidSouth MRP TSR	SRSB12	SRSSB1202	1 - 2	Subsurf	DIBENZ[A,H]ANTHRACENE	0.013 U	1	0.0065				
MidSouth MRP TSR	SRSB12	SRSSB1202	1 - 2	Subsurf	INDENO[1,2,3-CD]PYRENE	0.346	0.1	0.0346	0.546	0.015	0.21	0.565
MidSouth MRP TSR	SRSB13	SRSSB1302	1 - 2	Subsurf	BENZO[A]ANTHRACENE	0.183	0.1	0.0183				
MidSouth MRP TSR	SRSB13	SRSSB1302	1 - 2	Subsurf	BENZO[A]PYRENE	0.334	1	0.334				
MidSouth MRP TSR	SRSB13	SRSSB1302	1 - 2	Subsurf	BENZO[B]FLUORANTHENE	0.499	0.1	0.0499				
MidSouth MRP TSR	SRSB13	SRSSB1302	1 - 2	Subsurf	BENZO[K]FLUORANTHENE	0.15	0.01	0.0015				
MidSouth MRP TSR	SRSB13	SRSSB1302	1 - 2	Subsurf	CHRYSENE	0.234	0.001	0.000234				
MidSouth MRP TSR	SRSB13	SRSSB1302	1 - 2	Subsurf	DIBENZ[A,H]ANTHRACENE	0.0713	1	0.0713				
MidSouth MRP TSR	SRSB13	SRSSB1302	1 - 2	Subsurf	INDENO[1,2,3-CD]PYRENE	0.307	0.1	0.0307	0.506	0.015	0.21	0.565
MidSouth MRP TSR	SRSB15	SRSSB1502	1 - 2	Subsurf	BENZO[A]ANTHRACENE	0.0298	0.1	0.00298				
MidSouth MRP TSR	SRSB15	SRSSB1502	1 - 2	Subsurf	BENZO[A]PYRENE	0.0266	1	0.0266				
MidSouth MRP TSR	SRSB15	SRSSB1502	1 - 2	Subsurf	BENZO[B]FLUORANTHENE	0.0859	0.1	0.00859				
MidSouth MRP TSR	SRSB15	SRSSB1502	1 - 2	Subsurf	BENZO[K]FLUORANTHENE	0.0366	0.01	0.000366				
MidSouth MRP TSR	SRSB15	SRSSB1502	1 - 2	Subsurf	CHRYSENE	0.0059	0.001	0.0000059				
MidSouth MRP TSR	SRSB15	SRSSB1502	1 - 2	Subsurf	DIBENZ[A,H]ANTHRACENE	0.0234	1	0.0234				
MidSouth MRP TSR	SRSB15	SRSSB1502	1 - 2	Subsurf	INDENO[1,2,3-CD]PYRENE	0.0319	0.1	0.00319	0.0651	0.015	0.21	0.565
MidSouth MRP TSR	SRSB16	SRSSB1602	1 - 2	Subsurf	BENZO[A]ANTHRACENE	0.53	0.1	0.053				
MidSouth MRP TSR	SRSB16	SRSSB1602	1 - 2	Subsurf	BENZO[A]PYRENE	0.933	1	0.933				
MidSouth MRP TSR	SRSB16	SRSSB1602	1 - 2	Subsurf	BENZO[B]FLUORANTHENE	1.27	0.1	0.127				
MidSouth MRP TSR	SRSB16	SRSSB1602	1 - 2	Subsurf	BENZO[K]FLUORANTHENE	0.575	0.01	0.00575				
MidSouth MRP TSR	SRSB16	SRSSB1602	1 - 2	Subsurf	CHRYSENE	0.631	0.001	0.000631				
MidSouth MRP TSR	SRSB16	SRSSB1602	1 - 2	Subsurf	DIBENZ[A,H]ANTHRACENE	0.149	1	0.149				
MidSouth MRP TSR	SRSB16	SRSSB1602	1 - 2	Subsurf	INDENO[1,2,3-CD]PYRENE	0.817	0.1	0.0817	**1.35**	0.015	0.21	0.565
MidSouth MRP TSR	SRSB17	SRSSB1702	1 - 2	Subsurf	BENZO[A]ANTHRACENE	0.231	0.1	0.0231				
MidSouth MRP TSR	SRSB17	SRSSB1702	1 - 2	Subsurf	BENZO[A]PYRENE	0.372	1	0.372				
MidSouth MRP TSR	SRSB17	SRSSB1702	1 - 2	Subsurf	BENZO[B]FLUORANTHENE	0.601	0.1	0.0601				
MidSouth MRP TSR	SRSB17	SRSSB1702	1 - 2	Subsurf	BENZO[K]FLUORANTHENE	0.197	0.01	0.00197				
MidSouth MRP TSR	SRSB17	SRSSB1702	1 - 2	Subsurf	CHRYSENE	0.279	0.001	0.000279				
MidSouth MRP TSR	SRSB17	SRSSB1702	1 - 2	Subsurf	DIBENZ[A,H]ANTHRACENE	0.0652	1	0.0652				
MidSouth MRP TSR	SRSB17	SRSSB1702	1 - 2	Subsurf	INDENO[1,2,3-CD]PYRENE	0.274	0.1	0.0274	0.55	0.015	0.21	0.565
MidSouth MRP TSR	SRSB18	SRSSB1802	1 - 2	Subsurf	BENZO[A]ANTHRACENE	0.0541 J	0.1	0.00541				
MidSouth MRP TSR	SRSB18	SRSSB1802	1 - 2	Subsurf	BENZO[A]PYRENE	0.0676	1	0.0676				
MidSouth MRP TSR	SRSB18	SRSSB1802	1 - 2	Subsurf	BENZO[B]FLUORANTHENE	0.143	0.1	0.0143				
MidSouth MRP TSR	SRSB18	SRSSB1802	1 - 2	Subsurf	BENZO[K]FLUORANTHENE	0.0548	0.01	0.000548				
MidSouth MRP TSR	SRSB18	SRSSB1802	1 - 2	Subsurf	CHRYSENE	0.042	0.001	0.000042				
MidSouth MRP TSR	SRSB18	SRSSB1802	1 - 2	Subsurf	DIBENZ[A,H]ANTHRACENE	0.0313	1	0.0313				
MidSouth MRP TSR	SRSB18	SRSSB1802	1 - 2	Subsurf	INDENO[1,2,3-CD]PYRENE	0.0628	0.1	0.00628	0.125	0.015	0.21	0.565
MidSouth MRP TSR	SRSB25	SRSSB2502	1 - 2	Subsurf	BENZO[A]ANTHRACENE	5.31	0.1	0.531				
MidSouth MRP TSR	SRSB25	SRSSB2502	1 - 2	Subsurf	BENZO[A]PYRENE	5.22	1	5.22				
MidSouth MRP TSR	SRSB25	SRSSB2502	1 - 2	Subsurf	BENZO[B]FLUORANTHENE	8.12	0.1	0.812				
MidSouth MRP TSR	SRSB25	SRSSB2502	1 - 2	Subsurf	BENZO[K]FLUORANTHENE	2.44	0.01	0.0244				
MidSouth MRP TSR	SRSB25	SRSSB2502	1 - 2	Subsurf	CHRYSENE	5.71	0.001	0.00571				
MidSouth MRP TSR	SRSB25	SRSSB2502	1 - 2	Subsurf	DIBENZ[A,H]ANTHRACENE	0.949	1	0.949				
MidSouth MRP TSR	SRSB25	SRSSB2502	1 - 2	Subsurf	INDENO[1,2,3-CD]PYRENE	4.04	0.1	0.404	**7.95**	0.015	0.21	0.565
MidSouth MRP TSR	SRSB26	SRSSB2602	1 - 2	Subsurf	BENZO[A]ANTHRACENE	33.1	0.1	3.31				
MidSouth MRP TSR	SRSB26	SRSSB2602	1 - 2	Subsurf	BENZO[A]PYRENE	55.7	1	55.7				
MidSouth MRP TSR	SRSB26	SRSSB2602	1 - 2	Subsurf	BENZO[B]FLUORANTHENE	67.6	0.1	6.76				
MidSouth MRP TSR	SRSB26	SRSSB2602	1 - 2	Subsurf	BENZO[K]FLUORANTHENE	25	0.01	0.25				
MidSouth MRP TSR	SRSB26	SRSSB2602	1 - 2	Subsurf	CHRYSENE	42.4	0.001	0.0424				
MidSouth MRP TSR	SRSB26	SRSSB2602	1 - 2	Subsurf	DIBENZ[A,H]ANTHRACENE	12.9	1	12.9				
MidSouth MRP TSR	SRSB26	SRSSB2602	1 - 2	Subsurf	INDENO[1,2,3-CD]PYRENE	43.1	0.1	4.31	**83.3**	0.015	0.21	0.565
MidSouth MRP TSR	SRSB27	SRSSB2702	1 - 2	Subsurf	BENZO[A]ANTHRACENE	0.00201 U	0.1	0.0001005				
MidSouth MRP TSR	SRSB27	SRSSB2702	1 - 2	Subsurf	BENZO[A]PYRENE	0.00201 U	1	0.001005				
MidSouth MRP TSR	SRSB27	SRSSB2702	1 - 2	Subsurf	BENZO[B]FLUORANTHENE	0.00201 U	0.1	0.0001005				
MidSouth MRP TSR	SRSB27	SRSSB2702	1 - 2	Subsurf	BENZO[K]FLUORANTHENE	0.00201 U	0.01	0.00001005				
MidSouth MRP TSR	SRSB27	SRSSB2702	1 - 2	Subsurf	CHRYSENE	0.00304 U	0.001	0.00000152				
MidSouth MRP TSR	SRSB27	SRSSB2702	1 - 2	Subsurf	DIBENZ[A,H]ANTHRACENE	0.00257 U	1	0.001285				
MidSouth MRP TSR	SRSB27	SRSSB2702	1 - 2	Subsurf	INDENO[1,2,3-CD]PYRENE	0.00304 U	0.1	0.000152	0.00265	0.015	0.21	0.565
MidSouth MRP TSR	SRSB28	SRSSB2802	1 - 2	Subsurf	BENZO[A]ANTHRACENE	3.03	0.1	0.303				
MidSouth MRP TSR	SRSB28	SRSSB2802	1 - 2	Subsurf	BENZO[A]PYRENE	6.07	1	6.07				
MidSouth MRP TSR	SRSB28	SRSSB2802	1 - 2	Subsurf	BENZO[B]FLUORANTHENE	8.04	0.1	0.804				
MidSouth MRP TSR	SRSB28	SRSSB2802	1 - 2	Subsurf	BENZO[K]FLUORANTHENE	3.36	0.01	0.0336				
MidSouth MRP TSR	SRSB28	SRSSB2802	1 - 2	Subsurf	CHRYSENE	3.95	0.001	0.00395				
MidSouth MRP TSR	SRSB28	SRSSB2802	1 - 2	Subsurf	DIBENZ[A,H]ANTHRACENE	0.831	1	0.831				
MidSouth MRP TSR	SRSB28	SRSSB2802	1 - 2	Subsurf	INDENO[1,2,3-CD]PYRENE	5.47	0.1	0.547	**8.59**	0.015	0.21	0.565
MidSouth MRP TSR	SRSB29	SRSSB2902	1 - 2	Subsurf	BENZO[A]ANTHRACENE	0.00206 U	0.1	0.000103				

MidSouth MRP TSR	SRSB29	SRSSB2902	1 - 2	Subsurf	BENZO[A]PYRENE	0.00206 U	1	0.00103				
MidSouth MRP TSR	SRSB29	SRSSB2902	1 - 2	Subsurf	BENZO[B]FLUORANTHENE	0.00206 U	0.1	0.000103				
MidSouth MRP TSR	SRSB29	SRSSB2902	1 - 2	Subsurf	BENZO[K]FLUORANTHENE	0.00206 U	0.01	0.0000103				
MidSouth MRP TSR	SRSB29	SRSSB2902	1 - 2	Subsurf	CHRYSENE	0.00311 U	0.001	0.000001555				
MidSouth MRP TSR	SRSB29	SRSSB2902	1 - 2	Subsurf	DIBENZ[A,H]ANTHRACENE	0.00263 U	1	0.001315				
MidSouth MRP TSR	SRSB29	SRSSB2902	1 - 2	Subsurf	INDENO[1,2,3-CD]PYRENE	0.00311 U	0.1	0.0001555	0.00272	0.015	0.21	0.565
MidSouth MRP TSR	SRSB30	SRSSB3002	1 - 2	Subsurf	BENZO[A]ANTHRACENE	0.772	0.1	0.0772				
MidSouth MRP TSR	SRSB30	SRSSB3002	1 - 2	Subsurf	BENZO[A]PYRENE	1.12	1	1.12				
MidSouth MRP TSR	SRSB30	SRSSB3002	1 - 2	Subsurf	BENZO[B]FLUORANTHENE	1.86	0.1	0.186				
MidSouth MRP TSR	SRSB30	SRSSB3002	1 - 2	Subsurf	BENZO[K]FLUORANTHENE	0.474	0.01	0.00474				
MidSouth MRP TSR	SRSB30	SRSSB3002	1 - 2	Subsurf	CHRYSENE	0.881	0.001	0.000881				
MidSouth MRP TSR	SRSB30	SRSSB3002	1 - 2	Subsurf	DIBENZ[A,H]ANTHRACENE	0.167	1	0.167				
MidSouth MRP TSR	SRSB30	SRSSB3002	1 - 2	Subsurf	INDENO[1,2,3-CD]PYRENE	0.808	0.1	0.0808	**1.64**	0.015	0.21	0.565
MidSouth MRP TSR	SRSB31	SRSSB3102	1 - 2	Subsurf	BENZO[A]ANTHRACENE	0.428	0.1	0.0428				
MidSouth MRP TSR	SRSB31	SRSSB3102	1 - 2	Subsurf	BENZO[A]PYRENE	0.509	1	0.509				
MidSouth MRP TSR	SRSB31	SRSSB3102	1 - 2	Subsurf	BENZO[B]FLUORANTHENE	0.676	0.1	0.0676				
MidSouth MRP TSR	SRSB31	SRSSB3102	1 - 2	Subsurf	BENZO[K]FLUORANTHENE	0.321	0.01	0.00321				
MidSouth MRP TSR	SRSB31	SRSSB3102	1 - 2	Subsurf	CHRYSENE	0.424	0.001	0.000424				
MidSouth MRP TSR	SRSB31	SRSSB3102	1 - 2	Subsurf	DIBENZ[A,H]ANTHRACENE	0.0694	1	0.0694				
MidSouth MRP TSR	SRSB31	SRSSB3102	1 - 2	Subsurf	INDENO[1,2,3-CD]PYRENE	0.443	0.1	0.0443	**0.737**	0.015	0.21	0.565
MidSouth MRP TSR	SRSB32	SRSSB3202	1 - 2	Subsurf	BENZO[A]ANTHRACENE	0.287	0.1	0.0287				
MidSouth MRP TSR	SRSB32	SRSSB3202	1 - 2	Subsurf	BENZO[A]PYRENE	0.479	1	0.479				
MidSouth MRP TSR	SRSB32	SRSSB3202	1 - 2	Subsurf	BENZO[B]FLUORANTHENE	0.675	0.1	0.0675				
MidSouth MRP TSR	SRSB32	SRSSB3202	1 - 2	Subsurf	BENZO[K]FLUORANTHENE	0.252	0.01	0.00252				
MidSouth MRP TSR	SRSB32	SRSSB3202	1 - 2	Subsurf	CHRYSENE	0.384	0.001	0.000384				
MidSouth MRP TSR	SRSB32	SRSSB3202	1 - 2	Subsurf	DIBENZ[A,H]ANTHRACENE	0.0712	1	0.0712				
MidSouth MRP TSR	SRSB32	SRSSB3202	1 - 2	Subsurf	INDENO[1,2,3-CD]PYRENE	0.426	0.1	0.0426	**0.692**	0.015	0.21	0.565
MidSouth MRP TSR	SRSB34	SRSSB3402	1 - 2	Subsurf	BENZO[A]ANTHRACENE	0.166	0.1	0.0166				
MidSouth MRP TSR	SRSB34	SRSSB3402	1 - 2	Subsurf	BENZO[A]PYRENE	0.228	1	0.228				
MidSouth MRP TSR	SRSB34	SRSSB3402	1 - 2	Subsurf	BENZO[B]FLUORANTHENE	0.366	0.1	0.0366				
MidSouth MRP TSR	SRSB34	SRSSB3402	1 - 2	Subsurf	BENZO[K]FLUORANTHENE	0.122	0.01	0.00122				
MidSouth MRP TSR	SRSB34	SRSSB3402	1 - 2	Subsurf	CHRYSENE	0.191	0.001	0.000191				
MidSouth MRP TSR	SRSB34	SRSSB3402	1 - 2	Subsurf	DIBENZ[A,H]ANTHRACENE	0.0591	1	0.0591				
MidSouth MRP TSR	SRSB34	SRSSB3402	1 - 2	Subsurf	INDENO[1,2,3-CD]PYRENE	0.222	0.1	0.0222	0.364	0.015	0.21	0.565
MidSouth MRP TSR	SRSB35	SRSSB3502	1 - 2	Subsurf	BENZO[A]ANTHRACENE	21	0.1	2.1				
MidSouth MRP TSR	SRSB35	SRSSB3502	1 - 2	Subsurf	BENZO[A]PYRENE	28.4	1	28.4				
MidSouth MRP TSR	SRSB35	SRSSB3502	1 - 2	Subsurf	BENZO[B]FLUORANTHENE	32.7	0.1	3.27				
MidSouth MRP TSR	SRSB35	SRSSB3502	1 - 2	Subsurf	BENZO[K]FLUORANTHENE	18.1	0.01	0.181				
MidSouth MRP TSR	SRSB35	SRSSB3502	1 - 2	Subsurf	CHRYSENE	21.2	0.001	0.0212				
MidSouth MRP TSR	SRSB35	SRSSB3502	1 - 2	Subsurf	DIBENZ[A,H]ANTHRACENE	5.04	1	5.04				
MidSouth MRP TSR	SRSB35	SRSSB3502	1 - 2	Subsurf	INDENO[1,2,3-CD]PYRENE	28.7	0.1	2.87	**41.9**	0.015	0.21	0.565
MidSouth MRP TSR	SRSB36	SRSSB3602	1 - 2	Subsurf	BENZO[A]ANTHRACENE	0.0402 J	0.1	0.00402				
MidSouth MRP TSR	SRSB36	SRSSB3602	1 - 2	Subsurf	BENZO[A]PYRENE	0.0677 J	1	0.0677				
MidSouth MRP TSR	SRSB36	SRSSB3602	1 - 2	Subsurf	BENZO[B]FLUORANTHENE	0.113 J	0.1	0.0113				
MidSouth MRP TSR	SRSB36	SRSSB3602	1 - 2	Subsurf	BENZO[K]FLUORANTHENE	0.0425 J	0.01	0.000425				
MidSouth MRP TSR	SRSB36	SRSSB3602	1 - 2	Subsurf	CHRYSENE	0.0521 J	0.001	0.0000521				
MidSouth MRP TSR	SRSB36	SRSSB3602	1 - 2	Subsurf	DIBENZ[A,H]ANTHRACENE	0.0061 J	1	0.0061				
MidSouth MRP TSR	SRSB36	SRSSB3602	1 - 2	Subsurf	INDENO[1,2,3-CD]PYRENE	0.0466 J	0.1	0.00466	0.0943	0.015	0.21	0.565
MidSouth MRP TSR	SRSB37	SRSSB3702	1 - 2	Subsurf	BENZO[A]ANTHRACENE	0.103	0.1	0.0103				
MidSouth MRP TSR	SRSB37	SRSSB3702	1 - 2	Subsurf	BENZO[A]PYRENE	0.19	1	0.19				
MidSouth MRP TSR	SRSB37	SRSSB3702	1 - 2	Subsurf	BENZO[B]FLUORANTHENE	0.261	0.1	0.0261				
MidSouth MRP TSR	SRSB37	SRSSB3702	1 - 2	Subsurf	BENZO[K]FLUORANTHENE	0.106	0.01	0.00106				
MidSouth MRP TSR	SRSB37	SRSSB3702	1 - 2	Subsurf	CHRYSENE	0.136	0.001	0.000136				
MidSouth MRP TSR	SRSB37	SRSSB3702	1 - 2	Subsurf	DIBENZ[A,H]ANTHRACENE	0.0175	1	0.0175				
MidSouth MRP TSR	SRSB37	SRSSB3702	1 - 2	Subsurf	INDENO[1,2,3-CD]PYRENE	0.115	0.1	0.0115	0.257	0.015	0.21	0.565
MidSouth MRP TSR	SRSB38	SRSSB3802	1 - 2	Subsurf	BENZO[A]ANTHRACENE	2.66	0.1	0.266				
MidSouth MRP TSR	SRSB38	SRSSB3802	1 - 2	Subsurf	BENZO[A]PYRENE	3.37	1	3.37				
MidSouth MRP TSR	SRSB38	SRSSB3802	1 - 2	Subsurf	BENZO[B]FLUORANTHENE	3.71	0.1	0.371				
MidSouth MRP TSR	SRSB38	SRSSB3802	1 - 2	Subsurf	BENZO[K]FLUORANTHENE	2.25	0.01	0.0225				
MidSouth MRP TSR	SRSB38	SRSSB3802	1 - 2	Subsurf	CHRYSENE	3.08	0.001	0.00308				
MidSouth MRP TSR	SRSB38	SRSSB3802	1 - 2	Subsurf	DIBENZ[A,H]ANTHRACENE	0.328	1	0.328				
MidSouth MRP TSR	SRSB38	SRSSB3802	1 - 2	Subsurf	INDENO[1,2,3-CD]PYRENE	2.22	0.1	0.222	**4.58**	0.015	0.21	0.565
MidSouth MRP TSR	SRSB39	SRSSB3902	1 - 2	Subsurf	BENZO[A]ANTHRACENE	0.014	0.1	0.0014				
MidSouth MRP TSR	SRSB39	SRSSB3902	1 - 2	Subsurf	BENZO[A]PYRENE	0.0311	1	0.0311				
MidSouth MRP TSR	SRSB39	SRSSB3902	1 - 2	Subsurf	BENZO[B]FLUORANTHENE	0.0487	0.1	0.00487				
MidSouth MRP TSR	SRSB39	SRSSB3902	1 - 2	Subsurf	BENZO[K]FLUORANTHENE	0.0179	0.01	0.000179				
MidSouth MRP TSR	SRSB39	SRSSB3902	1 - 2	Subsurf	CHRYSENE	0.0187	0.001	0.0000187				
MidSouth MRP TSR	SRSB39	SRSSB3902	1 - 2	Subsurf	DIBENZ[A,H]ANTHRACENE	0.00269 U	1	0.001345				
MidSouth MRP TSR	SRSB39	SRSSB3902	1 - 2	Subsurf	INDENO[1,2,3-CD]PYRENE	0.0205	0.1	0.00205	0.041	0.015	0.21	0.565

MidSouth MRP TSR	SRSB40	SRSSB4002	1 - 2	Subsurf	BENZO[A]ANTHRACENE	0.00207 U	0.1	0.0001035				
MidSouth MRP TSR	SRSB40	SRSSB4002	1 - 2	Subsurf	BENZO[A]PYRENE	0.00207 U	1	0.001035				
MidSouth MRP TSR	SRSB40	SRSSB4002	1 - 2	Subsurf	BENZO[B]FLUORANTHENE	0.00207 U	0.1	0.0001035				
MidSouth MRP TSR	SRSB40	SRSSB4002	1 - 2	Subsurf	BENZO[K]FLUORANTHENE	0.00207 U	0.01	0.00001035				
MidSouth MRP TSR	SRSB40	SRSSB4002	1 - 2	Subsurf	CHRYSENE	0.00313 U	0.001	0.000001565				
MidSouth MRP TSR	SRSB40	SRSSB4002	1 - 2	Subsurf	DIBENZ[A,H]ANTHRACENE	0.00264 U	1	0.00132				
MidSouth MRP TSR	SRSB40	SRSSB4002	1 - 2	Subsurf	INDENO[1,2,3-CD]PYRENE	0.00313 U	0.1	0.0001565	0.00273	0.015	0.21	0.565
MidSouth MRP TSR	SRSB42	SRSSB4202	1 - 2	Subsurf	BENZO[A]ANTHRACENE	0.0651	0.1	0.00651				
MidSouth MRP TSR	SRSB42	SRSSB4202	1 - 2	Subsurf	BENZO[A]PYRENE	0.0801	1	0.0801				
MidSouth MRP TSR	SRSB42	SRSSB4202	1 - 2	Subsurf	BENZO[B]FLUORANTHENE	0.166	0.1	0.0166				
MidSouth MRP TSR	SRSB42	SRSSB4202	1 - 2	Subsurf	BENZO[K]FLUORANTHENE	0.0627	0.01	0.000627				
MidSouth MRP TSR	SRSB42	SRSSB4202	1 - 2	Subsurf	CHRYSENE	0.0514	0.001	0.0000514				
MidSouth MRP TSR	SRSB42	SRSSB4202	1 - 2	Subsurf	DIBENZ[A,H]ANTHRACENE	0.037	1	0.037				
MidSouth MRP TSR	SRSB42	SRSSB4202	1 - 2	Subsurf	INDENO[1,2,3-CD]PYRENE	0.0916	0.1	0.00916	0.15	0.015	0.21	0.565
MidSouth MRP TSR	SRSB43	SRSSB4302	1 - 2	Subsurf	BENZO[A]ANTHRACENE	0.0235	0.1	0.00235				
MidSouth MRP TSR	SRSB43	SRSSB4302	1 - 2	Subsurf	BENZO[A]PYRENE	0.0335	1	0.0335				
MidSouth MRP TSR	SRSB43	SRSSB4302	1 - 2	Subsurf	BENZO[B]FLUORANTHENE	0.0591	0.1	0.00591				
MidSouth MRP TSR	SRSB43	SRSSB4302	1 - 2	Subsurf	BENZO[K]FLUORANTHENE	0.0231	0.01	0.000231				
MidSouth MRP TSR	SRSB43	SRSSB4302	1 - 2	Subsurf	CHRYSENE	0.0246	0.001	0.0000246				
MidSouth MRP TSR	SRSB43	SRSSB4302	1 - 2	Subsurf	DIBENZ[A,H]ANTHRACENE	0.00582	1	0.00582				
MidSouth MRP TSR	SRSB43	SRSSB4302	1 - 2	Subsurf	INDENO[1,2,3-CD]PYRENE	0.0304	0.1	0.00304	0.0509	0.015	0.21	0.565
MidSouth MRP TSR	SRSB44	SRSSB4402	1 - 2	Subsurf	BENZO[A]ANTHRACENE	0.0738 J	0.1	0.00738				
MidSouth MRP TSR	SRSB44	SRSSB4402	1 - 2	Subsurf	BENZO[A]PYRENE	0.187 J	1	0.187				
MidSouth MRP TSR	SRSB44	SRSSB4402	1 - 2	Subsurf	BENZO[B]FLUORANTHENE	0.22 J	0.1	0.022				
MidSouth MRP TSR	SRSB44	SRSSB4402	1 - 2	Subsurf	BENZO[K]FLUORANTHENE	0.0967 J	0.01	0.000967				
MidSouth MRP TSR	SRSB44	SRSSB4402	1 - 2	Subsurf	CHRYSENE	0.104 J	0.001	0.000104				
MidSouth MRP TSR	SRSB44	SRSSB4402	1 - 2	Subsurf	DIBENZ[A,H]ANTHRACENE	0.0289 J	1	0.0289				
MidSouth MRP TSR	SRSB44	SRSSB4402	1 - 2	Subsurf	INDENO[1,2,3-CD]PYRENE	0.183 J	0.1	0.0183	0.265	0.015	0.21	0.565
MidSouth MRP TSR	SRSB45	SRSSB4502	1 - 2	Subsurf	BENZO[A]ANTHRACENE	0.283	0.1	0.0283				
MidSouth MRP TSR	SRSB45	SRSSB4502	1 - 2	Subsurf	BENZO[A]PYRENE	0.448	1	0.448				
MidSouth MRP TSR	SRSB45	SRSSB4502	1 - 2	Subsurf	BENZO[B]FLUORANTHENE	0.571	0.1	0.0571				
MidSouth MRP TSR	SRSB45	SRSSB4502	1 - 2	Subsurf	BENZO[K]FLUORANTHENE	0.314	0.01	0.00314				
MidSouth MRP TSR	SRSB45	SRSSB4502	1 - 2	Subsurf	CHRYSENE	0.324	0.001	0.000324				
MidSouth MRP TSR	SRSB45	SRSSB4502	1 - 2	Subsurf	DIBENZ[A,H]ANTHRACENE	0.0712	1	0.0712				
MidSouth MRP TSR	SRSB45	SRSSB4502	1 - 2	Subsurf	INDENO[1,2,3-CD]PYRENE	0.45	0.1	0.045	**0.653**	0.015	0.21	0.565
MidSouth MRP TSR	SRSB46	SRSSB4602	1 - 2	Subsurf	BENZO[A]ANTHRACENE	0.0636	0.1	0.00636				
MidSouth MRP TSR	SRSB46	SRSSB4602	1 - 2	Subsurf	BENZO[A]PYRENE	0.0928	1	0.0928				
MidSouth MRP TSR	SRSB46	SRSSB4602	1 - 2	Subsurf	BENZO[B]FLUORANTHENE	0.139	0.1	0.0139				
MidSouth MRP TSR	SRSB46	SRSSB4602	1 - 2	Subsurf	BENZO[K]FLUORANTHENE	0.0507	0.01	0.000507				
MidSouth MRP TSR	SRSB46	SRSSB4602	1 - 2	Subsurf	CHRYSENE	0.074	0.001	0.000074				
MidSouth MRP TSR	SRSB46	SRSSB4602	1 - 2	Subsurf	DIBENZ[A,H]ANTHRACENE	0.0138	1	0.0138				
MidSouth MRP TSR	SRSB46	SRSSB4602	1 - 2	Subsurf	INDENO[1,2,3-CD]PYRENE	0.0828	0.1	0.00828	0.136	0.015	0.21	0.565
MidSouth MRP TSR	SRSB47	SRSSB4702	1 - 2	Subsurf	BENZO[A]ANTHRACENE	0.158	0.1	0.0158				
MidSouth MRP TSR	SRSB47	SRSSB4702	1 - 2	Subsurf	BENZO[A]PYRENE	0.27	1	0.27				
MidSouth MRP TSR	SRSB47	SRSSB4702	1 - 2	Subsurf	BENZO[B]FLUORANTHENE	0.416	0.1	0.0416				
MidSouth MRP TSR	SRSB47	SRSSB4702	1 - 2	Subsurf	BENZO[K]FLUORANTHENE	0.141	0.01	0.00141				
MidSouth MRP TSR	SRSB47	SRSSB4702	1 - 2	Subsurf	CHRYSENE	0.176	0.001	0.000176				
MidSouth MRP TSR	SRSB47	SRSSB4702	1 - 2	Subsurf	DIBENZ[A,H]ANTHRACENE	0.0659	1	0.0659				
MidSouth MRP TSR	SRSB47	SRSSB4702	1 - 2	Subsurf	INDENO[1,2,3-CD]PYRENE	0.267	0.1	0.0267	0.422	0.015	0.21	0.565
MidSouth MRP TSR	SRSB48	SRSSB4802	1 - 2	Subsurf	BENZO[A]ANTHRACENE	0.0325 J	0.1	0.00325				
MidSouth MRP TSR	SRSB48	SRSSB4802	1 - 2	Subsurf	BENZO[A]PYRENE	0.0536 J	1	0.0536				
MidSouth MRP TSR	SRSB48	SRSSB4802	1 - 2	Subsurf	BENZO[B]FLUORANTHENE	0.0955 J	0.1	0.00955				
MidSouth MRP TSR	SRSB48	SRSSB4802	1 - 2	Subsurf	BENZO[K]FLUORANTHENE	0.0288 J	0.01	0.000288				
MidSouth MRP TSR	SRSB48	SRSSB4802	1 - 2	Subsurf	CHRYSENE	0.0383 J	0.001	0.0000383				
MidSouth MRP TSR	SRSB48	SRSSB4802	1 - 2	Subsurf	DIBENZ[A,H]ANTHRACENE	0.00749 J	1	0.00749				
MidSouth MRP TSR	SRSB48	SRSSB4802	1 - 2	Subsurf	INDENO[1,2,3-CD]PYRENE	0.0522 J	0.1	0.00522	0.0794	0.015	0.21	0.565
MidSouth MRP TSR	SRSB49	SRSSB4902	1 - 2	Subsurf	BENZO[A]ANTHRACENE	0.0562	0.1	0.00562				
MidSouth MRP TSR	SRSB49	SRSSB4902	1 - 2	Subsurf	BENZO[A]PYRENE	0.0609	1	0.0609				
MidSouth MRP TSR	SRSB49	SRSSB4902	1 - 2	Subsurf	BENZO[B]FLUORANTHENE	0.129	0.1	0.0129				
MidSouth MRP TSR	SRSB49	SRSSB4902	1 - 2	Subsurf	BENZO[K]FLUORANTHENE	0.0523	0.01	0.000523				
MidSouth MRP TSR	SRSB49	SRSSB4902	1 - 2	Subsurf	CHRYSENE	0.0335	0.001	0.0000335				
MidSouth MRP TSR	SRSB49	SRSSB4902	1 - 2	Subsurf	DIBENZ[A,H]ANTHRACENE	0.0295	1	0.0295				
MidSouth MRP TSR	SRSB49	SRSSB4902	1 - 2	Subsurf	INDENO[1,2,3-CD]PYRENE	0.0661	0.1	0.00661	0.116	0.015	0.21	0.565
MidSouth MRP TSR	SRSB54	SRSSB5402	1 - 2	Subsurf	BENZO[A]ANTHRACENE	0.389	0.1	0.0389				
MidSouth MRP TSR	SRSB54	SRSSB5402	1 - 2	Subsurf	BENZO[A]PYRENE	0.464	1	0.464				
MidSouth MRP TSR	SRSB54	SRSSB5402	1 - 2	Subsurf	BENZO[B]FLUORANTHENE	0.717	0.1	0.0717				
MidSouth MRP TSR	SRSB54	SRSSB5402	1 - 2	Subsurf	BENZO[K]FLUORANTHENE	0.242	0.01	0.00242				
MidSouth MRP TSR	SRSB54	SRSSB5402	1 - 2	Subsurf	CHRYSENE	0.444	0.001	0.000444				
MidSouth MRP TSR	SRSB54	SRSSB5402	1 - 2	Subsurf	DIBENZ[A,H]ANTHRACENE	0.0975	1	0.0975				

MidSouth MRP TSR	SRSB54	SRSSB5402	1 - 2	Subsurf	INDENO[1,2,3-CD]PYRENE	0.412	0.1	0.0412	**0.716**	0.015	0.21	0.565
MidSouth MRP TSR	SRSB55	SRSSB5502	1 - 2	Subsurf	BENZO[A]ANTHRACENE	0.36	0.1	0.036				
MidSouth MRP TSR	SRSB55	SRSSB5502	1 - 2	Subsurf	BENZO[A]PYRENE	0.404	1	0.404				
MidSouth MRP TSR	SRSB55	SRSSB5502	1 - 2	Subsurf	BENZO[B]FLUORANTHENE	0.507	0.1	0.0507				
MidSouth MRP TSR	SRSB55	SRSSB5502	1 - 2	Subsurf	BENZO[K]FLUORANTHENE	0.173	0.01	0.00173				
MidSouth MRP TSR	SRSB55	SRSSB5502	1 - 2	Subsurf	CHRYSENE	0.434	0.001	0.000434				
MidSouth MRP TSR	SRSB55	SRSSB5502	1 - 2	Subsurf	DIBENZ[A,H]ANTHRACENE	0.0886	1	0.0886				
MidSouth MRP TSR	SRSB55	SRSSB5502	1 - 2	Subsurf	INDENO[1,2,3-CD]PYRENE	0.308	0.1	0.0308	**0.612**	0.015	0.21	0.565
MidSouth MRP TSR	SRSB56	SRSSB5602	1 - 2	Subsurf	BENZO[A]ANTHRACENE	0.339	0.1	0.0339				
MidSouth MRP TSR	SRSB56	SRSSB5602	1 - 2	Subsurf	BENZO[A]PYRENE	0.466	1	0.466				
MidSouth MRP TSR	SRSB56	SRSSB5602	1 - 2	Subsurf	BENZO[B]FLUORANTHENE	0.745	0.1	0.0745				
MidSouth MRP TSR	SRSB56	SRSSB5602	1 - 2	Subsurf	BENZO[K]FLUORANTHENE	0.231	0.01	0.00231				
MidSouth MRP TSR	SRSB56	SRSSB5602	1 - 2	Subsurf	CHRYSENE	0.407	0.001	0.000407				
MidSouth MRP TSR	SRSB56	SRSSB5602	1 - 2	Subsurf	DIBENZ[A,H]ANTHRACENE	0.0761	1	0.0761				
MidSouth MRP TSR	SRSB56	SRSSB5602	1 - 2	Subsurf	INDENO[1,2,3-CD]PYRENE	0.483	0.1	0.0483	**0.702**	0.015	0.21	0.565
MidSouth MRP TSR	SRSB57	SRSSB5702	1 - 2	Subsurf	BENZO[A]ANTHRACENE	129	0.1	12.9				
MidSouth MRP TSR	SRSB57	SRSSB5702	1 - 2	Subsurf	BENZO[A]PYRENE	118	1	118				
MidSouth MRP TSR	SRSB57	SRSSB5702	1 - 2	Subsurf	BENZO[B]FLUORANTHENE	160	0.1	16				
MidSouth MRP TSR	SRSB57	SRSSB5702	1 - 2	Subsurf	BENZO[K]FLUORANTHENE	76.3	0.01	0.763				
MidSouth MRP TSR	SRSB57	SRSSB5702	1 - 2	Subsurf	CHRYSENE	110	0.001	0.11				
MidSouth MRP TSR	SRSB57	SRSSB5702	1 - 2	Subsurf	DIBENZ[A,H]ANTHRACENE	18.8	1	18.8				
MidSouth MRP TSR	SRSB57	SRSSB5702	1 - 2	Subsurf	INDENO[1,2,3-CD]PYRENE	84	0.1	8.4	**175**	0.015	0.21	0.565
MidSouth MRP TSR	SRSB58	SRSSB5802	1 - 2	Subsurf	BENZO[A]ANTHRACENE	0.616	0.1	0.0616				
MidSouth MRP TSR	SRSB58	SRSSB5802	1 - 2	Subsurf	BENZO[A]PYRENE	1.03	1	1.03				
MidSouth MRP TSR	SRSB58	SRSSB5802	1 - 2	Subsurf	BENZO[B]FLUORANTHENE	1.17	0.1	0.117				
MidSouth MRP TSR	SRSB58	SRSSB5802	1 - 2	Subsurf	BENZO[K]FLUORANTHENE	0.461	0.01	0.00461				
MidSouth MRP TSR	SRSB58	SRSSB5802	1 - 2	Subsurf	CHRYSENE	0.717	0.001	0.000717				
MidSouth MRP TSR	SRSB58	SRSSB5802	1 - 2	Subsurf	DIBENZ[A,H]ANTHRACENE	0.397	1	0.397				
MidSouth MRP TSR	SRSB58	SRSSB5802	1 - 2	Subsurf	INDENO[1,2,3-CD]PYRENE	0.489	0.1	0.0489	**1.66**	0.015	0.21	0.565
MidSouth MRP TSR	SRSB59	SRSSB5902	1 - 2	Subsurf	BENZO[A]ANTHRACENE	23.3	0.1	2.33				
MidSouth MRP TSR	SRSB59	SRSSB5902	1 - 2	Subsurf	BENZO[A]PYRENE	20.2	1	20.2				
MidSouth MRP TSR	SRSB59	SRSSB5902	1 - 2	Subsurf	BENZO[B]FLUORANTHENE	25.2	0.1	2.52				
MidSouth MRP TSR	SRSB59	SRSSB5902	1 - 2	Subsurf	BENZO[K]FLUORANTHENE	11.5	0.01	0.115				
MidSouth MRP TSR	SRSB59	SRSSB5902	1 - 2	Subsurf	CHRYSENE	24.6	0.001	0.0246				
MidSouth MRP TSR	SRSB59	SRSSB5902	1 - 2	Subsurf	DIBENZ[A,H]ANTHRACENE	3.23	1	3.23				
MidSouth MRP TSR	SRSB59	SRSSB5902	1 - 2	Subsurf	INDENO[1,2,3-CD]PYRENE	13.7	0.1	1.37	**29.8**	0.015	0.21	0.565
MidSouth MRP TSR	SRSB60	SRSSB6002	1 - 2	Subsurf	BENZO[A]ANTHRACENE	0.00207 U	0.1	0.0001035				
MidSouth MRP TSR	SRSB60	SRSSB6002	1 - 2	Subsurf	BENZO[A]PYRENE	0.00207 U	1	0.001035				
MidSouth MRP TSR	SRSB60	SRSSB6002	1 - 2	Subsurf	BENZO[B]FLUORANTHENE	0.00207 U	0.1	0.0001035				
MidSouth MRP TSR	SRSB60	SRSSB6002	1 - 2	Subsurf	BENZO[K]FLUORANTHENE	0.00207 U	0.01	0.00001035				
MidSouth MRP TSR	SRSB60	SRSSB6002	1 - 2	Subsurf	CHRYSENE	0.00314 U	0.001	0.00000157				
MidSouth MRP TSR	SRSB60	SRSSB6002	1 - 2	Subsurf	DIBENZ[A,H]ANTHRACENE	0.00265 U	1	0.001325				
MidSouth MRP TSR	SRSB60	SRSSB6002	1 - 2	Subsurf	INDENO[1,2,3-CD]PYRENE	0.00314 U	0.1	0.000157	0.00274	0.015	0.21	0.565
MidSouth MRP TSR	SRSB62	SRSSB6202	1 - 2	Subsurf	BENZO[A]ANTHRACENE	0.034	0.1	0.0034				
MidSouth MRP TSR	SRSB62	SRSSB6202	1 - 2	Subsurf	BENZO[A]PYRENE	0.0294	1	0.0294				
MidSouth MRP TSR	SRSB62	SRSSB6202	1 - 2	Subsurf	BENZO[B]FLUORANTHENE	0.0901	0.1	0.00901				
MidSouth MRP TSR	SRSB62	SRSSB6202	1 - 2	Subsurf	BENZO[K]FLUORANTHENE	0.0389	0.01	0.000389				
MidSouth MRP TSR	SRSB62	SRSSB6202	1 - 2	Subsurf	CHRYSENE	0.00861	0.001	0.00000861				
MidSouth MRP TSR	SRSB62	SRSSB6202	1 - 2	Subsurf	DIBENZ[A,H]ANTHRACENE	0.0244	1	0.0244				
MidSouth MRP TSR	SRSB62	SRSSB6202	1 - 2	Subsurf	INDENO[1,2,3-CD]PYRENE	0.0342	0.1	0.00342	0.07	0.015	0.21	0.565
MidSouth MRP TSR	SRSB63	SRSSB6302	1 - 2	Subsurf	BENZO[A]ANTHRACENE	0.868	0.1	0.0868				
MidSouth MRP TSR	SRSB63	SRSSB6302	1 - 2	Subsurf	BENZO[A]PYRENE	0.763	1	0.763				
MidSouth MRP TSR	SRSB63	SRSSB6302	1 - 2	Subsurf	BENZO[B]FLUORANTHENE	1.11	0.1	0.111				
MidSouth MRP TSR	SRSB63	SRSSB6302	1 - 2	Subsurf	BENZO[K]FLUORANTHENE	0.344	0.01	0.00344				
MidSouth MRP TSR	SRSB63	SRSSB6302	1 - 2	Subsurf	CHRYSENE	0.876	0.001	0.000876				
MidSouth MRP TSR	SRSB63	SRSSB6302	1 - 2	Subsurf	DIBENZ[A,H]ANTHRACENE	0.143	1	0.143				
MidSouth MRP TSR	SRSB63	SRSSB6302	1 - 2	Subsurf	INDENO[1,2,3-CD]PYRENE	0.566	0.1	0.0566	**1.16**	0.015	0.21	0.565
MidSouth MRP TSR	SRSB64	SRSSB6402	1 - 2	Subsurf	BENZO[A]ANTHRACENE	0.0904	0.1	0.00904				
MidSouth MRP TSR	SRSB64	SRSSB6402	1 - 2	Subsurf	BENZO[A]PYRENE	0.106	1	0.106				
MidSouth MRP TSR	SRSB64	SRSSB6402	1 - 2	Subsurf	BENZO[B]FLUORANTHENE	0.197	0.1	0.0197				
MidSouth MRP TSR	SRSB64	SRSSB6402	1 - 2	Subsurf	BENZO[K]FLUORANTHENE	0.0715	0.01	0.000715				
MidSouth MRP TSR	SRSB64	SRSSB6402	1 - 2	Subsurf	CHRYSENE	0.0837	0.001	0.0000837				
MidSouth MRP TSR	SRSB64	SRSSB6402	1 - 2	Subsurf	DIBENZ[A,H]ANTHRACENE	0.0399	1	0.0399				
MidSouth MRP TSR	SRSB64	SRSSB6402	1 - 2	Subsurf	INDENO[1,2,3-CD]PYRENE	0.111	0.1	0.0111	0.187	0.015	0.21	0.565
MidSouth MRP TSR	SRSB65	SRSSB6502	1 - 2	Subsurf	BENZO[A]ANTHRACENE	0.0307	0.1	0.00307				
MidSouth MRP TSR	SRSB65	SRSSB6502	1 - 2	Subsurf	BENZO[A]PYRENE	0.0279	1	0.0279				
MidSouth MRP TSR	SRSB65	SRSSB6502	1 - 2	Subsurf	BENZO[B]FLUORANTHENE	0.09	0.1	0.009				
MidSouth MRP TSR	SRSB65	SRSSB6502	1 - 2	Subsurf	BENZO[K]FLUORANTHENE	0.0387	0.01	0.000387				
MidSouth MRP TSR	SRSB65	SRSSB6502	1 - 2	Subsurf	CHRYSENE	0.00624	0.001	0.00000624				

Appendix C
Benzo(a)pyrene Equivalent Calculations for Subsurface Soil
UXO 1 and 2 NSA Mid-South

MidSouth MRP TSR	SRSB65	SRSSB6502	1 - 2	Subsurf	DIBENZ[A,H]ANTHRACENE	0.0248	1	0.0248				
MidSouth MRP TSR	SRSB65	SRSSB6502	1 - 2	Subsurf	INDENO[1,2,3-CD]PYRENE	0.0328	0.1	0.00328	0.0684	0.015	0.21	0.565
MidSouth MRP TSR	SRSB66	SRSSB6602	1 - 2	Subsurf	BENZO[A]ANTHRACENE	0.0363	0.1	0.00363				
MidSouth MRP TSR	SRSB66	SRSSB6602	1 - 2	Subsurf	BENZO[A]PYRENE	0.0314	1	0.0314				
MidSouth MRP TSR	SRSB66	SRSSB6602	1 - 2	Subsurf	BENZO[B]FLUORANTHENE	0.0968	0.1	0.00968				
MidSouth MRP TSR	SRSB66	SRSSB6602	1 - 2	Subsurf	BENZO[K]FLUORANTHENE	0.0411	0.01	0.000411				
MidSouth MRP TSR	SRSB66	SRSSB6602	1 - 2	Subsurf	CHRYSENE	0.01	0.001	0.00001				
MidSouth MRP TSR	SRSB66	SRSSB6602	1 - 2	Subsurf	DIBENZ[A,H]ANTHRACENE	0.026	1	0.026				
MidSouth MRP TSR	SRSB66	SRSSB6602	1 - 2	Subsurf	INDENO[1,2,3-CD]PYRENE	0.0377	0.1	0.00377	0.0749	0.015	0.21	0.565

Appendix D
Human Health Risk Assessment

HUMAN HEALTH RISK ASSESSMENT

Pistol Range (UXO 1) and
Trap/Skeet Ranges #1 and #2 (UXO 2)

NAVAL SUPPORT ACTIVITY MID-SOUTH
MILLINGTON, TENNESSEE

Version Number: 0

Prepared For:

Department of the Navy
Naval Facilities Engineering Command Midwest
201 Decatur Avenue, Building IA
Great Lakes, Illinois 60088

Prepared By:

Resolution Consultants
A Joint Venture of AECOM & EnSafe
1500 Wells Fargo Building
440 Monticello Avenue
Norfolk, Virginia 23510

Contract Number: N62470-11-D-8013
CTO F271

December 2013

Table of Contents

D.1.0 INTRODUCTION D-1

D.2.0 DATA COMPILATION AND EVALUATION D-2
- D.2.1 Summary of Existing Data D-2
- D.2.2 Data Evaluation D-3
  - D.2.2.1 Comparison to Background D-4
  - D.2.2.2 Identification of Chemicals of Potential Concern D-5

D.3.0 EXPOSURE ASSESSMENT D-10
- D.3.1 Characterization of Exposure Setting and Conceptual Site Model D-10
- D.3.2 Identification of Exposure Pathways D-14
  - D.3.2.1 Exposure Media D-14
  - D.3.2.2 Exposure Points and Routes D-14
  - D.3.2.3 Receptors and Land Use Scenarios D-15
- D.3.3 Quantification of Exposure D-16
  - D.3.3.1 Exposure Point Concentrations D-17
  - D.3.3.2 Chronic Daily Intakes D-17
  - D.3.3.3 Lead D-17

D.4.0 TOXICITY ASSESSMENT D-25
- D.4.1 Non-Carcinogenic Effects D-25
- D.4.2 Carcinogenic Effects D-26
- D.4.3 Dermal Toxicity Values D-29
- D.4.4 Toxicological Profiles D-30

D.5.0 RISK CHARACTERIZATION D-30
- D.5.1 Non-Cancer Effects D-30
- D.5.2 Cancer Risks D-32
- D.5.3 Lead Risk D-33
- D.5.4 Risk Characterization Results D-33
  - D.5.4.1 Hypothetical Recreational Scenario D-41
  - D.5.4.2 Site Worker Scenario D-42
  - D.5.4.3 Hypothetical Excavation Worker Scenario D-43
  - D.5.4.4 Hypothetical Residential Scenario D-43

D.6.0 UNCERTAINTY ANALYSIS D-44
- D.6.1 Uncertainties Associated with Data and Sampling Design D-44
- D.6.2 Uncertainties Associated with Exposure Assessment D-45
- D.6.3 Uncertainties Associated with Toxicity Assessment D-46
- D.6.4 Uncertainties Associated with the Risk Evaluation D-47

D.7.0 RISK SUMMARY D-47

D.8.0 REMEDIAL GOAL OPTIONS D-48

D.9.0 References D-54

Figures

Figure D-1 Use of Background in RCRA Facility Investigation Report....4
Figure D-2 Use of Background in RFI Report....52
Figure D-3 U.S. EPA's IEUBK Model Compartments....53

Tables

Table D-1 Screening Level References.... D-5
Table D-2 Occurrence, Distribution, and Selection of Chemicals of Potential Concern Current and Future Use — Surface Soil — UXO 1 and 2.... D-7
Table D-3 Occurrence, Distribution, and Selection of Chemicals of Potential Concern Current and Future Use — Subsurface Soil — UXO 1 and 2.... D-8
Table D-4 Example Calculation of Benzo(a)pyrene Equivalents at a Single Location.... D-9
Table D-5 Chemicals of Potential Concern.... D-10
Table D-6 Exposure Pathways and Receptor Routes Summary.... D-11
Table D-7 Exposure Point Concentrations Summary.... D-19
Table D-8 Reasonable Maximum Exposure Model Parameters.... D-20
Table D-9 Non-Cancer Toxicity Data.... D-28
Table D-10 Cancer Toxicity Data.... D-31
Table D-11 Risk Results from U.S. EPA's Risk Models Hypothetical Recreational Users.... D-34
Table D-12 Risk Results from U.S. EPA's Adult Lead Risk Models Hypothetical Recreational Users Surface Soil.... D-35
Table D-13 Risk Results from U.S. EPA's Adult Lead Risk Models Hypothetical Recreational Users Subsurface Soil.... D-35
Table D-14 Risk Results from U.S. EPA's Risk Models Site Workers.... D-36
Table D-15 Risk Results from U.S. EPA's Adult Lead Risk Models Site Workers Surface Soil.. D-37
Table D-16 Risk Results from U.S. EPA's Adult Lead Risk Models Site Workers .... Subsurface Soil.... D-37
Table D-17 Risk Results from U.S. EPA's Risk Models Hypothetical Excavation Workers.... D-38
Table D-18 Risk Results from U.S. EPA's Adult Lead Risk Models Hypothetical Excavation Workers Surface Soil.... D-39
Table D-19 Risk Results from U.S. EPA's Adult Lead Risk Models Hypothetical Excavation Workers Subsurface Soil.... D-39
Table D-20 Risk Results from USEPA's Risk Models Hypothetical Residents.... D-40
Table D-21 Risk Results from U.S. EPA's IEUBK Lead Risk Models Hypothetical Residential Users Surface Soil.... D-41
Table D-22 Risk Results from U.S. EPA's IEUBK Lead Risk Models Hypothetical Residential Users Subsurface Soil.... D-41
Table D-23 Summary of Risk Estimates.... D-41
Table D-24 Chemicals of Concern and Exposure Areas.... D-44
Table D-25 Chemicals of Concern and Land Use Scenarios.... D-48
Table D-26 Remedial Goal Options Hypothetical Recreational Users.... D-49
Table D-27 Remedial Goal Options Site Workers.... D-49
Table D-28 Remedial Goal Options Hypothetical Residents.... D-49
Table D-29 Remedial Goal Options Lead in Soil.... D-50
Table D-30 RGO Summary.... D-51

Attachments

Attachment D-1 Risk Assessment Information System Calculations
Attachment D-2 Exposure Point Concentration Calculations Using ProUCL
Attachment D-3 Lead Model Risk Calculations
Attachment D-4 Toxicological Effects Profiles

List of Acronyms

AOC	Area of Concern
BEQ	Benzo(a)pyrene Equivalents
CDI	Chronic Daily Intakes
COC	Chemical of Concern
COPC	Chemical of Potential Concern
CR	Cancer Risk
CSM	Conceptual Site Model
EPC	Exposure Point Concentration
HHRA	Human Health Risk Assessment
HI	Hazard Index
HQ	Hazard Quotient
IEUBK	Integrated Exposure Uptake Biokinetic
ILCR	Incremental Lifetime Cancer Risks
IRIS	Integrated Risk Information System
IUR	Inhalation Unit Risk
LOAEL	Lowest Observed Adverse Effect Level
$\mu g/m^3$	micrograms per cubic meter
µg/dL	micrograms per deciliter
MCL	Maximum Contaminant Level
mg/kg	Milligrams per Kilogram
mg/kg-day	Milligrams Per Kilogram Per Day
NA	Not Applicable
NCP	National Contingency Plan
NOAEL	No Observed Adverse Effect Level
NSA	Naval Support Activity
PAH	Polycyclic Aromatic Hydrocarbons
RAGS	Risk Assessment Guidance for Superfund
RAIS	Risk Assessment Information System
RCRA	Resource Conservation and Recovery Act
RfC	Reference Concentration
RfD	Reference Dose
RFI	RCRA Facility Investigation
RGO	Remedial Goal Objective
RME	Reasonable Maximum Exposure
RSL	Regional Screening Level
RV	Recreational Vehicle
SAP	Sampling And Analysis Plan
SF	Slope Factor
SI	Site Investigation

TDEC	Tennessee Department of Environment and Conservation
TEF	Toxicity Equivalency Factor
Tt	Tetra Tech NUS, Inc.
UCL	Upper Confidence Level
U.S. EPA	United States Environmental Protection Agency
UXO	Unexploded Ordnance
WOE	Weight of Evidence

D.1.0 INTRODUCTION

Naval Support Activity (NSA) Mid-South is in Millington, Tennessee, approximately 20 miles north of Memphis and 7 miles east of the Mississippi River (Figure 1-1). It is headquarters for the Navy Personnel Command, Navy Recruiting Command, the Navy Manpower Analysis Center, and the United States (U.S.) Army Corps of Engineers Finance Center, where approximately 7,500 military, civilian, and contract personnel are employed to provide administrative, operational, and logistic support to tenant activities, and to operate the facilities. Unexploded ordnance (UXO) 1 Pistol Range and UXO 2 Trap/Skeet Ranges #1 and #2, which comprise approximately 79 acres of the 1,600-acre facility, are the focus of this human health risk assessment (HHRA).

The purpose of the HHRA is to assess the potential human-health effects associated with past releases of lead and polycyclic aromatic hydrocarbons (PAHs) at NSA Mid-South UXOs 1 and 2 under current and anticipated future use scenarios. Lead and PAHs were reported by Tetra Tech in the 2010 SI at concentrations above human-health screening values in soil (Tt NUS, 2010). The extent of the contamination was unknown, so Resolution Consultants prepared and implemented a Sampling and Analysis Plan (SAP) as part of the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) to which this HHRA is attached to determine the extent of contamination in both UXOs 1 and 2 and to facilitate development of this HHRA.

In accordance with U.S. EPA *Risk Assessment Guidance for Superfund Volume I, Human Health Evaluation Manual, (Part A)* (RAGS) and the U.S. Navy's Tiered Human-Health Risk Assessment guidance, the HHRA was developed assuming that no action has been or would be taken to control or eliminate releases (U.S. EPA, 1989; Navy, 2002). The HHRA will be used as part of the rationale for risk management decisions at this site.

The HHRA was performed in accordance with U.S. EPA RAGS Parts A, B, D, E, and F (U.S. EPA 1989, 1991c, 2001, 2004a, and 2009a). The process is divided into six steps:

- Data Compilation and Evaluation
- Exposure Assessment
- Toxicity Assessment
- Risk Characterization
- Uncertainty Analysis
- Risk Summary

In addition to these six steps Remediation Goal Objectives (RGOs) were developed for chemicals identified as COCs in the HHRA to inform risk management decisions.

D.2.0 DATA COMPILATION AND EVALUATION

D.2.1 Summary of Existing Data

Data from two sampling investigations were considered in developing the HHRA dataset:

1. A Site Investigation (SI) was conducted in 2010 at NSA Mid-South, including the study area in this RFI: UXOs 1 and 2 (Tt, 2010). The SI results indicated that lead and PAHs were present at the site. Lead contamination in soil was in a well-defined area extending 600 feet out from the firing lines and PAHs in soil shared a similar but smaller footprint with respect to the extent of lead contamination.

2. Resolution Consultants conducted subsequent RFI soil sampling between 25 February and 15 March 2013.

The potential for release of contaminants from soil to air was evaluated as summarized in Section 6, which indicated that detected compounds are not volatile and as such, will not emanate from site soils in the vapor phase in significant amounts. As a result, the evaluation in the HHRA focused on exposure related to potential fugitive dust emissions for the inhalation pathway, which was incorporated into the soil exposure models used.

During the March 2013 Project Team meeting, groundwater was removed as a potential medium of concern based on Tennessee Department of Environment and Conservation's (TDEC) working knowledge of groundwater impacts at lead-contaminated sites in Shelby County and the absence of groundwater impacts. Surface water was also removed as a medium of concern because there is no surface water on the either of the two sites. Table 5-3 of the RFI summarizes the fate and transport evaluation.

Sediments at the site are part of a wet weather conveyance and are typically dry, so contact with sediment could occur during site activities, and exposure conditions would be similar to those for soil. Consequently, sediment data were included in the surface soil dataset and were evaluated assuming sediment exposure conditions would be equivalent to soil exposure conditions, in accordance with RAGS Part E (U.S. EPA, 2011). Surface soil and sediment data were combined and evaluated as surface soil throughout this HHRA.

Historical investigations are detailed in other sections of this RFI report and in the SI report (Tt, 2010). Analytical data from the SI and RFI are presented in Tables 4-2 and 4-3 of the RFI to which this appendix is attached.

D.2.2 Data Evaluation

Analytical data for the RFI were evaluated as described in the *Final Sampling and Analysis Plan, UXO 1 and UXO 2 (formerly AOC 1) Naval Support Activity Mid-South, Millington, Tennessee* (Resolution Consultants, 2012); RAGS Part A (U.S. EPA, 1989) and *Supplemental Guidance to RAGS: Calculating the Concentration Term* (U.S. EPA, 1992). The following data evaluation steps were performed:

- Gather and sort data
- Evaluate analytical methods
- Evaluate quality of data with respect to sample quantitation limits
- Evaluate quality of data with respect to qualifiers and codes
- Evaluate quality of data with respect to blanks
- Identify chemicals of potential concern (COPCs) through risk-based screening

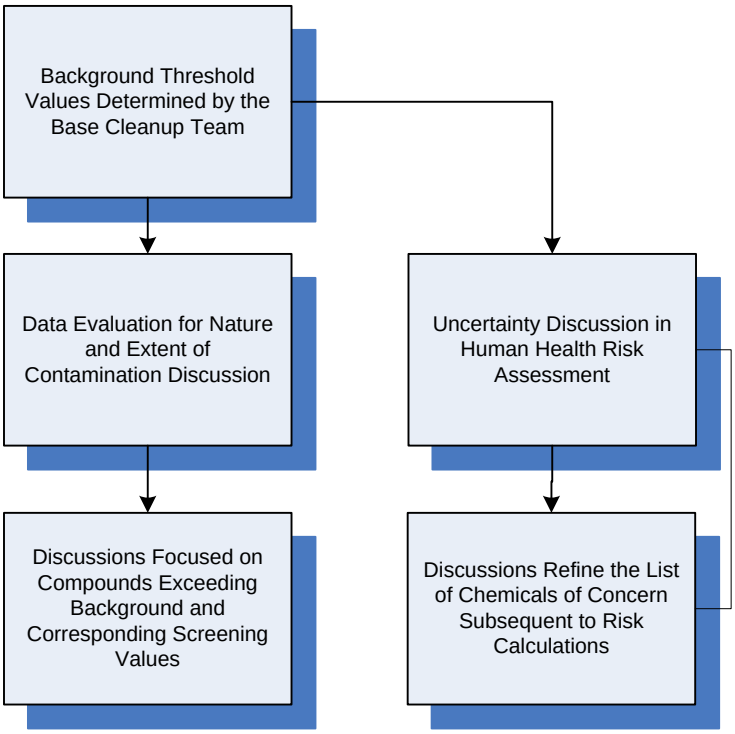
The first five steps of the data compilation and evaluation task were performed as part of the data verification/validation process, which was conducted in accordance with the *Department of Defense Quality Systems Manual for Environmental Laboratories*, Version 4.2, October 2010; *U.S. EPA Contract Laboratory Program National Functional Guidelines for Organic Data Review*, October 1999; and *U.S. EPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review*, October 2004, in conjunction with the project-specific quality control requirements detailed in the *Final Sampling and Analysis Plan, UXO 1 and UXO 2 (formerly AOC 1) Naval Support Activity, Mid-South, Millington, Tennessee* (Resolution Consultants 2012).

Analytical results were subjected to data quality review, results of which are documented in the *Data Verification/Validation Report* in Appendix B. As discussed in Appendix B, the February 2013 Naval Support Activity Mid-South soil and sediment data were reviewed by a validator to assess data quality. Analytes outside individual quality control criteria were flagged during this evaluation. No results were rejected and values that were qualified as estimated during data review may be biased high or low but are usable for their intended purpose, according to U.S. EPA guidelines.

D.2.2.1 Comparison to Background

As discussed in Section 5, background concentrations are available for some compounds reported in site soil. However, background concentrations were not part of risk screening in the HHRA and were not used to identify COPCs. In accordance with RAGS and U.S. EPA's standard practices in risk assessment, background comparisons are typically integrated into the uncertainty section of the risk assessment by comparing data for chemicals of concern (COCs) identified in the HHRA to background to determine if COC concentrations are consistent with background in the site vicinity. Figure D-1 illustrates this process. COCs determined to be consistent with background in the site vicinity are generally eliminated to produce a refined list of COCs that would most likely drive risk management decisions, or background is integrated into the decision process.

Figure D-1
Use of Background in the
RCRA Facility Investigation Report



Note: Background comparisons were not used to eliminate chemicals of potential concern in the human health risk assessment.

D.2.2.2 Identification of Chemicals of Potential Concern

COPCs were identified by comparing site data to conservative media-specific screening levels. Screening levels for human health were based on regulatory guidance, standards, and/or thresholds prescribed in U.S. Environmental Protection Agency (U.S. EPA) Regional Screening Levels (RSLs) and other applicable resources. The purpose of this screening was to focus the risk assessment on chemicals with the greatest potential to impact human health and to remove chemicals where no unacceptable risk or hazard was indicated. The source of the screening values used to identify COPCs for this HHRA was the U.S. EPA RSL table (Table D-1).[1]

Table D-1 **Screening Level References**
U.S. Environmental Protection Agency Regional Screening Levels [6]
— Residential Land Use
— Target Risk of 1E-6
— Target Hazard Quotient of 0.1
— Direct contact with soil and sediment

Preliminary screening was documented in the SI report, which identified PAHs and lead in soil as COPCs (Tt, 2010). In this RFI Report, this preliminary screening was supplemented and refined using the combined SI and RFI datasets (Tables 4-2 and 4-3) to determine human health COPCs.

To reduce the number of chemicals requiring risk analysis, a number of screening steps were performed, which are detailed in the following sections. The following factors were considered when identifying COPCs:

- Maximum detected concentrations in surface and subsurface soil were compared to conservative, risk-based screening concentrations.
- Screening values were adjusted to reflect a target hazard quotient (HQ) of 0.1 in accordance with U.S. EPA risk screening guidance for noncarcinogens.
- During the screening process, chemicals detected at least once at concentrations greater than corresponding screening values were retained as COPCs, regardless of the frequency of detection.
- Chemicals that were not detected in any sample were not identified as COPCs and media with no COPCs were eliminated from further evaluation in the HHRA.

[1] http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/usersguide.htm.

Soil screening levels for human health were residential RSLs established by U.S. EPA (U.S. EPA, 2012). Table D-2 presents the screening analysis and identifies COPCs in surface soil and Table 6-3 presents subsurface soil screening and corresponding COPCs.

As indicated in Table D-2, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, fluoranthene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, pyrene, and lead were identified as COPCs in surface soil. Benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, naphthalene, and lead were identified as COPCs in subsurface soil, as indicated in Table D-3.

In accordance with U.S. EPA's *Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons* (U.S. EPA, 1993a) and U.S. EPA *Human Health Risk Assessment Bulletins — Region 4 Supplement to RAGS* (U.S. EPA, 2000) RAGS, the potential accumulative impact of carcinogenic PAHs was evaluated by calculating benzo(a)pyrene equivalents (BEQ) for each sample location. BEQ is a weighted sum of carcinogenic PAHs based on their potency relative to benzo(a)pyrene. Seven PAHs are evaluated as carcinogens in this manner: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene. The potency of each of these PAHs is compared to that of benzo(a)pyrene using toxicity equivalency factors (TEFs), which indicate how carcinogenic each compound is relative to benzo(a)pyrene. For example, benzo(a)anthracene has a TEF of 0.1, which indicates that the cancer potency of benzo(a)anthracene is one-tenth that of benzo(a)pyrene. To calculate BEQ concentrations, each carcinogenic PAH concentration is multiplied by its TEF and the resulting equivalent concentrations are summed to determine the BEQ concentration for each location. Table D-4 shows an example BEQ calculation.

Table D-2
Occurrence, Distribution, and Selection of Chemicals of Potential Concern
Current and Future Use — Surface Soil — UXO 1 and 2

Scenario Timeframe:	**Hypothetical Future Residential**												
Medium:	**Soil**												
Exposure Medium:	**Surface Soil (includes sediment)**												
Exposure Point	**CAS Number**	**Chemical**	**Minimum Concentration**	**Maximum Concentration**	**Units**	**Location of Maximum**	**Detection Frequency**	**Range of Detection Limits**	**Concentration Used for Screening (1)**	**Mid-South Background Concentration (2)**	**Adjusted Screening Value (3)**	**COPC Flag**	**Rationale for Selection or Deletion**
Site	7439-92-1	**lead**	9.24	51,900	mg/kg	SRSSB2301	110/110	0.262 — 0.262	51,900	2.60E+01	400	Y	ASL
Site	90-12-0	1-methylnaphthalene	0.00517	0.0567	mg/kg	TSR-SS019-0001	50/129	0.00713 — 0.00911	0.0567	NA	16	N	BSL
Site	91-57-6	2-methylnaphthalene	0.00191	2.25	mg/kg	SRSSB3801	86/129	0.00294 — 0.03	2.25	NA	23	N	BSL
Site	83-32-9	acenaphthene	0.00204	9.14	mg/kg	SRSSB3801	37/129	0.00194 — 0.041	9.14	NA	340	N	BSL
Site	208-96-8	acenaphthylene	0.00339	0.0568	mg/kg	PRSSB1001	118/129	0.00194 — 0.041	0.0568	NA	340	N	BSL
Site	120-12-7	anthracene	0.00174	42.9	mg/kg	SRSSB3801	124/129	0.002 — 0.0098	42.9	NA	1700	N	BSL
Site	56-55-3	**benzo[a]anthracene**	0.00496	196	mg/kg	SRSSB3801	124/129	0.002 — 0.00911	196	NA	0.15	Y	ASL
Site	50-32-8	**benzo[a]pyrene**	0.00401	170	mg/kg	SRSSB3801	124/129	0.002 — 0.0022	170	NA	0.015	Y	ASL
Site	205-99-2	**benzo[b]fluoranthene**	0.00577	233	mg/kg	SRSSB3801	124/129	0.002 — 0.0022	233	NA	0.15	Y	ASL
Site	191-24-2	benzo[g,h,i]perylene	0.00541	128	mg/kg	SRSSB3801	124/129	0.00304 — 0.00911	128	NA	170	N	BSL
Site	207-08-9	**benzo[k]fluoranthene**	0.00336	114	mg/kg	SRSSB3801	124/129	0.002 — 0.00772	114	NA	1.5	Y	ASL
Site	218-01-9	**chrysene**	0.00543	184	mg/kg	SRSSB3801	124/129	0.00304 — 0.00333	184	NA	15	Y	ASL
Site	53-70-3	**dibenz[a,h]anthracene**	0.00136	30.9	mg/kg	SRSSB2801	98/129	0.00255 — 0.0251	30.9	NA	0.015	Y	ASL
Site	206-44-0	**fluoranthene**	0.00422	402	mg/kg	SRSSB3801	124/129	0.002 — 0.0022	402	NA	230	Y	BSL
Site	86-73-7	fluorene	0.00158	6.22	mg/kg	SRSSB3801	61/129	0.00194 — 0.041	6.22	NA	230	N	BSL
Site	193-39-5	**indeno[1,2,3-cd]pyrene**	0.0054	122	mg/kg	SRSSB3801	124/129	0.00304 — 0.00911	122	NA	0.15	Y	ASL
Site	91-20-3	**naphthalene**	0.00185	6.77	mg/kg	SRSSB3801	80/129	0.00294 — 0.0149	6.77	NA	3.6	Y	ASL
Site	85-01-8	**phenanthrene**	0.00291	200	mg/kg	SRSSB3801	118/129	0.002 — 0.0098	200	NA	170	Y	BSL
Site	129-00-0	**pyrene**	0.00565	297	mg/kg	SRSSB3801	124/129	0.002 — 0.0022	297	NA	170	Y	BSL
Site	NA	**beq**	0.00926	251	mg/kg	SRSSB3801	103/111	0.00264 — 0.0029	251	0.565	0.15	Y	ASL

Notes:
(1) Maximum concentration used for screening
(2) Site specific background values.
(3) USEPA Regional Screening Levels for residential soil, obtained from http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm
(4) Rationale Codes:
Selection Reason: Above Screening Level (ASL)
Deletion Reason: Below Screening Level (BSL)

Definitions:
NA = Not Applicable
COPC = Chemical of Potential Concern
mg/kg = milligrams per kilogram or parts per million (ppm)
Y = Yes
N = No
BEQ = Benzo(a)pyrene Equivalent

Table D-3
Occurrence, Distribution, and Selection of Chemicals of Potential Concern
Current and Future Use — Subsurface Soil — UXO 1 and 2

Scenario Timeframe:	**Hypothetical Future Residential**												
Medium:	**Soil**												
Exposure Medium:	**Subsurface Soil**												
Exposure Point	**CAS Number**	**Chemical**	**Minimum Concentration**	**Maximum Concentration**	**Units**	**Location of Maximum**	**Detection Frequency**	**Range of Detection Limits**	**Concentration Used for Screening (1)**	**Mid-South Background Concentration (2)**	**Adjusted Screening Value (3)**	**COPC Flag**	**Rationale for Selection or Deletion**
Site	7439-92-1	**Lead**	10.2	29,300	mg/kg	PRSSB04004	110/110	—	29,300	19.8	400	Y	ASL
Site	91-57-6	2-methylnaphthalene	0.00365	1.25	mg/kg	SRSSB5702	50/129	0.00281 — 0.0315	1.25	NA	23	N	BSL
Site	83-32-9	Acenaphthene	0.00364	6.3	mg/kg	SRSSB5702	86/129	0.00185 — 0.0101	6.3	NA	340	N	BSL
Site	208-96-8	Acenaphthylene	0.00362	0.0393	mg/kg	PRSSB05008	37/129	0.00191 — 0.1	0.0393	NA	340	N	BSL
Site	120-12-7	Anthracene	0.00147	20.8	mg/kg	SRSSB5702	118/129	0.00191 — 0.0101	20.8	NA	1700	N	BSL
Site	56-55-3	**Benzo[a]anthracene**	0.00805	129	mg/kg	SRSSB5702	124/129	0.00201 — 0.00208	129	NA	0.15	Y	ASL
Site	50-32-8	**Benzo[a]pyrene**	0.0113	118	mg/kg	SRSSB5702	124/129	0.00201 — 0.00208	118	NA	0.015	Y	ASL
Site	205-99-2	**Benzo[b]fluoranthene**	0.0272	160	mg/kg	SRSSB5702	124/129	0.00201 — 0.00208	160	NA	0.15	Y	ASL
Site	191-24-2	Benzo[g,h,i]perylene	0.00759	94.8	mg/kg	SRSSB5702	124/129	0.00304 — 0.00315	94.8	NA	170	N	BSL
Site	207-08-9	**Benzo[k]fluoranthene**	0.00567	76.3	mg/kg	SRSSB5702	124/129	0.00201 — 0.00208	76.3	NA	1.5	Y	ASL
Site	218-01-9	**Chrysene**	0.0059	110	mg/kg	SRSSB5702	124/129	0.00304 — 0.00315	110	NA	15	Y	ASL
Site	53-70-3	**Dibenz[a,h]anthracene**	0.00197	18.8	mg/kg	SRSSB5702	98/129	0.00239 — 0.128	18.8	NA	0.015	Y	ASL
Site	206-44-0	Fluoranthene	0.0047	216	mg/kg	SRSSB5702	124/129	0.00201 — 0.00208	216	NA	230	N	BSL
Site	86-73-7	Fluorene	0.00179	4.27	mg/kg	SRSSB5702	61/129	0.00185 — 0.0183	4.27	NA	230	N	BSL
Site	193-39-5	**Indeno[1,2,3-cd]pyrene**	0.00785	84	mg/kg	SRSSB5702	124/129	0.00304 — 0.00315	84	NA	0.15	Y	ASL
Site	91-20-3	**Naphthalene**	0.00184	4.01	mg/kg	SRSSB5702	80/129	0.00281 — 0.0315	4.01	NA	3.6	Y	ASL
Site	85-01-8	Phenanthrene	0.00437	92.5	mg/kg	SRSSB5702	118/129	0.00191 — 0.0101	92.5	NA	170	N	BSL
Site	129-00-0	Pyrene	0.0043	156	mg/kg	SRSSB5702	124/129	0.00201 — 0.00208	156	NA	170	N	BSL
Site	NA	**Beq**	0.018	175	mg/kg	SRSSB5702	124/129	0.00265 — 0.00275	175	0.565	0.015	Y	ASL

Notes:
(1) Maximum concentration used for screening
(2) Site specific background values.
(3) USEPA Regional Screening Levels for residential soil, obtained from http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm
(4) Rationale Codes:
Selection Reason: Above Screening Level (ASL)
Deletion Reason: Below Screening Level (BSL)

Definitions:
NA = Not Applicable
COPC = Chemical of Potential Concern
mg/kg = milligrams per kilogram or parts per million (ppm)
Y = Yes
N = No
BEQ = Benzo(a)pyrene Equivalent

Table D-4
Example Calculation of Benzo(a)pyrene Equivalents at a Single Location

Polycyclic Aromatic Hydrocarbon	Example PAH Concentration Reported in Soil (mg/kg)	TEF	Example Equivalent Soil BEQ (mg/kg)
Benzo(a)anthracene	1.8	0.1	0.18
Benzo(a)pyrene	1.55	1	1.55
Benzo(b)fluoranthene	1.68	0.1	0.168
Benzo(k)fluoranthene	1.02	0.01	0.0102
Chrysene	1.6	0.001	0.0016
Dibenz(a,h)anthracene	0.35	1	0.35
Indeno(1,2,3-cd)pyrene	0.72	0.1	0.072
		Sum of BEQ =	**2.3**

Notes:
BEQ = benzo(a)pyrene equivalent
mg/kg = milligram per kilogram

The seven PAHs that contribute to BEQ were carried forward in the risk assessment and were evaluated as BEQ, regardless of individual PAH concentrations. Additionally, other soil COPCs were carried forward in the risk assessment and were evaluated individually.

Section 4 of the RFI documents and summarizes BEQ calculations (Appendix C) in surface and subsurface soil. BEQ was included in risk screening and was evaluated as a single compound; BEQ information is summarized in Tables D-2 and D-3.

Summary

PAHs and lead were identified as COPCs in surface and subsurface soil based on the screening comparisons in this HHRA. Table D-5 summarizes COPCs and corresponding exposure media. In surface soil, BEQ, naphthalene, fluoranthene, phenanthrene, pyrene, and lead were carried forward through the exposure assessment; BEQ, naphthalene, and lead were carried forward for subsurface soil. Table D-5 also indicates the corresponding area where COPCs were identified based on the nature and extent discussions in Section 5 of this RFI.

Table D-5
Chemicals of Potential Concern

Parameter	Used in BEQ Calculations	Surface Soil Pistol Range	Surface Soil Trap/Skeet Ranges	Subsurface Soil Pistol Range	Subsurface Soil Trap/Skeet Ranges
Benzo(a)anthracene	Yes	X	X	X	X
Benzo(a)pyrene	Yes	X	X	X	X
Benzo(b)fluoranthene	Yes	X	X	X	X
Benzo(k)fluoranthene	Yes	X	X	X	X
Chrysene	Yes	Added	X	X	X
Dibenz(a,h)anthracene	Yes	X	X	X	X
Indeno(1,2,3-cd)pyrene	Yes	X	X	X	X
Fluoranthene	No	—	X	—	—
Phenanthrene	No	—	X	—	—
Pyrene	No	—	X	—	—
Naphthalene	No	—	X	—	X
Lead	No	X	X	X	X

Notes:
X = Parameter identified as a chemical of potential concern (COPC) for the depth interval and exposure area based on screening comparisons
— = Parameter not identified as a COPC for the depth interval and exposure area on screening comparisons
Added = Parameter is added as a COPC for the depth interval and exposure area to facilitate BEQ calculations
BEQ = Carcinogenic PAH used in benzo(a)pyrene equivalent calculations

D.3.0 EXPOSURE ASSESSMENT

The purpose of the exposure assessment is to identify receptors and characterize potential exposures under plausible current and future exposure scenarios. Co nsistent with RAGS Part A (U.S. EPA, 1989), exposure assessment was conducted in three steps: 1) characterization of exposure setting, 2) identification of exposure pathways, and 3) quantification of exposure. Exposure pathways, receptors, and routes are summarized in Table D-6.

D.3.1 Characterization of Exposure Setting and Conceptual Site Model

The location, demographics, and physical characteristics of the site are detailed in Sections 1 through 3 of this RFI report and summarized here. NSA Mid-South is in Millington, Tennessee, approximately 20 miles north of Memphis and 7 miles east of the Mississippi River (RFI Figure 1-1). Various civilian, Navy, and U.S. Army Corps of Engineers personnel work at the 1,600-acre facility. As previously discussed, the Pistol Range (UXO 1) and Trap/Skeet Ranges #1 and #2 (UXO 2), which comprise approximately 79 acres on the 1,600-acre facility, are the focus of this RFI and HHRA.

Table D-6
Exposure Pathways and Receptor Routes Summary

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Rationale for Selection or Exclusion of Exposure Pathway
Current/Future	Surface Soil	Surface Soil	Entire Site	Recreational User	Adult	Incidental Ingestion	Direct soil contact
						Dermal Contact	
					Child	Incidental Ingestion	
						Dermal Contact	
		Air	Entire Site	Recreational user	Adult	Inhalation	Fugitive dust originating with surface soil contamination
					Child	Inhalation	
Current/Future	Surface Soil	Surface Soil	Entire Site	Site Worker	Adult	Incidental Ingestion	Direct soil contact
						Dermal Contact	
		Air	Entire Site	Site Worker	Adult	Inhalation	Fugitive dust originating with surface soil contamination
Future	Surface Soil	Surface Soil	Entire Site	Excavation Worker	Adult	Incidental Ingestion	Direct soil contact
						Dermal Contact	
		Air	Entire Site	Excavation Worker	Adult	Inhalation	Fugitive dust originating with surface soil contamination
Future	Surface Soil	Surface Soil	Entire Site	Resident	Adult	Incidental Ingestion	Direct soil contact
						Dermal Contact	
					Child	Incidental Ingestion	
						Dermal Contact	
		Air	Entire Site	Resident	Adult	Inhalation	Fugitive dust originating with surface soil contamination
					Child	Inhalation	
Future	Subsurface Soil	Subsurface Soil	Entire Site	Recreational User	Adult	Incidental Ingestion	Direct soil contact
						Dermal Contact	
					Child	Incidental Ingestion	
						Dermal Contact	
		Air	Entire Site	Recreational user	Adult	Inhalation	Fugitive dust originating with assumed exposure to subsurface soil contamination
					Child	Inhalation	

Table D-6
Exposure Pathways and Receptor Routes Summary

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Rationale for Selection or Exclusion of Exposure Pathway
Future	Subsurface Soil	Subsurface Soil	Entire Site	Site Worker	Adult	Incidental Ingestion	Direct soil contact
						Dermal Contact	
		Air	Entire Site	Site Worker	Adult	Inhalation	Fugitive dust originating with assumed exposure to subsurface soil contamination
Future	Subsurface Soil	Subsurface Soil	Entire Site	Excavation Worker	Adult	Incidental Ingestion	Direct soil contact
						Dermal Contact	
		Air	Entire Site	Excavation Worker	Adult	Inhalation	Fugitive dust originating with assumed exposure to subsurface soil contamination
Future	Subsurface Soil	Subsurface Soil	Entire Site	Resident	Adult	Incidental Ingestion	Direct soil contact
						Dermal Contact	
					Child	Incidental Ingestion	
						Dermal Contact	
		Air	Entire Site	Resident	Adult	Inhalation	Fugitive dust originating with assumed exposure to subsurface soil contamination
					Child	Inhalation	

The Pistol Range (UXO 1) is approximately one-half acre within the berm area and is located within the Trap/Skeet Ranges (UXO 2). U XO 1 was used for small arms training until 1994, and property records indicate that the range consisted of a berm, shooting stations, targets, and an armory. Munitions used at UXO 1 were reportedly limited to small arms munitions, such as .22, .30, 9 mm, .38, and .45 calibers (Malcolm-Pirnie, 2005). UXO 1 structures have been removed, with the exception of the berm and three target lines. The berm is U-shaped, approximately 10 to 15 feet tall and 500 feet long, encompassing the area behind and on both sides of the target lines, which is currently overgrown with small trees and grass.

The Trap/Skeet Ranges (UXO 2) surround UXO 1. The last of the UXO 2 ranges was closed in 2005, and property records indicate that the ranges included a firing line, a skeet office and armory, two clay pigeon storage buildings, an ammunition storage building, instruction building, and multiple shooting stations. M unitions used were common small arms ammunition, primarily 12- and 20-gauge shotgun shells.

The majority of the UXOs 1 and 2 areas is vacant, with woods along the eastern boundary, maintained grass fields along the western boundary, and little evidence of the former ranges. The north end of UXO 2 overlaps with the Naval Exchange commissary, a recreational vehicle (RV) park, and a band equipment storage room. The RV park has a c ombination of short-term, weekend recreational users, and four long-term users (longer than 1 year). Currently there are no children living at the RV park; however, families with children could reside there for 1- to 2-month periods while waiting for pet-friendly housing.

Figure 5-5 shows the conceptual site model (CSM) for NSA Mid-South UXO Sites 1 and 2. The CSM assumes that the site is the primary source of contamination and that exposure to site surface and subsurface soil will occur. The areas where direct contact with soil is most likely to occur are the fields along the west and central portions of the Trap/Skeet ranges, which are maintained and mowed.

SWMU 2, a closed solid waste landfill, borders and overlaps the southern end of Trap/Skeet Range #2; however, given the landfill's existing institutional controls and restricted access, the Base Cleanup Team decided not to investigate the overlap area between the ranges and the landfill. Thus, it is outside the scope of this HHRA.

Infants and small children are more susceptible to the toxic effects of some chemicals in the environment. Consequently, land use scenarios and exposure models were based on the assumption that local residents will routinely visit the site. As a result, children under the age of seven were evaluated under current and future use scenarios, as detailed in Table D-6 and Sections 3.2 and 3.3.

D.3.2 Identification of Exposure Pathways

An exposure pathway links a source or contaminated medium to an exposed individual or receptor. Exposure pathways are identified based on the location and nature of the contaminated media and the types and patterns of human activity. To complete a pathway, a source, affected medium, point of contact, and effective exposure route all must exist.

D.3.2.1 Exposure Media

Soil was sampled at various locations, as previously described, and COPCs were identified as part of the risk screening process. Air was considered for indirect exposure associated with soil contamination through generation of fugitive dust. Surface water and groundwater were not assessed, as previously discussed. In summary, surface soil, subsurface soil, and air are addressed in the HHRA based on the COPCs identified during the screening process.

D.3.2.2 Exposure Points and Routes

Exposure routes evaluated in the HHRA include the following:

Soil (including Indirect Air Pathway)

- Incidental ingestion of COPCs in soil
- Dermal contact with COPCs in soil
- Inhalation of COPCs in particulates from soil sources

The surface soil exposure point was established as the ground surface (0 to 1-foot depth) across the site. It was assumed that site users could experience uniform exposure to surface soil (direct and indirect); thus the entire site was treated as a single exposure unit. Additionally, subsurface soil results were evaluated as a single exposure unit to address hypothetical future use, assuming that subsurface soil could become surface soil in the future.

Sediment

Site sediment is typically not saturated and under water, so soil exposure conditions would be applicable at this site. In accordance with U.S. EPA RAGS Part E, the same risk assessment approach used for soil is only recommended for sediment evaluation when sediment would not be submerged, as previously discussed. As discussed in Section 2.1, the sediment exposure pathway for human health was evaluated using soil exposure models, and sediment data were combined with surface soil data to evaluate corresponding risks. Figure 5-5 acknowledges that exposure could occur. Surface soil refers to the combined dataset of surface soil and sediment data.

Table D-6 summarizes exposure pathways and routes, which are limited to surface and subsurface soil.

D.3.2.3 Receptors and Land Use Scenarios

Land use scenarios were constructed based upon current and anticipated future site uses considering specific receptors, activities, exposure units, and timeframes. As indicated on Table D-6, site users include hypothetical recreational users (child and adult), site workers, hypothetical construction (excavation) workers, and hypothetical site residents. For each receptor, three exposure routes were identified, including incidental ingestion of COPCs in soil, dermal contact with COPCs in soil, and inhalation of COPCs in particulates from soil.

Soil was divided into two separate datasets, surface soil and subsurface soil, and COPCs were identified in each dataset using residential screening values as conservative screening tools, regardless of the applicable land use.

The land use scenarios and assumptions in the HHRA include the following and exposure quantification methods are detailed in Section 3.3:

- Current and Future Recreational Site Users: This scenario assumed that the study area will be used for recreational purposes. Receptor populations were children and adults living offsite but visiting regularly, including hypothetical exposure to subsurface soil, for 75 days per year for a lifetime.

- Current and Future Hypothetical Site Workers: This scenario assumed that the study area will be used by site workers for 250 days per year for 25 years. The receptor population includes adults living offsite but working at the site, including hypothetical exposure to subsurface soil.

- Future Hypothetical Construction (excavation) Workers: This scenario assumed that the study area will be used by construction workers for a hypothetical excavation project for 20 days (one working month) a year for 1 year. The receptor population includes adults living offsite but working at the site, including hypothetical exposure to subsurface soil.

- Future Hypothetical Site Residents: This scenario assumed that the study area will be used for residential purposes. Receptor populations were children and adults living onsite, including hypothetical exposure to subsurface soil, for 350 days per year for a lifetime.

D.3.3 Quantification of Exposure

For the HHRA, chemical exposures were quantified as chronic daily intakes (CDI) for each applicable exposure scenario, pathway, and route consistent with the *Final Sampling and Analysis Plan, UXO 1 and UXO 2 (formerly AOC 1) Naval Support Activity, Mid-South, Millington, Tennessee* (Resolution Consultants, 2012) an d U.S. EPA RAGS (U.S. EPA, 1989). In each case, the calculations were based on reasonable maximum exposure (RME) using the online Oak Ridge National Laboratory Risk Assessment Information System (RAIS), a web-based system of risk tools and information for risk assessment activities, which U.S. EPA uses to calculate their RSLs. The RAIS tools and information for the risk assessment process have been tailored to meet the needs for this site and RAIS model output is in Attachment 1.

RAIS and U.S. EPA HHRA tools were used to estimate exposure for potential receptors for the HHRA including recreational users, site workers, hypothetical construction workers, and hypothetical site residents. H HRA exposure routes consist of ingestion, dermal contact, and inhalation. Exposures to carcinogenic chemicals are averaged over a 70-year lifetime and integrated time-weighted average oral and dermal exposures (i.e., child/adult) were calculated to account for differences in exposure rates and body weights over the full exposure duration. For the recreational and residential scenarios, total exposure duration was assumed to be 30 years — 6 years as a child and 24 years as an adult.

Before calculating intake, representative exposure point concentrations (EPCs) were developed as discussed below and summarized in Table D-7. Additional exposure model parameters for each scenario and receptor are summarized in Table D-8.

D.3.3.1 Exposure Point Concentrations

The concentration term in each exposure model is intended to represent contact over the exposure duration and exposure area. Due to the uncertainties associated with these estimates, the upper confidence level (UCL) of the mean is most commonly used as the EPC for RME estimates. For the HHRA, ProUCL Version 4.1 (U.S. EPA, 2007a) was used to estimate EPCs. ProUCL uses the 'W test' (n ≤ 50) or Lilliefors test (n > 50) statistics to test for normal and lognormal data distributions. If the data do not fit the conventional distributions, it also tests for the gamma distribution, which is often a better method for evaluating positively skewed environmental data, using the Anderson-Darling or Kolmogorov-Smirnov tests. The UCL concentrations are estimated using various parametric and non-parametric methods. Depending upon the results of the distribution testing, the software recommends a particular UCL estimate as the most appropriate value to use for a COPC. Table D-7 summarizes EPCs; Attachment 2 provides additional ProUCL documentation.

Lead EPCs are exceptions to this method. Lead was evaluated using the U.S. EPA Integrated Exposure Uptake Biokinetic (IEUBK) model instead of typical RAGS exposure models. U.S. EPA IEUBK guidance recommends using the arithmetic mean lead concentration as the EPC rather than using a UCL, so the arithmetic mean lead concentration was used as the EPC for each dataset, as indicated in Table D-7. Additional details regarding U.S. EPA's lead model are presented in Section 3.3.3 and in Attachment 3.

D.3.3.2 Chronic Daily Intakes

Intake calculations and EPC values were combined to estimate CDI for each relevant exposure pathway; the calculation is integrated into U.S. EPA's exposure models from U.S. EPA and the RAIS. The CDI is documented separately in RAIS and U.S. EPA's models and is included in Attachment 1, which is the model output from RAIS. Table D-8 summarizes specific exposure model parameters used in U.S. EPA and RAIS models.

D.3.3.3 Lead

Lead was evaluated in accordance with U.S. EPA's *User's Guide for the Integrated Exposure Uptake Biokinetic Model for Lead in Children (IEUBK)* (U.S. EPA, 2007). The model estimates blood lead levels in children exposed to lead-contaminated media for a hypothetical child or population of children and a plausible distribution of blood lead concentrations centered on a geometric mean blood lead concentration. The geometric mean blood lead is predicted from available information about children's exposure to lead. From this distribution, the model estimates

the probability that the blood lead concentration will exceed 10 micrograms per deciliter (µg/dL). In this risk assessment, a probability higher than 5 percent that the blood lead concentration will exceed 10 µg/dL indicates the exposure conditions and scenario may lead to unacceptable risk due to lead and that lead may be identified as a COC. F igure D-2 was obtained from U.S. EPA's User's Guide for the IEUBK model and shows the components of the model (U.S. EPA 2007).

In accordance with U.S. EPA's *Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil*, U.S. EPA's adult lead model relates soil lead intake to blood lead concentrations in women of child-bearing age (U.S. EPA, 2003). The default adult lead model exposure frequency is 219 days per year, which was used for site workers. T he exposure frequency was modified for excavation workers and recreational users to match the exposure frequencies used in other exposure models in Table D-8.

In summary, lead risks were characterized for a child resident using U.S. EPA's IEUBK model and other receptors were evaluated using U.S. EPA's adult lead model. U.S. EPA's default recommended settings were used to evaluate Site workers and the exposure frequencies for excavation workers and recreational users were modified to evaluate risks for excavation workers and recreational users in accordance with U.S. EPA's adult lead model recommendations, U.S. EPA's calculation tools, and the calculation tools developed by Oak Ridge National Laboratory's RAIS (U.S. EPA, 2003; U.S. EPA, 2013; RAIS, 2013).

Table D-7
Exposure Point Concentrations Summary

					Exposure Point Concentration		
Chemical of Potential Concern	**Units**	**UCL**	**Distribution**	**Maximum Concentration**	**Value**	**Units**	**Notes**
Surface Soil							
Benzo(a)pyrene Equivalents	mg/kg	3.38E+01	Nonparametric	2.51E+02	3.38E+01	mg/kg	97.5% KM (Chebyshev) UCL
Fluoranthene	mg/kg	3.64E+01	Nonparametric	4.02E+02	3.64E+01	mg/kg	97.5% KM (Chebyshev) UCL
Lead	mg/kg	1.64E+03	Not Applicable	5.19E+04	1.64E+03	mg/kg	Arithmetic mean
Naphthalene	mg/kg	6.54E-01	Nonparametric	6.77E+00	6.54E-01	mg/kg	97.5% KM (Chebyshev) UCL
Phenanthrene	mg/kg	1.68E+01	Nonparametric	2.00E+02	1.68E+01	mg/kg	97.5% KM (Chebyshev) UCL
Pyrene	mg/kg	2.83E+01	Nonparametric	2.97E+02	2.83E+01	mg/kg	97.5% KM (Chebyshev) UCL
Subsurface Soil							
Benzo(a)pyrene Equivalents	mg/kg	1.89E+01	Nonparametric	1.75E+02	1.89E+01	mg/kg	97.5% KM (Chebyshev) UCL
Lead	mg/kg	4.79E+02	Not Applicable	2.93E+04	4.79E+02	mg/kg	Arithmetic mean
Naphthalene	mg/kg	3.55E-02	Nonparametric	4.01E+00	3.55E-02	mg/kg	97.5% KM (Chebyshev) UCL

Notes:
mg/kg = milligrams per kilogram or parts per million (ppm)
UCL = upper confidence level
The arithmetic mean lead concentration was used as the lead exposure point concentration in accordance with the USEPA IEUBK modeling guidelines

Table D-8
Reasonable Maximum Exposure Model Parameters

Symbol	Definition (units)	Default	Reference
Toxicity Values			
RfD_o	Chronic Oral Reference Dose (mg/kg-day)	Contaminant-specific	EPA Superfund hierarchy
RfC	Chronic Inhalation Reference Concentration (mg/m^3)	Contaminant-specific	EPA Superfund hierarchy
CSF_o	Chronic oral Slope Factor $(mg/kg\text{-}day)^{-1}$	Contaminant-specific	EPA Superfund hierarchy
IUR	Chronic Inhalation Unit Risk $(\mu g/m^3)^{-1}$	Contaminant-specific	EPA Superfund hierarchy
Miscellaneous Variables			
Symbol	**Definition (units)**	**Default**	**Reference**
C_{soil}	concentration of contaminant in soil (mg/kg)	User-input	Entered by user
TR	target risk (unitless)	1×10^{-6}	Determined in this calculator
THQ	target hazard quotient (unitless)	1	Determined in this calculator
LT	Lifetime (years)	70	U.S. EPA 1989 (pg. 6-22)
K	Andelman Volatilization Factor (L/m^3)	0.5	U.S. EPA 1991b (pg. 20)
K_p	permeability constant (cm/hr)	Chemical-specific	
t^*	Time to reach steady-state (hours)	Chemical-specific	U.S. EPA 2004 (Page 3-4)
τ_{event}	Lag time per event (hours/event)	Chemical-specific	U.S. EPA 2004 (Page 3-4)
B	Dimensionless ratio of the permeability coefficient of a compound through the stratum corneum relative to its permeability coefficient across the viable epidermis (unitless)	Chemical-specific	U.S. EPA 2004 (Page 3-4)
FA	Fraction absorbed water (unitless)	Chemical-specific	U.S. EPA 2004 (Page 3-4)
ABS_d	Fraction of contaminant absorbed dermally from soil (unitless)	Chemical-specific	U.S. EPA 2004 (Exhibit 3-4)
GIABS	Fraction of contaminant absorbed in gastrointestinal tract (unitless) Note: if the GIABS is >50% then it is set to 100% for the calculation of dermal toxicity values.	Chemical-specific	U.S. EPA 2004 (Exhibit 4-1)
Resident Soil Landuse Equation Variables			
Symbol	**Definition (units)**	**Default**	**Reference**
$CDI_{res\text{-}sol\text{-}nc\text{-}ing}$	Resident Soil Noncarcinogenic Ingestion (mg/kg)	Contaminant-specific Child, Adult and Age-adjusted Specific	Determined in this calculator
$CDI_{res\text{-}sol\text{-}nc\text{-}der}$	Resident Soil Noncarcinogenic Dermal (mg/kg)	Contaminant-specific Child, Adult and Age-adjusted Specific	Determined in this calculator
$CDI_{res\text{-}sol\text{-}nc\text{-}inh}$	Resident Soil Noncarcinogenic Inhalation (mg/kg)	Contaminant-specific Child, Adult and Age-adjusted Specific	Determined in this calculator
$CDI_{res\text{-}sol\text{-}nc\text{-}tot}$	Resident Soil Noncarcinogenic Total (mg/kg)	Contaminant-specific Child, Adult and Age-adjusted Specific	Determined in this calculator
$CDI_{res\text{-}sol\text{-}ca\text{-}ing}$	Resident Soil Carcinogenic Ingestion (mg/kg)	Contaminant-specific	Determined in this calculator
$CDI_{res\text{-}sol\text{-}ca\text{-}der}$	Resident Soil Carcinogenic Dermal (mg/kg)	Contaminant-specific	Determined in this calculator
$CDI_{res\text{-}sol\text{-}ca\text{-}inh}$	Resident Soil Carcinogenic Inhalation (mg/kg)	Contaminant-specific	Determined in this calculator
$CDI_{res\text{-}sol\text{-}ca\text{-}tot}$	Resident Soil Carcinogenic Total (mg/kg)	Contaminant-specific	Determined in this calculator
BW_{ressa}	Body Weight — adult (kg)	70	U.S. EPA 1991a (pg. 15)

Table D-8
Reasonable Maximum Exposure Model Parameters

BW_{ressc}	Body Weight — child (kg)	15	U.S. EPA 1991a (pg. 15)
BW_{0-2}	Body Weight — 0-2 Years (kg)	15	U.S. EPA 1991a (pg. 15)
BW_{2-6}	Body Weight — 2-6 Years (kg)	15	U.S. EPA 1991a (pg. 15)
BW_{6-16}	Body Weight — 6-16 Years (kg)	70	U.S. EPA 1991a (pg. 15)
BW_{16-30}	Body Weight — 16-30 Years (kg)	70	U.S. EPA 1991a (pg. 15)
ED_{ress}	Exposure Duration — adult + child (years)	30	U.S. EPA 1991a (pg. 15)
ED_{ressa}	Exposure Duration — adult (years)	24	U.S. EPA 1991a (pg. 15)
ED_{ressc}	Exposure Duration — child (years)	6	U.S. EPA 1991a (pg. 15)
ED_{0-2}	Exposure Duration — 0-2 Years (years)	2	U.S. EPA 1991a (pg. 15)
ED_{2-6}	Exposure Duration — 2-6 Years (years)	4	U.S. EPA 1991a (pg. 15)
ED_{6-16}	Exposure Duration — 6-16 Years (years)	10	U.S. EPA 1991a (pg. 15)
ED_{16-30}	Exposure Duration — 16-30 Years (years)	14	U.S. EPA 1991a (pg. 15)
EF_{ress}	Exposure Frequency — adult + child (days/year)	350	U.S. EPA 1991a (pg. 15)
EF_{ressa}	Exposure Frequency — adult (days/year)	350	U.S. EPA 1991a (pg. 15)
EF_{ressc}	Exposure Frequency — child (days/year)	350	U.S. EPA 1991a (pg. 15)
EF_{0-2}	Exposure Frequency — 0-2 Years (days/year)	350	U.S. EPA 1991a (pg. 15)
EF_{2-6}	Exposure Frequency — 2-6 Years (days/year)	350	U.S. EPA 1991a (pg. 15)
EF_{6-16}	Exposure Frequency — 6-16 Years (days/year)	350	U.S. EPA 1991a (pg. 15)
EF_{16-30}	Exposure Frequency — 16-30 Years (days/year)	350	U.S. EPA 1991a (pg. 15)
ET_{ress}	Exposure Time (hours/day)	24	Maximum hours in a day
IRS_{ressc}	Ingestion Rate — Child (mg/day)	200	U.S. EPA 1991a (pg. 15)
IRS_{ressa}	Ingestion Rate — Adult (mg/day)	100	U.S. EPA 1991a (pg. 15)
IRS_{0-2}	Ingestion Rate — 0-2 years (mg/day)	200	U.S. EPA 1991a (pg. 15)
IRS_{2-6}	Ingestion Rate — 2-6 years (mg/day)	200	U.S. EPA 1991a (pg. 15)
IRS_{6-16}	Ingestion Rate — 6-16 years (mg/day)	100	U.S. EPA 1991a (pg. 15)
IRS_{16-30}	Ingestion Rate — 16-30 years (mg/day)	100	U.S. EPA 1991a (pg. 15)
Resident Soil Landuse Equation Variables (Continued)			
Symbol	**Definition (units)**	**Default**	**Reference**
$IFS_{res-adj}$	Ingestion Rate — Age-adjusted (mg/kg)	40,000	Calculated using the age-adjusted intake factors equation
AF_{ressc}	Adherence factor-child (mg/cm^2)	0.2	U.S. EPA 2002 (Exhibit 1-2)
AF_{ressa}	Adherence factor-adult (mg/cm^2)	0.07	U.S. EPA 2002 (Exhibit 1-2)
AF_{0-2}	Adherence factor 0-2 years (mg/cm^2)	0.2	U.S. EPA 2002 (Exhibit 1-2)
AF_{2-6}	Adherence factor 2-6 years (mg/cm^2)	0.2	U.S. EPA 2002 (Exhibit 1-2)
AF_{6-16}	Adherence factor 6-16 years (mg/cm^2)	0.07	U.S. EPA 2002 (Exhibit 1-2)
AF_{16-30}	Adherence factor 16-30 years (mg/cm^2)	0.07	U.S. EPA 2002 (Exhibit 1-2)
$DFS_{res-adj}$	Dermal contact factor — age-adjusted (mg/kg)	126,280	Calculated using the age-adjusted intake factors equation

Table D-8 **Reasonable Maximum Exposure Model Parameters**			
SA_{ressc}	Surface area — child (cm^2)	2,800	U.S. EPA 2002 (Exhibit 1-2)
SA_{ressa}	Surface area — adult (cm^2)	5,700	U.S. EPA 2002 (Exhibit 1-2)
SA_{0-2}	Surface area 0-2 years (cm^2)	2,800	U.S. EPA 2002 (Exhibit 1-2)
SA_{2-6}	Surface area 2-6 years (cm^2)	2,800	U.S. EPA 2002 (Exhibit 1-2)
SA_{6-16}	Surface area 6-16 years (cm^2)	5,700	U.S. EPA 2002 (Exhibit 1-2)
SA_{16-30}	Surface area 16-30 (cm^2)	5,700	U.S. EPA 2002 (Exhibit 1-2)
AT_{ress}	Averaging time (days/year)	365	U.S. EPA 1989 (pg. 6-23)
Composite Worker Soil Landuse Equation Variables			
Symbol	**Definition (units)**	**Default**	**Reference**
$CDI_{cw\text{-}sol\text{-}nc\text{-}ing}$	Composite Worker Soil Noncarcinogenic Ingestion (mg/kg)	Contaminant-specific	Determined in this calculator
$CDI_{cw\text{-}sol\text{-}nc\text{-}der}$	Composite Worker Soil Noncarcinogenic Dermal (mg/kg)	Contaminant-specific	Determined in this calculator
$CDI_{cw\text{-}sol\text{-}nc\text{-}inh}$	Composite Worker Soil Noncarcinogenic Inhalation (mg/kg)	Contaminant-specific	Determined in this calculator
$CDI_{cw\text{-}sol\text{-}nc\text{-}tot}$	Composite Worker Soil Noncarcinogenic Total (mg/kg)	Contaminant-specific	Determined in this calculator
$CDI_{cw\text{-}sol\text{-}ca\text{-}ing}$	Composite Worker Soil Carcinogenic Ingestion (mg/kg)	Contaminant-specific	Determined in this calculator
$CDI_{cw\text{-}sol\text{-}ca\text{-}der}$	Composite Worker Soil Carcinogenic Dermal (mg/kg)	Contaminant-specific	Determined in this calculator
$CDI_{cw\text{-}sol\text{-}ca\text{-}inh}$	Composite Worker Soil Carcinogenic Inhalation (mg/kg)	Contaminant-specific	Determined in this calculator
$CDI_{cw\text{-}sol\text{-}ca\text{-}tot}$	Composite Worker Soil Carcinogenic Total (mg/kg)	Contaminant-specific	Determined in this calculator
BW_{cw}	Body Weight (kg)	70	U.S. EPA 1991a (pg. 15)
ED_{cw}	Exposure Duration (years)	25	U.S. EPA 1991a (pg. 15)
EF_{cw}	Exposure Frequency (days/year)	250	U.S. EPA 1991a (pg. 15)
ET_{cw}	Exposure Time (hours/day)	8	U.S. EPA 1991a (pg. 10)
IRS_{cw}	Ingestion Rate (mg/day)	100	U.S. EPA 1991a (pg. 15)
AF_{cw}	Adherence factor (mg/cm^2)	0.2	U.S. EPA 2002 (Exhibit 1-2)
SA_{cw}	Surface area (cm^2)	3,300	U.S. EPA 2002 (Exhibit 1-2)
AT_{cw}	Averaging time (days/year)	365	U.S. EPA 1989 (pg. 6-23)
Excavation/Construction Worker Soil Landuse Equation Variables			
Symbol	**Definition (units)**	**Default**	**Reference**
$CDI_{ew\text{-}sol\text{-}nc\text{-}ing}$	Excavation/Construction Worker Soil Noncarcinogenic Ingestion (mg/kg)	Contaminant-specific	Determined in this calculator
$CDI_{ew\text{-}sol\text{-}nc\text{-}der}$	Excavation/Construction Worker Soil Noncarcinogenic Dermal (mg/kg)	Contaminant-specific	Determined in this calculator
$CDI_{ew\text{-}sol\text{-}nc\text{-}inh}$	Excavation/Construction Worker Soil Noncarcinogenic Inhalation (mg/kg)	Contaminant-specific	Determined in this calculator
$CDI_{ew\text{-}sol\text{-}nc\text{-}tot}$	Excavation/Construction Worker Soil Noncarcinogenic Total (mg/kg)	Contaminant-specific	Determined in this calculator
$CDI_{ew\text{-}sol\text{-}ca\text{-}ing}$	Excavation/Construction Worker Soil Carcinogenic Ingestion (mg/kg)	Contaminant-specific	Determined in this calculator
$CDI_{ew\text{-}sol\text{-}ca\text{-}der}$	Excavation/Construction Worker Soil Carcinogenic Dermal (mg/kg)	Contaminant-specific	Determined in this calculator
$CDI_{ew\text{-}sol\text{-}ca\text{-}inh}$	Excavation/Construction Worker Soil Carcinogenic Inhalation (mg/kg)	Contaminant-specific	Determined in this calculator
$CDI_{ew\text{-}sol\text{-}ca\text{-}tot}$	Excavation/Construction Worker Soil Carcinogenic Total (mg/kg)	Contaminant-specific	Determined in this calculator
BW_{ew}	Body Weight (kg)	70	U.S. EPA 1991a (pg. 15)
ED_{ew}	Exposure Duration (years)	1	U.S. EPA 1991a (pg. 15)
EF_{ew}	Exposure Frequency (days/year)	20	U.S. EPA 1991a (pg. 15)

Table D-8 **Reasonable Maximum Exposure Model Parameters**			
ET_{ew}	Exposure Time (hours/day)	8	U.S. EPA 1991a (pg. 10)
IRS_{ew}	Ingestion Rate (mg/day)	330	U.S. EPA 1991a (pg. 15)
AF_{ew}	Adherence factor (mg/cm^2)	0.3	U.S. EPA 2002 (Exhibit 1-2)
SA_{ew}	Surface area (cm^2)	3,300	U.S. EPA 2002 (Exhibit 1-2)
AT_{cw}	Averaging time (days/year)	365	U.S. EPA 1989 (pg. 6-23)
Recreator Soil/Sediment Landuse Equation Variables			
Symbol	**Definition (units)**	**Default**	**Reference**
$CDI_{rec\text{-}sol\text{-}nc\text{-}ing}$	Recreation Soil Noncarcinogenic Ingestion (mg/kg)	Contaminant-specific Child, Adult and Age-adjusted Specific	Determined in this calculator
$CDI_{rec\text{-}sol\text{-}nc\text{-}der}$	Recreation Soil Noncarcinogenic Dermal (mg/kg)	Contaminant-specific Child, Adult and Age-adjusted Specific	Determined in this calculator
$CDI_{rec\text{-}sol\text{-}nc\text{-}inh}$	Recreation Soil Noncarcinogenic Inhalation (mg/kg)	Contaminant-specific Child, Adult and Age-adjusted Specific	Determined in this calculator
$CDI_{rec\text{-}sol\text{-}nc\text{-}tot}$	Recreation Soil Noncarcinogenic Total (mg/kg)	Contaminant-specific Child, Adult and Age-adjusted Specific	Determined in this calculator
$CDI_{rec\text{-}sol\text{-}ca\text{-}ing}$	Recreation Soil Carcinogenic Ingestion (mg/kg)	Contaminant-specific	Determined in this calculator
$CDI_{rec\text{-}sol\text{-}ca\text{-}der}$	Recreation Soil Carcinogenic Dermal (mg/kg)	Contaminant-specific	Determined in this calculator
$CDI_{rec\text{-}sol\text{-}ca\text{-}inh}$	Recreation Soil Carcinogenic Inhalation (mg/kg)	Contaminant-specific	Determined in this calculator
$CDI_{rec\text{-}sol\text{-}ca\text{-}tot}$	Recreation Soil Carcinogenic Total (mg/kg)	Contaminant-specific	Determined in this calculator
Recreator Soil/Sediment Landuse Equation Variables (Continued)			
Symbol	**Definition (units)**	**Default**	**Reference**
BW_{recsa}	Body Weight — adult (kg)	70	U.S. EPA 1991a (pg. 15)
BW_{recsc}	Body Weight — child (kg)	15	U.S. EPA 1991a (pg. 15)
$BW_{0\text{-}2}$	Body Weight — 0-2 Years (kg)	15	U.S. EPA 1991a (pg. 15)
$BW_{2\text{-}6}$	Body Weight — 2-6 Years (kg)	15	U.S. EPA 1991a (pg. 15)
$BW_{6\text{-}16}$	Body Weight — 6-16 Years (kg)	70	U.S. EPA 1991a (pg. 15)
$BW_{16\text{-}30}$	Body Weight — 16-30 Years (kg)	70	U.S. EPA 1991a (pg. 15)
ED_{recs}	Exposure Duration — adult + child (years)	30	U.S. EPA 1991a (pg. 15)
ED_{recsa}	Exposure Duration — adult (years)	24	U.S. EPA 1991a (pg. 15)
ED_{rescc}	Exposure Duration — child (years)	6	U.S. EPA 1991a (pg. 15)
$ED_{0\text{-}2}$	Exposure Duration — 0-2 Years (years)	2	U.S. EPA 1991a (pg. 15)
$ED_{2\text{-}6}$	Exposure Duration — 2-6 Years (years)	4	U.S. EPA 1991a (pg. 15)
$ED_{6\text{-}16}$	Exposure Duration — 6-16 Years (years)	10	U.S. EPA 1991a (pg. 15)
$ED_{16\text{-}30}$	Exposure Duration — 16-30 Years (years)	14	U.S. EPA 1991a (pg. 15)
EF_{recs}	Exposure Frequency — adult + child (days/year)	75	Reasonable Estimate
EF_{recsa}	Exposure Frequency — adult (days/year)	75	Reasonable Estimate
EF_{recsc}	Exposure Frequency — child (days/year)	75	Reasonable Estimate
$EF_{0\text{-}2}$	Exposure Frequency — 0-2 Years (days/year)	75	Reasonable Estimate

Table D-8
Reasonable Maximum Exposure Model Parameters

EF_{2-6}	Exposure Frequency — 2-6 Years (days/year)	75	Reasonable Estimate
EF_{6-16}	Exposure Frequency — 6-16 Years (days/year)	75	Reasonable Estimate
EF_{16-30}	Exposure Frequency — 16-30 Years (days/year)	75	Reasonable Estimate
ET_{recs}	Exposure Time (hours/day)	1	Reasonable Estimate
ET_{recsc}	Exposure time — child (hours/day)	1	Reasonable Estimate
ET_{recsa}	Exposure time — adult (hours/day)	1	Reasonable Estimate
ET_{0-2}	Exposure time 0-2 years (hours/day)	1	Reasonable Estimate
ET_{2-6}	Exposure time 2-6 years (hours/day)	1	Reasonable Estimate
ET_{6-16}	Exposure time 6-16 years (hours/day)	1	Reasonable Estimate
ET_{16-30}	Exposure time 16-30 years (hours/day)	1	Reasonable Estimate
IRS_{recsc}	Ingestion Rate — Child (mg/day)	200	U.S. EPA 1991a (pg. 15)
IRS_{recsa}	Ingestion Rate — Adult (mg/day)	100	U.S. EPA 1991a (pg. 15)
IRS_{0-2}	Ingestion Rate — 0-2 years (mg/day)	200	U.S. EPA 1991a (pg. 15)
IRS_{2-6}	Ingestion Rate — 2-6 years (mg/day)	200	U.S. EPA 1991a (pg. 15)
IRS_{6-16}	Ingestion Rate — 6-16 years (mg/day)	100	U.S. EPA 1991a (pg. 15)
IRS_{16-30}	Ingestion Rate — 16-30 years (mg/day)	100	U.S. EPA 1991a (pg. 15)
$IFS_{rec-adj}$	Ingestion Rate — Age-adjusted (mg/kg)	40,000	Calculated using the age-adjusted intake factors equation
AF_{rescc}	Adherence factor-child (mg/cm^2)	0.2	U.S. EPA 2002 (Exhibit 1-2)
AF_{resca}	Adherence factor-adult (mg/cm^2)	0.07	U.S. EPA 2002 (Exhibit 1-2)
AF_{0-2}	Adherence factor 0-2 years (mg/cm^2)	0.2	U.S. EPA 2002 (Exhibit 1-2)
AF_{2-6}	Adherence factor 2-6 years (mg/cm^2)	0.2	U.S. EPA 2002 (Exhibit 1-2)
AF_{6-16}	Adherence factor 6-16 years (mg/cm^2)	0.07	U.S. EPA 2002 (Exhibit 1-2)
AF_{16-30}	Adherence factor 16-30 years (mg/cm^2)	0.07	U.S. EPA 2002 (Exhibit 1-2)
$DFS_{rec-adj}$	Dermal contact factor — age-adjusted (mg/kg)	126,280	Calculated using the age-adjusted intake factors equation
SA_{recsc}	Surface area — child (cm^2)	2,800	U.S. EPA 2002 (Exhibit 1-2)
SA_{recsa}	Surface area — adult (cm^2)	5,700	U.S. EPA 2002 (Exhibit 1-2)
SA_{0-2}	Surface area 0-2 years (cm^2)	2,800	U.S. EPA 2002 (Exhibit 1-2)
SA_{2-6}	Surface area 2-6 years (cm^2)	2,800	U.S. EPA 2002 (Exhibit 1-2)
SA_{6-16}	Surface area 6-16 years (cm^2)	5,700	U.S. EPA 2002 (Exhibit 1-2)
SA_{16-30}	Surface area 16-30 (cm^2)	5,700	U.S. EPA 2002 (Exhibit 1-2)
AT_{recs}	Averaging time (days/year)	365	U.S. EPA 1989 (pg. 6-23)

D.4.0 TOXICITY ASSESSMENT

The purpose of the toxicity assessment is to evaluate available information regarding the potential for COPCs to cause adverse health effects and provide an estimate of the relationship between the magnitude of exposure and the probability (or severity) of the effect. In accordance with guidance (U.S. EPA, 1989), this assessment was performed in two steps.

The first step, hazard assessment, involves determination of whether an exposure can cause an increase in an adverse health effect and if the effect will manifest in humans. This amounts to a general causation analysis with consideration given to the nature and strength of evidence. The second step, dose-response evaluation, is a quantitative evaluation of toxicity data aimed at determining the relationship between dose and the degree of adverse effect in the exposed population. From this analysis, toxicity values are derived that allow for estimation of non-carcinogenic hazard or carcinogenic risk as a function of exposure. Cancer and non-cancer effects are assessed separately, although some chemicals may cause both types of effects. The primary source of toxicity values was U.S. EPA's Integrated Risk Information System (IRIS).

Derivation of toxicity values are documented in published U.S. EPA HHRA documents. References for specific values used are cited in individual tables and in subsequent text (Sections 4.1 and 4.2). The meaning and derivation of values for each type of effect are discussed in Sections 4.1 and 4.2.

D.4.1 Non-Carcinogenic Effects

Non-cancer effects include all health effects that are not cancer related. For most non-carcinogens, the human body is capable of detoxifying or otherwise protecting itself against the potential harmful effect. A threshold level typically exists above which these mechanisms are no longer able to protect the exposed individual. Common effects are organ toxicity (kidney, liver, and heart), blood disorders, central nervous system disorders (permanent damage or transient impairment), reproductive toxicity and developmental effects (retarded growth, defects). The threshold concept has been rejected in some instances, citing the difficulty of empirically distinguishing a true threshold from a dose-response curve that is nonlinear at low doses (U.S. EPA, 1996b and 1998b).

Reference doses (RfD) are derived based on experimental no observed or lowest observed adverse effect levels (NOAEL and LOAEL). Ideally, experiments would be based on human subjects under chronic exposure conditions with a well-defined lower limit of toxic response (NOAEL) identified.

However, very few such studies of adequate quality have been performed. As a result, most toxicological data used to derive RfDs have been obtained from chronic (or acute) animal studies.

To account for uncertainties related to sub-chronic experimental exposure, failure to identify a NOAEL/use of a LOAEL, extrapolation from animal species to humans, and sensitive human populations, RfDs typically reflect a series of uncertainty (or safety) factors ranging from 1 to 10. A modifying factor may also be applied to reflect the weaknesses or strengths of the associated toxicological database. The RfD is calculated as the NOAEL (or LOAEL) divided by the product of all applicable uncertainty and modifying factors.

Although sub-chronic (2 weeks to 7 years) and acute (less than 2 weeks) RfDs have been developed for some chemicals, only chronic RfDs (in units of milligrams per kilogram-day [mg/kg-day]) were considered for the HHRA based upon the proposed risk characterization approach. The reference concentration (RfC) is an estimate (with uncertainty spanning perhaps an order of magnitude) of a continuous inhalation exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime (U.S. EPA IRIS, 2013). The RfC considers both toxic effects of the respiratory system (portal-of-entry) and effects peripheral to the respiratory system (extrarespiratory effects) (U.S. EPA IRIS 2013). The inhalation RfC (generally expressed in units of milligrams per cubic meter) is analogous to the oral RfD and is similarly intended for use in risk assessments for health effects known or assumed to be produced through a n onlinear (presumed threshold) mode of action (U.S. EPA IRIS 2013). Non-carcinogenic toxicological information is summarized in Table D-9.

D.4.2 Carcinogenic Effects

Carcinogenic slope factors (SF) and inhalation unit risks (IUR), along with the accompanying weight-of-evidence (WOE) determination, are the toxicity data most commonly used to evaluate potential human carcinogenic risks. The basic methods U.S. EPA uses to derive these values are outlined as follows. A dditional detail is in *Guidelines for Carcinogen Risk Assessment* (U.S. EPA 1994 and 2005b).

In general, estimates of carcinogenicity are not based on a threshold assumption. Exposure at any magnitude is thought to present some potential for carcinogenesis. A WOE classification has historically been assigned based upon the strength of supporting human and/or animal data available for a chemical. The following classifications were defined by U.S. EPA (1986):

Group A: Known human carcinogen

Group B: Probable human carcinogen

Group B1: Limited evidence/data regarding carcinogenicity in humans
Group B2: Sufficient evidence in animals and inadequate or no evidence in humans

Group C: Possible human carcinogen

Group D: Not classifiable as to human carcinogenicity

Group E: Evidence of noncarcinogenicity for humans

For chemicals falling in Groups A, B, and sometimes C, SFs and IURs are derived using mathematical models to extrapolate from responses in high dose animal studies to responses anticipated at relatively low dose human environmental exposures. The values represent the 95% UCL of the slope of the dose-response curve for a specific exposure route (oral or inhalation).

U.S. EPA has traditionally used the linearized multistage model for this application, which has been shown to be conservative (i.e., predicts higher cancer potency) than other available models. SFs are expressed in units of $(mg/kg\text{-}day)^{-1}$ to allow for estimation of potential carcinogenicity based on chronic daily intake (or exposure) via oral routes. IURs are expressed in units of (micrograms per cubic meter)$^{-1}$ $[(\mu g/m^3)^{-1}]$ and represent the risk (unitless) per $\mu g/m^3$ of the contaminant in inhaled air.

In 2005, U.S. EPA issued updated guidelines on carcinogen risk assessment (U.S. EPA 2005b). The highlights of the changes are:

Consideration of all potentially relevant biological information. In addition to tumor data, data indicating other responses are to be used and modeled if they may be a measure of carcinogenic risk.

- Mode of action is emphasized to ensure the mechanisms and uncertainties associated with a chemical's likelihood to cause harm are considered in the dose-response approach.

Table D-9
Non-Cancer Toxicity Data

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD		Oral Absorption Efficiency for Dermal (1)	Absorbed RfD for Dermal		Primary Target Organ(s)	Combined Uncertainty/ Modifying Factors	RfD:Target Organ(s)	
		Value	Units		Value	Units			Source(s)	Date(s)
Benzo(a)pyrene	Chronic	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	Chronic	4.0E-02	mg/kg-day	NA	NA	NA	CNS, liver weight, blood	3,000	IRIS	2013
Naphthalene	Chronic	2.0E-02	mg/kg-day	NA	NA	NA	Decreased body weight	3,000	IRIS	2013
Phenanthrene	Chronic	-	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	Chronic	3.0E-02	mg/kg-day	NA	NA	NA	Kidney	3,000	IRIS	2013
Lead	Chronic	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
(1) USEPA RAGS Part E; RfD not adjusted for gastrointestinal absorption based on RAGS E Table 4-1
RfD = reference dose
NA = not applicable
CNS = central nervous system
IRIS = Integrated Risk Information System
mg/kg-day = milligrams per kilogram per day

The alphanumeric WOE classification has been replaced by a WOE narrative. Five standardized hazard descriptors are recommended: Carcinogenic to Humans, Likely to be Carcinogenic to Humans, Suggestive Evidence of Carcinogenic Potential, Inadequate Information to Assess Carcinogenic Potential, and Not Likely to be Carcinogenic to Humans.

- The narrative also summarizes hazard assessment results and provides a conclusion regarding the human carcinogenic potential on a route-specific basis. The types of evidence considered and how it was used to draw conclusions are discussed. The significant issues/strengths/limitations of data and conclusions and the mode of action information are summarized to support the dose-response approach.

- Various dose-response assessment options are provided. Extrapolation is based on extension of a biologically-based model if supported by substantial data. Otherwise, default approaches can be applied that are consistent with current understanding of mode(s) of action of the agent, including approaches that assume linearity or nonlinearity of the dose-response relationship, or both.

Oral SFs and IURs for COPCs are in Table D-10 along with references. Alphanumeric WOE classifications are also presented. Currently, the revised WOE guidelines are not reflected in the primary toxicological information sources for many chemicals.

D.4.3 Dermal Toxicity Values

Dermal exposures related to solids and water are calculated based on absorbed dose. Dermal toxicity values must be derived because they are not provided as part of U.S. EPA's toxicity value hierarchy. As a result, oral toxicity values must be modified to reflect absorbed rather than administered dose. In accordance with RAGS Part E, oral SFs are adjusted to represent absorbed dose as:

$$\text{Oral SF/Gastrointestinal Absorption Factor} = \text{Dermal SF (mg/kg-day)}^{-1}$$

Absorption factors and dermal toxicity values used in the HHRA, as per RAGS Part E (U.S. EPA, 2004a), are in Table D-10. As noted in U.S. EPA RAGS Part E and Table D-10, no adjustment is applicable to benzo(a)pyrene.

D.4.4 Toxicological Profiles

In accordance with RAGS, basic toxicological profiles for COPCs compiled and are in Attachment 4. The information was obtained from the Oak Ridge National Laboratory RAIS (RAIS, 2013).

D.5.0 RISK CHARACTERIZATION

Risk characterization combines the outputs of the exposure and toxicity assessments to estimate the potential for adverse effects in the exposed populations. The output of risk characterization provides the key elements for risk management and supports remedial decision-making. Non-carcinogenic and carcinogenic risks are predicted and evaluated separately. This section describes how these two types of health effects were assessed and discusses the results for each scenario.

D.5.1 Non-Cancer Effects

For non-cancer effects (systemic toxicants), acceptable exposure levels represent concentration levels that would not result in adverse effects during a lifetime or part of a lifetime, incorporating an adequate margin of safety (U.S. EPA 1994). This is represented by an HQ threshold of 1.0 for non-cancer effects.

The potential for adverse health effects other than cancer is evaluated as the ratio of the CDI over the corresponding RfD. HQs for each chemical in each exposure pathway are summed to obtain the hazard index (HI), which allows assessment of the overall potential for non-carcinogenic health effects (U.S. EPA 1989). Adverse health effects can occur when the HI exceeds 1.0, and this threshold is used to identify COCs.

The HQ is estimated using the following equation:

$$HQ = CDI / RfD$$

where:

HQ	=	hazard quotient (unitless)
CDI	=	chronic daily chemical intake (mg/kg-day)
RfD	=	reference dose (mg/kg-day)

Table D-10
Cancer Toxicity Data

Chemical of Potential Concern	Oral Cancer Slope Factor		Oral Absorption Efficiency for Dermal (1)	Absorbed Cancer Slope Factor for Dermal		IUR		Weight of Evidence/ Cancer Guideline Description	Oral CSF	
	Value	Units		Value	Units	Value	Units		Source(s)	Date
Benzo(a)pyrene	7.3E+00	(mg/kg-day)-1	NA	7.3E+00	(mg/kg-day)-1	1.1E-03	(µg/m3)-1	B2	IRIS	2013
Fluoranthene	NA	NA	NA	NA	NA	NA	NA	D	IRIS	2013
Naphthalene	NA	NA	NA	NA	NA	NA	NA	C	IRIS	2013
Phenanthrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA	NA	NA	NA	D	IRIS	2013
Lead	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
(1) U.S. EPA RAGS Part E; slope factor not adjusted for gastrointestinal absorption based on RAGS E Table 4-1
IUR = inhalation unit risk; obtained from U.S. EPA's online risk models, which reference California EPA
CSF = cancer slope factor
IRIS = Integrated Risk Information System
carcinogenic PAHs evaluated relative to benzo(a)pyrene
mg/kg-day = milligrams per kilogram per day
µg/m^3 = micrograms per cubic meter
B2, C, and D = U.S. EPA Cancer Classifications in IRIS

D.5.2 Cancer Risks

Potential risks associated with exposures to carcinogenic chemicals were assessed by computing the increased probability of an individual developing cancer during their lifetime. Incremental lifetime cancer risks (ILCR) in excess of the normal rate of cancer incidence were calculated using the output of the exposure assessment in combination with the SF and IUR.

Cancer risk estimates were compared to the U.S. EPA target risk range of 1E-6 to 1E-4, or 1 in 1 million to 1 in 10,000. The National Oil and Hazardous Substances Pollution Contingency Plan (NCP [U.S. EPA 1994]) determined U.S. EPA's acceptable risk range for making remedial decisions at contaminated sites. U.S. EPA's upper bound acceptable cancer risk of 1E-4 is their cumulative acceptable excess risk threshold, in accordance with Office of Solid Waste and Emergency Response (OSWER) Directive 9355.0-30 (U.S. EPA, 1991b).

Cancer risk is calculated by multiplying the CDI for each chemical by its upper-bound cancer SF, using the equation below (U.S. EPA 1989).

$$CR = CDI \times SF$$

where:

CR	=	cancer risk (unitless)
CDI	=	chronic daily chemical intake (mg/kg-day)
SF	=	slope factor $(mg/kg\text{-}day)^{-1}$

This equation is valid only at low risk. In accordance with RAGS, risks greater than 0.01 are re-calculated using the equation listed below (U.S. EPA, 1989). Variables are defined above.

$$CR = 1 \times \exp(-CDI \times SF)$$

ILCRs associated with oral and dermal exposure to individual chemicals were estimated as the product of the daily intake averaged over a 70-year lifetime and the cancer risk (CDI x SF). For inhalation exposure, ILCR was estimated as the product of the predicted airborne EPC (in $\mu g/m^3$) and the IUR (air concentration x IUR). The total ILCR for an individual was calculated as the sum for all relevant exposure routes and pathways. Because the SFs and IURs represent an upper bound estimate of carcinogenic potential, the ILCRs predicted using them also represent upper bound estimates.

COCs based on cancer risk are identified by first comparing the cumulative risk estimate for the land use scenario to U.S. EPA's upper bound acceptable excess risk range of 1 in 10,000 (1E-4). If the cumulative risk estimate exceeds U.S. EPA's threshold of 1E-4, COCs are identified as chemicals contributing at least 1E-6 risk to the total risk.

D.5.3 Lead Risk

In accordance with RAGS, lead risk characterization is based on a separate endpoint, the *probability* that the blood lead level threshold will exceed 10 µg/dL. As previously discussed, lead was evaluated using U.S. EPA's IEUBK and adult lead models (U.S. EPA 2007; U.S. EPA 2003). U.S. EPA's models estimate blood lead levels of receptors exposed to lead-contaminated media as well as the probability that the blood lead concentration will exceed 10 µg/dL. U.S. EPA's threshold is a 5 percent or greater probability that the blood lead level will be greater than 10 µg/dL (U.S. EPA 2007). Consequently, when lead models predict greater than a 5 percent probability that blood lead levels would exceed 10 µg/dL, lead is characterized as a COC for those exposure conditions.

D.5.4 Risk Characterization Results

Risk estimates for the site, based on RME assumptions, are presented in Tables D-11 through D-22 and Table D-23 summarizes the results and cumulative risks. As previously discussed, soil data were evaluated using the hypothetical recreational, site worker, hypothetical excavation worker, and hypothetical residential scenarios; the scenarios are characterized separately below.

Table D-11
Risk Results from U.S. EPA's Risk Models
Hypothetical Recreational Users

Chemical	Exposure Point Concentration (mg/kg)	Child Ingestion HQ	Child Inhalation HQ	Child Dermal HQ	Child Total HI	Adult Ingestion HQ	Adult Inhalation HQ	Adult Dermal HQ	Adult Total HI	Ingestion Risk	Inhalation Risk	Dermal Risk	Total Risk
Surface Soil Risks													
BEQ	33.8	—	—	—	—	—	—	—	—	3.55E-04	2.54E-10	1.36E-04	4.91E-04
Fluoranthene	36.4	2.49E-03	—	9.08E-04	3.40E-03	2.67E-04	—	1.39E-04	4.06E-04	—	—	—	—
Naphthalene	0.65	8.96E-05	3.74E-05	3.26E-05	1.60E-04	9.60E-06	3.74E-05	4.98E-06	5.20E-05	—	1.64E-09	—	1.64E-09
Phenanthrene	16.8	—	—	—	—	—	—	—	—	—	—	—	—
Pyrene	28.3	2.58E-03	—	9.41E-04	3.53E-03	2.77E-04	—	1.44E-04	4.21E-04	—	—	—	—
Total Risk or HI		5.16E-03	3.74E-05	1.88E-03	7.09E-03	5.54E-04	3.74E-05	2.88E-04	8.79E-04	**3.55E-04**	1.89E-09	**1.36E-04**	**4.91E-04**
Subsurface Soil Risks													
BEQ	18.9	—	—	—	—	—	—	—	—	1.98E-04	1.42E-10	7.61E-05	2.74E-04
Naphthalene	0.04	4.86E-06	2.03E-06	1.77E-06	8.66E-06	5.21E-07	2.03E-06	2.70E-07	2.82E-06	—	8.88E-11	—	8.88E-11
Total Risk or HI		4.86E-06	2.03E-06	1.77E-06	8.66E-06	5.21E-07	2.03E-06	2.70E-07	2.82E-06	**1.98E-04**	2.31E-10	***7.61E-05***	**2.74E-04**

Notes:

HQ	=	hazard quotient
HI	=	hazard index
Risk	=	incremental lifetime excess cancer risk; lifetime weighted average
Bold and Italic	=	indicates total risk greater than 1E-6 and less than 1E-4
Bold	=	indicates total risk greater than 1E-4

Table D-12
Risk Results from U.S. EPA's Adult Lead Risk Models
Hypothetical Recreational Users — Surface Soil

Calculations of Blood Lead Concentrations (PbBs)
U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee
Version date 6/21/09

Variable	Description of Variable	Units	GSDi and PbBo from Analysis of NHANES 1999-2004	GSDi and PbBo from Analysis of NHANES III (Phases 1&2)
PbS	Soil lead concentration	µg/g or ppm	1,636.4	1,636.4
Rfetal/maternal	Fetal/maternal PbB ratio	—	0.9	0.9
BKSF	Biokinetic Slope Factor	µg/dL per µg/day	0.4	0.4
GSDi	Geometric standard deviation PbB	—	1.8	2.1
PbB0	Baseline PbB	µg/dL	1.0	1.5
IRS	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.050	0.050
IRS+D	Total ingestion rate of outdoor soil and indoor dust	g/day	—	—
WS	Weighting factor; fraction of IRS+D ingested as outdoor soil	—	—	—
KSD	Mass fraction of soil in dust	—	—	—
AFS, D	Absorption fraction (same for soil and dust)	—	0.12	0.12
EFS, D	Exposure frequency (same for soil and dust)	days/yr	75	75
ATS, D	Averaging time (same for soil and dust)	days/yr	365	365
PbBadult	PbB of adult worker, geometric mean	µg/dL	1.8	2.3
PbBfetal, 0.95	95th percentile PbB among fetuses of adult workers	µg/dL	4.3	7.0
PbBt	Target PbB level of concern (e.g., 10 µg/dL)	µg/dL	10.0	10.0
P(PbBfetal > PbBt)	Probability that fetal PbB > PbBt, assuming lognormal distribution	%	0.1%	1.7%

Table D-13
Risk Results from U.S. EPA's Adult Lead Risk Models
Hypothetical Recreational Users — Subsurface Soil

Calculations of Blood Lead Concentrations (PbBs)
U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee
Version date 6/21/09

Variable	Description of Variable	Units	GSDi and PbBo from Analysis of NHANES 1999-2004	GSDi and PbBo from Analysis of NHANES III (Phases 1&2)
PbS	Soil lead concentration	µg/g or ppm	479.3	479.3
Rfetal/maternal	Fetal/maternal PbB ratio	--	0.9	0.9
BKSF	Biokinetic Slope Factor	µg/dL per µg/day	0.4	0.4
GSDi	Geometric standard deviation PbB	—	1.8	2.1
PbB0	Baseline PbB	µg/dL	1.0	1.5
IRS	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.050	0.050
IRS+D	Total ingestion rate of outdoor soil and indoor dust	g/day	—	—
WS	Weighting factor; fraction of IRS+D ingested as outdoor soil	—	—	—
KSD	Mass fraction of soil in dust	—	—	—
AFS, D	Absorption fraction (same for soil and dust)	—	0.12	0.12
EFS, D	Exposure frequency (same for soil and dust)	days/yr	75	75
ATS, D	Averaging time (same for soil and dust)	days/yr	365	365
PbBadult	PbB of adult worker, geometric mean	µg/dL	1.2	1.7
PbBfetal, 0.95	95th percentile PbB among fetuses of adult workers	µg/dL	2.9	5.3
PbBt	Target PbB level of concern (e.g., 10 µg/dL)	µg/dL	10.0	10.0
P(PbBfetal > PbBt)	Probability that fetal PbB > PbBt, assuming lognormal distribution	%	0.01%	0.6%

Table D-14
Risk Results from U.S. EPA's Risk Models
Site Workers

Chemical	Exposure Point Concentration (mg/kg)	Ingestion HQ	Inhalation HQ	Dermal HQ	Total HI	Ingestion Risk	Inhalation Risk	Dermal Risk	Total Risk
Surface Soil Risks									
BEQ	33.8	—	—	—	—	8.62E-05	2.23E-09	7.40E-05	1.60E-04
Fluoranthene	36.4	8.90E-04	—	7.64E-04	1.65E-03	—	—	—	—
Naphthalene	0.65	3.20E-05	9.98E-04	2.75E-05	1.06E-03	—	3.64E-08	—	3.64E-08
Phenanthrene	16.8	—	—	—	—	—	—	—	—
Pyrene	28.3	9.23E-04	—	7.92E-04	1.71E-03	—	—	—	—
Total Risk or HI		1.85E-03	9.98E-04	1.58E-03	4.42E-03	***8.62E-05***	3.86E-08	***7.40E-05***	**1.60E-04**
Subsurface Soil Risks									
BEQ	18.9	—	—	—	—	4.82E-05	1.25E-09	4.14E-05	8.96E-05
Naphthalene	0.04	1.74E-06	5.42E-05	1.49E-06	5.74E-05	—	1.97E-09	—	1.97E-09
Total Risk or HI		1.74E-06	5.42E-05	1.49E-06	5.74E-05	***4.82E-05***	3.22E-09	***4.14E-05***	**8.96E-05**

Notes:

HQ	=	hazard quotient
HI	=	hazard index
Risk	=	incremental lifetime excess cancer risk; lifetime weighted average
Bold and Italic	=	indicates total risk greater than 1E-6 and less than 1E-4
Bold	=	indicates total risk greater than 1E-4

Table D-15
Risk Results from U.S. EPA's Adult Lead Risk Models
Site Workers Surface Soil

Calculations of Blood Lead Concentrations (PbBs)
U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee
Version date 6/21/09

Variable	Description of Variable	Units	GSDi and PbBo from Analysis of NHANES 1999-2004	GSDi and PbBo from Analysis of NHANES III (Phases 1&2)
PbS	Soil lead concentration	µg/g or ppm	1,636.4	1,636.4
$R_{fetal/maternal}$	Fetal/maternal PbB ratio	—	0.9	0.9
BKSF	Biokinetic Slope Factor	µg/dL per µg/day	0.4	0.4
GSD_i	Geometric standard deviation PbB	—	1.8	2.1
PbB_0	Baseline PbB	µg/dL	1.0	1.5
IR_S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.050	0.050
IR_{S+D}	Total ingestion rate of outdoor soil and indoor dust	g/day	—	—
W_S	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	—	—	—
K_{SD}	Mass fraction of soil in dust	—	—	—
$AF_{S, D}$	Absorption fraction (same for soil and dust)	—	0.12	0.12
$EF_{S, D}$	Exposure frequency (same for soil and dust)	days/yr	219	219
$AT_{S, D}$	Averaging time (same for soil and dust)	days/yr	365	365
PbB_{adult}	PbB of adult worker, geometric mean	µg/dL	3.4	3.9
$PbB_{fetal, 0.95}$	95th percentile PbB among fetuses of adult workers	µg/dL	7.9	11.8
PbB_t	Target PbB level of concern (e.g., 10 µg/dL)	µg/dL	10.0	10.0
$P(PbB_{fetal} > PbB_t)$	Probability that fetal PbB > PbB_t,assuming lognormal distribution	%	2.1%	7.7%

Table D-16
Risk Results from U.S. EPA's Adult Lead Risk Models
Site Workers Subsurface Soil

Calculations of Blood Lead Concentrations (PbBs)
U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee
Version date 6/21/09

Variable	Description of Variable	Units	GSDi and PbBo from Analysis of NHANES 1999-2004	GSDi and PbBo from Analysis of NHANES III (Phases 1&2)
PbS	Soil lead concentration	µg/g or ppm	479.3	479.3
$R_{fetal/maternal}$	Fetal/maternal PbB ratio	—	0.9	0.9
BKSF	Biokinetic Slope Factor	µg/dL per µg/day	0.4	0.4
GSD_i	Geometric standard deviation PbB	—	1.8	2.1
PbB_0	Baseline PbB	µg/dL	1.0	1.5
IR_S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.050	0.050
IR_{S+D}	Total ingestion rate of outdoor soil and indoor dust	g/day	—	—
W_S	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	—	—	—
K_{SD}	Mass fraction of soil in dust	—	—	—
$AF_{S, D}$	Absorption fraction (same for soil and dust)	—	0.12	0.12
$EF_{S, D}$	Exposure frequency (same for soil and dust)	days/yr	219	219
$AT_{S, D}$	Averaging time (same for soil and dust)	days/yr	365	365
PbB_{adult}	PbB of adult worker, geometric mean	µg/dL	1.7	2.2
$PbB_{fetal, 0.95}$	95th percentile PbB among fetuses of adult workers	µg/dL	4.0	6.7
PbB_t	Target PbB level of concern (e.g., 10 µg/dL)	µg/dL	10.0	10.0
$P(PbB_{fetal} > PbB_t)$	Probability that fetal PbB > PbB_t, assuming lognormal distribution	%	0.1%	1.4%

Table D-17
Risk Results from U.S. EPA's Risk Models
Hypothetical Excavation Workers

Chemical	Exposure Point Concentration (mg/kg)	Ingestion HQ	Inhalation HQ	Dermal HQ	Total HI	Ingestion Risk	Inhalation Risk	Dermal Risk	Total Risk
Surface Soil Risks									
BEQ	33.8	—	—	—	—	9.11E-07	7.14E-12	3.55E-07	1.27E-06
Fluoranthene	36.4	2.35E-04	—	9.17E-05	3.27E-04	—	—	—	—
Naphthalene	0.65	8.45E-06	7.98E-05	3.29E-06	9.16E-05	—	1.16E-10	—	1.16E-10
Phenanthrene	16.8	—	—	—	—	—	—	—	—
Pyrene	28.3	2.44E-04	—	9.50E-05	3.39E-04	—	—	—	—
Total Risk or HI		4.87E-04	7.98E-05	1.90E-04	7.58E-04	9.11E-07	1.23E-10	3.55E-07	***1.27E-06***
Subsurface Soil Risks									
BEQ	18.9	—	—	—	—	5.09E-07	3.99E-12	1.99E-07	7.08E-07
Naphthalene	0.04	4.59E-07	4.33E-06	1.79E-07	4.97E-06	—	6.32E-12	—	6.32E-12
Total Risk or HI		4.59E-07	4.33E-06	1.79E-07	4.97E-06	5.09E-07	1.03E-11	1.99E-07	7.08E-07

Notes:

HQ	=	hazard quotient
HI	=	hazard index
Risk	=	incremental lifetime excess cancer risk
Bold and Italic	**=**	indicates total risk greater than 1E-6 and less than 1E-4

Table D-18
Risk Results from U.S. EPA's Adult Lead Risk Models
Hypothetical Excavation Workers — Surface Soil

Calculations of Blood Lead Concentrations (PbBs)
U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee
Version date 6/21/09

Variable	Description of Variable	Units	GSDi and PbBo from Analysis of NHANES 1999-2004	GSDi and PbBo from Analysis of NHANES III (Phases 1&2)
PbS	Soil lead concentration	µg/g or ppm	1636.4	1636.4
Rfetal/maternal	Fetal/maternal PbB ratio	—	0.9	0.9
BKSF	Biokinetic Slope Factor	µg/dL per µg/day	0.4	0.4
GSDi	Geometric standard deviation PbB	—	1.8	2.1
PbB0	Baseline PbB	µg/dL	1.0	1.5
IRS	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.050	0.050
IRS+D	Total ingestion rate of outdoor soil and indoor dust	g/day	—	—
WS	Weighting factor; fraction of IRS+D ingested as outdoor soil	—	—	—
KSD	Mass fraction of soil in dust	—	—	—
AFS, D	Absorption fraction (same for soil and dust)	—	0.12	0.12
EFS, D	Exposure frequency (same for soil and dust)	days/yr	20	20
ATS, D	Averaging time (same for soil and dust)	days/yr	365	365
PbBadult	PbB of adult worker, geometric mean	µg/dL	1.2	1.7
PbBfetal, 0.95	95th percentile PbB among fetuses of adult workers	µg/dL	2.9	5.2
PbBt	Target PbB level of concern (e.g., 10 µg/dL)	µg/dL	10.0	10.0
P(PbBfetal > PbBt)	Probability that fetal PbB > PbBt, assuming lognormal distribution	%	0.01%	0.6%

Table D-19
Risk Results from U.S. EPA's Adult Lead Risk Models
Hypothetical Excavation Workers — Subsurface Soil

Calculations of Blood Lead Concentrations (PbBs)
U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee
Version date 6/21/09

Variable	Description of Variable	Units	GSDi and PbBo from Analysis of NHANES 1999-2004	GSDi and PbBo from Analysis of NHANES III (Phases 1&2)
PbS	Soil lead concentration	µg/g or ppm	479.3	479.3
Rfetal/maternal	Fetal/maternal PbB ratio	—	0.9	0.9
BKSF	Biokinetic Slope Factor	µg/dL per µg/day	0.4	0.4
GSDi	Geometric standard deviation PbB	—	1.8	2.1
PbB0	Baseline PbB	µg/dL	1.0	1.5
IRS	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.050	0.050
IRS+D	Total ingestion rate of outdoor soil and indoor dust	g/day	—	—
WS	Weighting factor; fraction of IRS+D ingested as outdoor soil	—	—	—
KSD	Mass fraction of soil in dust	—	—	—
AFS, D	Absorption fraction (same for soil and dust)	—	0.12	0.12
EFS, D	Exposure frequency (same for soil and dust)	days/yr	20	20
ATS, D	Averaging time (same for soil and dust)	days/yr	365	365
PbBadult	PbB of adult worker, geometric mean	µg/dL	1.1	1.6
PbBfetal, 0.95	95th percentile PbB among fetuses of adult workers	µg/dL	2.5	4.8
PbBt	Target PbB level of concern (e.g., 10 µg/dL)	µg/dL	10.0	10.0
P(PbBfetal > PbBt)	Probability that fetal PbB > PbBt, assuming lognormal distribution	%	0.003%	0.4%

Table D-20
Risk Results from USEPA's Risk Models
Hypothetical Residents

Chemical	Exposure Point Concentration (mg/kg)	Child Ingestion HQ	Child Inhalation HQ	Child Dermal HQ	Child Total HI	Adult Ingestion HQ	Adult Inhalation HQ	Adult Dermal HQ	Adult Total HI	Ingestion Risk	Inhalation Risk	Dermal Risk	Total Risk
Surface Soil Risks													
BEQ	33.8	—	—	—	—	—	—	—	—	1.65E-03	2.85E-08	6.35E-04	2.29E-03
Fluoranthene	36.4	1.16E-02	—	4.24E-03	1.59E-02	1.25E-03	—	6.47E-04	1.90E-03	—	—	—	—
Naphthalene	0.65	4.18E-04	4.19E-03	1.52E-04	4.76E-03	4.48E-05	4.19E-03	2.32E-05	4.26E-03	—	1.83E-07	—	1.83E-07
Phenanthrene	16.8	—	—	—	—	—	—	—	—	—	—	—	—
Pyrene	28.3	1.21E-02	—	4.39E-03	1.65E-02	1.29E-03	—	6.71E-04	1.96E-03	—	—	—	—
Total Risk or HI		2.41E-02	4.19E-03	8.78E-03	3.72E-02	2.58E-03	4.19E-03	1.34E-03	8.12E-03	**1.65E-03**	2.12E-07	**6.35E-04**	**2.29E-03**
Subsurface Soil Risks													
BEQ	18.9	—	—	—	—	—	—	—	—	9.25E-04	1.59E-08	3.55E-04	1.28E-03
Naphthalene	0.04	2.27E-05	2.28E-04	8.26E-06	2.59E-04	2.43E-06	2.28E-04	1.26E-06	2.31E-04	—	9.95E-09	—	9.95E-09
Total Risk or HI		2.27E-05	2.28E-04	8.26E-06	2.59E-04	2.43E-06	2.28E-04	1.26E-06	2.31E-04	**9.25E-04**	2.59E-08	**3.55E-04**	**1.28E-03**

Notes:
HQ = hazard quotient
HI = hazard index
Risk = incremental lifetime excess cancer risk; lifetime weighted average
Bold = indicates total risk greater than 1E-4

Table D-21
Risk Results from U.S. EPA's IEUBK Lead Risk Models
Hypothetical Residential Users — Surface Soil

Blood Lead Concentrations (PbBs)
IEUBK Results Summary

Variable	Description of Variable	Units	IEUBK Information
Age Range	Range of Ages in IEUBK Model	months	0-84
GSD	Geometric standard deviation PbB	—	1.6
PbB0	Baseline PbB	µg/dL	1.0
PbB	PbB, geometric mean	µg/dL	12.821
PbBt	Target PbB level of concern (e.g., 10 µg/dL)	µg/dL	10.0
P(PbB > PbBt)	Probability that PbB > PbBt	%	70.152%

Table D-22
Risk Results from U.S. EPA's IEUBK Lead Risk Models
Hypothetical Residential Users — Subsurface Soil

Blood Lead Concentrations (PbBs)
IEUBK Results Summary

Variable	Description of Variable	Units	IEUBK Information
Age Range	Range of Ages in IEUBK Model	months	0-84
GSD	Geometric standard deviation PbB	—	1.6
PbB0	Baseline PbB	µg/dL	1.0
PbB	PbB, geometric mean	µg/dL	5.115
PbBt	Target PbB level of concern (e.g., 10 µg/dL)	µg/dL	10.0
P(PbB > PbBt)	Probability that PbB > PbBt	%	7.688%

Table D-23
Summary of Risk Estimates

Land Use Scenario	Medium	Exposure Unit and Group	Child HI	Adult HI	Cancer Risk	U.S. EPA Lead Model Probability
Recreational	Soil	Surface	7.1E-3	8.8E-4	**4.9E-4**	1.7%
	Soil	Subsurface	8.7E-6	2.8E-6	**2.7E-4**	0.6%
Composite Site Worker	Soil	Surface	NA	4.4E-3	**1.6E-4**	**7.7%**
	Soil	Subsurface	NA	5.7E-5	9.0E-5	1.4%
Excavation Worker	Soil	Surface	NA	7.6E-4	1.3E-6	0.6%
	Soil	Subsurface	NA	5.0E-6	7.1E-7	0.4%
Residential	Soil	Surface	3.7E-2	8.1E-3	**2.3E-3**	**70%**
	Soil	Subsurface	2.6E-4	2.3E-4	**1.3E-3**	**7.7%**

Notes:
NA indicates not applicable
Highlight and bold indicates chemicals of concern were identified
Detailed documentation and calculations are in Attachment 1.
HI = hazard index

D.5.4.1 Hypothetical Recreational Scenario

As shown in Table D-11, the child and adult HIs for surface soil were less than 1; thus, no COCs were identified in surface soil based on the HI. The cancer risk estimate was 4.9E-4, so BEQ was identified as a COC in surface soil for this scenario.

Table D-11 indicates that the child and adult HIs for subsurface soil were less than 1; thus, no COCs were identified based on the HI. The cancer risk estimate for subsurface soil was 2.7E-4, so BEQ was identified as a COC in subsurface soil for this scenario.

Tables D-12 and D-13 summarize U.S. EPA's lead model results for this scenario, which indicate that the probability is less than 5 percent that blood lead levels would exceed the target blood lead level of concern. Consequently, lead was not identified as a COC for this scenario in surface or subsurface soil.

In summary, BEQ was identified as a COC in surface and subsurface soil for the hypothetical recreational scenario.

D.5.4.2 Site Worker Scenario

As shown in Table D-14, the HIs for surface soil were less than 1; thus, no COCs were identified in surface soil based on the HI. The cancer risk estimate was 1.6E-4, so BEQ was identified as a COC in surface soil for this scenario.

Table D-14 indicates that the HIs for subsurface soil were less than 1; thus, no COCs were identified based on the HI. The cancer risk estimate for subsurface soil was less than 1E-4, so no COCs were identified in subsurface soil for this scenario.

Table D-15 summarizes U.S. EPA's lead model results for this scenario for surface soil, which indicate that the probability is greater than 5 percent that blood lead levels would exceed the target blood lead level of concern. Consequently, lead was identified as a COC for this scenario in surface soil.

Table D-16 summarizes U.S. EPA's lead model results for this scenario for subsurface soil, which indicate that the probability is less than 5 percent that blood lead levels would exceed the target blood lead level of concern. Consequently, lead was not identified as a COC for this scenario in subsurface soil.

In summary, BEQ and lead were identified as COCs in surface soil for the site worker scenario. No COCs were identified in subsurface soil for this land use scenario.

D.5.4.3 Hypothetical Excavation Worker Scenario

As shown in Table D-17, the HIs for soil were less than 1, and risk estimates were less than 1E-4; thus, no COCs were identified in surface or subsurface soil for this scenario based on the HI or cancer risk.

Tables D-18 and D-19 summarize U.S. EPA's lead model results for this scenario, which indicate that the probability is less than 5 percent that blood lead levels would exceed the target blood lead level of concern. Consequently, lead was not identified as a COC for this scenario in surface or subsurface soil.

In summary, no COCs were identified for the hypothetical excavation worker scenario.

D.5.4.4 Hypothetical Residential Scenario

As shown in Table D-20, the child and adult HIs for surface soil were less than 1; thus, no COCs were identified in surface soil based on the HI. The cancer risk estimate was 2.3E-3, so BEQ was identified as a COC in surface soil for this scenario.

Table D-20 indicates that the child and adult HIs for subsurface soil were less than 1; thus, no COCs were identified based on the HI. The cancer risk estimate for subsurface soil was 1.3E-3, so BEQ was identified as a COC in subsurface soil for this scenario.

Tables D-21 and D-22 summarize U.S. EPA's lead model results for this scenario, which indicate that the probability is greater than 5 percent that blood lead levels would exceed the target blood lead level of concern both in surface and subsurface soil. Consequently, lead was identified as a COC for this scenario in surface and subsurface soil.

In summary, BEQ and lead were identified as COCs in both surface and subsurface soil for the hypothetical residential scenario.

Table D-24 summarizes COCs, soil depths, and corresponding exposure areas.

Table D-24
Chemicals of Concern and Exposure Areas

Parameter	Surface Soil UXO 1	Surface Soil UXO 2	Subsurface Soil UXO 1	Subsurface Soil UXO 2
BEQ	X	X	X	X
Fluoranthene	—	—	—	—
Phenanthrene	—	—	—	—
Pyrene	—	—	—	—
Naphthalene	—	—	—	—
Lead	X	X	X	X

Notes:
X = Parameter identified as a COC for the depth interval and exposure area based on risk characterization
— = Parameter not identified as a COC for the depth interval and exposure area based on risk characterization
BEQ = Carcinogenic PAHs evaluated as benzo(a)pyrene equivalents

D.6.0 UNCERTAINTY ANALYSIS

Inherent in any risk evaluation are uncertainties related to the data used, exposure assessment assumptions and process, toxicological values applied, and the general characterization framework. The following summarizes some of the primary sources of uncertainty and variability related to the HHRA.

D.6.1 Uncertainties Associated with Data and Sampling Design

- The soil sampling efforts employed a biased approach, using a judgment or search-based sampling design (e.g., perimeter of target ranges, berms), rather than random allocation of samples. A s such, the resulting analytical data do not ideally support distributional analysis or computation of confidence limits on the mean at a particular decision scale. This is expected to positively bias EPCs.

- U.S. EPA's Technical Review Workgroup for lead has recommended that soil-related lead exposure be estimated on the basis of lead content in the soil size fraction less than 250 micrometers (U.S. EPA, 2000). Soil particles of this size are more likely to adhere to skin, and consequently be ingested by exposed children (or adults). According to studies referenced by the Technical Review Workgroup, this soil size fraction can be enriched (or depleted) relative to the standard 'whole sample' total concentrations of lead and other metals. Size fraction-specific analyses were not performed. Thus, use of total results in this HHRA could result in under-(or over-) estimation of exposure.

- Background sources and their relationship to the site are not known, and in this case, background comparisons were not necessary because the risk has been characterized in this HHRA rather than limiting the characterization to risks that are greater than background. Risks and corresponding contours were developed subsequent to this HHRA.

- Background locations were selected in areas that were not affected by the site. Sources other than the NSA Mid-South site may be contributing to concentrations detected. However, the focus of this HHRA was risk, not background.

- Data were presumed to be of sufficient quantity and quality to support the HHRA process. No detailed evaluations were performed in conjunction with risk assessment tasks.

D.6.2 Uncertainties Associated with Exposure Assessment

- It was assumed that recreational users would be uniformly exposed to surface soils (direct and indirect) throughout the entire site. Based on site features, however, site users would be infrequently exposed to soil through infrequent excursions while walking across the site. Hypothetical exposure could occur more frequently in the future, so hypothetical land use scenarios and exposure pathways were included in this risk assessment.

- As outlined previously for lead, particle size enrichment or contaminant state can have a bearing on exposure. Contaminants in a certain particle size fraction can be preferentially ingested via hand to mouth transfer and may also be more relevant to dermal transport. It is also recognized that contaminants in certain forms may be less bioavailable. This could be the case for PAHs if bound in a vitrified particle mass. Absent specific data, however, it was assumed that detected concentrations also represented the biorelevant form.

- Given the vegetation present onsite, estimates of inhalation exposure (via fugitive dust generation) and direct soil contact are likely biased high.

- During exposure days (75 days/year), it was assumed that the entirety of the daily soil ingestion for recreational land use would take place onsite. The assumed exposure pattern and frequency could under- or over-estimate chronic recreational exposure depending upon actual site use. Similar uncertainties exist with respect to exposure frequencies used and exposure estimated for the hypothetical residential and excavation worker scenarios.

- Total PAHs in sediments are generally less than 30 mg/kg (World Health Organization 1998). The arithmetic mean total of PAHs detected in sediment samples was 7.3 mg/kg. As previously discussed, sediment results were combined with surface soil based on the CSM and site conditions and carcinogenic PAHs were evaluated as BEQ.

- In some areas, PAH concentrations were higher in subsurface soil than they were in surface soil. As a result, EPC estimates could change (increase) if site soils were subjected to significant development, disturbance, or are otherwise reworked. However, there are no known plans that would disturb site soil. As an additional evaluation and as part of the risk management for this study area, soil contours were developed subsequent to the risk assessment to evaluate potential areas of elevated concentrations to address this concern.

- During the March 2013 Project Team meeting, groundwater was removed as a potential medium of concern based on TDEC's working knowledge of groundwater impacts at lead contaminated sites in Shelby County. Surface water was also removed as a medium of concern since there is no surface water on the either of the two sites.

- Field duplicates were used only for quality assurance and quality control as part of the data validation process, and duplicate data were not incorporated into the risk assessment. This could under- or over-estimate exposure due to variability in the results.

D.6.3 Uncertainties Associated with Toxicity Assessment

- BEQ concentrations use the SF for benzo(a)pyrene to evaluate intake and risks from BEQ. Toxic equivalents are approximations and add uncertainty, potentially over- or under-stating risk from BEQ. In general, U.S. EPA was conservative in their approach to developing toxic equivalents, so understating risk based on cancer potential while using RME exposure assumptions is unlikely.

- Cancer risk related to lead exposure was not quantified as U.S. EPA has not developed or published an SF for lead. U.S. EPA has, however, classified lead as a probable human carcinogen (Group B2). U.S. EPA acknowledges that estimating lead cancer risk involves a number of confounding issues, and that the pharmacokinetics of lead do not lend themselves to standard methods of risk estimation. U.S. EPA's Carcinogen Assessment Group recommends that a numerical estimate of the SF not be used (U.S. EPA 2009c).

D.6.4 Uncertainties Associated with the Risk Evaluation

The HHRA was structured to provide conclusions under the conservative assumption of RME. The use of biased sampling results with an investigative focus on more impacted areas adds further to the conservatism of the evaluation.

D.7.0 RISK SUMMARY

The scope of this risk assessment is limited to soil. The NSA Mid-South UXOs 1 and 2 areas were evaluated for several land use scenarios and receptors: hypothetical recreational, site workers, hypothetical construction/excavation workers, and hypothetical site residents, as described in the exposure assessment based on the CSM for this site. In accordance with the NCP and U.S. EPA OSWER Directive 9355.0-30, excess risk between the ranges of 1E-6 and 1E-4 is within U.S. EPA's acceptable excess risk range and generally does not warrant further action (U.S. EPA 1994 and 1991b). Acceptable exposure levels for non-cancer effects represent concentration levels that would not result in adverse effects during a lifetime or part of a lifetime, incorporating an adequate margin of safety (40 CFR 300.430). This is represented by U.S. EPA's HQ threshold of 1.0 for non-cancer effects. Soil lead was evaluated using U.S. EPA's lead models, a target blood lead level of 10 µg/dL, and a probability threshold of 5 percent, in accordance with U.S. EPA's IEUBK guidance.

BEQ and lead were identified as COCs in surface and subsurface soil based on cancer risk. BEQ was identified as a COC for the hypothetical residential and recreational scenario in both surface and subsurface soil. In the site worker scenario, BEQ was identified as a COC in surface soil and was not identified as a COC in subsurface soil. BEQ was not identified as a COC in the excavation worker scenario in either surface or subsurface soil.

Lead was identified as a COC based on U.S. EPA's IEUBK model and the estimated probability that a blood lead level would exceed 10 µg/dL. Lead was identified as a COC in both surface and subsurface soil for the hypothetical residential scenario. In the site worker scenario, lead was identified as a COC in surface soil and was not identified as a COC in subsurface soil. Lead was not identified as a COC in the excavation worker or recreational user scenarios in either surface or subsurface soil.

Table D-25 summarizes COCs, land use scenarios, and depth intervals. COCs were identified based on U.S. EPA's acceptable risk range and estimated blood lead levels.

Table D-25
Chemicals of Concern and Land Use Scenarios

	BEQ in Soil		Lead in Soil	
Parameter	**Surface**	**Subsurface**	**Surface**	**Subsurface**
Hypothetical Recreational	X	X	—	—
Site Worker	X	—	X	--
Hypothetical Excavation Worker	—	—	—	—
Hypothetical Site Resident	X	X	X	X

Notes:
X = COC identified for the depth interval and receptor based on risk characterization
— = COC not identified for the depth interval and receptor based on risk characterization
BEQ = Carcinogenic PAHs evaluated as benzo(a)pyrene equivalents

D.8.0 REMEDIAL GOAL OPTIONS

The site was evaluated for hypothetical recreational, industrial site workers, hypothetical construction/excavation workers, and hypothetical residential scenarios as described in the exposure assessment. No COCs were identified for the hypothetical construction/excavation worker scenario, so no RGOs were developed for that scenario. Similarly, no COCs were identified based on the HI, so no RGOs were developed based on a target HI.

BEQ and lead were identified as COCs, so RGOs were developed using target cancer risks of 1E-6, 1E-5, and 1E-4 for BEQ. Lead RGOs were developed using U.S. EPA's lead models, a probability of 5 percent, and a target blood lead level of 10 µg/dL. Development of RGOs does not necessarily indicate that remedial action will be required because risk managers may decide to preclude some land use scenarios using institutional controls or for other reasons. Therefore, some RGOs may not be applicable during the risk management decision making process. Instead, RGOs are provided to facilitate risk management decisions. RGOs for each of the scenarios mentioned above are in Tables D-26 through D-29. Table D-30 summarizes RGOs for each of the scenarios where COCs were identified.

Table D-26 Remedial Goal Options Hypothetical Recreational Users					
Chemical	**Exposure Point Concentration (mg/kg)**	**Total Risk**	**RGO (mg/kg) @1E-4**	**RGO (mg/kg) @1E-5**	**RGO (mg/kg) @1E-6**
Surface Soil Risks					
BEQ	33.8	4.91E-04	6.88E+00	6.88E-01	6.88E-02
Subsurface Soil Risks					
BEQ	18.9	2.74E-04	6.90E+00	6.90E-01	6.90E-02

Notes:
BEQ = Benzo(a)pyrene equivalents
RGO = Remedial Goal Options

Table D-27 Remedial Goal Options Site Workers					
Chemical	**Exposure Point Concentration (mg/kg)**	**Total Risk**	**RGO (mg/kg) @1E-4**	**RGO (mg/kg) @1E-5**	**RGO (mg/kg) @1E-6**
Surface Soil Risks					
BEQ	33.8	1.60E-04	2.11E+01	2.11E+00	2.11E-01

Notes:
BEQ = Benzo(a)pyrene equivalents
RGO = Remedial Goal Options

Table D-28 Remedial Goal Options Hypothetical Residents					
Chemical	**Exposure Point Concentration (mg/kg)**	**Total Risk**	**RGO (mg/kg) @1E-4**	**RGO (mg/kg) @1E-5**	**RGO (mg/kg) @1E-6**
Surface Soil Risks					
BEQ	33.8	2.29E-03	1.48E+00	1.48E-01	1.48E-02
Subsurface Soil Risks					
BEQ	18.9	1.28E-03	1.48E+00	1.48E-01	1.48E-02

Notes:
BEQ = Benzo(a)pyrene equivalents
RGO = Remedial Goal Options

Table D-29
Remedial Goal Options
Lead in Soil

Calculation of Recreational Preliminary Remediation Goal (PRG) **U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee** **Version date 6/21/09**				
Variable	**Description of Variable**	**Units**	**GSDi and PbBo from Analysis of NHANES 1999-2004**	**GSDi and PbBo from Analysis of NHANES III (Phases 1&2)**
$PbB_{fetal,\ 0.95}$	95th percentile PbB in fetus	µg/dL	10	10
$R_{fetal/maternal}$	Fetal/maternal PbB ratio	—	0.9	0.9
BKSF	Biokinetic Slope Factor	µg/dL per µg/day	0.4	0.4
GSD_i	Geometric standard deviation PbB	—	1.8	2.1
PbB_0	Baseline PbB	µg/dL	1.0	1.5
IR_S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.050	0.050
$AF_{S,\ D}$	Absorption fraction (same for soil and dust)	—	0.12	0.12
$EF_{S,\ D}$	Exposure frequency (same for soil and dust)	days/yr	75	75
$AT_{S,\ D}$	Averaging time (same for soil and dust)	days/yr	365	365
PRG		**ppm**	**6,540**	**3,607**

Calculation of Site Worker PRG **U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee** **Version date 6/21/09**				
Variable	**Description of Variable**	**Units**	**GSDi and PbBo from Analysis of NHANES 1999-2004**	**GSDi and PbBo from Analysis of NHANES III (Phases 1&2)**
$PbB_{fetal,\ 0.95}$	95th percentile PbB in fetus	µg/dL	10	10
$R_{fetal/maternal}$	Fetal/maternal PbB ratio	—	0.9	0.9
BKSF	Biokinetic Slope Factor	µg/dL per µg/day	0.4	0.4
GSD_i	Geometric standard deviation PbB	—	1.8	2.1
PbB_0	Baseline PbB	µg/dL	1.0	1.5
IR_S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.050	0.050
$AF_{S,\ D}$	Absorption fraction (same for soil and dust)	—	0.12	0.12
$EF_{S,\ D}$	Exposure frequency (same for soil and dust)	days/yr	219	219
$AT_{S,\ D}$	Averaging time (same for soil and dust)	days/yr	365	365
PRG		**ppm**	**2,240**	**1,235**

Table D-29
Remedial Goal Options
Lead in Soil

Calculation of Hypothetical Site Resident Child PRG
Integrated Exposure Uptake Biokinetic Model for Lead in Children, EPA 9285.7-42, May 2007

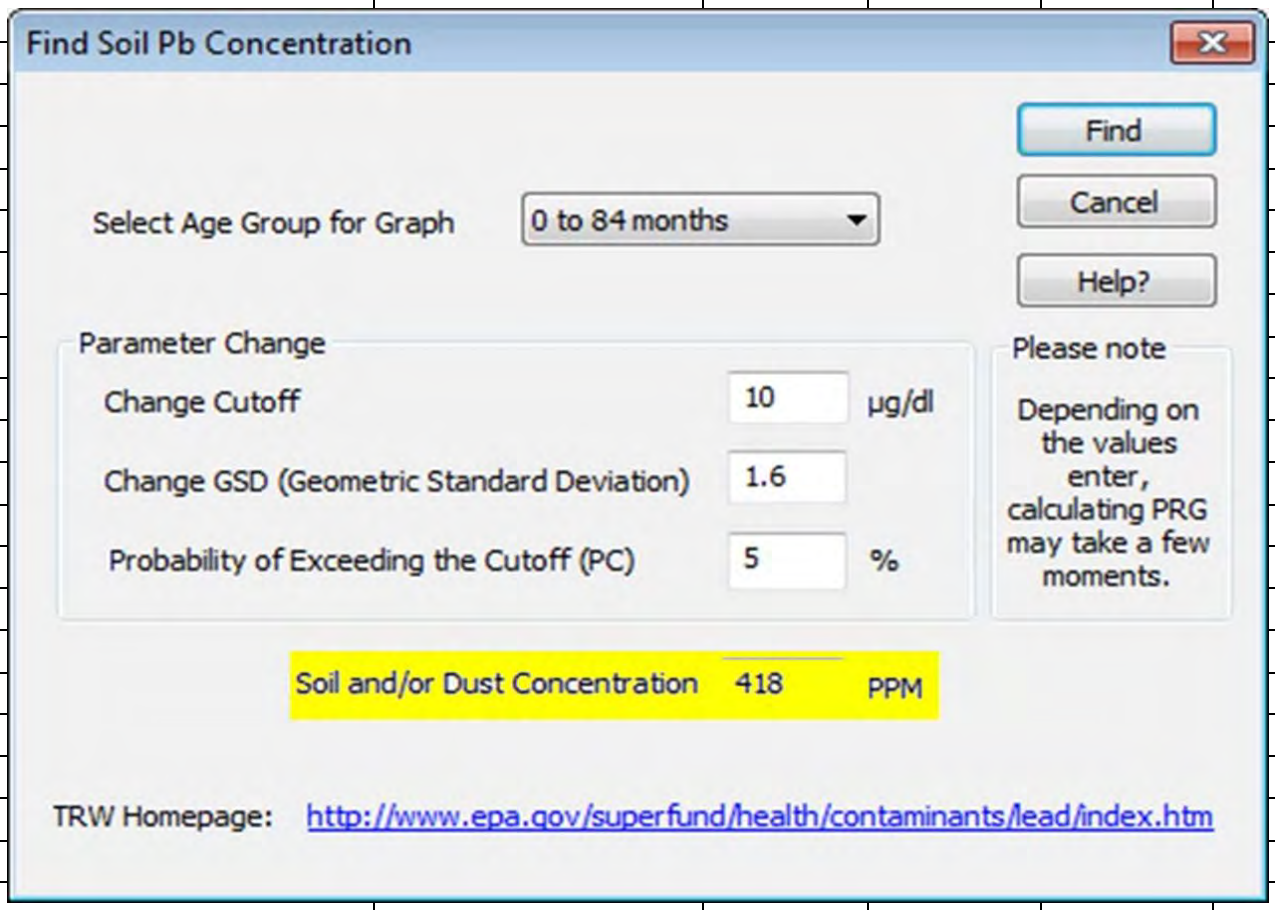


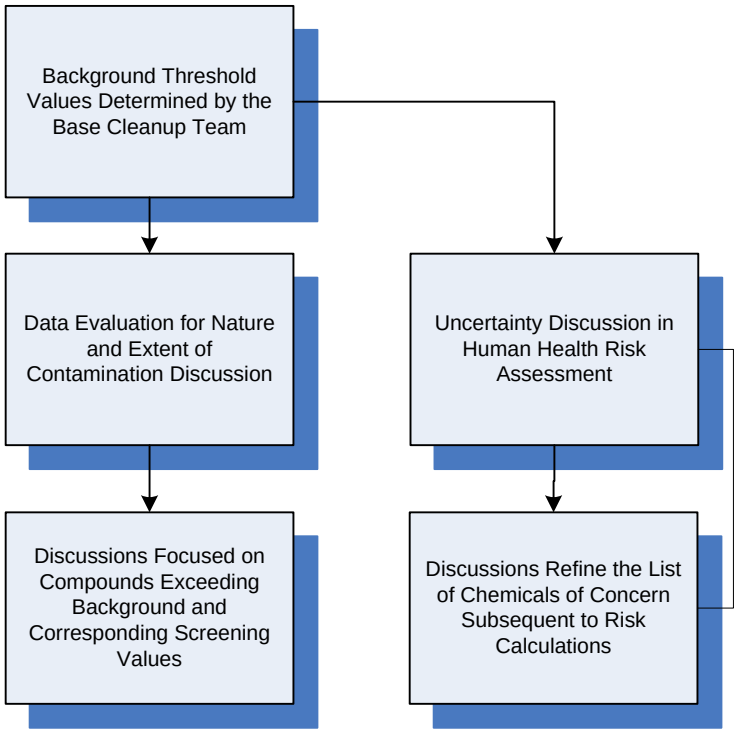
Table D-30
RGO Summary

	BEQ in Soil (1E-4 Risk)		Lead in Soil (IEUBK)	
Receptor	**Surface**	**Subsurface**	**Surface**	**Subsurface**
Hypothetical Recreational	6.9	6.9	—	—
Site Worker	21.1	—	1,235	—
Hypothetical Site Resident	1.5	1.5	418	418

Notes:

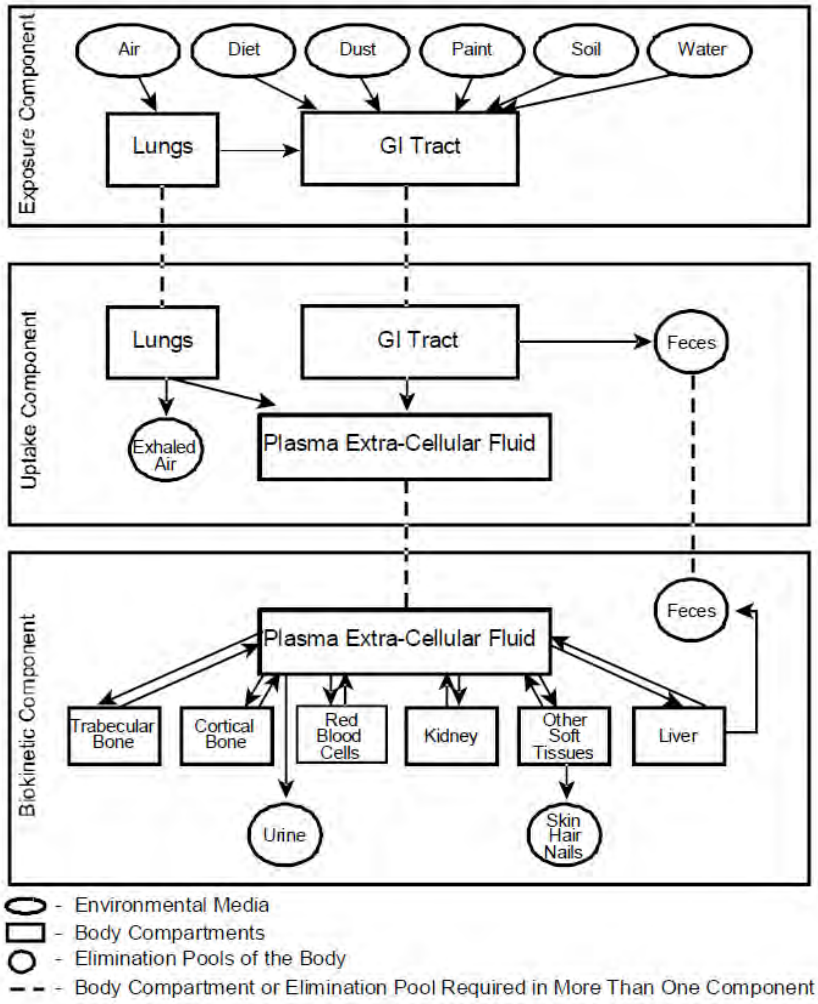
— = No COC identified at the corresponding depth interval and receptor
BEQ = Carcinogenic PAHs evaluated as benzo(a)pyrene equivalents
RGO = Remedial goal options in mg/kg for COCs identified at the depth interval and receptor above

Figure D-2
Use of Background in the
RCRA Facility Investigation Report



Note: Background comparisons were not used to eliminate chemicals of potential concern in the human health risk assessment.

Figure D-3
U.S. EPA's IEUBK Model Compartments



D.9.0 References

Malcolm Pirnie, (2005, August). *Preliminary Assessment*, Naval Support Activity Mid-South Millington, Tennessee.

Resolution Consultants, (2012, December). *Final Sampling and Analysis Plan, UXO 1 and UXO 2 (formerly AOC 1) Naval Support Activity, Mid-South, Millington, Tennessee* (Resolution Consultants, 2012)

Tetra Tech NUS, Inc. (2010 September). *Site Investigation Report for Munitions Response Program Site Inspections at NAVFAC Midwest and BRAC Program Management Office Southeast Munitions Response Sites and Areas of Concern*, Naval Support Activity Mid-South Millington, Tennessee.

U.S. Department of Defense (2010, October). *Department of Defense Quality Systems Manual for Environmental Laboratories*, Version 4.2.

U.S. Department of Energy (2009). *Oak Ridge National Laboratory Risk Assessment Information System,* U.S. Department of Energy, Office of Environmental Management, Oak Ridge Operations Office through a contract between Bechtel Jacobs Company LLC. and the University of Tennessee: (on-line database — http://risk.lsd.ornl.gov/).

U.S. Environmental Protection Agency. (1986, September). *Guidelines for Carcinogen Risk Assessment. Risk Assessment Forum*. Federal Register 51(185):33992-34003.

— (1989, December). *Risk Assessment Guidance for Superfund Volume I — Human Health Evaluation Manual (Part A) Interim Final*. EPA/540/1-89/002.

— (1991a, March). *Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual, Supplemental Guidance, Standard Default Exposure Factors*, *Interim Final*. OSWER (Office of Solid Waste and Emergency Response) Directive 9285.6-03.

— (1991b, April). *Role of the Baseline Risk Assessment in Superfund Remedy Selections.* OSWER Directive 9355.0-30.

— (1991c, December). *Risk Assessment Guidance for Superfund Volume I — Human Health Evaluation Manual (Part B — Development of Risk-Based Preliminary Remediation Goals) Interim*. EPA/540/R092/003.

— (1992, May). *Calculating the Concentration Term- Supplemental Guidance to RAGS*. OSWER # PB92-963373.

— (1993a, July). *Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons.* EPA/600/R-93/089.

— (1994, September). *National Oil and Hazardous Substances Pollution Contingency Plan.* Final Rule. 59 Federal Register 47384.

— (1999, October). Contract Laboratory Program National Functional Guidelines for Organic Data Review, U.S. Environmental Protection Agency.

— U.S. EPA (2000). Supplemental Guidance to RAGS: Region 4 Bulletins, Human Health Risk Assessment Bulletins. EPA Region 4, originally published November 1995, Website version last updated May 2000 (currently under revision). http://www.epa.gov/region4/superfund/programs/riskassess/healtbul.html

— (2001, December). *Risk Assessment Guidance for Superfund Volume I — Human Health Evaluation Manual (Part D — Standardized Planning, Reporting and Review of Superfund Risk Assessments) Final*. Publication# 9285.7-01D.

— (2003, January). *Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil*, EPA-540-R-03-001.

— (2004a, July). *Risk Assessment Guidance for Superfund Volume I — Human Health Evaluation Manual (Part E — Supplemental Guidance for Dermal Risk Assessment) Final*. EPA/540/R/99/005.

— (2004b, October). *National Functional Guidelines for Inorganic Data Review*. OSWER Directive 9240.1-45, EPA 540/R-04/004.

— (2005b, March). *Guidelines for Carcinogen Risk Assessment*. EPA/630/P - 03/001F.

U.S. EPA (2007). *User's Guide for the Integrated Exposure Uptake Biokinetic Model for Lead in Children (IEUBK) Windows,* U.S. EPA 9285.7-42, prepared by Syracuse Research Corporation, 6225 Running Ridge Road, North Syracuse, NY 13212.

— (2007a, April). *ProUCL Version 4.00.04* (on-line. http://www.epa.gov/nerlesd1/tsc/ TSC_form.htm).

— (2009c). *Integrated Risk Information System Database for Risk Assessment* (on-line database — http://www.epa.gov/iris/index.html).

— (2009a, January). *Risk Assessment Guidance for Superfund Volume I — Human Health Evaluation Manual (Part F, Supplemental Guidance for Inhalation Risk Assessment) Final*. EPA-540-R-070-002 OSWER 9285.7-82.

— (2004a, July). *Risk Assessment Guidance for Superfund Volume I — Human Health Evaluation Manual (Part E — Supplemental Guidance for Dermal Risk Assessment) Final*. EPA/540/R/99/005.

U.S. EPA (2012), Region 9 Regional Screening Levels November 2012. Retrieved from: http://www.epa.gov/region9/superfund/prg/

U.S. Navy (2002). *Tiered Human Health Risk Assessment,* U.S. Environmental Protection Agency, 2002.

World Health Organization. (1998). *Environmental Health Criteria 202, Selected Non-heterocyclic Polycyclic Aromatic Hydrocarbons*. Available at http://www.inchem.org/documents/ehc/ehc/ehc202.htm as of Nov 22, 2002.

Attachment D-1
Risk Assessment Information System Calculations

Attachment D-1

Model Input Definitions

Toxicity Values	
Symbol	**Definition (units)**
RfD_o	Chronic Oral Reference Dose (mg/kg-day)
RfC	Chronic Inhalation Reference Concentration (mg/m^3)
CSF_o	Chronic oral Slope Factor $(mg/kg\text{-}day)^{-1}$
IUR	Chronic Inhalation Unit Risk $(\mu g/m^3)^{-1}$

Miscellanous Variables	
Symbol	**Definition (units)**
C_{soil}	concentration of contaminant in soil (mg/kg)
$C_{g\text{-}water}$	concentration of contaminant in groundwater (mg/L)
$C_{s\text{-}water}$	concentration of contaminant in surface water (mg/L)
C_{air}	concentration of contaminant in air (mg/m^3)
C_{fish}	concentration of contaminant in fish (mg/kg)
$C_{produce}$	concentration of contaminant in produce (mg/kg)
C_{milk}	concentration of contaminant in milk (mg/kg)
C_{beef}	concentration of contaminant in beef (mg/kg)
TR	target risk (unitless)
THQ	target hazard quotient (unitless)
LT	Lifetime (years)
K	Andelman Volatilization Factor (L/m^3)
K_p	permeability constant (cm/hr)
t^*	Time to reach steady-state (hours)
τ_{event}	Lag time per event (hours/event)
B	Dimensionless ratio of the permeability coefficient of a compound through the stratum corneum relative to its permeability coefficient across the viable epidermis (unitless)
FA	Fraction absorbed water (unitless)
ABS_d	Fraction of contaminant absorbed dermally from soil (unitless)
GIABS	Fraction of contaminant absorbed in gastrointestinal tract (unitless) Note: if the GIABS is >50% then it is set to 100% for the calculation of dermal toxicity values.

Attachment D-1

Model Input Definitions

Resident Soil Landuse Equation Varibles	
Symbol	**Definition (units)**
$CDI_{res\text{-}sol\text{-}nc\text{-}ing}$	Resident Soil Noncarcinogenic Ingestion (mg/kg)
$CDI_{res\text{-}sol\text{-}nc\text{-}der}$	Resident Soil Noncarcinogenic Dermal (mg/kg)
$CDI_{res\text{-}sol\text{-}nc\text{-}inh}$	Resident Soil Noncarcinogenic Inhalation (mg/kg)
$CDI_{res\text{-}sol\text{-}nc\text{-}tot}$	Resident Soil Noncarcinogenic Total (mg/kg)
$CDI_{res\text{-}sol\text{-}ca\text{-}ing}$	Resident Soil Carcinogenic Ingestion (mg/kg)
$CDI_{res\text{-}sol\text{-}ca\text{-}der}$	Resident Soil Carcinogenic Dermal (mg/kg)
$CDI_{res\text{-}sol\text{-}ca\text{-}inh}$	Resident Soil Carcinogenic Inhalation (mg/kg)
$CDI_{res\text{-}sol\text{-}ca\text{-}tot}$	Resident Soil Carcinogenic Total (mg/kg)
$CDI_{res\text{-}soil\text{-}ca\text{-}vc\text{-}ing}$	Resident Soil Carcinogenic Vinyl Chloride Ingestion (mg/kg)
$CDI_{res\text{-}soil\text{-}ca\text{-}vc\text{-}der}$	Resident Soil Carcinogenic Vinyl Chloride Dermal (mg/kg)
$CDI_{res\text{-}soil\text{-}ca\text{-}vc\text{-}inh}$	Resident Soil Carcinogenic Vinyl Chloride Inhalation (mg/kg)
$CDI_{res\text{-}soil\text{-}ca\text{-}vc\text{-}tot}$	Resident Soil Carcinogenic Vinyl Chloride Total (mg/kg)
BW_{ressa}	Body Weight - adult (kg)
BW_{ressc}	Body Weight - child (kg)
$BW_{0\text{-}2}$	Body Weight - 0-2 Years (kg)
$BW_{2\text{-}6}$	Body Weight - 2-6 Years (kg)
$BW_{6\text{-}16}$	Body Weight - 6-16 Years (kg)
$BW_{16\text{-}30}$	Body Weight - 16-30 Years (kg)
ED_{ress}	Exposure Duration - adult + child (years)
ED_{ressa}	Exposure Duration - adult (years)
ED_{ressc}	Exposure Duration - child (years)
$ED_{0\text{-}2}$	Exposure Duration - 0-2 Years (years)
$ED_{2\text{-}6}$	Exposure Duration - 2-6 Years (years)
$ED_{6\text{-}16}$	Exposure Duration - 6-16 Years (years)
$ED_{16\text{-}30}$	Exposure Duration - 16-30 Years (years)
EF_{ress}	Exposure Frequency - adult + child (days/year)
EF_{ressa}	Exposure Frequency - adult (days/year)
EF_{ressc}	Exposure Frequency - child (days/year)
$EF_{0\text{-}2}$	Exposure Frequency - 0-2 Years (days/year)
$EF_{2\text{-}6}$	Exposure Frequency - 2-6 Years (days/year)
$EF_{6\text{-}16}$	Exposure Frequency - 6-16 Years (days/year)
$EF_{16\text{-}30}$	Exposure Frequency - 16-30 Years (days/year)
ET_{ress}	Exposure Time (hours/day)
IRS_{ressc}	Ingestion Rate - Child (mg/day)
IRS_{ressa}	Ingestion Rate - Adult (mg/day)
$IRS_{0\text{-}2}$	Ingestion Rate - 0-2 years (mg/day)
$IRS_{2\text{-}6}$	Ingestion Rate - 2-6 years (mg/day)
$IRS_{6\text{-}16}$	Ingestion Rate - 6-16 years (mg/day)
$IRS_{16\text{-}30}$	Ingestion Rate - 16-30 years (mg/day)

Attachment D-1

Model Input Definitions

Resident Soil Landuse Equation Varibles (Continued)	
Symbol	**Definition (units)**
$IFS_{res-adj}$	Ingestion Rate - Age-adjusted (mg/kg)
AF_{ressc}	Adherence factor-child (mg/cm^2)
AF_{ressa}	Adherence factor-adult (mg/cm^2)
AF_{0-2}	Adherence factor 0-2 years (mg/cm^2)
AF_{2-6}	Adherence factor 2-6 years (mg/cm^2)
AF_{6-16}	Adherence factor 6-16 years (mg/cm^2)
AF_{16-30}	Adherence factor 16-30 years (mg/cm^2)
$DFS_{res-adj}$	Dermal contact factor- age-adjusted (mg/kg)
SA_{ressc}	Surface area - child (cm^2)
SA_{ressa}	Surface area - adult (cm^2)
SA_{0-2}	Surface area 0-2 years (cm^2)
SA_{2-6}	Surface area 2-6 years (cm^2)
SA_{6-16}	Surface area 6-16 years (cm^2)
SA_{16-30}	Surface area 16-30 (cm^2)
AT_{ress}	Averaging time (days/year)

Composite Worker Soil Landuse Equation Variables	
Symbol	**Definition (units)**
$CDI_{cw-sol-nc-ing}$	Composite Worker Soil Noncarcinogenic Ingestion (mg/kg)
$CDI_{cw-sol-nc-der}$	Composite Worker Soil Noncarcinogenic Dermal (mg/kg)
$CDI_{cw-sol-nc-inh}$	Composite Worker Soil Noncarcinogenic Inhalation (mg/kg)
$CDI_{cw-sol-nc-tot}$	Composite Worker Soil Noncarcinogenic Total (mg/kg)
$CDI_{cw-sol-ca-ing}$	Composite Worker Soil Carcinogenic Ingestion (mg/kg)
$CDI_{cw-sol-ca-der}$	Composite Worker Soil Carcinogenic Dermal (mg/kg)
$CDI_{cw-sol-ca-inh}$	Composite Worker Soil Carcinogenic Inhalation (mg/kg)
$CDI_{cw-sol-ca-tot}$	Composite Worker Soil Carcinogenic Total (mg/kg)
BW_{cw}	Body Weight (kg)
ED_{cw}	Exposure Duration (years)
EF_{cw}	Exposure Frequency (days/year)
ET_{cw}	Exposure Time (hours/day)
IRS_{cw}	Ingestion Rate (mg/day)
AF_{cw}	Adherence factor (mg/cm^2)
SA_{cw}	Surface area (cm^2)
AT_{cw}	Averaging time (days/year)

Attachment D-1

Model Input Definitions

Excavation/Construction Worker Soil Landuse Equation Variables	
Symbol	**Definition (units)**
$CDI_{ew\text{-}sol\text{-}nc\text{-}ing}$	Excavation/Construction Worker Soil Noncarcinogenic Ingestion (mg/kg)
$CDI_{ew\text{-}sol\text{-}nc\text{-}der}$	Excavation/Construction Worker Soil Noncarcinogenic Dermal (mg/kg)
$CDI_{ew\text{-}sol\text{-}nc\text{-}inh}$	Excavation/Construction Worker Soil Noncarcinogenic Inhalation (mg/kg)
$CDI_{ew\text{-}sol\text{-}nc\text{-}tot}$	Excavation/Construction Worker Soil Noncarcinogenic Total (mg/kg)
$CDI_{ew\text{-}sol\text{-}ca\text{-}ing}$	Excavation/Construction Worker Soil Carcinogenic Ingestion (mg/kg)
$CDI_{ew\text{-}sol\text{-}ca\text{-}der}$	Excavation/Construction Worker Soil Carcinogenic Dermal (mg/kg)
$CDI_{ew\text{-}sol\text{-}ca\text{-}inh}$	Excavation/Construction Worker Soil Carcinogenic Inhalation (mg/kg)
$CDI_{ew\text{-}sol\text{-}ca\text{-}tot}$	Excavation/Construction Worker Soil Carcinogenic Total (mg/kg)
BW_{ew}	Body Weight (kg)
ED_{ew}	Exposure Duration (years)
EF_{ew}	Exposure Frequency (days/year)
ET_{ew}	Exposure Time (hours/day)
IRS_{ew}	Ingestion Rate (mg/day)
AF_{ew}	Adherence factor (mg/cm^2)
SA_{ew}	Surface area (cm^2)
AT_{cw}	Averaging time (days/year)

Recreator Soil/Sediment Landuse Equation Variables	
Symbol	**Definition (units)**
$CDI_{rec\text{-}sol\text{-}nc\text{-}ing}$	Recreation Soil Noncarcinogenic Ingestion (mg/kg)
$CDI_{rec\text{-}sol\text{-}nc\text{-}der}$	Recreation Soil Noncarcinogenic Dermal (mg/kg)
$CDI_{rec\text{-}sol\text{-}nc\text{-}inh}$	Recreation Soil Noncarcinogenic Inhalation (mg/kg)
$CDI_{rec\text{-}sol\text{-}nc\text{-}tot}$	Recreation Soil Noncarcinogenic Total (mg/kg)
$CDI_{rec\text{-}sol\text{-}ca\text{-}ing}$	Recreation Soil Carcinogenic Ingestion (mg/kg)
$CDI_{rec\text{-}sol\text{-}ca\text{-}der}$	Recreation Soil Carcinogenic Dermal (mg/kg)
$CDI_{rec\text{-}sol\text{-}ca\text{-}inh}$	Recreation Soil Carcinogenic Inhalation (mg/kg)
$CDI_{rec\text{-}sol\text{-}ca\text{-}tot}$	Recreation Soil Carcinogenic Total (mg/kg)
$CDI_{rec\text{-}soil\text{-}ca\text{-}vc\text{-}ing}$	Recreation Soil Carcinogenic Vinyl Chloride Ingestion (mg/kg)

Recreator Soil/Sediment Landuse Equation Variables (Continued)

Symbol	Definition (units)
$CDI_{rec\text{-}soil\text{-}ca\text{-}vc\text{-}der}$	Recreation Soil Carcinogenic Vinyl Chloride Dermal (mg/kg)
$CDI_{rec\text{-}soil\text{-}ca\text{-}vc\text{-}inh}$	Recreation Soil Carcinogenic Vinyl Chloride Inhalation (mg/kg)
$CDI_{rec\text{-}soil\text{-}ca\text{-}vc\text{-}tot}$	Recreation Soil Carcinogenic Vinyl Chloride Total (mg/kg)
BW_{recsa}	Body Weight - adult (kg)
BW_{recsc}	Body Weight - child (kg)
$BW_{0\text{-}2}$	Body Weight - 0-2 Years (kg)
$BW_{2\text{-}6}$	Body Weight - 2-6 Years (kg)
$BW_{6\text{-}16}$	Body Weight - 6-16 Years (kg)
$BW_{16\text{-}30}$	Body Weight - 16-30 Years (kg)
ED_{recs}	Exposure Duration - adult + child (years)
ED_{recsa}	Exposure Duration - adult (years)
ED_{rescc}	Exposure Duration - child (years)
$ED_{0\text{-}2}$	Exposure Duration - 0-2 Years (years)
$ED_{2\text{-}6}$	Exposure Duration - 2-6 Years (years)
$ED_{6\text{-}16}$	Exposure Duration - 6-16 Years (years)
$ED_{16\text{-}30}$	Exposure Duration - 16-30 Years (years)
EF_{recs}	Exposure Frequency - adult + child (days/year)
EF_{recsa}	Exposure Frequency - adult (days/year)
EF_{recsc}	Exposure Frequency - child (days/year)
$EF_{0\text{-}2}$	Exposure Frequency - 0-2 Years (days/year)
$EF_{2\text{-}6}$	Exposure Frequency - 2-6 Years (days/year)
$EF_{6\text{-}16}$	Exposure Frequency - 6-16 Years (days/year)
$EF_{16\text{-}30}$	Exposure Frequency - 16-30 Years (days/year)
ET_{recs}	Exposure Time (hours/day)
ET_{recsc}	Exposure time - child (hours/day)
ET_{recsa}	Exposure time - adult (hours/day)
$ET_{0\text{-}2}$	Exposure time 0-2 years (hours/day)
$ET_{2\text{-}6}$	Exposure time 2-6 years (hours/day)
$ET_{6\text{-}16}$	Exposure time 6-16 years (hours/day)
$ET_{16\text{-}30}$	Exposure time 16-30 years (hours/day)
IRS_{recsc}	Ingestion Rate - Child (mg/day)
IRS_{recsa}	Ingestion Rate - Adult (mg/day)
$IRS_{0\text{-}2}$	Ingestion Rate - 0-2 years (mg/day)
$IRS_{2\text{-}6}$	Ingestion Rate - 2-6 years (mg/day)
$IRS_{6\text{-}16}$	Ingestion Rate - 6-16 years (mg/day)
$IRS_{16\text{-}30}$	Ingestion Rate - 16-30 years (mg/day)
$IFS_{rec\text{-}adj}$	Ingestion Rate - Age-adjusted (mg/kg)
AF_{rescc}	Adherence factor-child (mg/cm^2)
AF_{resca}	Adherence factor-adult (mg/cm^2)
$AF_{0\text{-}2}$	Adherence factor 0-2 years (mg/cm^2)
$AF_{2\text{-}6}$	Adherence factor 2-6 years (mg/cm^2)
$AF_{6\text{-}16}$	Adherence factor 6-16 years (mg/cm^2)
$AF_{16\text{-}30}$	Adherence factor 16-30 years (mg/cm^2)
$DFS_{rec\text{-}adj}$	Dermal contact factor- age-adjusted (mg/kg)

Recreator Soil/Sediment Landuse Equation Variables (Continued)	
Symbol	**Definition (units)**
SA_{recsc}	Surface area - child (cm^2)
SA_{recsa}	Surface area - adult (cm^2)
SA_{0-2}	Surface area 0-2 years (cm^2)
SA_{2-6}	Surface area 2-6 years (cm^2)
SA_{6-16}	Surface area 6-16 years (cm^2)
SA_{16-30}	Surface area 16-30 (cm^2)
AT_{recs}	Averaging time (days/year)

Attachment D-1
Hazard Index and Site Risk
Model Input Parameters for Soil

Resident Equation Inputs for Soil

Variable	Value	Variable	Value
TR (target cancer risk) unitless	0.000001	EF_{2-6} (exposure frequency) day/year	350
ED_{ress} (exposure duration - resident) year	30	EF_{6-16} (exposure frequency) day/year	350
ED_{ressc} (exposure duration - child) year	6	EF_{16-30} (exposure frequency) day/year	350
ED_{ressa} (exposure duration - adult) year	24	ET_{0-2} (exposure time) hour/day	24
ET_{ress} (exposure time - resident) hour	24	ET_{2-6} (exposure time) hour/day	24
ET_{ressc} (exposure time - child) hour	24	ET_{6-16} (exposure time) hour/day	24
ET_{ressa} (exposure time - adult) hour	24	ET_{16-30} (exposure time) hour/day	24
BW_{ressa} (body weight - adult) kg	70	IRS_{0-2} (soil intake rate) mg/day	200
BW_{ressc} (body weight - child) kg	15	IRS_{2-6} (soil intake rate) mg/day	200
SA_{ressa} (skin surface area - adult) cm^2/day	5700	IRS_{6-16} (soil intake rate) mg/day	100
SA_{ressc} (skin surface area - child) cm^2/day	2800	IRS_{16-30} (soil intake rate) mg/day	100
THQ (target hazard quotient) unitless	1	SA_{0-2} (skin surface area) cm^2/day	2800
LT (lifetime - resident) year	70	SA_{2-6} (skin surface area) cm^2/day	2800
EF_{ress} (exposure frequency - resident) day/year	350	SA_{6-16} (skin surface area) cm^2/day	5700
EF_{ressc} (exposure frequency - child) day/year	350	SA_{16-30} (skin surface area) cm^2/day	5700
EF_{ressa} (exposure frequency - adult) day/year	350	City (Climate Zone) PEF Selection	Default
IRS_{ressa} (soil intake rate - adult) mg/day	100	A_s (acres) PEF Selection	0.5
IRS_{ressc} (soil intake rate - child) mg/day	200	Q/C_{wp} (g/m^2-s per kg/m^3) PEF Selection	93.77
AF_{ressa} (skin adherence factor - adult) mg/cm^2	0.07	PEF (particulate emission factor) m^3/kg	1359344438
AF_{ressc} (skin adherence factor - child) mg/cm^2	0.2	A (PEF Dispersion Constant)	16.2302
$IFS_{res-adj}$ (age-adjusted soil ingestion factor) mg/kg	40000	B (PEF Dispersion Constant)	18.7762
$DFS_{res-adj}$ (age-adjusted soil dermal factor) mg/kg	126280	C (PEF Dispersion Constant)	216.108
$IFSM_{res-adj}$ (mutagenic age-adjusted soil ingestion factor) mg/kg	171333	V (fraction of vegetative cover) unitless	0.5
$DFSM_{res-adj}$ (mutagenic age-adjusted soil dermal factor) mg/kg	505913	U_m (mean annual wind speed) m/s	4.69
AF_{0-2} (skin adherence factor) mg/cm^2	0.2	U_t (equivalent threshold value)	11.32
AF_{2-6} (skin adherence factor) mg/cm^2	0.2	F(x) (function dependant on U_m/U_t) unitless	0.194
AF_{6-16} (skin adherence factor) mg/cm^2	0.07	City (Climate Zone) VF Selection	Default
AF_{16-30} (skin adherence factor) mg/cm^2	0.07	A_s (acres) VF Selection	0.5
BW_{0-2} (body weight) kg	15	A (VF Dispersion Constant)	11.911
BW_{2-6} (body weight) kg	15	B (VF Dispersion Constant)	18.4385
BW_{6-16} (body weight) kg	70	C (VF Dispersion Constant)	209.7845
BW_{16-30} (body weight) kg	70	Q/C_{wp} (g/m^2-s per kg/m^3) VF Selection	68.18
ED_{0-2} (exposure duration) year	2	foc (fraction organic carbon in soil) g/g	0.006
ED_{2-6} (exposure duration) year	4	ρ$_b$ (dry soil bulk density) g/cm^3	1.5
ED_{6-16} (exposure duration) year	10	ρ$_s$ (soil particle density) g/cm^3	2.65
ED_{16-30} (exposure duration) year	14	θ$_w$ (water-filled soil porosity) L_{water}/L_{soil}	0.15
EF_{0-2} (exposure frequency) day/year	350	T (exposure interval) s	950000000

Output generated 17JUN2013:15:58:38

Attachment D-1
Hazard Index and Site Risk
Model Input Parameters for Soil

Composite Worker Equation Inputs for Soil	
Variable	**Value**
TR (target cancer risk) unitless	0.000001
THQ (target hazard quotient) unitless	1
AT_{cw} (averaging time - composite worker)	365
EF_{cw} (exposure frequency - composite worker) day/yr	250
ED_{cw} (exposure duration - composite worker) yr	25
ET_{cw} (exposure time - composite worker) hr	8
LT (lifetime) yr	70
BW_{cw} (body weight - composite worker)	70
IR_{cw} (soil ingestion rate - composite worker) mg/day	100
SA_{cw} (surface area - composite worker) cm^2/day	3300
AF_{cw} (skin adherence factor - composite worker) mg/cm^2	0.2
City (Climate Zone) PEF Selection	Default
A_s (acres) PEF Selection	0.5
Q/C_{wp} (g/m^2-s per kg/m^3) PEF Selection	93.77
PEF (particulate emission factor) m^3/kg	1359344438
A (PEF Dispersion Constant)	16.2302
B (PEF Dispersion Constant)	18.7762
C (PEF Dispersion Constant)	216.108
V (fraction of vegetative cover) unitless	0.5
U_m (mean annual wind speed) m/s	4.69
U_t (equivalent threshold value)	11.32
F(x) (function dependant on U_m/U_t) unitless	0.194
City (Climate Zone) VF Selection	Default
A_s (acres) VF Selection	0.5
A (VF Dispersion Constant)	11.911
B (VF Dispersion Constant)	18.4385
C (VF Dispersion Constant)	209.7845
Q/C_{wp} (g/m^2-s per kg/m^3) VF Selection	68.18
foc (fraction organic carbon in soil) g/g	0.006
ρ$_b$ (dry soil bulk density) g/cm^3	1.5
ρ$_s$ (soil particle density) g/cm^3	2.65
θ$_w$ (water-filled soil porosity) L_{water}/L_{soil}	0.15
T (exposure interval) s	950000000
Output generated 17JUN2013:16:34:16	

Attachment D-1
Hazard Index and Site Risk
Model Input Parameters for Soil

Excavation Worker Equation Inputs for Soil	
Variable	**Value**
TR (target cancer risk) unitless	0.000001
THQ (target hazard quotient) unitless	1
AT_{ew} (averaging time - excavation worker)	365
EF_{ew} (exposure frequency - excavation worker) day/yr	20
ED_{ew} (exposure duration - excavation worker) yr	1
ET_{ew} (exposure time - excavation worker) hr	8
LT (lifetime) yr	70
BW_{ew} (body weight - excavation worker) kg	70
IR_{ew} (soil ingestion rate - excavation worker) mg/day	330
SA_{ew} (surface area - excavation worker) cm^2/day	3300
AF_{ew} (skin adherence factor - excavation worker) mg/cm^2	0.3
City (Climate Zone) PEF Selection	Default
A_s (acres) PEF Selection	0.5
Q/C_{wp} (g/m^2-s per kg/m^3) PEF Selection	93.77
PEF (particulate emission factor) m^3/kg	1359344438
A (PEF Dispersion Constant)	16.2302
B (PEF Dispersion Constant)	18.7762
C (PEF Dispersion Constant)	216.108
V (fraction of vegetative cover) unitless	0.5
U_m (mean annual wind speed) m/s	4.69
U_t (equivalent threshold value)	11.32
F(x) (function dependant on U_m/U_t) unitless	0.194
City (Climate Zone) VF Selection	Default
A_s (acres) VF Selection	0.5
A (VF Dispersion Constant)	11.911
B (VF Dispersion Constant)	18.4385
C (VF Dispersion Constant)	209.7845
Q/C_{wp} (g/m^2-s per kg/m^3) VF Selection	68.18
foc (fraction organic carbon in soil) g/g	0.006
ρ$_b$ (dry soil bulk density) g/cm^3	1.5
ρ$_s$ (soil particle density) g/cm^3	2.65
θ$_w$ (water-filled soil porosity) L_{water}/L_{soil}	0.15
T (exposure interval) s	950000000
Output generated 17JUN2013:16:15:28	

Attachment D-1
Hazard Index and Site Risk
Model Input Parameters for Soil

Recreator Equation Inputs for Soil				
Variable	**Value**		**Variable**	**Value**
TR (target cancer risk) unitless	0.000001		ET_{0-2} (exposure time) hour/day	1
ED_r (exposure duration - recreator) years	30		ET_{2-6} (exposure time) hour/day	1
ET_r (exposure time - recreator) hours	1		ET_{6-16} (exposure time) hour/day	1
ED_c (exposure duration - child) years	6		ET_{16-30} (exposure time) hour/day	1
BW_a (body weight - adult) kg	70		IRS_{0-2} (soil intake rate) mg/day	200
BW_c (body weight - child) kg	15		IRS_{2-6} (soil intake rate) mg/day	200
SA_a (skin surface area - adult) cm^2/day	5700		IRS_{6-16} (soil intake rate) mg/day	100
SA_c (skin surface area - child) cm^2/day	2800		IRS_{16-30} (soil intake rate) mg/day	100
THQ (target hazard quotient) unitless	1		SA_{0-2} (skin surface area) cm^2/day	2800
LT (lifetime - recreator) yr	70		SA_{2-6} (skin surface area) cm^2/day	2800
EF_r (exposure frequency) d/yr	75		SA_{6-16} (skin surface area) cm^2/day	5700
IRS_a (soil intake rate - adult) mg/day	100		SA_{16-30} (skin surface area) cm^2/day	5700
IRS_c (soil intake rate - child) mg/day	200		City (Climate Zone) PEF Selection	Default
AF_a (skin adherence factor - adult) mg/cm^2	0.07		A_s (acres) PEF Selection	0.5
AF_c (skin adherence factor - child) mg/cm^2	0.2		Q/C_{wp} (g/m^2-s per kg/m^3) PEF Selection	93.77
IFS_{adj} (age-adjusted soil ingestion factor) mg/kg	8571		PEF (particulate emission factor) m^3/kg	1359344438
DFS_{adj} (age-adjusted soil dermal factor) mg/kg	27060		A (PEF Dispersion Constant)	16.2302
$IFSM_{adj}$ (mutagenic age-adjusted soil ingestion factor) mg/kg	36714		B (PEF Dispersion Constant)	18.7762
$DFSM_{adj}$ (mutagenic age-adjusted soil dermal factor) mg/kg	108410		C (PEF Dispersion Constant)	216.108
AF_{0-2} (skin adherence factor) mg/cm^2	0.2		V (fraction of vegetative cover) unitless	0.5
AF_{2-6} (skin adherence factor) mg/cm^2	0.2		U_m (mean annual wind speed) m/s	4.69
AF_{6-16} (skin adherence factor) mg/cm^2	0.07		U_t (equivalent threshold value)	11.32
AF_{16-30} (skin adherence factor) mg/cm^2	0.07		F(x) (function dependant on U_m/U_t) unitless	0.194
BW_{0-2} (body weight) kg	15		City (Climate Zone) VF Selection	Default
BW_{2-6} (body weight) kg	15		A_s (acres) VF Selection	0.5
BW_{6-16} (body weight) kg	70		A (VF Dispersion Constant)	11.911
BW_{16-30} (body weight) kg	70		B (VF Dispersion Constant)	18.4385
ED_{0-2} (exposure duration) year	2		C (VF Dispersion Constant)	209.7845
ED_{2-6} (exposure duration) year	4		Q/C_{wp} (g/m^2-s per kg/m^3) VF Selection	68.18
ED_{6-16} (exposure duration) year	10		foc (fraction organic carbon in soil) g/g	0.006
ED_{16-30} (exposure duration) year	14		ρ$_b$ (dry soil bulk density) g/cm^3	1.5
EF_{0-2} (exposure frequency) day/year	75		ρ$_s$ (soil particle density) g/cm^3	2.65
EF_{2-6} (exposure frequency) day/year	75		θ$_w$ (water-filled soil porosity) L_{water}/L_{soil}	0.15
EF_{6-16} (exposure frequency) day/year	75		T (exposure interval) s	950000000
EF_{16-30} (exposure frequency) day/year	75			
Output generated 17JUN2013:16:21:53				

Attachment D-1
Recreator
Hazard Index and Site Risk
Subsurface Soil

Recreator RISK for Subsurface Soil

Chemical	Chronic RfD (mg/kg-day)	RfD Reference	Chronic RfC (mg/m^3)	RfC Reference	Ingestion SF $(mg/kg\text{-}day)^{-1}$	SFO Reference	Inhalation Unit Risk $(ug/m^3)^{-1}$	IUR Reference	ABS_{gi}	ABS_{derm}	D_{ia}	D_{iw}	H`	K_d	Volatilization Factor (m^3/kg)
Benzo[a]pyrene	-		-		7.30E+00	IRIS	1.10E-03	CALEPA	1	0.13	4.76E-02	5.56E-06	1.87E-05	-	-
Naphthalene	2.00E-02	IRIS	3.00E-03	IRIS	-		3.40E-05	CALEPA	1	0.13	6.05E-02	8.38E-06	1.80E-02	9.264	4.99E+04
**Total Risk/HI*	-		-		-		-		-	-	-	-	-	-	-

Output generated 17JUN2013:17:12:59

Particulate Emission Factor (m^3/kg)	Soil Saturation Concentration (mg/kg)	Concentration (mg/kg)	Child Ingestion Noncarcinogenic CDI	Child Inhalation Noncarcinogenic CDI	Child Dermal Noncarcinogenic CDI	Adult Ingestion Noncarcinogenic CDI	Adult Inhalation Noncarcinogenic CDI	Adult Dermal Noncarcinogenic CDI	Adjusted Ingestion Noncarcinogenic CDI	Adjusted Inhalation Noncarcinogenic CDI	Adjusted Dermal Noncarcinogenic CDI	Ingestion Carcinogenic CDI	Inhalation Carcinogenic CDI	Dermal Carcinogenic CDI
1.36E+09	-	18.9	5.18E-05	1.19E-10	1.88E-05	5.55E-06	1.19E-10	2.88E-06	1.48E-05	1.19E-10	6.07E-06	2.72E-05	1.29E-07	1.04E-05
1.36E+09	-	0.0355	9.73E-08	6.09E-09	3.54E-08	1.04E-08	6.09E-09	5.41E-09	2.78E-08	6.09E-09	1.14E-08	1.19E-08	2.61E-06	4.89E-09
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Child Ingestion HQ	Child Inhalation HQ	Child Dermal HQ	Child Total HI	Adult Ingestion HQ	Adult Inhalation HQ	Adult Dermal HQ	Adult Total HI	Adjusted Ingestion HQ	Adjusted Inhalation HQ	Adjusted Dermal HQ	Adjusted Total HI	Ingestion Risk	Inhalation Risk	Dermal Risk	Total Risk
-	-	-	-	-	-	-	-	-	-	-	-	1.98E-04	1.42E-10	7.61E-05	2.74E-04
4.86E-06	2.03E-06	1.77E-06	8.66E-06	5.21E-07	2.03E-06	2.70E-07	2.82E-06	1.39E-06	2.03E-06	5.70E-07	3.99E-06	-	8.88E-11	-	8.88E-11
4.86E-06	*2.03E-06*	*1.77E-06*	*8.66E-06*	*5.21E-07*	*2.03E-06*	*2.70E-07*	*2.82E-06*	*1.39E-06*	*2.03E-06*	*5.70E-07*	*3.99E-06*	*1.98E-04*	*2.31E-10*	*7.61E-05*	*2.74E-04*

Attachment D-1
Recreator
Hazard Index and Site Risk
Surface Soil

Recreator RISK for Surface Soil

Chemical	Chronic RfD (mg/kg-day)	RfD Reference	Chronic RfC (mg/m^3)	RfC Reference	Ingestion SF $(mg/kg\text{-}day)^{-1}$	SFO Reference	Inhalation Unit Risk $(ug/m^3)^{-1}$	IUR Reference	ABS_{gi}	ABS_{derm}	D_{ia}	D_{iw}	H`	K_d	Volatilization Factor (m^3/kg)
Benzo[a]pyrene	-		-		7.30E+00	IRIS	1.10E-03	CALEPA	1	0.13	4.76E-02	5.56E-06	1.87E-05	-	-
Fluoranthene	4.00E-02	IRIS	-		-		-		1	0.13	2.76E-02	7.18E-06	3.62E-04	-	-
Naphthalene	2.00E-02	IRIS	3.00E-03	IRIS	-		3.40E-05	CALEPA	1	0.13	6.05E-02	8.38E-06	1.80E-02	9.264	4.99E+04
Phenanthrene	-		-		-		-		1	0.13	3.45E-02	6.69E-06	1.73E-03	100.14	6.93E+05
Pyrene	3.00E-02	IRIS	-		-		-		1	0.13	2.78E-02	7.25E-06	4.87E-04	326.04	2.56E+06
**Total Risk/HI*	-		-		-		-		-	-	-	-	-	-	-

Output generated 17JUN2013:16:21:53

Particulate Emission Factor (m^3/kg)	Soil Saturation Concentration (mg/kg)	Concentration (mg/kg)	Child Ingestion Noncarcinogenic CDI	Child Inhalation Noncarcinogenic CDI	Child Dermal Noncarcinogenic CDI	Adult Ingestion Noncarcinogenic CDI	Adult Inhalation Noncarcinogenic CDI	Adult Dermal Noncarcinogenic CDI	Adjusted Ingestion Noncarcinogenic CDI	Adjusted Inhalation Noncarcinogenic CDI	Adjusted Dermal Noncarcinogenic CDI	Ingestion Carcinogenic CDI	Inhalation Carcinogenic CDI	Dermal Carcinogenic CDI
1.36E+09	-	33.8	9.26E-05	2.13E-10	3.37E-05	9.92E-06	2.13E-10	5.15E-06	2.65E-05	2.13E-10	1.09E-05	4.86E-05	2.31E-07	1.86E-05
1.36E+09	-	36.4	9.97E-05	2.29E-10	3.63E-05	1.07E-05	2.29E-10	5.54E-06	2.85E-05	2.29E-10	1.17E-05	1.22E-05	9.83E-08	5.01E-06
1.36E+09	-	0.654	1.79E-06	1.12E-07	6.52E-07	1.92E-07	1.12E-07	9.96E-08	5.12E-07	1.12E-07	2.10E-07	2.19E-07	4.81E-05	9.00E-08
1.36E+09	-	16.8	4.60E-05	2.08E-07	1.68E-05	4.93E-06	2.08E-07	2.56E-06	1.32E-05	2.08E-07	5.40E-06	5.64E-06	8.90E-05	2.31E-06
1.36E+09	-	28.3	7.75E-05	9.48E-08	2.82E-05	8.31E-06	9.48E-08	4.31E-06	2.22E-05	9.48E-08	9.09E-06	9.49E-06	4.06E-05	3.90E-06
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Child Ingestion HQ	Child Inhalation HQ	Child Dermal HQ	Child Total HI	Adult Ingestion HQ	Adult Inhalation HQ	Adult Dermal HQ	Adult Total HI	Adjusted Ingestion HQ	Adjusted Inhalation HQ	Adjusted Dermal HQ	Adjusted Total HI	Ingestion Risk	Inhalation Risk	Dermal Risk	Total Risk
-	-	-	-	-	-	-	-	-	-	-	-	3.55E-04	2.54E-10	1.36E-04	4.91E-04
2.49E-03	-	9.08E-04	3.40E-03	2.67E-04	-	1.39E-04	4.06E-04	7.12E-04	-	2.92E-04	1.00E-03	-	-	-	-
8.96E-05	3.74E-05	3.26E-05	1.60E-04	9.60E-06	3.74E-05	4.98E-06	5.20E-05	2.56E-05	3.74E-05	1.05E-05	7.35E-05	-	1.64E-09	-	1.64E-09
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2.58E-03	-	9.41E-04	3.53E-03	2.77E-04	-	1.44E-04	4.21E-04	7.38E-04	-	3.03E-04	1.04E-03	-	-	-	-
5.16E-03	*3.74E-05*	*1.88E-03*	*7.09E-03*	*5.54E-04*	*3.74E-05*	*2.88E-04*	*8.79E-04*	*1.48E-03*	*3.74E-05*	*6.06E-04*	*2.11E-03*	***3.55E-04***	*1.89E-09*	***1.36E-04***	***4.91E-04***

Attachment D-1
Excavation Worker
Hazard Index and Site Risk
Subsurface Soil

Excavation Worker RISK for Subsurface Soil

Chemical	Chronic RfD (mg/kg-day)	RfD Reference	Chronic RfC (mg/m^3)	RfC Reference	Ingestion SF $(mg/kg\text{-}day)^{-1}$	SFO Reference	Inhalation Unit Risk $(ug/m^3)^{-1}$	IUR Reference	ABS_{gi}	ABS_d	D_{ia}	D_{iw}	H`	K_d	Volatilization Factor (m^3/kg)	Particulate Emission Factor (m^3/kg)
Benzo[a]pyrene	-		-		7.30E+00	IRIS	1.10E-03	CALEPA	1	0.13	4.76E-02	5.56E-06	1.87E-05	-	-	1.36E+09
Naphthalene	2.00E-02	IRIS	3.00E-03	IRIS	-		3.40E-05	CALEPA	1	0.13	6.05E-02	8.38E-06	1.80E-02	9.264	4.99E+04	1.36E+09
**Total Risk/HI*	-		-		-		-		-	-	-	-	-	-	-	-

Output generated 17JUN2013:17:07:21

Soil Saturation Concentration (mg/kg)	Concentration (mg/kg)	Ingestion Noncarcinogenic CDI	Inhalation Noncarcinogenic CDI	Dermal Noncarcinogenic CDI	Ingestion Carcinogenic CDI	Inhalation Carcinogenic CDI	Dermal Carcinogenic CDI	Ingestion HQ	Inhalation HQ	Dermal HQ	Total HI	Ingestion Risk	Inhalation Risk	Dermal Risk	Total Risk
-	18.9	4.88E-06	2.54E-10	1.90E-06	6.97E-08	3.63E-09	2.72E-08	-	-	-	-	5.09E-07	3.99E-12	1.99E-07	7.08E-07
-	0.0355	9.17E-09	1.30E-08	3.58E-09	1.31E-10	1.86E-07	5.11E-11	4.59E-07	4.33E-06	1.79E-07	4.97E-06	-	6.32E-12	-	6.32E-12
-	-	-	-	-	-	-	-	*4.59E-07*	*4.33E-06*	*1.79E-07*	*4.97E-06*	*5.09E-07*	*1.03E-11*	*1.99E-07*	*7.08E-07*

Attachment D-1
Excavation Worker
Hazard Index and Site Risk
Surface Soil

Excavation Worker RISK for Surface Soil

Chemical	Chronic RfD (mg/kg-day)	RfD Reference	Chronic RfC (mg/m^3)	RfC Reference	Ingestion SF $(mg/kg\text{-}day)^{-1}$	SFO Reference	Inhalation Unit Risk $(ug/m^3)^{-1}$	IUR Reference	ABS_{gi}	ABS_d	D_{ia}	D_{iw}	H`	K_d	Volatilization Factor (m^3/kg)	Particulate Emission Factor (m^3/kg)
Benzo[a]pyrene	-		-		7.30E+00	IRIS	1.10E-03	CALEPA	1	0.13	4.76E-02	5.56E-06	1.87E-05	-	-	1.36E+09
Fluoranthene	4.00E-02	IRIS	-		-		-		1	0.13	2.76E-02	7.18E-06	3.62E-04	-	-	1.36E+09
Naphthalene	2.00E-02	IRIS	3.00E-03	IRIS	-		3.40E-05	CALEPA	1	0.13	6.05E-02	8.38E-06	1.80E-02	9.264	4.99E+04	1.36E+09
Phenanthrene	-		-		-		-		1	0.13	3.45E-02	6.69E-06	1.73E-03	100.14	6.93E+05	1.36E+09
Pyrene	3.00E-02	IRIS	-		-		-		1	0.13	2.78E-02	7.25E-06	4.87E-04	326.04	2.56E+06	1.36E+09
**Total Risk/HI*	-		-		-		-		-	-	-	-	-	-	-	-

Soil Saturation Concentration (mg/kg)	Concentration (mg/kg)	Ingestion Noncarcinogenic CDI	Inhalation Noncarcinogenic CDI	Dermal Noncarcinogenic CDI	Ingestion Carcinogenic CDI	Inhalation Carcinogenic CDI	Dermal Carcinogenic CDI	Ingestion HQ	Inhalation HQ	Dermal HQ	Total HI	Ingestion Risk	Inhalation Risk	Dermal Risk	Total Risk
-	33.8	8.73E-06	4.54E-10	3.41E-06	1.25E-07	6.49E-09	4.86E-08	-	-	-	-	9.11E-07	7.14E-12	3.55E-07	**1.27E-06**
-	36.4	9.40E-06	4.89E-10	3.67E-06	1.34E-07	6.99E-09	5.24E-08	2.35E-04	-	9.17E-05	3.27E-04	-	-	-	-
-	0.654	1.69E-07	2.40E-07	6.59E-08	2.41E-09	3.42E-06	9.41E-10	8.45E-06	7.98E-05	3.29E-06	9.16E-05	-	1.16E-10	-	1.16E-10
-	16.8	4.34E-06	4.43E-07	1.69E-06	6.20E-08	6.33E-06	2.42E-08	-	-	-	-	-	-	-	-
-	28.3	7.31E-06	2.02E-07	2.85E-06	1.04E-07	2.89E-06	4.07E-08	2.44E-04	-	9.50E-05	3.39E-04	-	-	-	-
-	-	-	-	-	-	-	-	*4.87E-04*	*7.98E-05*	*1.90E-04*	*7.58E-04*	*9.11E-07*	*1.23E-10*	*3.55E-07*	***1.27E-06***

Attachment D-1
Composite Worker
Hazard Index and Site Risk
Subsurface Soil

Composite Worker RISK for Subsurface Soil

Chemical	Chronic RfD (mg/kg-day)	RfD Reference	Chronic RfC (mg/m^3)	RfC Reference	Ingestion SF $(mg/kg\text{-}day)^{-1}$	SFO Reference	Inhalation Unit Risk $(ug/m^3)^{-1}$	IUR Reference	ABS_{gi}	ABS_d	D_{ia}	D_{iw}	H`	K_d	Volatilization Factor (m^3/kg)	Particulate Emission Factor (m^3/kg)
Benzo[a]pyrene	-		-		7.30E+00	IRIS	1.10E-03	CALEPA	1	0.13	4.76E-02	5.56E-06	1.87E-05	-	-	1.36E+09
Naphthalene	2.00E-02	IRIS	3.00E-03	IRIS	-		3.40E-05	CALEPA	1	0.13	6.05E-02	8.38E-06	1.80E-02	9.264	4.99E+04	1.36E+09
**Total Risk/HI*	-		-		-		-		-	-	-	-	-	-	-	-

Output generated 17JUN2013:16:34:16

Soil Saturation Concentration (mg/kg)	Concentration (mg/kg)	Ingestion Noncarcinogenic CDI	Inhalation Noncarcinogenic CDI	Dermal Noncarcinogenic CDI	Ingestion Carcinogenic CDI	Inhalation Carcinogenic CDI	Dermal Carcinogenic CDI	Ingestion HQ	Inhalation HQ	Dermal HQ	Total HI	Ingestion Risk	Inhalation Risk	Dermal Risk	Total Risk
-	18.9	1.85E-05	3.17E-09	1.59E-05	6.60E-06	1.13E-06	5.67E-06	-	-	-	-	4.82E-05	1.25E-09	4.14E-05	8.96E-05
-	0.0355	3.47E-08	1.63E-07	2.98E-08	1.24E-08	5.80E-05	1.06E-08	1.74E-06	5.42E-05	1.49E-06	5.74E-05	-	1.97E-09	-	1.97E-09
-	-	-	-	-	-	-	-	*1.74E-06*	*5.42E-05*	*1.49E-06*	*5.74E-05*	*4.82E-05*	*3.22E-09*	*4.14E-05*	*8.96E-05*

Attachment D-1
Composite Worker
Hazard Index and Site Risk
Surface Soil

Composite Worker RISK for Surface Soil

Chemical	Chronic RfD (mg/kg-day)	RfD Reference	Chronic RfC (mg/m^3)	RfC Reference	Ingestion SF $(mg/kg\text{-}day)^{-1}$	SFO Reference	Inhalation Unit Risk $(ug/m^3)^{-1}$	IUR Reference	ABS_{gi}	ABS_d	D_{ia}	D_{iw}	H`	K_d	Volatilization Factor (m^3/kg)	Particulate Emission Factor (m^3/kg)
Benzo[a]pyrene	-		-		7.30E+00	IRIS	1.10E-03	CALEPA	1	0.13	4.76E-02	5.56E-06	1.87E-05	-	-	1.36E+09
Fluoranthene	4.00E-02	IRIS	-		-		-		1	0.13	2.76E-02	7.18E-06	3.62E-04	-	-	1.36E+09
Naphthalene	2.00E-02	IRIS	3.00E-03	IRIS	-		3.40E-05	CALEPA	1	0.13	6.05E-02	8.38E-06	1.80E-02	9.264	4.99E+04	1.36E+09
Phenanthrene	-		-		-		-		1	0.13	3.45E-02	6.69E-06	1.73E-03	100.14	6.93E+05	1.36E+09
Pyrene	3.00E-02	IRIS	-		-		-		1	0.13	2.78E-02	7.25E-06	4.87E-04	326.04	2.56E+06	1.36E+09
**Total Risk/HI*	-		-		-		-		-	-	-	-	-	-	-	-

Output generated 17JUN2013:16:08:32

Soil Saturation Concentration (mg/kg)	Concentration (mg/kg)	Ingestion Noncarcinogenic CDI	Inhalation Noncarcinogenic CDI	Dermal Noncarcinogenic CDI	Ingestion Carcinogenic CDI	Inhalation Carcinogenic CDI	Dermal Carcinogenic CDI	Ingestion HQ	Inhalation HQ	Dermal HQ	Total HI	Ingestion Risk	Inhalation Risk	Dermal Risk	Total Risk
-	33.8	3.31E-05	5.68E-09	2.84E-05	1.18E-05	2.03E-06	1.01E-05	-	-	-	-	8.62E-05	2.23E-09	7.40E-05	1.60E-04
-	36.4	3.56E-05	6.11E-09	3.06E-05	1.27E-05	2.18E-06	1.09E-05	8.90E-04	-	7.64E-04	1.65E-03	-	-	-	-
-	0.654	6.40E-07	2.99E-06	5.49E-07	2.29E-07	1.07E-03	1.96E-07	3.20E-05	9.98E-04	2.75E-05	1.06E-03	-	3.64E-08	-	3.64E-08
-	16.8	1.64E-05	5.54E-06	1.41E-05	5.87E-06	1.98E-03	5.04E-06	-	-	-	-	-	-	-	-
-	28.3	2.77E-05	2.53E-06	2.38E-05	9.89E-06	9.03E-04	8.49E-06	9.23E-04	-	7.92E-04	1.71E-03	-	-	-	-
-	-	-	-	-	-	-	-	*1.85E-03*	*9.98E-04*	*1.58E-03*	*4.42E-03*	*8.62E-05*	*3.86E-08*	*7.40E-05*	*1.60E-04*

Attachment D-1
Resident
Hazard Index and Site Risk
Subsurface Soil

Resident RISK for Subsurface Soil

Chemical	Chronic RfD (mg/kg-day)	RfD Reference	Chronic RfC (mg/m^3)	RfC Reference	Ingestion SF $(mg/kg\text{-}day)^{-1}$	SFO Reference	Inhalation Unit Risk $(ug/m^3)^{-1}$	IUR Reference	ABS_{gi}	ABS_{derm}	D_{ia}	D_{iw}	H`	K_d	Volatilization Factor (m^3/kg)
Benzo[a]pyrene	-		-		7.30E+00	IRIS	1.10E-03	CALEPA	1	0.13	4.76E-02	5.56E-06	1.87E-05	-	-
Naphthalene	2.00E-02	IRIS	3.00E-03	IRIS	-		3.40E-05	CALEPA	1	0.13	6.05E-02	8.38E-06	1.80E-02	9.264	4.99E+04
*Total Risk/HI	-		-		-		-		-	-	-	-	-	-	-

Output generated 17JUN2013:16:29:11

Particulate Emission Factor (m^3/kg)	Soil Saturation Concentration (mg/kg)	Concentration (mg/kg)	Child Ingestion Noncarcinogenic CDI	Child Inhalation Noncarcinogenic CDI	Child Dermal Noncarcinogenic CDI	Adult Ingestion Noncarcinogenic CDI	Adult Inhalation Noncarcinogenic CDI	Adult Dermal Noncarcinogenic CDI	Adjusted Ingestion Noncarcinogenic CDI	Adjusted Inhalation Noncarcinogenic CDI	Adjusted Dermal Noncarcinogenic CDI	Ingestion Carcinogenic CDI	Inhalation Carcinogenic CDI	Dermal Carcinogenic CDI	Child Ingestion HQ
1.36E+09	-	18.9	2.42E-04	1.33E-08	8.80E-05	2.59E-05	1.33E-08	1.34E-05	6.90E-05	1.33E-08	2.83E-05	1.27E-04	1.45E-05	4.87E-05	-
1.36E+09	-	0.0355	4.54E-07	6.83E-07	1.65E-07	4.86E-08	6.83E-07	2.52E-08	1.30E-07	6.83E-07	5.32E-08	5.56E-08	2.93E-04	2.28E-08	2.27E-05
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.27E-05

Child Inhalation HQ	Child Dermal HQ	Child Total HI	Adult Ingestion HQ	Adult Inhalation HQ	Adult Dermal HQ	Adult Total HI	Adjusted Ingestion HQ	Adjusted Inhalation HQ	Adjusted Dermal HQ	Adjusted Total HI	Ingestion Risk	Inhalation Risk	Dermal Risk	Total Risk
-	-	-	-	-	-	-	-	-	-	-	9.25E-04	1.59E-08	3.55E-04	1.28E-03
2.28E-04	8.26E-06	2.59E-04	2.43E-06	2.28E-04	1.26E-06	2.31E-04	6.48E-06	2.28E-04	2.66E-06	2.37E-04	-	9.95E-09	-	9.95E-09
2.28E-04	8.26E-06	2.59E-04	2.43E-06	2.28E-04	1.26E-06	2.31E-04	6.48E-06	2.28E-04	2.66E-06	2.37E-04	9.25E-04	2.59E-08	3.55E-04	1.28E-03

Attachment D-1
Resident
Hazard Index and Site Risk
Surface Soil

Resident RISK for Surface Soil

Chemical	Chronic RfD (mg/kg-day)	RfD Reference	Chronic RfC (mg/m^3)	RfC Reference	Ingestion SF $(mg/kg\text{-}day)^{-1}$	SFO Reference	Inhalation Unit Risk $(ug/m^3)^{-1}$	IUR Reference	ABS_{gi}	ABS_{derm}	D_{ia}	D_{iw}	H`	K_d	Volatilization Factor (m^3/kg)
Benzo[a]pyrene	-		-		7.30E+00	IRIS	1.10E-03	CALEPA	1	0.13	4.76E-02	5.56E-06	1.87E-05	-	-
Fluoranthene	4.00E-02	IRIS	-		-		-		1	0.13	2.76E-02	7.18E-06	3.62E-04	-	-
Naphthalene	2.00E-02	IRIS	3.00E-03	IRIS	-		3.40E-05	CALEPA	1	0.13	6.05E-02	8.38E-06	1.80E-02	9.264	4.99E+04
Phenanthrene	-		-		-		-		1	0.13	3.45E-02	6.69E-06	1.73E-03	100.14	6.93E+05
Pyrene	3.00E-02	IRIS	-		-		-		1	0.13	2.78E-02	7.25E-06	4.87E-04	326.04	2.56E+06
**Total Risk/HI*	-		-		-		-		-	-	-	-	-	-	-

Output generated 17JUN2013:15:58:38

Particulate Emission Factor (m^3/kg)	Soil Saturation Concentration (mg/kg)	Concentration (mg/kg)	Child Ingestion Noncarcinogenic CDI	Child Inhalation Noncarcinogenic CDI	Child Dermal Noncarcinogenic CDI	Adult Ingestion Noncarcinogenic CDI	Adult Inhalation Noncarcinogenic CDI	Adult Dermal Noncarcinogenic CDI	Adjusted Ingestion Noncarcinogenic CDI	Adjusted Inhalation Noncarcinogenic CDI	Adjusted Dermal Noncarcinogenic CDI	Ingestion Carcinogenic CDI	Inhalation Carcinogenic CDI	Dermal Carcinogenic CDI
1.36E+09	-	33.787828	4.32E-04	2.38E-08	1.57E-04	4.63E-05	2.38E-08	2.40E-05	1.23E-04	2.38E-08	5.07E-05	2.27E-04	2.59E-05	8.70E-05
1.36E+09	-	36.438427	4.66E-04	2.57E-08	1.70E-04	4.99E-05	2.57E-08	2.59E-05	1.33E-04	2.57E-08	5.46E-05	5.70E-05	1.10E-05	2.34E-05
1.36E+09	-	0.6537671	8.36E-06	1.26E-05	3.04E-06	8.96E-07	1.26E-05	4.65E-07	2.39E-06	1.26E-05	9.80E-07	1.02E-06	5.39E-03	4.20E-07
1.36E+09	-	16.833688	2.15E-04	2.33E-05	7.83E-05	2.31E-05	2.33E-05	1.20E-05	6.15E-05	2.33E-05	2.52E-05	2.64E-05	9.99E-03	1.08E-05
1.36E+09	-	28.322256	3.62E-04	1.06E-05	1.32E-04	3.88E-05	1.06E-05	2.01E-05	1.03E-04	1.06E-05	4.25E-05	4.43E-05	4.55E-03	1.82E-05
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Child Ingestion HQ	Child Inhalation HQ	Child Dermal HQ	Child Total HI	Adult Ingestion HQ	Adult Inhalation HQ	Adult Dermal HQ	Adult Total HI	Adjusted Ingestion HQ	Adjusted Inhalation HQ	Adjusted Dermal HQ	Adjusted Total HI	Ingestion Risk	Inhalation Risk	Dermal Risk	Total Risk
-	-	-	-	-	-	-	-	-	-	-	-	1.65E-03	2.85E-08	6.35E-04	2.29E-03
1.16E-02	-	4.24E-03	1.59E-02	1.25E-03	-	6.47E-04	1.90E-03	3.33E-03	-	1.37E-03	4.69E-03	-	-	-	-
4.18E-04	4.19E-03	1.52E-04	4.76E-03	4.48E-05	4.19E-03	2.32E-05	4.26E-03	1.19E-04	4.19E-03	4.90E-05	4.36E-03	-	1.83E-07	-	1.83E-07
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1.21E-02	-	4.39E-03	1.65E-02	1.29E-03	-	6.71E-04	1.96E-03	3.45E-03	-	1.42E-03	4.86E-03	-	-	-	-
2.41E-02	*4.19E-03*	*8.78E-03*	*3.72E-02*	*2.58E-03*	*4.19E-03*	*1.34E-03*	*8.12E-03*	*6.90E-03*	*4.19E-03*	*2.84E-03*	*1.39E-02*	***1.65E-03***	*2.12E-07*	***6.35E-04***	***2.29E-03***

Attachment D-2

Exposure Point Concentration Calculations Using ProUCL

Chemical of Potential Concern	Units	UCL	Distribution	Maximum Concentration	Exposure Point Concentration		
					Value	Units	Notes
Surface Soil							
Benzo(a)pyrene Equivalents	mg/kg	3.38E+01	Nonparametric	2.51E+02	3.38E+01	mg/kg	97.5% KM (Chebyshev) UCL
Fluoranthene	mg/kg	3.64E+01	Nonparametric	4.02E+02	3.64E+01	mg/kg	97.5% KM (Chebyshev) UCL
Lead	mg/kg	1.64E+03	Not Applicable	5.19E+04	1.64E+03	mg/kg	Arithmetic mean
Naphthalene	mg/kg	6.54E-01	Nonparametric	6.77E+00	6.54E-01	mg/kg	97.5% KM (Chebyshev) UCL
Phenanthrene	mg/kg	1.68E+01	Nonparametric	2.00E+02	1.68E+01	mg/kg	97.5% KM (Chebyshev) UCL
Pyrene	mg/kg	2.83E+01	Nonparametric	2.97E+02	2.83E+01	mg/kg	97.5% KM (Chebyshev) UCL
Subsurface Soil							
Benzo(a)pyrene Equivalents	mg/kg	1.89E+01	Nonparametric	1.75E+02	1.89E+01	mg/kg	97.5% KM (Chebyshev) UCL
Lead	mg/kg	4.79E+02	Not Applicable	2.93E+04	4.79E+02	mg/kg	Arithmetic mean
Naphthalene	mg/kg	3.55E-02	Nonparametric	4.01E+00	3.55E-02	mg/kg	97.5% KM (Chebyshev) UCL

Notes:

mg/kg = milligrams per kilogram or parts per million (ppm)

UCL = upper confidence level

The arithmetic mean lead concentration was used in accordance with the USEPA IEUBK modeling guidelines

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	Lead SO.wst
Full Precision	ON
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Result_ppm (surf)

General Statistics

Number of Valid Data	142	Number of Detected Data	141
Number of Distinct Detected Data	138	Number of Non-Detect Data	1
		Percent Non-Detects	0.70%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	9.24	Minimum Detected	2.223542
Maximum Detected	51900	Maximum Detected	10.85707
Mean of Detected	1636.443	Mean of Detected	5.56474
SD of Detected	5340.835	SD of Detected	1.84621
Minimum Non-Detect	0.262	Minimum Non-Detect	-1.339411
Maximum Non-Detect	0.262	Maximum Non-Detect	-1.339411

UCL Statistics

Normal Distribution Test with Detected Values Only

Lilliefors Test Statistic	0.380308
5% Lilliefors Critical Value	0.074615

Data not Normal at 5% Significance Level

Lognormal Distribution Test with Detected Values Only

Lilliefors Test Statistic	0.064255
5% Lilliefors Critical Value	0.074615

Data appear Lognormal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method	
Mean	1624.92
SD	5323.634
95% DL/2 (t) UCL	2364.617
Maximum Likelihood Estimate(MLE) Method	
Mean	1598.727
SD	5327.657
95% MLE (t) UCL	2338.983
95% MLE (Tiku) UCL	2249.654

Assuming Lognormal Distribution

DL/2 Substitution Method	
Mean	5.511237
SD	1.946995
95% H-Stat (DL/2) UCL	2791.424
Log ROS Method	
Mean in Log Scale	5.528076
SD in Log Scale	1.890818
Mean in Original Scale	1624.929
SD in Original Scale	5323.631
95% t UCL	2364.626
95% Percentile Bootstrap UCL	2469.029
95% BCA Bootstrap UCL	2791.459
95% H UCL	2483.407

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.360994
Theta Star	4533.157
nu star	101.8003
A-D Test Statistic	8.323442
5% A-D Critical Value	0.852634
K-S Test Statistic	0.852634
5% K-S Critical Value	0.084917

Data not Gamma Distributed at 5% Significance Level

Data Distribution Test with Detected Values Only

Data appear Lognormal at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	51900
Mean	1624.919
Median	224.5
SD	5323.634
k star	0.340738
Theta star	4768.828
Nu star	96.76945
AppChi2	75.07862
95% Gamma Approximate UCL (Use when n >= 40)	2094.371
95% Adjusted Gamma UCL (Use when n < 40)	2099.817

Note: DL/2 is not a recommended method.

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	1624.984
SD	5304.836
SE of Mean	446.759
95% KM (t) UCL	2364.697
95% KM (z) UCL	2359.837
95% KM (jackknife) UCL	2364.672
95% KM (bootstrap t) UCL	3147.085
95% KM (BCA) UCL	2484.599
95% KM (Percentile Bootstrap) UCL	2392.548
95% KM (Chebyshev) UCL	3572.361
97.5% KM (Chebyshev) UCL	4414.993
99% KM (Chebyshev) UCL	6070.18

Potential UCLs to Use

97.5% KM (Chebyshev) UCL	4414.993

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	Lead SO.wst
Full Precision	ON
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Result_ppm (subsurf)

General Statistics

Number of Valid Observations	110	Number of Distinct Observations	102

Raw Statistics

Minimum	10.2
Maximum	29300
Mean	479.3409
Geometric Mean	84.92535
Median	88.9
SD	2858.203
Std. Error of Mean	272.5189
Coefficient of Variation	5.962777
Skewness	9.666898

Log-transformed Statistics

Minimum of Log Data	2.322388
Maximum of Log Data	10.28534
Mean of log Data	4.441773
SD of log Data	1.245598

Relevant UCL Statistics

Normal Distribution Test

Lilliefors Test Statistic	0.459736
Lilliefors Critical Value	0.084477

Data not Normal at 5% Significance Level

Lognormal Distribution Test

Lilliefors Test Statistic	0.127827
Lilliefors Critical Value	0.084477

Data not Lognormal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL	931.4372

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)	1195.986
95% Modified-t UCL (Johnson-1978)	973.3008

Assuming Lognormal Distribution

95% H-UCL	247.2304
95% Chebyshev (MVUE) UCL	304.1287
97.5% Chebyshev (MVUE) UCL	356.8761
99% Chebyshev (MVUE) UCL	460.488

Gamma Distribution Test

k star (bias corrected)	0.378535
Theta Star	1266.306
MLE of Mean	479.3409
MLE of Standard Deviation	779.0971
nu star	83.27766
Approximate Chi Square Value (.05)	63.24605
Adjusted Level of Significance	0.047818
Adjusted Chi Square Value	63.01535
Anderson-Darling Test Statistic	17.71006
Anderson-Darling 5% Critical Value	0.847417
Kolmogorov-Smirnov Test Statistic	0.328409
Kolmogorov-Smirnov 5% Critical Value	0.093288

Data not Gamma Distributed at 5% Significance Level

Data Distribution

Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics

95% CLT UCL	927.5947
95% Jackknife UCL	931.4372
95% Standard Bootstrap UCL	924.1098
95% Bootstrap-t UCL	3860.192
95% Hall's Bootstrap UCL	2794.898
95% Percentile Bootstrap UCL	993.1518
95% BCA Bootstrap UCL	1312.207
95% Chebyshev(Mean, Sd) UCL	1667.223
97.5% Chebyshev(Mean, Sd) UCL	2181.221
99% Chebyshev(Mean, Sd) UCL	3190.87

Assuming Gamma Distribution

95% Approximate Gamma UCL (Use when n >= 40)	631.1602
95% Adjusted Gamma UCL (Use when n < 40)	633.4709

Potential UCL to Use

Use 95% Chebyshev (Mean, Sd) UCL 1667.223

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	BEQ SO.wst
Full Precision	ON
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Result_ppm (surf)

General Statistics

Number of Valid Data	111	Number of Detected Data	103
Number of Distinct Detected Data	103	Number of Non-Detect Data	8
		Percent Non-Detects	7.21%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.009263	Minimum Detected	-4.68172
Maximum Detected	250.624	Maximum Detected	5.523954
Mean of Detected	12.69557	Mean of Detected	0.07659
SD of Detected	38.38889	SD of Detected	2.531629
Minimum Non-Detect	0.002644	Minimum Non-Detect	-5.93564
Maximum Non-Detect	0.002904	Maximum Non-Detect	-5.84161

Note: Data have multiple DLs - Use of KM Method is recommended
For all methods (except KM, DL/2, and ROS Methods),
Observations < Largest ND are treated as NDs

Number treated as Non-Detect	8
Number treated as Detected	103
Single DL Non-Detect Percentage	7.21%

UCL Statistics

Normal Distribution Test with Detected Values Only

Lilliefors Test Statistic	0.370523
5% Lilliefors Critical Value	0.0873

Data not Normal at 5% Significance Level

Lognormal Distribution Test with Detected Values Only

Lilliefors Test Statistic	0.078446
5% Lilliefors Critical Value	0.0873

Data appear Lognormal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method	
Mean	11.78068
SD	37.11338
95% DL/2 (t) UCL	17.62413
Maximum Likelihood Estimate(MLE) Method	
Mean	9.794248
SD	38.68106
95% MLE (t) UCL	15.88453
95% MLE (Tiku) UCL	15.31892

Assuming Lognormal Distribution

DL/2 Substitution Method	
Mean	-0.40336
SD	2.989287
95% H-Stat (DL/2) UCL	215.5355
Log ROS Method	
Mean in Log Scale	-0.33507
SD in Log Scale	2.853896
Mean in Original Scale	11.78084
SD in Original Scale	37.11333
95% t UCL	17.62428
95% Percentile Bootstrap UCL	18.2353
95% BCA Bootstrap UCL	20.17325
95% H UCL	139.4419

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.280774
Theta Star	45.21636
nu star	57.83943
A-D Test Statistic	3.634476
5% A-D Critical Value	0.875476
K-S Test Statistic	0.875476
5% K-S Critical Value	0.096588

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	250.624
Mean	11.78058
Median	0.995333
SD	37.11341
k star	0.21483
Theta star	54.83676
Nu star	47.69225
AppChi2	32.84237
95% Gamma Approximate UCL (Use when n >= 40)	17.10724
95% Adjusted Gamma UCL (Use when n < 40)	17.19192

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data appear Lognormal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	11.78125
SD	36.94565
SE of Mean	3.523873
95% KM (t) UCL	17.62673
95% KM (z) UCL	17.5775
95% KM (jackknife) UCL	17.62436
95% KM (bootstrap t) UCL	21.16502
95% KM (BCA) UCL	17.855
95% KM (Percentile Bootstrap) UCL	17.86543
95% KM (Chebyshev) UCL	27.14145
97.5% KM (Chebyshev) UCL	33.78783
99% KM (Chebyshev) UCL	46.84334

Potential UCLs to Use

97.5% KM (Chebyshev) UCL	33.78783

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	BEQ SO.wst
Full Precision	ON
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Result_ppm (subsurf)

General Statistics

Number of Valid Data	129	Number of Detected Data	124
Number of Distinct Detected Data	124	Number of Non-Detect Data	5
		Percent Non-Detects	3.88%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.017945	Minimum Detected	-4.02044
Maximum Detected	174.973	Maximum Detected	5.164632
Mean of Detected	7.157093	Mean of Detected	-0.19042
SD of Detected	22.1921	SD of Detected	1.998694
Minimum Non-Detect	0.002655	Minimum Non-Detect	-5.93147
Maximum Non-Detect	0.002748	Maximum Non-Detect	-5.89707

Note: Data have multiple DLs - Use of KM Method is recommended
For all methods (except KM, DL/2, and ROS Methods),
Observations < Largest ND are treated as NDs

Number treated as Non-Detect	5
Number treated as Detected	124
Single DL Non-Detect Percentage	3.88%

UCL Statistics

Normal Distribution Test with Detected Values Only

Lilliefors Test Statistic	0.384843
5% Lilliefors Critical Value	0.079565

Data not Normal at 5% Significance Level

Lognormal Distribution Test with Detected Values Only

Lilliefors Test Statistic	0.079391
5% Lilliefors Critical Value	0.079565

Data appear Lognormal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method

Mean	6.879739
SD	21.79849
95% DL/2 (t) UCL	10.05964

Maximum Likelihood Estimate(MLE) Method

Mean	6.273063
SD	22.24505
95% MLE (t) UCL	9.518107
95% MLE (Tiku) UCL	9.169963

Assuming Lognormal Distribution

DL/2 Substitution Method

Mean	-0.4389
SD	2.319907
95% H-Stat (DL/2) UCL	20.10238

Log ROS Method

Mean in Log Scale	-0.37517
SD in Log Scale	2.166063
Mean in Original Scale	6.879959
SD in Original Scale	21.79842
95% t UCL	10.05985
95% Percentile Bootstrap UCL	10.18968
95% BCA Bootstrap UCL	11.26553
95% H UCL	13.92484

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.314372
Theta Star	22.76635
nu star	77.96415
A-D Test Statistic	9.516687
5% A-D Critical Value	0.863914
K-S Test Statistic	0.863914
5% K-S Critical Value	0.09018

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data

Minimum	0.000001
Maximum	174.973
Mean	6.879687
Median	0.691904
SD	21.79851
k star	0.264687
Theta star	25.99179
Nu star	68.28922
AppChi2	50.2686
95% Gamma Approximate UCL (Use when n >= 40)	9.345963
95% Adjusted Gamma UCL (Use when n < 40)	9.378417

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data appear Lognormal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method

Mean	6.880382
SD	21.71363
SE of Mean	1.919534
95% KM (t) UCL	10.06075
95% KM (z) UCL	10.03774
95% KM (jackknife) UCL	10.06025
95% KM (bootstrap t) UCL	12.06232
95% KM (BCA) UCL	10.43984
95% KM (Percentile Bootstrap) UCL	10.46264
95% KM (Chebyshev) UCL	15.24744
97.5% KM (Chebyshev) UCL	18.86787
99% KM (Chebyshev) UCL	25.97951

Potential UCLs to Use

97.5% KM (Chebyshev) UCL	18.86787

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	Naphthalene SO.wst
Full Precision	ON
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Result_ppm (surf)

General Statistics

Number of Valid Data	111	Number of Detected Data	61
Number of Distinct Detected Data	60	Number of Non-Detect Data	50
		Percent Non-Detects	45.05%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.00185	Minimum Detected	-6.29257
Maximum Detected	6.77	Maximum Detected	1.912501
Mean of Detected	0.348317	Mean of Detected	-2.66549
SD of Detected	1.023656	SD of Detected	1.615522
Minimum Non-Detect	0.00294	Minimum Non-Detect	-5.82935
Maximum Non-Detect	0.0149	Maximum Non-Detect	-4.20639

Note: Data have multiple DLs - Use of KM Method is recommended
For all methods (except KM, DL/2, and ROS Methods),
Observations < Largest ND are treated as NDs

Number treated as Non-Detect	61
Number treated as Detected	50
Single DL Non-Detect Percentage	54.95%

UCL Statistics

Normal Distribution Test with Detected Values Only

Lilliefors Test Statistic	0.36955
5% Lilliefors Critical Value	0.113441

Data not Normal at 5% Significance Level

Lognormal Distribution Test with Detected Values Only

Lilliefors Test Statistic	0.090484
5% Lilliefors Critical Value	0.113441

Data appear Lognormal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method	
Mean	0.192528
SD	0.77553
95% DL/2 (t) UCL	0.314634
Maximum Likelihood Estimate(MLE) Method	N/A

MLE yields a negative mean

Assuming Lognormal Distribution

DL/2 Substitution Method	
Mean	-4.22992
SD	2.130899
95% H-Stat (DL/2) UCL	0.285733
Log ROS Method	
Mean in Log Scale	-4.35607
SD in Log Scale	2.250238
Mean in Original Scale	0.192244
SD in Original Scale	0.7756
95% t UCL	0.314361
95% Percentile Bootstrap UCL	0.322027
95% BCA Bootstrap UCL	0.395497
95% H-UCL	0.351438

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.398211
Theta Star	0.874705
nu star	48.58174
A-D Test Statistic	5.153474
5% A-D Critical Value	0.838045
K-S Test Statistic	0.838045
5% K-S Critical Value	0.121914

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	6.77
Mean	0.191418
Median	0.0116
SD	0.775805
k star	0.132473
Theta star	1.44496
Nu star	29.40898
AppChi2	18.02882
95% Gamma Approximate UCL (Use when n >= 40)	0.312245
95% Adjusted Gamma UCL (Use when n < 40)	0.314289

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data appear Lognormal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	0.19232
SD	0.772079
SE of Mean	0.073891
95% KM (t) UCL	0.314891
95% KM (z) UCL	0.313859
95% KM (jackknife) UCL	0.312709
95% KM (bootstrap t) UCL	0.488537
95% KM (BCA) UCL	0.350126
95% KM (Percentile Bootstrap) UCL	0.329186
95% KM (Chebyshev) UCL	0.514402
97.5% KM (Chebyshev) UCL	0.653767
99% KM (Chebyshev) UCL	0.927523

Potential UCLs to Use

97.5% KM (Chebyshev) UCL	0.653767

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	Naphthalene SO.wst
Full Precision	ON
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Result_ppm (subsurf)

General Statistics

Number of Valid Data	129	Number of Detected Data	80
Number of Distinct Detected Data	79	Number of Non-Detect Data	49
		Percent Non-Detects	37.98%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.00184	Minimum Detected	-6.29799
Maximum Detected	4.01	Maximum Detected	1.388791
Mean of Detected	0.189487	Mean of Detected	-3.30772
SD of Detected	0.53343	SD of Detected	1.655852
Minimum Non-Detect	0.00281	Minimum Non-Detect	-5.87457
Maximum Non-Detect	0.0315	Maximum Non-Detect	-3.45777

Note: Data have multiple DLs - Use of KM Method is recommended
For all methods (except KM, DL/2, and ROS Methods),
Observations < Largest ND are treated as NDs

Number treated as Non-Detect	91
Number treated as Detected	38
Single DL Non-Detect Percentage	70.54%

UCL Statistics

Normal Distribution Test with Detected Values Only

Lilliefors Test Statistic	0.362504
5% Lilliefors Critical Value	0.099058

Data not Normal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method	
Mean	0.118346
SD	0.428892
95% DL/2 (t) UCL	0.180912
Maximum Likelihood Estimate(MLE) Method	N/A

MLE yields a negative mean

Lognormal Distribution Test with Detected Values Only

Lilliefors Test Statistic	0.112244
5% Lilliefors Critical Value	0.099058

Data not Lognormal at 5% Significance Level

Assuming Lognormal Distribution

DL/2 Substitution Method	
Mean	-4.45625
SD	1.989111
95% H-Stat (DL/2) UCL	0.148571
Log ROS Method	
Mean in Log Scale	-4.64404
SD in Log Scale	2.18696
Mean in Original Scale	0.118005
SD in Original Scale	0.428983
95% t UCL	0.180584
95% Percentile Bootstrap UCL	0.188488
95% BCA Bootstrap UCL	0.213066
95% H-UCL	0.206305

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.393496
Theta Star	0.481548
nu star	62.95936
A-D Test Statistic	6.545064
5% A-D Critical Value	0.841876
K-S Test Statistic	0.841876
5% K-S Critical Value	0.106888

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	4.01
Mean	0.117512
Median	0.00822
SD	0.429119
k star	0.150837
Theta star	0.779065
Nu star	38.91591
AppChi2	25.62714
95% Gamma Approximate UCL (Use when n >= 40)	0.178447
95% Adjusted Gamma UCL (Use when n < 40)	0.179298

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	0.118441
SD	0.4272
SE of Mean	0.03785
95% KM (t) UCL	0.181153
95% KM (z) UCL	0.180699
95% KM (jackknife) UCL	0.181003
95% KM (bootstrap t) UCL	0.23561
95% KM (BCA) UCL	0.188871
95% KM (Percentile Bootstrap) UCL	0.187008
95% KM (Chebyshev) UCL	0.283427
97.5% KM (Chebyshev) UCL	0.354816
99% KM (Chebyshev) UCL	0.495047

Potential UCLs to Use

97.5% KM (Chebyshev) UCL	0.354816

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	Fluoranthene.wst
Full Precision	ON
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

FLUORANTHENE_ppm (surf)

General Statistics

Number of Valid Data	111	Number of Detected Data	102
Number of Distinct Detected Data	100	Number of Non-Detect Data	9
		Percent Non-Detects	8.11%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.00422	Minimum Detected	-5.46792
Maximum Detected	402	Maximum Detected	5.9964521
Mean of Detected	11.297825	Mean of Detected	-0.592974
SD of Detected	45.742739	SD of Detected	2.7491228
Minimum Non-Detect	0.002	Minimum Non-Detect	-6.214608
Maximum Non-Detect	0.0022	Maximum Non-Detect	-6.119298

Note: Data have multiple DLs - Use of KM Method is recommended
For all methods (except KM, DL/2, and ROS Methods),
Observations < Largest ND are treated as NDs

Number treated as Non-Detect	9
Number treated as Detected	102
Single DL Non-Detect Percentage	8.11%

UCL Statistics

Normal Distribution Test with Detected Values Only

Lilliefors Test Statistic	0.4024952
5% Lilliefors Critical Value	0.0877271

Data not Normal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method	
Mean	10.38187
SD	43.940833
95% DL/2 (t) UCL	17.300294
Maximum Likelihood Estimate(MLE) Method	
Mean	7.6215454
SD	45.971843
95% MLE (t) UCL	14.859749
95% MLE (Tiku) UCL	14.196123

Lognormal Distribution Test with Detected Values Only

Lilliefors Test Statistic	0.1075972
5% Lilliefors Critical Value	0.0877271

Data not Lognormal at 5% Significance Level

Assuming Lognormal Distribution

DL/2 Substitution Method	
Mean	-1.101315
SD	3.1455783
95% H-Stat (DL/2) UCL	197.42664
Log ROS Method	
Mean in Log Scale	-1.093443
SD in Log Scale	3.1318882
Mean in Original Scale	10.381881
SD in Original Scale	43.94083
95% t UCL	17.300305
95% Percentile Bootstrap UCL	17.624027
95% BCA Bootstrap UCL	22.837677
95% H UCL	188.39725

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.236911
Theta Star	47.688049
nu star	48.329851
A-D Test Statistic	5.001572
5% A-D Critical Value	0.8956509
K-S Test Statistic	0.8956509
5% K-S Critical Value	0.097766

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	402
Mean	10.381785
Median	0.502
SD	43.940853
k star	0.1868278
Theta star	55.568736
Nu star	41.475774
AppChi2	27.714766
95% Gamma Approximate UCL (Use when n >= 40)	15.536576
95% Adjusted Gamma UCL (Use when n < 40)	15.619856

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	10.382127
SD	43.742392
SE of Mean	4.1723472
95% KM (t) UCL	17.303318
95% KM (z) UCL	17.245028
95% KM (jackknife) UCL	17.300435
95% KM (bootstrap t) UCL	31.229611
95% KM (BCA) UCL	18.603632
95% KM (Percentile Bootstrap) UCL	17.722309
95% KM (Chebyshev) UCL	28.568967
97.5% KM (Chebyshev) UCL	36.438427
99% KM (Chebyshev) UCL	51.896458

Potential UCLs to Use

97.5% KM (Chebyshev) UCL	36.438427

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	Phenanthrene.wst
Full Precision	ON
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

PHENANTHRENE_ppm (surf)

General Statistics

Number of Valid Data	111	Number of Detected Data	94
Number of Distinct Detected Data	92	Number of Non-Detect Data	17
		Percent Non-Detects	15.32%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.00291	Minimum Detected	-5.839602
Maximum Detected	200	Maximum Detected	5.2983174
Mean of Detected	5.2490363	Mean of Detected	-1.379079
SD of Detected	22.61674	SD of Detected	2.669798
Minimum Non-Detect	0.002	Minimum Non-Detect	-6.214608
Maximum Non-Detect	0.0098	Maximum Non-Detect	-4.625373

Note: Data have multiple DLs - Use of KM Method is recommended
For all methods (except KM, DL/2, and ROS Methods),
Observations < Largest ND are treated as NDs

Number treated as Non-Detect	30
Number treated as Detected	81
Single DL Non-Detect Percentage	27.03%

UCL Statistics

Normal Distribution Test with Detected Values Only

Lilliefors Test Statistic	0.4082854
5% Lilliefors Critical Value	0.0913839

Data not Normal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method	
Mean	4.4453596
SD	20.882246
95% DL/2 (t) UCL	7.7332407
Maximum Likelihood Estimate(MLE) Method	N/A

MLE yields a negative mean

Lognormal Distribution Test with Detected Values Only

Lilliefors Test Statistic	0.1111689
5% Lilliefors Critical Value	0.0913839

Data not Lognormal at 5% Significance Level

Assuming Lognormal Distribution

DL/2 Substitution Method	
Mean	-2.190908
SD	3.1211944
95% H-Stat (DL/2) UCL	60.251999
Log ROS Method	
Mean in Log Scale	-2.259333
SD in Log Scale	3.2257378
Mean in Original Scale	4.4452773
SD in Original Scale	20.882264
95% t UCL	7.7331612
95% Percentile Bootstrap UCL	8.2785166
95% BCA Bootstrap UCL	10.138654
95% H-UCL	85.827277

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.2355984
Theta Star	22.279588
nu star	44.292507
A-D Test Statistic	5.3641189
5% A-D Critical Value	0.8958834
K-S Test Statistic	0.8958834
5% K-S Critical Value	0.1015039

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	200
Mean	4.44513
Median	0.157
SD	20.882296
k star	0.1611933
Theta star	27.576399
Nu star	35.784907
AppChi2	23.095622
95% Gamma Approximate UCL (Use when n >= 40)	6.8873902
95% Adjusted Gamma UCL (Use when n < 40)	6.9275848

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	4.4456006
SD	20.787918
SE of Mean	1.9836815
95% KM (t) UCL	7.7361797
95% KM (z) UCL	7.7084664
95% KM (jackknife) UCL	7.7333487
95% KM (bootstrap t) UCL	15.892283
95% KM (BCA) UCL	8.6401678
95% KM (Percentile Bootstrap) UCL	8.2297605
95% KM (Chebyshev) UCL	13.092268
97.5% KM (Chebyshev) UCL	16.833688
99% KM (Chebyshev) UCL	24.182983

Potential UCLs to Use

97.5% KM (Chebyshev) UCL	16.833688

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	Pyrene.wst
Full Precision	ON
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

PYRENE_ppm (surf)

General Statistics

Number of Valid Data	111	Number of Detected Data	102
Number of Distinct Detected Data	99	Number of Non-Detect Data	9
		Percent Non-Detects	8.11%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.00565	Minimum Detected	-5.1761
Maximum Detected	297	Maximum Detected	5.6937321
Mean of Detected	9.1588336	Mean of Detected	-0.641747
SD of Detected	34.933974	SD of Detected	2.6846102
Minimum Non-Detect	0.002	Minimum Non-Detect	-6.214608
Maximum Non-Detect	0.0022	Maximum Non-Detect	-6.119298

Note: Data have multiple DLs - Use of KM Method is recommended
For all methods (except KM, DL/2, and ROS Methods),
Observations < Largest ND are treated as NDs

Number treated as Non-Detect	9
Number treated as Detected	102
Single DL Non-Detect Percentage	8.11%

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.3966554	Lilliefors Test Statistic	0.0983969
5% Lilliefors Critical Value	0.0877271	5% Lilliefors Critical Value	0.0877271
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	8.4163104	Mean	-1.146134
SD	33.568414	SD	3.0865835
95% DL/2 (t) UCL	13.701611	95% H-Stat (DL/2) UCL	149.39393
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	6.3198691	Mean in Log Scale	-1.129957
SD	35.134219	SD in Log Scale	3.0574504
95% MLE (t) UCL	11.851704	Mean in Original Scale	8.4163319
95% MLE (Tiku) UCL	11.34666	SD in Original Scale	33.568408
		95% t UCL	13.701632
		95% Percentile Bootstrap UCL	14.414754
		95% BCA Bootstrap UCL	16.784856
		95% H UCL	135.4846

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only
k star (bias corrected)	0.2480629	Data do not follow a Discernable Distribution (0.05)
Theta Star	36.921421	
nu star	50.604825	
A-D Test Statistic	4.6153994	
5% A-D Critical Value	0.8905153	
K-S Test Statistic	0.8905153	
5% K-S Critical Value	0.0975376	
Data not Gamma Distributed at 5% Significance Level		

Assuming Gamma Distribution		Nonparametric Statistics	
Gamma ROS Statistics using Extrapolated Data		Kaplan-Meier (KM) Method	
Minimum	0.000001	Mean	8.4166836
Maximum	297	SD	33.416768
Mean	8.4162256	SE of Mean	3.1874425
Median	0.512	95% KM (t) UCL	13.704091
SD	33.568435	95% KM (z) UCL	13.65956
k star	0.1935433	95% KM (jackknife) UCL	13.701959
Theta star	43.484985	95% KM (bootstrap t) UCL	21.753125
Nu star	42.966603	95% KM (BCA) UCL	14.904616
AppChi2	28.93734	95% KM (Percentile Bootstrap) UCL	14.361556
95% Gamma Approximate UCL (Use when n >= 40)	12.49654	95% KM (Chebyshev) UCL	22.310423
95% Adjusted Gamma UCL (Use when n < 40)	12.562184	97.5% KM (Chebyshev) UCL	28.322256
		99% KM (Chebyshev) UCL	40.131336
		Potential UCLs to Use	
		97.5% KM (Chebyshev) UCL	28.322256

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Attachment D-3
Lead Model Risk Calculations

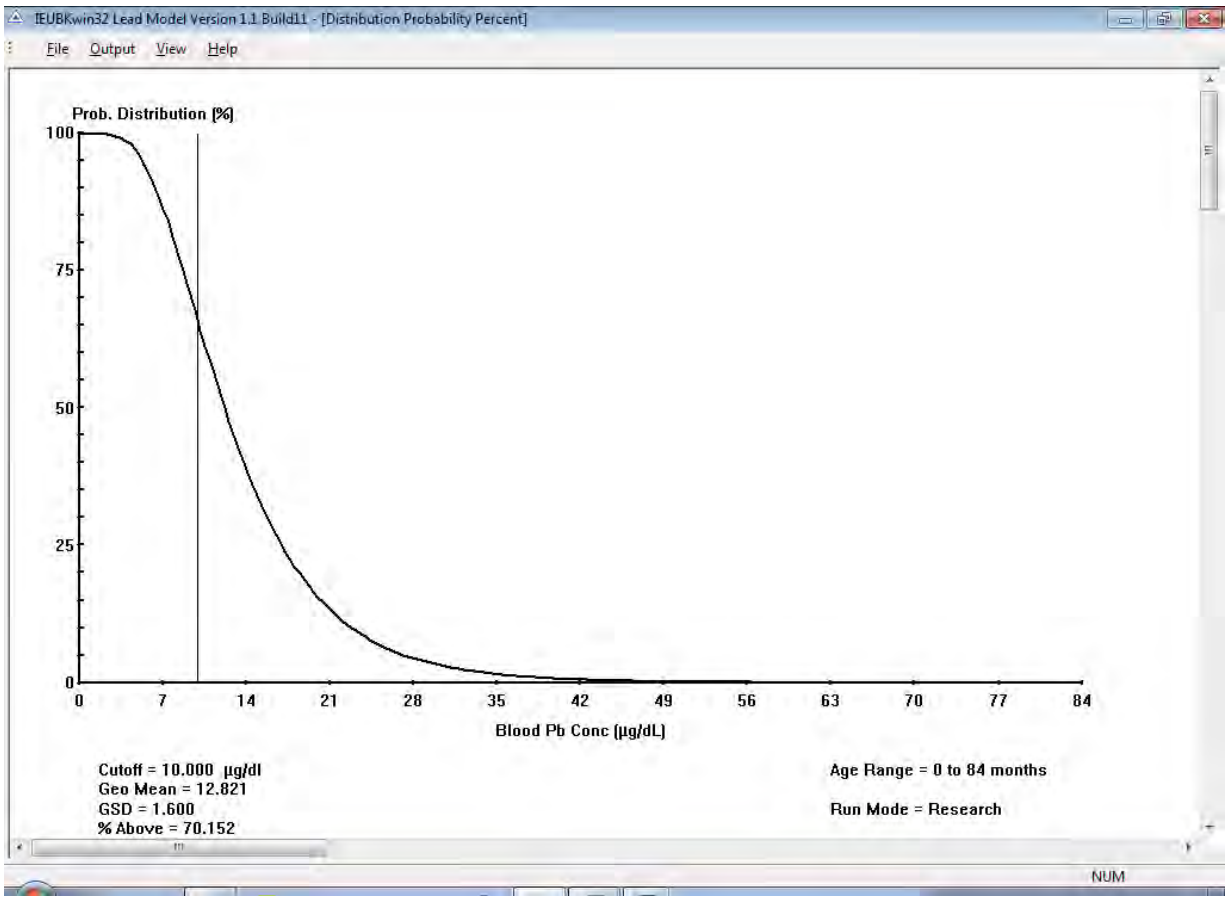
Attachment D-3
Lead Risk Assessment Documentation

Lead was evaluated in accordance with USEPA's *User's Guide for the Integrated Exposure Uptake Biokinetic Model for Lead in Children (IEUBK)* (USEPA, 2007). The model estimates blood lead levels in children exposed to lead-contaminated media for a hypothetical child or population of children and a plausible distribution of blood lead concentrations centered on a geometric mean blood lead concentration. The geometric mean blood lead is predicted from available information about children's exposure to lead. From this distribution, the model estimates the probability that the blood lead concentration will exceed 10 µg/dL. A probability higher than five percent that the blood lead concentration will exceed 10 µg/dL indicates the exposure conditions and scenario may be unacceptable due to lead risk, and lead will be identified as a chemical of concern.

Residential

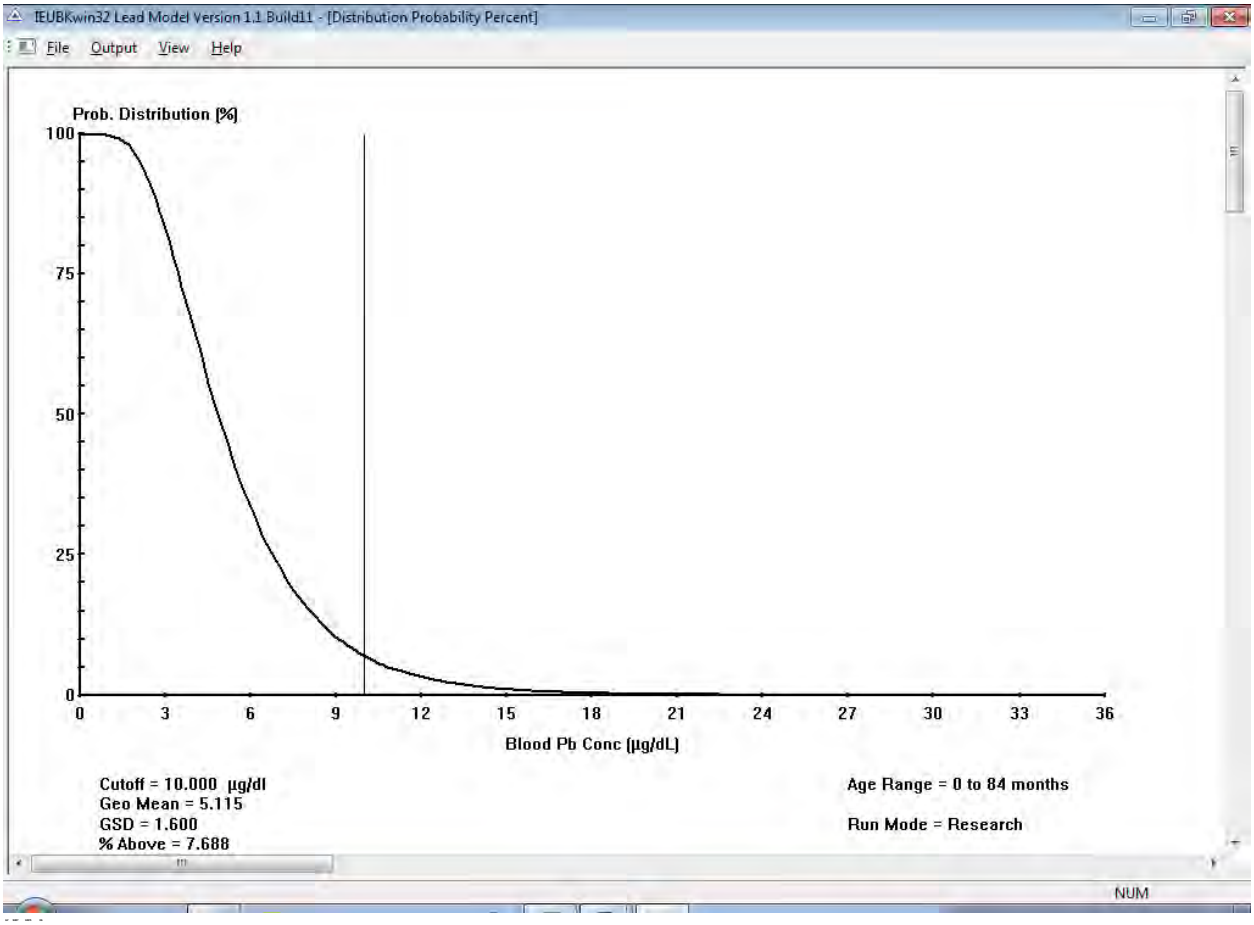
Surface

As shown in the lead model documentation below, the probability that the blood lead concentration will exceed 10 µg/dL is greater than five percent. Consequently, the exposure conditions and scenario may lead to unacceptable risk due to lead, and lead is a COC for this scenario and depth interval.



Subsurface

As shown in the lead model documentation below, the probability that the blood lead concentration will exceed 10 µg/dL is greater than five percent. Consequently, the exposure conditions and scenario may lead to unacceptable risk due to lead, and lead is a COC for this scenario and depth interval.



Site Worker

Surface

As shown in the lead model documentation below, the probability that the blood lead concentration will exceed 10 µg/dL is greater than five percent. Consequently, the exposure conditions and scenario may lead to unacceptable risk due to lead, and lead is a COC for this scenario and depth interval.

Attachment D-3
Lead Risk Assessment Documentation

Calculations of Blood Lead Concentrations (PbBs)
U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee
Version date 6/21/09

Variable	Description of Variable	Units	GSDi and PbBo from Analysis of NHANES 1999-2004	GSDi and PbBo from Analysis of NHANES III (Phases 1&2)
PbS	Soil lead concentration	ug/g or ppm	1636.4	1636.4
$R_{fetal/maternal}$	Fetal/maternal PbB ratio	--	0.9	0.9
BKSF	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4
GSD_i	Geometric standard deviation PbB	--	1.8	2.1
PbB_0	Baseline PbB	ug/dL	1.0	1.5
IR_S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.050	0.050
IR_{S+D}	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--
W_S	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--
K_{SD}	Mass fraction of soil in dust	--	--	--
$AF_{S, D}$	Absorption fraction (same for soil and dust)	--	0.12	0.12
$EF_{S, D}$	Exposure frequency (same for soil and dust)	days/yr	219	219
$AT_{S, D}$	Averaging time (same for soil and dust)	days/yr	365	365
PbB_{adult}	**PbB of adult worker, geometric mean**	**ug/dL**	**3.4**	**3.9**
$PbB_{fetal, 0.95}$	95th percentile PbB among fetuses of adult workers	ug/dL	7.9	11.8
PbB_t	Target PbB level of concern (e.g., 10 ug/dL)	ug/dL	**10.0**	**10.0**
$P(PbB_{fetal} > PbB_t)$	**Probability that fetal PbB > PbB_t, assuming lognormal distribution**	**%**	**2.1%**	**7.7%**

Subsurface

As shown in the lead model documentation below, the probability that the blood lead concentration will exceed 10 µg/dL is less than five percent. Consequently, lead is not a COC for this scenario and depth interval.

Calculations of Blood Lead Concentrations (PbBs)
U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee
Version date 6/21/09

Variable	Description of Variable	Units	GSDi and PbBo from Analysis of NHANES 1999-2004	GSDi and PbBo from Analysis of NHANES III (Phases 1&2)
PbS	Soil lead concentration	ug/g or ppm	479.3	479.3
$R_{fetal/maternal}$	Fetal/maternal PbB ratio	--	0.9	0.9
BKSF	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4
GSD_i	Geometric standard deviation PbB	--	1.8	2.1
PbB_0	Baseline PbB	ug/dL	1.0	1.5
IR_S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.050	0.050
IR_{S+D}	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--
W_S	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--
K_{SD}	Mass fraction of soil in dust	--	--	--
$AF_{S, D}$	Absorption fraction (same for soil and dust)	--	0.12	0.12
$EF_{S, D}$	Exposure frequency (same for soil and dust)	days/yr	219	219
$AT_{S, D}$	Averaging time (same for soil and dust)	days/yr	365	365
PbB_{adult}	**PbB of adult worker, geometric mean**	**ug/dL**	**1.7**	**2.2**
$PbB_{fetal, 0.95}$	95th percentile PbB among fetuses of adult workers	ug/dL	4.0	6.7
PbB_t	Target PbB level of concern (e.g., 10 ug/dL)	ug/dL	**10.0**	**10.0**
$P(PbB_{fetal} > PbB_t)$	**Probability that fetal PbB > PbB_t, assuming lognormal distribution**	**%**	**0.1%**	**1.4%**

Attachment D-3
Lead Risk Assessment Documentation

Excavation Worker

Surface

As shown in the lead model documentation below, the probability that the blood lead concentration will exceed 10 µg/dL is less than five percent. Consequently, lead is not a COC for this scenario and depth interval.

Calculations of Blood Lead Concentrations (PbBs)
U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee
Version date 6/21/09

Variable	Description of Variable	Units	GSDi and PbBo from Analysis of NHANES 1999-2004	GSDi and PbBo from Analysis of NHANES III (Phases 1&2)
PbS	Soil lead concentration	ug/g or ppm	1636.4	1636.4
Rfetal/maternal	Fetal/maternal PbB ratio	--	0.9	0.9
BKSF	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4
GSDi	Geometric standard deviation PbB	--	1.8	2.1
PbB0	Baseline PbB	ug/dL	1.0	1.5
IRS	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.050	0.050
IRS+D	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--
WS	Weighting factor; fraction of IRS+D ingested as outdoor soil	--	--	--
KSD	Mass fraction of soil in dust	--	--	--
AFS, D	Absorption fraction (same for soil and dust)	--	0.12	0.12
EFS, D	Exposure frequency (same for soil and dust)	days/yr	20	20
ATS, D	Averaging time (same for soil and dust)	days/yr	365	365
PbBadult	**PbB of adult worker, geometric mean**	**ug/dL**	**1.2**	**1.7**
PbBfetal, 0.95	95th percentile PbB among fetuses of adult workers	ug/dL	2.9	5.2
PbBt	Target PbB level of concern (e.g., 10 ug/dL)	ug/dL	**10.0**	**10.0**
P(PbBfetal > PbBt)	**Probability that fetal PbB > PbBt, assuming lognormal distribution**	**%**	**0.01%**	**0.6%**

Subsurface

As shown in the lead model documentation below, the probability that the blood lead concentration will exceed 10 µg/dL is less than five percent. Consequently, lead is not a COC for this scenario and depth interval.

Attachment D-3
Lead Risk Assessment Documentation

Calculations of Blood Lead Concentrations (PbBs)
U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee
Version date 6/21/09

Variable	Description of Variable	Units	GSDi and PbBo from Analysis of NHANES 1999-2004	GSDi and PbBo from Analysis of NHANES III (Phases 1&2)
PbS	Soil lead concentration	ug/g or ppm	479.3	479.3
Rfetal/maternal	Fetal/maternal PbB ratio	--	0.9	0.9
BKSF	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4
GSDi	Geometric standard deviation PbB	--	1.8	2.1
PbB0	Baseline PbB	ug/dL	1.0	1.5
IRS	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.050	0.050
IRS+D	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--
WS	Weighting factor; fraction of IRS+D ingested as outdoor soil	--	--	--
KSD	Mass fraction of soil in dust	--	--	--
AFS, D	Absorption fraction (same for soil and dust)	--	0.12	0.12
EFS, D	Exposure frequency (same for soil and dust)	days/yr	20	20
ATS, D	Averaging time (same for soil and dust)	days/yr	365	365
PbBadult	**PbB of adult worker, geometric mean**	**ug/dL**	**1.1**	**1.6**
PbBfetal, 0.95	95th percentile PbB among fetuses of adult workers	ug/dL	2.5	4.8
PbBt	Target PbB level of concern (e.g., 10 ug/dL)	ug/dL	**10.0**	**10.0**
P(PbBfetal > PbBt)	**Probability that fetal PbB > PbBt, assuming lognormal distribution**	**%**	**0.003%**	**0.4%**

Recreational User

Surface

As shown in the lead model documentation below, the probability that the blood lead concentration will exceed 10 µg/dL is less than five percent. Consequently, lead is not a COC for this scenario and depth interval.

Calculations of Blood Lead Concentrations (PbBs)
U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee
Version date 6/21/09

Variable	Description of Variable	Units	GSDi and PbBo from Analysis of NHANES 1999-2004	GSDi and PbBo from Analysis of NHANES III (Phases 1&2)
PbS	Soil lead concentration	ug/g or ppm	1636.4	1636.4
Rfetal/maternal	Fetal/maternal PbB ratio	--	0.9	0.9
BKSF	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4
GSDi	Geometric standard deviation PbB	--	1.8	2.1
PbB0	Baseline PbB	ug/dL	1.0	1.5
IRS	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.050	0.050
IRS+D	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--
WS	Weighting factor; fraction of IRS+D ingested as outdoor soil	--	--	--
KSD	Mass fraction of soil in dust	--	--	--
AFS, D	Absorption fraction (same for soil and dust)	--	0.12	0.12
EFS, D	Exposure frequency (same for soil and dust)	days/yr	75	75
ATS, D	Averaging time (same for soil and dust)	days/yr	365	365
PbBadult	**PbB of adult worker, geometric mean**	**ug/dL**	**1.8**	**2.3**
PbBfetal, 0.95	95th percentile PbB among fetuses of adult workers	ug/dL	4.3	7.0
PbBt	Target PbB level of concern (e.g., 10 ug/dL)	ug/dL	**10.0**	**10.0**
P(PbBfetal > PbBt)	**Probability that fetal PbB > PbBt, assuming lognormal distribution**	**%**	**0.1%**	**1.7%**

Subsurface

As shown in the lead model documentation below, the probability that the blood lead concentration will exceed 10 µg/dL is less than five percent. Consequently, lead is not a COC for this scenario and depth interval.

Calculations of Blood Lead Concentrations (PbBs)
U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee
Version date 6/21/09

Variable	Description of Variable	Units	GSDi and PbBo from Analysis of NHANES 1999-2004	GSDi and PbBo from Analysis of NHANES III (Phases 1&2)
PbS	Soil lead concentration	ug/g or ppm	479.3	479.3
Rfetal/maternal	Fetal/maternal PbB ratio	--	0.9	0.9
BKSF	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4
GSDi	Geometric standard deviation PbB	--	1.8	2.1
PbB0	Baseline PbB	ug/dL	1.0	1.5
IRS	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.050	0.050
IRS+D	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--
WS	Weighting factor; fraction of IRS+D ingested as outdoor soil	--	--	--
KSD	Mass fraction of soil in dust	--	--	--
AFS, D	Absorption fraction (same for soil and dust)	--	0.12	0.12
EFS, D	Exposure frequency (same for soil and dust)	days/yr	75	75
ATS, D	Averaging time (same for soil and dust)	days/yr	365	365
PbBadult	**PbB of adult worker, geometric mean**	**ug/dL**	**1.2**	**1.7**
PbBfetal, 0.95	95th percentile PbB among fetuses of adult workers	ug/dL	2.9	5.3
PbBt	Target PbB level of concern (e.g., 10 ug/dL)	ug/dL	**10.0**	**10.0**
P(PbBfetal > PbBt)	**Probability that fetal PbB > PbBt, assuming lognormal distribution**	**%**	**0.01%**	**0.6%**

Lead Summary

Lead was identified as a COC in both surface and subsurface soil for the hypothetical residential scenario. In the site worker scenario, lead was identified as a COC in surface soil and was not identified as a COC in subsurface soil. Lead was not identified as a COC in the excavation worker or recreational user scenarios.

Attachment D-4
Toxicological Effects Profiles

Chemicals of Potential Concern (COPCs) were identified in the human health risk assessment, and toxicological summaries were included for the COPCs below.

- Benzo(a)pyrene Equivalents
- Benzo(a)pyrene
- Benzo(a)anthracene
- Benzo(b)fluoranthene
- Benzo(k)fluoranthene
- Chrysene
- Dibenz(a,h)anthracene
- Indeno(1,2,3-cd)pyrene
- Fluoranthene
- Phenanthrene
- Pyrene
- Naphthalene
- Lead

Unless otherwise noted, references are available in the Oak Ridge National Laboratory Risk Assessment Information System. Some toxicity profiles could have been written prior to the updates made in USEPA's Risk Assessment Information System (IRIS) and other sources of toxicity values. Consequently, USEPA's hierarchy of toxicity values takes precedence over the following toxicological summaries in accordance with USEPA's December 5, 2003 OSWER Directive 9285.7-53, which recommends the following toxicity value hierarchy:

1. EPA's IRIS.

2. EPA's Provisional Peer Reviewed Toxicity Values (PPRTVs) — The Office of Research and Development/National Center for Environmental Assessment/Superfund Health Risk Technical Support Center (STSC) develops PPRTVs on a chemical specific basis when requested by EPA's Superfund program.

3. Other Toxicity Values — This tier includes additional EPA and non-EPA sources of toxicity information. Priority should be given to those sources of information that are the most current, the basis for which is transparent and publicly available, and which have been peer reviewed.

Benzo[a]pyrene equivalents (BEQ) is the equivalent concentration of benzo[a]pyrene, which is calculated by using a toxic equivalency factor (TEF) for each carcinogenic polycyclic aromatic hydrocarbon (PAH) that has a mechanism similar to benzo[a]pyrene. The equivalent concentrations for each carcinogenic PAH are summed to provide one BEQ concentration per location and depth interval, in accordance with USEPA's Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons (USEPA, 1993a) and USEPA Human Health Risk Assessment Bulletins – Region 4 Supplement to RAGS (USEPA, 2000). After calculating the sum BEQ for each location, BEQ is evaluated as a single chemical using toxicological information for benzo[a]pyrene.

Example Calculation of Benzo[a]pyrene Equivalents At a Single Location			
Polycyclic Aromatic Hydrocarbon	**PAH Concentration Reported in Soil (mg/kg)**	**Toxic Equivalency Factor (unitless)**	**Soil BEQ (mg/kg)**
Benzo(a)anthracene	1.8	0.1	0.18
Benzo(a)pyrene	1.548	1.0	1.548
Benzo(b)fluoranthene	1.684	0.1	0.1684
Benzo(k)fluoranthene	1.022	0.01	0.01022
Chrysene	1.6	0.001	0.0016
Dibenz(a,h)anthracene	0.346	1.0	0.346
Indeno(1,2,3-cd)pyrene	0.715	0.1	0.0715
			Sum of BEQ = 2.33

Benzo(a)pyrene is one of many PAHs. It exists as yellowish plates and needles. Benzo[a]pyrene is practically insoluble in water but is soluble in benzene, toluene, xylene and sparingly soluble in alcohol and methanol. No current commercial production or use of benzo[a]pyrene is known. It occurs ubiquitously in products of incomplete combustion and in fossil fuels. It has been identified in surface water, tap water, rain water, groundwater, waste water, and sewage sludge. Benzo[a]pyrene is primarily released to the air and removed from the atmosphere by photochemical oxidation and dry deposition to land or water. Biodegradation is the most important transformation process in soil or sediment.

No data are available on the systemic (non-carcinogenic) effects of benzo[a]pyrene in humans. Benzo[a]pyrene is readily absorbed following inhalation, oral, and dermal routes of administration. Following inhalation exposure, benzo[a]pyrene is rapidly distributed to several tissues in rats. The metabolism of benzo[a]pyrene is complex and includes the formation of a proposed ultimate carcinogen, benzo[a]pyrene 7,8 diol-9,10-epoxide. D ietary administration of doses as low as 10 mg/kg during gestation caused reduced fertility and reproductive capacity in mice offspring, and treatment by gavage with 120 mg/kg/day during gestation caused stillbirths, resorptions, and malformations.

Numerous epidemiologic studies have shown a clear association between exposure to various mixtures of PAHs containing benzo[a]pyrene (e.g., coke oven emissions, roofing tar emissions, and cigarette smoke) and increased risk of lung cancer and other tumors. However, each of the mixtures also contained other potentially carcinogenic PAHs; therefore, it is not possible to evaluate the contribution of benzo[a]pyrene to the carcinogenicity of these mixtures. Based on United States Environmental Protection Agency (USEPA) guidelines, benzo[a]pyrene was assigned to weight-of-evidence group B2, probable human carcinogen.

The following is a presentation of the toxicity information associated with benzo[a]pyrene:

Carcinogenic Health Effects

- The Oral Slope Factor is 7.30E+00 $(mg/kg\text{-}day)^{-1}$.
- The Oral Slope Factor study target organ is forestomach.
- The Oral Slope Factor study cancer type is squamous cell papillomas and carcinomas.
- The Oral Slope Factor is based on the Neal and Rigdon study from 1967.
- The Inhalation Unit Risk is 8.8E-01 $(mg/m^3)^{-1}$.
- The Dermal Slope Factor is 2.35E+01 $(mg/kg\text{-}day)^{-1}$.
- The Dermal Slope Factor is based on a gastrointestinal absorption factor of 0.3100.

Faust, Rosmarie A., Chemical Hazard Evaluation Group, Biomedical and Environmental Information Analysis Section, Health Sciences Research Division, Oak Ridge, Tennessee.

USEPA's Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons (USEPA, 1993a)

USEPA Human Health Risk Assessment Bulletins — Region 4 Supplement to RAGS (USEPA, 2000).

USEPA Integrated Risk Information System.

Lead occurs naturally as a sulfide in galena. It is a soft, bluish-white, silvery gray, malleable metal with a melting point of 327.5C. Elemental lead reacts with hot boiling acids and is attacked by pure water. The solubility of lead salts in water varies from insoluble to soluble depending on the type of salt (IARC, 1980; Goyer, 1988; Budavari et al., 1989).

Lead is a natural element that is persistent in water and soil. Most of the lead in environmental media is of anthropogenic sources. The mean concentration is 3.9 ug/L in surface water and 0.005 ug/L in sea water. River sediments contain about 20,000 ug/g and coastal sediments about 100,000 ug/g. Soil content varies with the location, ranging up to 30 ug/g in rural areas, 3000 ug/g in urban areas, and 20,000 ug/g near point sources. Human exposure occurs primarily through diet, air, drinking water, and ingestion of dirt and paint chips (EPA, 1989; ATSDR, 1993).

The efficiency of lead absorption depends on the route of exposure, age, and nutritional status. Adult humans absorb about 10-15% of ingested lead, whereas children may absorb up to 50%, depending on whether lead is in the diet, dirt, or paint chips. More than 90% of lead particles deposited in the respiratory tract are absorbed into systemic circulation. Inorganic lead is not efficiently absorbed through the skin; consequently, this route does not contribute considerably to the total body lead burden (EPA, 1986a).

Lead absorbed into the body is distributed to three major compartments: blood, soft tissue, and bone. The largest compartment is the bone, which contains about 95% of the total body lead burden in adults and about 73% in children. The half-life of bone lead is more than 20 years. The concentration of blood lead changes rapidly with exposure, and its half-life of only 25-28 days is considerably shorter than that of bone lead. Blood lead is in equilibrium with lead in bone and soft tissue. The soft tissues that take up lead are liver, kidneys, brain, and muscle. Lead is not metabolized in the body, but it may be conjugated with glutathione and excreted primarily in the urine (EPA, 1986a,c; ATSDR, 1993). Exposure to lead is evidenced by elevated blood lead levels.

The systemic toxic effects of lead in humans have been well-documented by the EPA (EPA, 1986a-e, 1989a, 1990) and ATSDR (1993), who extensively reviewed and evaluated data reported in the literature up to 1991. The evidence shows that lead is a multitargeted toxicant, causing effects in the gastrointestinal tract, hematopoietic system, cardiovascular system, central and peripheral nervous systems, kidneys, immune system, and reproductive system. Overt symptoms of subencephalopathic central nervous system (CNS) effects and peripheral nerve damage occur at blood lead levels of 40-60 ug/dL, and nonovert symptoms, such as peripheral nerve dysfunction, occur at levels of 30-50 ug/dL in adults; no clear threshold is evident. Cognitive and neuropsychological deficits are not usually the focus of studies in adults, but there is some evidence of neuropsychological impairment (Ehle and McKee, 1990) and cognitive deficits in lead workers with blood levels of 41-80 ug/dL (Stollery et al., 1993).

Although similar effects occur in adults and children, children are more sensitive to lead exposure than are adults. Irreversible brain damage occurs at blood lead levels greater than or equal to 100 ug/dL in adults and at 80-100 ug/dL in children; death can occur at the same blood levels in children. Children who survive these high levels of exposure suffer permanent severe mental retardation.

As discussed previously, neuropsychological impairment and cognitive (IQ) deficits are sensitive indicators of lead exposure; both neuropsychological impairment and IQ deficits have been the subject of cross-sectional and longitudinal studies in children. One of the early studies reported IQ score deficits of four points at blood lead levels of 30-50 ug/dL and one to two points at levels of 15-30 ug/dL among 75 black children of low socioeconomic status (Schroeder and Hawk, 1986).

Very detailed longitudinal studies have been conducted on children (starting at the time of birth) living in Port Pirie, Australia (Vimpani et al., 1985, 1989; McMichael et al., 1988; Wigg et al., 1988; Baghurst et al., 1992a,b), Cincinnati, Ohio (Dietrich et al., 1986, 1991, 1992, 1993), and Boston, Massachusetts (Bellinger et al., 1984, 1987, 1990, 1992; Stiles and Bellinger 1993). Various measures of cognitive performance have been assessed in these children. Studies of the Port Pirie children up to 7 years of age revealed IQ deficits in 2-year-old children of 1.6 points for each 10-ug/dL increase in blood lead, deficits of 7.2 points in 4-year-old children, and deficits of 4.4 to 5.3

points in 7-year-old children as blood lead increased from 10-30 ug/dL. No significant neurobehavioral deficits were noted for children, 5 years or younger, who lived in the Cincinnati, Ohio, area. In 6.5-year-old children, performance IQ was reduced by 7 points in children whose lifetime blood level exceeded 20 ug/dL.

Children living in the Boston, Massachusetts, area have been studied up to the age of 10 years. Cognitive performance scores were negatively correlated with blood lead in the younger children in the high lead group (greater than or equal to 10 ug/dL), and improvements were noted in some children at 57 months as their blood lead levels became lower. However, measures of IQ and academic performance in 10-year-old children showed a 5.8-point deficit in IQ and an 8.9-point deficit in academic performance as blood lead increased by 10 ug/dL within the range of 1-25 ug/dL. Because of the large database on subclinical neurotoxic effects of lead in children, only a few of the studies have been included. However, EPA (EPA, 1986a, 1990) concluded that there is no clear threshold for neurotoxic effects of lead in children.

In adults, the cardiovascular system is a very sensitive target for lead. Hypertension (elevated blood pressure) is linked to lead exposure in occupationally exposed subjects and in the general population. Three large population-based studies have been conducted to study the relationship between blood lead levels and high blood pressure. The British Regional Heart Study (BRHS) (Popcock et al., 1984), the NHANES II study (Harlan et al., 1985; Pirkle et al., 1985; Landis and Flegal, 1988; Schwartz, 1990; EPA, 1990), and Welsh Heart Programme (Ellwood et al., 1988a,b) comprise the major studies for the general population. The BRHS study showed that systolic pressure greater than 160 mm Hg and diastolic pressure greater than 100 mm Hg were associated with blood lead levels greater than 37 ug/dL (Popcock et al., 1984). An analysis of 9933 subjects in the NHANES study showed positive correlations between blood pressure and blood lead among 12-74-year-old males but not females (Harlan et al., 1985; Landis and Flegal et al., 1988), 40-59-year-old white males with blood levels ranging from 7-34 ug/dL (Pirkle et al., 1985), and males and females greater than 20 years old (Schwartz, 1991). In addition, left ventricular hypertrophy was also positively associated with blood lead (Schwartz, 1991). The Welsh study did not show an association among men and women with blood lead of 12.4 and 9.6 ug/dL, respectively (Ellwood et al., 1988a,b). Other smaller studies showed both positive and negative results. The EPA (EPA, 1990) concluded that increased blood pressure is positively correlated with blood lead levels in middle-aged men, possibly at concentrations as low as 7 ug/dL. In addition, the EPA estimated that systolic pressure is increased by 1.5-3.0 mm Hg in males and 1.0-2.0 mm Hg in females for every doubling of blood lead concentration.

The hematopoietic system is a target for lead as evidenced by frank anemia occurring at blood lead levels of 80 ug/dL in adults and 70 ug/dL in children. The anemia is due primarily to reduced heme synthesis, which is observed in adults having blood levels of 50 ug/dL and in children having blood levels of 40 ug/dL. Reduced heme synthesis is caused by inhibition of key enzymes involved in the

synthesis of heme. Inhibition of erythrocyte -aminolevulinic acid dehydrase (ALAD) activity (catalyzes formation of porphobilinogen from -aminolevulinic acid) has been detected in adults and children having blood levels of less than 10 ug/dL. ALAD activity is the most sensitive measure of lead exposure, but erythrocyte zinc protoporphyrin is the most reliable indicator of lead exposure because it is a measure of the toxicologically active fraction of bone lead. The activity of another erythrocyte enzyme, pyrimidine-5-nucleotidase, is also inhibited by lead exposure. Inhibition has been observed at levels below 5 ug/dL; no clear threshold is evident.

Other organs or systems affected by exposure to lead are the kidneys, immune system, reproductive system, gastrointestinal tract, and liver. These effects usually occur at high blood levels, or the blood levels at which they occur have not been sufficiently documented.

The EPA has not developed an RfD for lead because it appears that lead is a nonthreshold toxicant, and it is not appropriate to develop RfDs for these types of toxicants. Instead the EPA has developed the Integrated Exposure Uptake Biokenetic Model to estimate the percentage of the population of children up to 6 years of age with blood lead levels above a critical value, 10 ug/dL. The model determines the contribution of lead intake from multimedia sources (diet, soil and dirt, air, and drinking water) on the concentration of lead in the blood. Site-specific concentrations of lead in various media are used when available; otherwise default values are assumed. The EPA has established a screening level of 400 ppm (ug/g) for lead in soil (EPA, 1994a).

Inorganic lead and lead compounds have been evaluated for carcinogenicity by the EPA (EPA, 1989, 1993). The data from human studies are inadequate for evaluating the potential carcinogenicity of lead. Data from animal studies, however, are sufficient based on numerous studies showing that lead induces renal tumors in experimental animals. A few studies have shown evidence for induction of tumors at other sites (cerebral gliomas; testicular, adrenal, prostate, pituitary, and thyroid tumors). A slope factor was not derived for inorganic lead or lead compounds.

Davidson, Kowetha A., Chemical Hazard Evaluation and Communication Program, Biomedical and Environmental Information Analysis Section, Health Sciences Research Division, Oak Ridge, Tennessee.

USEPA Integrated Risk Information System.

Naphthalene (CAS Reg. No. 91-20-3), a white solid with a characteristic odor of mothballs, is a polycyclic aromatic hydrocarbon composed of two fused benzene rings. The principal end use of naphthalene is as a raw material for the production of phthalic anhydride. It is also used as an intermediate for synthetic resins, celluloid, lampblack, smokeless powder, solvents, and lubricants. Naphthalene is used directly as a moth repellant, insecticide, anthelmintic, and intestinal antiseptic (ATSDR, 1990; U.S. EPA, 1986).

Naphthalene can be absorbed by the oral, inhalation, and dermal routes of exposure and can cross the placenta in amounts sufficient to cause fetal toxicity. The most commonly observed effect of naphthalene toxicity following acute oral or inhalation exposure in humans is hemolytic anemia associated with decreased hemoglobin and hematocrit values, increased reticulocyte counts, presence of Heinz bodies, and increased serum bilirubin levels (ATSDR, 1990). Hemolytic anemia has been observed in an infant dermally exposed to naphthalene (Schafer, 1951) and in infants whose mothers were exposed to naphthalene during pregnancy (Anziulewicz et al., 1959; Zinkham and Childs, 1958). Infants and individuals having a congenital deficiency of erythrocyte glucose-6-phosphate dehydrogenase are especially susceptible to naphthalene-induced hemolytic anemia (Wintrobe et al., 1974).

Acute oral and subchronic inhalation exposure of humans to naphthalene has resulted in neurotoxic effects (confusion, lethargy, listlessness, vertigo), gastrointestinal distress, hepatic effects (jaundice, hepatomegaly, elevated serum enzyme levels), renal effects, and ocular effects (cataracts, optical atrophy). Cataracts have been reported in individuals occupationally exposed to naphthalene (Ghetti and Mariani, 1956) and in rabbits and rats exposed orally to naphthalene (Van Heyningen and Pirie, 1976; Fitzhugh and Buschke, 1949). A number of deaths have been reported following intentional ingestion of naphthalene-containing mothballs (ATSDR, 1990). The estimated lethal dose of naphthalene is 5-15 g for adults and 2-3 g for children. Naphthalene is a primary skin irritant and is acutely irritating to the eyes of humans (Sandmeyer, 1981).

Increased mortality, clinical signs of toxicity, kidney and thymus lesions, and signs of anemia were observed in rats treated by gavage with 400 mg/kg of naphthalene for 13 weeks (NTP, 1980a). No adverse effects occurred at 50 mg/kg. Transient clinical signs of toxicity were seen in mice exposed by gavage to 53 mg/kg for 13 weeks (NTP, 1980b). Subchronic oral exposure to 133 mg/kg/day for 90 days produced decreased spleen weights in female mice (Shopp et al., 1984). Reduced numbers of pups/litter were observed when naphthalene was administered orally to pregnant mice (Pflasterer et al., 1985). Negative results in a two-year feeding study with rats receiving 10-20 mg naphthalene/kg/day (Schmahl, 1955) and equivocal results in a mouse lung tumor bioassay (Adkins et al., 1986) suggest that naphthalene is not a potential carcinogen.

A subchronic and chronic oral reference dose (RfD) of 4E-2 mg/kg/day for naphthalene has been calculated by U.S. EPA (1992). These values are based on a NOEL of 50 mg/kg/day derived from a subchronic oral toxicity study with rats (NTP, 1980a). The RfD is currently under review by U.S. EPA and may be subject to change (U.S. EPA, 1992). A reference concentration (RfC) for chronic inhalation exposure has not been derived by U.S. EPA. Available cancer bioassays were insufficient to assess the carcinogenicity of naphthalene. Therefore, U.S. EPA (1991, 1992) has placed naphthalene in weight-of-evidence group D, not classifiable as to human carcinogenicity.

Faust, Rosmarie A., Chemical Hazard Evaluation Group Biomedical and Environmental Information Analysis Section, Health and Safety Research Division, Oak Ridge, Tennessee.

Fluoranthene is a PAH that can be derived from coal tar. Occurring ubiquitously in products of incomplete combustion of fossil fuels, fluoranthene has been identified in ambient air, surface, drinking, and waste water, and in char-broiled foods. Currently, there is no commercial production or use of this compound (IARC, 1983). .

Fluoranthene can be absorbed through the skin following dermal exposure (Storer et al., 1984) and, by analogy to structurally-related PAHs, would be expected to be absorbed from the gastrointestinal tract and lungs (U.S. EPA, 1988). An in vitro study identified 2-methylfluoranthene and 3-methylfluoranthene and their dihydrodiols as metabolites of fluoranthene (La Voie et al., 1982). .

Although a large body of literature exists on the toxicity and carcinogenicity of PAHs, primarily benzo[a]pyrene, toxicity data for phenanthrene are very limited. No human data were available that addressed the toxicity of fluoranthene. Acute toxicity data for animals include an oral LD50 of 2000 mg/kg for rats; a dermal LD50 of 3180 mg/kg for rabbits (Smyth et al., 1962); and an intravenous LD50 of 100 mg/kg for mice (RTECS, 1993). Subchronic oral exposure to fluoranthene at doses of greater than or equal to 250 mg/kg produced nephropathy, increased liver weights, and increased liver enzyme levels in rats (U.S. EPA, 1988). A single intraperitoneal injection of fluoranthene to pregnant rats caused an increased rate of embryo resorptions (Irvin and Martin, 1987). Fluoranthene was photosensitizing, enhancing erythema elicited by ultraviolet radiation in guinea pig skin (Kochevar et al., 1982) and was irritating to the eyes of rabbits (Grant, 1986). .

A Reference Dose (RfD) of 4.00E-01 mg/kg/day for subchronic oral exposure and 4.00E-02 mg/kg/day for chronic oral exposure to fluoranthene was calculated from a no-observed-adverse-effect level (NOAEL) of 125 mg/kg/day and a lowest-observed-adverse-effect level (LOAEL) of 250 mg/kg/day derived from a 13-week gavage study with mice (U.S. EPA, 1993a,b). The critical effects were nephropathy, increased liver weights, and changes in clinical and hematological parameters. Data were insufficient to derive an inhalation Reference Concentration (RfC) for fluoranthene (U.S. EPA, 1993a,b). .

No oral or inhalation bioassays were available to assess the carcinogenicity of fluoranthene. Bioassays by other exposure routes generally gave negative results. Studies involving topical application to the skin of mice (Horton and Christian, 1974; Hoffmann, 1972; Wynder and Hoffmann, 1959; Suntzeff et al., 1957) and subcutaneous injection in mice (Shear, 1938) provided no evidence of carcinogenicity. Fluoranthene was also inactive in mouse skin initiation and promotion assays (Van Duuren and Goldschmidt, 1976; Hoffmann, et al., 1972). However, fluoranthene has been shown to be active as a cocarcinogen when applied with benzo[a]pyrene to mice by skin application (Van Duuren and Goldschmidt, 1976) and was active as a complete carcinogen in a short-term lung tumor assay with newborn mice (Busby et al., 1984). .

Based on no human data and inadequate data from animal bioassays, U.S. EPA (1993a,b) has placed fluoranthene in weight-of-evidence group D, not classifiable as to human carcinogenicity.

Faust, Rosmarie A., Chemical Hazard Evaluation Group Biomedical and Environmental Information Analysis Section, Health and Safety Research Division, Oak Ridge, Tennessee.

Phenanthrene is a PAH that can be derived from coal tar. Currently, there is no commercial production or use of this compound (U.S. EPA, 1987). Phenanthrene is ubiquitous in the environment as a product of incomplete combustion of fossil fuels and wood and has been identified in ambient air, surface and drinking water, and in foods (U.S. EPA, 1988; IARC, 1983)..

Phenanthrene is absorbed following oral and dermal exposure (Storer et al., 1984; Chang, 1943). Data from structurally related PAHs suggest that phenanthrene would be absorbed from the lungs (U.S. EPA, 1987). Metabolites of phenanthrene identified in in vivo and in vitro studies indicate that metabolism proceeds by epoxidation at the 1-2, 3-4, and 9-10 carbons, with dihydrodiols as the primary metabolites (Nordqvist et al., 1981; Chaturapit and Holder, 1978; Sims, 1970; Boyland and Sims, 1962; Boyland and Wolf, 1950)..

Although a large body of literature exists on the toxicity and carcinogenicity of PAHs, primarily benzo[a]pyrene, toxicity data for phenanthrene are very limited. No human data were available that addressed the toxicity of phenanthrene. Single intraperitoneal injections of phenanthrene produced slight hepatotoxicity in rats (Yoshikawa et al., 1985). Data regarding the subchronic, chronic, developmental, or reproductive toxicity in experimental animals by any route of exposure could not be located in the available literature. .

Data were insufficient to derive an oral reference dose (RfD) or inhalation reference concentration (RfC) for phenanthrene (U.S. EPA, 1988). The chemical is not currently listed in IRIS or HEAST (U.S. EPA, 1993a,b)..

No inhalation bioassays were available to assess the carcinogenicity of phenanthrene. A single oral dose of phenanthrene did not induce mammary tumors in rats (Huggins and Yang, 1962) and a single subcutaneous injection did not result in treatment-related increases in tumor incidence in mice (Steiner, 1955). Neonate mice administered intraperitoneal or subcutaneous injections of phenanthrene also did not develop tumors (Buening et al., 1979). No skin tumors were reported in two skin painting assays with mice (Roe and Grant, 1964; Kennaway, 1924). Phenanthrene was also tested in several mouse skin initiation-promotion assays. It was active as an initiator in one study (Scribner, 1973), inactive as an initiator in four others (LaVoie et al., 1981; Wood et al., 1979; Roe, 1962; Salaman and Roe, 1956), and inactive as a promoter in one study (Roe and Grant, 1964)..

Based on no human data and inadequate data from animal bioassays, U.S. EPA (1993a, 1987) has placed phenanthrene in weight-of-evidence group D, not classifiable as to human carcinogenicity.

Faust, Rosmarie A., Chemical Hazard Evaluation Group Biomedical and Environmental Information Analysis Section, Health and Safety Research Division, Oak Ridge, Tennessee.

Pyrene, also referred to as benzo(def)phenanthrene and -pyrene, is a PAH that can be derived from coal tar. Currently, there is no commercial production or use of this compound. Pyrene is ubiquitous in the environment as a product of incomplete combustion of fossil fuels and has been identified in surface and drinking water, numerous foods, and in ambient air (U.S. EPA, 1988, 1987; IARC, 1983). .

Although a large body of literature exists on the toxicity and carcinogenicity of PAHs, toxicity data for pyrene are limited. No human data were available that addressed the toxicity of pyrene. Subchronic oral exposure to pyrene produced nephropathy, decreased kidney weights, increased liver weights, and slight hematological changes in mice (TRL, 1989) and produced fatty livers in rats (White and White, 1939). A single intraperitoneal injection of pyrene produced swelling and congestion of the liver and increased serum aspartate amino transferase (AST) and bilirubin levels in rats (Yoshikawa et al., 1985). No data were available concerning the toxic effects of inhalation exposure to pyrene or data regarding teratogenicity or other reproductive effects by any route of exposure..

A Reference Dose (RfD) of 3E-1 mg/kg/day for subchronic (U.S. EPA, 1993a) and 3E-2 mg/kg/day for chronic oral exposure (U.S. EPA, 1993b) to pyrene was calculated from a no-observed-adverse-effect level (NOAEL) of 75 mg/kg/day in a 13-week gavage study with mice (TRL, 1989). Data were insufficient to derive an inhalation Reference Concentration (RfC) for pyrene (U.S. EPA, 1993a,b)..

No oral or inhalation bioassays were available to assess the carcinogenicity of pyrene. Studies involving other routes of exposure (intratracheal, dermal, and subcutaneous) generally gave negative results. Intratracheal administration of pyrene in combination with Fe2O3 particles did not induce tumors in hamsters (Sellakumar and Shubik, 1974). Skin painting assays evaluating complete carcinogenesis in mice (Van Duuren and Goldschmidt, 1976; Horton and Christian, 1974; Roe and Grant, 1964; Wynder and Hoffman, 1959); or initiating (Roe and Grant, 1964); or promoting capacity (Wood et al., 1980; Scribner, 1973; Salaman and Roe, 1956) h ave been negative or inconclusive. Mice injected subcutaneously with pyrene did not develop tumors (Shear and Leiter, 1941), but there is evidence that pyrene enhances the tumorigenicity of topically applied benzo[a]pyrene (Slaga et al., 1979; Van Duuren and Goldschmidt, 1976; Goldschmidt et al., 1973). .

Based on no human data and inadequate data from animal bioassays, U.S. EPA (1993a,b) has placed pyrene in weight-of-evidence group D, not classifiable as to human carcinogenicity.

Faust, Rosmarie A., Chemical Hazard Evaluation Group Biomedical and Environmental Information Analysis Section, Health and Safety Research Division, Oak Ridge, Tennessee.