RADFORD ARMY AMMUNITION PLANT, VIRGINIA

Interim Measures Completion Reports: SWMU 51, SWMU 39, and FLFA

Prepared for:

USACE Baltimore District
10 S. Howard St.
Baltimore, MD 21201

Prepared by:

Shaw Environmental, Inc.
2113 Emmorton Park Rd.
Edgewood, MD 21040

Final Document **February 2010**

10-44

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

April 1, 2010

Commander,
Radford Army Ammunition Plant
Attn: SJMRF-OP-EQ (Jim McKenna)
P.O. Box 2
Radford, VA 24141-0099

P.W. Holt
Environmental Manager
Alliant Techsystems, Inc.
Radford Army Ammunition Plant
P.O. Box 1
Radford, VA 24141-0100

Re: Radford Army Ammunition Plant, Va.
SWMU 51, SWMU 39, and FLFA
Review of the Army's Interim Measures Completion Report

Dear Mr. McKenna and Ms. Holt:

The U.S. Environmental Protection Agency (EPA) has reviewed the U.S. Army's (Army's) February, 2010 Final Interim Measures Completion Report for SWMU 51, SWMU 39, and the FLFA, located at the Radford Army Ammunition Plant (RFAAP). Based upon our review, the report is approved, and in accordance with Part II. (E) (5) of RFAAP's Corrective Action Permit, it can now be considered final.

If you have any questions, please call me at 215-814-3413. Thanks.

Sincerely,

William Geiger
RCRA Project Manager
Office of Remediation (3LC20)

cc: James Cutler, VDEQ

ATK Armament Systems
Energetic Systems
Radford Army Ammunition Plant
Route 114, P.O. Box 1
Radford, VA 24143-0100

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February 3, 2010

Mr. William Geiger
RCRA General Operations Branch, Mail Code: 3WC23
Waste and Chemicals Management Division
U. S. Environmental Protection Agency, Region III
1650 Arch Street
Philadelphia, PA 19103-2029

Mr. James L. Cutler, Jr.
Virginia Department of Environmental Quality
629 East Main Street
Richmond, VA 24143-0100

Subject: With Certification, Interim Measures Completion Reports: SWMU 51, SWMU 39, and FLFA, Final Document, February 2010
EPA ID# VA1 210020730

Dear Mr. Geiger and Mr. Cutler:

Enclosed is the certification for the subject document that was sent to you on February 1 , 2010. Also enclosed is the 01 February 2010 transmittal email.

Please coordinate with and provide any questions or comments to myself at (540) 639-8658, Jerry Redder ATK staff (540) 639-7536 or Jim McKenna, ACO Staff (540) 731-5782.

Sincerely,

P.W. Holt, Environmental Manager
Alliant Techsystems Inc.

c: Karen Sismour
Virginia Department of Environmental Quality
P. O. Box 10009
Richmond, VA 23240-0009

E. A. Lohman
Virginia Department of Environmental Quality
Blue Ridge Regional Office
3019 Peters Creek Road
Roanoke, VA 24019

10-815-22
JMcKenna

Rich Mendoza
U.S. Army Environmental Command
1 Rock Island Arsenal
Bldg 90, 3rd Floor, Room 30A
IMAE-CDN
Rock Island, Illinois 61299

Tom Meyer
Corps of Engineers, Baltimore District
ATTN: CENAB-EN-HM
10 South Howard Street
Baltimore, MD 21201

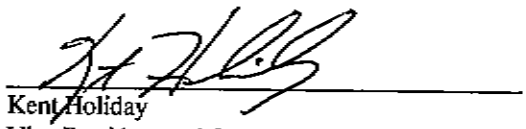
10-815-22
JMcKenna

Concerning the following:

Radford Army Ammunition Plant
Interim Measures Completion Reports:
SWMU 51, SWMU 39, and FLFA
Final Document February 2010

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

SIGNATURE: 
PRINTED NAME: Antonio Munera
TITLE: LTC, CM
Commanding

SIGNATURE: 
PRINTED NAME: Kent Holiday
TITLE: Vice President and General Manager
ATK Energetics Systems

10-815-22
JMcKenna

Greene, Anne

From: McKenna, Jim
Sent: Monday, February 01, 2010 12:41 PM
To: Greene, Anne; Cutler,Jim; dennis.druck@us.army.mil; diane.wisbeck@arcadis-us.com; durwood willis2; Geiger.William@epamail.epa.gov; Redder, Jerome; jim spencer; Llewellyn, Tim; Lohman,Elizabeth; Mendoza, Rich; Meyer, Tom NAB02; Parks, Jeffrey N; Sismour,Karen; Timothy.Leahy@shawgrp.com; Tina_MacGillivray@URSCorp.com; Ryan, Susan M CIV USA IMCOM
Subject: IM completion reports for SWMU 51, 39 and FLFA (UNCLASSIFIED)

Importance: High

Classification: UNCLASSIFIED
Caveats: FOUO

All:

Note the contractor will ship the subject document with a copy of this email to the POCs and tracking numbers below. Also, please note that The Completion Reports have been revised to incorporate responses to the EPA and VDEQ comments received via email on January 7, 2010. The comments and responses are summarized below so that changes to the document are easier to identify. A certification letter will follow.

Thank you for your support of the Radford Army Ammunition Plant Installation Restoration Program.

Jim McKenna

Jim McKenna	1Z63V8841397112151
Mr. Richard Mendoza	1Z63V8840198324185
Mr. Tom Meyer	1Z63V8840195058568
Mr. Dennis Druck	1Z63V8840199430577
Mr. James Cutler	1Z63V8840195094617
Ms. Elizabeth Lohman	1Z63V8840195234626
Mr. William Geiger	1Z63V8840196460200
Ms. Susan Ryan	1Z63V8840195195393

EPA Comments

The report layout for all 3 areas was somewhat confusing and difficult to follow.

SWMU 51

1. Somewhere in the beginning of the report there should be a brief summary of the contents of the work plan. The basic remediation strategy and sequence should be presented upfront. This would include the rationale for sampling and selection of the RGs. The visually contaminated soil will be excavated first….etc.

Response: Additional information has been added to section 1 that summarizes the removal strategy and the layout of the report.

2. Section 2.1- The consequences of the delineation sampling should be discussed. Did the detection of constituents above RGs affect the initial excavation strategy?

Response: The delineation sampling demonstrated that the contamination was well-defined during the RFI. A sentence has been added to Section 2.1 stating that the results of the delineation sampling did not alter the excavation plan.

3. Section 3.3- Fourth paragraph- EPA Region III should be referenced, rather than the VRP. The wording should be changed to something along the lines of, "EPA Region III recommended 15 ft as the cutoff depth between shallow and deep RGs based on...."

Response: the text has been changed to: "As a general default, EPA assumes that soil contamination could be encountered by human receptors down to a depth of 15 ft and should be included in the risk assessment. As such, the EPA Region III recommended a depth of 15 ft as the cutoff depth for shallow and deep RGs based on exposure depths used in the standard risk assessment scenarios. Soil excavated below a depth of 15 ft was considered non-risk based and was intended to demonstrate that the sludge layer and grossly-contaminated soils were removed."

4. Figures 3-1 and 3-2. The results of the confirmation sampling should be distinguished for each excavation event. It is not clear which samples indicted additional soil removal when they are all depicted on the same figure. It also appears that confirmation samples were not collected in the immediate vicinity of the samples above the RG. The confirmation sampling strategy should be explained for each excavation event.

Response: Additional figures have been added to the report to show the phases of the excavation. Note that the "short" walls of the excavation are approximately 20 feet long. The confirmation samples from the short walls were taken from different locations each time to ensure that all soil above the RGs was removed.

5. Section 4.4 - The FLFA is incorrectly referenced in the conclusion.

Response: This typographical error has been corrected.

SWMU 39 and FLFA
Again the objectives from the CMS should be clearly stated upfront. The basic strategy and anticipated sequence of events should be summarized before subsequent detail is presented. The conclusion for SMWU 39, section 4.4, also incorrectly references the FLFA.

Response: Similar changes were made to the other reports as well.

Classification: UNCLASSIFIED
Caveats: FOUO

Leahy, Timothy

From: Geiger.William@epamail.epa.gov
Sent: Thursday, January 07, 2010 10:01 AM
To: McKenna, Jim J Mr CIV USA AMC
Cc: Kalinowski, Chris; diane.wisbeck@arcadis-us.com; Cutler,Jim; jim spencer; jeremy.flint@atk.com; jerome.redder@atk.com; Mendoza, Rich; Leahy, Timothy; Tina_MacGillivray@URSCorp.com; Meyer, Tom NAB02
Subject: IM completion reports for SWMU 51, 39 and FLFA

Below are EPA/VDEQ comments for the December 2009 Draft Interim Measures Completion Report for SMWUs 51, 39, and the FLFA.

The report layout for all 3 areas was somewhat confusing and difficult to follow.

SWMU 51

1. Somewhere in the beginning of the report there should be a brief summary of the contents of the work plan. The basic remediation strategy and sequence should be presented upfront. This would include the rationale for sampling and selection of the RGs. The visually contaminated soil will be excavated first….etc.

2. Section 2.1- The consequences of the delineation sampling should be discussed. Did the detection of constituents above RGs affect the initial excavation strategy?

3. Section 3.3- Fourth paragraph- EPA Region III should be referenced, rather than the VRP. The wording should be changed to something along the lines of, "EPA Region III recommended 15 ft as the cutoff depth between shallow and deep RGs based on...."

4. Figures 3-1 and 3-2. The results of the confirmation sampling should be distinguished for each excavation event. It is not clear which samples indicted additional soil removal when they are all depicted on the same figure. It also appears that confirmation samples were not collected in the immediate vicinity of the samples above the RG. The confirmation sampling strategy should be explained for each excavation event.

5. Section 4.4 - The FLFA is incorrectly referenced in the conclusion.

SWMU 39 and FLFA

Again the objectives from the CMS should be clearly stated upfront. The basic strategy and anticipated sequence of events should be summarized before subsequent detail is presented.

The conclusion for SMWU 39, section 4.4, also incorrectly references the FLFA.

William A. Geiger
Remedial Project Manager
Office of Remediation (3LC20)
U.S. Environmental Protection Agency
1650 Arch Street
Philadelphia, PA 19103-2029
Phone: 215.814.3413
Geiger.William@epa.gov

ATK Armament Systems
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Radford Army Ammunition Plant
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December 14, 2009

Mr. William Geiger
RCRA General Operations Branch, Mail Code: 3WC23
Waste and Chemicals Management Division
U. S. Environmental Protection Agency, Region III
1650 Arch Street
Philadelphia, PA 19103-2029

Mr. James L. Cutler, Jr.
Virginia Department of Environmental Quality
629 East Main Street
Richmond, VA 24143-0100

Subject: With Certification, Interim Measures Completion Reports: SWMU 51, SWMU 39, and FLFA, Draft Document, December 2009
EPA ID# VA1 210020730

Dear Mr. Geiger and Mr. Cutler:

Enclosed is the certification for the subject document that was sent to you on December 14, 2009. Also enclosed is the 14 December 2009 transmittal email.

Please coordinate with and provide any questions or comments to myself at (540) 639-8658, Jerry Redder ATK staff (540) 639-7536 or Jim McKenna, ACO Staff (540) 731-5782.

Sincerely,

P.W. Holt, Environmental Manager
Alliant Techsystems Inc.

c: Karen Sismour
Virginia Department of Environmental Quality
P. O. Box 10009
Richmond, VA 23240-0009

E. A. Lohman
Virginia Department of Environmental Quality
Blue Ridge Regional Office
3019 Peters Creek Road
Roanoke, VA 24019

09-815-208
JMcKenna

Rich Mendoza
U.S. Army Environmental Command
1 Rock Island Arsenal
Bldg 90, 3rd Floor, Room 30A
IMAE-CDN
Rock Island, Illinois 61299

Tom Meyer
Corps of Engineers, Baltimore District
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10 South Howard Street
Baltimore, MD 21201

09-815-208
JMcKenna

bc: Administrative File
J. McKenna, ACO Staff
Rob Davie-ACO Staff
P.W. Holt
J. J. Redder
Env. File

Coordination: J. McKenna

M. A. Miano

09-815-208
JMcKenna

Concerning the following:

Radford Army Ammunition Plant
Interim Measures Completion Reports:
SWMU 51, SWMU 39, and FLFA
Draft Document December 2009

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

SIGNATURE:
PRINTED NAME: Antonio Munera
TITLE: LTC, CM
Commanding

SIGNATURE:
PRINTED NAME: Kent Holiday
TITLE: Vice President and General Manager
ATK Energetics Systems

09-815-208
JMcKenna

Greene, Anne

From: McKenna, Jim J Mr CIV USA AMC [jim.mckenna@us.army.mil]
Sent: Monday, December 14, 2009 12:57 PM
To: Anne Greene; Cutler,Jim; dennis.druck@us.army.mil; diane.wisbeck@arcadis-us.com; durwood willis2; Geiger.William@epamail.epa.gov; jerome.redder@atk.com; jim spencer; 'Llewellyn, Tim'; Lohman,Elizabeth; Mendoza, Rich; Meyer, Tom NAB02; Parks, Jeffrey N; Sismour,Karen; Timothy.Leahy@shawgrp.com; Tina_MacGillivray@URSCorp.com
Subject: Draft Interim Measures Completion Reports: SWMU 51, 39 & FLFA (UNCLASSIFIED)

Importance: High

Classification: UNCLASSIFIED
Caveats: FOUO

All:

Note the contractor will ship the subject document with a copy of this email to the POCs and tracking numbers below.

A certification letter will follow.

Thank you for your support of the Radford Army Ammunition Plant Installation Restoration Program.

Jim McKenna

Mr. Jim McKenna	1Z63V8842210010611 (2 hard copies)
Mr. Richard Mendoza	1Z63V8840190143528 (1 hard copy)
Mr. Tom Meyer	1Z63V8840194379302 (1 hard copy)
Mr. Dennis Druck	1Z63V8840191625916 (1 electronic copy)
Mr. James Cutler	1Z63V8840193391746 (1 hard copy)
Ms. Elizabeth Lohman	1Z63V8840194322354 (1 electronic copy)
Mr. William Geiger	1Z63V8840193032133 (3 hard copies)

Classification: UNCLASSIFIED
Caveats: FOUO

DEPARTMENT OF THE ARMY
US ARMY PUBLIC HEALTH COMMAND (PROVISIONAL)
5158 BLACKHAWK ROAD
ABERDEEN PROVING GROUND, MD 21010-5403

MCHB-TS-REH

4 DEC 2009

MEMORANDUM FOR Office of Environmental Quality, Radford Army Ammunition Plant (SJMRF-OP-EQ/Mr. Jim McKenna), P.O. Box 2, Radford, VA 24143-0002

SUBJECT: Internal Draft Interim Measures Completion Report: SWMU 51 and SWMU 39 (RAAP-001), and the Former Lead Furnace Area (RAAP-040), Radford Army Ammunition Plant, Virginia, November 2009

1. The US Army Public Health Command (Provisional), formerly the US Army Center for Health Promotion and Preventive Medicine, reviewed the subject document on behalf of the Office of The Surgeon General pursuant to Army Regulation 200-1 (Environmental Protection and Enhancement). We appreciate the opportunity to review the report.

2. The completion of the interim measures at these sites should be protective of human health and the environment.

3. The document was reviewed by Mr. Dennis Druck, Environmental Health Risk Assessment Program. He can be reached at DSN 584-2953, commercial (410) 436-2953 or electronic mail, dennis.druck@us.army.mil.

FOR THE COMMANDER:

JEFFREY S. KIRKPATRICK
Director, Health Risk Management

CF:
HQDA (DASG-PPM-NC)
IMCOM-NE (IMNE-PWD-E)
USACE (CEHNC-CX-ES)
USAEC (IMAE-CD/Mr. Rich Mendoza)

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The Appendices are Included on a CD Located at the Back of this Report

LIST OF ACRONYMS AND ABBREVIATIONS

ATK .....Alliant TechSystems, Inc.
CMO .....Corrective Measures Objective
CMS .....Corrective Measures Study
COI.....Contaminant of Interest
CY .....cubic yards
DNT .....Dinitrotoluene
ft bgs.....feet below ground surface
ft msl .....feet mean sea level
ft .....foot or feet
HWMU .....Hazardous Waste Management Unit
IMWP.....Interim Measures Work Plan
i-SL .....Industrial Screening Level
mg/kg .....milligrams per kilogram
mg/L.....milligrams per liter
NELAC .....National Environmental Laboratory Accreditation Conference
NG.....Nitroglycerin
PCB.....Polychlorinated Biphenyl
RCRA.....Resource Conservation and Recovery Act
RFAAP.....Radford Army Ammunition Plant
RFI .....RCRA Facility Investigation
RG.....Remedial Goal
r-SL .....Residential Screening Level
Shaw.....Shaw Environmental, Inc.
s-RG .....Soil Remedial Goal
SVOC.....Semivolatile Organic Compound
SWMU .....Solid Waste Management Unit
TAL.....Target Analyte List
TCL .....Target Compound List
TCLP.....Toxicity Characteristic Leaching Procedure
TCLPRL.....TCLP Regulatory Limit
TNT.....Trinitrotoluene
USACE .....U.S. Army Corps of Engineers
USEPA.....U.S. Environmental Protection Agency
VDEQ .....Virginia Department of Environment Quality
VOC .....Volatile Organic Compound

1.0 INTRODUCTION

Shaw Environmental, Inc. (Shaw) has been contracted by the U.S. Army Corps of Engineers (USACE) to perform excavation activities at Solid Waste Management Unit (SWMU) 51 (RAAP-001), the Trinitrotoluene (TNT) Waste Acid Neutralization Pit, at Radford Army Ammunition Plant (RFAAP), Radford, Virginia. This work was performed under Contract Number W912QR-04-D-0027, Delivery Order DA0101. Specific elements of the project included: development of a work plan; delineation sampling of the area to determine the extent of contamination; the excavation and disposal of contaminated soils; restoration of the site; and, development of a final report. Work was performed in accordance with the approved *Draft SWMU 51 Interim Measures Work Plan (IMWP)* (Shaw, 2008a), the *Radford Army Ammunition Plant, Radford, Virginia, Final Master Work Plan* (URS, 2003), and the *U.S. Environmental Protection Agency (USEPA) Permit for Corrective Action and Waste Minimization* (USEPA, 2000).

1.1 SITE DESCRIPTION AND LOCATION

SWMU 51 is situated in the eastern portion of the Horseshoe Area of RFAAP (**Figure 1-1**). The SWMU consisted of one trench, approximately 140 feet (ft) long, 23 ft wide, and 14 ft deep (in the center of the trench), located immediately to the southeast of, and adjacent to, SWMU 30 (Closed Asbestos Waste Site) (**Figure 1-2**). SWMU 30 was reportedly used for asbestos disposal and is not part of this unit. SWMU 51 is located approximately 200 ft west of Hazardous Waste Management Unit (HWMU) 16 (Closed Hazardous Waste Landfill) and SWMU 52 (Closed Sanitary Landfill), and 200 ft southwest of SWMU 28 (Closed Sanitary Landfill). The trench has been filled to natural grade with soil and is covered by grass and weeds. A barbed-wire fence surrounds SWMU 51. Separate barbed-wire fencing surrounds the trench areas of SWMU 30.

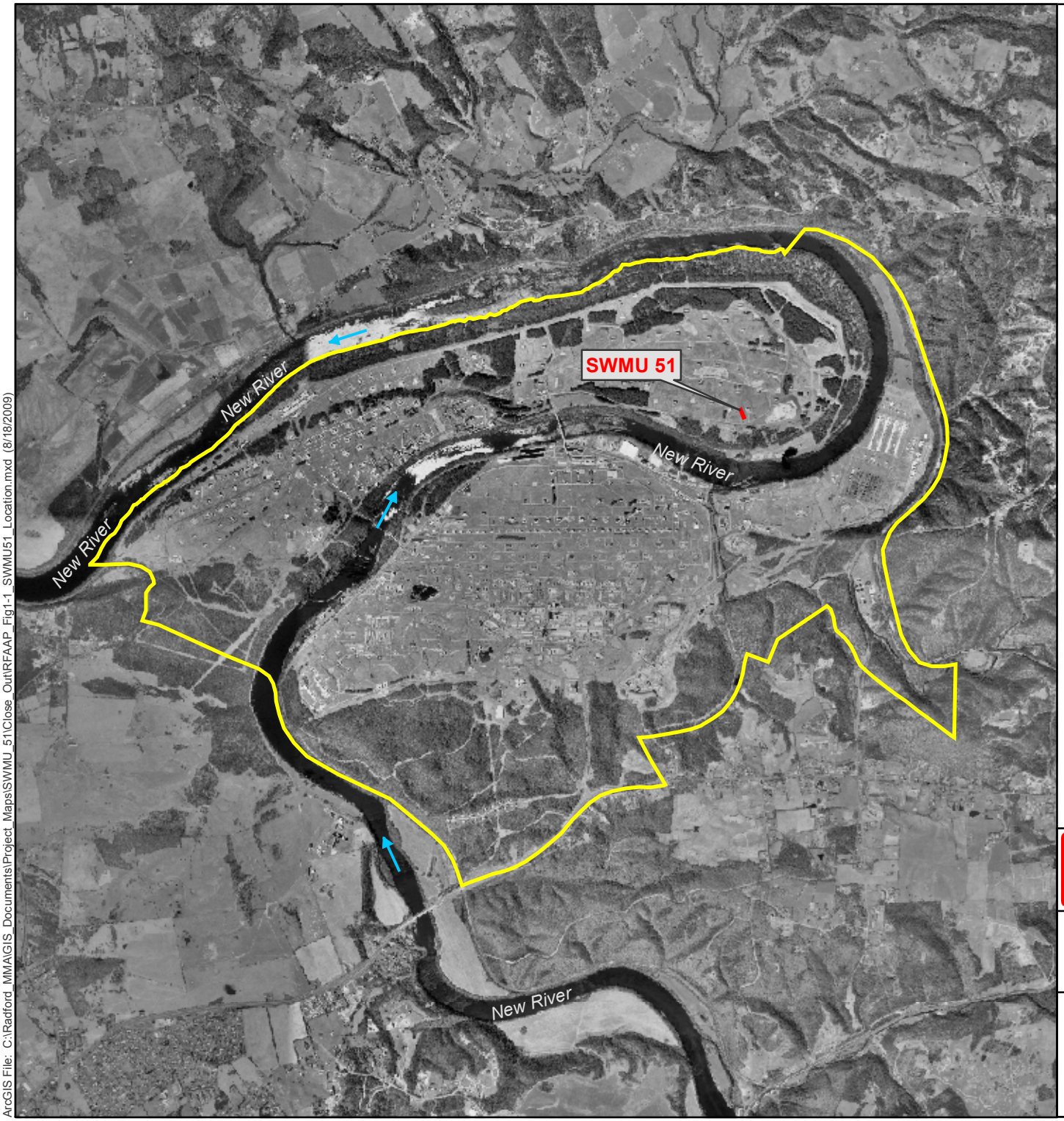
As illustrated on **Figure 1-2**, the SWMU is situated on a plateau ranging from approximately 1,820 to 1,840 feet mean sea level (ft msl). The plateau is generally flat to slightly sloping and is surrounded by a horseshoe bend of the New River (approximately 1,700 ft msl).

1.2 SITE HISTORY

An unknown quantity of TNT neutralization sludge (estimated at 550-650 tons by geophysical investigation) from the treatment of red water, a waste product generated during the production of TNT, was disposed of in this unlined trench in the 1970s. The sludge contains 2,4,6-TNT, transformation products, and other associated explosives compounds. The source of the sludge was from the RFAAP Red Water Treatment Plant equalization/neutralization basin (listed as Unit 81a in USEPA, 1987).

During the production of TNT, an alkaline, red-colored aqueous waste is generated (red water). This waste stream is composed of TNT purification filtrate, air pollution control scrubber effluent, washwater from cleaning of equipment and facilities, and washwater from product washdown operations. The sludge is the result of deliquification (settling/evaporation) of the red water. No red water was disposed in the trench.

In addition to sludge disposal, an estimated 10 tons of red water ash was reportedly disposed of in the trench from 1968 to 1972. During this period, red water was concentrated by evaporation and the sludge was burned in rotary kilns located in the TNT manufacturing area (USATHAMA,



LEGEND

- New River Flow Direction
- Installation Boundary
- SWMU 51 Boundary

Notes:
1) Aerial photo, dated 25 May 2000, was obtained from the Army Topographic Engineering Center.

N

Scale:

0 1,750 3,500 7,000 Feet

U.S. Army Corps of Engineers

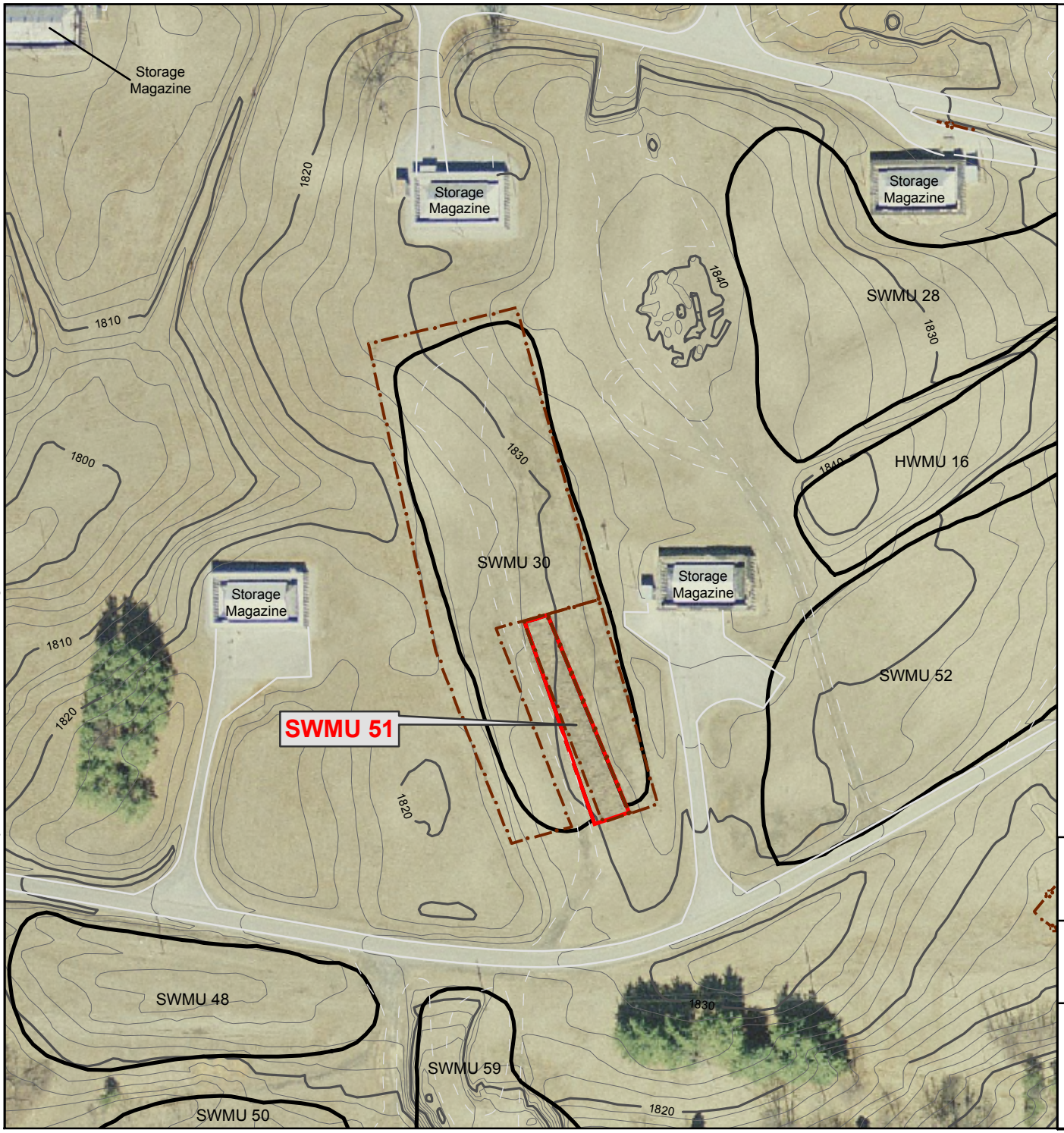
Shaw® Shaw Environmental, Inc.

FIGURE 1-1

SWMU 51 Site Location Map

Radford Army Ammunition Plant,
Radford, VA

ArcGIS File: C:\Radford_MMA\GIS_Documents\Project_Maps\SWMU_51\Close_Out\RFAAP_Fig1-1_SWMU51_Location.mxd (8/18/2009)



LEGEND

- Dirt Road
- Paved Road
- 10 ft Contour Line
- Fence Line
- SWMU 51 Boundary
- Other SWMU/HWMU Boundary

Notes:
1) Aerial photo, dated 2005, was obtained from Montgomery County, VA Planning & GIS Services.

N

Scale:

0 75 150 300 Feet

U.S. Army Corps of Engineers

Shaw® Shaw Environmental, Inc.

FIGURE 1-2
SWMU 51 Site Map

Radford Army Ammunition Plant,
Radford, VA

ArcGIS File: C:\Radford_MMA\GIS_Documents\Project_Maps\SWMU_51\Close_Out\RFAAP_Fig1-2_SWMU51_SiteMap.mxd (8/19/2009)

1976). The ash from the red water sludge produced from these kilns (red water ash) was disposed in SWMUs 41 (Red Water Ash Landfill) and 51. Wastewater treatment sludges from the manufacturing and processing of explosives is identified as a USEPA hazardous waste (K044) solely for its reactivity (40 CFR 261.32).

There are no records after 1972 regarding activities at SWMU 51; however, aerial photographic analysis (USEPA, 1992) indicated that there was an open trench at the site in a 1975 photograph. A 1981 aerial photograph indicated that the trench had been filled and a revegetating ground scar was the major site feature visible (USEPA, 1992).

The site-specific corrective measures objective (CMO) for SWMU 51 was to eliminate the potential threats to human health and the environment that exist from the sludge material and/or grossly-contaminated soil under the sludge material, as well as eliminate the threat for a potential future release of contaminants from the sludge material to groundwater. The remedial goals (RGs) were developed for SWMU 51 in order to confirm that all COIs have been removed to levels that are safe for human health and the environment. The RGs were used to compare results from confirmation samples collected after the removal of the trench sludge and grossly-contaminated soil immediately below the sludge.

Prior to excavation, soil borings were advanced to accurately delineate the horizontal and vertical extents of the trench boundary. Initial excavations of the trench were based on the delineation borings and the visual evidence of sludge material. Excavations were completed when no further evidence of sludge material was apparent. Confirmation samples were then collected from the side walls and bottom of the excavation and concentrations were compared to the shallow RGs at depths less than 15 feet below ground surface (ft bgs) and to deep RGs at depths greater than 15 ft bgs to confirm that the sludge and grossly-contaminated soil had been removed. Sample locations that contained concentrations above the RGs were reexcavated and sampled until the shallow and deep RGs were achieved.

1.3 PROJECT OBJECTIVES

Based on the *SWMU 51 Resource Conservation and Recovery Act (RCRA) Facility Investigation/ Corrective Measures Study (RFI/CMS) Report, Final Document* (Shaw, 2008b), interim measures were performed at SWMU 51. The interim measures were conducted to mitigate the threat of a contaminant release, migration, and/or exposure to the public and the environment, as well as facilitate clean closeout in accordance with Part II (D) (11-21) Interim Measures of the RFAAP Corrective Action Permit (USEPA, 2000). The measures include:

1. **Site Preparation.**
2. **Soil Delineation Sampling and Excavation.** Delineation of sludge material and grossly-contaminated soil under the sludge material and excavation of the delineated area such that the remaining soil is below the selected RGs.
3. **Waste Characterization & Off-site Disposal.**
4. **Confirmation Sampling.** Samples were collected after removal of the sludge and grossly-contaminated soil to ensure that impacted soil has been removed. Excavation continued until the RGs were met.

2.0 PRE-EXCAVATION SAMPLING

2.1 DELINEATION SAMPLING

A total of 12 additional soil delineation samples were collected from subsurface locations to further delineate the areal extent and depth to the top of the waste. Composite waste characterization samples were also collected to determine the appropriate disposal option for the soil/sludge during excavation activities (see *Section 2.2*).

Subsurface soil samples were used to further delineate the extent of contamination. All samples were analyzed for aluminum, lead, and select explosives [1,3-Dinitrobenzene, 2,4- and 2,6-Dinitrotoluene (DNT), 2- and 4-Nitrotoluene, and 2,4,6-TNT]. Three samples (51DE02, 51DE03, and 51DE06B) were also analyzed for dioxins/furans. Sample locations are shown on **Figure 2-1**. Results from the samples are presented in **Table 2-1**.

The results from the samples indicated that aluminum, lead, explosives, and TCDD TE concentrations were below the respective RGs in all samples, with the exception of:

- 2,4-DNT was detected at a concentration of 66 milligrams per kilogram (mg/kg) in sample 51DE03. The RG for 2,4-DNT in soil greater than15 ft bgs (deep soil) is 60.5 mg/kg.

As illustrated on **Figure 2-1**, soil sample 51DE03 was collected within the approximate center of the trench limits. Results from the soil delineation samples did not alter the initial excavation strategy proposed in Shaw (2008a).

2.2 WASTE CHARACTERIZATION SAMPLING

A composite sample (51DW01) was collected from multiple borings within the trench limits to characterize the soil for disposal. The sample was composited from soil immediately above, within, and immediately below the trench sludge layer. This sample was analyzed for dioxins/furans, explosives, Toxicity Characteristic Leaching Procedure (TCLP) metals, and TCLP reactivity, ignitibility, and corrosivity as pH. A second composite sample (51DW02) was also collected from soil immediately above, within, and immediately below the trench sludge layer and only analyzed for TCLP 2,4-DNT. The results from both composite samples are presented in **Table 2-2**.

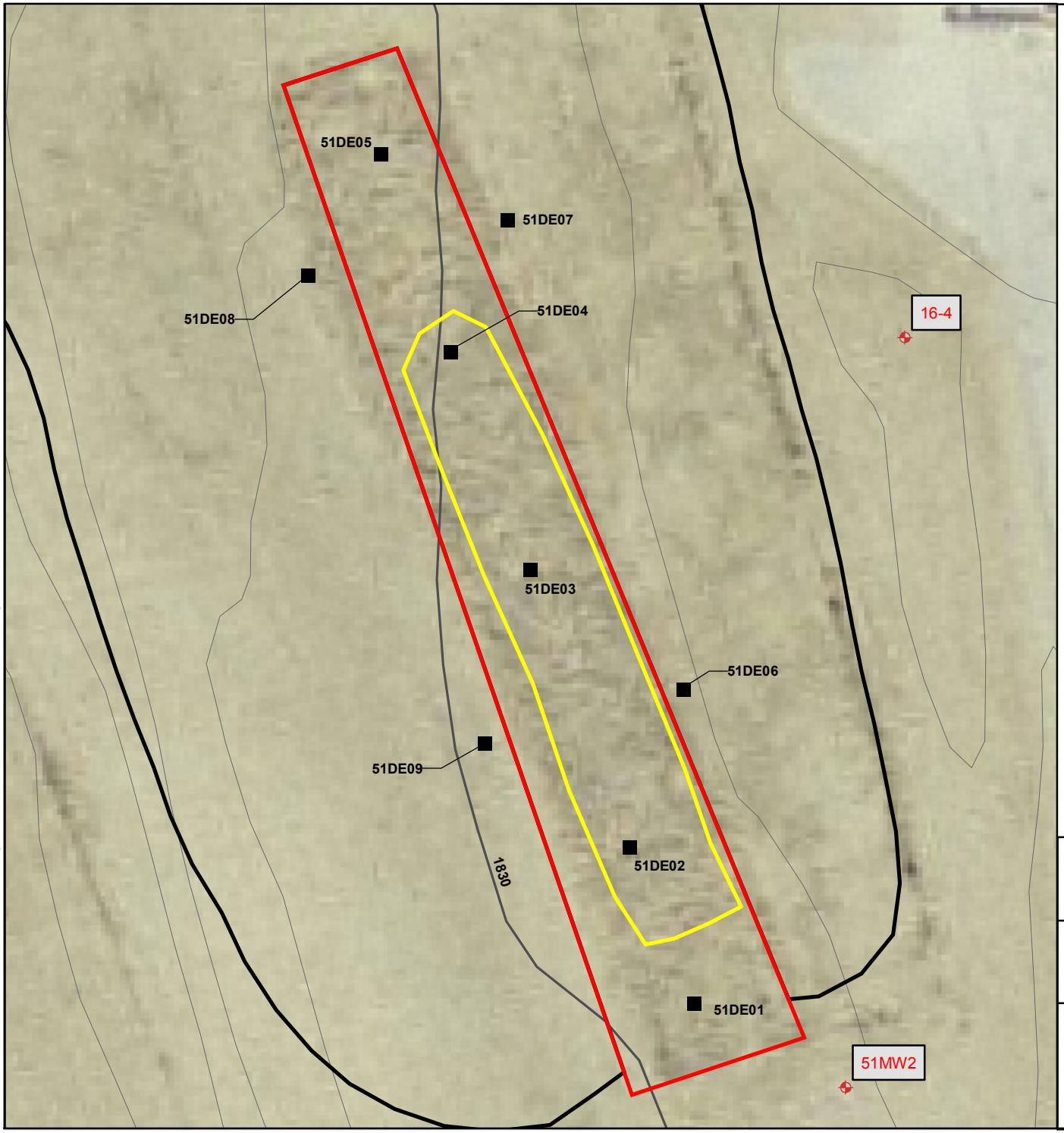
Results from sample 51DW02 indicated that the concentration of leachable 2,4-DNT [170 milligrams per liter (mg/L)] was greater than the TCLP Regulatory Limit (TCLPRL) of 0.13 mg/L, and the soil was classified and disposed of as hazardous waste. The waste disposal profile is presented in **Appendix C-3**.

2.3 BACKFILL AND TOP SOIL SAMPLING

Soil used to backfill the excavation was obtained from two sources, including native/cover soil overlying the trench sludge and from a local contractor (JWB Contractors, LLC). Top soil used at the site was also obtained from JWB Contractors, LLC. Details of the sampling and results are described in the following subsections.

2.3.1 Native/Cover Soil

Two composite samples (51DW05 and 51DW06) were collected from 8-10 ft bgs along the length of the trench from native/cover soil within the trench limits. The purpose of these



LEGEND

- Monitoring Well Location
- Delineation Soil Sample Location
- 10 ft Contour Line
- Trench Boundary as Defined In the RFI (Shaw, 2008)
- SWMU 30 Boundary
- SWMU 51 Boundary

Notes:
1) Aerial photo, dated 2005, was obtained from Montgomery County, VA Planning & GIS Services.

N

Scale:

0 15 30 60 Feet

U.S. Army Corps of Engineers

Shaw® Shaw Environmental, Inc.

FIGURE 2-1
SWMU 51
Delineation Soil Sample Locations
Radford Army Ammunition Plant,
Radford, VA

ArcGIS File: C:\Radford_MMA\GIS_Documents\Project_Maps\SWMU_51\Close_Out\RFAAP_Fig2-1_SWMU51_DelineationSampleLocations.mxd (8/18/2009)

Table 2-1
Analytes Detected in Soil Delineation Samples -
SWMU 51 Interim Measures

Analyte	Sample ID		51DE01				51DE02				51DE03				51DE04A			
	Sample Date		11/19/08				11/19/08				11/19/08				11/19/08			
	Sample Depth		13-15				17-18.5				20-22				18-20			
	S-RG	D-RG	Result	Lab Q	MDL	MRL	Result	Lab Q	MDL	MRL	Result	Lab Q	MDL	MRL	Result	Lab Q	MDL	MRL
Explosives (mg/kg)																		
2,4,6-Trinitrotoluene	4.4	43	3.2		*0.019*	*0.25*	30		*0.19*	*2.5*	11		*0.39*	*5*	11		*0.097*	*1.2*
2,4-Dinitrotoluene	1.2	60.5	0.1	J	*0.005*	*0.25*	39		*0.053*	*2.5*	66		*0.11*	*5*	19		*0.026*	*1.2*
2,6-Dinitrotoluene	1.2	14	0.053	J	*0.007*	*0.25*	11		*0.073*	*2.5*	6.5		*0.007*	*0.25*	4.6		*0.007*	*0.25*
2-Nitrotoluene	91	10000	0.25	U	*0.013*	*0.25*	0.69		*0.013*	*0.25*	0.25	U	*0.013*	*0.25*	0.037	J	*0.013*	*0.25*
4-Nitrotoluene	30.8	310	0.5	U	*0.018*	*0.5*	0.99		*0.018*	*0.5*	0.5	U	*0.018*	*0.5*	0.12	J	*0.018*	*0.5*
Metals (mg/kg)																		
Aluminum	40041	40041	14000		*8.1*	*24.2*	7920		*7.7*	*23*	13000		*8.9*	*26.7*	11600		*7.8*	*23.4*
Lead	400	400	7.9		*0.69*	*2.3*	3.5		*0.66*	*2.2*	1.3	B	*0.76*	*2.5*	3.7		*0.67*	*2.2*
Dioxins/Furans (ng/kg)																		
TCDD TE	1000	1000	NT				0.032				0				NT			

S-RG = remedial goal for soil <15 ft bgs

D-RG = remedial goal for soil ≥15 ft bgs

Shading indicates that the sample concentration exceeded its respective remedial goal

Refer to legend immediately following this table for a list of definitions and table notes

Table 2-1
Analytes Detected in Soil Delineation Samples -
SWMU 51 Interim Measures

Analyte	Sample ID		51DE04B				51DE05				51DE06A				51DE06B			
	Sample Date		11/19/08				11/20/08				11/20/08				11/20/08			
	Sample Depth		27-28				12-14				16-18				26-28			
	S-RG	D-RG	Result	Lab Q	MDL	MRL	Result	Lab Q	MDL	MRL	Result	Lab Q	MDL	MRL	Result	Lab Q	MDL	MRL
Explosives (mg/kg)																		
2,4,6-Trinitrotoluene	4.4	43	11		*0.19*	*2.5*	2.6		*0.019*	*0.25*	0.11	J PG	*0.019*	*0.25*	0.15	J	*0.019*	*0.25*
2,4-Dinitrotoluene	1.2	60.5	30		*0.053*	*2.5*	3.4		*0.005*	*0.25*	0.1	J PG	*0.005*	*0.25*	0.1	J	*0.005*	*0.25*
2,6-Dinitrotoluene	1.2	14	3.8		*0.007*	*0.25*	0.69		*0.007*	*0.25*	0.057	J	*0.007*	*0.25*	0.048	J	*0.007*	*0.25*
2-Nitrotoluene	91	10000	0.33	PG	*0.013*	*0.25*	0.08	J	*0.013*	*0.25*	1.1	PG	*0.013*	*0.25*	0.25	U	*0.013*	*0.25*
4-Nitrotoluene	30.8	310	0.5	U	*0.018*	*0.5*	0.13	J	*0.018*	*0.5*	0.5	U	*0.018*	*0.5*	0.5	U	*0.018*	*0.5*
Metals (mg/kg)																		
Aluminum	40041	40041	17800		*8.5*	*25.5*	15800		*8.1*	*24.2*	10000		*7.7*	*23.2*	17200		*10.2*	*30.5*
Lead	400	400	2.5		*0.73*	*2.4*	7.9		*0.69*	*2.3*	4.8		*0.66*	*2.2*	7.6		*0.87*	*2.9*
Dioxins/Furans (ng/kg)																		
TCDD TE	1000	1000	NT				NT				NT				0.01196			

S-RG = remedial goal for soil <15 ft bgs

D-RG = remedial goal for soil ≥15 ft bgs

Shading indicates that the sample concentration exceeded its respective remedial goal

Refer to legend immediately following this table for a list of definitions and table notes

Table 2-1
Analytes Detected in Soil Delineation Samples -
SWMU 51 Interim Measures

Analyte	Sample ID		51DE07				51DE08				51DE09A				51DE09B			
	Sample Date		11/20/08				11/20/08				11/20/08				11/20/08			
	Sample Depth		14-16				16-18				13-15				15-17			
	S-RG	D-RG	Result	Lab Q	MDL	MRL	Result	Lab Q	MDL	MRL	Result	Lab Q	MDL	MRL	Result	Lab Q	MDL	MRL
Explosives (mg/kg)																		
2,4,6-Trinitrotoluene	4.4	43	0.033	J	*0.019*	*0.25*	0.14	J PG	*0.019*	*0.25*	2.7		*0.019*	*0.25*	0.63		*0.019*	*0.25*
2,4-Dinitrotoluene	1.2	60.5	0.11	J	*0.005*	*0.25*	0.14	J	*0.005*	*0.25*	1.1		*0.005*	*0.25*	0.62		*0.005*	*0.25*
2,6-Dinitrotoluene	1.2	14	0.049	J	*0.007*	*0.25*	0.061	J	*0.007*	*0.25*	0.3		*0.007*	*0.25*	0.13	J	*0.007*	*0.25*
2-Nitrotoluene	91	10000	0.25	U	*0.013*	*0.25*	0.25	U	*0.013*	*0.25*	0.057	J	*0.013*	*0.25*	0.02	J	*0.013*	*0.25*
4-Nitrotoluene	30.8	310	0.5	U	*0.018*	*0.5*	0.5	U	*0.018*	*0.5*	0.11	J	*0.018*	*0.5*	0.038	J	*0.018*	*0.5*
Metals (mg/kg)																		
Aluminum	40041	40041	10400		*7.8*	*23.4*	8070		*7.8*	*23.3*	14000		*8*	*24.1*	12700		*8*	*23.9*
Lead	400	400	5.2		*0.67*	*2.2*	3.5		*0.67*	*2.2*	7.1		*0.69*	*2.3*	6.3		*0.68*	*2.3*
Dioxins/Furans (ng/kg)																		
TCDD TE	1000	1000	NT				NT				NT				NT			

S-RG = remedial goal for soil <15 ft bgs

D-RG = remedial goal for soil ≥15 ft bgs

Shading indicates that the sample concentration exceeded its respective remedial goal

Refer to legend immediately following this table for a list of definitions and table note

Table 2-1
Legend

12	J	Shading and black font indicate that the sample concentration exceeded its respective remedial goal
12	*12*	Shading in the MDL/MRL columns indicates the MDL exceeds a criterion.

mg/kg = milligrams per kilogram (parts per million).
ng/kg = nanograms per kilogram (parts per trillion).
µg/kg = micrograms per kilogram (parts per billion).
NA = not applicable.
NT = analyte not tested.

Lab Q = Lab Data Qualifiers

* = Laboratory duplicate not within control limits.
B = (organics) Blank contamination. Value detected in sample and associated blank.
A (Dioxins) = B = (metals) Value <MRL and >MDL and is considered estimated.
E (metals) = Reported value is estimated because of the presence of interferences.
EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/PCDF ions was outside accepted ranges. The detected PCDD/PCDF was reported as an estimated maximum possible concentration (EMPC).
J = (organics) Value <MRL and >MDL and is considered estimated.
U = Analyte not-detected at the method reporting limit.
X = (dioxins) Ion abundance ratio outside acceptable range. Value reported is EMPC.

Val Q = Validation Data Qualifiers

B = blank contamination. Value detected in sample and associated blank.
J = estimated concentration.
K = estimated concentration bias high.
L = estimated concentration bias low.
N = presumptive evidence for tentatively identified compounds using a library search.
U = analyte not detected.
UJ = estimated concentration non-detect.
UL = estimated concentration non-detect bias low.

Table 2-2
Waste Characterization Sample Results
SWMU 51 Interim Measures

Analyte	Sample ID Matrix Sample Date	51DW01 Soil/Sludge 11/20/2008		51DW02 Soil/Sludge 12/30/2008	
	TCLP RL	Result	Lab Q	Result	Lab Q
Dioxins/Furans (ng/kg)					
2,3,7,8-TCDF	na	24		NT	
1,2,3,7,8-PeCDF	na	5.4	J	NT	
2,3,4,7,8-PeCDF	na	13		NT	
1,2,3,4,7,8-HxCDF	na	9.3		NT	
2,3,4,6,7,8-HxCDF	na	7.1	U	NT	
1,2,3,7,8,9-HxCDF	na	7.1	U	NT	
1,2,3,4,6,7,8-HpCDF	na	52		NT	
OCDF	na	170		NT	
Total TCDF	na	100		NT	
Total PeCDF	na	58		NT	
Total HxCDF	na	84		NT	
Total HpCDF	na	170		NT	
Total TCDD	na	1.4	U	NT	
2,3,7,8-TCDD	na	1.4	U	NT	
Total PeCDD	na	0.96		NT	
1,2,3,7,8-PeCDD	na	0.96	J	NT	
Total HxCDD	na	45		NT	
1,2,3,7,8,9-HxCDD	na	5	J	NT	
Total HpCDD	na	480		NT	
1,2,3,4,6,7,8-HpCDD	na	290		NT	
OCDD	na	4700	B	NT	
1,2,3,6,7,8-HxCDF	na	4	J	NT	
1,2,3,4,7,8,9-HpCDF	na	5.6	J	NT	
1,2,3,4,7,8-HxCDD	na	2.7	J	NT	
1,2,3,6,7,8-HxCDD	na	10		NT	
Explosives (mg/kg)					
1,3-Dinitrobenzene	na	2.9		NT	
RDX	na	2.1		NT	
2,4-Dinitrotoluene	na	2500		NT	
2,6-Dinitrotoluene	na	610	J	NT	
Nitrobenzene	na	120	U	NT	
Nitroglycerin	na	250	U	NT	
1,3,5-Trinitrobenzene	na	37	J	NT	
2,4,6-Trinitrotoluene	na	2700		NT	
HMX	na	120	U	NT	
Tetryl	na	120	U	NT	
2-Nitrotoluene	na	1300		NT	
3-Nitrotoluene	na	120	PG	NT	
4-Nitrotoluene	na	1000		NT	
4-Amino-2,6-dinitrotoluene	na	120	U	NT	
2-Amino-4,6-dinitrotoluene	na	120	U	NT	
PETN	na	250	U	NT	
TCLP SVOCs (mg/L)					
2,4-Dinitrotoluene	0.13	NT		170	Q
TCLP Metals (mg/L)					
TCLP Lead	5	0.29		NT	
TCLP Silver	5	0.025	U	NT	
TCLP Arsenic	5	0.1	U	NT	
TCLP Barium	100	1.2	J	NT	
TCLP Chromium	5	0.025	U	NT	
TCLP Selenium	1	0.057	B	NT	
TCLP Cadmium	1	0.01	U	NT	
TCLP Mercury	0.2	0.003	U	NT	
TCLP Characteristics					
Ignitability (Flashpoint)	140 (°F)	No Ignition		NT	
Corrosivity as pH	<2 or >12 (Units)	7.6		NT	
Sulfide Reactivity	500 (mg/kg)	7.1	U	NT	
Cyanide Reactivity	250 (mg/kg)	4		NT	

Table 2-2
Legend

12	J	Shading and black font indicate that the sample concentration exceeded its TCLP RL

mg/kg = milligrams per kilogram (parts per million).
mg/L = milligrams per liter (parts per million).
ng/kg = nanograms per kilogram (parts per trillion).
µg/kg = micrograms per kilogram (parts per billion).
NA = not applicable.
NT = analyte not tested.

Lab Q = Lab Data Qualifiers

* = Laboratory duplicate not within control limits.
B = (organics) Blank contamination. Value detected in sample and associated blank.
A (Dioxins) = B = (metals) Value <MRL and >MDL and is considered estimated.
E (metals) = Reported value is estimated because of the presence of interferences.
EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/PCDF ions was outside accepted ranges. The detected PCDD/PCDF was reported as an estimated maximum possible concentration (EMPC).
J = (organics) Value <MRL and >MDL and is considered estimated.
U = Analyte not-detected at the method reporting limit.
X = (dioxins) Ion abundance ratio outside acceptable range. Value reported is EMPC.

Val Q = Validation Data Qualifiers

B = blank contamination. Value detected in sample and associated blank.
J = estimated concentration.
K = estimated concentration bias high.
L = estimated concentration bias low.
N = presumptive evidence for tentatively identified compounds using a library search.
U = analyte not detected.
UJ = estimated concentration non-detect.
UL = estimated concentration non-detect bias low.

samples was to determine whether the native/cover soil material overlying the trench was acceptable for reuse as fill at the bottom of the excavation. These samples were analyzed for target compound list (TCL) volatile organic compounds (VOCs), TCL semivolatile organic compounds (SVOCs), pesticides/polychlorinated biphenyls (PCBs), explosives, and target analyte list (TAL) metals. Due to a laboratory error, a second set of composite samples (51DW05a and 51DW06a) was collected and analyzed for TCL VOCs only. The results from the native/cover soil composite samples are presented in **Table 2-3**.

As shown in **Table 2-3**, one of the two sample results exceeded the shallow soil RG (s-RG) for nitroglycerin (NG) (s-RG = 0.8 mg/kg - sample concentration = 1.4 mg/kg). The other sample result was below the s-RG. All other contaminants of interest (COIs) were below their RGs in both samples. After a review of the soil sample results from the SWMU 51 RFI (Shaw, 2008b), NG was only detected in 1 of 8 of the trench sludge samples (concentration = 3,300 mg/kg) and 1 of 13 of the deep soil samples (concentration = 6.7 mg/kg). NG was not detected in any of the 17 "clean (shallow)" samples during the RFI (Shaw, 2008b). In summary, NG was detected in 2 of 38 samples on site.

One of the samples also had a detection of Aroclor-1254 above the residential screening level (r-SL), but below the industrial screening level (i-SL) (note: Aroclor is not a COI). It should be noted that this compound was not detected in any of the 18 samples collected from the native/cover soil during the RFI (Shaw, 2008b). Due to its low frequency of detection in the native fill (two detections out of 19 samples), the fact that the sample concentration was below the i-SL, and the depth that the native/cover soil will be placed (greater than 15 ft bgs and below the residential depth of exposure), PCBs do not appear to be a concern at SWMU 51.

After a review of the native/cover soil sample results, USEPA Region III and Virginia Department of Environment Quality (VDEQ) determined that the native/cover soil could be re-used as fill at the bottom of the excavation and covered with clean fill from off site since the deep s-RGs were met and there were no concentrations greater than i-SLs. r-SLs are not applicable at this depth interval since the residential exposure scenario only uses soil from the top 15 ft.

2.3.2 Certified Clean Fill/Top Soil

Certified clean general fill and top soil were obtained from a local contractor, JWB Contractors, LLC of Dublin, Virginia. The borrow site was visited by site personnel and the material was sampled and sent to a laboratory for analysis for TCL VOCs, TCL SVOCs, pesticides/PCBs, explosives, and TAL metals. The results from the native/cover soil composite samples are presented in **Table 2-4**.

As shown in **Table 2-4**, results from the fill material and top soil samples indicated that SVOCs, pesticides, and PCBs were not detected in either sample. Although VOCs and explosives were detected, none of the detected concentrations were above r-SLs or RGs. Metals were present at levels below the RFAAP facility-wide background concentrations with the exception of beryllium. However, beryllium concentrations were below the r-SL.

Table 2-3
Analytes Detected in Native/Cover Soil Composite Samples - SWMU 51 Interim Measures

Analyte	Sample ID				51DW05					51DW06					51DW05A					51DW06A				
	Sample Date				1/9/09					1/9/09					2/16/09					2/16/09				
	i-SL	r-SL	S-RG	D-RG	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL
VOCs (ug/kg)																								
2-Butanone	1.9E+08	28000000	na	na	NT					NT					8.8	J	J	*1.6*	*11*	10	J	J	*1.8*	*13*
Acetone	6.1E+08	61000000	na	na	NT					NT					160			*1.6*	*23*	160			*1.8*	*26*
Chlorobenzene	1500000	310000	na	na	NT					NT					0.81	J	J	*0.33*	*5.6*	0.95	J	J	*0.38*	*6.6*
SVOCs (ug/kg)																								
Diethylphthalate	4.9E+08	49000000	na	na	930			*110*	*400*	1100			*110*	*390*	NT					NT				
Pesticides (ug/kg)	None detected																							
PCBs (mg/kg)																								
PCB-1254	0.74	0.22	na	na	0.017	J AA	J	*0.01*	*0.04*	**0.61**	PG	J	*0.1*	*0.41*	NT					NT				
Explosives (mg/kg)																								
2,4,6-Trinitrotoluene	79	19	4.4	43	0.11	J	J	*0.019*	*0.25*	0.038	J PG	J	*0.019*	*0.25*	NT					NT				
2,4-Dinitrotoluene	1200	120	1.2	60.5	0.085	J	J	*0.005*	*0.25*	0.092	J PG	J	*0.005*	*0.25*	NT					NT				
2,6-Dinitrotoluene	620	61	1.2	14	0.022	J	J	*0.007*	*1.2*	1.2	U		*0.007*	*1.2*	NT					NT				
2-Nitrotoluene	13	2.9	91	10000	0.25	U		*0.013*	*0.25*	0.25	PG	J	*0.013*	*0.25*	NT					NT				
4-amino-2,6-Dinitrotoluene	1900	150	na	310	0.25	U		*0.01*	*0.25*	0.012	J PG	J	*0.009*	*0.25*	NT					NT				
Nitrobenzene	280	31	na	na	0.25	U		*0.018*	*0.25*	0.037	J PG	J	*0.017*	*0.25*	NT					NT				
Nitroglycerin	62	6.1	0.8	7.8	0.09	J	J	*0.015*	*0.5*	1.4			*0.015*	*0.5*	NT					NT				
Metals (mg/kg)																								
Aluminum	990000	77000	40041	40041	22500			*8.5*	*25.5*	19300			*8.6*	*25.7*	NT					NT				
Arsenic	1.6	0.39	15.8	na	3.1			*0.85*	*2.5*	3.5			*0.86*	*2.6*	NT					NT				
Barium	190000	15000	na	na	54.7			*0.49*	*2.4*	52.3			*0.49*	*2.4*	NT					NT				
Beryllium	2000	160	na	na	0.54			*0.12*	*0.36*	0.5			*0.12*	*0.37*	NT					NT				
Calcium	na	na	na	na	198			*30.3*	*121*	221			*30.6*	*122*	NT					NT				
Chromium	1400	280	na	na	21.7			*0.49*	*1.5*	19.8			*0.49*	*1.5*	NT					NT				
Cobalt	300	23	na	na	5.6			*0.24*	*0.73*	5.6			*0.24*	*0.73*	NT					NT				
Copper	41000	3100	na	na	10.9			*0.61*	*3*	51.8			*0.61*	*3.1*	NT					NT				
Iron	720000	55000	50962	na	27200			*3.8*	*12.1*	23800			*3.8*	*12.2*	NT					NT				
Lead	800	400	400	400	13.9			*0.73*	*2.4*	168			*0.73*	*2.4*	NT					NT				
Magnesium	na	na	na	na	900			*9.1*	*60.6*	836			*9.2*	*61.1*	NT					NT				
Manganese	23000	1800	2543	na	216		K	*0.49*	*1.5*	216		K	*0.49*	*1.5*	NT					NT				
Mercury	28	6.7	na	na	0.073			*0.01*	*0.049*	0.063			*0.01*	*0.049*	NT					NT				
Nickel	20000	1600	na	na	8.3			*0.36*	*1.2*	7.3			*0.37*	*1.2*	NT					NT				
Potassium	na	na	na	na	845			*30.3*	*121*	743			*30.6*	*122*	NT					NT				
Selenium	5100	390	na	na	1	B	J	*0.73*	*2.4*	0.78	B	J	*0.73*	*2.4*	NT					NT				
Thallium	66	5.1	na	na	1	B	J	*0.61*	*2.4*	0.94	B	J	*0.61*	*2.4*	NT					NT				
Vanadium	7200	550	108	na	56.3			*0.36*	*1.2*	48.3			*0.37*	*1.2*	NT					NT				
Zinc	310000	23000	na	na	30.8			*0.73*	*3.6*	34.9			*0.73*	*3.7*	NT					NT				

* Refer to legend immediately following this table for a list of definitions and table notes

Table 2-3
Legend

12	J	Bold outline indicates a S-RG exceedance.
12	*12*	Shading in the MDL/MRL columns indicates the MDL exceeds a criterion.

i-SL = industrial soil screening level
r-SL = residential soil screening level
S-RG = remedial goal for soil <15 ft bgs
D-RG = remedial goal for soil ≥15 ft bgs
mg/kg = milligrams per kilogram (parts per million).
ng/kg = nanograms per kilogram (parts per trillion).
µg/kg = micrograms per kilogram (parts per billion).
SL = Screening Level (Source: ORNL Regional Screening Table, September 2008).
SLs for non-Carcinogenic compounds have been recalculated to an HI of 0.1.
NA = not applicable.
NT = analyte not tested.

Lab Q = Lab Data Qualifiers

* = Laboratory duplicate not within control limits.
B = (organics) Blank contamination. Value detected in sample and associated blank.
A (Dioxins) = B = (metals) Value <MRL and >MDL and is considered estimated.
E (metals) = Reported value is estimated because of the presence of interferences.
EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/PCDF ions was outside accepted ranges. The detected PCDD/PCDF was reported as an estimated maximum possible concentration (EMPC).
J = (organics) Value <MRL and >MDL and is considered estimated.
U = Analyte not-detected at the method reporting limit.
X = (dioxins) Ion abundance ratio outside acceptable range. Value reported is EMPC.

Val Q = Validation Data Qualifiers

B = blank contamination. Value detected in sample and associated blank.
J = estimated concentration.
K = estimated concentration bias high.
L = estimated concentration bias low.
N = presumptive evidence for tentatively identified compounds using a library search.
U = analyte not detected.
UJ = estimated concentration non-detect.
UL = estimated concentration non-detect bias low.

Table 2-4
Analytes Detected in Clean Fill/Top Soil Composite Samples - SWMU 51 Interim Measures

Analyte	Sample ID / Sample Date				JWB-GF01 2/16/09 Borrow					JWB-TS01 2/16/09 Topsoil				
	i-SL	r-SL	S-RG	D-RG	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL
VOCs (ug/kg)														
1,1-Dichloroethene	1100000	250000	na	na	1.1	J	J	*0.4*	*7.6*	6.8	U		*0.35*	*6.8*
2-Butanone	190000000	28000000	na	na	5.7	J	J	*2.1*	*15*	43			*1.9*	*14*
2-Hexanone	na	na	na	na	15	U		*1.1*	*15*	1.1	J	J	*1*	*14*
Acetone	610000000	61000000	na	na	55			*2.1*	*30*	140	J B	B	*59*	*590*
Chlorobenzene	1500000	310000	na	na	4	J	J	*0.44*	*7.6*	0.9	J	J	*0.39*	*6.8*
SVOCs (ug/kg)	None detected													
Pesticides (ug/kg)	None detected													
PCBs (mg/kg)	None detected													
Explosives (mg/kg)														
2,4,6-Trinitrotoluene	79	19	4.4	43	0.042	J	J	*0.019*	*0.25*	0.36			*0.019*	*0.25*
2,4-Dinitrotoluene	1200	120	1.2	60.5	0.098	J	J	*0.005*	*0.25*	0.28			*0.005*	*0.25*
2,6-Dinitrotoluene	620	61	1.2	14	0.018	J	J	*0.007*	*1.2*	0.06	J	J	*0.007*	*1.2*
4-amino-2,6-Dinitrotoluene	1900	150	na	na	0.25	U		*0.01*	*0.25*	0.013	J	J	*0.009*	*0.25*
Metals (mg/kg)														
Aluminum	990000	77000	40041	40041	33900			*8.9*	*26.7*	14500			*8*	*24.1*
Arsenic	1.6	0.39	15.8	na	8.9		L	*0.89*	*2.7*	8.5		L	*0.8*	*2.4*
Barium	190000	15000	na	na	36.9		L	*0.51*	*2.5*	44.7		L	*0.46*	*2.3*
Beryllium	2000	160	na	na	1.3			*0.13*	*0.38*	0.94			*0.11*	*0.34*
Cadmium	810	70	na	na	0.13	B	L	*0.13*	*0.38*	0.16	B	L	*0.11*	*0.34*
Calcium	na	na	na	na	2000		L	*31.8*	*127*	617		L	*28.7*	*115*
Chromium	1400	280	na	na	41.6		L	*0.51*	*1.5*	35.5		L	*0.46*	*1.4*
Cobalt	300	23	na	na	11.9		J	*0.25*	*0.76*	15.5		J	*0.23*	*0.69*
Copper	41000	3100	na	na	20.1		L	*0.64*	*3.2*	8.8		L	*0.57*	*2.9*
Iron	720000	55000	50962	na	37000			*3.9*	*12.7*	44100			*3.6*	*11.5*
Lead	800	400	400	400	15.9		L	*0.76*	*2.5*	20.3		L	*0.69*	*2.3*
Magnesium	na	na	na	na	8580		K	*9.5*	*63.5*	4230		K	*8.6*	*57.3*
Manganese	23000	1800	2543	na	342			*0.51*	*1.5*	1260			*0.46*	*1.4*
Mercury	28	6.7	na	na	0.11			*0.011*	*0.051*	0.039	B	J	*0.009*	*0.046*
Nickel	20000	1600	na	na	18.2		L	*0.38*	*1.3*	9		L	*0.34*	*1.1*
Potassium	na	na	na	na	3300			*31.8*	*127*	1060			*28.7*	*115*
Sodium	na	na	na	na	40	B	J	*31.8*	*635*	573	U		*28.7*	*573*
Thallium	66	5.1	na	na	2.5	U	UL	*0.64*	*2.5*	0.61	B	L	*0.57*	*2.3*
Vanadium	7200	550	108	na	72.1		L	*0.38*	*1.3*	94.6		L	*0.34*	*1.1*
Zinc	310000	23000	na	na	46.7		L	*0.76*	*3.8*	27.2		L	*0.69*	*3.4*

* Refer to legend immediately following this table for a list of definitions and table notes

Table 2-4
Legend

12 *12* Shading in the MDL/MRL columns indicates the MDL exceeds a criterion.

i-SL = industrial soil screening level
r-SL = residential soil screening level
S-RG = remedial goal for soil <15 ft bgs
D-RG = remedial goal for soil ≥15 ft bgs
mg/kg = milligrams per kilogram (parts per million).
ng/kg = nanograms per kilogram (parts per trillion).
µg/kg = micrograms per kilogram (parts per billion).
SL = Screening Level (Source: ORNL Regional Screening Table, September 2008).
SLs for non-Carcinogenic compounds have been recalculated to an HI of 0.1.
NA = not applicable.
NT = analyte not tested.

Lab Q = Lab Data Qualifiers

* = Laboratory duplicate not within control limits.
B = (organics) Blank contamination. Value detected in sample and associated blank.
A (Dioxins) = B = (metals) Value <MRL and >MDL and is considered estimated.
E (metals) = Reported value is estimated because of the presence of interferences.
EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/PCDF ions was outside accepted ranges. The detected PCDD/PCDF was reported as an estimated maximum possible concentration (EMPC).
J = (organics) Value <MRL and >MDL and is considered estimated.
U = Analyte not-detected at the method reporting limit.
X = (dioxins) Ion abundance ratio outside acceptable range. Value reported is EMPC.

Val Q = Validation Data Qualifiers

B = blank contamination. Value detected in sample and associated blank.
J = estimated concentration.
K = estimated concentration bias high.
L = estimated concentration bias low.
N = presumptive evidence for tentatively identified compounds using a library search.
U = analyte not detected.
UJ = estimated concentration non-detect.
UL = estimated concentration non-detect bias low.

3.0 SOIL EXCAVATION

The first phase of the project was the collection of additional soil samples to further delineate the extent of contamination (*Section 2.1*) and the excavation and disposal of contaminated soil/sludge. During this time, Shaw mobilized the equipment and manpower required to begin the project. Photos depicting different aspects of the project are presented in **Appendix A**. Daily quality control reports are presented in **Appendix E**.

3.1 MOBILIZATION

Because a geophysical survey was completed during the RFI phase, a utility survey to identify underground service lines within or near the excavation area was not performed. Alliant TechSystems, Inc. (ATK) confirmed that the geophysical survey was an acceptable method of utility avoidance. An Area Access Permit and a Hot Work Permit were issued by the ATK Safety Department for the duration of the project. Copies of the permits are presented in **Appendix F**. A job safety analysis was completed by the site safety officer, was reviewed with the crew, and all potential hazards were identified prior to commencement of work activities. Daily tailgate safety meetings were held and daily work plans discussed with the crew every morning before work began. Copies of the completed health and safety forms are presented in **Appendix F**.

Erosion and sediment controls, consisting of silt fencing and hay bales, were installed according to the *SWMU 51 IMWP* (Shaw, 2008a) and the requirements of the USACE representative on site.

3.2 EXCAVATION ACTIVITIES

Upon receipt of the final delineation sample results and the waste characterization results, disposal profiles were completed and approved, excavation and direct loading into dump trailers was ready to begin.

Excavation and the loading of dump trailers was performed using a 20-Ton tracked excavator (trackhoe) and a front-end loader. No stockpiling of material was performed during the project; any excavated soils were shipped out the same day they were excavated. The hazardous waste disposal manifests are presented in **Appendix C-1**, and the certificates of disposal from the hazardous waste disposal facility are presented in **Appendix C-2**. The hazardous waste shipping log is presented in **Appendix D**.

Geotextile fabric was used to construct a temporary loading zone for the trucks to stage on while being loaded. The geotextile fabric extended from the truck to the edge of the excavation. The temporary loading zone was moved as the leading edge of the excavation moved forward.

The trench excavation began in the central portion of the site and progressed outward and southward to the southern portion of the site. When the southern boundary of the trench was reached, the excavation resumed northward from the central portion of the trench excavation. Confirmation samples were collected from the side walls and bottom of the excavation after visual signs of sludge have been removed, and concentrations were compared to the shallow RGs at depths less than 15 ft bgs and to deep RGs at depths greater than 15 ft bgs to confirm that the sludge and grossly-contaminated soil had been removed. Areas which sample results still contained concentrations above the RGs were excavated again and additional samples were collected. Excavation continued until confirmation sample concentrations were below the RGs.

Based on the SWMU 51 CMS (Shaw, 2008b), an estimated 662 cubic yards (CY) of contaminated soil was proposed to be removed to reach RGs. Upon completion of the project, a total of 1,867 tons or 1,245 CY of contaminated soil was excavated from SWMU 51.

3.3 POST-EXCAVATION SAMPLES AND ANALYTICAL RESULTS

Post-excavation samples were collected at various locations as initial excavation activities were completed. Samples were collected from the floor and sidewalls of the excavation to confirm that soil with concentrations above the RGs had been removed. The analytical services for the sampling effort were provided using the National Environmental Laboratory Accreditation Conference (NELAC) accredited laboratory TestAmerica, Inc. located in West Sacramento, California. TestAmerica provided analytical support for the collected soil samples using *USEPA SW-846, Third Edition, Test Methods for Evaluating Solid Waste, Update IIIB* (USEPA, 2004). Results were requested on a 24-hour turnaround time to keep the project moving forward quickly. Completed chain-of-custody forms for the shipments of samples to the laboratory are presented in **Appendix B-3**.

Data obtained from the laboratory were reviewed by the Shaw Project Chemist to determine whether the project-specific data quality objectives, as defined in the associated work plans and sampling and analysis plans, were met. The laboratory analytical data is presented in **Appendix B-1**. For the SWMU 51 Interim Measures, the confirmatory samples and top soil/backfill material were validated. Data validation determines the acceptability or unacceptability of the data quality based on a set of pre-defined criteria and is defined as the systematic process for reviewing a data package against a set of criteria to provide assurance that the data is adequate for its intended uses. The data validation criteria is based on a combination of project-specific Work Plan/Quality Assurance Project Plan criteria, method-specific criteria, *Department of Defense Quality Systems Manual Final Version 3* (DoD, 2006), and the subcontract laboratory standard operating procedures. The data qualifier scheme was consistent with USEPA Region III guidance.

All data packages were validated to ensure compliance with specified analytical, quality assurance/quality control requirements, data reduction procedures, data reporting requirements, and required accuracy, precision, and completeness criteria. Results were assessed for accuracy and precision of laboratory analysis to determine the limitations and quality of the data. The quality of the data collected in support of the sampling activity was considered acceptable, unless qualified rejected "R" during the validation process. Samples qualified "J", "L", or "UL" were considered acceptable as estimated with noted definitions. No sample data points were determined to be rejected "R." Out of criteria lab control samples or calibration standards resulted in some data to be qualified estimated; however, did not impact the usability of the data to make informed conclusions in this report. Qualified data for where the matrix spike and spike duplicates, serial dilutions, and field duplicates exceeded criteria were most likely due to sample matrix or inhomogeneity effects with the given analytical methodology; however, the data was determined useable as estimated and did not impact the conclusions of this report. The data validation reports are presented in **Appendix B-2**.

As a general default, EPA assumes that soil contamination could be encountered by human receptors down to a depth of 15 ft and should be included in the risk assessment. As such, the EPA Region III recommended a depth of 15 ft as the cutoff depth for shallow and deep RGs based on exposure depths used in the standard risk assessment scenarios. Soil excavated below a

depth of 15 ft was considered non-risk based and was intended to demonstrate that the sludge layer and grossly-contaminated soils were removed.

Shallow and deep confirmation soil sample results are compared against their respective RGs in **Tables 3-1 and 3-2**, respectively. **Figure 3-1** depicts the trench boundary established during the SWMU 51 RFI (Shaw, 2008b) before excavation activities commenced. Successive excavations (initial, secondary, and final) and associated confirmation sample locations are shown on **Figures 3-2 through Figure 3-4**. Samples that are shown in red contained concentrations that were greater than the RGs, and shown in green where sample concentrations were below the RGs. At locations where confirmation sample results were greater than the RGs, additional soil was removed from the sample location and another confirmation sample was collected to confirm that the remaining soil concentrations were below RGs. As indicated on **Figure 3-4**, the final dimensions of the excavation were 170' L x 36' W x 25' D. As a result of the soil excavation at SWMU 51, residential use was achieved in accordance with the approved RFI/CMS.

Table 3-1
Shallow Soil Confirmation Sample Results - SWMU 51 Interim Measures
Page 1 of 4

Analyte	Sample ID / Sample Date / Sample Depth	51SC01 3/4/09 9-9.5					51SC02 3/4/09 11-11.5					51SC03 3/4/09 6-6.5					51SC04 3/4/09 6-6.5					51SC05 3/4/09 10-10.5					51SC06 3/4/09 12-12.5					51SC07 3/4/09 10-10.5				
	S-RG	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL
Explosives (mg/kg)																																			
1,3-Dinitrobenzene	0.8	0.25	U		*0.004*	*0.25*	0.25	U		*0.004*	*0.25*	0.25	U		*0.004*	*0.25*	0.25	U		*0.004*	*0.25*	0.25	U		*0.004*	*0.25*	0.25	U		*0.004*	*0.25*	0.25	U		*0.004*	*0.25*
2,4,6-Trinitrotoluene	4.4	2.1		J	*0.019*	*0.25*	9.2			*0.039*	*0.5*	3.6			*0.019*	*0.25*	3			*0.019*	*0.25*	0.13	J	J	*0.019*	*0.25*	0.38			*0.019*	*0.25*	0.3		J	*0.019*	*0.25*
2,4-Dinitrotoluene	1.2	0.17	J	J	*0.005*	*0.25*	4.2			*0.005*	*0.25*	1.3			*0.005*	*0.25*	0.85			*0.005*	*0.25*	0.048	J	J	*0.005*	*0.25*	0.025	J	J	*0.005*	*0.25*	0.1	J	J	*0.005*	*0.25*
2,6-Dinitrotoluene	1.2	0.11	J	J	*0.007*	*1.2*	0.88	J	J	*0.007*	*1.2*	0.39	J	J	*0.007*	*1.2*	0.28	J	J	*0.007*	*1.2*	0.025	J	J	*0.007*	*1.2*	0.044	J	J	*0.007*	*1.2*	0.072	J	J	*0.007*	*1.2*
2-Nitrotoluene	91	0.25	U	UJ	*0.013*	*0.25*	0.21	J	J	*0.013*	*0.25*	0.098	J	J	*0.013*	*0.25*	0.14	J	J	*0.013*	*0.25*	0.064	J	J	*0.013*	*0.25*	0.25	U		*0.013*	*0.25*	0.25	U	UJ	*0.013*	*0.25*
4-Nitrotoluene	30.8	0.5	U		*0.018*	*0.5*	0.25	J	J	*0.018*	*0.5*	0.11	J	J	*0.018*	*0.5*	0.11	J	J	*0.018*	*0.5*	0.044	J	J	*0.018*	*0.5*	0.5	U		*0.018*	*0.5*	0.5	U	UJ	*0.018*	*0.5*
Nitroglycerin	0.8	0.5	U		*0.015*	*0.5*	0.5	U		*0.015*	*0.5*	0.5	U		*0.015*	*0.5*	0.5	U		*0.015*	*0.5*	0.5	U		*0.015*	*0.5*	0.5	U		*0.015*	*0.5*	0.5	U		*0.015*	*0.5*
Metals (mg/kg)																																			
Aluminum	40041	17200		J	*8.5*	*25.6*	19600			*8.4*	*25.2*	22300			*8.6*	*25.9*	21400			*8.5*	*25.6*	20100			*8.3*	*25*	12000			*7.7*	*23*	20100			*8.1*	*24.2*
Lead	400	10.8		J	*0.73*	*2.4*	14.7			*0.72*	*2.4*	9.8			*0.74*	*2.5*	11			*0.73*	*2.4*	9.1			*0.72*	*2.4*	6.4			*0.66*	*2.2*	12.5			*0.69*	*2.3*
Dioxins/Furans (ng/kg)																																			
TCDD TE	1000	0.7953					NT					NT					NT					NT					NT					NT				

**Refer to legend immediately following this table for a list of table notes.

Table 3-1
Shallow Soil Confirmation Sample Results - SWMU 51 Interim Measures
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Analyte	Sample ID	51SC08					51SC09					51SC10					51SC15					51SC17					51SC19					51SC21				
	Sample Date	3/4/09					3/4/09					3/4/09					3/10/09					3/10/09					3/10/09					3/10/09				
	Sample Depth	4-4.5					8-8.5					10-10.5					13-13.5					12-12.5					8-8.5					6-6.5				
	S-RG	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL
Explosives (mg/kg)																																				
1,3-Dinitrobenzene	0.8	0.25	U		*0.004*	*0.25*	0.25	U		*0.004*	*0.25*	0.25	U		*0.004*	*0.25*	0.25	U		*0.004*	*0.25*	0.25	U		*0.004*	*0.25*	0.41		K	*0.004*	*0.25*	0.4		K	*0.004*	*0.25*
2,4,6-Trinitrotoluene	4.4	21		K	*0.097*	*1.2*	1.4			*0.019*	*0.25*	27		K	*0.097*	*1.2*	0.05	J	J	*0.019*	*0.25*	4.2		K	*0.019*	*0.25*	1300			*9.7*	*120*	990			*9.7*	*120*
2,4-Dinitrotoluene	1.2	31		K	*0.026*	*1.2*	0.64			*0.005*	*0.25*	20		K	*0.026*	*1.2*	0.14	J	J	*0.005*	*0.25*	4.8		K	*0.005*	*0.25*	780			*2.6*	*120*	750			*2.6*	*120*
2,6-Dinitrotoluene	1.2	3.4		K	*0.007*	*1.2*	0.26	J	J	*0.007*	*1.2*	5		K	*0.007*	*1.2*	0.1	J	J	*0.007*	*0.25*	1.1		K	*0.007*	*0.25*	220			*3.6*	*120*	210			*3.6*	*120*
2-Nitrotoluene	91	0.63		K	*0.013*	*0.25*	0.27			*0.013*	*0.25*	1.4		K	*0.013*	*0.25*	0.63			*0.013*	*0.25*	0.6		K	*0.013*	*0.25*	170			*6.5*	*120*	240			*6.5*	*120*
4-Nitrotoluene	30.8	0.49	J	K	*0.018*	*0.5*	0.21	J	J	*0.018*	*0.5*	1.6		K	*0.018*	*0.5*	0.42	J	J	*0.018*	*0.5*	0.79		K	*0.018*	*0.5*	120	J	J	*9.1*	*250*	170	J	J	*9.1*	*250*
Nitroglycerin	0.8	0.5	U		*0.015*	*0.5*	0.5	U		*0.015*	*0.5*	0.5	U		*0.015*	*0.5*	0.5	U		*0.015*	*0.5*	0.5	U		*0.015*	*0.5*	1.1		K	*0.015*	*0.5*	0.54		K	*0.015*	*0.5*
Metals (mg/kg)																																				
Aluminum	40041	23300			*8.9*	*26.7*	33600			*9.3*	*28*	30500			*8.8*	*26.3*	29600			*8.7*	*26.2*	14900			*7.9*	*23.7*	19200			*8.6*	*25.8*	19000			*8.7*	*26.1*
Lead	400	11.8			*0.76*	*2.5*	12.6			*0.8*	*2.7*	15.1			*0.75*	*2.5*	17.2		J	*0.75*	*2.5*	11.8		J	*0.68*	*2.3*	12.8		J	*0.74*	*2.5*	37.9		J	*0.75*	*2.5*
Dioxins/Furans (ng/kg)																																				
TCDD TE	1000	NT					NT					NT					NT					NT					NT					1.327				

**Refer to legend immediately following this table for a list of table notes.

Table 3-1
Shallow Soil Confirmation Sample Results - SWMU 51 Interim Measures
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Analyte	Sample ID	51SC23					51SC24					51SC25					51SC26					51SC42					51SC43					51SC44				
	Sample Date	3/10/09					3/10/09					3/10/09					3/10/09					4/7/09					4/7/09					4/7/09				
	Sample Depth	12-12.5					10-10.5					6-6.5					8-8.5					2-2.5					4-4.5					10-10.5				
	S-RG	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL
Explosives (mg/kg)																																				
1,3-Dinitrobenzene	0.8	0.25	U		*0.004*	*0.25*	0.25	U		*0.004*	*0.25*	0.25	U		*0.004*	*0.25*	0.25	U		*0.004*	*0.25*	0.25	U		*0.004*	*0.25*	0.25	U		*0.004*	*0.25*	0.25	U		*0.004*	*0.25*
2,4,6-Trinitrotoluene	4.4	70			*0.19*	*2.5*	1.7			*0.019*	*0.25*	0.4			*0.019*	*0.25*	1.6			*0.019*	*0.25*	0.5			*0.019*	*0.25*	0.072	J		*0.019*	*0.25*	0.14	J		*0.019*	*0.25*
2,4-Dinitrotoluene	1.2	10			*0.053*	*2.5*	0.34			*0.005*	*0.25*	0.43			*0.005*	*0.25*	2.1			*0.005*	*0.25*	0.19	J		*0.005*	*0.25*	0.042	J		*0.005*	*0.25*	0.025	J		*0.005*	*0.25*
2,6-Dinitrotoluene	1.2	5.6		K	*0.007*	*0.25*	0.21	J	J	*0.007*	*0.25*	0.2	J	J	*0.007*	*0.25*	0.69			*0.007*	*0.25*	0.1	J		*0.007*	*0.25*	0.016	J		*0.007*	*0.25*	0.25	U		*0.007*	*0.25*
2-Nitrotoluene	91	2.6	PG	J	*0.013*	*0.25*	1.1			*0.013*	*0.25*	1.4			*0.013*	*0.25*	1.2			*0.013*	*0.25*	0.25	U		*0.013*	*0.25*	0.25	U		*0.013*	*0.25*	0.25	U		*0.013*	*0.25*
4-Nitrotoluene	30.8	1.8	PG	J	*0.018*	*0.5*	0.78			*0.018*	*0.5*	0.89			*0.018*	*0.5*	0.85			*0.018*	*0.5*	0.5	U		*0.018*	*0.5*	0.5	U		*0.018*	*0.5*	0.5	U		*0.018*	*0.5*
Nitroglycerin	0.8	20			*0.15*	*5*	0.5	U		*0.015*	*0.5*	0.5	U		*0.015*	*0.5*	0.5	U		*0.015*	*0.5*	0.5	U		*0.015*	*0.5*	0.5	U		*0.015*	*0.5*	0.5	U		*0.015*	*0.5*
Metals (mg/kg)																																				
Aluminum	40041	18600			*8.6*	*25.8*	32700			*8.7*	*26*	24600			*8.3*	*24.8*	18300			*8.2*	*24.6*	NT					NT					NT				
Lead	400	45.8		J	*0.74*	*2.5*	22.8		J	*0.74*	*2.5*	14.6		J	*0.71*	*2.4*	10.4		J	*0.7*	*2.3*	NT					NT					NT				
Dioxins/Furans (ng/kg)																																				
TCDD TE	1000	NT					NT					NT					NT					NT					NT					NT				

**Refer to legend immediately following this table for a list of table notes.

Table 3-1
Shallow Soil Confirmation Sample Results - SWMU 51 Interim Measures
Page 4 of 4

Analyte	Sample ID Sample Date Sample Depth	51SC45 4/7/09 6-6.5					51SC46 4/7/09 8-8.5					51SC47 4/7/09 10-10.5					51SC48 4/7/09 6-6.5					51SC49 4/7/09 8-8.5					51SC50 4/7/09 6-6.5					51SC51 4/7/09 4-4.5				
	S-RG	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL
Explosives (mg/kg)																																				
1,3-Dinitrobenzene	0.8	0.03	J		*0.004*	*0.25*	0.25	U		*0.004*	*0.25*	0.25	U		*0.004*	*0.25*	0.25	U		*0.004*	*0.25*	0.25	U		*0.004*	*0.25*	0.25	U		*0.004*	*0.25*	0.25	U		*0.004*	*0.25*
2,4,6-Trinitrotoluene	4.4	120			*0.39*	*5*	870			*3.9*	*50*	0.57			*0.019*	*0.25*	0.091	J		*0.019*	*0.25*	2			*0.019*	*0.25*	0.22	J		*0.019*	*0.25*	3.8			*0.019*	*0.25*
2,4-Dinitrotoluene	1.2	37			*0.11*	*5*	2.9			*0.005*	*0.25*	0.021	J		*0.005*	*0.25*	0.087	J		*0.005*	*0.25*	0.096	J		*0.005*	*0.25*	0.03	J		*0.005*	*0.25*	3.3			*0.005*	*0.25*
2,6-Dinitrotoluene	1.2	15			*0.15*	*5*	6			*0.007*	*0.25*	0.022	J PG		*0.007*	*0.25*	0.044	J		*0.007*	*0.25*	0.053	J		*0.007*	*0.25*	0.014	J		*0.007*	*0.25*	0.66			*0.007*	*0.25*
2-Nitrotoluene	91	3.8			*0.013*	*0.25*	0.6			*0.013*	*0.25*	0.25	U		*0.013*	*0.25*	0.25	U		*0.013*	*0.25*	0.25	U		*0.013*	*0.25*	0.25	U		*0.013*	*0.25*	0.12	J		*0.013*	*0.25*
4-Nitrotoluene	30.8	2.8			*0.018*	*0.5*	1.2			*0.018*	*0.5*	0.5	U		*0.018*	*0.5*	0.5	U		*0.018*	*0.5*	0.5	U		*0.018*	*0.5*	0.5	U		*0.018*	*0.5*	0.11	J		*0.018*	*0.5*
Nitroglycerin	0.8	0.5	U		*0.015*	*0.5*	4			*0.015*	*0.5*	0.5	U		*0.015*	*0.5*	0.5	U		*0.015*	*0.5*	0.5	U		*0.015*	*0.5*	0.5	U		*0.015*	*0.5*	0.5	U		*0.015*	*0.5*
Metals (mg/kg)																																				
Aluminum	40041	NT					NT					NT					NT					NT					NT					NT				
Lead	400	NT					NT					NT					NT					NT					NT					NT				
Dioxins/Furans (ng/kg)																																				
TCDD TE	1000	NT					NT					NT					NT					NT					NT					NT				

**Refer to legend immediately following this table for a list of table notes.

Table 3-1
Legend

12	J	Shading and black font indicate a S-RG exceedance.
12	*12*	Shading in the MDL/MRL columns indicates the MDL exceeds a criterion.

S-RG = remedial goal for soil <15 ft bgs
mg/kg = milligrams per kilogram (parts per million).
ng/kg = nanograms per kilogram (parts per trillion).
µg/kg = micrograms per kilogram (parts per billion).
SL = Screening Level (Source: ORNL Regional Screening Table, September 2008).
SLs for non-Carcinogenic compounds have been recalculated to an HI of 0.1.
NA = not applicable.
NT = analyte not tested.

Lab Q = Lab Data Qualifiers

* = Laboratory duplicate not within control limits.
B = (organics) Blank contamination. Value detected in sample and associated blank.
A (Dioxins) = B = (metals) Value <MRL and >MDL and is considered estimated.
E (metals) = Reported value is estimated because of the presence of interferences.
EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/PCDF ions was outside accepted ranges. The detected PCDD/PCDF was reported as an estimated maximum possible concentration (EMPC).
J = (organics) Value <MRL and >MDL and is considered estimated.
U = Analyte not-detected at the method reporting limit.
X = (dioxins) Ion abundance ratio outside acceptable range. Value reported is EMPC.

Val Q = Validation Data Qualifiers

B = blank contamination. Value detected in sample and associated blank.
J = estimated concentration.
K = estimated concentration bias high.
L = estimated concentration bias low.
N = presumptive evidence for tentatively identified compounds using a library search.
U = analyte not detected.
UJ = estimated concentration non-detect.
UL = estimated concentration non-detect bias low.

Table 3-2
Deep Soil Confirmation Sample Results - SWMU 51 Interim Measures

Analyte	Sample ID	51SC11					51SC12					51SC13					51SC14					51SC16					51SC18				
	Sample Date	3/4/09					3/4/09					3/4/09					3/4/09					3/10/09					3/10/09				
	Sample Depth	23-23.5					23-23.5					24-24.5					23-23.5					23-23.5					23-23.5				
	D-RG	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL
Explosives (mg/kg)																														
1,3-Dinitrobenzene	7.8	0.25	U		*0.004*	*0.25*	0.034	J PG	J	*0.004*	*0.25*	0.066	J PG	J	*0.004*	*0.25*	0.3		K	*0.004*	*0.25*	0.53		J	*0.004*	*0.25*	0.31		K	*0.004*	*0.25*
2,4,6-Trinitrotoluene	43	11		K	*0.039*	*0.5*	71			*0.39*	*5*	230			*0.97*	*12*	500			*1.9*	*25*	1900		J	*19*	*250*	1000			*9.7*	*120*
2,4-Dinitrotoluene	60.5	4.3		K	*0.005*	*0.25*	29			*0.11*	*5*	45			*0.26*	*12*	480			*0.53*	*25*	1000		J	*5.3*	*250*	640			*2.6*	*120*
2,6-Dinitrotoluene	14	2		K	*0.007*	*1.2*	12	J	J	*0.15*	*25*	34	J	J	*0.36*	*62*	140			*0.73*	*120*	250		J	*7.3*	*250*	130			*3.6*	*120*
2-Nitrotoluene	10000	0.63		K	*0.013*	*0.25*	4.6		K	*0.013*	*0.25*	6.9		K	*0.013*	*0.25*	120			*1.3*	*25*	250		J	*13*	*250*	73	J	J	*6.5*	*120*
4-Nitrotoluene	310	0.65		K	*0.018*	*0.5*	4.8		K	*0.018*	*0.5*	5.5		K	*0.018*	*0.5*	95			*1.8*	*50*	200	J	J	*18*	*500*	78	J	J	*9.1*	*250*
Nitroglycerin	7.8	0.5	U		*0.015*	*0.5*	0.5	U		*0.015*	*0.5*	0.5	U		*0.015*	*0.5*	0.5	U		*0.015*	*0.5*	0.2	J	J	*0.015*	*0.5*	0.24	J	J	*0.015*	*0.5*
Metals (mg/kg)																														
Aluminum	40041	18200			*8.7*	*26.1*	7710			*7.7*	*23.1*	15500			*8.5*	*25.6*	15700			*8.7*	*26.1*	16900			*8.4*	*25.2*	28400			*8.6*	*25.9*
Lead	400	34.1			*0.75*	*2.5*	4.9			*0.66*	*2.2*	309			*0.73*	*2.4*	86.7			*0.75*	*2.5*	46.5		J	*0.72*	*2.4*	13.9		J	*0.74*	*2.5*
Dioxins/Furans (ng/kg)																														
TCDD TE	1000	1.635					NT					NT					NT					NT					NT				

**Refer to legend immediately following this table for a list of table notes.

Table 3-2
Deep Soil Confirmation Sample Results - SWMU 51 Interim Measures
Page 2 of 4

Analyte	Sample ID	51SC20					51SC22					51SC27					51SC28					51SC29					51SC30				
	Sample Date	3/10/09					3/10/09					3/23/09					3/23/09					3/23/09					3/23/09				
	Sample Depth	23-23.5					23-23.5					23-23.5					23-23.5					23-23.5					23-23.5				
	D-RG	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL
Explosives (mg/kg)																														
1,3-Dinitrobenzene	7.8	0.42		K	*0.004*	*0.25*	0.44		K	*0.004*	*0.25*	0.25	U		*0.004*	*0.25*	0.25	U		*0.004*	*0.25*	0.25	U		*0.004*	*0.25*	0.25	U		*0.004*	*0.25*
2,4,6-Trinitrotoluene	43	1200			*9.7*	*120*	1200			*9.7*	*120*	14			*0.097*	*1.2*	16			*0.097*	*1.2*	12			*0.097*	*1.2*	11			*0.097*	*1.2*
2,4-Dinitrotoluene	60.5	830			*2.6*	*120*	870			*2.6*	*120*	4.4			*0.005*	*0.25*	1			*0.005*	*0.25*	1			*0.005*	*0.25*	2.8			*0.005*	*0.25*
2,6-Dinitrotoluene	14	220			*3.6*	*120*	250			*3.6*	*120*	0.71			*0.007*	*0.25*	0.39			*0.007*	*0.25*	0.42			*0.007*	*0.25*	0.27			*0.007*	*0.25*
2-Nitrotoluene	10000	140			*6.5*	*120*	200			*6.5*	*120*	0.24	J	J	*0.013*	*0.25*	0.11	J	J	*0.013*	*0.25*	0.13	J	J	*0.013*	*0.25*	0.095	J	J	*0.013*	*0.25*
4-Nitrotoluene	310	100	J	J	*9.1*	*250*	110	J	J	*9.1*	*250*	0.3	J	J	*0.018*	*0.5*	0.12	J	J	*0.018*	*0.5*	0.14	J	J	*0.018*	*0.5*	0.1	J	J	*0.018*	*0.5*
Nitroglycerin	7.8	1.5		K	*0.015*	*0.5*	3.5		K	*0.015*	*0.5*	0.4	J	J	*0.015*	*0.5*	0.17	J	J	*0.015*	*0.5*	0.17	J	J	*0.015*	*0.5*	0.12	J	J	*0.015*	*0.5*
Metals (mg/kg)																														
Aluminum	40041	21300			*9.1*	*27.2*	17300			*8.4*	*25.1*	24500			*8.6*	*25.9*	24600			*8.7*	*26.1*	26600			*8.7*	*26.1*	24600			*8.7*	*26*
Lead	400	335		J	*0.78*	*2.6*	49.6		J	*0.72*	*2.4*	15.8			*0.74*	*2.5*	15.6			*0.74*	*2.5*	13.9			*0.75*	*2.5*	13.3			*0.74*	*2.5*
Dioxins/Furans (ng/kg)																														
TCDD TE	1000	NT					NT					NT					NT					NT					NT				

**Refer to legend immediately following this table for a list of table notes.

Table 3-2
Deep Soil Confirmation Sample Results - SWMU 51 Interim Measures

Analyte	Sample ID	51SC31					51SC32					51SC33					51SC34					51SC35					51SC36				
	Sample Date	3/23/09					3/23/09					3/23/09					3/23/09					3/23/09					3/23/09				
	Sample Depth	23-23.5					23-23.5					23-23.5					23-23.5					16-16.5					15-15.5				
	D-RG	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL
Explosives (mg/kg)																															
1,3-Dinitrobenzene	7.8	0.25	U		*0.004*	*0.25*	0.25	U		*0.004*	*0.25*	0.25	U		*0.004*	*0.25*	0.25	U		*0.004*	*0.25*	0.25	U		*0.004*	*0.25*	0.25	U		*0.004*	*0.25*
2,4,6-Trinitrotoluene	43	7.3			*0.019*	*0.25*	16			*0.097*	*1.2*	16			*0.097*	*1.2*	14		K	*0.097*	*1.2*	11		K	*0.097*	*1.2*	23		K	*0.097*	*1.2*
2,4-Dinitrotoluene	60.5	1.2			*0.005*	*0.25*	1.7			*0.005*	*0.25*	2.8			*0.005*	*0.25*	4.7		K	*0.005*	*0.25*	7		K	*0.005*	*0.25*	15		K	*0.026*	*1.2*
2,6-Dinitrotoluene	14	0.38			*0.007*	*0.25*	0.6			*0.007*	*0.25*	0.77			*0.007*	*0.25*	0.74		K	*0.007*	*0.25*	1.3		K	*0.007*	*0.25*	2.6		K	*0.007*	*0.25*
2-Nitrotoluene	10000	0.22	J	J	*0.013*	*0.25*	0.18	J	J	*0.013*	*0.25*	0.28			*0.013*	*0.25*	0.19	J	K	*0.013*	*0.25*	0.4		K	*0.013*	*0.25*	0.66		K	*0.013*	*0.25*
4-Nitrotoluene	310	0.18	J	J	*0.018*	*0.5*	0.2	J	J	*0.018*	*0.5*	0.3	J	J	*0.018*	*0.5*	0.2	J	K	*0.018*	*0.5*	0.61		K	*0.018*	*0.5*	0.93		K	*0.018*	*0.5*
Nitroglycerin	7.8	0.096	J	J	*0.015*	*0.5*	0.28	J	J	*0.015*	*0.5*	0.19	J	J	*0.015*	*0.5*	0.19	J	K	*0.015*	*0.5*	0.5	U		*0.015*	*0.5*	0.5	U		*0.015*	*0.5*
Metals (mg/kg)																															
Aluminum	40041	27800			*8.6*	*25.8*	24200			*8.6*	*25.7*	24200			*8.5*	*25.4*	22700			*8.6*	*25.7*	19000			*8*	*24*	17500			*8.2*	*24.5*
Lead	400	16.1			*0.74*	*2.5*	16.4			*0.73*	*2.4*	16.5			*0.73*	*2.4*	16.8			*0.74*	*2.5*	13.7			*0.69*	*2.3*	14.1			*0.7*	*2.3*
Dioxins/Furans (ng/kg)																															
TCDD TE	1000	0.6386					NT					NT					NT					NT					NT				

**Refer to legend immediately following this table for a list of table notes.

Table 3-2
Deep Soil Confirmation Sample Results - SWMU 51 Interim Measures
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Analyte	Sample ID	51SC37					51SC38					51SC39					51SC40					51SC41				
	Sample Date	3/23/09					3/23/09					3/23/09					3/23/09					3/23/09				
	Sample Depth	18-18.5					15-15.5					16-16.5					15-15.5					15-15.5				
	D-RG	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL
Explosives (mg/kg)																										
1,3-Dinitrobenzene	7.8	0.25	U		*0.004*	*0.25*	0.25	U		*0.004*	*0.25*	0.25	U		*0.004*	*0.25*	0.25	U		*0.004*	*0.25*	0.25	U		*0.004*	*0.25*
2,4,6-Trinitrotoluene	43	6.4		K	*0.019*	*0.25*	11		K	*0.097*	*1.2*	0.1	J	J	*0.019*	*0.25*	0.66			*0.019*	*0.25*	3			*0.019*	*0.25*
2,4-Dinitrotoluene	60.5	5		K	*0.005*	*0.25*	3.5			*0.005*	*0.25*	0.07	J	J	*0.005*	*0.25*	0.7			*0.005*	*0.25*	4			*0.005*	*0.25*
2,6-Dinitrotoluene	14	1.2		K	*0.007*	*0.25*	0.83			*0.007*	*0.25*	0.02	J	J	*0.007*	*0.25*	0.23	J	J	*0.007*	*0.25*	1.5			*0.007*	*0.25*
2-Nitrotoluene	10000	0.32		K	*0.013*	*0.25*	0.36	PG	J	*0.013*	*0.25*	0.25	U		*0.013*	*0.25*	0.057	J	J	*0.013*	*0.25*	0.082	J	J	*0.013*	*0.25*
4-Nitrotoluene	310	0.49	J	K	*0.018*	*0.5*	0.43	J PG	J	*0.018*	*0.5*	0.5	U		*0.018*	*0.5*	0.078	J	J	*0.018*	*0.5*	0.12	J	J	*0.018*	*0.5*
Nitroglycerin	7.8	0.5	U		*0.015*	*0.5*	0.85			*0.015*	*0.5*	0.5	U		*0.015*	*0.5*	0.5	U		*0.015*	*0.5*	0.5	U		*0.015*	*0.5*
Metals (mg/kg)																										
Aluminum	40041	15500			*7.9*	*23.8*	20700			*8.1*	*24.3*	33700			*8.8*	*26.4*	33500			*8.8*	*26.4*	35000			*8.8*	*26.3*
Lead	400	12.6			*0.68*	*2.3*	26.4			*0.69*	*2.3*	11.8			*0.75*	*2.5*	23.6			*0.76*	*2.5*	15.1			*0.75*	*2.5*
Dioxins/Furans (ng/kg)																										
TCDD TE	1000	NT					NT					NT					NT					0.1487				

**Refer to legend immediately following this table for a list of table notes.

Table 3-2
Legend

12	J	Shading and black font indicate a D-RG exceedance.
12	*12*	Shading in the MDL/MRL columns indicates the MDL exceeds a criterion.

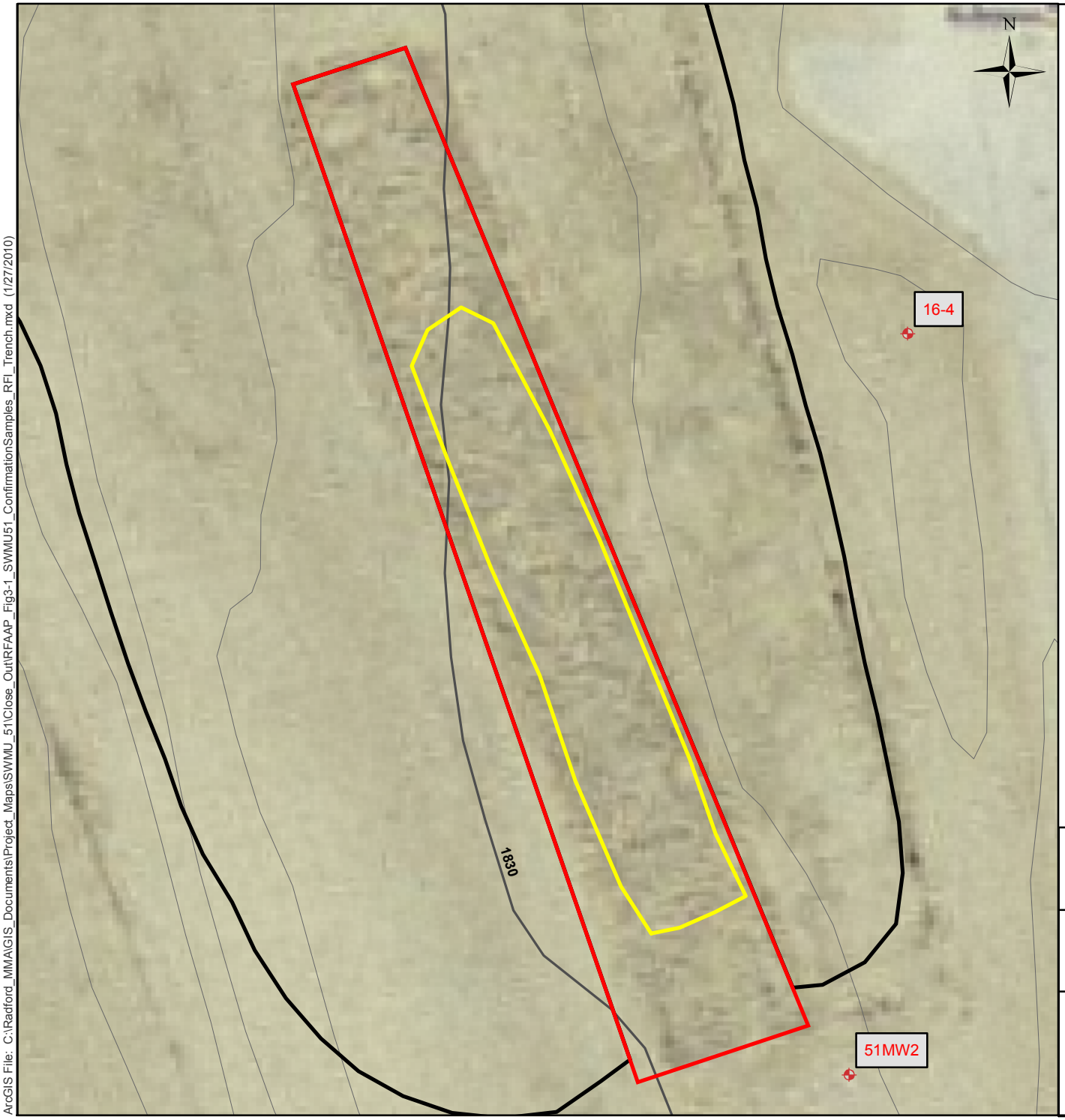
D-RG = remedial goal for soil ≥15 ft bgs
mg/kg = milligrams per kilogram (parts per million).
ng/kg = nanograms per kilogram (parts per trillion).
µg/kg = micrograms per kilogram (parts per billion).
SL = Screening Level (Source: ORNL Regional Screening Table, September 2008).
SLs for non-Carcinogenic compounds have been recalculated to an HI of 0.1.
NA = not applicable.
NT = analyte not tested.

Lab Q = Lab Data Qualifiers

* = Laboratory duplicate not within control limits.
B = (organics) Blank contamination. Value detected in sample and associated blank.
A (Dioxins) = B = (metals) Value <MRL and >MDL and is considered estimated.
E (metals) = Reported value is estimated because of the presence of interferences.
EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/PCDF ions was outside accepted ranges. The detected PCDD/PCDF was reported as an estimated maximum possible concentration (EMPC).
J = (organics) Value <MRL and >MDL and is considered estimated.
U = Analyte not-detected at the method reporting limit.
X = (dioxins) Ion abundance ratio outside acceptable range. Value reported is EMPC.

Val Q = Validation Data Qualifiers

B = blank contamination. Value detected in sample and associated blank.
J = estimated concentration.
K = estimated concentration bias high.
L = estimated concentration bias low.
N = presumptive evidence for tentatively identified compounds using a library search.
U = analyte not detected.
UJ = estimated concentration non-detect.
UL = estimated concentration non-detect bias low.



LEGEND

- Monitoring Well Location
- 10 ft Contour Line
- Trench Boundary As Defined In the RFI (Shaw, 2008)
- SWMU 30 Boundary
- SWMU 51 Boundary

Notes:
1) Aerial photo, dated 2005, was obtained from Montgomery County, VA Planning & GIS Services.

Scale:

0 15 30 60 Feet

U.S. Army Corps of Engineers

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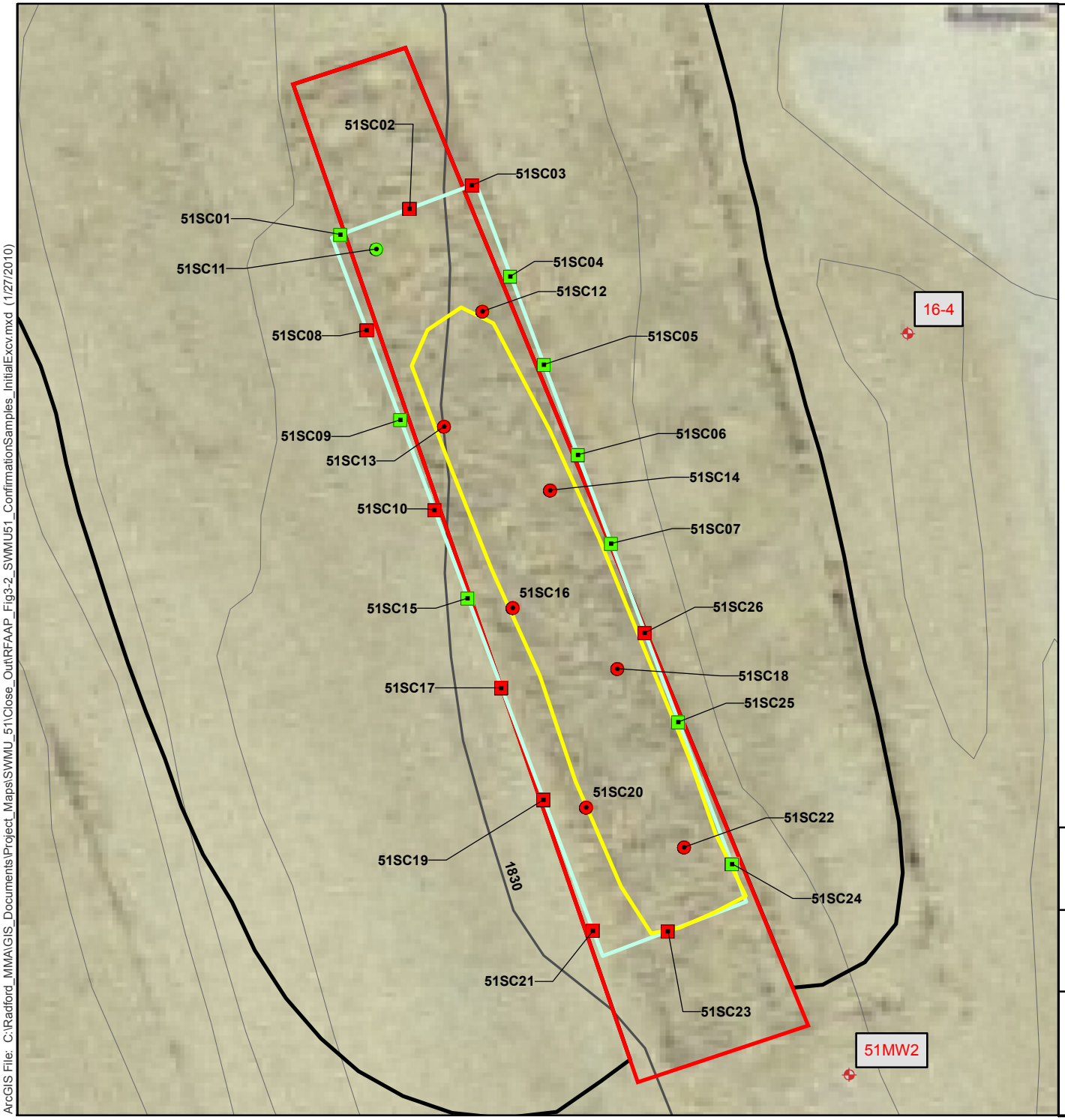
FIGURE 3-1

SWMU 51
RFI Trench Boundary
Radford Army Ammunition Plant,
Radford, VA

ArcGIS File: C:\Radford_MMA\GIS_Documents\Project_Maps\SWMU_51\Close_Out\RFAAP_Fig3-1_SWMU51_ConfirmationSamples_RFI_Trench.mxd (1/27/2010)



ArcGIS File: C:\Radford_MMA\GIS_Documents\Project_Maps\SWMU_51\Close_Out\RFAAP_Fig3-2_SWMU51_ConfirmationSamples_InitialExcv.mxd (1/27/2010)

LEGEND

- Deep Soil (>= 15 ft bgs) Confirmation Sample Location < RGs
- Shallow Soil (< 15 ft bgs) Confirmation Sample Location < RGs
- Deep Soil (>= 15 ft bgs) Confirmation Sample Location > RGs
- Shallow Soil (< 15 ft bgs) Confirmation Sample Location > RGs
- Monitoring Well Location
- 10 ft Contour Line
- Initial Excavation Boundary (160' x 32' x 23')
- Trench Boundary As Defined In the RFI (Shaw, 2008)
- SWMU 30 Boundary
- SWMU 51 Boundary

Notes:
1) Aerial photo, dated 2005, was obtained from Montgomery County, VA Planning & GIS Services.

N

Scale:

0 15 30 60 Feet

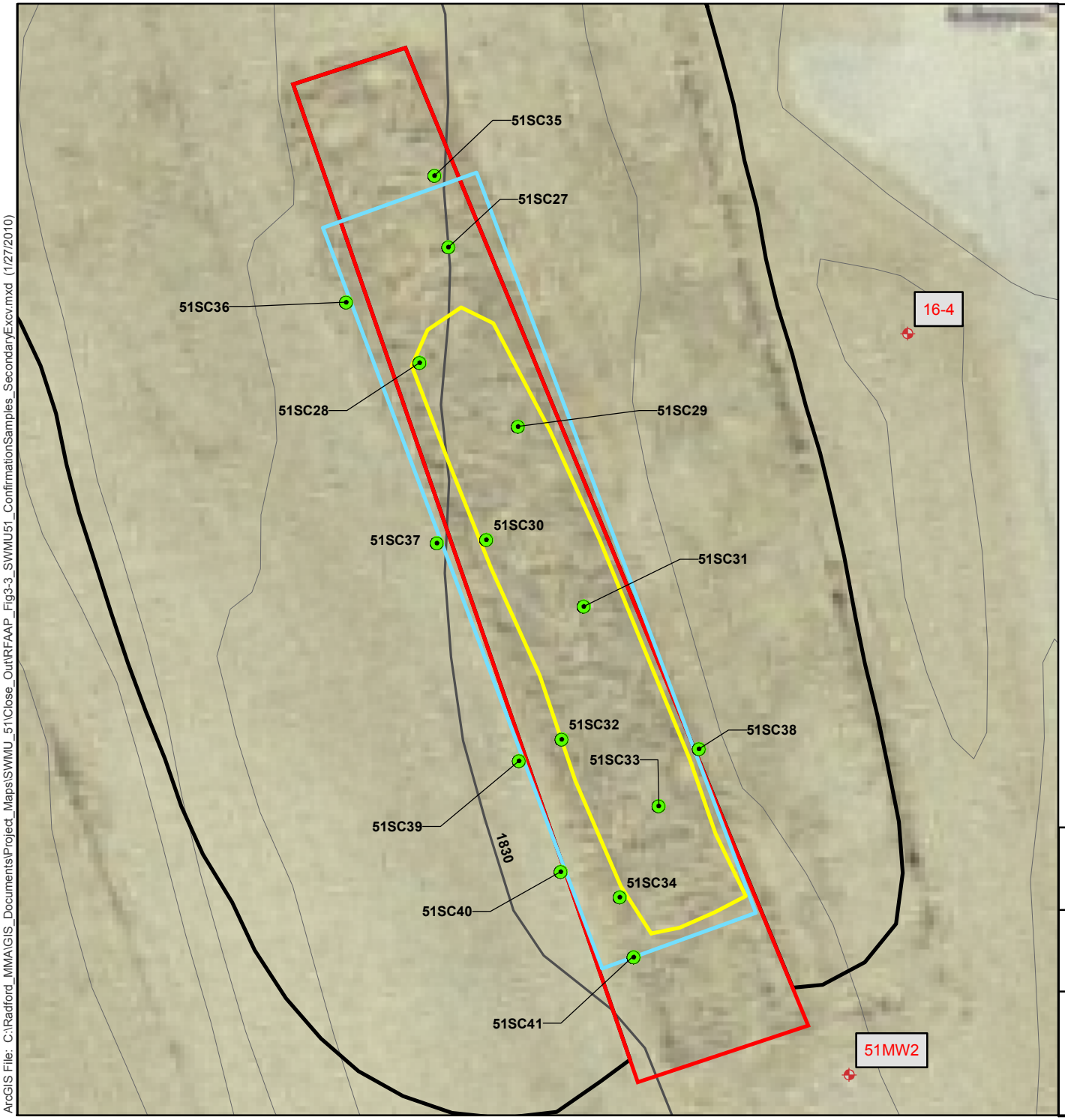
U.S. Army Corps of Engineers

Shaw® Shaw Environmental, Inc.

FIGURE 3-2

SWMU 51 Initial Excavation Boundary and Associated Confirmation Soil Sample Locations

Radford Army Ammunition Plant, Radford, VA



LEGEND

- Deep Soil (>= 15 ft bgs) Confirmation Sample Location < RGs
- Shallow Soil (< 15 ft bgs) Confirmation Sample Location < RGs
- Deep Soil (>= 15 ft bgs) Confirmation Sample Location > RGs
- Shallow Soil (< 15 ft bgs) Confirmation Sample Location > RGs
- Monitoring Well Location
- 10 ft Contour Line
- Secondary Excavation Boundary (165' x 34' x 24')
- Trench Boundary As Defined In the RFI (Shaw, 2008)
- SWMU 30 Boundary
- SWMU 51 Boundary

Notes:
1) Aerial photo, dated 2005, was obtained from Montgomery County, VA Planning & GIS Services.

N

Scale:

0 15 30 60 Feet

U.S. Army Corps of Engineers

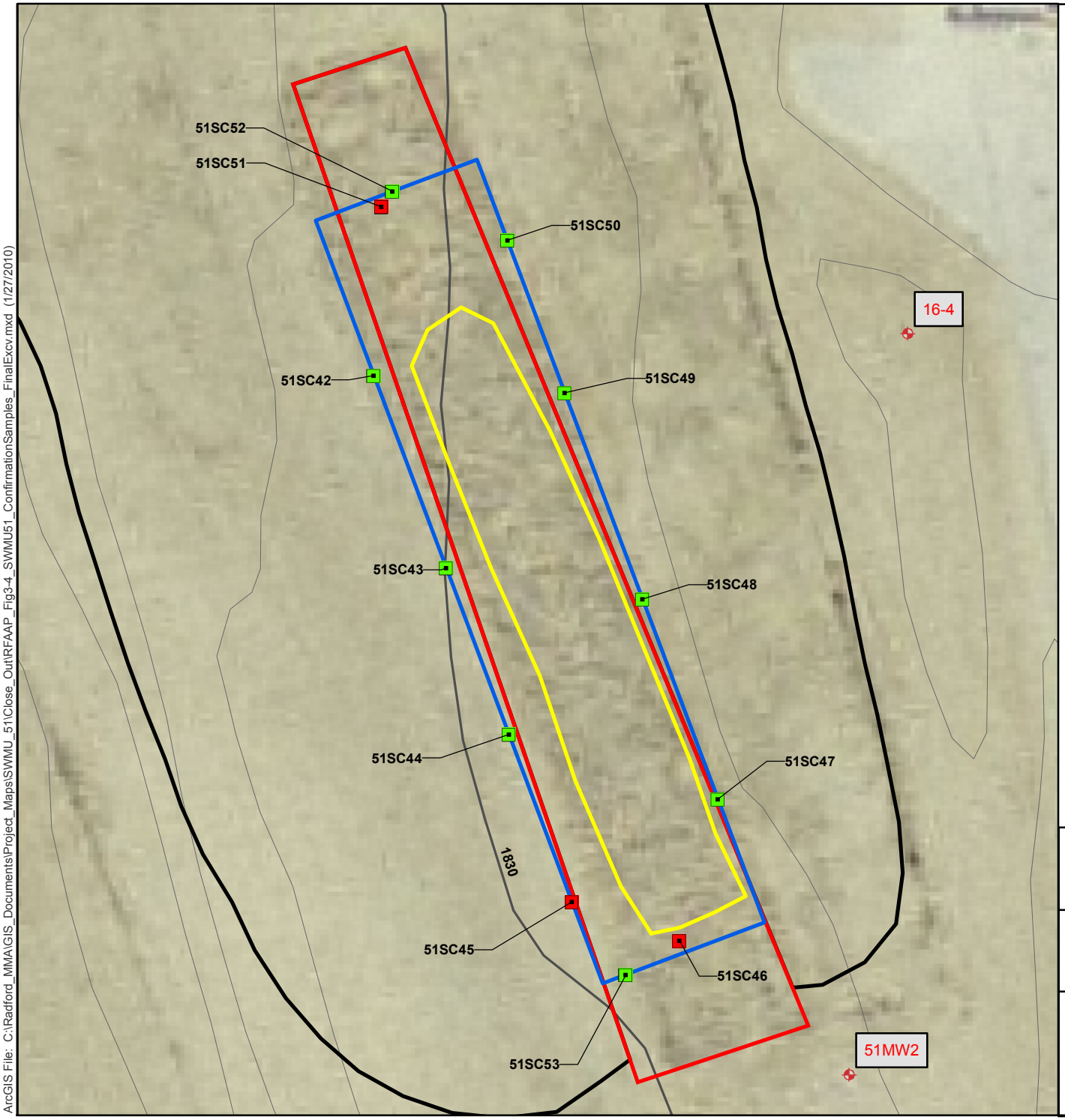
Shaw® Shaw Environmental, Inc.

FIGURE 3-3

SWMU 51 Secondary Excavation Boundary and Associated Confirmation Soil Sample Locations

Radford Army Ammunition Plant, Radford, VA

ArcGIS File: C:\Radford_MMA\GIS_Documents\Project_Maps\SWMU_51\Close_Out\RFAAP_Fig3-3_SWMU51_ConfirmationSamples_SecondaryExcv.mxd (1/27/2010)



ArcGIS File: C:\Radford_MMA\GIS_Documents\Project_Maps\SWMU_51\Close_Out\RFAAP_Fig3-4_SWMU51_ConfirmationSamples_FinalExcv.mxd (1/27/2010)

LEGEND

- Deep Soil (>= 15 ft bgs) Confirmation Sample Location < RGs
- Shallow Soil (< 15 ft bgs) Confirmation Sample Location < RGs
- Deep Soil (>= 15 ft bgs) Confirmation Sample Location > RGs
- Shallow Soil (< 15 ft bgs) Confirmation Sample Location > RGs
- Monitoring Well Location
- 10 ft Contour Line
- Final Excavation Boundary (170' x 36' x 25')
- Trench Boundary As Defined In the RFI (Shaw, 2008)
- SWMU 30 Boundary
- SWMU 51 Boundary

Notes:
1) Aerial photo, dated 2005, was obtained from Montgomery County, VA Planning & GIS Services.

N

Scale:

0 15 30 60 Feet

U.S. Army Corps of Engineers

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FIGURE 3-4

SWMU 51 Final Excavation Boundary and Associated Confirmation Sample Locations

Radford Army Ammunition Plant, Radford, VA

4.0 SITE RESTORATION AND DEMOBILIZATION

This stage of the project commenced after the completion of the excavation and the receipt of all analytical samples collected to confirm that the remaining soil concentrations met their associated RGs. This task included the backfill, topsoil and hydro-seeding of the excavation area and associated disturbed areas.

4.1 EXCAVATION BACKFILL AND FINAL GRADING

As described in *Section 2.3*, soil used to backfill the excavation was obtained from two sources including, native/cover soil overlying the trench sludge and from a local contractor (JWB Contractors, LLC).

Following approval from the VDEQ and USEPA Region III, the native/cover soil was used to backfill the bottom of the excavation. General fill material was transported in 10 CY loads to the site and placed on top of the native/cover soil using an excavator and a bulldozer in the excavation areas and compacted. A total of 73 loads or 730 CY of general fill was used to complete the backfilling of the excavation. After completion of the placement of the general fill, an additional 45 loads or 450 CY of topsoil were hauled into the site in 10 CY loads by JWB Contractors. The topsoil was placed over the general fill material in a 1-ft lift and spread and graded using a John Deere 650 wide-track bulldozer. Final grading was performed so that the excavation was brought up-to-grade with the surrounding surface.

4.2 HYDRO-SEEDING

After the backfill of the excavation and placement of topsoil was complete, Shaw subcontracted with a local, small business (Gregory Seeding of Pulaski, Virginia) to hydro-seed and mulch the entire area, which was disturbed during site activities. Hydro-seeding is a process in which grass seed, fertilizer, and mulch are applied suspended in a liquefied slurry and is typically sprayed onto the ground surface. Hydro-seeding at the SWMU 51 project site was performed on September 11, 2009, and was finished on the same day. Hydro-seeding activities are depicted in the photo log presented in **Appendix A**.

4.3 POST-COMPLETION INSPECTION

An inspection was performed at the site on December 14, 2009, approximately 90 days after completion of the site restoration activities. The purpose of the inspection was to ensure that grass was growing and that the excavated areas were not eroding. Observations from the inspection indicated that there were no eroded areas present and that the grass was growing well.

4.4 CONCLUSIONS

Based on the work performed at SWMU 51, the site is now suitable for industrial/commercial use.

5.0 REFERENCES

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RADFORD ARMY AMMUNITION PLANT, VIRGINIA

Interim Measures Completion Reports: SWMU 51, SWMU 39, and FLFA

Prepared for:

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Final Document **February 2010**

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The Appendices are Included on a CD Located at the Back of this Report

LIST OF ACRONYMS AND ABBREVIATIONS

ATK .....Alliant TechSystems, Inc.
CMS .....Corrective Measures Study
COI.....Contaminant of Interest
CY .....cubic yards
ft bgs.....feet below ground surface
ft msl .....feet mean sea level
ft .....foot or feet
IMWP.....Interim Measures Work Plan
mg/kg .....milligrams per kilogram
mg/L .....milligrams per liter
NELAC .....National Environmental Laboratory Accreditation Conference
PAH.....Polynuclear Aromatic Hydrocarbon
PCB .....Polychlorinated Biphenyl
RCRA.....Resource Conservation and Recovery Act
RFAAP.....Radford Army Ammunition Plant
RFI .....RCRA Facility Investigation
RG .....Remedial Goal
r-RG .....Residential Remedial Goal
Shaw.....Shaw Environmental, Inc.
SVOC.....Semivolatile Organic Compound
SWMU .....Solid Waste Management Unit
TAL.....Target Analyte List
TCL .....Target Compound List
TCLP.....Toxicity Characteristic Leaching Procedure
TCLPRL.....TCLP Regulatory Limit
TE.....Toxicity Equivalent
USACE .....U.S. Army Corps of Engineers
USEPA.....U.S. Environmental Protection Agency
VOC .....Volatile Organic Compound
XRF.....X-ray Fluorescence

1.0 INTRODUCTION

Shaw Environmental, Inc. (Shaw) has been contracted by the U.S. Army Corps of Engineers (USACE) to perform excavation activities at Solid Waste Management Unit (SWMU) 39 (RAAP-001), the Wastewater Ponds from the Propellant Incinerators, at Radford Army Ammunition Plant (RFAAP), Radford, Virginia. This work was performed under Contract Number W912QR-04-D-0027, Delivery Order DA0101. Specific elements of the project included: development of a work plan; delineation sampling of the area to determine the extent of contamination; the excavation and disposal of contaminated soils; restoration of the site; and, development of a final report. Work was performed in accordance with the approved *Final SWMU 39 Interim Measures Work Plan (IMWP)* (Shaw, 2008), the *Radford Army Ammunition Plant, Radford, Virginia, Final Master Work Plan* (URS, 2003), and the *U.S. Environmental Protection Agency (USEPA) Permit for Corrective Action and Waste Minimization* (USEPA, 2000).

1.1 SITE DESCRIPTION AND LOCATION

SWMU 39 consists of two unlined and bermed earthen ponds and is located in the north-central section of the Horseshoe Area (**Figure 1-1**), adjacent to and associated with the Hazardous Waste Incinerators. The SWMU is adjacent to a Resource Conservation and Recovery Act (RCRA) closed concrete-lined spray pond (Hazardous Waste Management Unit 39). A site map depicting the locations of the settling ponds, the hazardous waste incinerators, and the former location of the incinerator spray pond is presented on **Figure 1-2**.

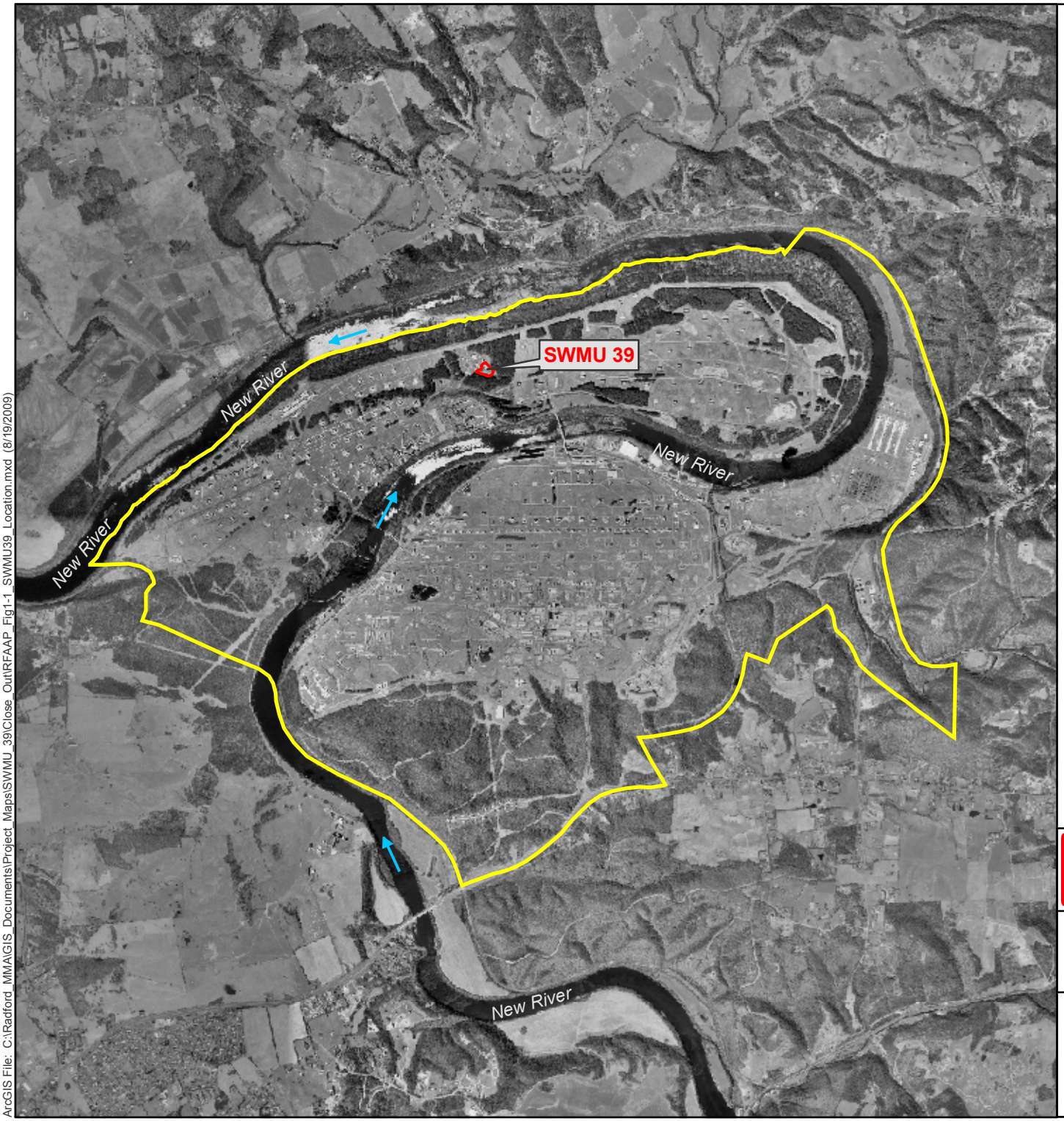
The earthen settling ponds received scrubber and precooler quench water from incinerator exhaust. The settling ponds were excavated approximately 6 to 8 feet (ft) into the natural grade and contain no drainage outlet. The excavated material was used to create a berm that surrounds each pond. A fence surrounds the ponds, and the enclosed area is approximately 450-ft by 300-ft at the widest points. Caustic was reportedly added to neutralize the water received in the two settling ponds. Settled material has not been removed from the ponds [Alliant TechSystems, Inc. (ATK), 1998].

SWMU 39 is a generally flat level area, at an elevation of approximately 1,700 feet above mean sea level (ft msl). A small section of the southern boundary rises to a maximum elevation of approximately 1,720 ft msl. Because the settling ponds are no longer in use, surface water is not present in the ponds except during heavy rain, snow melt, or other precipitation events.

1.2 SITE HISTORY

SWMU 39 consists of two unlined, earthen ponds that were associated with the Hazardous Waste Incinerators. According to the aerial photographic interpretation contained in the Installation Assessment (USEPA, 1992), construction activity of the ponds was first noted at the site in 1975. Excavation of the ponds appeared to be completed by 1981.

Three incinerators were constructed at the site in 1979 to incinerate slurried waste and off-specification explosives and propellants. The westernmost incinerator was the prototype for the other two incinerators and is inactive. As described in USEPA (1987), the incinerators are equipped with a refractory lined rotary kiln into which the propellant slurry is injected and incinerated. Combustion gasses are passed through an afterburner to effect total combustion. The exhaust gasses then pass through a water quench precooler to reduce the temperature prior to



LEGEND

- New River Flow Direction
- Installation Boundary
- SWMU 39 Boundary

Notes:
1) Aerial photo, dated 25 May 2000, was obtained from the Army Topographic Engineering Center.

N

Scale:
0 1,750 3,500 7,000 Feet

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FIGURE 1-1

SWMU 39 Site Location Map

Radford Army Ammunition Plant,
Radford, VA

ArcGIS File: C:\Radford_MMA\GIS_Documents\Project_Maps\SWMU_39\Close_Out\RFAAP_Fig1-1_SWMU39_Location.mxd (8/19/2009)

LEGEND

- Building Boundary
- Fence Line
- Dirt Road
- Paved Road
- Other SWMU Boundary
- SWMU 39 Boundary

Notes:
1) Aerial photo, dated 2005, was obtained from Montgomery County, VA Planning & GIS Services.
2) Samples were collected in April/May 2009.

N

Scale:
0 32.5 65 130
Feet

U.S. Army Corps of Engineers

Shaw® Shaw Environmental, Inc.

FIGURE 1-2

SWMU 39 Site Map

Radford Army Ammunition Plant,
Radford, VA

ArcGIS File: C:\Radford_MMA\GIS_Documents\Project_Maps\SWMU_39\Close_Out\RFAAP_Fig1-2_SWMU39_SiteMap.mxd (8/19/2009)

passing through a wet scrubber to remove noxious gasses and particulates. The gasses are exhausted and the wastewaters from both the quench towers and scrubbers were conveyed to the settling ponds (SWMU 39).

The site specific corrective measures objective for SWMU 39 was to reduce contaminant concentrations in soil to levels that are protective of industrial workers at the site. Additionally, the Army elected to evaluate residential exposure pathways to assess what the increase in remedial effort would be to remediate the site for unrestricted future reuse and facilitate clean closeout. Therefore, residential remedial goals (r-RGs) were developed that met this stringent criteria.

Prior to the excavation of the site, discrete soil delineation samples were collected from surface and subsurface locations within the settling ponds. In addition to the areas identified during the RCRA Facility Investigation/Corrective Measures Study (RFI/CMS) with elevated constituents, samples were to be collected from uncharacterized portions of the ponds to ensure that all soils with elevated constituents are removed.

Initially, one surface and one subsurface soil sample was collected from approximately 120 locations and analyzed for lead using a portable X-ray fluorescence (XRF) machine. In addition, five samples were collected from 5.0-5.5 feet below ground surface (ft bgs) in the areas of the northern and southern settling ponds where high concentrations were detected during the RFI/CMS to delineate the vertical extent of the soil contamination in these areas.

The extent of lead was expected to be the same or greater than the extent of the other contaminants of interest (COIs), and lead was initially used to delineate the areas to be excavated. The limit of the area to be excavated was bounded by soil characterization samples with concentrations below the chemical-specific remedial goals (RGs). Initial excavations were to be to a depth of 1 ft bgs in areas where a lead "hit" was detected.

Following the soil excavation, XRF confirmation samples were collected from the excavation floor and sidewalls to confirm that all contaminated soils had been removed above the RG. Discrete confirmation samples were collected from the sidewalls adjacent to the boundary of the excavation as determined by the delineation samples collected during the site delineation sampling event. The remaining samples were located by the site supervisor and project manager based on the final delineation of the area to be excavated. At a minimum, XRF samples were collected from the floor of the excavation area at a rate of one sample per 25 x 25 ft area. Additional XRF samples were collected at a rate of one sample per 20 linear feet along the sidewall. Approximately 10% of the XRF samples were sent to an off-site laboratory for confirmation of target analyte list (TAL) metals concentrations. Approximately 25% of the confirmation samples were also analyzed for dioxin/furans.

1.3 PROJECT OBJECTIVES

Based on the *SWMU 39 RFI/CMS Report, Final Document* (Shaw, 2005), interim measures were performed at SWMU 39. The interim measures were conducted to mitigate the threat of a contaminant release, migration, and/or exposure to the public and the environment, as well as facilitate clean closeout in accordance with Part II (D) (11-21) Interim Measures of the RFAAP Corrective Action Permit (USEPA, 2000). The measures include:

1. **Site Preparation.** Prior to commencement of work, a utility survey was performed and dig permits were obtained. In addition, erosion/sediment control measures were implemented.
2. **Soil Delineation Sampling and Excavation.** Delineation of soil containing arsenic, lead, vanadium, and dioxins/furans above the r-RG.
3. **Fence Removal.** Removal of chain-link fence surrounding SWMU 39.
4. **Soil Excavation.** Excavation of the delineated area such that the remaining soil was below the r-RG.
5. **Waste Characterization & Off-site Disposal.** Samples were collected to assess appropriate disposal options prior to soil excavation. Sample results determined the appropriate off-site disposal method.

2.0 PRE-EXCAVATION ACTIVITIES

2.1 DELINEATION SAMPLING

Prior to mobilization of excavation personnel, discrete soil delineation samples were collected from surface and subsurface locations within the settling ponds (**Figure 2-1**). In addition to the areas identified during the RFI/CMS (Shaw, 2005) with elevated constituents, samples were collected from uncharacterized portions of the ponds to ensure that all soil with elevated constituents would be removed.

Soil delineation samples were collected from the floors and banks of both ponds and analyzed for lead using XRF. A total of 72 (62 surface and 10 subsurface) samples were collected in the northern settling pond and 41 (31 surface and 10 subsurface) were collected in the southern settling pond. Once the extent of lead was delineated, select samples were analyzed by an off-site laboratory for TAL metals (10% frequency) and dioxins/furans (5% frequency) to ensure that the extent of other COIs [arsenic, vanadium, and dioxins/furans as toxicity equivalent (TE)] were also delineated.

As shown on **Figure 2-1** and in **Table 2-1**, XRF sample results indicated that surface soil in both ponds contained lead concentrations above 400 milligrams per kilogram (mg/kg). The only surface soil samples with XRF lead concentrations below 400 mg/kg were collected from the banks of the settling ponds. XRF delineation results from subsurface soil in both settling ponds indicated lead concentrations below 400 mg/kg.

As indicated in **Tables 2-1 and 2-2**, off-site laboratory sample results were mostly consistent with XRF sample results. Off-site laboratory results indicated that lead concentrations were above 400 mg/kg in 11 out of 12 samples collected. Laboratory delineation results also indicated that concentrations of the other COIs (arsenic, vanadium, and dioxins/furans as TE) were all below their respective RGs.

In addition to the XRF sampling, two subsurface samples were collected at 2.5-3.0 and 5.0-5.5 ft bgs depth, where high concentrations were detected during the RFI/CMS to delineate the vertical extent of soil contamination in these areas.

2.2 WASTE CHARACTERIZATION SAMPLING

Two composite samples (39DW01 – Northern Pond and 39DW02 – Southern Pond) were collected from 0-2 ft bgs from three borings within each pond to characterize the soil for disposal. The samples were analyzed for dioxins/furans, explosives, Toxicity Characteristic Leaching Procedure (TCLP) metals, and TCLP reactivity, ignitibility, and corrosivity as pH. The results from both composite samples are presented in **Table 2-3**.

Results from the samples indicated that the concentration of leachable lead [39DW01: 7.9 milligrams per liter (mg/L) and 39DW02: 8.4 mg/L] was greater than the TCLP Regulatory Limit (TCLPRL) of 5 mg/L in both ponds and the soil was classified and disposed of as hazardous waste. The remaining sample concentrations were below the waste characterization screening levels, where applicable. The waste disposal profile is presented in **Appendix C-3**.

LEGEND

- Soil XRF Delineation Sample Location Result < 400 mg/kg
- Soil XRF Delineation Sample Location Result > 400 mg/kg
- SWMU 39 Boundary

Notes:
1) Aerial photo, dated 2005, was obtained from Montgomery County, VA Planning & GIS Services.
2) Samples were collected in November 2008

N

Scale:

0 30 60 120 Feet

U.S. Army Corps of Engineers

Shaw® Shaw Environmental, Inc.

FIGURE 2-1

SWMU 39 XRF Delineation Results

Radford Army Ammunition Plant,
Radford, VA

ArcGIS File: C:\Radford_MMA\GIS_Documents\Project_Maps\SWMU_39\Close_Out\RFAAP_Fig2-1_SWMU39_XRF_Delineation_Results.mxd (8/19/2009)

Table 2-1
XRF Soil Delineation Samples - SWMU 39 Interim Measures
Page 1 of 2

Pond	XRF_ID	Depth	Sample_Dat	XRF_Readin	PlusMinus	Error	Units	Conf ID	Lab Conc	Units
Northern	0e0n	0-0.5	11/19/2008	3978	+-	183	mg/kg			
Northern	0e100s	0-0.5	11/19/2008	1588	+-	95	mg/kg			
Northern	0e25n	0-0.5	11/19/2008	27199	+-	511	mg/kg			
Northern	0e25s	0-0.5	11/19/2008	2352	+-	238	mg/kg			
Northern	0e50n	0-0.5	11/19/2008	13127	+-	373	mg/kg			
Northern	0e50s	0-0.5	11/19/2008	1595	+-	43	mg/kg			
Northern	0e75s	0-0.5	11/19/2008	1799	+-	63	mg/kg			
Northern	25e0n	0-0.5	11/19/2008	4248	+-	86	mg/kg	39DE15	4050	mg/kg
Northern	25e100s	0-0.5	11/19/2008	2038	+-	90	mg/kg			
Northern	25e125s	0-0.5	11/19/2008	2054	+-	56	mg/kg	39DE14	2930	mg/kg
Northern	25e150s	0-0.5	11/19/2008	2195	+-	61	mg/kg			
Northern	25e25n	0-0.5	11/19/2008	4543	+-	124	mg/kg			
Northern	25e25s	0-0.5	11/19/2008	1696	+-	111	mg/kg			
Northern	25e50n	0-0.5	11/19/2008	3532	+-	131	mg/kg			
Northern	25e50s	0-0.5	11/19/2008	902	+-	84	mg/kg			
Northern	25e75s	0-0.5	11/19/2008	2079	+-	60	mg/kg			
Northern	25w0n	0-0.5	11/19/2008	9145	+-	166	mg/kg			
Northern	25w100s	0-0.5	11/19/2008	107	+-	12	mg/kg			
Northern	25w25n	0-0.5	11/19/2008	8375	+-	233	mg/kg			
Northern	25w25s	0-0.5	11/19/2008	5293	+-	424	mg/kg			
Northern	25w50n	0-0.5	11/19/2008	18241	+-	548	mg/kg			
Northern	25w50s	0-0.5	11/19/2008	1552	+-	37	mg/kg			
Northern	25w75s	0-0.5	11/19/2008	1354	+-	69	mg/kg			
Northern	40w0n	0-0.5	11/19/2008	4967	+-	173	mg/kg			
Northern	40w25n	0-0.5	11/19/2008	61577	+-	2338	mg/kg			
Northern	40w25s	0-0.5	11/19/2008	910	+-	32	mg/kg	39DE12	1050	mg/kg
Northern	40w50n	0-0.5	11/19/2008	3839	+-	91	mg/kg			
Northern	40w50s	0-0.5	11/19/2008	1131	+-	135	mg/kg			
Northern	40w75s	0-0.5	11/19/2008	141	+-	24	mg/kg			
Northern	50e0n	0-0.5	11/19/2008	3460	+-	215	mg/kg			
Northern	50e100s	0-0.5	11/19/2008	978	+-	92	mg/kg			
Northern	50e125s	0-0.5	11/19/2008	1716	+-	98	mg/kg			
Northern	50e150s	0-0.5	11/19/2008	643	+-	35	mg/kg			
Northern	50e175s	0-0.5	11/19/2008	946	+-	27	mg/kg			
Northern	50e200s	0-0.5	11/19/2008	1210	+-	74	mg/kg			
Northern	50e25n	0-0.5	11/19/2008	6690	+-	526	mg/kg			
Northern	50e25s	0-0.5	11/19/2008	3324	+-	65	mg/kg			
Northern	50e50n	0-0.5	11/19/2008	1426	+-	58	mg/kg			
Northern	50e50s	0-0.5	11/19/2008	3228	+-	90	mg/kg			
Northern	50e75s	0-0.5	11/19/2008	1478	+-	40	mg/kg			
Northern	55w0n	0-0.5	11/19/2008	92416	+-	3104	mg/kg			
Northern	55w25s	0-0.5	11/19/2008	1199	+-	63	mg/kg			
Northern	55w50s	0-0.5	11/19/2008	813	+-	32	mg/kg	39DE11	760	mg/kg
Northern	65w0n	0-0.5	11/19/2008	3433	+-	167	mg/kg			
Northern	65w10n	0-0.5	11/19/2008	154	+-	17	mg/kg			
Northern	65w10s	0-0.5	11/19/2008	253	+-	15	mg/kg			
Northern	75e0n	0-0.5	11/19/2008	3686	+-	144	mg/kg			
Northern	75e100s	0-0.5	11/19/2008	2363	+-	53	mg/kg			
Northern	75e125s	0-0.5	11/19/2008	1238	+-	89	mg/kg			
Northern	75e150s	0-0.5	11/19/2008	1489	+-	99	mg/kg			
Northern	75e175s	0-0.5	11/19/2008	681	+-	24	mg/kg			
Northern	75e200s	0-0.5	11/19/2008	1513	+-	58	mg/kg			
Northern	75e225s	0-0.5	11/19/2008	1142	+-	71	mg/kg			
Northern	75e25n	0-0.5	11/19/2008	1930	+-	53	mg/kg			
Northern	75e25s	0-0.5	11/19/2008	3813	+-	69	mg/kg			
Northern	75e50s	0-0.5	11/19/2008	2462	+-	62	mg/kg	39DE13	2410	mg/kg
Northern	75e75s	0-0.5	11/19/2008	1956	+-	46	mg/kg			
Northern	39DE06A	0-0.5	11/18/2008	2588	+-	52	mg/kg			
Northern	39DE06B	2.5-3	11/18/2008	351	+-	26	mg/kg	39DE06B	461	mg/kg
Northern	39DE06C	5-5.5	11/18/2008	20	+-		mg/kg			
Northern	39DE07A	0-0.5	11/18/2008	93	+-	11	mg/kg			
Northern	39DE07B	2.5-3	11/18/2008	52	+-	8	mg/kg			
Northern	39DE07C	5-5.5	11/18/2008	20	+-		mg/kg			
Northern	39DE08A	0-0.5	11/18/2008	2603	+-	74	mg/kg	39DE08A	4760	mg/kg
Northern	39DE08B	2.5-3	11/18/2008	20	+-		mg/kg	39DE16	1270	mg/kg
Northern	39DE08C	5-5.5	11/18/2008	19	+-		mg/kg			
Northern	39DE09A	0-0.5	11/18/2008	1794	+-	54	mg/kg	39DE09A	1220	mg/kg
Northern	39DE09B	2.5-3	11/18/2008	68	+-	9	mg/kg			
Northern	39DE09C	5-5.5	11/18/2008	18	+-		mg/kg			
Northern	39DE10A	0-0.5	11/18/2008	4153	+-	87	mg/kg			
Northern	39DE10B	2.5-3	11/18/2008	52	+-	8	mg/kg			
Northern	39DE10C	5-5.5	11/18/2008	19	+-		mg/kg			
Southern	100w250s	0-0.5	11/18/2008	1042	+-	65	mg/kg			
Southern	100w290s	0-0.5	11/18/2008	799	+-	58	mg/kg			

Table 2-1
XRF Soil Delineation Samples - SWMU 39 Interim Measures
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Pond	XRF_ID	Depth	Sample_Dat	XRF_Readin	PlusMinus	Error	Units	Conf ID	Lab Conc	Units
Southern	115w200s	0-0.5	11/18/2008	1207	+-	37	mg/kg			
Southern	125w150s	0-0.5	11/18/2008	104	+-	11	mg/kg	39DE17	3330	mg/kg
Southern	125w200s	0-0.5	11/18/2008	1071	+-	43	mg/kg			
Southern	125w250s	0-0.5	11/18/2008	279	+-	39	mg/kg			
Southern	150w100s	0-0.5	11/18/2008	1312	+-	86	mg/kg			
Southern	150w150s	0-0.5	11/19/2008	871	+-	23	mg/kg			
Southern	150w200s	0-0.5	11/18/2008	906	+-	29	mg/kg			
Southern	175w100s	0-0.5	11/18/2008	1111	+-	68	mg/kg			
Southern	175w150s	0-0.5	11/18/2008	3096	+-	82	mg/kg			
Southern	175w200s	0-0.5	11/18/2008	1268	+-	53	mg/kg	39DE01A	5770	mg/kg
Southern	175w25s	0-0.5	11/18/2008	3893	+-	158	mg/kg			
Southern	200w0n	0-0.5	11/18/2008	85942	+-	4434	mg/kg			
Southern	200w100s	0-0.5	11/18/2008	578	+-	37	mg/kg			
Southern	200w25n	0-0.5	11/18/2008	4305	+-	220	mg/kg	39DE02B	175	mg/kg
Southern	200w25s	0-0.5	11/18/2008	8484	+-	180	mg/kg			
Southern	200w30s	0-0.5	11/18/2008	3725	+-	218	mg/kg			
Southern	205w50s	0-0.5	11/19/2008	3560	+-	70	mg/kg			
Southern	220w50s	0-0.5	11/18/2008	67	+-	13	mg/kg			
Southern	225w25n	0-0.5	11/18/2008	7172	+-	643	mg/kg			
Southern	225w25s	0-0.5	11/18/2008	3147	+-	75	mg/kg			
Southern	225w60n	0-0.5	11/18/2008	45	+-	8	mg/kg			
Southern	230w25s	0-0.5	11/18/2008	1107	+-	30	mg/kg			
Southern	235w0n	0-0.5	11/18/2008	1184	+-	54	mg/kg			
Southern	235w25s	0-0.5	11/18/2008	170	+-	29	mg/kg			
Southern	39DE01A	0-0.5	11/18/2008	2092	+-	69	mg/kg			
Southern	39DE01B	2.5-3	11/18/2008	133	+-	12	mg/kg			
Southern	39DE01C	5-5.5	11/18/2008	36	+-		mg/kg			
Southern	39DE02A	0-0.5	11/18/2008	9504	+-	158	mg/kg			
Southern	39DE02B	2.5-3	11/18/2008	234	+-	25	mg/kg			
Southern	39DE02C	5-5.5	11/18/2008	30	+-		mg/kg			
Southern	39DE03A	0-0.5	11/18/2008	28612	+-	505	mg/kg			
Southern	39DE03B	2.5-3	11/18/2008	76	+-	10	mg/kg			
Southern	39DE03C	5-5.5	11/18/2008	37	+-		mg/kg			
Southern	39DE04A	0-0.5	11/18/2008	6316	+-	153	mg/kg			
Southern	39DE04B	2.5-3	11/18/2008	24	+-		mg/kg			
Southern	39DE04C	5-5.5	11/18/2008	31	+-		mg/kg			
Southern	39DE05A	0-0.5	11/18/2008	516	+-	21	mg/kg			
Southern	39DE05B	2.5-3	11/18/2008	20	+-		mg/kg			
Southern	39DE05C	5-5.5	11/18/2008	19	+-		mg/kg			

Table 2-2
Soil Delineation Sample Results - SWMU 39 Interim Measures

Analyte	Sample ID	39DE01A					39DE02B					39DE06B					39DE08A				
	Sample Date	11/18/08					11/18/08					11/18/08					11/18/08				
	Sample Depth	0-0.5					2.5-3					2.5-3					0-0.5				
	RG	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL
Metals (mg/kg)																					
Arsenic	15.8	3.5			*0.86*	*2.6*	4.8			*0.84*	*2.5*	2.3			*0.76*	*2.3*	1.6	B		*0.78*	*2.3*
Lead	400	5770			*0.73*	*2.4*	175			*0.72*	*2.4*	461			*0.66*	*2.2*	4760			*0.67*	*2.2*
Vanadium	108	47.4			*0.37*	*1.2*	66.7			*0.36*	*1.2*	28.3			*0.33*	*1.1*	30.2			*0.33*	*1.1*
Zinc	31000	88.2			*0.73*	*3.7*	65.5			*0.72*	*3.6*	41			*0.66*	*3.3*	42.5			*0.67*	*3.3*
Dioxins/Furans (ng/kg)																					
TCDD TE	1000	2.033					0.3400					1.907					6.269				

**Refer to legend immediately following this table for a list of definitions and table notes.

Table 2-2
Soil Delineation Sample Results - SWMU 39 Interim Measures
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Analyte	Sample ID	39DE09A					39DE11					39DE12					39DE13				
	Sample Date	11/18/08					11/19/08					11/19/08					11/19/08				
	Sample Depth	0-0.5					0-0.5					0-0.5					0-0.5				
	RG	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL
Metals (mg/kg)																					
Arsenic	15.8	3.4			*0.84*	*2.5*	2.9	B G		*1.6*	*4.8*	4.4			*0.85*	*2.6*	2.4			*0.79*	*2.4*
Lead	400	1220			*0.72*	*2.4*	760			*0.69*	*2.3*	1050			*0.73*	*2.4*	2410			*0.68*	*2.3*
Vanadium	108	49.5			*0.36*	*1.2*	37.7			*0.35*	*1.2*	61			*0.37*	*1.2*	41.9			*0.34*	*1.1*
Zinc	31000	51.6			*0.72*	*3.6*	58.6			*0.69*	*3.5*	66.9			*0.73*	*3.7*	53.2			*0.68*	*3.4*
Dioxins/Furans (ng/kg)																					
TCDD TE	1000	2.893					NT					NT					NT				

**Refer to legend immediately following this table for a list of definitions and table notes.

Table 2-2
Soil Delineation Sample Results - SWMU 39 Interim Measures

Analyte	Sample ID	39DE14					39DE15					39DE16					39DE17				
	Sample Date	11/19/08					11/19/08					11/19/08					11/19/08				
	Sample Depth	0-0.5					0-0.5					0-0.5					0-0.5				
	RG	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL
Metals (mg/kg)																					
Arsenic	15.8	3.2			*0.87*	*2.6*	2.4	B		*0.83*	*2.5*	3.8			*0.91*	*2.7*	1.4	B		*0.9*	*2.7*
Lead	400	2930			*0.74*	*2.5*	4050			*0.71*	*2.4*	1270			*0.78*	*2.6*	3330			*0.77*	*2.6*
Vanadium	108	55.8			*0.37*	*1.2*	54.8			*0.35*	*1.2*	67.9			*0.39*	*1.3*	57.1			*0.39*	*1.3*
Zinc	31000	62			*0.74*	*3.7*	63.3			*0.71*	*3.5*	82.1			*0.78*	*3.9*	66.1			*0.77*	*3.9*
Dioxins/Furans (ng/kg)																					
TCDD TE	1000	NT					6.962					NT					NT				

**Refer to legend immediately following this table for a list of definitions and table notes.

Table 2-2
Legend

12	J	Shading and black font indicate an industrial SL exceedance.
12	J	Bold outline indicates a residential SL exceedance.
12	**J**	Bold, underlined font indicates a background exceedance.
12	*12*	Shading in the MDL/MRL columns indicates the MDL exceeds a criterion.

SLs for non-Carcinogenic compounds have been recalculated to an HI of 0.1.
The pyrene SLs were used for acenaphthylene, benzo(g,h,i)perylene, and phenanthrene.
Inorganic results below background UTLs are not indicated as exceedances on the table.
SL = Screening Level (Source: ORNL Regional Screening Table, September 2008).
SL values in table are for the more conservative chromium VI.
SL values for chromium III are 150,000 (ind) and 12,000 (res), which were not exceeded.
Lead screening values from Technical Review Workgroup for Lead: Guidance Document (USEPA, 1999b).
mg/kg = milligrams per kilogram (parts per million).
ng/kg = nanograms per kilogram (parts per trillion).
µg/kg = micrograms per kilogram (parts per billion).
NA = not applicable.
NT = analyte not tested.
Lab Q = Lab Data Qualifiers
* = Laboratory duplicate not within control limits.
B = (organics) Blank contamination. Value detected in sample and associated blank.
A (Dioxins) = B = (metals) Value <MRL and >MDL and is considered estimated.
E (metals) = Reported value is estimated because of the presence of interferences.
EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/PCDF ions was outside accepted ranges. The detected PCDD/PCDF was reported as an estimated maximum possible concentration (EMPC).
J = (organics) Value <MRL and >MDL and is considered estimated.
U = Analyte not-detected at the method reporting limit.
X = (dioxins) Ion abundance ratio outside acceptable range. Value reported is EMPC.
Val Q = Validation Data Qualifiers
B = blank contamination. Value detected in sample and associated blank.
J = estimated concentration.
K = estimated concentration bias high.
L = estimated concentration bias low.
N = presumptive evidence for tentatively identified compounds using a library search.
U = analyte not detected.
UJ = estimated concentration non-detect.
UL = estimated concentration non-detect bias low.

Table 2-3
Waste Characterization Sample Results
SWMU 39 Interim Measures

Analyte	Sample ID Matrix Sample Date	39DW01 Soil 11/19/2008		39DW02 Soil 11/19/2008	
	TCLP RL	Result	Lab Q	Result	Lab Q
Dioxins/Furans (ng/kg)					
2,3,7,8-TCDF	na	1.1	U	34	CON
1,2,3,7,8-PeCDF	na	5.7	U	7.5	
2,3,4,7,8-PeCDF	na	5.7	U	17	
1,2,3,4,7,8-HxCDF	na	1.2	J	22	
2,3,4,6,7,8-HxCDF	na	0.68	J	3	J
1,2,3,7,8,9-HxCDF	na	5.7	U	0.4	J
1,2,3,4,6,7,8-HpCDF	na	2.9	J	80	
OCDF	na	2.9	J	230	
Total TCDF	na	1.1	U	120	
Total PeCDF	na	1.1		78	
Total HxCDF	na	4		120	
Total HpCDF	na	4.4		260	
Total TCDD	na	1.1	U	1.2	U
2,3,7,8-TCDD	na	1.1	U	1.2	U
Total PeCDD	na	5.7	U	1.2	
1,2,3,7,8-PeCDD	na	5.7	U	1.2	
Total HxCDD	na	7.5		63	
1,2,3,7,8,9-HxCDD	na	5.7	U	5.1	J
Total HpCDD	na	54		620	
1,2,3,4,6,7,8-HpCDD	na	28		380	
OCDD	na	2400	B	5.8	J
1,2,3,6,7,8-HxCDF	na	0.61	J	9.2	
1,2,3,4,7,8,9-HpCDF	na	5.7	U	3.7	J
1,2,3,4,7,8-HxCDD	na	5.7	U	13	
1,2,3,6,7,8-HxCDD	na	5.7	U	6000	B
Explosives (mg/kg)					
1,3-Dinitrobenzene	na	0.25	U	0.25	U
RDX	na	0.25	U	0.25	U
2,4-Dinitrotoluene	na	0.02	J	0.058	J
2,6-Dinitrotoluene	na	1.2	U	1.2	U
Nitrobenzene	na	0.25	U	0.25	U
Nitroglycerin	na	0.5	U	0.18	J
1,3,5-Trinitrobenzene	na	0.25	U	0.25	U
2,4,6-Trinitrotoluene	na	0.25	U	0.25	U
HMX	na	0.25	U	0.25	U
Tetryl	na	0.25	U	0.25	U
2-Nitrotoluene	na	0.035	J PG	0.25	U
3-Nitrotoluene	na	0.25	U	0.25	U
4-Nitrotoluene	na	0.5	U	0.5	U
4-Amino-2,6-dinitrotoluene	na	0.25	U	0.25	U
2-Amino-4,6-dinitrotoluene	na	0.25	U	0.25	U
PETN	na	0.5	U	0.5	U
TCLP Metals (mg/L)					
TCLP Lead	5	7.9		8.4	
TCLP Arsenic	5	0.1	U	0.1	U
TCLP Chromium	5	0.025	U	0.025	U
TCLP Characteristics					
Ignitability (Flashpoint)	140 (°F)	No Ignition		No Ignition	
Corrosivity as pH	<2 or >12 (Units)	4.8		4.5	
Sulfide Reactivity	500 (mg/kg)	5.7	U	6.2	U
Cyanide Reactivity	250 (mg/kg)	0.57	U	0.62	U

**Refer to legend immediately following this table for a list of table notes.

Table 2-3
Legend

12	J	Shading and black font indicate an industrial SL exceedance.
12	J	Bold outline indicates a residential SL exceedance.
12	**J**	Bold, underlined font indicates a background exceedance.
12	*12*	Shading in the MDL/MRL columns indicates the MDL exceeds a criterion.

SLs for non-Carcinogenic compounds have been recalculated to an HI of 0.1.
The pyrene SLs were used for acenaphthylene, benzo(g,h,i)perylene, and phenanthrene.
Inorganic results below background UTLs are not indicated as exceedances on the table.
SL = Screening Level (Source: ORNL Regional Screening Table, September 2008).
SL values in table are for the more conservative chromium VI.
SL values for chromium III are 150,000 (ind) and 12,000 (res), which were not exceeded.
Lead screening values from Technical Review Workgroup for Lead: Guidance Document (USEPA, 1999b).
mg/kg = milligrams per kilogram (parts per million).
ng/kg = nanograms per kilogram (parts per trillion).
µg/kg = micrograms per kilogram (parts per billion).
NA = not applicable.
NT = analyte not tested.
Lab Q = Lab Data Qualifiers
* = Laboratory duplicate not within control limits.
B = (organics) Blank contamination. Value detected in sample and associated blank.
A (Dioxins) = B = (metals) Value <MRL and >MDL and is considered estimated.
E (metals) = Reported value is estimated because of the presence of interferences.
EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/PCDF ions was outside accepted ranges. The detected PCDD/PCDF was reported as an estimated maximum possible concentration (EMPC).
J = (organics) Value <MRL and >MDL and is considered estimated.
U = Analyte not-detected at the method reporting limit.
X = (dioxins) Ion abundance ratio outside acceptable range. Value reported is EMPC.
Val Q = Validation Data Qualifiers
B = blank contamination. Value detected in sample and associated blank.
J = estimated concentration.
K = estimated concentration bias high.
L = estimated concentration bias low.
N = presumptive evidence for tentatively identified compounds using a library search.
U = analyte not detected.
UJ = estimated concentration non-detect.
UL = estimated concentration non-detect bias low.

2.3 TOPSOIL AND BORROW MATERIAL SAMPLING

Certified clean general fill and topsoil were obtained from a local contractor, JWB Contractors, LLC of Dublin, Virginia. The borrow site was visited by site personnel and the material sampled and sent to a laboratory for analysis for target compound list (TCL) volatile organic compounds (VOCs), TCL semivolatile organic compounds (SVOCs), pesticides/polychlorinated biphenyls (PCBs), polynuclear aromatic hydrocarbons (PAHs), TAL metals, and pH. Approximately one sample was collected for every 1,000 cubic yards (CY) of borrow/topsoil material.

Results from the samples indicated that PCBs and herbicides were not detected in either the topsoil or borrow material. Although VOCs, SVOCs, pesticides, PAHs, and explosives were detected, none of the detected concentrations were above residential screening levels or RGs. Metals were present at levels below the RFAAP facility-wide background concentrations with the exception of aluminum, beryllium, and mercury. Aluminum, beryllium, and mercury concentrations were below the residential risk-based concentration. Results from the topsoil and borrow material samples are presented in **Table 2-4**.

Table 2-4
Topsoil/Borrow Material Characterization Sample Results - SWMU 39 Interim Measures
Page 1 of 3

Analyte	Sample ID			JWB-GF19					JWB-GF20					JWB-GF21					JWB-GF22					JWB-GF23					JWB-GF24					JWB-GF25					JWB-GF26				
	Sample Date			8/6/09					8/6/09					8/6/09					8/6/09					8/6/09					8/6/09					8/6/09					8/6/09				
	Sample Depth			0-0.5					0-0.5					0-0.5					0-0.5					0-0.5					0-0.5					0-0.5					0-0.5				
				Borrow					Borrow					Borrow					Borrow					Borrow					Borrow					Borrow					Borrow				
	i-SL	r-SL	Background	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL
VOCs (ug/kg)																																											
1,1-Dichloroethene	1100000	250000	na	5.2	U		*0.27*	*5.2*	5.6	U		*0.29*	*5.6*	5.7	U		*0.3*	*5.7*	6	U		*0.31*	*6*	5.4	U		*0.28*	*5.4*	5.6	U		*0.29*	*5.6*	5.1	U		*0.27*	*5.1*	5.8	U		*0.3*	*5.8*
2-Butanone	190000000	28000000	na	10	U		*1.5*	*10*	11	U		*1.6*	*11*	11	U		*1.6*	*11*	12	U		*1.7*	*12*	11	U		*1.5*	*11*	11	U		*1.6*	*11*	10	U		*1.4*	*10*	12	U		*1.6*	*12*
2-Hexanone	na	na	na	10	U		*0.77*	*10*	11	U		*0.82*	*11*	11	U		*0.84*	*11*	12	U		*0.88*	*12*	11	U		*0.79*	*11*	11	U		*0.83*	*11*	10	U		*0.75*	*10*	12	U		*0.86*	*12*
Acetone	610000000	61000000	na	21	U		*1.5*	*21*	22	U		*1.6*	*22*	23	U		*1.6*	*23*	24	U		*1.7*	*24*	21	U		*1.5*	*21*	3.9	J B		*1.6*	*22*	20	U		*1.4*	*20*	23	U		*1.6*	*23*
Chlorobenzene	1500000	310000	na	5.2	U		*0.3*	*5.2*	5.6	U		*0.32*	*5.6*	5.7	U		*0.33*	*5.7*	6	U		*0.35*	*6*	5.4	U		*0.31*	*5.4*	5.6	U		*0.32*	*5.6*	5.1	U		*0.3*	*5.1*	5.8	U		*0.34*	*5.8*
PAHs (ug/kg)																																											
Benz(a)anthracene	2100	150	na	0.47	J		*0.43*	*7*	6.8	U		*0.41*	*6.8*	6.6	U		*0.4*	*6.6*	6.6	U		*0.4*	*6.6*	6.5	U		*0.39*	*6.5*	7.1	U		*0.43*	*7.1*	6.7	U		*0.41*	*6.7*	6.5	U		*0.4*	*6.5*
Benzo(b)fluoranthene	2100	150	na	0.98	J		*0.71*	*7*	6.8	U		*0.69*	*6.8*	6.6	U		*0.67*	*6.6*	6.6	U		*0.66*	*6.6*	6.5	U		*0.66*	*6.5*	7.1	U		*0.72*	*7.1*	6.7	U		*0.68*	*6.7*	6.5	U		*0.66*	*6.5*
Chrysene	210000	15000	na	0.68	J		*0.49*	*7*	6.8	U		*0.47*	*6.8*	6.6	U		*0.46*	*6.6*	6.6	U		*0.46*	*6.6*	6.5	U		*0.45*	*6.5*	7.1	U		*0.49*	*7.1*	6.7	U		*0.46*	*6.7*	0.76	J		*0.45*	*6.5*
Fluoranthene	22000000	2300000	na	1.4	J		*0.41*	*7*	6.8	U		*0.4*	*6.8*	6.6	U		*0.39*	*6.6*	6.6	U		*0.39*	*6.6*	6.5	U		*0.38*	*6.5*	7.1	U		*0.42*	*7.1*	6.7	U		*0.39*	*6.7*	0.57	J		*0.38*	*6.5*
Pyrene	17000000	1700000	na	1.1	J		*0.49*	*7*	6.8	U		*0.48*	*6.8*	6.6	U		*0.46*	*6.6*	6.6	U		*0.46*	*6.6*	6.5	U		*0.46*	*6.5*	7.1	U		*0.5*	*7.1*	6.7	U		*0.47*	*6.7*	0.5	J		*0.46*	*6.5*
SVOCs (ug/kg)																																											
2,4-Dinitrotoluene	1200000	120000	na	460	U		*120*	*460*	450	U		*120*	*450*	440	U		*120*	*440*	430	U		*120*	*430*	430	U		*120*	*430*	470	U		*130*	*470*	440	U		*120*	*440*	430	U		*120*	*430*
Pesticides (ug/kg)																																											
Endosulfan I	na	na	na	2.4	U		*0.074*	*2.4*	0.08	J B		*0.071*	*2.3*	2.2	U		*0.069*	*2.2*	0.096	J B		*0.068*	*2.2*	2.2	U		*0.068*	*2.2*	2.4	U		*0.075*	*2.4*	2.3	U		*0.07*	*2.3*	2.3	U		*0.07*	*2.3*
PCBs (mg/kg)																																											
Explosives (mg/kg)																																											
2,4,6-Trinitrotoluene	79	19	na	NT					NT					NT					NT					NT					NT					NT					NT				
2,4-Dinitrotoluene	1200	120	na	NT					NT					NT					NT					NT					NT					NT					NT				
2,6-Dinitrotoluene	620	61	na	NT					NT					NT					NT					NT					NT					NT					NT				
4-amino-2,6-Dinitrotoluene	1900	150	na	NT					NT					NT					NT					NT					NT					NT					NT				
Herbicides (ug/kg)	Samples were not tested for this group.																																										
Metals (mg/kg)																																											
Aluminum	990000	77000	40041	**42500**			*7.9*	*29.5*	**40600**			*7.7*	*28.7*	37500			*7.3*	*27.5*	39200			*7.4*	*27.6*	39700			*7.4*	*27.6*	**42700**			*8*	*29.9*	**40800**			*7.4*	*27.9*	**41000**			*7.4*	*27.8*
Arsenic	1.6	0.39	15.8	10.2			*1.8*	*3*	10.3			*1.8*	*2.9*	6.8			*1.7*	*2.7*	9.9			*1.7*	*2.8*	7			*1.7*	*2.8*	8.7			*1.9*	*3*	10			*1.7*	*2.8*	9			*1.7*	*2.8*
Barium	190000	15000	209	51.1			*0.56*	*2.8*	53			*0.55*	*2.7*	36			*0.52*	*2.6*	39.9			*0.53*	*2.6*	36.4			*0.53*	*2.6*	44.7			*0.57*	*2.8*	40.9			*0.53*	*2.7*	45.1			*0.53*	*2.6*
Beryllium	2000	160	1.02	**1.9**			*0.14*	*0.42*	**2.2**			*0.14*	*0.41*	0.93			*0.13*	*0.39*	**1.5**			*0.13*	*0.39*	**1.1**			*0.13*	*0.39*	**1.7**			*0.14*	*0.43*	**1.7**			*0.13*	*0.4*	**1.5**			*0.13*	*0.4*
Cadmium	810	70	0.69	0.42	U		*0.14*	*0.42*	0.41	U		*0.14*	*0.41*	0.39	U		*0.13*	*0.39*	0.39	U		*0.13*	*0.39*	0.39	U		*0.13*	*0.39*	0.43	U		*0.14*	*0.43*	0.4	U		*0.13*	*0.4*	0.4	U		*0.13*	*0.4*
Calcium	na	na	na	1870			*35.2*	*141*	7920			*34.2*	*137*	1450			*32.7*	*131*	3290			*32.9*	*132*	2450			*32.9*	*132*	20400			*35.6*	*142*	1700			*33.2*	*133*	2740			*33.1*	*132*
Chromium	1400	280	65.3	31.4			*0.46*	*1.7*	31.5			*0.45*	*1.6*	37.9			*0.43*	*1.6*	46.1			*0.43*	*1.6*	41.7			*0.43*	*1.6*	31.1			*0.47*	*1.7*	63.2			*0.44*	*1.6*	28.8			*0.44*	*1.6*
Cobalt	300	23	72.3	12.5			*0.35*	*0.84*	21.1			*0.34*	*0.82*	27.9			*0.33*	*0.78*	16.8			*0.33*	*0.79*	15.6			*0.33*	*0.79*	12.1			*0.36*	*0.85*	10			*0.33*	*0.8*	45.7			*0.33*	*0.79*
Copper	41000	3100	53.5	20.9			*0.7*	*3.5*	21			*0.68*	*3.4*	22.7			*0.65*	*3.3*	19.5			*0.66*	*3.3*	23.6			*0.66*	*3.3*	20.8			*0.71*	*3.6*	19.5			*0.66*	*3.3*	20.6			*0.66*	*3.3*
Iron	720000	55000	50962	26900			*4.4*	*14.1*	26400			*4.2*	*13.7*	34300			*4.1*	*13.1*	40000			*4.1*	*13.2*	37900			*4.1*	*13.2*	28500			*4.4*	*14.2*	39300			*4.1*	*13.3*	26500			*4.1*	*13.2*
Lead	8000	4000	26.8	14.4			*0.46*	*2.8*	16.2			*0.45*	*2.7*	15.2			*0.43*	*2.6*	18.6			*0.43*	*2.6*	15.7			*0.43*	*2.6*	13.6			*0.47*	*2.8*	16.3			*0.44*	*2.7*	16.5			*0.44*	*2.6*
Magnesium	na	na	na	22700			*10.5*	*70.3*	23000			*10.2*	*68.3*	4480			*9.8*	*65.4*	11900			*9.9*	*65.8*	5690			*9.9*	*65.8*	27800			*10.7*	*71.2*	14900			*9.9*	*66.3*	18100			*9.9*	*66.2*
Manganese	23000	1800	2543	186			*0.46*	*1.7*	366			*0.45*	*1.6*	507			*0.43*	*1.6*	564			*0.43*	*1.6*	272			*0.43*	*1.6*	235			*0.47*	*1.7*	249			*0.44*	*1.6*	806	RLA		*2.2*	*7.9*
Mercury	24	4.3	0.13	0.086			*0.012*	*0.056*	**0.15**			*0.012*	*0.055*	0.093			*0.011*	*0.052*	0.098			*0.011*	*0.053*	0.094			*0.011*	*0.053*	0.1			*0.012*	*0.057*	0.11			*0.011*	*0.053*	0.096			*0.011*	*0.053*
Nickel	20000	1600	62.8	25.5			*0.42*	*1.4*	24			*0.41*	*1.4*	23.7			*0.39*	*1.3*	19.4			*0.39*	*1.3*	19.4			*0.39*	*1.3*	23.6			*0.43*	*1.4*	21.2			*0.4*	*1.3*	33.5			*0.4*	*1.3*
Potassium	na	na	na	7500			*35.2*	*141*	6010			*34.2*	*137*	1710			*32.7*	*131*	3490			*32.9*	*132*	1950			*32.9*	*132*	6070			*35.6*	*142*	4890			*33.2*	*133*	5440			*33.1*	*132*
Sodium	na	na	na	52	B		*35.2*	*703*	46.9	B		*34.2*	*683*	654	U		*32.7*	*654*	36	B		*32.9*	*658*	658	U		*32.9*	*658*	55.5	B		*35.6*	*712*	663	U		*33.2*	*663*	38.1	B		*33.1*	*662*
Thallium	66	5.1	2.11	2.8	U		*1.2*	*2.8*	2.7	U		*1.1*	*2.7*	1.5	B		*1.1*	*2.6*	2.6	U		*1.1*	*2.6*	1.4	B		*1.1*	*2.6*	2.8	U		*1.2*	*2.8*	2.7	U		*1.1*	*2.7*	2.6	U		*1.1*	*2.6*
Vanadium	7200	550	108	49.6			*0.42*	*1.4*	50			*0.41*	*1.4*	62.2			*0.39*	*1.3*	79.8			*0.39*	*1.3*	67			*0.39*	*1.3*	51.4			*0.43*	*1.4*	74.4			*0.4*	*1.3*	52.4			*0.4*	*1.3*
Zinc	310000	23000	202	45.4			*0.84*	*4.2*	36.2			*0.82*	*4.1*	38			*0.78*	*3.9*	33.3			*0.79*	*3.9*	41.7			*0.79*	*3.9*	39			*0.85*	*4.3*	39.6			*0.8*	*4*	40.2			*0.79*	*4*

**Refer to legend immediately following this table for a list of table notes.

Table 2-4
Topsoil/Borrow Material Characterization Sample Results - SWMU 39 Interim Measures

Analyte	Sample ID			JWB-GF27					JWB-GF28					JWB-GF29					JWB-GF30					JWB-GF31					JWB-GF32					JWB-GF33					JWB-GF34				
	Sample Date			8/6/09					8/6/09					8/6/09					8/6/09					8/6/09					8/6/09					8/6/09					8/6/09				
	Sample Depth			0-0.5					0-0.5					0-0.5					0-0.5					0-0.5					0-0.5					0-0.5					0-0.5				
				Borrow					Borrow					Borrow					Borrow					Borrow					Borrow					Borrow					Borrow				
	i-SL	r-SL	Background	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL
VOCs (ug/kg)																																												
1,1-Dichloroethene	1100000	250000	na	4.7	U		*0.24*	*4.7*	4.8	U		*0.25*	*4.8*	5.2	U		*0.27*	*5.2*	5.7	U		*0.3*	*5.7*	5	U		*0.26*	*5*	5.4	U		*0.28*	*5.4*	5.1	U		*0.27*	*5.1*	5.4	U		*0.28*	*5.4*
2-Butanone	190000000	28000000	na	9.4	U		*1.3*	*9.4*	9.7	U		*1.4*	*9.7*	10	U		*1.4*	*10*	11	U		*1.6*	*11*	9.9	U		*1.4*	*9.9*	11	U		*1.5*	*11*	10	U		*1.4*	*10*	11	U		*1.5*	*11*
2-Hexanone	na	na	na	9.4	U		*0.7*	*9.4*	9.7	U		*0.72*	*9.7*	10	U		*0.76*	*10*	11	U		*0.84*	*11*	9.9	U		*0.73*	*9.9*	11	U		*0.79*	*11*	10	U		*0.75*	*10*	11	U		*0.8*	*11*
Acetone	610000000	61000000	na	19	U		*1.3*	*19*	19	U		*1.4*	*19*	21	U		*1.4*	*21*	23	U		*1.6*	*23*	20	U		*1.4*	*20*	21	U		*1.5*	*21*	3.2	J B		*1.4*	*20*	22	U		*1.5*	*22*
Chlorobenzene	1500000	310000	na	4.7	U		*0.27*	*4.7*	4.8	U		*0.28*	*4.8*	5.2	U		*0.3*	*5.2*	5.7	U		*0.33*	*5.7*	5	U		*0.29*	*5*	5.4	U		*0.31*	*5.4*	5.1	U		*0.3*	*5.1*	5.4	U		*0.31*	*5.4*
PAHs (ug/kg)																																												
Benz(a)anthracene	2100	150	na	6.4	U		*0.39*	*6.4*	6.8	U		*0.41*	*6.8*	6.8	U		*0.41*	*6.8*	6.9	U		*0.42*	*6.9*	6.9	U		*0.42*	*6.9*	6.9	U		*0.42*	*6.9*	6.9	U		*0.42*	*6.9*	7.2	U		*0.44*	*7.2*
Benzo(b)fluoranthene	2100	150	na	6.4	U		*0.65*	*6.4*	6.8	U		*0.68*	*6.8*	6.8	U		*0.69*	*6.8*	0.76	J		*0.7*	*6.9*	6.9	U		*0.7*	*6.9*	6.9	U		*0.69*	*6.9*	6.9	U		*0.69*	*6.9*	7.2	U		*0.73*	*7.2*
Chrysene	210000	15000	na	6.4	U		*0.45*	*6.4*	6.8	U		*0.47*	*6.8*	6.8	U		*0.47*	*6.8*	6.9	U		*0.48*	*6.9*	0.81	J		*0.48*	*6.9*	6.9	U		*0.48*	*6.9*	6.9	U		*0.48*	*6.9*	7.2	U		*0.5*	*7.2*
Fluoranthene	22000000	2300000	na	6.4	U		*0.38*	*6.4*	6.8	U		*0.4*	*6.8*	0.5	J		*0.4*	*6.8*	0.46	J		*0.4*	*6.9*	6.9	U		*0.41*	*6.9*	6.9	U		*0.4*	*6.9*	6.9	U		*0.4*	*6.9*	7.2	U		*0.42*	*7.2*
Pyrene	17000000	1700000	na	6.4	U		*0.45*	*6.4*	6.8	U		*0.47*	*6.8*	6.8	U		*0.48*	*6.8*	6.9	U		*0.48*	*6.9*	6.9	U		*0.49*	*6.9*	6.9	U		*0.48*	*6.9*	6.9	U		*0.48*	*6.9*	7.2	U		*0.5*	*7.2*
SVOCs (ug/kg)																																												
2,4-Dinitrotoluene	1200000	120000	na	430	U		*120*	*430*	440	U		*120*	*440*	450	U		*120*	*450*	460	U		*120*	*460*	480	U		*130*	*480*	440	U		*120*	*440*	450	U		*120*	*450*	470	U		*130*	*470*
Pesticides (ug/kg)																																												
Endosulfan I	na	na	na	2.1	U		*0.066*	*2.1*	2.3	U		*0.07*	*2.3*	2.3	U		*0.071*	*2.3*	2.4	U		*0.074*	*2.4*	2.4	U		*0.072*	*2.4*	2.4	U		*0.072*	*2.4*	2.3	U		*0.069*	*2.3*	0.095	J B		*0.074*	*2.4*
PCBs (mg/kg)																																												
Explosives (mg/kg)																																												
2,4,6-Trinitrotoluene	79	19	na	NT					NT					NT					NT					NT					NT					NT					NT				
2,4-Dinitrotoluene	1200	120	na	NT					NT					NT					NT					NT					NT					NT					NT				
2,6-Dinitrotoluene	620	61	na	NT					NT					NT					NT					NT					NT					NT					NT				
4-amino-2,6-Dinitrotoluene	1900	150	na	NT					NT					NT					NT					NT					NT					NT					NT				
Herbicides (ug/kg)																																												
Metals (mg/kg)																																												
Aluminum	990000	77000	40041	39300			*7.3*	*27.3*	**40300**			*7.6*	*28.4*	37200			*7.6*	*28.6*	**41800**			*7.8*	*29.3*	**42600**			*7.8*	*29.4*	**42900**			*7.7*	*28.8*	**40900**			*7.6*	*28.6*	**42000**			*8.1*	*30.3*
Arsenic	1.6	0.39	15.8	8.8			*1.7*	*2.7*	8.4			*1.8*	*2.8*	9.1			*1.8*	*2.9*	9.6			*1.8*	*2.9*	8.2			*1.8*	*2.9*	9.8			*1.8*	*2.9*	10			*1.8*	*2.9*	12			*1.9*	*3*
Barium	190000	15000	209	42			*0.52*	*2.6*	45			*0.54*	*2.7*	98.6			*0.54*	*2.7*	40.9			*0.56*	*2.8*	41.4			*0.56*	*2.8*	53.6			*0.55*	*2.7*	66.2			*0.54*	*2.7*	58			*0.58*	*2.9*
Beryllium	2000	160	1.02	**1.9**			*0.13*	*0.39*	**1.6**			*0.14*	*0.41*	**2.8**			*0.14*	*0.41*	**1.9**			*0.14*	*0.42*	**1.5**			*0.14*	*0.42*	**2.1**			*0.14*	*0.41*	**2.2**			*0.14*	*0.41*	**2.1**			*0.14*	*0.43*
Cadmium	810	70	0.69	0.39	U		*0.13*	*0.39*	0.41	U		*0.14*	*0.41*	0.41	U		*0.14*	*0.41*	0.42	U		*0.14*	*0.42*	0.42	U		*0.14*	*0.42*	0.41	U		*0.14*	*0.41*	0.41	U		*0.14*	*0.41*	0.43	U		*0.14*	*0.43*
Calcium	na	na	na	3430			*32.5*	*130*	5280			*33.8*	*135*	4590			*34.1*	*136*	2640			*34.9*	*140*	2900			*35*	*140*	5100			*34.3*	*137*	1170			*34*	*136*	1380			*36*	*144*
Chromium	1400	280	65.3	34.5			*0.43*	*1.6*	35.5			*0.45*	*1.6*	28.7			*0.45*	*1.6*	49.8			*0.46*	*1.7*	40			*0.46*	*1.7*	33.6			*0.45*	*1.6*	31.9			*0.45*	*1.6*	33.2			*0.48*	*1.7*
Cobalt	300	23	72.3	14.5			*0.32*	*0.78*	11.7			*0.34*	*0.81*	9.3			*0.34*	*0.82*	17.5			*0.35*	*0.84*	20.8			*0.35*	*0.84*	19			*0.34*	*0.82*	9.4			*0.34*	*0.82*	18.7			*0.36*	*0.86*
Copper	41000	3100	53.5	18.9			*0.65*	*3.2*	19			*0.68*	*3.4*	20.6			*0.68*	*3.4*	21.3			*0.7*	*3.5*	21.1			*0.7*	*3.5*	20.4			*0.69*	*3.4*	22.7			*0.68*	*3.4*	23.6			*0.72*	*3.6*
Iron	720000	55000	50962	30300			*4*	*13*	31900			*4.2*	*13.5*	24600			*4.2*	*13.6*	41400			*4.3*	*14*	31500			*4.3*	*14*	26300			*4.3*	*13.7*	27800			*4.2*	*13.6*	30600			*4.5*	*14.4*
Lead	8000	4000	26.8	14			*0.43*	*2.6*	14.9			*0.45*	*2.7*	18			*0.45*	*2.7*	16.9			*0.46*	*2.8*	14.7			*0.46*	*2.8*	17			*0.45*	*2.7*	17.2			*0.45*	*2.7*	17.1			*0.48*	*2.9*
Magnesium	na	na	na	16700			*9.7*	*64.9*	16100			*10.2*	*67.7*	9620			*10.2*	*68.1*	14600			*10.5*	*69.8*	13300			*10.5*	*70.1*	24100			*10.3*	*68.7*	13100			*10.2*	*68*	11100			*10.8*	*72.1*
Manganese	23000	1800	2543	349			*0.43*	*1.6*	331			*0.45*	*1.6*	338			*0.45*	*1.6*	517			*0.46*	*1.7*	379			*0.46*	*1.7*	314			*0.45*	*1.6*	307			*0.45*	*1.6*	344			*0.48*	*1.7*
Mercury	24	4.3	0.13	0.078			*0.011*	*0.052*	0.1			*0.012*	*0.054*	0.12			*0.012*	*0.054*	0.11			*0.012*	*0.056*	0.11			*0.012*	*0.056*	0.087			*0.012*	*0.055*	0.088			*0.012*	*0.054*	**0.14**			*0.012*	*0.058*
Nickel	20000	1600	62.8	23			*0.39*	*1.3*	22.6			*0.41*	*1.4*	33.1			*0.41*	*1.4*	30			*0.42*	*1.4*	25.3			*0.42*	*1.4*	26.6			*0.41*	*1.4*	30.8			*0.41*	*1.4*	24.1			*0.43*	*1.4*
Potassium	na	na	na	4970			*32.5*	*130*	4060			*33.8*	*135*	2360			*34.1*	*136*	4530			*34.9*	*140*	4320			*35*	*140*	5960			*34.3*	*137*	4860			*34*	*136*	4060			*36*	*144*
Sodium	na	na	na	37.6	B		*32.5*	*649*	37.7	B		*33.8*	*677*	44.3	B		*34.1*	*681*	38.2	B		*34.9*	*698*	37.8	B		*35*	*701*	43.1	B		*34.3*	*687*	680	U		*34*	*680*	721	U		*36*	*721*
Thallium	66	5.1	2.11	2.6	U		*1.1*	*2.6*	2.7	U		*1.1*	*2.7*	2.7	U		*1.1*	*2.7*	2.8	U		*1.2*	*2.8*	2.8	U		*1.2*	*2.8*	2.7	U		*1.2*	*2.7*	2.7	U		*1.1*	*2.7*	2.9	U		*1.2*	*2.9*
Vanadium	7200	550	108	61.8			*0.39*	*1.3*	60.2			*0.41*	*1.4*	42.5			*0.41*	*1.4*	74.7			*0.42*	*1.4*	58.8			*0.42*	*1.4*	53.3			*0.41*	*1.4*	47.9			*0.41*	*1.4*	54.2			*0.43*	*1.4*
Zinc	310000	23000	202	37.5			*0.78*	*3.9*	35.2			*0.81*	*4.1*	32.3			*0.82*	*4.1*	42.8			*0.84*	*4.2*	41.9			*0.84*	*4.2*	37.7			*0.82*	*4.1*	41			*0.82*	*4.1*	39.6			*0.86*	*4.3*

**Refer to legend immediately following this table for a list of table notes.

Table 2-4
Topsoil/Borrow Material Characterization Sample Results - SWMU 39 Interim Measures
Page 3 of 3

Analyte	Sample ID			JWB-GF35					JWB-TS01					JWB-GF01					39DW15					39DW16					39DW17				
	Sample Date			8/6/09					2/16/09					2/16/09					3/31/09					3/31/09					3/31/09				
	Sample Depth			0-0.5					0-0.5					0-0.5					0-0.5					0-0.5					0-0.5				
				Borrow					Topsoil					Borrow					Topsoil					Topsoil					Topsoil				
	i-SL	r-SL	Background	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL
VOCs (ug/kg)																																	
1,1-Dichloroethene	1100000	250000	na	5.8	U		*0.3*	*5.8*	6.8	U		*0.35*	*6.8*	1.1	J	J	*0.4*	*7.6*	5.5	U		*0.29*	*5.5*	5.8	U		*0.3*	*5.8*	6.4	U		*0.33*	*6.4*
2-Butanone	190000000	28000000	na	12	U		*1.6*	*12*	43			*1.9*	*14*	5.7	J	J	*2.1*	*15*	11	U		*1.5*	*11*	12	U		*1.6*	*12*	13	U		*1.8*	*13*
2-Hexanone	na	na	na	12	U		*0.86*	*12*	1.1	J	J	*1*	*14*	15	U		*1.1*	*15*	11	U		*0.82*	*11*	12	U		*0.86*	*12*	13	U		*0.95*	*13*
Acetone	610000000	61000000	na	4.7	J B		*1.6*	*23*	140	J B	B	*59*	*590*	55			*2.1*	*30*	22	U		*1.5*	*22*	23	U		*1.6*	*23*	26	U		*1.8*	*26*
Chlorobenzene	1500000	310000	na	5.8	U		*0.34*	*5.8*	0.9	J	J	*0.39*	*6.8*	4	J	J	*0.44*	*7.6*	5.5	U		*0.32*	*5.5*	5.8	U		*0.34*	*5.8*	6.4	U		*0.37*	*6.4*
PAHs (ug/kg)																																	
Benz(a)anthracene	2100	150	na	6.6	U		*0.4*	*6.6*	NT					NT					NT					NT					NT				
Benzo(b)fluoranthene	2100	150	na	0.78	J		*0.67*	*6.6*	NT					NT					NT					NT					NT				
Chrysene	210000	15000	na	6.6	U		*0.46*	*6.6*	NT					NT					NT					NT					NT				
Fluoranthene	22000000	2300000	na	6.6	U		*0.39*	*6.6*	NT					NT					NT					NT					NT				
Pyrene	17000000	1700000	na	6.6	U		*0.46*	*6.6*	NT					NT					NT					NT					NT				
SVOCs (ug/kg)																																	
2,4-Dinitrotoluene	1200000	120000	na	440	U		*120*	*440*	110	J	J	*100*	*380*	420	U		*110*	*420*	410	U		*110*	*410*	410	U		*110*	*410*	400	U		*110*	*400*
Pesticides (ug/kg)																																	
Endosulfan I	na	na	na	0.087	J B		*0.07*	*2.3*	0.042	U		*0.16*	*2*	2.2	U		*0.18*	*2.2*	2.1	U		*0.17*	*2.1*	2.1	U		*0.17*	*2.1*	2.1	U		*0.17*	*2.1*
PCBs (mg/kg)																																	
Explosives (mg/kg)																																	
2,4,6-Trinitrotoluene	79	19	na	NT					0.36			*0.019*	*0.25*	0.042	J	J	*0.019*	*0.25*	NT					NT					NT				
2,4-Dinitrotoluene	1200	120	na	NT					0.28			*0.005*	*0.25*	0.098	J	J	*0.005*	*0.25*	NT					NT					NT				
2,6-Dinitrotoluene	620	61	na	NT					0.06	J	J	*0.007*	*1.2*	0.018	J	J	*0.007*	*1.2*	NT					NT					NT				
4-amino-2,6-Dinitrotoluene	1900	150	na	NT					0.013	J	J	*0.009*	*0.25*	0.25	U		*0.01*	*0.25*	NT					NT					NT				
Herbicides (ug/kg)																																	
Metals (mg/kg)																																	
Aluminum	990000	77000	40041	**43000**			*7.5*	*28.2*	14500			*8*	*24.1*	33900			*8.9*	*26.7*	12600			*8.6*	*25.8*	14300			*8.6*	*25.8*	14200			*8.6*	*25.9*
Arsenic	1.6	0.39	15.8	8.9			*1.7*	*2.8*	8.5		L	*0.8*	*2.4*	8.9		L	*0.89*	*2.7*	3		L	*0.86*	*2.6*	3.5		L	*0.86*	*2.6*	3.9		L	*0.86*	*2.6*
Barium	190000	15000	209	51.1			*0.54*	*2.7*	44.7		L	*0.46*	*2.3*	36.9		L	*0.51*	*2.5*	148			*0.49*	*2.5*	139			*0.49*	*2.5*	130			*0.49*	*2.5*
Beryllium	2000	160	1.02	**2.1**			*0.13*	*0.4*	0.94			*0.11*	*0.34*	**1.3**			*0.13*	*0.38*	0.92		L	*0.12*	*0.37*	0.93		L	*0.12*	*0.37*	0.89		L	*0.12*	*0.37*
Cadmium	810	70	0.69	0.4	U		*0.13*	*0.4*	0.16	B	L	*0.11*	*0.34*	0.13	B	L	*0.13*	*0.38*	0.37	U		*0.12*	*0.37*	0.37	U		*0.12*	*0.37*	0.37	U		*0.12*	*0.37*
Calcium	na	na	na	7610			*33.5*	*134*	617		L	*28.7*	*115*	2000		L	*31.8*	*127*	1220			*30.7*	*123*	1350			*30.7*	*123*	11200			*30.8*	*123*
Chromium	1400	280	65.3	30.3			*0.44*	*1.6*	35.5		L	*0.46*	*1.4*	41.6		L	*0.51*	*1.5*	23			*0.49*	*1.5*	24.1			*0.49*	*1.5*	27			*0.49*	*1.5*
Cobalt	300	23	72.3	8.6			*0.34*	*0.8*	15.5		J	*0.23*	*0.69*	11.9		J	*0.25*	*0.76*	10.2			*0.25*	*0.74*	11.5			*0.25*	*0.74*	10.7			*0.25*	*0.74*
Copper	41000	3100	53.5	18.8			*0.67*	*3.4*	8.8		L	*0.57*	*2.9*	20.1		L	*0.64*	*3.2*	11.4			*0.61*	*3.1*	13.4			*0.61*	*3.1*	14.1			*0.62*	*3.1*
Iron	720000	55000	50962	24600			*4.2*	*13.4*	44100			*3.6*	*11.5*	37000			*3.9*	*12.7*	17300			*3.8*	*12.3*	20200			*3.8*	*12.3*	21500			*3.8*	*12.3*
Lead	8000	4000	26.8	14			*0.44*	*2.7*	20.3		L	*0.69*	*2.3*	15.9		L	*0.76*	*2.5*	15.9			*0.74*	*2.5*	19.5			*0.74*	*2.5*	21.5			*0.74*	*2.5*
Magnesium	na	na	na	29600			*10.1*	*67.1*	4230		K	*8.6*	*57.3*	8580		K	*9.5*	*63.5*	2160			*9.2*	*61.4*	2560			*9.2*	*61.4*	8480			*9.2*	*61.6*
Manganese	23000	1800	2543	263			*0.44*	*1.6*	1260			*0.46*	*1.4*	342			*0.51*	*1.5*	767			*0.49*	*1.5*	856			*0.49*	*1.5*	769			*0.49*	*1.5*
Mercury	24	4.3	0.13	0.1			*0.012*	*0.054*	0.039	B	J	*0.009*	*0.046*	0.11			*0.011*	*0.051*	0.03	B	J	*0.011*	*0.049*	0.032	B	J	*0.011*	*0.049*	0.032	B	J	*0.011*	*0.049*
Nickel	20000	1600	62.8	22			*0.4*	*1.3*	9		L	*0.34*	*1.1*	18.2		L	*0.38*	*1.3*	10.4			*0.37*	*1.2*	12.1			*0.37*	*1.2*	11.4			*0.37*	*1.2*
Potassium	na	na	na	5860			*33.5*	*134*	1060			*28.7*	*115*	3300			*31.8*	*127*	992			*30.7*	*123*	1390			*30.7*	*123*	1390			*30.8*	*123*
Sodium	na	na	na	52.2	B		*33.5*	*671*	573	U		*28.7*	*573*	40	B	J	*31.8*	*635*	35.5	B	J	*30.7*	*614*	36.8	B	J	*30.7*	*614*	45.7	B	J	*30.8*	*616*
Thallium	66	5.1	2.11	2.7	U		*1.1*	*2.7*	0.61	B	L	*0.57*	*2.3*	2.5	U	UL	*0.64*	*2.5*	2.5	U		*0.61*	*2.5*	0.67	B	J	*0.61*	*2.5*	2.5	U		*0.62*	*2.5*
Vanadium	7200	550	108	50			*0.4*	*1.3*	94.6		L	*0.34*	*1.1*	72.1		L	*0.38*	*1.3*	33.8			*0.37*	*1.2*	36.3			*0.37*	*1.2*	36.4			*0.37*	*1.2*
Zinc	310000	23000	202	33.2			*0.8*	*4*	27.2		L	*0.69*	*3.4*	46.7		L	*0.76*	*3.8*	50.5			*0.74*	*3.7*	57.1			*0.74*	*3.7*	54.1			*0.74*	*3.7*

**Refer to legend immediately following this table for a list of table notes.

Table 2-4
Legend

12	J	Shading and black font indicate an industrial SL exceedance.
12	J	Bold outline indicates a residential SL exceedance.
12	**J**	Bold, underlined font indicates a background exceedance.
12	*12*	Shading in the MDL/MRL columns indicates the MDL exceeds a criterion.

SLs for non-Carcinogenic compounds have been recalculated to an HI of 0.1.
The pyrene SLs were used for acenaphthylene, benzo(g,h,i)perylene, and phenanthrene.
Inorganic results below background UTLs are not indicated as exceedances on the table.
SL = Screening Level (Source: ORNL Regional Screening Table, September 2008).
SL values in table are for the more conservative chromium VI.
SL values for chromium III are 150,000 (ind) and 12,000 (res), which were not exceeded.
Lead screening values from Technical Review Workgroup for Lead: Guidance Document (USEPA, 1999b).
mg/kg = milligrams per kilogram (parts per million).
ng/kg = nanograms per kilogram (parts per trillion).
µg/kg = micrograms per kilogram (parts per billion).
NA = not applicable.
NT = analyte not tested.
Lab Q = Lab Data Qualifiers
* = Laboratory duplicate not within control limits.
B = (organics) Blank contamination. Value detected in sample and associated blank.
A (Dioxins) = B = (metals) Value <MRL and >MDL and is considered estimated.
E (metals) = Reported value is estimated because of the presence of interferences.
EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/PCDF ions was outside accepted ranges. The detected PCDD/PCDF was reported as an estimated maximum possible concentration (EMPC).
J = (organics) Value <MRL and >MDL and is considered estimated.
U = Analyte not-detected at the method reporting limit.
X = (dioxins) Ion abundance ratio outside acceptable range. Value reported is EMPC.
Val Q = Validation Data Qualifiers
B = blank contamination. Value detected in sample and associated blank.
J = estimated concentration.
K = estimated concentration bias high.
L = estimated concentration bias low.
N = presumptive evidence for tentatively identified compounds using a library search.
U = analyte not detected.
UJ = estimated concentration non-detect.
UL = estimated concentration non-detect bias low.

3.0 SOIL EXCAVATION

The first phase of the project was the collection of additional samples to further delineate the extent of contamination (*Section 2.0*) and the excavation and disposal of contaminated soil. During this time, Shaw mobilized the equipment and manpower required to begin the project. Photos depicting different aspects of the project are presented in **Appendix A**. Daily quality control reports are presented in **Appendix E**.

3.1 MOBILIZATION

Prior to intrusive activity at the site, a utility survey to identify underground service lines within or near the excavation area was performed and all lines were identified by ATK. An Area Access Permit and a Hot Work Permit were issued by the ATK Safety Department for the duration of the project. Copies of the permits are presented in **Appendix F**. A job safety analysis was completed by the site safety officer, was reviewed with the crew, and all potential hazards were identified prior to commencement of work activities. Daily tailgate safety meetings were held and daily work plans discussed with the crew every morning before work began. Copies of the completed health and safety forms are presented in **Appendix F**.

Prior to excavation, 14,100 linear feet of 4-foot-high chain-link fence was removed from the site to enable equipment access. The concrete "anchors" were removed from the metal post and disposed off site. The chain-link fencing and metal posts were sent to a recycling center. After removal of the chain-link fencing, Shaw cut down and chipped approximately 80 trees that were growing within the excavation areas.

3.2 EXCAVATION ACTIVITIES

Upon receipt of the final delineation sample results and the waste characterization results, disposal profiles were completed and approved, excavation and direct loading into dump trailers was ready to begin.

Excavation and the loading of dump trailers was performed using a 20-Ton tracked excavator (trackhoe) and a front-end loader. No stockpiling of material was performed during the project; any excavated soils were shipped out the same day they were excavated. The hazardous waste disposal manifests are presented in **Appendix C-1**, and the certificates of disposal from the hazardous waste disposal facility are presented in **Appendix C-2**. The hazardous waste shipping log is presented in **Appendix D**.

Geotextile fabric was used to construct a temporary loading zone, at the northeast corner of the southern settling pond, for the trucks to stage on while being loaded. Based on the results of the delineation sampling, the initial excavation consisted of 1-ft removal from the floor of the ponds.

The pond excavation began in the northern portion of the northern pond and progressed westward and southward to the southern settling pond portion of the site. When the southern settling pond boundary was reached, the excavation resumed in the northern settling pond northward from the southern boundary of the trench excavation. Following excavation, soil confirmation samples were tested for lead using an XRF. XRF confirmation samples were collected from the sidewalls and bottom of the excavation at a rate of one sample per 25 x 25 ft area. In addition, sidewall samples were collected at the outside edges of the floor excavation at a rate of one sample per 20 linear feet of sidewall. Areas which XRF sample results indicated concentrations above the RGs were excavated, an additional foot in depth and additional samples

were collected to confirm soil concentrations. Once the lead was delineated, selected samples (10% frequency) were analyzed for TAL metals. When the confirmation samples demonstrated removal of TAL metal COIs to RGs, select samples (5% frequency) were analyzed for dioxin/furans to ensure these compounds were removed to concentrations below RGs. Excavation continued until XRF and confirmation sample concentrations were below the RGs. The SWMU 39 CMS (Shaw, 2005) estimated that 1,905 CY of contaminated soil would be excavated to meet RGs. Upon completion of the project, a total of 4,131 tons or approximately 2,754 CY of contaminated soil was removed from the two ponds.

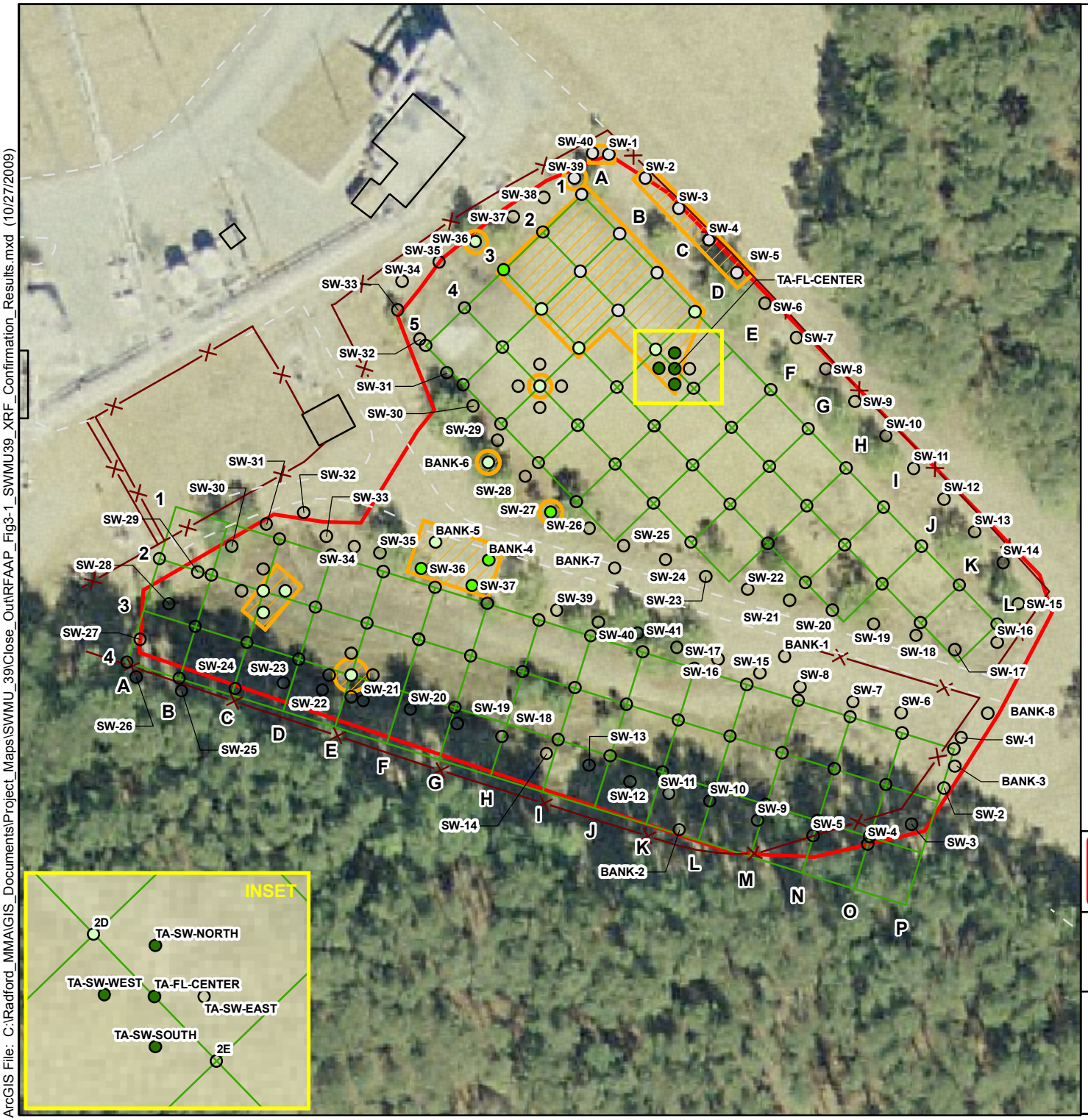
3.3 POST-EXCAVATION SAMPLES AND ANALYTICAL RESULTS

Post-excavation samples were collected from various locations as initial excavation activities were completed. Samples were collected from the floor and sidewalls of the excavation to confirm that soil with concentrations above the RGs had been removed. The analytical services for the sampling effort were provided using the National Environmental Laboratory Accreditation Conference (NELAC) accredited laboratory TestAmerica, Inc. located in West Sacramento, California. TestAmerica provided analytical support for the collected soil samples using *USEPA SW-846, Third Edition, Test Methods for Evaluating Solid Waste, Update IIIB* (USEPA, 2004). Results were requested on a 24-hour turnaround time to keep the project moving forward quickly. Completed chain-of-custody forms for the shipments of samples to the laboratory are presented in **Appendix B-4**.

Data obtained from the laboratory were reviewed by the Shaw Project Chemist to determine whether the project-specific data quality objectives, as defined in the associated work plans and sampling and analysis plans, were met. The laboratory analytical data is presented in **Appendix B-1**. Data validation determines the acceptability or unacceptability of the data quality based on a set of pre-defined criteria and is defined as the systematic process for reviewing a data package against a set of criteria to provide assurance that the data is adequate for its intended uses. The data validation criteria is based on a combination of project-specific Work Plan/Quality Assurance Project Plan criteria, method-specific criteria, *Department of Defense Quality Systems Manual Final Version 3* (DoD, 2006), and the subcontract laboratory standard operating procedures. The data qualifier scheme was consistent with USEPA Region III guidance.

All data packages were validated to ensure compliance with specified analytical, quality assurance/quality control requirements, data reduction procedures, data reporting requirements, and required accuracy, precision, and completeness criteria. Results were assessed for accuracy and precision of laboratory analysis to determine the limitations and quality of the data. The quality of the data collected in support of the sampling activity was considered acceptable, unless qualified rejected "R" during the validation process. Samples qualified "J", "L", or "UL" were considered acceptable as estimated with noted definitions. No sample data points were determined to be rejected "R." Out of criteria lab control samples or calibration standards resulted in some data to be qualified estimated; however, did not impact the usability of the data to make informed conclusions in this report. Qualified data for where the matrix spike and spike duplicates, serial dilutions, and field duplicates exceeded criteria were most likely due to sample matrix or inhomogeneity effects with the given analytical methodology; however, the data was determined useable as estimated and did not impact the conclusions of this report. The data validation reports are presented in **Appendix B-2**.

Sample results for the XRF confirmation samples and associated laboratory confirmation sample results are presented in **Table 3-1**. The final XRF confirmation sample locations are presented on **Figure 3-1**. As illustrated on **Figure 3-1**, all remaining soil concentrations were below RGs at the final excavation depth. XRF field logs are presented in **Appendix B-3**. **Figure 3-2** and **Table 3-2** present the final laboratory confirmation sample locations and results after soil removal was complete. As a result of the soil excavation at SWMU 39, residential use was achieved in accordance with the approved RFI/CMS.



ArcGIS File: C:\Radford_MMA\GIS_Documents\Project_Maps\SWMU_39\Close_Out\RFAAP_Fig3-1_SWMU39_XRF_Confirmation_Results.mxd (10/27/2009)

LEGEND

- Soil XRF Confirmation Sample Location Result < 400 mg/kg

Final XRF Confirmation Sample Location Result < 400 mg/kg

- 1-1.5 ft
- 1-2 ft
- 2-2.5 ft
- 2-3 ft
- Areas Samples Deeper than 1 ft bgs
- SWMU 39 Boundary

Notes:
1) Aerial photo, dated 2005, was obtained from Montgomery County, VA Planning & GIS Services.
2) Samples were collected in April/May 2009.

N

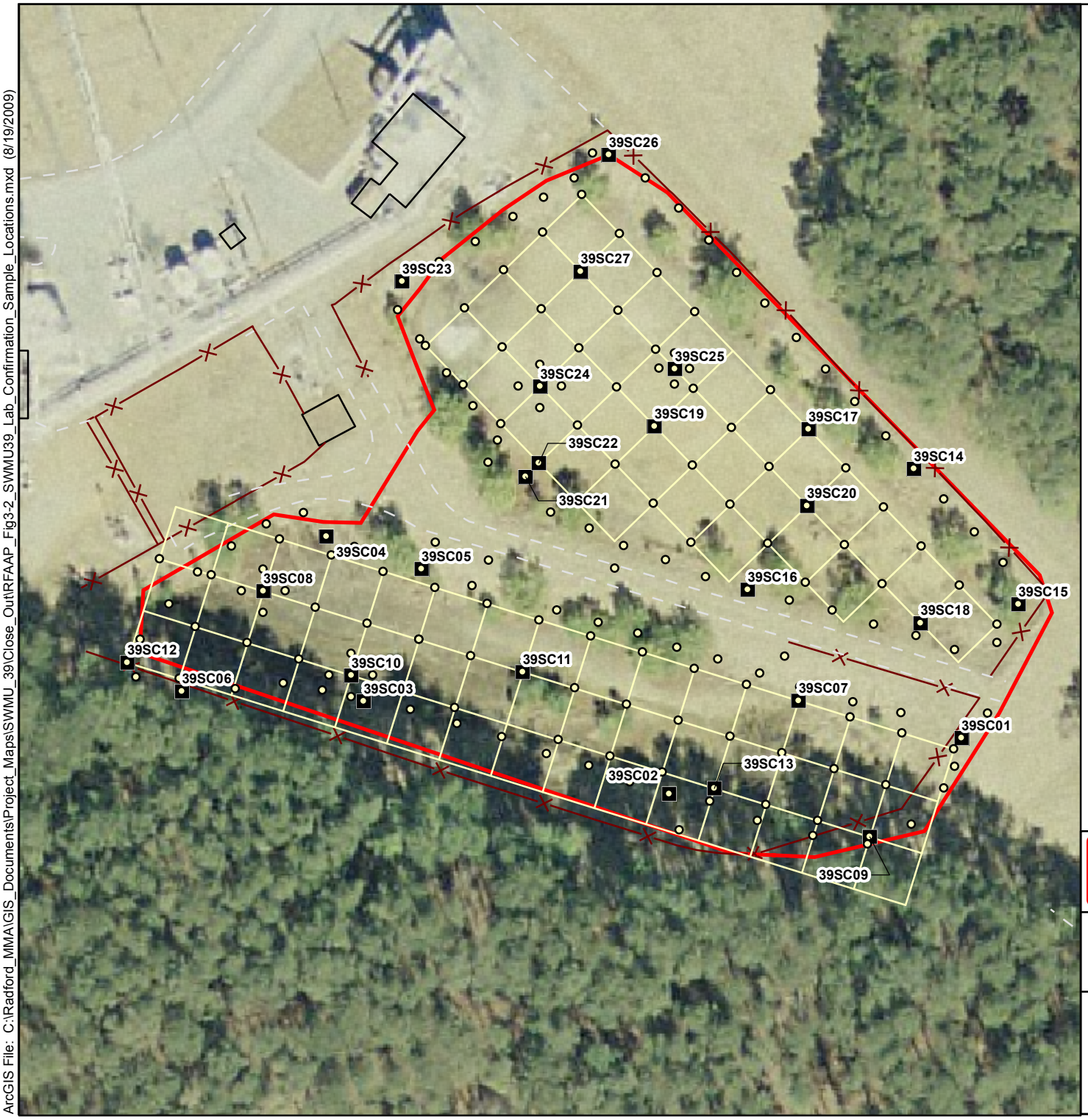
Scale:
0 32.5 65 130
Feet

U.S. Army Corps of Engineers

Shaw® Shaw Environmental, Inc.

FIGURE 3-1
SWMU 39 Post Excavation XRF Confirmation Sample Results

Radford Army Ammunition Plant,
Radford, VA



LEGEND

- Soil XRF Confirmation Sample Location
- Soil Lab Confirmation Sample Location
- SWMU 39 Boundary

Notes:
1) Aerial photo, dated 2005, was obtained from Montgomery County, VA Planning & GIS Services.
2) Samples were collected in April/May 2009.

N

Scale:
0 32.5 65 130 Feet

U.S. Army Corps of Engineers

Shaw® Shaw Environmental, Inc.

FIGURE 3-2
SWMU 39 Post Excavation
Lab Confirmation Sample Locations
Radford Army Ammunition Plant,
Radford, VA

ArcGIS File: C:\Radford_MMA\GIS_Documents\Project_Maps\SWMU_39\Close_Out\RFAAP_Fig3-2_SWMU39_Lab_Confirmation_Sample_Locations.mxd (8/19/2009)

Table 3-1
XRF Soil Confirmation Sample Results - SWMU 39 - Interim Measures

Pond	XRF Conf ID	Date	Depth	Pb Conc	Pb +/-	Units	As Conc	As +/-	Units	Lab Conf ID	Pb Conc	As Conc
Borrow	39DW15	3/31/2009	0-0.5	14	2	mg/kg	<LOD	5	mg/kg			
Borrow	39DW16	3/31/2009	0-0.5	23	3	mg/kg	<LOD	6	mg/kg			
Borrow	39DW16 (R2)	3/31/2009	0-0.5	20	3	mg/kg	<LOD	6	mg/kg			
Borrow	39DW16 (R3)	3/31/2009	0-0.5	12	2	mg/kg	<LOD	5	mg/kg			
Borrow	39-DW17	3/31/2009	0-0.5	21	3	mg/kg	<LOD	6	mg/kg			
Center	BANK-1	4/7/2009	0-0.5	57	4	mg/kg	<LOD	8	mg/kg			
Center	BANK-2	4/7/2009	0-0.5	96	4	mg/kg	<LOD	9	mg/kg			
Center	BANK-3	4/7/2009	0-0.5	71	4	mg/kg	<LOD	8	mg/kg			
Center	BANK-4	4/22/2009	0-1	1055	15	mg/kg	<LOD	28	mg/kg			
Center	BANK-4	4/23/2009	2-2.5	12	3	mg/kg	<LOD	6	mg/kg			
Center	BANK-4	4/7/2009	0-0.5	518	9	mg/kg	<LOD	19	mg/kg			
Center	BANK-5	4/22/2009	0-1	297	7	mg/kg	<LOD	15	mg/kg			
Center	BANK-5	4/23/2009	1-2	10	2	mg/kg	<LOD	5	mg/kg			
Center	BANK-5	4/7/2009	0-0.5	527	9	mg/kg	<LOD	19	mg/kg			
Center	BANK-6	4/22/2009	0-1	2066	24	mg/kg	68	14	mg/kg			
Center	BANK-6	4/23/2009	1-2	12	2	mg/kg	<LOD	5	mg/kg			
Center	BANK-7	4/23/2009	0-0.5	95	4	mg/kg	<LOD	9	mg/kg			
Center	BANK-8	4/23/2009	0-1	24	3	mg/kg	<LOD	6	mg/kg			
Northern	NSP-FL-1A	4/9/2009	0-1	20	3	mg/kg	<LOD	6	mg/kg			
Northern	NSP-FL-1A	5/27/2009	1-1.5	130	5	mg/kg	<LOD	11	mg/kg			
Northern	NSP-FL-1B	4/9/2009	0-1	47	4	mg/kg	<LOD	8	mg/kg			
Northern	NSP-FL-1B	5/14/2009	0-1	253	6	mg/kg	<LOD	13	mg/kg			
Northern	NSP-FL-1B	5/27/2009	1-1.5	9	2	mg/kg	<LOD	5	mg/kg			
Northern	NSP-FL-1C	4/9/2009	0-1	9	2	mg/kg	<LOD	5	mg/kg			
Northern	NSP-FL-1C	5/14/2009	0-1	<LOD	5	mg/kg	<LOD	3	mg/kg			
Northern	NSP-FL-1C	5/27/2009	1-1.5	<LOD	6	mg/kg	<LOD	5	mg/kg			
Northern	NSP-FL-1D	4/9/2009	0-1	66	4	mg/kg	<LOD	8	mg/kg			
Northern	NSP-FL-1D	5/14/2009	1-2	219	6	mg/kg	<LOD	13	mg/kg			
Northern	NSP-FL-1E	4/9/2009	0-1	<LOD	7	mg/kg	<LOD	5	mg/kg			
Northern	NSP-FL-1F	4/9/2009	0-1	131	5	mg/kg	<LOD	11	mg/kg			
Northern	NSP-FL-1G	4/9/2009	0-1	116	5	mg/kg	<LOD	10	mg/kg	39SC17	178	2.9
Northern	NSP-FL-1H	4/13/2009	0-1	13	3	mg/kg	<LOD	6	mg/kg			
Northern	NSP-FL-1I	4/13/2009	0-1	18	3	mg/kg	<LOD	6	mg/kg			
Northern	NSP-FL-1J	4/13/2009	0-1	52	4	mg/kg	<LOD	8	mg/kg			
Northern	NSP-FL-1K	4/13/2009	0-1	41	3	mg/kg	<LOD	7	mg/kg			
Northern	NSP-FL-1L	4/13/2009	0-1	10	3	mg/kg	<LOD	6	mg/kg			
Northern	NSP-FL-2A	5/27/2009	0-1	<LOD	6	mg/kg	<LOD	4	mg/kg			
Northern	NSP-FL-2B	5/27/2009	1-1.5	366	7	mg/kg	<LOD	16	mg/kg	39SC27	219	1.7
Northern	NSP-FL-2B (R2)	5/27/2009	1-1.5	247	6	mg/kg	<LOD	13	mg/kg			
Northern	NSP-FL-2B (R3)	5/27/2009	1-1.5	192	5	mg/kg	<LOD	12	mg/kg			
Northern	NSP-FL-2C	5/27/2009	1-1.5	12	2	mg/kg	<LOD	5	mg/kg			
Northern	NSP-FL-2D	4/21/2009	0-1	230	6	mg/kg	<LOD	14	mg/kg			
Northern	NSP-FL-2D	5/14/2009	1-2	278	7	mg/kg	<LOD	15	mg/kg			
Northern	NSP-FL-2D (R2)	4/21/2009	0-1	240	7	mg/kg	<LOD	14	mg/kg			
Northern	NSP-FL-2D (R3)	4/21/2009	0-1	223	6	mg/kg	<LOD	14	mg/kg			
Northern	NSP-FL-2D (R3)	4/21/2009	0-1	223	6	mg/kg	<LOD	14	mg/kg			
Northern	NSP-FL-2E	4/21/2009	0-1	24	4	mg/kg	<LOD	8	mg/kg			
Northern	NSP-FL-2F	4/21/2009	0-1	8	2	mg/kg	<LOD	5	mg/kg			
Northern	NSP-FL-2G	4/17/2009	0-1	9	2	mg/kg	<LOD	5	mg/kg			
Northern	NSP-FL-2H	4/13/2009	0-1	214	6	mg/kg	<LOD	14	mg/kg	39SC20	119	2.4
Northern	NSP-FL-2H (R2)	4/13/2009	0-1	192	6	mg/kg	<LOD	13	mg/kg			
Northern	NSP-FL-2H (R3)	4/13/2009	0-1	176	6	mg/kg	<LOD	13	mg/kg			
Northern	NSP-FL-2I	4/13/2009	0-1	8	3	mg/kg	<LOD	6	mg/kg			
Northern	NSP-FL-2J	4/13/2009	0-1	<LOD	8	mg/kg	<LOD	6	mg/kg			
Northern	NSP-FL-2K	4/13/2009	0-1	142	10	mg/kg	<LOD	22	mg/kg	39SC18	55.5	3.2

Table 3-1
XRF Soil Confirmation Sample Results - SWMU 39 - Interim Measures

Pond	XRF Conf ID	Date	Depth	Pb Conc	Pb +/-	Units	As Conc	As +/-	Units	Lab Conf ID	Pb Conc	As Conc
Northern	NSP-FL-2K (R2)	4/13/2009	0-1	58	4	mg/kg	<LOD	8	mg/kg			
Northern	NSP-FL-2K (R3)	4/13/2009	0-1	77	4	mg/kg	<LOD	9	mg/kg			
Northern	NSP-FL-2K (R4)	4/13/2009	0-1	77	4	mg/kg	<LOD	9	mg/kg			
Northern	NSP-FL-3A	5/14/2009	1-2	547	10	mg/kg	<LOD	21	mg/kg			
Northern	NSP-FL-3A	5/18/2009	2-2.5	8	2	mg/kg	<LOD	5	mg/kg			
Northern	NSP-FL-3B	5/14/2009	1-2	17	3	mg/kg	<LOD	5	mg/kg			
Northern	NSP-FL-3C	5/14/2009	1-2	9	2	mg/kg	<LOD	5	mg/kg			
Northern	NSP-FL-3D	4/14/2009	0-1	91	4	mg/kg	<LOD	9	mg/kg			
Northern	NSP-FL-3E	4/14/2009	0-1	11	3	mg/kg	<LOD	6	mg/kg	39SC19	11.4	2.0
Northern	NSP-FL-3F	4/13/2009	0-1	31	3	mg/kg	<LOD	7	mg/kg			
Northern	NSP-FL-3G	4/13/2009	0-1	<LOD	6	mg/kg	<LOD	4	mg/kg			
Northern	NSP-FL-3H	4/13/2009	0-1	11	3	mg/kg	<LOD	6	mg/kg			
Northern	NSP-FL-3I	4/13/2009	0-1	11	3	mg/kg	<LOD	6	mg/kg			
Northern	NSP-FL-4A	4/28/2009	0-1	14	3	mg/kg	<LOD	6	mg/kg			
Northern	NSP-FL-4B	4/28/2009	0-1	22	3	mg/kg	<LOD	6	mg/kg			
Northern	NSP-FL-4C	4/28/2009	0-1	493	9	mg/kg	<LOD	20	mg/kg			
Northern	NSP-FL-4C	4/28/2009	1-2	8	2	mg/kg	<LOD	5	mg/kg	39SC24	9.1	1.8
Northern	NSP-FL-4C-E	4/28/2009	0-1	15	3	mg/kg	<LOD	6	mg/kg			
Northern	NSP-FL-4C-N	4/28/2009	0-1	15	3	mg/kg	<LOD	6	mg/kg			
Northern	NSP-FL-4C-S	4/28/2009	0-1	16	3	mg/kg	<LOD	6	mg/kg			
Northern	NSP-FL-4C-W	4/28/2009	0-1	9	2	mg/kg	<LOD	5	mg/kg			
Northern	NSP-FL-4D	4/14/2009	0-1	22	3	mg/kg	<LOD	6	mg/kg			
Northern	NSP-FL-4D	4/23/2009	0-1	35	3	mg/kg	<LOD	7	mg/kg			
Northern	NSP-FL-4E	4/21/2009	0-1	159	6	mg/kg	<LOD	12	mg/kg			
Northern	NSP-FL-4F	4/13/2009	0-1	16	3	mg/kg	<LOD	6	mg/kg			
Northern	NSP-FL-4G	4/13/2009	0-1	14	3	mg/kg	<LOD	6	mg/kg			
Northern	NSP-FL-5A	4/28/2009	0-1	15	3	mg/kg	<LOD	5	mg/kg			
Northern	NSP-FL-5B	4/28/2009	0-1	18	3	mg/kg	<LOD	6	mg/kg			
Northern	NSP-FL-5C	4/28/2009	0-1	39	3	mg/kg	<LOD	7	mg/kg			
Northern	NSP-FL-5D	4/23/2009	0-1	30	3	mg/kg	<LOD	7	mg/kg	39SC22	115	3.3
Northern	NSP-FL-5E	4/23/2009	0-1	28	3	mg/kg	<LOD	7	mg/kg			
Northern	NSP-SW-1	4/9/2009	0-1	17	3	mg/kg	<LOD	6	mg/kg			
Northern	NSP-SW-1	5/27/2009	1-1.5	11	2	mg/kg	<LOD	5	mg/kg	39SC26	16.3	2.4
Northern	NSP-SW-10	4/13/2009	0-1	13	3	mg/kg	<LOD	5	mg/kg			
Northern	NSP-SW-11	4/13/2009	0-1	<LOD	7	mg/kg	<LOD	5	mg/kg	39SC14	10.9	3.3
Northern	NSP-SW-12	4/13/2009	0-1	14	3	mg/kg	<LOD	6	mg/kg			
Northern	NSP-SW-13	4/13/2009	0-1	8	3	mg/kg	<LOD	6	mg/kg			
Northern	NSP-SW-14	4/13/2009	0-1	10	3	mg/kg	<LOD	6	mg/kg			
Northern	NSP-SW-15	4/13/2009	0-1	12	3	mg/kg	<LOD	6	mg/kg	39SC15	23.3	3.4
Northern	NSP-SW-16	4/13/2009	0-1	11	3	mg/kg	<LOD	5	mg/kg			
Northern	NSP-SW-17	4/13/2009	0-1	13	3	mg/kg	<LOD	6	mg/kg			
Northern	NSP-SW-18	4/13/2009	0-1	34	3	mg/kg	<LOD	7	mg/kg			
Northern	NSP-SW-19	4/13/2009	0-1	9	3	mg/kg	<LOD	6	mg/kg			
Northern	NSP-SW-2	4/9/2009	0-1	15	3	mg/kg	<LOD	6	mg/kg			
Northern	NSP-SW-2	5/27/2009	1-1.5	17	3	mg/kg	<LOD	6	mg/kg			
Northern	NSP-SW-20	4/13/2009	0-1	15	3	mg/kg	<LOD	6	mg/kg			
Northern	NSP-SW-21	4/13/2009	0-1	12	3	mg/kg	<LOD	5	mg/kg			
Northern	NSP-SW-22	4/13/2009	0-1	11	3	mg/kg	<LOD	6	mg/kg	39SC16	19.1	3.6
Northern	NSP-SW-23	4/13/2009	0-1	31	3	mg/kg	<LOD	7	mg/kg			
Northern	NSP-SW-24	4/13/2009	0-1	12	3	mg/kg	<LOD	5	mg/kg			
Northern	NSP-SW-25	4/13/2009	0-1	21	3	mg/kg	<LOD	6	mg/kg			
Northern	NSP-SW-26	4/23/2009	0-1	111	5	mg/kg	<LOD	10	mg/kg			
Northern	NSP-SW-27	4/23/2009	0-1	2233	26	mg/kg	55	14	mg/kg			
Northern	NSP-SW-27	4/28/2009	2-2.5	13	3	mg/kg	<LOD	6	mg/kg			
Northern	NSP-SW-28	4/23/2009	0-1	147	5	mg/kg	<LOD	11	mg/kg	39SC21	203	5.0

Table 3-1
XRF Soil Confirmation Sample Results - SWMU 39 - Interim Measures

Pond	XRF Conf ID	Date	Depth	Pb Conc	Pb +/-	Units	As Conc	As +/-	Units	Lab Conf ID	Pb Conc	As Conc
Northern	NSP-SW-29	4/23/2009	0-1	14	3	mg/kg	<LOD	6	mg/kg			
Northern	NSP-SW-3	4/9/2009	0-1	10	2	mg/kg	<LOD	5	mg/kg			
Northern	NSP-SW-3	5/18/2009	1-1.5	12	3	mg/kg	<LOD	6	mg/kg			
Northern	NSP-SW-30	4/28/2009	0-1	15	3	mg/kg	<LOD	6	mg/kg			
Northern	NSP-SW-31	4/28/2009	0-1	46	3	mg/kg	<LOD	8	mg/kg			
Northern	NSP-SW-32	4/28/2009	0-1	26	3	mg/kg	<LOD	7	mg/kg			
Northern	NSP-SW-33	4/28/2009	0-1	20	3	mg/kg	<LOD	6	mg/kg			
Northern	NSP-SW-34	4/28/2009	0-1	11	2	mg/kg	<LOD	6	mg/kg	39SC23	11.4	4.3
Northern	NSP-SW-35	5/14/2009	0-1	46	3	mg/kg	<LOD	7	mg/kg			
Northern	NSP-SW-36	5/14/2009	0-1	27097	296	mg/kg	633	63	mg/kg			
Northern	NSP-SW-36	5/18/2009	1-2	11	2	mg/kg	<LOD	5	mg/kg			
Northern	NSP-SW-36 (R2)	5/14/2009	0-1	8160	81	mg/kg	228	29	mg/kg			
Northern	NSP-SW-37	5/14/2009	0-1	18	3	mg/kg	<LOD	6	mg/kg			
Northern	NSP-SW-38	5/27/2009	0-1	9	2	mg/kg	<LOD	5	mg/kg			
Northern	NSP-SW-39	5/27/2009	1-1.5	7	2	mg/kg	<LOD	5	mg/kg			
Northern	NSP-SW-4	4/9/2009	0-1	11	3	mg/kg	<LOD	5	mg/kg			
Northern	NSP-SW-4	5/18/2009	1-1.5	12	3	mg/kg	<LOD	6	mg/kg			
Northern	NSP-SW-40	5/27/2009	1-1.5	8	2	mg/kg	<LOD	5	mg/kg			
Northern	NSP-SW-5	4/9/2009	0-1	10	3	mg/kg	<LOD	6	mg/kg			
Northern	NSP-SW-5	5/18/2009	1-1.5	13	3	mg/kg	<LOD	6	mg/kg			
Northern	NSP-SW-6	4/9/2009	0-1	153	5	mg/kg	<LOD	12	mg/kg			
Northern	NSP-SW-6 (R2)	4/9/2009	0-1	101	4	mg/kg	<LOD	10	mg/kg			
Northern	NSP-SW-6 (R3)	4/9/2009	0-1	97	4	mg/kg	<LOD	10	mg/kg			
Northern	NSP-SW-7	4/9/2009	0-1	13	3	mg/kg	<LOD	6	mg/kg			
Northern	NSP-SW-8	4/13/2009	0-1	13	3	mg/kg	<LOD	6	mg/kg			
Northern	NSP-SW-9	4/13/2009	0-1	13	3	mg/kg	<LOD	6	mg/kg			
Northern	NSP-TA-FL-CENTER	5/13/2009	2-3	7	2	mg/kg	<LOD	5	mg/kg	39SC25	9.1	1.8
Northern	NSP-TA-SW-EAST	5/13/2009	0-1	<LOD	6	mg/kg	<LOD	4	mg/kg			
Northern	NSP-TA-SW-NORTH	5/13/2009	2-3	<LOD	6	mg/kg	<LOD	4	mg/kg			
Northern	NSP-TA-SW-SOUTH	5/13/2009	2-3	11	2	mg/kg	<LOD	5	mg/kg			
Northern	NSP-TA-SW-WEST	5/13/2009	2-3	8	2	mg/kg	<LOD	5	mg/kg			
Southern	SSP-BANK-1	4/17/2009	0-0.5	135	5	mg/kg	<LOD	11	mg/kg			
Southern	SSP-BANK-2	4/17/2009	0-0.5	30	3	mg/kg	<LOD	6	mg/kg			
Southern	SSP-BANK-3	4/17/2009	0-0.5	132	5	mg/kg	<LOD	11	mg/kg			
Southern	SSP-FL-1C	4/21/2009	0-1	36	3	mg/kg	<LOD	7	mg/kg			
Southern	SSP-FL-1D	4/21/2009	0-1	14	3	mg/kg	<LOD	6	mg/kg			
Southern	SSP-FL-1E	4/21/2009	0-1	64	4	mg/kg	<LOD	8	mg/kg			
Southern	SSP-FL-1F	4/22/2009	0-1	13	3	mg/kg	<LOD	6	mg/kg			
Southern	SSP-FL-1G	4/22/2009	0-1	147	5	mg/kg	<LOD	12	mg/kg			
Southern	SSP-FL-1H	4/22/2009	0-1	21	3	mg/kg	<LOD	7	mg/kg			
Southern	SSP-FL-1I	4/21/2009	0-1	143	5	mg/kg	<LOD	12	mg/kg			
Southern	SSP-FL-1J	4/21/2009	0-1	12	3	mg/kg	<LOD	6	mg/kg			
Southern	SSP-FL-1K	4/21/2009	0-1	11	3	mg/kg	<LOD	6	mg/kg			
Southern	SSP-FL-1L	4/21/2009	0-1	19	3	mg/kg	<LOD	7	mg/kg			
Southern	SSP-FL-1M	4/17/2009	0-1	13	3	mg/kg	<LOD	6	mg/kg	39SC07	15.1	5.1
Southern	SSP-FL-1N	4/14/2009	0-1	11	3	mg/kg	<LOD	6	mg/kg			
Southern	SSP-FL-1O	4/14/2009	0-1	15	3	mg/kg	<LOD	6	mg/kg			
Southern	SSP-FL-1P	4/14/2009	0-1	18	3	mg/kg	<LOD	6	mg/kg			
Southern	SSP-FL-2A	4/14/2009	0-1	19	3	mg/kg	<LOD	6	mg/kg			
Southern	SSP-FL-2B	4/21/2009	0-1	16	3	mg/kg	<LOD	6	mg/kg			
Southern	SSP-FL-2C	4/21/2009	0-1	320	7	mg/kg	<LOD	16	mg/kg			
Southern	SSP-FL-2C	4/21/2009	1-2	17	3	mg/kg	<LOD	6	mg/kg	39SC08	16.1	4.4
Southern	SSP-FL-2C (R2)	4/21/2009	0-1	186	6	mg/kg	23	5	mg/kg			
Southern	SSP-FL-2C (R3)	4/21/2009	0-1	1471	19	mg/kg	42	11	mg/kg			
Southern	SSP-FL-2C (R4)	4/21/2009	0-1	401	8	mg/kg	61	6	mg/kg			

Table 3-1
XRF Soil Confirmation Sample Results - SWMU 39 - Interim Measures

Pond	XRF Conf ID	Date	Depth	Pb Conc	Pb +/-	Units	As Conc	As +/-	Units	Lab Conf ID	Pb Conc	As Conc
Southern	SSP-FL-2C-E	4/21/2009	0-1	278	7	mg/kg	22	5	mg/kg			
Southern	SSP-FL-2C-E2	4/21/2009	0-1	17	3	mg/kg	<LOD	6	mg/kg			
Southern	SSP-FL-2C-E2	4/21/2009	1-2	13	3	mg/kg	<LOD	6	mg/kg			
Southern	SSP-FL-2C-N	4/21/2009	0-1	62	4	mg/kg	<LOD	9	mg/kg			
Southern	SSP-FL-2C-S	4/21/2009	0-1	18	3	mg/kg	<LOD	6	mg/kg			
Southern	SSP-FL-2C-S	4/21/2009	1-2	17	3	mg/kg	<LOD	6	mg/kg			
Southern	SSP-FL-2C-W	4/21/2009	0-1	41	3	mg/kg	<LOD	7	mg/kg			
Southern	SSP-FL-2D	4/21/2009	0-1	32	3	mg/kg	<LOD	7	mg/kg			
Southern	SSP-FL-2E	4/21/2009	0-1	23	3	mg/kg	<LOD	6	mg/kg			
Southern	SSP-FL-2F	4/21/2009	0-1	184	6	mg/kg	<LOD	12	mg/kg			
Southern	SSP-FL-2F	4/21/2009	0-1	69	4	mg/kg	<LOD	8	mg/kg			
Southern	SSP-FL-2G	4/21/2009	0-1	19	3	mg/kg	<LOD	6	mg/kg			
Southern	SSP-FL-2H	4/21/2009	0-1	39	3	mg/kg	<LOD	7	mg/kg	39SC11	14.5	3.3
Southern	SSP-FL-2I	4/21/2009	0-1	14	3	mg/kg	<LOD	6	mg/kg			
Southern	SSP-FL-2J	4/21/2009	0-1	<LOD	25	mg/kg	<LOD	19	mg/kg			
Southern	SSP-FL-2J (R2)	4/21/2009	0-1	52	4	mg/kg	<LOD	9	mg/kg			
Southern	SSP-FL-2K	4/21/2009	0-1	13	3	mg/kg	<LOD	6	mg/kg			
Southern	SSP-FL-2L	4/21/2009	0-1	16	3	mg/kg	<LOD	6	mg/kg			
Southern	SSP-FL-2M	4/17/2009	0-1	22	3	mg/kg	<LOD	7	mg/kg			
Southern	SSP-FL-2N	4/14/2009	0-1	13	3	mg/kg	<LOD	6	mg/kg			
Southern	SSP-FL-2O	4/14/2009	0-1	22	3	mg/kg	<LOD	6	mg/kg			
Southern	SSP-FL-3B	4/21/2009	0-1	71	4	mg/kg	<LOD	9	mg/kg			
Southern	SSP-FL-3C	4/21/2009	0-1	19	3	mg/kg	<LOD	6	mg/kg			
Southern	SSP-FL-3D	4/21/2009	0-1	78	4	mg/kg	<LOD	9	mg/kg			
Southern	SSP-FL-3E	4/21/2009	0-1	407	9	mg/kg	26	6	mg/kg			
Southern	SSP-FL-3E	4/21/2009	1-2	10	3	mg/kg	<LOD	6	mg/kg	39SC10	11.5	3.7
Southern	SSP-FL-3E-E	4/21/2009	0-1	75	4	mg/kg	10	3	mg/kg			
Southern	SSP-FL-3E-N	4/21/2009	0-1	208	6	mg/kg	<LOD	14	mg/kg			
Southern	SSP-FL-3E-S	4/21/2009	0-1	16	3	mg/kg	<LOD	6	mg/kg			
Southern	SSP-FL-3E-W	4/21/2009	0-1	14	3	mg/kg	<LOD	6	mg/kg			
Southern	SSP-FL-3G	4/21/2009	0-1	27	3	mg/kg	8	2	mg/kg			
Southern	SSP-FL-3G	4/21/2009	0-1	38	3	mg/kg	<LOD	7	mg/kg			
Southern	SSP-FL-3I	4/21/2009	0-1	63	4	mg/kg	<LOD	8	mg/kg			
Southern	SSP-FL-3J	4/15/2009	0-1	18	3	mg/kg	<LOD	7	mg/kg			
Southern	SSP-FL-3K	4/15/2009	0-1	23	3	mg/kg	<LOD	7	mg/kg			
Southern	SSP-FL-3L	4/15/2009	0-1	68	4	mg/kg	<LOD	10	mg/kg	39SC13	95.5	12.3
Southern	SSP-FL-3M	4/15/2009	0-1	21	3	mg/kg	<LOD	7	mg/kg			
Southern	SSP-FL-3N	4/14/2009	0-1	21	3	mg/kg	<LOD	7	mg/kg			
Southern	SSP-FL-3O	4/14/2009	0-1	8	2	mg/kg	<LOD	5	mg/kg	39SC09	13.4	2.7
Southern	SSP-FL-4A	4/21/2009	0-1	36	3	mg/kg	<LOD	7	mg/kg	39SC12	27.8	3.6
Southern	SSP-FL-4B	4/21/2009	0-1	15	3	mg/kg	<LOD	6	mg/kg			
Southern	SSP-SW-1	4/14/2009	0-1	18	3	mg/kg	<LOD	5	mg/kg	39SC01	18.1	2.8
Southern	SSP-SW-10	4/15/2009	0-1	25	4	mg/kg	<LOD	9	mg/kg	39SC02	16.6	5.3
Southern	SSP-SW-11	4/15/2009	0-1	11	3	mg/kg	<LOD	6	mg/kg			
Southern	SSP-SW-12	4/15/2009	0-1	13	3	mg/kg	<LOD	6	mg/kg			
Southern	SSP-SW-13	4/15/2009	0-1	8	2	mg/kg	<LOD	5	mg/kg			
Southern	SSP-SW-14	4/15/2009	0-1	<LOD	7	mg/kg	<LOD	5	mg/kg			
Southern	SSP-SW-15	4/21/2009	0-1	20	3	mg/kg	<LOD	6	mg/kg			
Southern	SSP-SW-16	4/21/2009	0-1	22	3	mg/kg	<LOD	6	mg/kg			
Southern	SSP-SW-17	4/21/2009	0-1	23	3	mg/kg	<LOD	6	mg/kg			
Southern	SSP-SW-18	4/21/2009	0-1	15	3	mg/kg	<LOD	6	mg/kg			
Southern	SSP-SW-19	4/21/2009	0-1	60	4	mg/kg	<LOD	9	mg/kg			
Southern	SSP-SW-2	4/14/2009	0-1	42	3	mg/kg	<LOD	7	mg/kg			
Southern	SSP-SW-20	4/21/2009	0-1	29	3	mg/kg	<LOD	7	mg/kg			
Southern	SSP-SW-21	4/21/2009	0-1	35	3	mg/kg	<LOD	7	mg/kg	39SC03	83.6	3.6

Table 3-1
XRF Soil Confirmation Sample Results - SWMU 39 - Interim Measures

Pond	XRF Conf ID	Date	Depth	Pb Conc	Pb +/-	Units	As Conc	As +/-	Units	Lab Conf ID	Pb Conc	As Conc
Southern	SSP-SW-22	4/21/2009	0-1	26	3	mg/kg	<LOD	6	mg/kg			
Southern	SSP-SW-23	4/21/2009	0-1	18	3	mg/kg	<LOD	6	mg/kg			
Southern	SSP-SW-24	4/22/2009	0-1	41	3	mg/kg	<LOD	8	mg/kg			
Southern	SSP-SW-25	4/22/2009	0-1	43	3	mg/kg	<LOD	7	mg/kg	39SC06	99.8	2.7
Southern	SSP-SW-26	4/22/2009	0-1	13	3	mg/kg	<LOD	6	mg/kg			
Southern	SSP-SW-27	4/22/2009	0-1	53	4	mg/kg	<LOD	8	mg/kg			
Southern	SSP-SW-28	4/22/2009	0-1	33	3	mg/kg	<LOD	7	mg/kg			
Southern	SSP-SW-29	4/22/2009	0-1	55	2	mg/kg	6	2	mg/kg			
Southern	SSP-SW-3	4/14/2009	0-1	22	3	mg/kg	<LOD	6	mg/kg			
Southern	SSP-SW-30	4/22/2009	0-1	19	3	mg/kg	<LOD	6	mg/kg			
Southern	SSP-SW-31	4/22/2009	0-1	51	3	mg/kg	<LOD	7	mg/kg			
Southern	SSP-SW-32	4/22/2009	0-1	38	3	mg/kg	<LOD	7	mg/kg			
Southern	SSP-SW-33	4/22/2009	0-1	23	3	mg/kg	<LOD	6	mg/kg	39SC04	50.9	3.5
Southern	SSP-SW-34	4/22/2009	0-1	37	3	mg/kg	<LOD	6	mg/kg			
Southern	SSP-SW-35	4/22/2009	0-1	31	3	mg/kg	<LOD	6	mg/kg			
Southern	SSP-SW-36	4/22/2009	0-1	532	10	mg/kg	<LOD	20	mg/kg			
Southern	SSP-SW-36	4/22/2009	1-2	422	31	mg/kg	<LOD	66	mg/kg			
Southern	SSP-SW-36	4/23/2009	2-2.5	14	2	mg/kg	<LOD	5	mg/kg	39SC05	13.1	3.9
Southern	SSP-SW-36 (R2)	4/22/2009	1-2	860	13	mg/kg	80	9	mg/kg			
Southern	SSP-SW-37	4/22/2009	0-1	1015	15	mg/kg	93	10	mg/kg			
Southern	SSP-SW-37	4/22/2009	0-1	10	2	mg/kg	<LOD	5	mg/kg			
Southern	SSP-SW-37	4/22/2009	1-2	37	3	mg/kg	<LOD	7	mg/kg			
Southern	SSP-SW-37	4/23/2009	2-2.5	41	4	mg/kg	<LOD	9	mg/kg			
Southern	SSP-SW-39	4/22/2009	0-1	15	3	mg/kg	<LOD	6	mg/kg			
Southern	SSP-SW-4	4/14/2009	0-1	18	3	mg/kg	<LOD	6	mg/kg			
Southern	SSP-SW-40	4/22/2009	0-1	15	3	mg/kg	<LOD	6	mg/kg			
Southern	SSP-SW-41	4/22/2009	0-1	18	3	mg/kg	8	2	mg/kg			
Southern	SSP-SW-5	4/14/2009	0-1	29	3	mg/kg	<LOD	7	mg/kg			
Southern	SSP-SW-6	4/14/2009	0-1	<LOD	7	mg/kg	<LOD	5	mg/kg			
Southern	SSP-SW-7	4/14/2009	0-1	17	3	mg/kg	<LOD	6	mg/kg			
Southern	SSP-SW-8	4/14/2009	0-1	27	3	mg/kg	<LOD	7	mg/kg			
Southern	SSP-SW-9	4/14/2009	0-1	34	3	mg/kg	<LOD	8	mg/kg			

Table 3-2
Laboratory Soil Confirmation Sample Results - SWMU 39 Interim Measures

Analyte	Sample ID	39SC01					39SC02					39SC03					39SC04					39SC05				
	Sample Date	4/14/09					4/8/09					4/21/09					4/22/09					4/23/09				
	Sample Depth	0-1					0-1					0-1					0-1					1-2				
	RG	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL
Metals (mg/kg)																										
Arsenic	15.8	2.8	B	L	*1.7*	*5.2*	5.3		L	*0.82*	*2.5*	3.6		L	*0.86*	*2.6*	3.5		L	*0.85*	*2.5*	3.9		L	*0.84*	*2.5*
Lead	400	18.1		L	*1.5*	*4.9*	16.6		L	*0.7*	*2.3*	83.6		L	*0.74*	*2.5*	50.9		L	*0.73*	*2.4*	13.1		L	*0.72*	*2.4*
Vanadium	108	39.2			*0.74*	*2.5*	37.4			*0.35*	*1.2*	54.5			*0.37*	*1.2*	40.6			*0.36*	*1.2*	36.2			*0.36*	*1.2*
Dioxins/Furans (ng/kg)																										
TCDD TE	1000	0.7006					NT					0.1841					NT					0.3362				

Analyte	Sample ID	39SC06					39SC07					39SC08					39SC09					39SC10				
	Sample Date	4/22/09					4/16/09					4/21/09					4/14/09					4/21/09				
	Sample Depth	0-1					0-1					1-2					0-1					1-2				
	RG	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL
Metals (mg/kg)																										
Arsenic	15.8	2.7		L	*0.85*	*2.6*	5.1		L	*0.87*	*2.6*	4.4		L	*0.87*	*2.6*	2.7		L	*0.81*	*2.4*	3.7		L	*0.85*	*2.5*
Lead	400	99.8		L	*0.73*	*2.4*	15.1		L	*0.74*	*2.5*	16.1		L	*0.75*	*2.5*	13.4		L	*0.7*	*2.3*	11.5		L	*0.73*	*2.4*
Vanadium	108	49.9			*0.37*	*1.2*	66.4			*0.37*	*1.2*	67.4			*0.37*	*1.2*	26			*0.35*	*1.2*	61.9			*0.36*	*1.2*
Dioxins/Furans (ng/kg)																										
TCDD TE	1000	NT					0.3045					0.2522					NT					0.9921				

Analyte	Sample ID	39SC11					39SC12					39SC13					39SC14					39SC15				
	Sample Date	4/21/09					4/21/09					4/15/09					4/13/09					4/13/09				
	Sample Depth	0-1					0-1					0-1					0-1					0-1				
	RG	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL
Metals (mg/kg)																										
Arsenic	15.8	3.3		L	*0.85*	*2.5*	3.6		L	*0.85*	*2.6*	12.3		L	*0.89*	*2.7*	3.3		L	*0.8*	*2.4*	3.4		L	*0.82*	*2.4*
Lead	400	14.5		L	*0.72*	*2.4*	27.8		L	*0.73*	*2.4*	95.5		L	*0.76*	*2.5*	10.9			*0.69*	*2.3*	23.3			*0.7*	*2.3*
Vanadium	108	49.3			*0.36*	*1.2*	55.6			*0.36*	*1.2*	77.2			*0.38*	*1.3*	39.3			*0.34*	*1.1*	56.9			*0.35*	*1.2*
Dioxins/Furans (ng/kg)																										
TCDD TE	1000	NT					0.2888					NT					0.2295					NT				

**Refer to legend immediately following this table for a list of tables notes.

Table 3-2
Laboratory Soil Confirmation Sample Results - SWMU 39 Interim Measures

Analyte	Sample ID	39SC16					39SC17					39SC18					39SC19					39SC20				
	Sample Date	4/13/09					4/9/09					4/13/09					4/14/09					4/13/09				
	Sample Depth	0-1					0-1					0-1					0-1					0-1				
	RG	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL
Metals (mg/kg)																										
Arsenic	15.8	3.6		L	*0.83*	*2.5*	2.9		L	*0.82*	*2.5*	3.2		L	*0.84*	*2.5*	2	B	J	*0.84*	*2.5*	2.4	B	L	*0.85*	*2.5*
Lead	400	19.1			*0.72*	*2.4*	178			*0.7*	*2.3*	55.5			*0.72*	*2.4*	11.4			*0.72*	*2.4*	119			*0.73*	*2.4*
Vanadium	108	50.7			*0.36*	*1.2*	48.7			*0.35*	*1.2*	46.6			*0.36*	*1.2*	50			*0.36*	*1.2*	48.1			*0.36*	*1.2*
Dioxins/Furans (ng/kg)																										
TCDD TE	1000	0.2068					NT					0.2284					0.1165					NT				

Analyte	Sample ID	39SC21					39SC22					39SC23					39SC24					39SC25				
	Sample Date	4/23/09					4/23/09					4/28/09					4/28/09					5/13/09				
	Sample Depth	0-1					0-1					0-1					1-2					2-3				
	RG	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL
Metals (mg/kg)																										
Arsenic	15.8	5		L	*0.85*	*2.6*	3.3		L	*0.85*	*2.6*	4.3		L	*0.81*	*2.4*	3.4		L	*0.85*	*2.5*	1.8	B	L	*0.74*	*2.2*
Lead	400	203			*0.73*	*2.4*	115			*0.73*	*2.4*	11.4			*0.69*	*2.3*	10			*0.73*	*2.4*	9.1			*0.64*	*2.1*
Vanadium	108	58.4			*0.37*	*1.2*	51.8			*0.36*	*1.2*	52.2			*0.35*	*1.2*	52.5			*0.36*	*1.2*	21.4			*0.32*	*1.1*
Dioxins/Furans (ng/kg)																										
TCDD TE	1000	0.2824					0.1571					NT					NT					NT				

Analyte	Sample ID	39SC26					39SC27					MMDDYYR1					MMDDYYR2				
	Sample Date	5/27/09					5/27/09					4/13/09					5/27/09				
	Sample Depth	1-1.5					1-1.5					0-1					1-1.5				
	RG	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL
Metals (mg/kg)																					
Arsenic	15.8	2.4	B	L	*0.99*	*3*	1.7	B	L	*1.1*	*3.2*	3.3		L	*0.8*	*2.4*	1.4	B	L	*1*	*3.1*
Lead	400	16.3			*0.84*	*2.8*	219			*0.9*	*3*	25.8			*0.68*	*2.3*	202			*0.88*	*2.9*
Vanadium	108	32.9			*0.42*	*1.4*	23.7			*0.45*	*1.5*	44.3			*0.34*	*1.1*	21.3			*0.44*	*1.5*
Dioxins/Furans (ng/kg)																					
TCDD TE	1000	NT					NT					NT					NT				

**Refer to legend immediately following this table for a list of tables notes.

Table 3-2
Legend

12	J	Shading and black font indicate an industrial SL exceedance.
12	J	Bold outline indicates a residential SL exceedance.
12	**J**	Bold, underlined font indicates a background exceedance.
12	*12*	Shading in the MDL/MRL columns indicates the MDL exceeds a criterion.

SLs for non-Carcinogenic compounds have been recalculated to an HI of 0.1.
The pyrene SLs were used for acenaphthylene, benzo(g,h,i)perylene, and phenanthrene.
Inorganic results below background UTLs are not indicated as exceedances on the table.
SL = Screening Level (Source: ORNL Regional Screening Table, September 2008).
SL values in table are for the more conservative chromium VI.
SL values for chromium III are 150,000 (ind) and 12,000 (res), which were not exceeded.
Lead screening values from Technical Review Workgroup for Lead: Guidance Document (USEPA, 1999b).
mg/kg = milligrams per kilogram (parts per million).
ng/kg = nanograms per kilogram (parts per trillion).
µg/kg = micrograms per kilogram (parts per billion).
NA = not applicable.
NT = analyte not tested.
Lab Q = Lab Data Qualifiers
* = Laboratory duplicate not within control limits.
B = (organics) Blank contamination. Value detected in sample and associated blank.
A (Dioxins) = B = (metals) Value <MRL and >MDL and is considered estimated.
E (metals) = Reported value is estimated because of the presence of interferences.
EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/PCDF ions was outside accepted ranges. The detected PCDD/PCDF was reported as an estimated maximum possible concentration (EMPC).
J = (organics) Value <MRL and >MDL and is considered estimated.
U = Analyte not-detected at the method reporting limit.
X = (dioxins) Ion abundance ratio outside acceptable range. Value reported is EMPC.
Val Q = Validation Data Qualifiers
B = blank contamination. Value detected in sample and associated blank.
J = estimated concentration.
K = estimated concentration bias high.
L = estimated concentration bias low.
N = presumptive evidence for tentatively identified compounds using a library search.
U = analyte not detected.
UJ = estimated concentration non-detect.
UL = estimated concentration non-detect bias low.

4.0 SITE RESTORATION AND DEMOBILIZATION

This stage of the project commenced after the completion of the excavation and the receipt of all analytical samples collected to confirm that the remaining soil concentrations were below their associated RGs. This task included the backfill, topsoil and hydro-seeding of the excavation area and associated disturbed areas.

4.1 EXCAVATION BACKFILL AND FINAL GRADING

As described in *Section 2.3*, soil used to backfill the excavation was obtained from a local contractor (JWB Contractors, LLC). General fill material was transported in 10 CY loads to the site and placed using and excavator and a bulldozer in the excavation areas and compacted with a roller. There were 1,865 loads or 18,650 CY of general fill placed. After completion of the placement of the general fill, an additional 279 loads or 2,790 CY of topsoil were hauled into the site in 10 CY loads by JWB Contractors, LLC. The topsoil was placed over the general fill material in a 1-ft lift and spread and graded using a John Deere 650 wide-track bulldozer and compaction was performed using an Ingersol-Rand 10 ton vibratory roller. Final grading was performed so that the excavation was brought up-to-grade so that the surface water runoff will drain away from the existing incinerator buildings.

4.2 HYDRO-SEEDING

After the backfill of the excavation and placement of topsoil was complete, Shaw subcontracted with a local, small business (Gregory Seeding of Pulaski, Virginia) to hydro-seed and mulch the entire area, which was disturbed during site activities. Hydro-seeding is a process in which grass seed, fertilizer, and mulch are applied suspended in a liquefied slurry and is typically sprayed onto the ground surface. Hydro-seeding at the SWMU 39 project site was performed on September 11, 2009, and was finished on the same day. Hydro-seeding activities are depicted in the photo log presented in **Appendix A**.

4.3 POST-COMPLETION INSPECTION

An inspection was attempted on December 14, 2009, approximately 90 days after completion of the site restoration activities; however, operations being conducted at the incinerator prevented personnel from inspecting the site. The purpose of the inspection was to ensure that grass was growing and that the excavated areas were not eroding. The site inspection is rescheduled for the last week of January 2010. In the event of erosion or the grass failing to grow, the failed areas will be brought to surrounding grade with topsoil and replanted.

4.4 CONCLUSIONS

Based on the work performed at SWMU 39, the site is now suitable for unrestricted use.

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RADFORD ARMY AMMUNITION PLANT, VIRGINIA

Interim Measures Completion Reports: SWMU 51, SWMU 39, and FLFA

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Final Document **February 2010**

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LIST OF ACRONYMS AND ABBREVIATIONS

ATK .....Alliant TechSystems, Inc.
CMO .....Corrective Measures Objective
CMS .....Corrective Measures Study
COI.....Contaminant of Interest
CY .....cubic yards
FLFA.....Former Lead Furnace Area
ft bgs.....feet below ground surface
ft msl .....feet mean sea level
ft .....foot or feet
IMWP.....Interim Measures Work Plan
mg/kg .....milligrams per kilogram
mg/L.....milligrams per liter
NELAC .....National Environmental Laboratory Accreditation Conference
PAH.....Polynuclear Aromatic Hydrocarbon
PCB .....Polychlorinated Biphenyl
RCRA.....Resource Conservation and Recovery Act
RFAAP.....Radford Army Ammunition Plant
RFI .....RCRA Facility Investigation
RG.....Remedial Goal
r-RG .....Residential Remedial Goal
Shaw.....Shaw Environmental, Inc.
SVOC.....Semivolatile Organic Compound
SWMU .....Solid Waste Management Unit
TAL.....Target Analyte List
TCL.....Target Compound List
TCLP.....Toxicity Characteristic Leaching Procedure
TCLPRL.....TCLP Regulatory Limit
TE.....Toxicity Equivalent
USACE .....U.S. Army Corps of Engineers
USEPA.....U.S. Environmental Protection Agency
VI .....Verification Investigation
VOC .....Volatile Organic Compound
XRF.....X-ray Fluorescence

1.0 INTRODUCTION

Shaw Environmental, Inc. (Shaw) has been contracted by the U.S. Army Corps of Engineers (USACE) to perform excavation activities at the Former Lead Furnace Area (FLFA) (RAAP-040), at Radford Army Ammunition Plant (RFAAP), Radford, Virginia. This work was performed under Contract Number W912QR-04-D-0027, Delivery Order DA0101. Specific elements of the project included: development of a work plan; delineation sampling of the area to determine the extent of contamination; the excavation and disposal of contaminated soils; restoration of the site; and, development of a final report. Work was performed in accordance with the approved *Draft FLFA Interim Measures Work Plan (IMWP)* (Shaw, 2008a), the *Radford Army Ammunition Plant, Radford, Virginia, Final Master Work Plan* (URS, 2003), and the *U.S. Environmental Protection Agency (USEPA) Permit for Corrective Action and Waste Minimization* (USEPA, 2000).

1.1 SITE DESCRIPTION AND LOCATION

The FLFA consists of an approximately 0.78-acre (33,976 square feet) site located within the Main Manufacturing Area at the bottom of a steeply-sloping hillside in the southeast portion of Solid Waste Management Unit (SWMU) 17A, the Stage and Burn Area (**Figure 1-1**). A site map depicting the location of FLFA is presented on **Figure 1-2**.

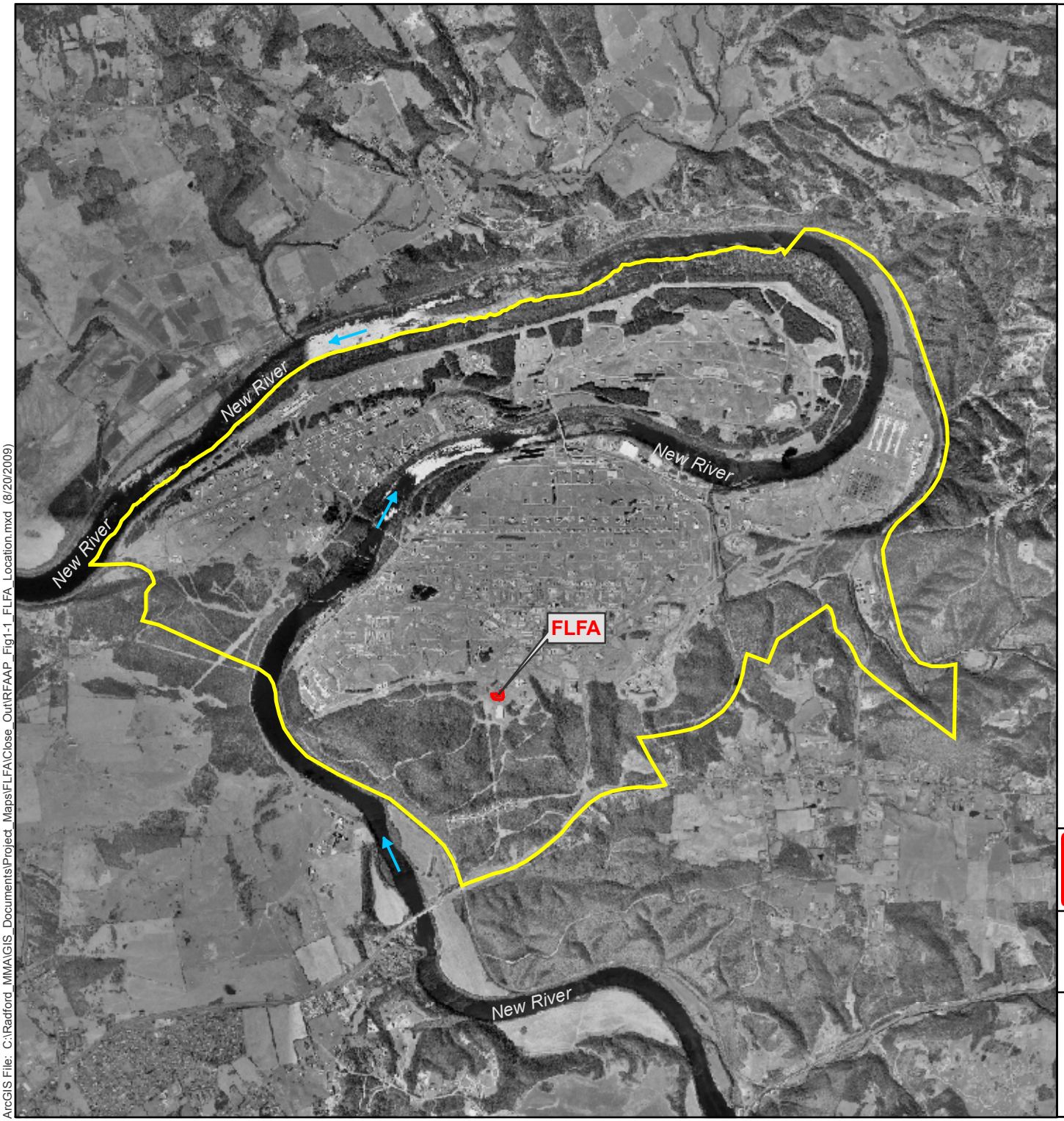
Building foundations and surrounding soil have been taken out and replaced by clean fill. The FLFA was built into the sloping side of the sinkhole. The elevation of the top of the slope above the FLFA is approximately 1,892 feet mean sea level (ft msl), while the bottom of the slope is approximately 1,874 ft msl. The location of the former used oil tank (SWMU 76) is upslope to the east of the FLFA at an elevation of approximately 1,895 ft msl.

1.2 SITE HISTORY

The FLFA functioned as a lead furnace to melt and cast recovered lead into ingots for salvage. Although little is known about the operations at the FLFA, typical smelter operations involved melting the lead in a tank with an overhead heater, then pouring the molten lead into molds. Historical records and document searches conducted in conjunction with the Verification Investigation (VI) (Dames and Moore, 1992) date its operation during World War II. The location of lead slag remnants suggested that the lead was off-loaded at the top of the hill. Building foundations and surrounding soils associated with the FLFA were taken out and replaced by clean fill in 1998.

The site-specific corrective measures objective (CMO) for the FLFA was to reduce contaminant concentrations of arsenic, copper, lead, Aroclor-1254, and dioxins/furans in soil to levels that are protective of industrial workers at the site. Additionally, the Army also elected to evaluate residential exposure pathways to assess what the increase in remedial effort would be to remediate the site for unrestricted future reuse and facilitate clean closeout. Therefore, residential remedial goals (r-RGs) were developed.

Lead was the primary contaminant of interest (COI) at the site and had the greatest extent in soil, and therefore was used as a tracer to define the extent of the remediation area. An X-ray Fluorescence (XRF) instrument was used to obtain field measurements of the lead concentrations in the soil. Contaminated soil within the remediation area would be removed in an initial 1-foot (ft) lift, and soil from the bottom and sides of the excavation were to be screened with the XRF.



LEGEND

- New River Flow Direction
- Installation Boundary
- Former Lead Furnace Area Boundary

Notes:
1) Aerial photo, dated 25 May 2000, was obtained from the Army Topographic Engineering Center.

N

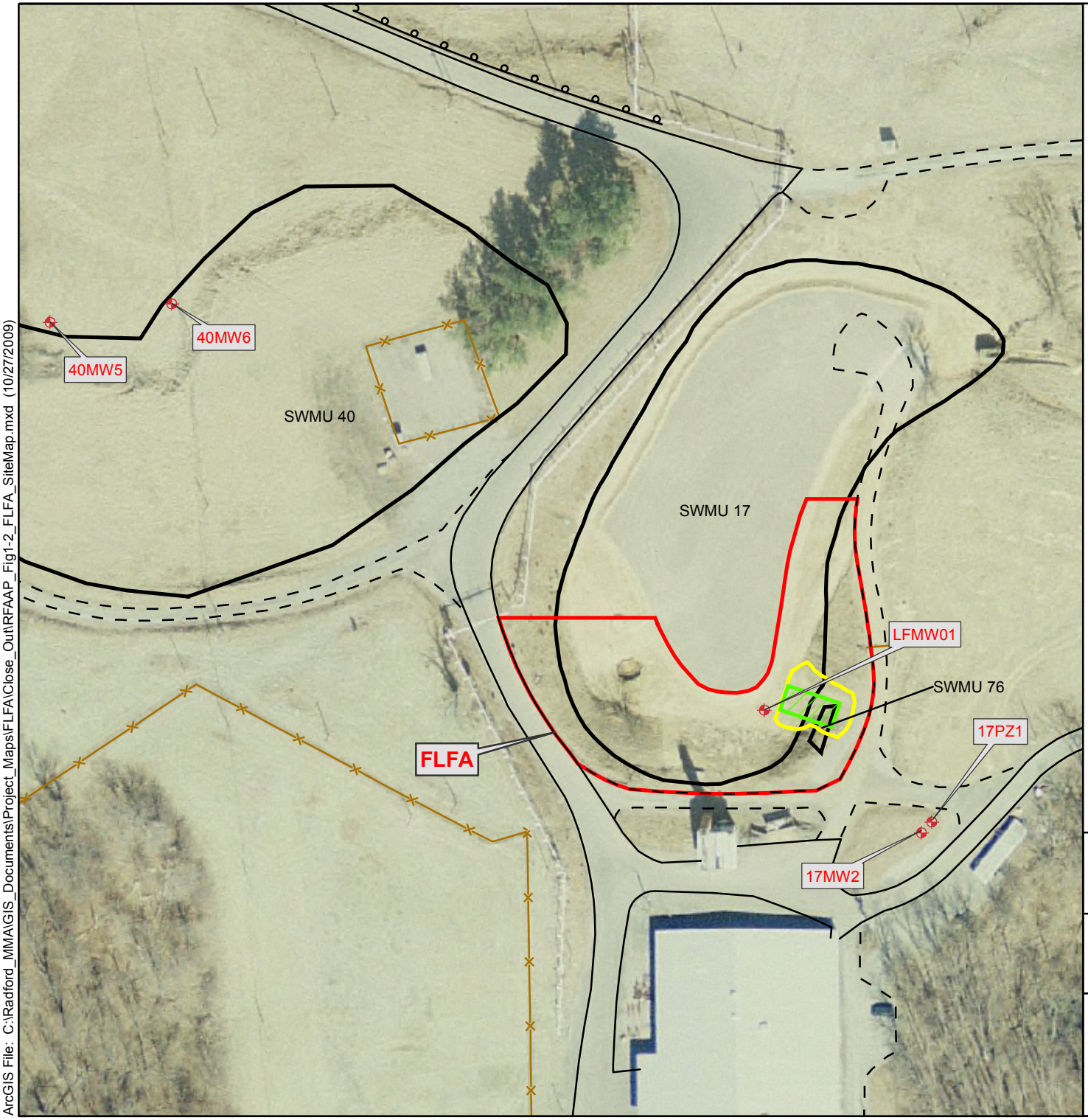
Scale:
0 1,750 3,500 7,000 Feet

U.S. Army Corps of Engineers

Shaw® Shaw Environmental, Inc.

FIGURE 1-1
Former Lead Furnace Area
Site Location Map
Radford Army Ammunition Plant,
Radford, VA

ArcGIS File: C:\Radford_MMA\GIS_Documents\Project_Maps\FLFA\Close_Out\RFAAP_Fig1-1_FLFA_Location.mxd (8/20/2009)



LEGEND

- Monitoring Well
- Fence Line
- Dirt Road
- Paved Road
- Approximate Location of Former Lead Furnace
- 1998 RFI Excavation Boundary
- Other SWMU Boundary
- Former Lead Furnace Area Boundary

Notes:
1) Aerial photo, dated 2005, was obtained from Montgomery County, VA Planning & GIS Services.

N

Scale:
0 55 110 220 Feet

U.S. Army Corps of Engineers

Shaw® Shaw Environmental, Inc.

FIGURE 1-2
Former Lead Furnace Area
Site Map
Radford Army Ammunition Plant,
Radford, VA

ArcGIS File: C:\Radford_MMA\GIS_Documents\Project_Maps\FLFA\Close_Out\RFAAP_Fig1-2_FLFA_SiteMap.mxd (10/27/2009)

If the lead concentrations were greater than the remedial goal (RG) below the excavation, an additional 1-ft lift was to be removed until XRF concentrations were below the RG. Upon completion of the excavation, confirmation samples for laboratory analysis would be taken from approximately 10% of the XRF sample locations. These samples were to be analyzed for target analyte list (TAL) metals, target compound list (TCL) polychlorinated biphenyls (PCBs), and 50% of the confirmation samples were to be analyzed for dioxins/furans.

1.3 PROJECT OBJECTIVES

Based on the *FLFA Resource Conservation and Recovery Act (RCRA) Facility Investigation/ Corrective Measures Study (RFI/CMS) Report, Final Document* (Shaw, 2008b), interim measures were performed at FLFA. The interim measures were conducted to mitigate the threat of a contaminant release, migration, and/or exposure to the public and the environment, as well as facilitate clean closeout in accordance with Part II (D) (11-21) Interim Measures of the RFAAP Corrective Action Permit (USEPA, 2000). The measures include:

1. **Site Preparation.** Prior to commencement of work, a utility survey was performed and dig permits were obtained. In addition, erosion/sediment control measures were implemented.
2. **Soil Delineation Sampling and Excavation.** Delineation of soil containing arsenic, copper, lead, Aroclor -1254, and dioxins/furans above the r-RG.
3. **Soil Excavation.** Excavation of the delineated area such that the remaining soil was below the r-RG.
4. **Waste Characterization & Off-site Disposal.** Samples were collected to assess appropriate disposal options prior to soil excavation. Sample results determined the appropriate off-site disposal method.

2.0 PRE-EXCAVATION ACTIVITIES

2.1 DELINEATION SAMPLING

Prior to mobilization of excavation personnel, discrete surface soil delineation samples were collected across the FLFA. As shown on **Figure 2-1**, soil delineation samples were collected from across the site and analyzed for lead using an XRF instrument. A total of 376 surface samples were collected to delineate the site. Once the extent of lead was delineated, select samples were analyzed by an off-site laboratory for PCBs, TAL metals (10% frequency), and dioxins/furans (5% frequency) to ensure that the extent of other COIs [arsenic, copper, and dioxins/furans as toxicity equivalent (TE)] were also delineated.

As shown on **Figure 2-1** and in **Table 2-1**, XRF sample results indicated that several surface soil samples at the FLFA contained lead concentrations above 400 milligrams per kilogram (mg/kg). As indicated in **Tables 2-1 and 2-2**, off-site laboratory sample results were mostly consistent with XRF sample results. Laboratory delineation results also indicated that concentrations of the other COIs (arsenic, copper, and dioxins/furans as TE) were present at concentrations above their respective RGs.

2.2 WASTE CHARACTERIZATION SAMPLING

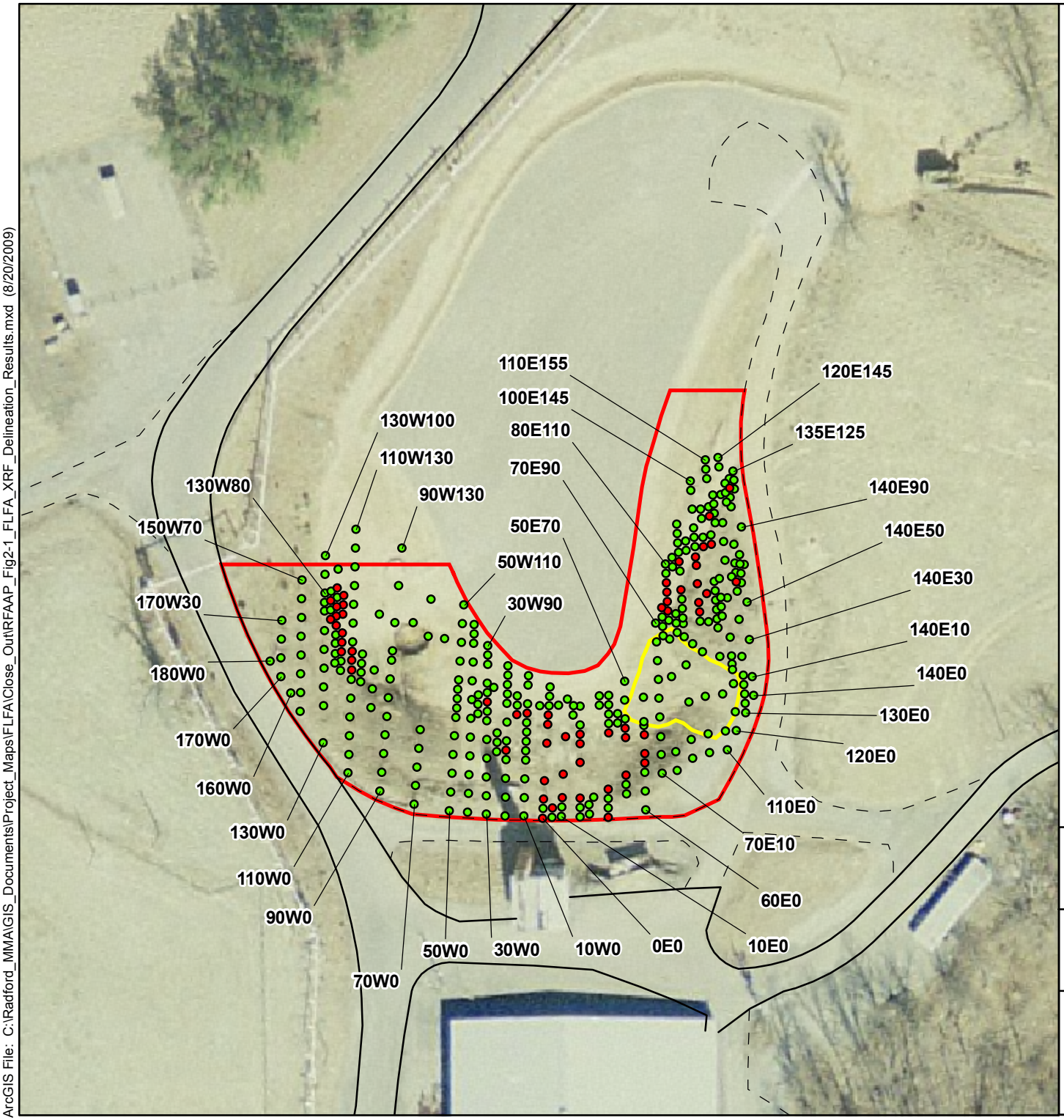
One composite sample (LFDW02) was collected from 0-1 feet below ground surface (ft bgs) within the areas of highest concentrations to characterize the soil for disposal. The sample was analyzed for dioxins/furans, pesticides/PCBs, Toxicity Characteristic Leaching Procedure (TCLP) metals, and TCLP reactivity, ignitibility, and corrosivity as pH. The results from the composite sample are presented in **Table 2-3**.

Results from the samples indicated that the concentration of leachable lead [LFDW02: 0.69 milligrams per liter (mg/L)] was less than the TCLP Regulatory Limit (TCLPRL) of 5 mg/L, and the soil was classified and disposed of as non-hazardous waste. The remaining sample concentrations were below the waste characterization screening levels, where applicable.

2.3 TOPSOIL MATERIAL SAMPLING

Certified clean top soil was obtained from a local contractor, JWB Contractors, LLC of Dublin, Virginia. The borrow site was visited by site personnel and the material sampled and sent to a laboratory for analysis for TCL volatile organic compounds (VOCs), polynuclear aromatic hydrocarbons (PAHs), TCL semivolatile organic compounds (SVOCs), pesticides/PCBs, explosives, TAL metals, and pH. Approximately one sample was collected for every 1,000 cubic yards (CY) of topsoil material.

Results from the samples indicated that PCBs and herbicides were not detected in the topsoil material. Although VOCs, SVOCs, pesticides, PAHs, and explosives were detected, none of the detected concentrations were above residential screening levels or RGs. Metals were present at levels below the RFAAP facility-wide background concentrations with the exception of aluminum, beryllium, and mercury. However, aluminum, beryllium, and mercury concentrations were below their respective residential risk-based screening levels. Results from the topsoil samples are presented in **Table 2-4**.



LEGEND

- Soil XRF Delineation Sample Location Result < 400 ppm
- Soil XRF Delineation Sample Location Result > 400 ppm
- Dirt Road
- Paved Road
- 1998 RFI Excavation Boundary
- Former Lead Furnace Area Boundary

Notes:
1) Aerial photo, dated 2005, was obtained from Montgomery County, VA Planning & GIS Services.
2) Samples were collected in 2007.

N

Scale:

0 37.5 75 150 Feet

U.S. Army Corps of Engineers

Shaw® Shaw Environmental, Inc.

FIGURE 2-1

Former Lead Furnace Area
XRF Delineation Results

Radford Army Ammunition Plant,
Radford, VA

ArcGIS File: C:\Radford_MMA\GIS_Documents\Project_Maps\FLFA\Close_Out\RFAAP_Fig2-1_FLFA_XRF_Delineation_Results.mxd (8/20/2009)

Table 2-1
XRF Field Screening and Confirmation Sample Results for Lead at the FLFA

XRF ID	XRF Reading	Conf. ID	Lab Result
0E0	424		
0E10	455		
0E20	584		
0E40	1025		
0E5	260		
0E50	1857		
0E55	1125		
0E60	30		
0E65	113		
0E70	96		
100E0	13		
100E10	13		
100E100	489		
100E105	535	LFSS16	1550
100E110	161		
100E115	81		
100E120	73		
100E130	59		
100E140	125		
100E145	90		
100E30	16		
100E50	276		
100E70	274		
100E75	3514		
100E80	1893		
100E90	427		
100W40	41		
100W50	76		
100W60	29		
100W90	52		
105E110	836		
105E115	57		
105E125	97		
105E130	125		
105E70	286		
105E85	7671		
105W50	82	LFSS10	86.2
105W55	33		
105W60	38		
105W65	60		
10E0	203		
10E10	1098		
10E20	1381	LFSS17	1660
10E40	3170		
10E5	367		
10E55	434		
10E60	54		
10W0	190		
10W10	152	LFSS04	118
10W20	239		
10W30	80		
10W35	75		
10W40	327		
10W45	107		
10W50	215		
10W55	1705		
10W60	111	LFSS07	51.1
10W70	172		
10W75	78		

XRF ID	XRF Reading	Conf. ID	Lab Result
110E0	20		
110E10	62		
110E110	561		
110E115	88		
110E125	1042		
110E130	43		
110E145	68		
110E150	53		
110E155	53		
110E30	15		
110E50	160		
110E65	165	LFSS11	372
110E70	390		
110E75	230		
110E80	146	LFSS12	241
110E85	54		
110E90	261		
110W0	159		
110W10	90		
110W100	44		
110W110	25		
110W120	48		
110W130	16		
110W20	66		
110W30	40		
110W40	62		
110W50	138		
110W55	1986		
110W60	700	LFSS20	36500
110W65	4908		
110W70	129		
110W80	176		
110W85	206		
110W90	233		
115E115	134		
115E120	135		
115E125	73		
115E130	31		
115E65	146		
115E70	194		
115E75	295		
115E85	95		
115W50	61		
115W55	94		
115W60	505		
115W65	556		
115W70	3801		
115W80	2785		
115W85	431		
115W90	1236		
120E0	85		
120E10	52		
120E100	113		
120E110	225		
120E125	47		
120E140	65		
120E145	19		
120E25	41		
120E30	381		

Table 2-1
XRF Field Screening and Confirmation Sample Results for Lead at the FLFA

XRF ID	XRF Reading	Conf. ID	Lab Result
120E35	205		
120E40	98		
120E50	50		
120E70	259		
120E90	135		
120W100	98		
120W50	91		
120W55	111		
120W60	85		
120W65	191		
120W70	907		
120W75	405		
120W80	2599		
120W85	131		
120W90	732		
12590	276		
125E115	23		
125E120	85		
125E125	86		
125E75	48		
125W70	1090		
125W75	74		
125W80	407		
125W85	78		
130E0	117		
130E10	320		
130E110	14		
130E115	180		
130E120	1038		
130E125	22		
130E15	67		
130E20	233		
130E30	150		
130E5	160		
130E50	162		
130E65	132		
130E70	522		
130E75	108		
130E80	41		
130E90	72		
130W0	29		
130W100	204		
130W20	92		
130W30	113		
130W40	101		
130W50	73		
130W60	79		
130W70	109	LFSS09	126
130W75	73		
130W80	91		
130W90	89		
135E115	58		
135E120	175		
135E125	153		
135E65	50		
135E70	79		
135E75	81		

XRF ID	XRF Reading	Conf. ID	Lab Result
135E80	22		
140E0	247		
140E10	162		
140E30	145		
140E50	85		
140E70	86		
140E90	138		
150W0	181		
150W10	146		
150W20	47		
150W30	65		
150W40	102		
150W50	67		
150W60	28		
150W70	33		
150W80	26		
15E55	290		
15E60	298		
15W55	961		
15W60	70		
15W65	46		
160W0	50		
170W0	106		
170W10	87		
170W20	29		
170W30	270		
180W0	73		
20E0	37		
20E10	669	LFSS21	1230
20E30	924		
20E40	1288		
20E45	3398		
20E5	325		
20E50	31		
20E60	32		
20W0	94		
20W10	48		
20W20	52		
20W30	93	LFSS05	94.5
20W35	715		
20W40	25		
20W50	395		
20W60	342		
20W65	20		
20W70	44		
20W75	56		
20W80	139		
25E0	120		
25E5	146		
25W35	170		
25W40	347		
25W45	316		
25W65	48		
30E10	281		
30W0	169		
30W10	51		
30W20	36		

Table 2-1
XRF Field Screening and Confirmation Sample Results for Lead at the FLFA

XRF ID	XRF Reading	Conf. ID	Lab Result
30W30	178		
30W40	122		
30W50	127	LFSS06	135
30W55	202		
30W60	909		
30W65	39		
30W70	17		
30W80	15		
30W85	113		
30W90	82		
35E60	210		
35E65	69		
35W55	46		
35W60	50		
35W65	92		
40E0	401	LFSS18	294
40E10	164		
40E15	8508		
40E45	3754		
40E5	151		
40E50	91		
40E55	22		
40E60	387		
40E65	29		
40W0	190		
40W10	40		
40W100	25		
40W20	99		
40W30	83		
40W40	101		
40W50	44		
40W60	11		
40W70	19		
40W80	16		
40W90	41		
40W95	39		
45E50	341		
45E55	156		
50E10	104		
50E15	123		
50E20	433	LFSS19	105
50E40	2273		
50E45	553		
50E50	113		
50E60	32		
50E70	70		
50W0	182		
50W10	43		
50W100	28		
50W110	18		
50W20	83		
50W30	47		
50W40	66		
50W50	65		
50W55	44		
50W60	105		
50W65	28		
50W70	19		
50W80	16		
50W90	52		
5E0	186		
5E5	428		
5E60	147		
5W60	59		
60E0	62		
60E10	38	LFSS14	35.9
60E20	99		
60E25	1183		
60E30	1736		
60E40	628		
60E45	28		
60E50	43	LFSS08	37.1
60E60	10		
60W90	20		
70E10	49		
70E20	139		
70E30	72		
70E40	25		
70E50	18		
70E60	38		
70E70	63		
70E80	128		
70E90	12		
70W0	241		
70W10	38		
70W110	26		
70W135	17		
70W20	67		
70W30	152		
70W40	56		
70W90	61		
75E80	151		
75E85	51		
75E90	31		
75E95	1395		
80E0	25		
80E10	33		
80E100	769		
80E105	361		
80E110	102		
80E50	20		
80E70	16		
80E80	186		
80E85	547		
80E90	7063		
80E95	526		
80W90	33		
85E105	160		
85E110	219		
85E70	25		
85E75	214		
85E80	86		
8E30	27		
90E0	18		
90E10	24		
90E100	389		
90E105	983		
90E110	296		

Table 2-1
XRF Field Screening and Confirmation Sample Results for Lead at the FLFA

XRF ID	XRF Reading	Conf. ID	Lab Result
90E115	168		
90E120	153		
90E125	93	LFSS13	161
90E30	42		
90E50	23		
90E65	90		
90E70	334	LFSS15	186
90E75	173		
90E80	223		
90E85	302		
90E90	469		
90W0	68		
90W10	36		
90W110	15		
90W130	17		
90W20	19		
90W30	31		
90W40	27		
90W50	187		
90W60	92		
90W70	14		
90W75	25		
90W90	202		
95E110	382		
95E115	54		
95E60	111		

Table 2-2
Laboratory Soil Delineation Sample Results - FLFA Interim Measures - 2007 Investigation

Analyte			Sample ID	LFSS04					LFSS05					LFSS06					LFSS07					LFSS08				
			Sample Date	8/2/07					8/2/07					8/2/07					8/2/07					8/2/07				
			Sample Depth	0-0.5					0-0.5					0-0.5					0-0.5					0-0.5				
	i-SL	**r-SL**	**Background**	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL
PCBs (mg/kg)																												
PCB-1254	1.4	0.16	na	0.161	J	J	*0.021*	*0.042*	0.0285		J	*0.01*	*0.021*	0.0243		J	*0.0096*	*0.019*	0.0135	J	J	*0.009*	*0.018*	0.309			*0.043*	*0.087*
PCB-1260	1.4	0.32	na	0.0568	J	J	*0.021*	*0.042*	0.021	U		*0.01*	*0.021*	0.019	U		*0.0096*	*0.019*	0.018	U		*0.009*	*0.018*	0.087	U		*0.043*	*0.087*
Metals (mg/kg)																												
Aluminum	100000	7800	40041	16300		J	*3*	*12*	17800		J	*2.8*	*12*	10200		J	*2.7*	*11*	14300		J	*2.7*	*11*	9770		J	*2.5*	*10*
Antimony	41	3.1	na	1	J	B	*0.24*	*3.7*	0.94	J	B	*0.22*	*3.5*	0.89	J	B	*0.21*	*3.4*	0.34	J	B	*0.21*	*3.3*	0.42	J	B	*0.2*	*3.1*
Arsenic	1.9	0.43	15.8	12.2		J	*0.24*	*0.5*	3.7		J	*0.23*	*0.47*	5.9		J	*0.22*	*0.45*	1.9		J	*0.22*	*0.44*	2.6		J	*0.2*	*0.41*
Barium	20000	1600	209	90		J	*0.31*	*12*	90.3		J	*0.29*	*12*	**253**	**C**	**J**	*0.28*	*11*	79.9		J	*0.28*	*11*	65.1		J	*0.26*	*10*
Beryllium	200	16	1.02	**1.5**		**B**	*0.12*	*0.62*	**1.6**		**B**	*0.12*	*0.58*	0.98		B	*0.11*	*0.56*	0.8		B	*0.11*	*0.56*	0.9		B	*0.11*	*0.56*
Cadmium	51	3.9	0.69	0.062	U	UL	*0.062*	*0.25*	0.59	U	UL	*0.59*	*1.2*	0.28	U	UL	*0.28*	*0.44*	0.55	U	UL	*0.55*	*0.88*	1	U	UL	*1*	*2.1*
Calcium	na	na	na	5420		J	*6.2*	*310*	4140		J	*5.9*	*290*	1520		J	*5.6*	*280*	5540		J	*5.5*	*280*	3740		J	*5.2*	*260*
Chromium	310	23	65.3	30.2		J	*0.087*	*0.62*	32.7		J	*0.082*	*0.59*	20.6		J	*0.078*	*0.56*	18.5		J	*0.078*	*0.55*	13.1		J	*0.072*	*0.52*
Cobalt	na	na	72.3	11.9		J	*0.068*	*3.1*	9.4		J	*0.064*	*2.9*	22.5		J	*0.061*	*2.8*	8.7		J	*0.061*	*2.8*	6.4		J	*0.057*	*2.6*
Copper	4100	310	53.5	**160**		**J**	*0.12*	*1.6*	**54.3**		**J**	*0.11*	*1.5*	**64.2**		**J**	*0.11*	*1.4*	46.4		J	*0.11*	*1.4*	30.3		J	*0.098*	*1.3*
Iron	72000	5500	50962	22300		J	*0.87*	*6.2*	21100		J	*0.82*	*5.9*	19600		J	*0.78*	*5.6*	17800		J	*0.78*	*5.5*	14100		J	*0.72*	*5.2*
Lead	800	400	26.8	**118**		**J**	*0.15*	*6.2*	**94.5**		**J**	*0.14*	*5.9*	**135**		**J**	*0.13*	*5.6*	**51.1**		**J**	*0.13*	*5.5*	**37.1**		**J**	*0.12*	*5.2*
Magnesium	na	na	na	4450		J	*6.2*	*310*	11000		J	*5.9*	*290*	4490		J	*5.6*	*280*	4910		J	*5.5*	*280*	2720		J	*5.2*	*260*
Manganese	2000	160	2543	435	C	J	*0.062*	*0.93*	360	C	J	*0.059*	*0.88*	2060		J	*0.56*	*8.4*	417	C	J	*0.055*	*0.83*	247	C	J	*0.052*	*0.77*
Mercury	31	2.3	0.13	**0.21**		**J**	*0.012*	*0.1*	**0.16**		**J**	*0.012*	*0.094*	0.081	J	J	*0.011*	*0.088*	0.049	J	J	*0.011*	*0.086*	0.03	J	J	*0.011*	*0.086*
Nickel	2000	160	62.8	16.4		J	*0.16*	*2.5*	19.3		J	*0.15*	*2.3*	12.8		J	*0.14*	*2.2*	12.3		J	*0.14*	*2.2*	7.7		J	*0.13*	*2.1*
Potassium	na	na	na	1920		J	*6.2*	*620*	2550		J	*5.9*	*590*	1440		J	*5.6*	*560*	1520		J	*5.5*	*550*	1130		J	*5.2*	*520*
Selenium	510	39	na	0.61	J	L	*0.28*	*6.2*	0.53	J	L	*0.26*	*5.9*	1.1	J	L	*0.25*	*5.6*	0.51	J	L	*0.25*	*5.5*	0.5	J	L	*0.23*	*5.2*
Silver	510	39	na	0.91		L	*0.087*	*0.62*	0.62		L	*0.082*	*0.59*	0.6		L	*0.078*	*0.56*	6.1		L	*0.078*	*0.55*	0.11	J	L	*0.072*	*0.52*
Sodium	na	na	na	465	J	L	*31*	*620*	328	J	L	*29*	*590*	307	J	L	*28*	*560*	264	J	B	*28*	*550*	214	J	B	*26*	*520*
Thallium	7.2	0.55	2.11	0.7	U	UL	*0.7*	*1.2*	0.66	U	UL	*0.66*	*1.2*	0.62	U	UL	*0.62*	*1*	0.78	J	B	*0.62*	*1*	0.83	J	B	*0.6*	*1*
Vanadium	102	7.8	108	44.6		J	*0.062*	*3.1*	44.8		J	*0.059*	*2.9*	32.7		J	*0.056*	*2.8*	33.1		J	*0.055*	*2.8*	21.6		J	*0.052*	*2.6*
Zinc	31000	2300	202	**290**	**C**	**J**	*0.31*	*1.2*	165		J	*0.29*	*1.2*	**327**	**C**	**J**	*0.28*	*1.1*	123		J	*0.28*	*1.1*	44		J	*0.26*	*1*
Dioxins/Furans (ng/kg)																												
2,3,7,8-TCDF	na	na	na	29.9					6.95					7.6					3.6					1.62				
2,3,7,8-TCDD	19	4.3	na	11					2.88					2.67					1.25					0.682	J	B		
1,2,3,7,8-PECDD	na	na	na	38.8	EMPC	J	*0.584*	*0.584*	3.54	J	J			5.17	J	J			4.6	J	J			0.932	J	J		
1,2,3,4,7,8-HXCDD	460	100	na	43.8					3.75	J	J			6.11					4.71	J	J			1.29	J	J		
1,2,3,6,7,8-HXCDD	460	100	na	85.6					8.13					9.98					8.42					2.32	J	J		
1,2,3,7,8,9-HXCDD	460	100	na	80.7					7.67					10.2					8.88					2.76	J	J		
1,2,3,4,6,7,8-HPCDD	na	na	na	1730					158					155					167					57.2				
OCDD	na	na	na	11500	E	J			5280	E	J			2670					4700	E	J			1440				
1,2,3,7,8-PECDF	na	na	na	26.1					3.42	J	J			6.31					4.91	J	J			1.8	J	J		
2,3,4,7,8-PECDF	na	na	na	45.3					7.92					8.67					6.99					1.37	J, EMPC	J	*1.37*	*1.37*
1,2,3,4,7,8-HXCDF	na	na	na	59.3					12.1					10.8					11.6					2.15	J	J		
1,2,3,6,7,8-HXCDF	na	na	na	47.7					7.36					7.82					8.51					1.4	J, EMPC	J	*1.4*	*1.4*
2,3,4,6,7,8-HXCDF	na	na	na	58					9.75					10.6					10.1					1.76	J	J		
1,2,3,7,8,9-HXCDF	na	na	na	15					2.73	J	J			2.79	J	J			2.84	J	J			0.387	J, EMPC	J	*0.378*	*0.378*
1,2,3,4,6,7,8-HPCDF	na	na	na	467					52.3					47.3					61.4					12.1				
1,2,3,4,7,8,9-HPCDF	na	na	na	33.3					4.06	J	J			3.52	J	J			5.15					0.845	J	J		
OCDF	na	na	na	1000					60.1					52					101					23.1				
TOTAL TCDD	na	na	na	166	EMPC	J			27.6	EMPC	J			40.4	EMPC	J			27.6					4.61	EMPC	J		
TOTAL PECDD	na	na	na	347	Q, EMPC	J			46.1					73.3					56.6					12.8	EMPC	J		
TOTAL HXCDD	460	100	na	828					80.6					113					94.4					25.5	EMPC	J		
TOTAL HPCDD	na	na	na	3880					373					370					399					137				
TOTAL TCDF	na	na	na	408	Q, EMPC	J			77.5	EMPC	J			81.4	EMPC	J			63.8	EMPC	J			14.4	EMPC	J		
TOTAL PECDF	na	na	na	362	Q, EMPC	J			66.9	EMPC	J			73.2	EMPC	J			62.4	EMPC	J			14.1	EMPC	J		
TOTAL HXCDF	na	na	na	542					76.3	EMPC	J			86					92.8	EMPC	J			18	EMPC	J		
TOTAL HPCDF	na	na	na	1330					100					95.7	EMPC	J			142					32				

**Refer to legend immediately following this table for a list of definitions and table notes.

Table 2-2
Laboratory Soil Delineation Sample Results - FLFA Interim Measures - 2007 Investigation

Analyte	i-SL	r-SL	Background	Sample ID / Sample Date / Sample Depth	LFSS09 8/2/07 0-0.5					LFSS10 8/2/07 0-0.5					LFSS11 8/2/07 0-0.5					LFSS12 8/2/07 0-0.5					LFSS13 8/2/07 0-0.5				
				Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL
PCBs (mg/kg)																													
PCB-1254	1.4	0.16	na	0.0453	J	J	*0.0098*	*0.02*	0.067	J	J	*0.011*	*0.022*	0.402			*0.047*	*0.095*	0.117			*0.01*	*0.02*	0.111			*0.011*	*0.021*
PCB-1260	1.4	0.32	na	0.0621	J	J	*0.0098*	*0.02*	0.0373	J	J	*0.011*	*0.022*	0.095	U		*0.047*	*0.095*	0.02	U		*0.01*	*0.02*	0.021	U		*0.011*	*0.021*
Metals (mg/kg)																													
Aluminum	100000	7800	40041	16400		J	*2.9*	*12*	14400		J	*3.1*	*13*	17300		J	*2.6*	*11*	18700		J	*3*	*12*	20400		J	*2.9*	*12*
Antimony	41	3.1	na	1	J	B	*0.23*	*3.6*	0.88	J	B	*0.25*	*3.9*	0.89	J	B	*0.2*	*3.2*	0.86	J	B	*0.23*	*3.7*	1.4	J	B	*0.23*	*3.6*
Arsenic	1.9	0.43	15.8	5.1		J	*0.23*	*0.48*	3.7		J	*0.25*	*0.52*	6.1		J	*0.21*	*0.43*	6.8		J	*0.24*	*0.49*	**31.4**		**J**	*0.23*	*0.48*
Barium	20000	1600	209	70.6		J	*0.3*	*12*	69.7		J	*0.33*	*13*	89.8		J	*0.27*	*11*	112		J	*0.31*	*12*	84		J	*0.3*	*12*
Beryllium	200	16	1.02	**1.5**		**B**	*0.12*	*0.6*	**1.7**		**B**	*0.13*	*0.66*	0.7		B	*0.11*	*0.54*	**1.2**		**B**	*0.12*	*0.62*	**1.3**		**B**	*0.12*	*0.6*
Cadmium	51	3.9	0.69	1.2	U	UL	*1.2*	*2.4*	1.3	U	UL	*1.3*	*2.6*	1.1	U	UL	*1.1*	*2.2*	1.2	U	UL	*1.2*	*2.5*	0.14	J	L	*0.06*	*0.24*
Calcium	na	na	na	1580		J	*6*	*300*	2070		J	*6.5*	*330*	8340		J	*5.4*	*270*	2930		J	*6.2*	*310*	10600		J	*6*	*300*
Chromium	310	23	65.3	35.7		J	*0.083*	*0.6*	29.9		J	*0.091*	*0.65*	24.3		J	*0.075*	*0.54*	32.1		J	*0.086*	*0.62*	44		J	*0.083*	*0.6*
Cobalt	na	na	72.3	12.1		J	*0.066*	*3*	13.7		J	*0.072*	*3.3*	6.3		J	*0.059*	*2.7*	10.6		J	*0.068*	*3.1*	11.2		J	*0.066*	*3*
Copper	4100	310	53.5	**62.1**		**J**	*0.11*	*1.5*	**92.3**		**J**	*0.12*	*1.6*	**86.2**		**J**	*0.1*	*1.3*	**121**		**J**	*0.12*	*1.5*	**7560**		**J**	*5.7*	*75*
Iron	72000	5500	50962	25000		J	*0.83*	*6*	28700		J	*0.91*	*6.5*	21900		J	*0.75*	*5.4*	25200		J	*0.86*	*6.2*	24600		J	*0.83*	*6*
Lead	800	400	26.8	**126**		**J**	*0.14*	*6*	**86.2**		**J**	*0.16*	*6.5*	**372**	**C**	**J**	*0.13*	*5.4*	**241**		**J**	*0.15*	*6.2*	**161**		**J**	*0.14*	*6*
Magnesium	na	na	na	5160		J	*6*	*300*	4540		J	*6.5*	*330*	4460		J	*5.4*	*270*	15000		J	*6.2*	*310*	9290		J	*6*	*300*
Manganese	2000	160	2543	467	C	J	*0.06*	*0.89*	500	C	J	*0.065*	*0.98*	823		J	*0.54*	*8.1*	607		J	*0.062*	*0.92*	794		J	*1.2*	*18*
Mercury	31	2.3	0.13	0.12		J	*0.012*	*0.096*	0.12		J	*0.013*	*0.1*	**0.16**		**J**	*0.011*	*0.09*	0.1		J	*0.012*	*0.098*	0.087	J	J	*0.012*	*0.099*
Nickel	2000	160	62.8	16.3		J	*0.15*	*2.4*	18.7		J	*0.16*	*2.6*	25.6		J	*0.13*	*2.2*	19.5		J	*0.15*	*2.5*	34.9		J	*0.15*	*2.4*
Potassium	na	na	na	1530		J	*6*	*600*	1440		J	*6.5*	*650*	1400		K	*5.4*	*540*	3510		K	*6.2*	*620*	2250		J	*6*	*600*
Selenium	510	39	na	0.7	J	L	*0.27*	*6*	0.78	J	L	*0.29*	*6.5*	0.37	J	L	*0.24*	*5.4*	0.34	J	L	*0.28*	*6.2*	0.39	J	L	*0.27*	*6*
Silver	510	39	na	0.19	J	L	*0.083*	*0.6*	0.5	J	L	*0.091*	*0.65*	0.18	J	K	*0.075*	*0.54*	0.39	J	K	*0.086*	*0.62*	0.53	J	L	*0.083*	*0.6*
Sodium	na	na	na	341	J	L	*30*	*600*	357	J	L	*33*	*650*	344	J	J	*27*	*540*	397	J	J	*31*	*620*	527	J	L	*30*	*600*
Thallium	7.2	0.55	2.11	1.3		B	*0.66*	*1.2*	2		B	*0.74*	*1.2*	0.6	U		*0.6*	*1*	0.64	U		*0.64*	*1.2*	0.66	U	UL	*0.66*	*1.2*
Vanadium	102	7.8	108	53		J	*0.06*	*3*	45		J	*0.065*	*3.3*	45.3		J	*0.054*	*2.7*	40.2		J	*0.062*	*3.1*	48.1		J	*0.06*	*3*
Zinc	31000	2300	202	145		J	*0.3*	*1.2*	**223**		**J**	*0.33*	*1.3*	132		J	*0.27*	*1.1*	172		J	*0.31*	*1.2*	**2820**		**J**	*6*	*24*
Dioxins/Furans (ng/kg)																													
2,3,7,8-TCDF	na	na	na	6.94					13.4					9.35					7.34					40.3				
2,3,7,8-TCDD	19	4.3	na	3.03					16.1					3.94					1.79					12.9				
1,2,3,7,8-PECDD	na	na	na	4.8	J	J			12.1					14.3					5.6	J	J			35.9				
1,2,3,4,7,8-HXCDD	460	100	na	6.1					12.9					14.1					5.98	J	J			27				
1,2,3,6,7,8-HXCDD	460	100	na	9.94					21					22.8					10.3					53.8				
1,2,3,7,8,9-HXCDD	460	100	na	10.6					23.3					25.3					11.1					57.2				
1,2,3,4,6,7,8-HPCDD	na	na	na	250					395					458					171					798				
OCDD	na	na	na	7270	E	J			7690	E	J			7440	E	J			1300		K			6770	E	J		
1,2,3,7,8-PECDF	na	na	na	5.28	J	J			10.5					10.6					6.02	J	J			40				
2,3,4,7,8-PECDF	na	na	na	5.6	J	J			14.1					14.6					7.4					79.5				
1,2,3,4,7,8-HXCDF	na	na	na	8.36					20.8					20					8.77					82.9				
1,2,3,6,7,8-HXCDF	na	na	na	5.46	J	J			13.6					13.8					6.47					75.5				
2,3,4,6,7,8-HXCDF	na	na	na	6.04					15.1					17.3					8.26					92.9				
1,2,3,7,8,9-HXCDF	na	na	na	1.51	J	J			3.64	J	J			4.41	J	J			2.25	J	J			16.1				
1,2,3,4,6,7,8-HPCDF	na	na	na	44.6					89.9					112					47.6					457				
1,2,3,4,7,8,9-HPCDF	na	na	na	3.15	J	J			5.89	J	J			7.39					3.58	J	J			19.5				
OCDF	na	na	na	84.9					133					191					74.5					327				
TOTAL TCDD	na	na	na	34.1	EMPC	J			96	EMPC	J			85	EMPC	J			40.2					257	Q, EMPC	J		
TOTAL PECDD	na	na	na	53	EMPC	J			147					163					68.7					370	Q, EMPC	J		
TOTAL HXCDD	460	100	na	108					245					255					109	EMPC	J			675				
TOTAL HPCDD	na	na	na	619					984					1080					384					1660				
TOTAL TCDF	na	na	na	63.3	EMPC	J			155	EMPC	J			187	EMPC	J			87.9	EMPC	J			1220	Q, EMPC	J		
TOTAL PECDF	na	na	na	53.8	EMPC	J			123	EMPC	J			127	EMPC	J			66.1	EMPC	J			1040	Q, EMPC	J		
TOTAL HXCDF	na	na	na	67.1					148	EMPC	J			172	EMPC	J			77.4					858				
TOTAL HPCDF	na	na	na	116	EMPC	J			187					282					115	EMPC	J			667				

**Refer to legend immediately following this table for a list of definitions and table notes.

Table 2-2
Laboratory Soil Delineation Sample Results - FLFA Interim Measures - 2007 Investigation

Analyte			Sample ID	LFSS14					LFSS15					LFSS16					LFSS17					LFSS18				
			Sample Date	8/2/07					8/2/07					8/2/07					8/2/07					8/2/07				
			Sample Depth	0-0.5					0-0.5					0-0.5					0-0.5					0-0.5				
	i-SL	**r-SL**	**Background**	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL
PCBs (mg/kg)																												
PCB-1254	1.4	0.16	na	0.0533			*0.01*	*0.02*	0.151			*0.018*	*0.037*	0.18	U		*0.088*	*0.18*	0.0642	J	J	*0.0094*	*0.019*	0.11	J	J	*0.0099*	*0.02*
PCB-1260	1.4	0.32	na	0.02	U		*0.01*	*0.02*	0.037	U		*0.018*	*0.037*	1.09			*0.088*	*0.18*	0.133	J	J	*0.0094*	*0.019*	0.0677	J	J	*0.0099*	*0.02*
Metals (mg/kg)																												
Aluminum	100000	7800	40041	14400		J	*2.7*	*11*	17900		J	*2.6*	*11*	20000		J	*2.7*	*11*	19300		J	*2.8*	*12*	16100		J	*2.7*	*11*
Antimony	41	3.1	na	0.65	J	B	*0.22*	*3.4*	0.74	J	B	*0.2*	*3.2*	1.1	J	B	*0.21*	*3.3*	5.3		L	*0.22*	*3.5*	1.4	J	B	*0.22*	*3.4*
Arsenic	1.9	0.43	15.8	4.3		J	*0.22*	*0.45*	4.9		J	*0.21*	*0.43*	3		J	*0.22*	*0.44*	10.7		J	*0.23*	*0.47*	5.3		J	*0.22*	*0.46*
Barium	20000	1600	209	52.9		J	*0.28*	*11*	75.5		J	*0.27*	*11*	68.3		J	*0.28*	*11*	**2420**		**J**	*5.9*	*230*	**438**	**C**	**J**	*0.29*	*11*
Beryllium	200	16	1.02	0.64		B	*0.11*	*0.56*	0.7		B	*0.11*	*0.54*	**1.4**		**B**	*0.11*	*0.56*	**1.6**		**B**	*0.12*	*0.58*	**1.4**		**B**	*0.11*	*0.58*
Cadmium	51	3.9	0.69	1.1	U	UL	*1.1*	*2.3*	1.1	U	UL	*1.1*	*2.1*	0.056	U	UL	*0.056*	*0.22*	**5.1**		**L**	*0.059*	*0.23*	0.45		L	*0.057*	*0.23*
Calcium	na	na	na	1590		J	*5.7*	*280*	6850		J	*5.3*	*270*	14200		J	*5.6*	*280*	12400		J	*5.9*	*290*	11300		J	*5.7*	*290*
Chromium	310	23	65.3	27.6		J	*0.079*	*0.57*	29.9		J	*0.075*	*0.53*	30.5		J	*0.078*	*0.56*	59.1		J	*0.082*	*0.59*	33.2		J	*0.08*	*0.57*
Cobalt	na	na	72.3	6.9		J	*0.062*	*2.8*	7.1		J	*0.059*	*2.7*	8.3		J	*0.061*	*2.8*	10.2		J	*0.065*	*2.9*	26.9		J	*0.063*	*2.9*
Copper	4100	310	53.5	37.5		J	*0.11*	*1.4*	33.4		J	*0.1*	*1.3*	**97.3**		**J**	*0.11*	*1.4*	**3090**		**J**	*2.2*	*29*	**179**		**J**	*0.11*	*1.4*
Iron	72000	5500	50962	20400		J	*0.79*	*5.7*	23100		J	*0.75*	*5.3*	20600		J	*0.78*	*5.6*	25500		J	*0.82*	*5.9*	26200		J	*0.8*	*5.7*
Lead	800	400	26.8	**35.9**		**J**	*0.14*	*5.7*	**186**		**J**	*0.13*	*5.3*	**1550**		**J**	*1.3*	*56*	**1660**		**J**	*2.8*	*120*	**294**	**C**	**J**	*0.14*	*5.7*
Magnesium	na	na	na	1070		J	*5.7*	*280*	3500		J	*5.3*	*270*	24100		J	*5.6*	*280*	12100		J	*5.9*	*290*	8400		J	*5.7*	*290*
Manganese	2000	160	2543	548		J	*0.057*	*0.85*	680		J	*0.53*	*8*	355		J	*0.56*	*8.3*	907		J	*1.2*	*18*	1940		J	*0.57*	*8.6*
Mercury	31	2.3	0.13	0.1		J	*0.012*	*0.095*	**0.14**		**J**	*0.011*	*0.086*	0.048	J	J	*0.011*	*0.086*	**0.89**		**J**	*0.036*	*0.29*	**0.45**		**J**	*0.011*	*0.091*
Nickel	2000	160	62.8	7.5		J	*0.14*	*2.3*	10.4		J	*0.13*	*2.1*	19.8		J	*0.14*	*2.2*	48.3		J	*0.15*	*2.3*	20.3		J	*0.14*	*2.3*
Potassium	na	na	na	712		J	*5.7*	*570*	957		J	*5.3*	*530*	3590		J	*5.6*	*560*	2250		J	*5.9*	*590*	2030		J	*5.7*	*570*
Selenium	510	39	na	1.3	J	L	*0.26*	*5.7*	0.79	J	L	*0.24*	*5.3*	0.25	U	UL	*0.25*	*5.6*	0.68	J	L	*0.26*	*5.9*	0.49	J	L	*0.26*	*5.7*
Silver	510	39	na	0.19	J	L	*0.079*	*0.57*	0.075	U	UL	*0.075*	*0.53*	0.36	J	L	*0.078*	*0.56*	65.2		L	*0.082*	*0.59*	6.2		L	*0.08*	*0.57*
Sodium	na	na	na	228	J	B	*28*	*570*	304	J	L	*27*	*530*	362	J	L	*28*	*560*	915		L	*29*	*590*	435	J	L	*29*	*570*
Thallium	7.2	0.55	2.11	1.7		B	*0.64*	*1.1*	0.78	J	B	*0.6*	*1*	0.62	U	UL	*0.62*	*1.1*	0.66	U	UL	*0.66*	*1.2*	0.64	U	UL	*0.64*	*1.2*
Vanadium	102	7.8	108	45.2		J	*0.057*	*2.8*	51.3		J	*0.053*	*2.7*	44.6		J	*0.056*	*2.8*	39		J	*0.059*	*2.9*	37.3		J	*0.057*	*2.9*
Zinc	31000	2300	202	60.5		J	*0.28*	*1.1*	111		J	*0.27*	*1.1*	135		J	*0.28*	*1.1*	**3150**		**J**	*5.9*	*23*	**369**	**C**	**J**	*0.29*	*1.1*
Dioxins/Furans (ng/kg)																												
2,3,7,8-TCDF	na	na	na	2.77					3.83					6.29					41.8					19.5				
2,3,7,8-TCDD	19	4.3	na	1.01	J, EMPC	J	*0.143*	*0.143*	1.84					1.11	J	J			5.67					3.32				
1,2,3,7,8-PECDD	na	na	na	2.76	J	J			5.6	J	J			3.2	J	J			21.7					15.4				
1,2,3,4,7,8-HXCDD	460	100	na	2.85	J	J			4.95	J	J			2.91	J, EMPC	J	*0.57*	*0.57*	23					23.7				
1,2,3,6,7,8-HXCDD	460	100	na	5.01	J	J			9.97					6.89					46.5					37.1				
1,2,3,7,8,9-HXCDD	460	100	na	5.47	J	J			11.2					6.57					40.3					33.6				
1,2,3,4,6,7,8-HPCDD	na	na	na	123					203					144					509					507				
OCDD	na	na	na	4270					3430					1780					3760					4400				
1,2,3,7,8-PECDF	na	na	na	2.15	J	J			3.26	J	J			3.44	J	J			63.2					24.6				
2,3,4,7,8-PECDF	na	na	na	3.63	J	J			4.3	J	J			4.65	J	J			79.5					43.3				
1,2,3,4,7,8-HXCDF	na	na	na	4.53	J	J			5.97	J	J			24					107					61.9				
1,2,3,6,7,8-HXCDF	na	na	na	3.88	J	J			4.69	J	J			4.95	J	J			97					50.2				
2,3,4,6,7,8-HXCDF	na	na	na	4.44	J	J			5.07	J	J			5.98					116					59.5				
1,2,3,7,8,9-HXCDF	na	na	na	0.955	J	J			1.22	J	J			1.59	J	J			29.8					16.4				
1,2,3,4,6,7,8-HPCDF	na	na	na	25.9					38.9					49.2					567					300				
1,2,3,4,7,8,9-HPCDF	na	na	na	2.15	J	J			3.12	J	J			4.11	J	J			42.4					27.7				
OCDF	na	na	na	41.3					80.6					72.5					414					257				
TOTAL TCDD	na	na	na	15.3	EMPC	J			28.2	EMPC	J			21.5	EMPC	J			241	Q	J			135				
TOTAL PECDD	na	na	na	30.1	EMPC	J			53.5	EMPC	J			36.3	EMPC	J			355					218	Q, EMPC	J		
TOTAL HXCDD	460	100	na	57.9					106					64	EMPC	J			534					447				
TOTAL HPCDD	na	na	na	314					463					321					1290					1170				
TOTAL TCDF	na	na	na	41.4	EMPC	J			53.7	EMPC	J			73.3	EMPC	J			882	EMPC	J			353	Q, EMPC	J		
TOTAL PECDF	na	na	na	29	EMPC	J			37.5	EMPC	J			108	EMPC	J			715	Q, EMPC	J			314	Q, EMPC	J		
TOTAL HXCDF	na	na	na	37.3	EMPC	J			51.8	EMPC	J			84.3					820					459				
TOTAL HPCDF	na	na	na	57.8					106					110					903					525				

**Refer to legend immediately following this table for a list of definitions and table notes.

Table 2-2
Laboratory Soil Delineation Sample Results - FLFA Interim Measures - 2007 Investigation

Analyte	Sample ID			LFSS19					LFSS20					LFSS21				
	Sample Date			8/2/07					8/2/07					8/2/07				
	Sample Depth			0-0.5					0-0.5					0-0.5				
	i-SL	r-SL	Background	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL
PCBs (mg/kg)																		
PCB-1254	1.4	0.16	na	0.0343			*0.01*	*0.02*	0.331	J	J	*0.051*	*0.1*	0.206	J	J	*0.053*	*0.11*
PCB-1260	1.4	0.32	na	0.02	U		*0.01*	*0.02*	0.125	J	J	*0.051*	*0.1*	0.179	J	J	*0.053*	*0.11*
Metals (mg/kg)																		
Aluminum	100000	7800	40041	18500		J	*2.9*	*12*	35600		J	*29*	*120*	21800		J	*3*	*13*
Antimony	41	3.1	na	1.3	J	B	*0.23*	*3.6*	6.2		L	*0.23*	*3.6*	3.8		B	*0.24*	*3.8*
Arsenic	1.9	0.43	15.8	7.3		J	*0.23*	*0.48*	13.8		J	*0.23*	*0.48*	14.1		J	*0.24*	*0.5*
Barium	20000	1600	209	72.3		J	*0.3*	*12*	**824**		**J**	*3*	*120*	**776**		**J**	*3.1*	*130*
Beryllium	200	16	1.02	0.79		B	*0.12*	*0.6*	0.64		B	*0.12*	*0.6*	**1.6**		**B**	*0.12*	*0.62*
Cadmium	51	3.9	0.69	1.5	U	UL	*1.5*	*2.4*	**6.6**		**L**	*0.06*	*0.24*	**4.4**		**L**	*0.063*	*0.25*
Calcium	na	na	na	1740		J	*6*	*300*	8950		J	*6*	*300*	19200		J	*6.3*	*310*
Chromium	310	23	65.3	59.1		J	*0.084*	*0.6*	**162**		**J**	*0.084*	*0.6*	55.8		J	*0.088*	*0.63*
Cobalt	na	na	72.3	18		J	*0.066*	*3*	13.7		J	*0.066*	*3*	12.4		J	*0.069*	*3.1*
Copper	4100	310	53.5	**55.1**		**J**	*0.11*	*1.5*	**37200**		**J**	*23*	*300*	**1130**		**J**	*1.2*	*16*
Iron	72000	5500	50962	40900		J	*8.4*	*60*	40800		J	*8.4*	*60*	48900		J	*8.8*	*63*
Lead	800	400	26.8	**105**		**J**	*0.14*	*6*	**36500**		**J**	*29*	*1200*	**1230**		**J**	*1.5*	*63*
Magnesium	na	na	na	1280		J	*6*	*300*	4880		J	*6*	*300*	15600		J	*6.3*	*310*
Manganese	2000	160	2543	732		J	*0.6*	*9*	906		J	*0.6*	*9*	809		J	*0.63*	*9.4*
Mercury	31	2.3	0.13	**0.21**		**J**	*0.011*	*0.091*	**0.15**		**J**	*0.011*	*0.091*	**2.2**		**J**	*0.066*	*0.54*
Nickel	2000	160	62.8	10.2		J	*0.15*	*2.4*	**123**		**J**	*0.15*	*2.4*	49.4		J	*0.16*	*2.5*
Potassium	na	na	na	945		J	*6*	*600*	2320		J	*6*	*600*	1970		J	*6.3*	*630*
Selenium	510	39	na	1.3	J	L	*0.27*	*6*	0.27	U	UL	*0.27*	*6*	0.28	U	UL	*0.28*	*6.3*
Silver	510	39	na	2.5		L	*0.084*	*0.6*	7.5		L	*0.084*	*0.6*	24.2		L	*0.088*	*0.63*
Sodium	na	na	na	376	J	L	*30*	*600*	3230		L	*30*	*600*	850		L	*31*	*630*
Thallium	7.2	0.55	2.11	**2.9**		**B**	*0.64*	*1.2*	0.64	U	UL	*0.64*	*1.2*	0.7	U	UL	*0.7*	*1.2*
Vanadium	102	7.8	108	75.6		J	*0.06*	*3*	35.1		J	*0.06*	*3*	40.5		J	*0.063*	*3.1*
Zinc	31000	2300	202	133		J	*0.3*	*1.2*	**22100**		**J**	*60*	*240*	**2090**		**J**	*3.1*	*13*
Dioxins/Furans (ng/kg)																		
2,3,7,8-TCDF	na	na	na	12.6					245					43.5				
2,3,7,8-TCDD	19	4.3	na	2.78					166					8.08				
1,2,3,7,8-PECDD	na	na	na	7.19					481					39				
1,2,3,4,7,8-HXCDD	460	100	na	7.29					428					52.1				
1,2,3,6,7,8-HXCDD	460	100	na	13.7					821					75.4				
1,2,3,7,8,9-HXCDD	460	100	na	13.2					826					70.3				
1,2,3,4,6,7,8-HPCDD	na	na	na	215					18100					1010				
OCDD	na	na	na	7090	E	J			135000					6530	E	J		
1,2,3,7,8-PECDF	na	na	na	12.2					273					57.5				
2,3,4,7,8-PECDF	na	na	na	18.8					507					99.2				
1,2,3,4,7,8-HXCDF	na	na	na	25.1					437					137				
1,2,3,6,7,8-HXCDF	na	na	na	19.3					381					117				
2,3,4,6,7,8-HXCDF	na	na	na	24.7					484					157				
1,2,3,7,8,9-HXCDF	na	na	na	6.79					83.3					37.5				
1,2,3,4,6,7,8-HPCDF	na	na	na	108					2330					727				
1,2,3,4,7,8,9-HPCDF	na	na	na	9.47					159					60.2				
OCDF	na	na	na	86.3					4090					565				
TOTAL TCDD	na	na	na	53.9	EMPC	J			2770	Q	J			333				
TOTAL PECDD	na	na	na	92.3					4130	Q	J			545	Q, EMPC	J		
TOTAL HXCDD	460	100	na	149					8090					953				
TOTAL HPCDD	na	na	na	526					34500					2340				
TOTAL TCDF	na	na	na	160	EMPC	J			6890	Q, EMPC	J			972	EMPC	J		
TOTAL PECDF	na	na	na	145	EMPC	J			4380	Q, EMPC	J			873	Q, EMPC	J		
TOTAL HXCDF	na	na	na	175	EMPC	J			3900	Q	J			1110				
TOTAL HPCDF	na	na	na	186					6470					1220				

**Refer to legend immediately following this table for a list of definitions and table notes.

Table 2-2
Legend

12	J	Shading and black font indicate an industrial SL exceedance.
12	J	Bold outline indicates a residential SL exceedance.
12	**J**	Bold, underlined font indicates a background exceedance.
12	*12*	Shading in the MDL/MRL columns indicates the MDL exceeds a criterion.

SLs for non-Carcinogenic compounds have been recalculated to an HI of 0.1.
Inorganic results below background UTLs are not indicated as exceedances on the table.
SL = Screening Level (Source: ORNL Regional Screening Table, September 2008).
Lead screening values from Technical Review Workgroup for Lead: Guidance Document (USEPA, 1999b).
mg/kg = milligrams per kilogram (parts per million).
ng/kg = nanograms per kilogram (parts per trillion).
µg/kg = micrograms per kilogram (parts per billion).
NA = not applicable.
NT = analyte not tested.

Lab Q = Lab Data Qualifiers

* = Laboratory duplicate not within control limits.
B = (organics) Blank contamination. Value detected in sample and associated blank.
A (Dioxins) = B = (metals) Value <MRL and >MDL and is considered estimated.
E (metals) = Reported value is estimated because of the presence of interferences.
EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/PCDF ions was outside accepted ranges. The detected PCDD/PCDF was reported as an estimated maximum possible concentration (EMPC).
J = (organics) Value <MRL and >MDL and is considered estimated.
U = Analyte not-detected at the method reporting limit.
X = (dioxins) Ion abundance ratio outside acceptable range. Value reported is EMPC.

Val Q = Validation Data Qualifiers

B = blank contamination. Value detected in sample and associated blank.
J = estimated concentration.
K = estimated concentration bias high.
L = estimated concentration bias low.
N = presumptive evidence for tentatively identified compounds using a library search.
U = analyte not detected.
UJ = estimated concentration non-detect.
UL = estimated concentration non-detect bias low.

Table 2-3
Waste Characterization Sample Results
FLFA Interim Measures

Analyte	Sample ID Matrix Sample Date	LFDW02 Soil 5/12/2009	
	TCLP RL	Result	Lab Q
Dioxins/Furans (ng/kg)			
2,3,7,8-TCDF	na	11	
1,2,3,7,8-PeCDF	na	10	B
2,3,4,7,8-PeCDF	na	17	B
1,2,3,4,7,8-HxCDF	na	49	B
2,3,4,6,7,8-HxCDF	na	21	
1,2,3,7,8,9-HxCDF	na	0.55	J B
1,2,3,4,6,7,8-HpCDF	na	100	B
OCDF	na	140	B
Total TCDF	na	170	
Total PeCDF	na	190	
Total HxCDF	na	180	
Total HpCDF	na	210	
Total TCDD	na	33	
2,3,7,8-TCDD	na	2	
Total PeCDD	na	83	
1,2,3,7,8-PeCDD	na	6	J
Total HxCDD	na	140	
1,2,3,7,8,9-HxCDD	na	17	
Total HpCDD	na	400	
1,2,3,4,6,7,8-HpCDD	na	190	B
OCDD	na	1900	B
1,2,3,6,7,8-HxCDF	na	17	B
1,2,3,4,7,8,9-HpCDF	na	8.4	B
1,2,3,4,7,8-HxCDD	na	6.7	
1,2,3,6,7,8-HxCDD	na	11	B
PCBs (mg/kg)			
Aroclor 1016	na	0.043	U
Aroclor 1221	na	0.043	U
Aroclor 1232	na	0.043	U
Aroclor 1242	na	0.043	U
Aroclor 1248	na	0.043	U
Aroclor 1254	na	0.043	U
Aroclor 1260	na	0.049	
Pesticides (ug/kg)			
4,4'-DDD	na	0.8	J
4,4'-DDE	na	12	
4,4'-DDT	na	22	
Aldrin	na	2.2	U
alpha-BHC	na	2.2	U
alpha-Chlordane	na	0.99	J
beta-BHC	na	2.2	U
delta-BHC	na	2.2	U
Dieldrin	na	4.5	U
Endosulfan II	na	4.5	U
Endosulfan I	na	2.2	U
Endosulfan sulfate	na	4.5	U
Endrin aldehyde	na	4.5	U
Endrin ketone	na	4.5	U
Endrin	na	4.5	U
gamma-Chlordane	na	2.3	PG
Heptachlor epoxide	na	1.3	J PG
Heptachlor	na	2.2	U
Lindane	na	2.2	U
Methoxychlor	na	22	U
Toxaphene	na	88	U
TCLP Metals (mg/L)			
TCLP Lead	5	0.69	
TCLP Silver	5	0.025	U
TCLP Arsenic	5	0.1	U
TCLP Barium	100	2.2	J
TCLP Chromium	5	0.025	U
TCLP Selenium	1	0.075	U
TCLP Cadmium	1	0.009	B
TCLP Mercury	0.2	0.003	U
TCLP Characteristics			
Corrosivity as pH	<2 or >12 (Units)	7.5	
Sulfide Reactivity	500 (mg/kg)	6.7	U
Cyanide Reactivity	250 (mg/kg)	0.67	U

Table 2-3
Legend

mg/kg = milligrams per kilogram (parts per million).

mg/L = milligrams per kilogram (parts per million).

ng/kg = nanograms per kilogram (parts per trillion).

µg/kg = micrograms per kilogram (parts per billion).

NA = not applicable.

NT = analyte not tested.

Lab Q = Lab Data Qualifiers

* = Laboratory duplicate not within control limits.

B = (organics) Blank contamination. Value detected in sample and associated blank.

A (Dioxins) = B = (metals) Value <MRL and >MDL and is considered estimated.

E (metals) = Reported value is estimated because of the presence of interferences.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/PCDF ions was outside accepted ranges. The detected PCDD/PCDF was reported as an estimated maximum possible concentration (EMPC).

J = (organics) Value <MRL and >MDL and is considered estimated.

P = (organics) Target analyte confirmation is >40% difference for detected compound between the primary and secondary columns.

U = Analyte not-detected at the method reporting limit.

X = (dioxins) Ion abundance ratio outside acceptable range. Value reported is EMPC.

Table 2-4
Topsoil Characterization Sample Results - FLFA Interim Measures

Analyte	Sample ID			JWB-TS01					39DW15					39DW16					39DW17				
	Sample Date			2/16/09					3/31/09					3/31/09					3/31/09				
	Sample Depth			0-0.5					0-0.5					0-0.5					0-0.5				
	i-SL	**r-SL**	**Background**	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL	Result	Lab Q	Val Q	MDL	MRL
VOCs (ug/kg)																							
1,1-Dichloroethene	1100000	250000	na	6.8	U		*0.35*	*6.8*	5.5	U		*0.29*	*5.5*	5.8	U		*0.3*	*5.8*	6.4	U		*0.33*	*6.4*
2-Butanone	1.9E+08	28000000	na	43			*1.9*	*14*	11	U		*1.5*	*11*	12	U		*1.6*	*12*	13	U		*1.8*	*13*
2-Hexanone	na	na	na	1.1	J	J	*1*	*14*	11	U		*0.82*	*11*	12	U		*0.86*	*12*	13	U		*0.95*	*13*
Acetone	6.1E+08	61000000	na	140	J B	B	*59*	*590*	22	U		*1.5*	*22*	23	U		*1.6*	*23*	26	U		*1.8*	*26*
Chlorobenzene	1500000	310000	na	0.9	J	J	*0.39*	*6.8*	5.5	U		*0.32*	*5.5*	5.8	U		*0.34*	*5.8*	6.4	U		*0.37*	*6.4*
PAHs (ug/kg)																							
Benz(a)anthracene	2100	150	na	NT					NT					NT					NT				
Benzo(b)fluoranthene	2100	150	na	NT					NT					NT					NT				
Chrysene	210000	15000	na	NT					NT					NT					NT				
Fluoranthene	22000000	2300000	na	NT					NT					NT					NT				
Pyrene	17000000	1700000	na	NT					NT					NT					NT				
SVOCs (ug/kg)																							
2,4-Dinitrotoluene	1200000	120000	na	110	J	J	*100*	*380*	410	U		*110*	*410*	410	U		*110*	*410*	400	U		*110*	*400*
Pesticides (ug/kg)																							
Endosulfan I	na	na	na	0.042	U		*0.16*	*2*	2.1	U		*0.17*	*2.1*	2.1	U		*0.17*	*2.1*	2.1	U		*0.17*	*2.1*
PCBs (mg/kg)		None detected																					
Explosives (mg/kg)																							
2,4,6-Trinitrotoluene	79	19	na	0.36			*0.019*	*0.25*	NT					NT					NT				
2,4-Dinitrotoluene	1200	120	na	0.28			*0.005*	*0.25*	NT					NT					NT				
2,6-Dinitrotoluene	620	61	na	0.06	J	J	*0.007*	*1.2*	NT					NT					NT				
4-amino-2,6-Dinitrotoluene	1900	150	na	0.013	J	J	*0.009*	*0.25*	NT					NT					NT				
Herbicides (ug/kg)		None detected																					
Metals (mg/kg)																							
Aluminum	990000	77000	40041	14500			*8*	*24.1*	12600			*8.6*	*25.8*	14300			*8.6*	*25.8*	14200			*8.6*	*25.9*
Arsenic	1.6	0.39	15.8	8.5		L	*0.8*	*2.4*	3		L	*0.86*	*2.6*	3.5		L	*0.86*	*2.6*	3.9		L	*0.86*	*2.6*
Barium	190000	15000	209	44.7		L	*0.46*	*2.3*	148			*0.49*	*2.5*	139			*0.49*	*2.5*	130			*0.49*	*2.5*
Beryllium	2000	160	1.02	0.94			*0.11*	*0.34*	0.92		L	*0.12*	*0.37*	0.93		L	*0.12*	*0.37*	0.89		L	*0.12*	*0.37*
Cadmium	810	70	0.69	0.16	B	L	*0.11*	*0.34*	0.37	U		*0.12*	*0.37*	0.37	U		*0.12*	*0.37*	0.37	U		*0.12*	*0.37*
Calcium	na	na	na	617		L	*28.7*	*115*	1220			*30.7*	*123*	1350			*30.7*	*123*	11200			*30.8*	*123*
Chromium	1400	280	65.3	35.5		L	*0.46*	*1.4*	23			*0.49*	*1.5*	24.1			*0.49*	*1.5*	27			*0.49*	*1.5*
Cobalt	300	23	72.3	15.5		J	*0.23*	*0.69*	10.2			*0.25*	*0.74*	11.5			*0.25*	*0.74*	10.7			*0.25*	*0.74*
Copper	41000	3100	53.5	8.8		L	*0.57*	*2.9*	11.4			*0.61*	*3.1*	13.4			*0.61*	*3.1*	14.1			*0.62*	*3.1*
Iron	720000	55000	50962	44100			*3.6*	*11.5*	17300			*3.8*	*12.3*	20200			*3.8*	*12.3*	21500			*3.8*	*12.3*
Lead	8000	4000	26.8	20.3		L	*0.69*	*2.3*	15.9			*0.74*	*2.5*	19.5			*0.74*	*2.5*	21.5			*0.74*	*2.5*
Magnesium	na	na	na	4230		K	*8.6*	*57.3*	2160			*9.2*	*61.4*	2560			*9.2*	*61.4*	8480			*9.2*	*61.6*
Manganese	23000	1800	2543	1260			*0.46*	*1.4*	767			*0.49*	*1.5*	856			*0.49*	*1.5*	769			*0.49*	*1.5*
Mercury	24	4.3	0.13	0.039	B	J	*0.009*	*0.046*	0.03	B	J	*0.011*	*0.049*	0.032	B	J	*0.011*	*0.049*	0.032	B	J	*0.011*	*0.049*
Nickel	20000	1600	62.8	9		L	*0.34*	*1.1*	10.4			*0.37*	*1.2*	12.1			*0.37*	*1.2*	11.4			*0.37*	*1.2*
Potassium	na	na	na	1060			*28.7*	*115*	992			*30.7*	*123*	1390			*30.7*	*123*	1390			*30.8*	*123*
Sodium	na	na	na	573	U		*28.7*	*573*	35.5	B	J	*30.7*	*614*	36.8	B	J	*30.7*	*614*	45.7	B	J	*30.8*	*616*
Thallium	66	5.1	2.11	0.61	B	L	*0.57*	*2.3*	2.5	U		*0.61*	*2.5*	0.67	B	J	*0.61*	*2.5*	2.5	U		*0.62*	*2.5*
Vanadium	7200	550	108	94.6		L	*0.34*	*1.1*	33.8			*0.37*	*1.2*	36.3			*0.37*	*1.2*	36.4			*0.37*	*1.2*
Zinc	310000	23000	202	27.2		L	*0.69*	*3.4*	50.5			*0.74*	*3.7*	57.1			*0.74*	*3.7*	54.1			*0.74*	*3.7*

**Refer to legend immediately following this table for a list of table notes.

Table 2-4
Legend

12	J	Shading and black font indicate an industrial SL exceedance.
12	J	Bold outline indicates a residential SL exceedance.
12	**J**	Bold, underlined font indicates a background exceedance.
12	*12*	Shading in the MDL/MRL columns indicates the MDL exceeds a criterion.

SLs for non-Carcinogenic compounds have been recalculated to an HI of 0.1.
Inorganic results below background UTLs are not indicated as exceedances on the table.
SL = Screening Level (Source: ORNL Regional Screening Table, September 2008).
Lead screening values from Technical Review Workgroup for Lead: Guidance Document (USEPA, 1999b).
mg/kg = milligrams per kilogram (parts per million).
ng/kg = nanograms per kilogram (parts per trillion).
µg/kg = micrograms per kilogram (parts per billion).
NA = not applicable.
NT = analyte not tested.

Lab Q = Lab Data Qualifiers

* = Laboratory duplicate not within control limits.
B = (organics) Blank contamination. Value detected in sample and associated blank.
A (Dioxins) = B = (metals) Value <MRL and >MDL and is considered estimated.
E (metals) = Reported value is estimated because of the presence of interferences.
EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/PCDF ions was outside accepted ranges. The detected PCDD/PCDF was reported as an estimated maximum possible concentration (EMPC).
J = (organics) Value <MRL and >MDL and is considered estimated.
U = Analyte not-detected at the method reporting limit.
X = (dioxins) Ion abundance ratio outside acceptable range. Value reported is EMPC.

Val Q = Validation Data Qualifiers

B = blank contamination. Value detected in sample and associated blank.
J = estimated concentration.
K = estimated concentration bias high.
L = estimated concentration bias low.
N = presumptive evidence for tentatively identified compounds using a library search.
U = analyte not detected.
UJ = estimated concentration non-detect.
UL = estimated concentration non-detect bias low.

3.0 SOIL EXCAVATION

The first phase of the project was the collection of additional soil samples to further delineate the extent of contamination (*Section 2.0*) followed by the excavation and disposal of contaminated soil. During this time, Shaw mobilized the equipment and manpower required to begin the project. Photos depicting different aspects of the project are presented in **Appendix A**. Daily quality control reports are presented in **Appendix E**.

3.1 MOBILIZATION

Prior to intrusive activity at the site, a utility survey to identify underground service lines within or near the excavation area was performed and all lines were identified by Alliant TechSystems, Inc. (ATK). An Area Access Permit and a Hot Work Permit were issued by the ATK Safety Department for the duration of the project. Copies of the permits are presented in **Appendix F**. A job safety analysis was completed by the site safety officer, was reviewed with the crew, and all potential hazards were identified prior to commencement of work activities. Daily tailgate safety meetings were held and daily work plans discussed with the crew every morning before work began. Copies of the completed health and safety forms are presented in **Appendix F**.

3.2 EXCAVATION ACTIVITIES

Upon receipt of the final delineation sample results and the waste characterization results, disposal profiles were completed and approved, excavation and direct loading into dump trailers was ready to begin. The disposal profile and shipping manifests for the non-hazardous soil are presented in **Appendix C**, and the non-hazardous shipping log is presented in **Appendix D**.

Excavation and the loading of dump trailers was performed using a 20-Ton tracked excavator (trackhoe) and a front-end loader. No stockpiling of material was performed during the project; any excavated soils were shipped out the same day they were excavated. The non-hazardous waste disposal manifests are presented in **Appendix C-1**, and the certificates of disposal from the non-hazardous waste disposal facility are presented in **Appendix C-2**. The non-hazardous waste shipping log is presented in **Appendix D**.

Geotextile fabric was used to construct a temporary loading zone for the trucks to stage on while being loaded. The geotextile fabric extended from the truck to the edge of the excavation. The temporary loading zone was moved as the leading edge of the excavation moved forward.

The FLFA excavation began in the western portion of the site and progressed eastward. Following excavation, soil confirmation samples were analyzed for lead using an XRF. XRF confirmation samples were collected from the side walls and bottom of the excavation at a rate of one sample per 25 x 25 ft area. In addition, sidewall samples were collected at the outside edges of the floor excavation at a rate of one sample per 20 linear feet of sidewall. Areas which XRF sample results still contained concentrations above the RGs were excavated an additional foot in depth and additional confirmation samples were collected as necessary. Once the lead was delineated, selected samples (10% frequency) were analyzed for TAL metals, PCBs, and dioxin/furans (5% frequency) to ensure these COIs were removed to concentrations below RGs. Excavation continued until XRF and confirmation sample concentrations were below the RGs. The FLFA CMS (Shaw, 2008b) estimated that 166 CY of contaminated soil would be excavated to meet RGs. Upon completion of the project, a total of 702 tons or approximately 468 CY of contaminated soil was removed from the two ponds.

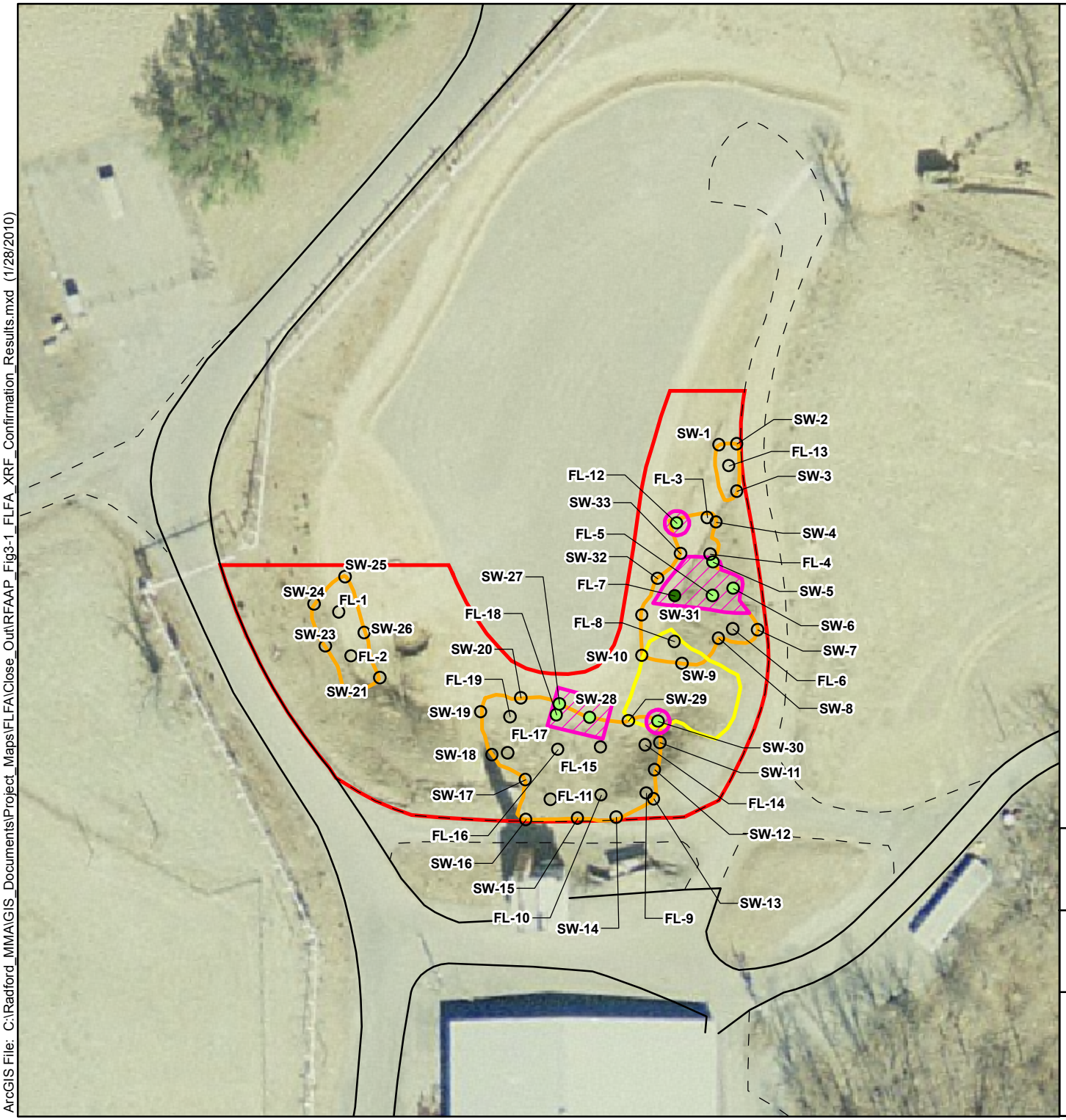
3.3 POST-EXCAVATION SAMPLES AND ANALYTICAL RESULTS

Post-excavation samples were collected at various locations as initial excavation activities were completed. Samples were collected from the floor and sidewalls of the excavation to confirm that soil with concentrations above the RGs had been removed. The analytical services for the sampling effort were provided using the National Environmental Laboratory Accreditation Conference (NELAC) accredited laboratory TestAmerica, Inc. located in West Sacramento, California. TestAmerica provided analytical support for the collected soil samples using *USEPA SW-846, Third Edition, Test Methods for Evaluating Solid Waste, Update IIIB* (USEPA, 2004). Results were requested on a 24-hour turnaround time to keep the project moving forward quickly. Completed chain-of-custody forms for the shipments of samples to the laboratory are presented in **Appendix B-4**.

Data obtained from the laboratory were reviewed by the Shaw Project Chemist to determine whether the project-specific data quality objectives, as defined in the associated work plans and sampling and analysis plans, were met. The laboratory analytical data is presented in **Appendix B-1**. The data validation criteria is based on a combination of project specific Work Plan/Quality Assurance Project Plan criteria, method-specific criteria, *Department of Defense Quality Systems Manual Final Version 3* (DoD, 2006), and the subcontract laboratory standard operating procedures. The data qualifier scheme was consistent with USEPA Region III guidance.

All data packages were validated to ensure compliance with specified analytical, quality assurance/quality control requirements, data reduction procedures, data reporting requirements, and required accuracy, precision, and completeness criteria. Results were assessed for accuracy and precision of laboratory analysis to determine the limitations and quality of the data. The quality of the data collected in support of the sampling activity was considered acceptable, unless qualified rejected "R" during the validation process. Samples qualified "J", "L", or "UL" were considered acceptable as estimated with noted definitions. No sample data points were determined to be rejected "R." Out of criteria lab control samples or calibration standards resulted in some data to be qualified estimated; however, did not impact the usability of the data to make informed conclusions in this report. Qualified data for where the matrix spike and spike duplicates, serial dilutions, and field duplicates exceeded criteria were most likely due to sample matrix or inhomogeneity effects with the given analytical methodology; however, the data was determined useable as estimated and did not impact the conclusions of this report. The data validation reports are presented in **Appendix B-2**.

Sample results for the XRF confirmation samples and associated laboratory confirmation sample results are presented in **Table 3-1**. The final XRF confirmation sample locations are presented on **Figure 3-1**. As illustrated on **Figure 3-1**, all remaining soil concentrations were below RGs at the final excavation depth. XRF field logs are presented in **Appendix B-3**. **Figure 3-2** and **Table 3-2** present the final laboratory confirmation samples after soil removal was complete. As a result of the soil excavation at FLFA, residential use was achieved in accordance with the approved RFI/CMS.



LEGEND

- XRF Conf Sample Location Result < 400 ppm

Final XRF Confirmation Sample Location Result < 400 ppm

- 1-2 ft
- 2-3 ft
- Dirt Road
- Paved Road
- 1998 RFI Excavation Boundary
- 2009 Excavation Boundary
- Areas Sampled Deeper than 1 ft bgs
- Former Lead Furnace Area Boundary

Notes:
1) Aerial photo, dated 2005, was obtained from Montgomery County, VA Planning & GIS Services.
2) Samples were collected in July 2009.

N

Scale:

0 37.5 75 150 Feet

U.S. Army Corps of Engineers

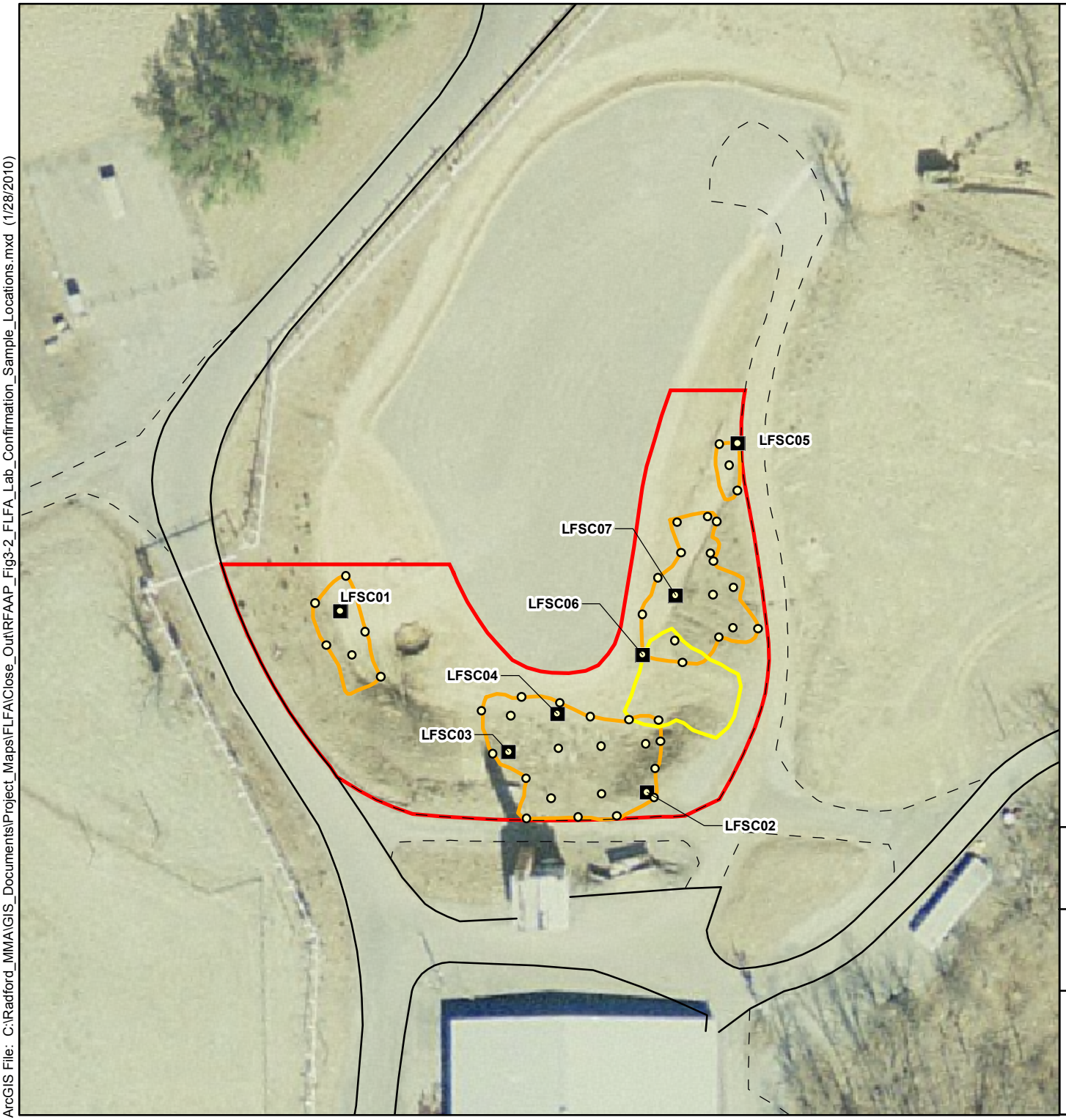
Shaw® Shaw Environmental, Inc.

FIGURE 3-1

Former Lead Furnace Area
XRF Confirmation Results

Radford Army Ammunition Plant,
Radford, VA

ArcGIS File: C:\Radford_MMA\GIS_Documents\Project_Maps\FLFA\Close_Out\RFAAP_Fig3-1_FLFA_XRF_Confirmation_Results.mxd (1/28/2010)



LEGEND

- Soil XRF Confirmation Sample Location
- Soil Lab Confirmation Sample Location
- Dirt Road
- Paved Road
- 1998 RFI Excavation Boundary
- 2009 Excavation Boundary
- Former Lead Furnace Area Boundary

Notes:
1) Aerial photo, dated 2005, was obtained from Montgomery County, VA Planning & GIS Services.
2) Samples were collected in July 2009.

N

Scale:

0 37.5 75 150 Feet

U.S. Army Corps of Engineers

Shaw® Shaw Environmental, Inc.

FIGURE 3-2

Former Lead Furnace Area
Lab Confirmation Sample Locations

Radford Army Ammunition Plant,
Radford, VA

ArcGIS File: C:\Radford_MMA\GIS_Documents\Project_Maps\FLFA\Close_Out\RFAAP_Fig3-2_FLFA_Lab_Confirmation_Sample_Locations.mxd (1/28/2010)

Table 3-1
XRF Soil Confirmation Sample Results – FLFA Interim Measures

XRF ID	Date	Depth	Pb Conc.	As Conc.	Conf ID	Pb Conc.	As Conc.
FL-1	7/27/2009	0-1	6.80	4.63	LFSC01	25.4	5.3
FL-2	7/27/2009	0-1	7.44	5.19			
FL-3	7/27/2009	0-1	18.13	5.57			
FL-4	7/27/2009	0-1	9.04	4.96			
FL-5	7/28/2009	1-2	24.98	6.69			
FL-6	7/27/2009	0-1	185.57	14.72			
FL-7	7/28/2009	2-3	9.27	5.92	LFSC07	16.7	6.7
FL-8	7/27/2009	0-1	122.29	11.37			
FL-9	7/27/2009	0-1	45.59	9.77	LFSC02	62.5	7
FL-10	7/27/2009	0-1	6.28	4.44			
FL-11	7/27/2009	0-1	7.70	5.38			
FL-12	7/27/2009	1-2	45.31	3.02			
FL-13	7/27/2009	0-1	19.25	6.85			
FL-14	7/28/2009	0-1	16.33	5.63			
FL-15	7/28/2009	0-1	20.83	6.02			
FL-16	7/28/2009	0-1	33.70	7.51			
FL-17	7/28/2009	0-1	53.87	7.69	LFSC03	27.7	5.5
FL-18	7/28/2009	1-2	9.06	6.47	LFSC04	20	5.9
FL-19	7/28/2009	0-1	88.25	9.78			
SW-1	7/27/2009	0-1	42.94	6.71			
SW-2	7/27/2009	0-1	37.22	6.72	LFSC05	23.8	5.6
SW-3	7/27/2009	0-1	28.55	6.71			
SW-4	7/27/2009	0-1	11.99	6.19			
SW-5	7/28/2009	1-2	20.99	6.52			
SW-6	7/28/2009	1-2	56.23	8.82			
SW-7	7/27/2009	0-1	88.98	9.08			
SW-8	7/27/2009	0-1	205.73	12.14			
SW-9	7/27/2009	0-1	27.87	6.41			
SW-10	7/27/2009	0-1	21.56	7.74	LFSC06	21.3	5.8
SW-11	7/27/2009	0-1	7.56	6.29			
SW-12	7/27/2009	0-1	211.04	12.07			
SW-13	7/27/2009	0-1	6.27	5.11			
SW-14	7/27/2009	0-1	49.44	8.23			
SW-15	7/27/2009	0-1	64.75	7.78			
SW-16	7/27/2009	0-1	142.87	12.55			
SW-17	7/27/2009	0-1	15.74	6.10			
SW-18	7/27/2009	0-1	68.67	8.87			
SW-19	7/27/2009	0-1	17.39	6.20			
SW-20	7/27/2009	0-1	27.83	6.89			
SW-21	7/27/2009	0-1	41.51	7.62			
SW-23	7/27/2009	0-1	10.81	5.50			
SW-24	7/27/2009	0-1	18.14	5.71			
SW-25	7/27/2009	0-1	7.44	5.16			
SW-26	7/27/2009	0-1	7.75	4.80			
SW-27	7/28/2009	1-2	10.08	5.01			
SW-28	7/28/2009	1-2	10.39	7.14			
SW-29	7/28/2009	0-1	139.55	11.68			
SW-30	7/28/2009	1-2	20.62	7.41			
SW-31	7/28/2009	0-1	28.15	10.58			
SW-32	7/28/2009	0-1	10.32	7.00			
SW-33	7/28/2009	0-1	41.10	8.13			

All concentrations in mg/kg

Table 3-2
Laboratory Soil Confirmation Sample Results – FLFA Interim Measures

Analyte	Sample ID			LFSC01				LFSC02				LFSC03				LFSC04			
	Sample Date			7/27/09				7/27/09				7/28/09				7/28/09			
	Sample Depth			0-1				0-1				0-1				1-2			
	i-RG	**r-RG**	**Background**	Result	Lab Q	MDL	MRL	Result	Lab Q	MDL	MRL	Result	Lab Q	MDL	MRL	Result	Lab Q	MDL	MRL
PCBs (mg/kg)																			
PCB-1254	25	1	na	0.04	U	*0.01*	*0.04*	0.042	U	*0.011*	*0.042*	0.042	U	*0.011*	*0.042*	0.04	U	*0.01*	*0.04*
Metals (mg/kg)																			
Arsenic	18	18	15.8	5.3		*1.6*	*2.5*	7		*1.7*	*2.7*	5.5		*1.7*	*2.7*	5.9		*1.6*	*2.6*
Copper	2890	2890	53.5	18.4		*0.6*	*3*	33.3		*0.64*	*3.2*	38.7		*0.64*	*3.2*	20.9		*0.61*	*3.1*
Lead	400	400	26.8	25.4		*0.4*	*2.4*	**62.5**		*0.42*	*2.6*	**27.7**		*0.43*	*2.6*	20		*0.4*	*2.5*
Dioxins/Furans (ng/kg)																			
TCDD TE	1,000	1,000	na	NT				6.414				NT				1.349			

Analyte	Sample ID			LFSC05				LFSC06				LFSC07			
	Sample Date			7/27/09				7/27/09				7/28/09			
	Sample Depth			0-1				0-1				2-3			
	i-RG	**r-RG**	**Background**	Result	Lab Q	MDL	MRL	Result	Lab Q	MDL	MRL	Result	Lab Q	MDL	MRL
PCBs (mg/kg)															
PCB-1254	25	1	na	0.016	J	*0.011*	*0.042*	0.021	J	*0.01*	*0.04*	0.039	U	*0.0098*	*0.039*
Metals (mg/kg)															
Arsenic	18	18	15.8	5.6		*1.7*	*2.7*	5.8		*1.6*	*2.5*	6.7		*1.6*	*2.5*
Copper	2890	2890	53.5	34.2		*0.64*	*3.2*	21.4		*0.61*	*3*	12.8		*0.6*	*3*
Lead	400	400	26.8	23.8		*0.42*	*2.6*	21.3		*0.4*	*2.4*	16.7		*0.4*	*2.4*
Dioxins/Furans (ng/kg)															
TCDD TE	1,000	1,000	na	NT				1.195				NT			

Table 3-2
Legend

12 **J** Bold, underlined font indicates a background exceedance.

i-RG = industrial remedial goal
r-RG = residential remedial goal
mg/kg = milligrams per kilogram (parts per million).
ng/kg = nanograms per kilogram (parts per trillion).
µg/kg = micrograms per kilogram (parts per billion).
NA = not applicable.
NT = analyte not tested.

Lab Q = Lab Data Qualifiers

* = Laboratory duplicate not within control limits.
B = (organics) Blank contamination. Value detected in sample and associated blank.
A (Dioxins) = B = (metals) Value <MRL and >MDL and is considered estimated.
E (metals) = Reported value is estimated because of the presence of interferences.
EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/PCDF ions was outside accepted ranges. The detected PCDD/PCDF was reported as an estimated maximum possible concentration (EMPC).
J = (organics) Value <MRL and >MDL and is considered estimated.
U = Analyte not-detected at the method reporting limit.
X = (dioxins) Ion abundance ratio outside acceptable range. Value reported is EMPC.

4.0 SITE RESTORATION AND DEMOBILIZATION

This stage of the project commenced after the completion of the excavation and the receipt of all analytical samples collected to confirm that the remaining soil concentrations were below their associated RGs. This task included the backfill, topsoil and hydro-seeding of the excavation area and associated disturbed areas.

4.1 EXCAVATION FINAL GRADING

Following the completion of remedial actions, the excavated areas of FLFA were graded into the existing slopes. After completion of the grading, an additional 69 loads or 690 CY of topsoil were hauled into the site in 10 CY loads by JWB Contractors. The topsoil was placed over the graded areas in a 1-ft lift and spread and graded using a John Deere 650 wide-track bulldozer. Final grading was performed so that the excavated areas were brought up to pre-excavation grades so that the surface water runoff followed original runoff patterns.

4.2 HYDRO-SEEDING

After the backfill of the excavation and placement of topsoil was complete, Shaw subcontracted with a local, small business (Gregory Seeding of Pulaski, Virginia) to hydro-seed and mulch the entire area, which was disturbed during site activities. Hydro-seeding is a process in which grass seed, fertilizer, and mulch are applied suspended in a liquefied slurry and is typically sprayed onto the ground surface. Hydro-seeding at the FLFA project site was performed on September 11, 2009, and was finished on the same day. Hydro-seeding activities are depicted in the photo log presented in **Appendix A**.

4.3 POST-COMPLETION INSPECTION

An inspection was performed at the site on December 14, 2009, approximately 90 days after completion of the site restoration activities. The purpose of the inspection was to ensure that grass was growing and that the excavated areas were not eroding. Observations from the inspection indicated that there were no eroded areas present and that the grass was growing well.

4.4 CONCLUSIONS

Based on the work performed at the FLFA, the site is now suitable for unrestricted use.

5.0 REFERENCES

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