UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

May 6, 2009

EMAIL & US MAIL

4SD-FFB

Lisa Holstein
BRAC Environmental Coordinator
U.S. Army Transition Force, Fort McClellan
P.O. Box 5022
Anniston, AL 36205-5000

SUBJ: Draft Interim Removal Action Work Plan; Range 20, Infiltration Course, Parcel 76Q-X; Soil Remediation on U.S. Fish and Wildlife Services Property; Fort McClellan, Alabama

Dear Ms. Holstein:

The Environmental Protection Agency (EPA) has reviewed the subject document and agrees with it as written. Therefore, EPA approves the subject document. If you have any questions, please call me at (404) 562-8549.

Sincerely,

Doyle T. Brittain
Senior Remedial Project Manager

cc: Michael Kelly, US Army AEC
Brandi Little, ADEM
Lee Coker, USA/COE
Steve Moran, Shaw Environmental
Daniel Copeland, CEHNC-OE-DC
Miki Schneider, JPA
Pete Tuttle, USF&WS

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Shaw™ Shaw Environmental, Inc.

July 9, 2009

SHAW-MC-CK11- 0442
Project No. 800486

Mr. Lee Coker
U.S. Army Corps of Engineers, Mobile District
Attn: EN-GE/Lee Coker
109 St. Joseph Street
Mobile, Alabama 36602

Contract: **DACA21-96-D-0018, Task Order CK11**
Fort McClellan, Alabama

Subject: **Final Interim Removal Action Work Plan for Range 20 Soil Remediation on U.S. Fish and Wildlife Service (USFWS) Property**

Dear Mr. Coker:

The subject document is enclosed in both hardcopy and PDF format for your records. Both ADEM and EPA previously approved the draft work plan as documented in the attached letters. Minor comments received from the Army Transition Force have been incorporated into this final document.

At your request, I have distributed copies of this document according to the attached distribution list. If you have questions, or need further information, please contact me at (865) 694-7361.

Sincerely,

Stephen G Moran

Stephen G. Moran, P.G.
Project Manager

Enclosure

Distribution: Lisa Holstein, Army TF (4 hardcopies; 2 CDs)
Brandi Little, ADEM (2 hardcopies; 2 CDs)
Doyle Brittain, EPA Region 4 (1 hardcopy; 1 CD)
Richard Henry, USFWS (1 hardcopy; 1 CD)
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Michelle Beekman, Matrix Environmental (1 hardcopy; 1 CD)

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June 26, 2009

Mr. Scott Bolton
Site Manager
US Army Transition Force
P.O. Box 5022
Fort McClellan, Alabama 36205

RE: ADEM Review and Concurrence: Draft *Interim Removal Action Work Plan: Range 20 Soil Remediation on USFWS Property,* dated April 2009
Fort McClellan, Calhoun County, Alabama
Facility I.D. No. AL4 210 020 562

Dear Mr. Bolton:

The Alabama Department of Environmental Management (ADEM or the Department) has reviewed Fort McClellan's Draft *Interim Removal Action Work Plan: Range 20 Soil Remediation on USFWS* (U.S. Fish and Wildlife Service) *Property,* dated April 2009. In summary, the work plan explains how the Army will refine lead-contaminated soil removal areas using x-ray fluorescence (XRF) field screening. The Army will remove soil having lead concentrations above the cleanup goal of 500 milligrams/kilogram. Soil that is removed will be stabilized using Portland cement, and then will be transported and disposed in an appropriately permitted off-site disposal facility. The Department concurs with the proposed work plan.

Please note that the Department has recently promulgated regulations, effective May 26, 2009, to establish minimum requirements governing environmental covenants pursuant to the Alabama Uniform Environmental Covenants Act (UECA), Code of Alabama 1975, §§ 35-19-1 to 35-19-14. ADEM Admin. Code r. 335-5 is located on the ADEM website and applies to all sites that are not remediated to unrestricted use. Therefore, it is required that a covenant request, including appropriate information, be submitted along with the land use control implementation plan (LUCIP) prior to approval of the final remedy.

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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May 6, 2009

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4SD-FFB

Lisa Holstein
BRAC Environmental Coordinator
U.S. Army Transition Force, Fort McClellan
P.O. Box 5022
Anniston, AL 36205-5000

SUBJ: Draft Interim Removal Action Work Plan; Range 20, Infiltration Course, Parcel 76Q-X; Soil Remediation on U.S. Fish and Wildlife Services Property; Fort McClellan, Alabama

Dear Ms. Holstein:

The Environmental Protection Agency (EPA) has reviewed the subject document and agrees with it as written. Therefore, EPA approves the subject document. If you have any questions, please call me at (404) 562-8549.

Sincerely,

Doyle T. Brittain
Senior Remedial Project Manager

cc: Michael Kelly, US Army AEC
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Miki Schneider, JPA
Pete Tuttle, USF&WS

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BOB RILEY
GOVERNOR

August 6, 2009

Mr. Scott Bolton
Site Manager
US Army Transition Force
P.O. Box 5022
Fort McClellan, Alabama 36205

RE: **Acknowledge Receipt and Concurrence**
Submittal of *Final Interim Removal Action Work Plan: Range 20 Soil Remediation on USFWS Property,* dated July 9, 2009
McClellan, Calhoun County, Alabama
Facility I.D. No. AL4 210 020 562

Dear Mr. Bolton:

The Alabama Department of Environmental Management (ADEM or the Department) received the *Final Interim Removal Action Work Plan: Range 20 Soil Remediation on USFWS Property* on July 13, 2009. The Department issued a concurrence letter for the *Draft Work Plan* on June 26, 2009. No modifications were requested or made; therefore, the Department concurs with the *Final Work Plan.*

If you have any questions concerning this matter, please contact Mrs. Ashley T. Mastin of the Remediation Engineering Section at 334-271-7797 or via email at atmastin@adem.state.al.us.

Sincerely,

Stephen A. Cobb, Chief
Governmental Hazardous Waste Branch
Land Division

SAC/TPS/ATM/mal

Cc: Mr. Lee Coker/USACE, Mobile District
Mr. Robin Scott/MDA
Ms. Lisa Holstein/Army
Mr. Doyle Brittain/EPA Region 4
Ms. Tracy P. Strickland/ADEM
Ms. Brandi Little/ADEM

Final

Interim Removal Action Work Plan
Range 20, Infiltration Course Parcel 76Q-X
Soil Remediation on U.S. Fish and Wildlife Service Property

Prepared for:

U.S. Army Corps of Engineers, Mobile District
109 St. Joseph Street
Mobile, Alabama 36602

Prepared by:

Shaw Environmental, Inc.
312 Directors Drive
Knoxville, Tennessee 37923

Task Order CK11
Contract No. DACA21-96-D-0018
Shaw Project No. 800486

July 2009

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1.0 Project Description

1.1 Introduction

Shaw Environmental, Inc. (Shaw) will conduct an interim removal action of metals-contaminated soil on those portions of Range 20 (part of the Baby Bains Gap Road [BBGR] Ranges) that lie on U.S Fish and Wildlife Service (USFWS) property at Fort McClellan (FTMC), Alabama. The areas targeted for remediation include the main impact area for Range 20 as well as other smaller areas of lead contamination on USFWS property that were identified during the remedial investigation (RI) for the BBGR Ranges. Figure 1-1 shows the location of Range 20 at the former FTMC. The USFWS property boundary is shown on Figure 1-2. The overall objective of the removal action is to excavate all soil from Range 20 with lead concentrations above the cleanup goal of 500 milligrams per kilogram (mg/kg). As shown on Figure 1-2, the RI study area for Range 20 consists of approximately 33.4 acres and includes the M-60 impact zone area (1.7 acres). The range safety fan for Range 20 extends to the southeast, covering an area of approximately 1,613 acres. For this removal action the main area of concern is the M-60 impact area. The total area to be remediated is approximately 1.823 acres and falls within the USFWS property. The work will be performed by Shaw in accordance with the provisions of Prime Contract DACA21-96-D-0018 with the U.S. Army Corps of Engineers (USACE)-Mobile District.

1.2 Scope and Objective

The overall objective of this interim removal action is to excavate and perform onsite stabilization of metals-contaminated soil at areas within Range 20 including the impact area located on USFWS property. Lead is the primary contaminant of concern and the cleanup will be based on a lead cleanup value of 500 mg/kg based on protection of ecological receptors. The lead-contaminated areas identified in the RI will be confirmed or refined using x-ray fluorescence (XRF) field screening. The initial excavation will remove the upper 1-foot of contaminated soil based on the delineation results. The excavation will extend horizontally in a given area until the entire impacted area has been removed. After excavation of the initial 1-foot of soil, a second round of XRF delineation sampling will be performed over the excavated area to determine whether all lead-contaminated soil was removed. This process will continue in an iterative manner until all lead-contaminated soil has been removed from Range 20. XRF Sampling data will be used to delineate the excavation boundary. Approximately 14 samples will be sent for off-site confirmation analysis for lead during this phase of work.

Based on existing data and conservatively assuming that up to 2 feet of soil will be removed in the contaminated areas above 500 mg/kg, it is estimated that approximately 5,882 cubic yards of lead-contaminated soil will be excavated during the project. The excavated soil will be loaded into dump trucks and moved to a centralized treatment area to be established within the fenced area at Range 20. The excavated soil will then be segregated into stockpiles of approximately 300-350 cubic yards each within the Range 20 fenced area in preparation for stabilization using Portland cement and then composite sampled for disposal. After stabilization, the material will be transported and disposed in an appropriately permitted off-site disposal facility. The excavated areas will be regraded and reseeded as necessary to prevent erosion.

The following tasks will be completed by Shaw or its subcontractors:

- Site surveying and XRF analysis
- Unexploded ordnance (UXO) support
- Soil removal and stabilization
- Post-excavation soil sampling and analysis
- Waste characterization sampling and analysis
- Transportation and disposal of treated soil
- Site restoration
- Report preparation.

1.3 Purpose

The purpose of this removal action is to remove metals-contaminated soil at Range 20 (particularly the M-60 impact area) where lead concentrations exceed 500 mg/kg. The excavated soil will be stabilized on site with Portland cement to stabilize the metals and then composite sampled for disposal. Treated material will be transported and disposed of in an appropriately permitted landfill.

This site-specific removal action work plan will be used in conjunction with the site-specific safety and health plan (SSHP), the FTMC Installation-Wide Work Plan (IWWP, IT 2002a), and Installation-Wide Sampling and Analysis Plan (SAP) (IT, 2002b). The SSHP includes a site-specific munitions and explosives of concern (MEC) safety plan.

2.0 Site Description and History

Range 20, Parcel 76Q-X is one of several ranges that comprise the BBGR Ranges located in the central section of former FTMC Main Post (Figure 1-1).

Most ranges including Range 20 have been divided into two main areas: the study area and the safety fan. The study area includes the range firing lines(s), target line(s), and impact zone(s). Study areas were originally defined based on the historical range use and topography. However, the study areas were revised based on the results of the investigation activities; contaminated areas were added and uncontaminated areas were removed. The safety fan is the downrange area where personnel were not allowed when training was in progress. Safety fan limits were originally defined by the Army and are based on the ballistics of the weapons used at the range and on the range orientation.

The Archives Search Report (ASR) indicates that Range 20 is located within the World War I Artillery Impact Area and should be considered an area where unexploded ordnance may exist (USACE, 2001a). All ranges including Range 20 were investigated during an environmental baseline study (EBS) performed by Environmental Science and Engineering, Inc. (ESE) prior to base closure in 1999 and various site investigation and RI sampling events performed by Shaw. The ASR and the EBS summarize much of what is known about Range 20. Shaw's investigations are summarized in the draft RI report for the BBGR Ranges dated August 2004 (Shaw, 2004).

Range 20 is discussed in the EBS and included in the ASR. The study area (33.4 acres) extends over the entire range, including the M-60 impact zone area (1.7 acres). The range safety fan extends to the southeast, covering an area of approximately 1,613 acres (Figure 1-2). The EBS indicates that Range 20 began use in 1980. Weapons fired at this range included M-60 (.308 caliber) machine gun and M-60 with tracer. The EBS further reports that trinitrotoluene (TNT) and military explosive C4 were used in explosive pits for artillery impact simulation and may have been used in demolition training. The ASR states that the area near Range 20 was historically used as Old Range 27 (OA-35), which appeared on the 1958 FTMC range map as Close Combat 1 & 2. Old Range 27 included a safety fan that was similar to ranges where live-fire rifle and machine gun training was conducted. Old Range 27 was abandoned in 1967. The ASR also indicates that Range 20 was constructed within the WWI Artillery Impact Area (OA-29 and OA-39). Range 20 appears on Plates 6 and 7 in the ASR.

Aerial Photographs. Although the range history indicates Range 20 was constructed in 1980, the December 1982 aerial photograph and prior photographs do not show any development or activity in this area. Range 20 is evident on the February 1994 photograph and the March 1998 photograph (Figure 2-1). The M-60 machine gun impact area, a cleared area southeast of the range, is prominent in both photographs, as is the presence of 15 circular pits arranged in five staggered rows north of the semicircular access road.

The arrangement of the pits presents four separate paths leading northwest to the four machine gun firing positions to the east and west of a central range tower. FTMC Regulation 350-2 (FTMC, 1991) describes two machine gun positions instead of the four positions visible in aerial photographs. The M-60 guns were used to provide overhead fire while explosives were used in the pits to simulate artillery impacts during maneuvers. No additional machine gun impact zones are evident in either 1994 or 1998 photographs.

Range Features. The main area of soil removal is the M-60 impact zone, a cleared area located approximately 1,200 feet southeast of the firing points on the northwestern face of a hillside (Figure 1-2). Historical evidence indicates that the Range 20 orientation has always been to the southeast, towards the northwestern slope of the unnamed hill. The impact zone is visible from the former firing line points and is bare of trees and vegetation. Bullet channels and numerous bullets and bullet fragments were found in this area. No evidence of additional target areas for the M-60 was found during the investigation.

Personnel used the area between the M-60 impact zone and the firing point area for "infiltration maneuver training." This area is moderately to densely wooded. Abandoned vehicles, concrete pillboxes, and a mock cemetery that were used for maneuver training are found in this area. According to former FTMC range control personnel, no live ammunition was fired in the infiltration maneuver training area, only blanks. No indication of bullet impact was noted in this area during investigation activities.

Access to the Range 20 firing line area is provided by a short gravel driveway that connects the range to Bains Gap Road. Two tributaries of Ingram Creek cut across the Range 20 infiltration training area, draining runoff water west towards Ingram Creek. The overall elevation of Range 20 ranges from approximately 925 to 1,200 feet amsl. The lowest elevation is found near the tributaries, and the highest elevation is at the top of the hill east of the M-60 impact zone. Ground surface is relatively flat in the M-60 firing point and explosive pit area, with a 75-foot descent to the tributary in the infiltration training area and a steep 1,025-foot rise towards the impact zone hillside southeast of the M-60 firing points.

Prior to November 1999, the entire fenced area at Range 20 where the tower, machine gun firing points, and explosive pits were located was regraded, soil removed, and all of the structures were demolished. The soil removal was conducted by Calhoun County Highway Department personnel on September 2, 1999. Approximately 1,100 cubic yards of soil were removed, transported, and stockpiled at seven separate locations for later use. The stockpiled locations included six county highway department locations and one location within the Alabama Army National Guard Enclave at Fort McClellan. The Army requested that IT Corporation (now Shaw Environmental, Inc.) collect samples of the stockpiles to ensure that the soil did not contain potential site-related contaminants (i.e. lead and explosive compounds). The sample results showed that the soil was not contaminated. Currently, this area is being used by USACE-Huntsville for unexploded ordnance operations and has a 10-foot-high security fence around it; therefore, no sampling was conducted inside the firing point area.

Summary of Previous Investigations

EBS. An EBS was conducted by ESE to document current environmental conditions of all FTMC property (ESE, 1998). The objective of the study was to identify sites that, based on available information, had no history of contamination and complied with U.S. Department of Defense (DOD) guidance for fast-track cleanup at closing installations. The EBS also provided a baseline picture of FTMC properties by identifying and categorizing the properties by the following seven criteria:

1. Areas where no storage, release, or disposal of hazardous substances or petroleum products has occurred (including no migration of these substances from adjacent areas)

2. Areas where only release or disposal of petroleum products has occurred

3. Areas where release, disposal, and/or migration of hazardous substances has occurred, but at concentrations that do not require a removal or remedial response

4. Areas where release, disposal, and/or migration of hazardous substances has occurred, and all removal or remedial actions to protect human health and the environment have been taken

5. Areas where release, disposal, and/or migration of hazardous substances has occurred, and removal or remedial actions are underway, but all required remedial actions have not yet been taken

6. Areas where release, disposal, and/or migration of hazardous substances has occurred, but required actions have not yet been implemented

7. Areas that are not evaluated or require further evaluation.

For non-CERCLA environmental or safety issues, the parcel label includes the following components: a unique non-CERCLA issue number, the letter "Q" designating the parcel as a Community Environmental Response Facilitation Act (CERFA) Category 1 Qualified Parcel, and the code for the specific non-CERCLA issue(s) present (ESE, 1998). The non-CERCLA issue codes used are:

- A = Asbestos (in buildings)
- L = Lead-based paint (in buildings)
- P = Polychlorinated biphenyls
- R = Radon (in buildings)
- RD = Radionuclides/radiological issues
- X = UXO
- CWM = Chemical warfare material.

Range 20 was classified as a CERFA Category 1 Qualified parcel in the EBS. Category 1 parcels are areas where no storage, release, or disposal (including migration) has occurred; however, the parcels were qualified because chemicals of potential concern may be present as a result of historical range activities. Range 20 (Parcel 76Q-X) was assigned the "X" designation for potential UXO.

Remedial Investigation. In 2001 and 2002, Shaw conducted an RI at the BBGR Ranges (including Range 20) to determine the nature and extent of contamination. The primary contaminants were assumed to be mostly metals from the residual bullets and shot fragments present from historical weapons training activities. Many RI soil samples were analyzed for target analyte list (TAL) metals or only lead. Select samples were submitted for additional analyses to assess other potential contaminants of concern, including target compound list (TCL) volatile organic compounds (VOC), TCL semivolatile organic compounds (SVOC), nitroaromatic explosive compounds, chlorinated pesticides and organophosphorus pesticides, chlorinated herbicides, polychlorinated biphenyl (PCB) compounds, perchlorate, and cyanide. Additional analyses were requested for impact zone sample locations where high concentrations of lead were suspected and in range support areas where organic solvents may have been used for gun cleaning and maintenance. Groundwater samples were analyzed for TAL metals, VOCs, SVOCs, nitroaromatic explosive compounds, and perchlorate. Sediment and surface water

samples were analyzed for TAL metals, nitroaromatic explosive compounds, and perchlorate. Sediment samples were also analyzed for total organic carbon and grain size.

A total of 339 surface and depositional soil, 144 subsurface soil, 19 groundwater, and 12 surface water/sediment samples were collected and analyzed from the BBGR Ranges. In addition, screening was performed to further delineate the extent of metals contamination in surface soil and to evaluate potential contamination within the range safety fans. Of the total samples, 15 surface and depositional soil, 3 subsurface soil, and 3 surface water/sediment samples and 23 XRF screening samples were collected and analyzed from Range 20, as shown on Figure 2-2. The RI concluded that soil at Range 20 was contaminated with lead and other metals (e.g., antimony, copper) known to be constituents of small arms ammunition. Figure 2-3, modified from the BBGR RI report, shows the estimated extent of contaminated surface soil (0-1 foot bgs) at Range 20 based on a cleanup goal of 500 mg/kg.

3.0 Soil Remediation Activities

3.1 Mobilization/Demobilization

Shaw will mobilize all necessary personnel and equipment to support the removal action field activities. Heavy equipment requirements include two Caterpillar (CAT) 320 excavators, two CAT 950E loaders, two off-road dump trucks, a CAT D6 dozer, a water truck for dust suppression, a large-capacity storage box, and the soil stabilization equipment. Shaw field personnel will include a site superintendent, an XRF analyst/sample coordinator, two heavy equipment operators, two MEC technicians, and two field technicians.

Equipment will be rented from local vendors to minimize mobilization costs. Support equipment requirements include a field-portable XRF analyzer, heath and safety equipment (e.g., air monitoring and personal protective equipment), sampling supplies and equipment, on-site transportation, crushed stone for road construction/improvement, Portland cement for soil stabilization, and hay bales and silt fencing for erosion control. Most equipment and material will be procured at the Shaw-FTMC field office through equipment vendors and scientific supply vendors and shipped directly to the site. Demobilization will primarily consist of disassembly, packing, and return of rented equipment to the supplier and travel for personnel back to the Shaw office in Knoxville, Tennessee.

Subcontracts will be issued for a licensed Alabama land surveyor, analytical laboratory, a waste transporter, and a waste disposal facility. Mobilization and demobilization to the site will be included.

3.2 UXO Support, Site Preparation and Road Construction

Shaw assumes that Range 20 will be cleared of MEC under a separate contract prior to beginning the soil removal action. However, as a conservative measure MEC construction support will be performed during all field activities. MEC located on or near the surface will be identified and conspicuously marked for easy avoidance. The MEC specialists will closely monitor the soil excavation activities to identify any potential MEC items that may be unearthed. Additionally, MEC technicians will assist with brush clearing and tree removal, establish the sampling grid and roads and ensure the safety of all field personnel. A site-specific MEC safety plan is included as an attachment to the SSHP in Appendix A. The site-specific MEC safety plan attachment has been written in conjunction with Appendix E of the SAP (IT, 2002a). UXO personnel requirements, procedures, and detailed descriptions of the geophysical equipment to be used are provided in Appendix E of the SAP (IT, 2002a).

The Shaw site manager will direct field personnel including brush clearing, tree removal and road construction / improvement operations, identifying and marking of the contaminated areas to be excavated using global positioning system (GPS) surveying, installation of construction fencing to control site access to the work areas; installation of silt fencing and hay bales to control surface water runoff during construction; establishment of a soil staging/stabilization area within the fenced area of Range 20; and the construction and/or improvement of site access roads for hauling.

3.3 Locating, Marking, and Surveying of Contaminated Areas

The areas of contamination will be located, marked, and surveyed to guide the field crew during excavation activities. As shown on Figure 3-1, sequentially numbered and marking points have been placed at approximately 25-foot intervals along the perimeter of the planned excavation areas. The horizontal coordinates (northings and eastings) for the marking points were then established using geographic information system data and summarized in a table on Figure 3-1. Using a subcontracted Alabama-licensed surveyor and the coordinates provided in the tables, Shaw will locate these points in the field and mark them with highly visible wooden stakes or pin flags to delineate the extent of the excavation area. Surveying methods will follow the procedures specified in the FTMC IWSAP.

3.4 Preconstruction and Clearing

Once the excavation limits are defined, the site can be further prepared by assessing the need for additional clearing, instituting site controls, determining how to minimize the impact of the soil removal on the existing surface water features (i.e., intermittent tributary streams to Ingram Creek), and control erosion and site runoff. During this stage, existing roads and firebreaks may be improved to facilitate truck access and loading (Figure 3-1).

3.4.1 Clearing and Tree Removal

Due to the MEC clearance to be performed under a separate contract, prior to the soil removal action Shaw anticipates the majority of vegetation and tree removal will be completed. However, the Shaw site manager will coordinate with the FWS to ensure compliance with forestry policies and procedures (i.e. placement of trees, maximum diameter of trees authorized for cutting and removal, endangered tree species, etc.). Trees will be cut with chainsaws and moved to areas outside the construction zone. Additionally, brush and\or tree removal may be necessary to access the haul roads and from the impact area to the soil treatment area to facilitate off-road dump truck access and loading. In areas of thick vegetation, a brush hog may be used to

remove vegetation from the excavation areas or improve existing roads for better sight and driving.

3.4.2 Site Control

Shaw will use construction fencing materials and barricade tape to delineate the site exclusion zone (EZ), contamination reduction zone, and site support zones in compliance with the SSHP (Appendix A). The soil removal will be conducted in a remote area that is gated and locked. Little opportunity for site trespassers exists, but several warning signs will be posted at conspicuous locations around the perimeter of the soil removal areas to discourage unauthorized entry.

3.4.3 Surface Water and Erosion Controls

The only suspected area where surface water may be encountered are the two tributaries of Ingram Creek that cut across the Range 20 infiltration training area (Figure 2-3). Once the soil removal areas are demarcated, the area will be assessed to determine how to conduct the soil removal while minimizing impacts to both tributaries. This may include redirecting the tributary streams around the haul road. Shaw will also ensure that site erosion controls such as silt fencing and/or staked hay bales are in place to prevent soil from the removal area migrating into streams or other peripheral areas.

3.4.4 Haul Road and Loading Area Construction

Shaw expects to construct and/or improve the existing roads around Range 20 to facilitate equipment access and loading in the area. Shaw plans to use the existing Range 20 access road as part of the haul road to the treatment area (Figure 3-1) and improve the existing dirt access roads. The excavator, loader, dump truck, bulldozer, and water truck (for dust suppression) may be used to construct the haul road. Up to 600 cubic yards of ¾-inch crushed stone may be required to complete this task.

3.5 Excavation of Contaminated Soil

Figure 3-1, modified from the BBGR RI report, show the estimated extent of contaminated soil at Range 20. Initial excavation limits will be set based on the results of the XRF survey. However, it is anticipated that approximately 1.823 acres of lead-contaminated soil exceeding 500 mg/kg will be excavated at Range 20. Soil will be excavated in a series of approximately 1-foot lifts using a CAT 320 excavator and loaded in dump trucks and delivered to a centralized treatment area at Range 20 (Figure 3-1). The excavation will extend horizontally in a given area until the entire area has been removed. Additional lifts will be removed from selected grids based on the post-excavation confirmation sampling results.

One excavator will be used initially at the impact area. The second excavator will be used to support the excavation and soil stabilization activities. The two loaders will be used at both locations and for loading the stabilized soil piles into dump trucks for transportation off-site.

Approximately 1.823 acres of soil with lead concentrations exceeding 500 mg/kg will be removed. Assuming these areas are correct following the XRF delineation survey, Shaw will excavate the top one foot of soil. This excavation will yield approximately 2,941 cy of material for treatment. However, based on the lead contour map presented in the BBGR RI report and conservatively assuming that up to 2 feet of soil will be removed in the contaminated areas above 500 mg/kg, it is estimated that 5,882 cubic yards of lead-contaminated soil will be excavated during the project. A minimum rate of production to support soil treatment is 485 tons per day. Assuming a production rate of 485 tons per day, a total of five weeks is anticipated to complete the excavation. This task will be performed concurrently with soil stabilization and transportation and disposal tasks.

3.5.1 XRF Field Screening Procedure

Shaw will use an Innov-X portable XRF (or equivalent) to perform the field screening analysis. The instrument will be operated in accordance with manufacture's instructions and following the applicable sections of the standard operating procedure included as Appendix B. Samples for XRF analysis will be randomly collected from the excavator bucket during the loading of soil into the off-road dump truck. It is anticipated that one XRF screening sample will be collected from every dump truck load (approximately 20 cubic yards) prior to transport to the stockpile area. The samples will be collected using a stainless-steel spoon or trowel and placed in a re-sealable plastic bag. The sample will be homogenized and rocks, sticks, and vegetative matter will be removed prior to analysis. Once homogenized, the soil will be directly analyzed in the plastic bag using the method described in Appendix B. Data from the analysis will be manually recorded and will be used to ensure the soil removed is in excess of 500 mg/kg. The initial excavation will remove the upper 1 foot of lead-contaminated soil based on the XRF delineation results. After excavation of the initial 1 foot of soil, a second round of XRF delineation sampling will be performed over the excavated area to determine whether all lead-contaminated soil was removed. Approximately 14 surface soil samples from the 1-foot excavation will be randomly selected and analyzed by an off-site laboratory to confirm the XRF screening results on a 24 hour TAT (Table 1). Waste characterization samples will be subsequently collected from all soil stockpiles for fixed-base laboratory analysis to facilitate off-site disposal (see Section 3.5.5).

3.5.2 Post-Excavation Confirmation Sampling

Confirmation samples will be collected from approximately 44 locations within the excavated areas to confirm that lead-contaminated soils have been removed to levels below 500 mg/kg (Table 1). The post-excavation confirmation samples will be 5-point composite samples collected from representative regions within the excavated areas at the discretion of the XRF operator in consultation with the Shaw site supervisor. The 5-point composite samples will consist of a center point with the four remaining sub-samples collected at approximately 15-foot intervals in the four cardinal directions around the center point. Each 5-point composite sample will be representative of an approximately 50-foot by 50-foot area of the excavation. If the area to be sampled is smaller than 50 feet by 50 feet, then the compositing scheme will be modified accordingly (i.e., the outer sub-samples may be moved closer to the center point) or a grab sample will be collected.

Sample Collection. Confirmation samples from the 1-foot and 2-foot-deep excavation areas will be collected with a stainless steel spoon and placed in a stainless-steel bowl. The soil will be thoroughly mixed (homogenized) and then placed in the appropriate sample containers per the FTMC SAP. In deeper exaction areas where health and safety concerns may preclude the sample technician from entering the excavation, the confirmation samples may be collected using a stainless-steel hand auger (with extensions) or with the assistance of the excavator bucket. If the excavator is used to retrieve soil from the bottom of the excavation, the sample technician will guide the excavator operator to the appropriate areas to be sampled and then collect the soil samples directly from the excavator bucket once the material has been brought to the surface.

The post-excavation confirmation samples will be analyzed for lead using EPA Method 6010B. As shown on Table 2, confirmation samples will be collected using routine quality assurance/quality control (QA/QC) sample frequencies (i.e. 10 percent field duplicates, 5 percent matrix spike/matrix spike duplicate). The off-site laboratory data will be reported directly to the Shaw site supervisor on a 24-hour turn-around time (TAT) to expedite the fieldwork. The post-excavation confirmation sample results will be compared to the remedial goal of 500 mg/kg to ensure that project goals have been achieved.

3.5.3 Stabilization Work Area

A soil stabilization work area (Figure 3-1) will be established within the fenced area at Range 20 and will be of sufficient size to hold several 325 cubic yards of stockpiles. The soil will be brought to the stabilization work area using dump trucks and placed in stockpiles. Each stockpile will contain approximately 325 cy (485 tons) of soil. The area will be surrounded by a 1-foot high earthen berm and/or hay bales to prevent runoff water and soil migration.

3.5.4 Soil Stabilization

This activity includes the stabilization of lead-contaminated soils using Portland cement to render the material non-hazardous for waste disposal purposes. The Shaw field crew will include a stabilization technician, equipment operators, and laborers. Heavy equipment will include an excavator and loader. This task will be conducted concurrently with the construction support and transportation and disposal tasks.

Each stockpile of soil will have Portland cement added. Portland cement will be purchased, delivered in pneumatic tankers, and stockpiled onsite as needed. An ash filter system will be used during its unloading and handling to control fugitive dust emissions. Based on a density of 60 pounds per cubic foot for the stockpiled Portland cement and a density of 1.5 tons per cubic yard for the stockpiled soil, 16 cubic yards (equivalent to 24 tons of Portland cement) will be added to every 325 cubic yards (485 tons) of stockpiled soil. The addition of the Portland cement will be monitored by the treatment technician on site. The soil and Portland cement will be mixed with an excavator as needed until homogenous. After treatment, the stabilized soil stockpile will be composite sampled and analyzed by U.S. Environmental Protection Agency (EPA) Methods 1311/6010B for Toxicity Characteristic Leaching Procedure (TCLP) metals on a 72-hour rush turnaround basis. Treated stockpiles will be covered with heavy-duty plastic sheeting to prevent erosion of the pile and migration of the material out of the area.

If the stabilization is successful and the stabilized soil meets the RCRA criteria for non-hazardous waste, it will be marked for transportation and disposal. If the soil stockpile fails to meet the standard, the stockpile will be retreated and resampled.

Assuming a rate of 485 tons per day, approximately five weeks will be required to complete the soil stabilization. One composite TCLP metals sample will be collected per 485 ton batch of soil treated. Soil quantity will be monitored using a loader bucket scale.

3.5.5 Waste Characterization Sampling

Composite soil samples will be collected from each of the treated soil stockpiles to characterize the material for off-site disposal. One multi-point composite sample will be collected from each of the anticipated 26 stockpiles (Table 1). These multi-point composite samples will be collected with a stainless-steel spoon from the sides and top of the soil stockpile, placed in a stainless-steel bowl, and homogenized. The samples will be transferred to the appropriate sample container(s) and analyzed for TCLP metals using SW-846 Methods 1311/6010B per the FTMC SAP. No additional QA/QC samples (other than the method-required batch QC) will be required. The

TCLP metals results will be reported directly to the Shaw site supervisor on a rush TAT to ensure the stockpiled soil can be loaded for off-site disposal in a timely manner.

Upon receipt of the analytical data, the waste characterization sample results will be compared to the regulatory levels for each of the eight RCRA-regulated metals. If the TCLP results are all less than the regulatory levels, then the stockpile will be considered non-hazardous waste and can be transported and disposed as non-hazardous special waste at a Subtitle D landfill. If TCLP results indicate that one or more metals exceeds its regulatory level, the stockpiles will be re-treated using the process described in Section 3.5.4 and re-sampled for waste characterization purposes. If the stockpile cannot be rendered non-hazardous using the stabilization process described herein, the material will be transported and disposed as hazardous waste at a permitted RCRA Subtitle C treatment, storage, and disposal facility (TSDF).

3.6 Transportation and Disposal of Stabilized Soil

This task includes the loading and transportation of stabilized soil to a permitted off-site disposal facility. It is expected that all excavated soil will be disposed as non-hazardous waste at a Subtitle D disposal facility. However, the actual disposal requirements will be based on the waste characterization results. Any soil that cannot be rendered non-hazardous using the stabilization process described herein will be disposed as hazardous waste at a permitted Subtitle C facility. The disposal of the material shall be in compliance with all applicable federal, state, and local regulations. No hazardous waste is anticipated to be generated during the soil removal activity.

Transportation services will be provided by a licensed waste hauler under subcontract to Shaw. The Shaw construction quality control (QC) officer or Shaw site supervisor will document the quantities of waste loaded onto each truck and facilitate the Bill of Lading documentation. Transportation will comply with all U.S. Department of Transportation regulations. Shaw will coordinate with the transporters so that the waste will be shipped to arrive on schedule at the landfill. Shaw will receive written approval from the landfill prior to shipping waste to their facility. This will include checking that the facility is in EPA compliance before shipping waste. The landfill will provide Shaw with a certificate of disposal for each load received and processed.

The Shaw construction QC manager or Shaw site supervisor will be on site to complete the documentation of the transportation and disposal of generated wastes onsite on a daily basis. The information will be transmitted to the USACE as required in their guidance and collected for inclusion into the final construction report.

Assuming most of the treated soil can be stockpiled in the soil stabilization area and a minimum transportation rate of 800 tons per day, approximately three weeks will be required to complete transportation and hauling. This task will be conducted during construction support, soil treatment, and site restoration tasks.

3.7 Site Restoration

Site restoration will begin only after the confirmatory sampling results from the offsite laboratory indicates the lead concentrations in the remaining site soils are less than 500 mg/kg. The downgradient side of excavation areas will be regarded so that storm water is not trapped within the area. Borrow material will not be hauled to the soil removal area. Existing site soils will be used as fill whenever possible.

The entire area impacted from the removal action may require hydroseeding. Shaw will subcontract hydroseeding activities to a local contractor.

3.8 Decontamination

Personnel decontamination areas will be established within the contamination reduction zone at Range 20 to provide them with a controlled transition from the EZ to the support zone. Personnel decontamination requirements are outlined in the SHP, Section 7.0.

Equipment decontamination may be required at the Range 20 excavation areas. Whenever possible, the excavator and/or loader will be stationed in the support zone and only the bucket used to remove soil from the EZ. The site superintendent will sequence the excavation as much as possible to work from outside the EZ across the areas excavated. This will facilitate decontamination on the excavator/loader bucket.

If needed, one temporary equipment decontamination pad will be constructed at Range 20. The pad will be constructed using heavy-duty plastic liner with a wooden barricade/framework to contain decontamination fluids. Lumber drilling mats and/or steel plates will be used to support the equipment while on the pad. Water for decontamination will be supplied by the water truck. Decontamination fluids will be filtered and tested for metals before disposing onsite as required in the FTMC investigation-derived waste plan. Decontamination solids will be added to the soil stockpile for treatment and disposal.

Heavy equipment decontamination can begin after the final area of excavation has passed confirmation analysis and site restoration activities are complete.

4.0 Project Management Plan

4.1 Technical Approach

Technical project management support and oversight will be provided from the Shaw office in Knoxville. Daily decisions concerning grid sampling, excavation, soil treatment will be made onsite in compliance with the general guidance of this construction work plan. Shaw will coordinate with its subcontractors and the USACE to ensure all of the technical requirements of this work plan are met.

4.2 Field Schedule

It is estimated that the fieldwork will take a total of 10 weeks to complete and includes mobilization/demobilization, procurement, site preparation and road construction, excavation and stabilization of contaminated soil, confirmation sampling and analysis, transportation and disposal (T & D) of excavated soil, and site restoration.

4.3 Personnel

Shaw will use a project manager supplemented by a QA officer and safety and health officer to oversee all operations compliance with this construction plan. In the field, a site superintendent will oversee all day-to-day operations and manage the field construction crew. He will be supported by the XRF analyst \ sample coordinator. The field crew will also include two heavy equipment operators, two laborers and two technicians. The field crew will be escorted by two UXO technicians for avoidance support.

4.4 Reporting

A construction report will be issued to summarize the field activities and present the documentation of the sampling and analysis, soil treatment, and disposal from this soil removal at Range 20. The report will be issued by Shaw in a draft and final form following final laboratory data validation, review and analysis.

5.0 References

Environmental Science and Engineering, Inc. (ESE), 1998, ***Final Environmental Baseline Survey***, Fort McClellan, Alabama, prepared for the U.S. Army Environmental Center, Aberdeen Proving Ground, Maryland, January.

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IT Corporation, 2002a, ***Draft Installation-Wide Work Plan, Fort McClellan, Calhoun County, Alabama***, Revision 2, February.

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Shaw Environmental, Inc. (Shaw), 2004, ***Draft Remedial Investigation Report, Baby Bains Gap Road Ranges***, Fort McClellan, Calhoun County, Alabama, August.

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ATTACHMENT 1

LIST OF ABBREVIATIONS AND ACRONYMS

List of Abbreviations and Acronyms

2-ADNT	2-amino-4,6-dinitrotoluene
4-ADNT	4-amino-2,6-dinitrotoluene
2,4-D	2,4-dichlorophenoxyacetic acid
2,4,5-T	2,4,5-trichlorophenoxyacetic acid
2,4,5-TP	2,4,5-trichlorophenoxypropionic acid
3D	3D International Environmental Group
AB	ambient blank
AbB3	Anniston gravelly clay loam, 2 to 6 percent slopes, severely eroded
AbC3	Anniston gravelly clay loam, 6 to 10 percent slopes, severely eroded
AbD3	Anniston and Allen gravelly clay loams, 10 to 15 percent slopes, eroded
ABLM	adult blood lead model
Abs	skin absorption
ABS	dermal absorption factor
AC	hydrogen cyanide
ACAD	AutoCadd
AcB2	Anniston and Allen gravelly loams, 2 to 6 percent slopes, eroded
AcC2	Anniston and Allen gravelly loams, 6 to 10 percent slopes, eroded
AcD2	Anniston and Allen gravelly loams, 10 to 15 percent slopes, eroded
AcE2	Anniston and Allen gravelly loams, 15 to 25 percent slopes, eroded
ACGIH	American Conference of Governmental Industrial Hygienists
ACM	asbestos-containing material
AdE	Anniston and Allen stony loam, 10 to 25 percent slope
ADEM	Alabama Department of Environmental Management
ADPH	Alabama Department of Public Health
AEC	U.S. Army Environmental Center
AEDA	ammunition, explosives, and other dangerous articles
AEL	airborne exposure limit
AET	adverse effect threshold; apparent effects threshold
AF	soil-to-skin adherence factor
AHA	ammunition holding area
AL	Alabama
ALARNG	Alabama Army National Guard
ALAD	δ-aminolevulinic acid dehydratase
ALDOT	Alabama Department of Transportation
amb.	amber
amsl	above mean sea level
ANAD	Anniston Army Depot
ANOVA	Analysis of Variance
AOC	area of concern
AOI	area of investigation
AP	armor piercing
APEC	areas of potential ecological concern
APT	armor-piercing tracer
AR	analysis request
ARAR	applicable or relevant and appropriate requirement
AREE	area requiring environmental evaluation
AS/SVE	air sparging/soil vapor extraction
ASP	Ammunition Supply Point
ASR	Archives Search Report
AST	aboveground storage tank
ASTM	American Society for Testing and Materials
AT	averaging time
atm-m^3/mol	atmospheres per cubic meter per mole
ATSDR	Agency for Toxic Substances and Disease Registry
ATV	all-terrain vehicle
AUF	area use factor
AWARE	Associated Water and Air Resources Engineers, Inc.
AWQC	ambient water quality criteria
AWWSB	Anniston Water Works and Sewer Board
'B'	Analyte detected in laboratory or field blank at concentration greater than the reporting limit (and greater than zero)
BAF	bioaccumulation factor
BBGR	Baby Bains Gap Road
BCF	blank correction factor; bioconcentration factor
BCT	BRAC Cleanup Team
BERA	baseline ecological risk assessment
BEHP	bis(2-ethylhexyl)phthalate
BFB	bromofluorobenzene
BFE	base flood elevation
BFM	bonded fiber matrix
BG	Bacillus globigii
BGR	Bains Gap Road
bgs	below ground surface
BHC	hexachlorocyclohexane
BHHRA	baseline human health risk assessment
BIRTC	Branch Immaterial Replacement Training Center
bkg	background
bls	below land surface
BOD	biological oxygen demand
Bp	soil-to-plant biotransfer factors
BRAC	Base Realignment and Closure
Braun	Braun Intertec Corporation
BSAF	biota-to-sediment accumulation factors
BSC	background screening criterion
BSV	background screening values
BTAG	Biological Technical Assistance Group
BTEX	benzene, toluene, ethyl benzene, and xylenes
BTOC	below top of casing
BTV	background threshold value
BW	biological warfare; body weight
BZ	breathing zone; 3-quinuclidinyl benzilate
C	ceiling limit value
Ca	carcinogen
$CaCO_3$	calcium carbonate
CAA	Clean Air Act
CAB	chemical warfare agent breakdown products
CACM	Chemical Agent Contaminated Media
CAIS	chemical agent identification set
CAMU	corrective action management unit
CBR	chemical, biological, and radiological
CCAL	continuing calibration
CCB	continuing calibration blank
CCV	continuing calibration verification
CD	compact disc
CDTF	Chemical Defense Training Facility
CEHNC	U.S. Army Engineering and Support Center, Huntsville
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERFA	Community Environmental Response Facilitation Act
CESAS	Corps of Engineers South Atlantic Savannah
CF	chloroform
CF	conversion factor
CFC	chlorofluorocarbon
CFDP	Center for Domestic Preparedness
CFR	Code of Federal Regulations
CG	phosgene (carbonyl chloride)
CGI	combustible gas indicator
ch	inorganic clays of high plasticity
CHPPM	U.S. Army Center for Health Promotion and Preventive Medicine
CIH	Certified Industrial Hygienist
CK	cyanogen chloride
cl	inorganic clays of low to medium plasticity
Cl	chlorinated
CLP	Contract Laboratory Program
cm	centimeter
CN	chloroacetophenone
CNB	chloroacetophenone, benzene, and carbon tetrachloride
CNS	chloroacetophenone, chloropicrin, and chloroform
CO	carbon monoxide
CO_2	carbon dioxide
Co-60	cobalt-60
CoA	Code of Alabama
COC	chain of custody; chemical of concern
COE	Corps of Engineers
Con	skin or eye contact
COPC	chemical of potential concern
COPEC	constituent of potential ecological concern
CPOM	coarse particulate organic matter
CPSS	chemicals present in site samples
CQCSM	Contract Quality Control System Manager
CRDL	contract-required detection limit
CRL	certified reporting limit
CRQL	contract-required quantitation limit
CRZ	contamination reduction zone
Cs-137	cesium-137

CS	ortho-chlorobenzylidene-malononitrile
CSEM	conceptual site exposure model
CSM	conceptual site model
CT	central tendency
CT	carbon tetrachloride
ctr.	container
CWA	chemical warfare agent; Clean Water Act
CWM	chemical warfare materiel; clear, wide mouth
CX	dichloroformoxime
'D'	duplicate; dilution
D&I	detection and identification
DA	Department of the Army
DAAMS	depot area agent monitoring station
DAF	dilution-attenuation factor
DANC	decontamination agent, non-corrosive
ºC	degrees Celsius
ºF	degrees Fahrenheit
DCA	dichloroethane
DCE	dichloroethene
DD	Defense Department
DDD	dichlorodiphenyldichloroethane
DDE	dichlorodiphenyldichloroethene
DDT	dichlorodiphenyltrichloroethane
DEH	Directorate of Engineering and Housing
DEHP	di(2-ethylhexyl)phthalate
DEP	depositional soil
DFTPP	decafluorotriphenylphosphine
DI	deionized
DID	data item description
DIMP	di-isopropylmethylphosphonate
DM	dry matter; adamsite
DMBA	dimethylbenz(a)anthracene
DMMP	dimethylmethylphosphonate
DNAPL	dense nonaqueous-phase liquid
DNT	dinitrotoluene
DO	dissolved oxygen
DOD	U.S. Department of Defense
DOJ	U.S. Department of Justice
DOT	U.S. Department of Transportation
DP	direct-push
DPDO	Defense Property Disposal Office
DPT	direct-push technology
DQO	data quality objective
DRMO	Defense Reutilization and Marketing Office
DRO	diesel range organics
DS	deep (subsurface) soil
DS2	Decontamination Solution Number 2
DSERTS	Defense Site Environmental Restoration Tracking System
DWEL	drinking water equivalent level
E&E	Ecology and Environment, Inc.
EB	equipment blank
EBC	Eastern Bypass Corridor
EBS	environmental baseline survey
EBV	EBV Explosives Environmental Co.
EC_{20}	effects concentration for 20 percent of a test population
EC_{50}	effects concentration for 50 percent of a test population
ECBC	Edgewood Chemical Biological Center
ED	exposure duration
EDD	electronic data deliverable
EF	exposure frequency
EDQL	ecological data quality level
EE/CA	engineering evaluation and cost analysis
Eh	oxidation-reduction potential
Elev.	elevation
EM	electromagnetic
EMI	Environmental Management Inc.
EM31	Geonics Limited EM31 Terrain Conductivity Meter
EM61	Geonics Limited EM61 High-Resolution Metal Detector
EOD	explosive ordnance disposal
EODT	explosive ordnance disposal team
EPA	U.S. Environmental Protection Agency
EPC	exposure point concentration
EPIC	Environmental Photographic Interpretation Center
EPRI	Electrical Power Research Institute
EPT	Ephemeroptera, Plecoptera, Trichoptera
ER	equipment rinsate
ERA	ecological risk assessment
ER-L	effects range-low
ER-M	effects range-medium
ESE	Environmental Science and Engineering, Inc.
ESL	ecological screening level
ESMP	Endangered Species Management Plan
ESN	Environmental Services Network, Inc.
ESV	ecological screening value
ET	exposure time
EU	exposure unit
Exp.	Explosives
EXTOXNET	Extension Toxicology Network
E-W	east to west
EZ	exclusion zone
FAR	Federal Acquisition Regulations
FB	field blank
FBI	Family Biotic Index
FD	field duplicate
FDC	Former Decontamination Complex
FDA	U.S. Food and Drug Administration
Fe^{+3}	ferric iron
Fe^{+2}	ferrous iron
FedEx	Federal Express, Inc.
FEMA	Federal Emergency Management Agency
FFCA	Federal Facilities Compliance Act
FFE	field flame expedient
FFS	focused feasibility study
FI	fraction of exposure
Fil	filtered
Flt	filtered
FMDC	Fort McClellan Development Commission
FML	flexible membrane liner
f_{oc}	fraction organic carbon
FOMRA	Former Ordnance Motor Repair Area
FOST	Finding of Suitability to Transfer
Foster Wheeler	Foster Wheeler Environmental Corporation
FR	Federal Register
Frtn	fraction
FS	field split; feasibility study; fuming sulfuric acid
FSP	field sampling plan
ft	feet
ft/day	feet per day
ft/ft	feet per foot
ft/yr	feet per year
FTA	Fire Training Area
FTMC	Fort McClellan
FTRRA	FTMC Reuse & Redevelopment Authority
g	gram
g/m^3	gram per cubic meter
G-856	Geometrics, Inc. G-856 magnetometer
G-858G	Geometrics, Inc. G-858G magnetic gradiometer
GAF	gastrointestinal absorption factor
gal	gallon
gal/min	gallons per minute
GB	sarin (isopropyl methylphosphonofluoridate)
gc	clay gravels; gravel-sand-clay mixtures
GC	gas chromatograph
GCL	geosynthetic clay liner
GC/MS	gas chromatograph/mass spectrometer
GCR	geosynthetic clay liner
GFAA	graphite furnace atomic absorption
GIS	Geographic Information System
gm	silty gravels; gravel-sand-silt mixtures
gp	poorly graded gravels; gravel-sand mixtures
gpm	gallons per minute
GPR	ground-penetrating radar
GPS	global positioning system
GRA	general response action

GS	ground scar
GSA	General Services Administration; Geologic Survey of Alabama
GSBP	Ground Scar Boiler Plant
GSSI	Geophysical Survey Systems, Inc.
GST	ground stain
GW	groundwater
gw	well-graded gravels; gravel-sand mixtures
H&S	health and safety
HA	hand auger
HC	mixture of hexachloroethane, aluminum powder, and zinc oxide (smoke producer)
HCl	hydrochloric acid
HD	distilled mustard (bis-[dichloroethyl]sulfide)
HDPE	high-density polyethylene
HE	high explosive
HEAST	Health Effects Assessment Summary Tables
Herb.	herbicides
HHRA	human health risk assessment
HI	hazard index
HN	hydrogen mustard
H_2O_2	hydrogen peroxide
HPLC	high-performance liquid chromatography
HNO_3	nitric acid
HQ	hazard quotient
HQ_{screen}	screening-level hazard quotient
hr	hour
HRC	hydrogen releasing compound
HSA	hollow-stem auger
HSDB	Hazardous Substance Data Bank
HTRW	hazardous, toxic, and radioactive waste
'I'	out of control, data rejected due to low recovery
IASPOW	Impact Area South of POW Training Facility
IATA	International Air Transport Authority
ICAL	initial calibration
ICB	initial calibration blank
ICP	inductively-coupled plasma
ICRP	International Commission on Radiological Protection
ICS	interference check sample
ID	inside diameter
IDL	instrument detection limit
IDLH	immediately dangerous to life or health
IDM	investigative-derived media
IDW	investigation-derived waste
IEUBK	Integrated Exposure Uptake Biokinetic
IF	ingestion factor; inhalation factor
ILCR	incremental lifetime cancer risk
IMPA	isopropylmethyl phosphonic acid
IMR	Iron Mountain Road
in.	inch
Ing	ingestion
Inh	inhalation
IP	ionization potential
IPS	International Pipe Standard
IR	ingestion rate
IRDMIS	Installation Restoration Data Management Information System
IRIS	Integrated Risk Information Service
IRP	Installation Restoration Program
IS	internal standard
ISCP	Installation Spill Contingency Plan
IT	IT Corporation
ITEMS	IT Environmental Management System™
ITRC	Interstate Trade and Regulatory Council
IWWP	installation-wide work plan
'J'	estimated concentration
JeB2	Jefferson gravelly fine sandy loam, 2 to 6 percent slopes, eroded
JeC2	Jefferson gravelly fine sandy loam, 6 to 10 percent slopes, eroded
JfB	Jefferson stony fine sandy loam, 0 to 10 percent slopes have strong slopes
JPA	Anniston-Calhoun County Fort McClellan Development Joint Powers Authority
K	conductivity
K_d	soil-water distribution coefficient
kg	kilogram
KeV	kilo electron volt
K_{oc}	organic carbon partioning coefficient
K_{ow}	octonal-water partition coefficient
$KMnO_4$	potassium permanganate
L	liter; Lewisite (dichloro-[2-chloroethyl]sulfide)
L/kg/day	liters per kilogram per day
l	liter
LAW	light anti-tank weapon
lb	pound
LBP	lead-based paint
LC	liquid chromatography
LCS	laboratory control sample
LC_{50}	lethal concentration for 50 percent population tested
LD_{50}	lethal dose for 50 percent population tested
LEL	lower explosive limit
LOAEL	lowest-observed-adverse-effects-level
LOEC	lowest-observable-effect-concentration
LRA	land redevelopment authority
LT	less than the certified reporting limit
LUC	land-use control
LUCAP	land-use control assurance plan
LUCER	land-use control effectiveness report
LUCIP	land-use control implementation plan
m	meter
m/yr	meters per year
max	maximum
MB	method blank
MCL	maximum contaminant level
MCLG	maximum contaminant level goal
MCPA	4-chloro-2-methylphenoxyacetic acid
MCPP	2-(2-methyl-4-chlorophenoxy)propionic acid
MCS	media cleanup standard
MD	matrix duplicate
MDA	Calhoun County McClellan Development Authority
MDC	maximum detected concentration
MDCC	maximum detected constituent concentration
MDL	method detection limit
MEC	munitions and explosives of concern
MeV	mega electron volt
mg	milligrams
mg/kg	milligrams per kilogram
mg/kg/day	milligram per kilogram per day
mg/kgbw/day	milligrams per kilogram of body weight per day
mg/L	milligrams per liter
mg/m^3	milligrams per cubic meter
mh	inorganic silts, micaceous or diatomaceous fine, sandy or silt soils
MHz	megahertz
µg/g	micrograms per gram
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
µmhos/cm	micromhos per centimeter
min	minimum
MINICAMS	miniature continuous air monitoring system
ml	inorganic silts and very fine sands
mL	milliliter
mm	millimeter
MM	mounded material
MMBtu/hr	million Btu per hour
MNA	monitored natural attenuation
MnO_4-	permanganate ion
MOA	Memorandum of Agreement
MOGAS	motor vehicle gasoline
MOUT	Military Operations in Urban Terrain
MP	Military Police
MPA	methyl phosphonic acid
MPC	maximum permissible concentration
MPM	most probable munition
MQL	method quantitation limit
MR	molasses residue
MRL	method reporting limit
MS	matrix spike
mS/cm	millisiemens per centimeter
mS/m	millisiemens per meter

MSD	matrix spike duplicate; minimum separation distance
MTBE	methyl tertiary butyl ether
msl	mean sea level
MtD3	Montevallo shaly, silty clay loam, 10 to 40 percent slopes , severely eroded
mV	millivolts
MW	monitoring well
MWI&MP	Monitoring Well Installation and Management Plan
Na	sodium
NA	not applicable; not available
NAD	North American Datum
NAD83	North American Datum of 1983
$NaMnO_4$	sodium permanganate
NAVD88	North American Vertical Datum of 1988
NAS	National Academy of Sciences
NCEA	National Center for Environmental Assessment
NCP	National Contingency Plan
NCRP	National Council on Radiation Protection and Measurements
ND	not detected
NE	no evidence; northeast
ne	not evaluated
NEW	net explosive weight
NFA	No Further Action
NG	National Guard
NGP	National Guardsperson
ng/L	nanograms per liter
NGVD	National Geodetic Vertical Datum
Ni	nickel
NIC	notice of intended change
NIOSH	National Institute for Occupational Safety and Health
NIST	National Institute of Standards and Technology
NLM	National Library of Medicine
NO_3^-	nitrate
NOEC	no-observable-effect-concentration
NPDES	National Pollutant Discharge Elimination System
NPW	net present worth
No.	number
NOAA	National Oceanic and Atmospheric Administration
NOAEL	no-observed-adverse-effects-level
NR	not requested; not recorded; no risk
NRC	National Research Council
NRCC	National Research Council of Canada
NRHP	National Register of Historic Places
NRT	near real time
ns	nanosecond
N-S	north to south
NS	not surveyed
NSA	New South Associates, Inc.
nT	nanotesla
nT/m	nanoteslas per meter
NTU	nephelometric turbidity unit
nv	not validated
O_2	oxygen
O_3	ozone
O&G	oil and grease
O&M	operation and maintenance
OB/OD	open burning/open detonation
OD	outside diameter
OE	ordnance and explosives
oh	organic clays of medium to high plasticity
OH•	hydroxyl radical
ol	organic silts and organic silty clays of low plasticity
OP	organophosphorus
ORC	Oxygen Releasing Compound
ORP	oxidation-reduction potential
OSHA	Occupational Safety and Health Administration
OSWER	Office of Solid Waste and Emergency Response
OVM-PID/FID	organic vapor meter-photoionization detector/flame ionization detector
OWS	oil/water separator
oz	ounce
PA	preliminary assessment
PAH	polynuclear aromatic hydrocarbon
PARCCS	precision, accuracy, representativeness, comparability, completeness, and sensitivity
Parsons	Parsons Engineering Science, Inc.
Pb	lead
PBMS	performance-based measurement system
PC	permeability coefficient
PCB	polychlorinated biphenyl
PCDD	polychlorinated dibenzo-p-dioxins
PCDF	polychlorinated dibenzofurans
PCE	perchloroethene
PCP	pentachlorophenol
PDS	Personnel Decontamination Station
PEF	particulate emission factor
PEL	permissible exposure limit
PERA	preliminary ecological risk assessment
PERC	perchloroethene
PES	potential explosive site
Pest.	pesticides
PETN	pentaerythritoltetranitrate
PFT	portable flamethrower
PG	professional geologist
PID	photoionization detector
PkA	Philo and Stendal soils local alluvium, 0 to 2 percent slopes
PM	project manager
POC	point of contact
POL	petroleum, oils, and lubricants
POTW	publicly owned treatment works
POW	prisoner of war
PP	peristaltic pump; Proposed Plan
ppb	parts per billion
ppbv	parts per billion by volume
PPE	personal protective equipment
ppm	parts per million
PPMP	Print Plant Motor Pool
ppt	parts per thousand
PR	potential risk
PRA	preliminary risk assessment
PRG	preliminary remediation goal
PS	chloropicrin
PSSC	potential site-specific chemical
pt	peat or other highly organic silts
PVC	polyvinyl chloride
QA	quality assurance
QA/QC	quality assurance/quality control
QAM	quality assurance manual
QAO	quality assurance officer
QAP	installation-wide quality assurance plan
QC	quality control
QST	QST Environmental, Inc.
qty	quantity
Qual	qualifier
QuickSilver	QuickSilver Analytics, Inc.
R	rejected data; resample; retardation factor
R^2	coefficient of determination
R&A	relevant and appropriate
RA	remedial action
RAO	remedial action objective
RBC	risk-based concentration; red blood cell
RBP	Rapid Bioassessment Protocol
RBRG	risk-based remedial goal
RCRA	Resource Conservation and Recovery Act
RCWM	Recovered Chemical Warfare Material
RD	remedial design
RDX	cyclotrimethylenetrinitramine
ReB3	Rarden silty clay loams
REG	regular field sample
REL	recommended exposure limit
RFA	request for analysis
RfC	reference concentration
RfD	reference dose
RGO	remedial goal option
RI	remedial investigation
RL	reporting limit

RME	reasonable maximum exposure
ROD	Record of Decision
RPD	relative percent difference
RR	range residue
RRF	relative response factor
RRSE	Relative Risk Site Evaluation
RSD	relative standard deviation
RTC	Recruiting Training Center
RTECS	Registry of Toxic Effects of Chemical Substances
RTK	real-time kinematic
RWIMR	Ranges West of Iron Mountain Road
SA	exposed skin surface area
SAD	South Atlantic Division
SAE	Society of Automotive Engineers
SAIC	Science Applications International Corporation
SAP	installation-wide sampling and analysis plan
SARA	Superfund Amendments and Reauthorization Act
sc	clayey sands; sand-clay mixtures
Sch.	schedule
SCM	site conceptual model
SD	sediment
SDG	sample delivery group
SDWA	Safe Drinking Water Act
SDZ	safe distance zone; surface danger zone
SEMS	Southern Environmental Management & Specialties, Inc.
SF	cancer slope factor
SFSP	site-specific field sampling plan
SGF	standard grade fuels
Shaw	Shaw Environmental, Inc.
SHP	installation-wide safety and health plan
SI	site investigation
SINA	Special Interest Natural Area
SL	standing liquid
SLERA	screening-level ecological risk assessment
sm	silty sands; sand-silt mixtures
SM	Serratia marcescens
SMDP	Scientific Management Decision Point
s/n	signal-to-noise ratio
SO_4^{-2}	sulfate
SOD	soil oxidant demand
SOP	standard operating procedure
SOPQAM	U.S. EPA's *Standard Operating Procedure/Quality Assurance Manual*
sp	poorly graded sands; gravelly sands
SP	submersible pump
SPCC	system performance calibration compound
SPCS	State Plane Coordinate System
SPM	sample planning module
SQRT	screening quick reference tables
Sr-90	strontium-90
SRA	streamlined human health risk assessment
SRI	supplemental remedial investigation
SRM	standard reference material
Ss	stony rough land, sandstone series
SS	surface soil
SSC	site-specific chemical
SSHO	site safety and health officer
SSHP	site-specific safety and health plan
SSL	soil screening level
SSSL	site-specific screening level
SSSSL	site-specific soil screening level
STB	supertropical bleach
STC	source-term concentration
STD	standard deviation
STEL	short-term exposure limit
STL	Severn-Trent Laboratories
STOLS	Surface Towed Ordnance Locator System®
Std. units	standard units
SU	standard unit
SUXOS	senior UXO supervisor
SVOC	semivolatile organic compound
SW	surface water
SW-846	U.S. EPA's *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods*
SWMU	solid waste management unit
SWPP	storm water pollution prevention plan
SZ	support zone
TAL	target analyte list
TAT	turn around time
TB	trip blank
TBC	to be considered
TCA	trichloroethane
TCDD	2,3,7,8-tetrachlorodibenzo-p-dioxin
TCDF	tetrachlorodibenzofurans
TCE	trichloroethene
TCL	target compound list
TCLP	toxicity characteristic leaching procedure
TDEC	Tennessee Department of Environment and Conservation
TDGCL	thiodiglycol
TDGCLA	thiodiglycol chloroacetic acid
TEA	triethylaluminum
TeCA	1,1,2,2-tetrachloroethane
Tetryl	trinitrophenylmethylnitramine
TERC	Total Environmental Restoration Contract
TEU	Technical Escort Unit
THI	target hazard index
TIC	tentatively identified compound
TLV	threshold limit value
TN	Tennessee
TNB	trinitrobenzene
TNT	trinitrotoluene
TOC	top of casing; total organic carbon
TPH	total petroleum hydrocarbons
TR	target cancer risk
TRADOC	U.S. Army Training and Doctrine Command
TRPH	total recoverable petroleum hydrocarbons
TRV	toxicity reference value
TSCA	Toxic Substances Control Act
TSDF	treatment, storage, and disposal facility
TSS	total suspended solids
TWA	time-weighted average
UCL	upper confidence limit
UCR	upper certified range
'U'	not detected above reporting limit
UIC	underground injection control
UF	uncertainty factor
URF	unit risk factor
USACE	U.S. Army Corps of Engineers
USACHPPM	U.S. Army Center for Health Promotion and Preventive Medicine
USAEC	U.S. Army Environmental Center
USAEHA	U.S. Army Environmental Hygiene Agency
USACMLS	U.S. Army Chemical School
USAMPS	U.S. Army Military Police School
USATCES	U.S. Army Technical Center for Explosive Safety
USATEU	U.S. Army Technical Escort Unit
USATHAMA	U.S. Army Toxic and Hazardous Material Agency
USC	United States Code
USCS	Unified Soil Classification System
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UST	underground storage tank
UTL	upper tolerance level; upper tolerance limit
UXO	unexploded ordnance
UXOQCS	UXO Quality Control Supervisor
UXOSO	UXO safety officer
V	vanadium
VC	vinyl chloride
VOA	volatile organic analyte
VOC	volatile organic compound
VOH	volatile organic hydrocarbon
VQlfr	validation qualifier
VQual	validation qualifier
VX	nerve agent (O-ethyl-S-[diisopropylaminoethyl]-methylphosphonothiolate)
WAC	Women's Army Corps

Weston	Roy F. Weston, Inc.
WP	white phosphorus
WRS	Wilcoxon rank sum
WS	watershed
WSA	Watershed Screening Assessment
WWI	World War I
WWII	World War II
XRF	x-ray fluorescence
yd^3	cubic yards
ZVI	zero-valent iron

TABLES

Table 1

Proposed Sample Designations and QA/QC Sample Quantities
Soil Removal Activities for Range 20, Parcel 76Q-X
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Designation	Sample Depth (ft bgs)	QA/QC Samples		Analytical Suite
			Field Duplicates	MS/MSD	
14 Surface Samples for XRF Confirmation					
HR-76Q-N_,W_	HR-76Q-N_,W_.SS-SN0001-REG	1.0			Lead by SW-846 6010B
HR-76Q-N_,W_	HR-76Q-N_,W_.SS-SN0002-REG	1.0			Lead by SW-846 6010B
HR-76Q-N_,W_	HR-76Q-N_,W_.SS-SN0003-REG	1.0			Lead by SW-846 6010B
HR-76Q-N_,W_	HR-76Q-N_,W_.SS-SN0004-REG	1.0			Lead by SW-846 6010B
HR-76Q-N_,W_	HR-76Q-N_,W_.SS-SN0005-REG	1.0			Lead by SW-846 6010B
HR-76Q-N_,W_	HR-76Q-N_,W_.SS-SN0006-REG	1.0			Lead by SW-846 6010B
HR-76Q-N_,W_	HR-76Q-N_,W_.SS-SN0007-REG	1.0			Lead by SW-846 6010B
HR-76Q-N_,W_	HR-76Q-N_,W_.SS-SN0008-REG	1.0			Lead by SW-846 6010B
HR-76Q-N_,W_	HR-76Q-N_,W_.SS-SN0009-REG	1.0			Lead by SW-846 6010B
HR-76Q-N_,W_	HR-76Q-N_,W_.SS-SN0010-REG	1.0			Lead by SW-846 6010B
HR-76Q-N_,W_	HR-76Q-N_,W_.SS-SN0011-REG	1.0			Lead by SW-846 6010B
HR-76Q-N_,W_	HR-76Q-N_,W_.SS-SN0012-REG	1.0			Lead by SW-846 6010B
HR-76Q-N_,W_	HR-76Q-N_,W_.SS-SN0013-REG	1.0			Lead by SW-846 6010B
HR-76Q-N_,W_	HR-76Q-N_,W_.SS-SN0014-REG	1.0	HR-76Q-N_,W_-SN0015-REG		Lead by SW-846 6010B
30 Composite Samples for Post-Excavation Confirmation					
HR-76Q-CONF1	HR-76Q-CONF1-CS-SN0016-REG	2.0			Lead by SW-846 6010B
HR-76Q-CONF2	HR-76Q-CONF2-CS-SN0017-REG	2.0			Lead by SW-846 6010B
HR-76Q-CONF3	HR-76Q-CONF3-CS-SN0018-REG	2.0	HR-76Q-CONFS3-CS-SN0019-FD		Lead by SW-846 6010B
HR-76Q-CONF4	HR-76Q-CONF4-CS-SN0020-REG	2.0			Lead by SW-846 6010B
HR-76Q-CONF5	HR-76Q-CONF5-CS-SN0021-REG	2.0			Lead by SW-846 6010B
HR-76Q-CONF6	HR-76Q-CONF6-CS-SN0022-REG	2.0	HR-76Q-CONF6-CS-SN0023-FD		Lead by SW-846 6010B
HR-76Q-CONF7	HR-76Q-CONF7-CS-SN0024-REG	2.0			Lead by SW-846 6010B
HR-76Q-CONF8	HR-76Q-CONF8-CS-SN0025-REG	2.0			Lead by SW-846 6010B
HR-76Q-CONF9	HR-76Q-CONF9-CS-SN0026-REG	2.0			Lead by SW-846 6010B
HR-76Q-CONF10	HR-76Q-CONF10-CS-SN0027-REG	2.0		HR-76Q-CONF10-CS-SN0027-MS/MSD	Lead by SW-846 6010B
HR-76Q-CONF11	HR-76Q-CONF11-CS-SN0028-REG	2.0			Lead by SW-846 6010B
HR-76Q-CONF12	HR-76Q-CONF12-CS-SN0029-REG	2.0			Lead by SW-846 6010B
HR-76Q-CONF13	HR-76Q-CONF13-CS-SN0030-REG	2.0			Lead by SW-846 6010B
HR-76Q-CONF14	HR-76Q-CONF14-CS-SN0031-REG	2.0			Lead by SW-846 6010B
HR-76Q-CONF15	HR-76Q-CONF15-CS-SN0032-REG	2.0			Lead by SW-846 6010B
HR-76Q-CONF16	HR-76Q-CONF16-CS-SN0033-REG	2.0			Lead by SW-846 6010B
HR-76Q-CONF17	HR-76Q-CONF17-CS-SN0034-REG	2.0			Lead by SW-846 6010B
HR-76Q-CONF18	HR-76Q-CONF18-CS-SN0035-REG	2.0			Lead by SW-846 6010B
HR-76Q-CONF19	HR-76Q-CONF19-CS-SN0036-REG	2.0			Lead by SW-846 6010B
HR-76Q-CONF20	HR-76Q-CONF20-CS-SN0037-REG	2.0			Lead by SW-846 6010B

Table 1

Proposed Sample Designations and QA/QC Sample Quantities
Soil Removal Activities for Range 20, Parcel 76Q-X
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Designation	Sample Depth (ft bgs)	QA/QC Samples		Analytical Suite
			Field Duplicates	MS/MSD	
HR-76Q-CONF21	HR-76Q-CONF21-CS-SN0038-REG	2.0			Lead by SW-846 6010B
HR-76Q-CONF22	HR-76Q-CONF22-CS-SN0039-REG	2.0			Lead by SW-846 6010B
HR-76Q-CONF23	HR-76Q-CONF23-CS-SN0040-REG	2.0			Lead by SW-846 6010B
HR-76Q-CONF24	HR-76Q-CONF24-CS-SN0041-REG	2.0			Lead by SW-846 6010B
HR-76Q-CONF25	HR-76Q-CONF25-CS-SN0042-REG	2.0			Lead by SW-846 6010B
HR-76Q-CONF26	HR-76Q-CONF26-CS-SN0043-REG	2.0			Lead by SW-846 6010B
HR-76Q-CONF27	HR-76Q-CONF27-CS-SN0044-REG	2.0	HR-76Q-CONF27-CS-SN0045-FD	HR-76Q-CONF27-CS-SN0044-MS/MSD	Lead by SW-846 6010B
HR-76Q-CONF28	HR-76Q-CONF28-CS-SN0046-REG	2.0			Lead by SW-846 6010B
HR-76Q-CONF29	HR-76Q-CONF29-CS-SN0047-REG	2.0			Lead by SW-846 6010B
HR-76Q-CONF30	HR-76Q-CONF30-CS-SN0048-REG	2.0			Lead by SW-846 6010B
26 Treated Composite Soil Samples for Waste Characterization[a]					
HR-76Q-BATCH1	HR-76Q-BATCH1-WC-SN0049-REG	Comp			TCLP Metals by SW-846 1311 6010B/7470A
HR-76Q-BATCH2	HR-76Q-BATCH2-WC-SN0050-REG	Comp			TCLP Metals by SW-846 1311 6010B/7470A
HR-76Q-BATCH3	HR-76Q-BATCH3-WC-SN0051-REG	Comp			TCLP Metals by SW-846 1311 6010B/7470A
HR-76Q-BATCH4	HR-76Q-BATCH4-WC-SN0052-REG	Comp			TCLP Metals by SW-846 1311 6010B/7470A
HR-76Q-BATCH5	HR-76Q-BATCH5-WC-SN0053-REG	Comp			TCLP Metals by SW-846 1311 6010B/7470A
HR-76Q-BATCH6	HR-76Q-BATCH6-WC-SN0054-REG	Comp			TCLP Metals by SW-846 1311 6010B/7470A
HR-76Q-BATCH7	HR-76Q-BATCH7-WC-SN0055-REG	Comp			TCLP Metals by SW-846 1311 6010B/7470A
HR-76Q-BATCH8	HR-76Q-BATCH8-WC-SN0056-REG	Comp			TCLP Metals by SW-846 1311 6010B/7470A
HR-76Q-BATCH9	HR-76Q-BATCH9-WC-SN0057-REG	Comp			TCLP Metals by SW-846 1311 6010B/7470A
HR-76Q-BATCH10	HR-76Q-BATCH10-WC-SN0058-REG	Comp			TCLP Metals by SW-846 1311 6010B/7470A
HR-76Q-BATCH11	HR-76Q-BATCH11-WC-SN0059-REG	Comp			TCLP Metals by SW-846 1311 6010B/7470A
HR-76Q-BATCH12	HR-76Q-BATCH12-WC-SN0060-REG	Comp			TCLP Metals by SW-846 1311 6010B/7470A
HR-76Q-BATCH13	HR-76Q-BATCH13-WC-SN0061-REG	Comp			TCLP Metals by SW-846 1311 6010B/7470A
HR-76Q-BATCH14	HR-76Q-BATCH14-WC-SN0062-REG	Comp			TCLP Metals by SW-846 1311 6010B/7470A
HR-76Q-BATCH15	HR-76Q-BATCH15-WC-SN0063-REG	Comp			TCLP Metals by SW-846 1311 6010B/7470A
HR-76Q-BATCH16	HR-76Q-BATCH16-WC-SN0064-REG	Comp			TCLP Metals by SW-846 1311 6010B/7470A
HR-76Q-BATCH17	HR-76Q-BATCH17-WC-SN0065-REG	Comp			TCLP Metals by SW-846 1311 6010B/7470A
HR-76Q-BATCH18	HR-76Q-BATCH18-WC-SN0066-REG	Comp			TCLP Metals by SW-846 1311 6010B/7470A

Table 1

Proposed Sample Designations and QA/QC Sample Quantities
Soil Removal Activities for Range 20, Parcel 76Q-X
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Designation	Sample Depth (ft bgs)	QA/QC Samples		Analytical Suite
			Field Duplicates	MS/MSD	
HR-76Q-BATCH19	HR-76Q-BATCH19-WC-SN0067-REG	Comp			TCLP Metals by SW-846 1311 6010B/7470A
HR-76Q-BATCH20	HR-76Q-BATCH20-WC-SN0068-REG	Comp			TCLP Metals by SW-846 1311 6010B/7470A
HR-76Q-BATCH21	HR-76Q-BATCH21-WC-SN0069-REG	Comp			TCLP Metals by SW-846 1311 6010B/7470A
HR-76Q-BATCH22	HR-76Q-BATCH22-WC-SN0070-REG	Comp			TCLP Metals by SW-846 1311 6010B/7470A
HR-76Q-BATCH23	HR-76Q-BATCH23-WC-SN0071-REG	Comp			TCLP Metals by SW-846 1311 6010B/7470A
HR-76Q-BATCH24	HR-76Q-BATCH24-WC-SN0072-REG	Comp			TCLP Metals by SW-846 1311 6010B/7470A
HR-76Q-BATCH25	HR-76Q-BATCH25-WC-SN0073-REG	Comp			TCLP Metals by SW-846 1311 6010B/7470A
HR-76Q-BATCH26	HR-76Q-BATCH26-WC-SN0074-REG	Comp			TCLP Metals by SW-846 1311 6010B/7470A

[a]Comp - Composite sample collected from waste sample.
"N_,W_" refers to a specific grid node that will be selected in the field.

FD - Field duplicate.
MS/MSD - Matrix spike/matrix spike duplicate.
ft bgs - Feet below ground surface.
QA/QC - Quality assurance/quality control.
REG - Regular field sample.
TCLP - Toxicity characteristic leaching procedure.

Table 2

Summary of Proposed Sampling, Analysis, and QC Program
Soil Removal Activities for Range 20, Parcel 76Q-X on Fish and Wildlife Service Property
Fort McClellan, Calhoun, County, Alabama

				Field Samples			QA/QC Samples [1]				EMAX
Parameters	Analysis Method	Sample Matrix	TAT Needed	No. of Sample Points	No. of Events	No. of Field Samples	Field Dups (10%)	MS/MSD (5%)	Trip Blank (1/ship)	Eq. Rinse (1/wk/matrix)	Total No. Analysis
Range 20 FWS Soil Removal Samples: 14 XRF Confirmation, 30 Post-Excavation Confirmation, 26 Treated Soil Composites											
Lead	6010B	soil	**24-hr**	14	1	14	1				15
Lead	6010B	soil	**24-hr**	30	1	30	3	2		3	40
TCLP Metals	1311/6010B	soil	**72-hr**	26	1	26					26
			Range 20 Soil Removal Total:			70	4	2	0	3	81

FWS - Fish and Wildlife Service
XRF - X-ray fluorescence
MS/MSD - Matrix spike/MS duplicate
TCLP - Toxicity Characteristic Leaching Procedure

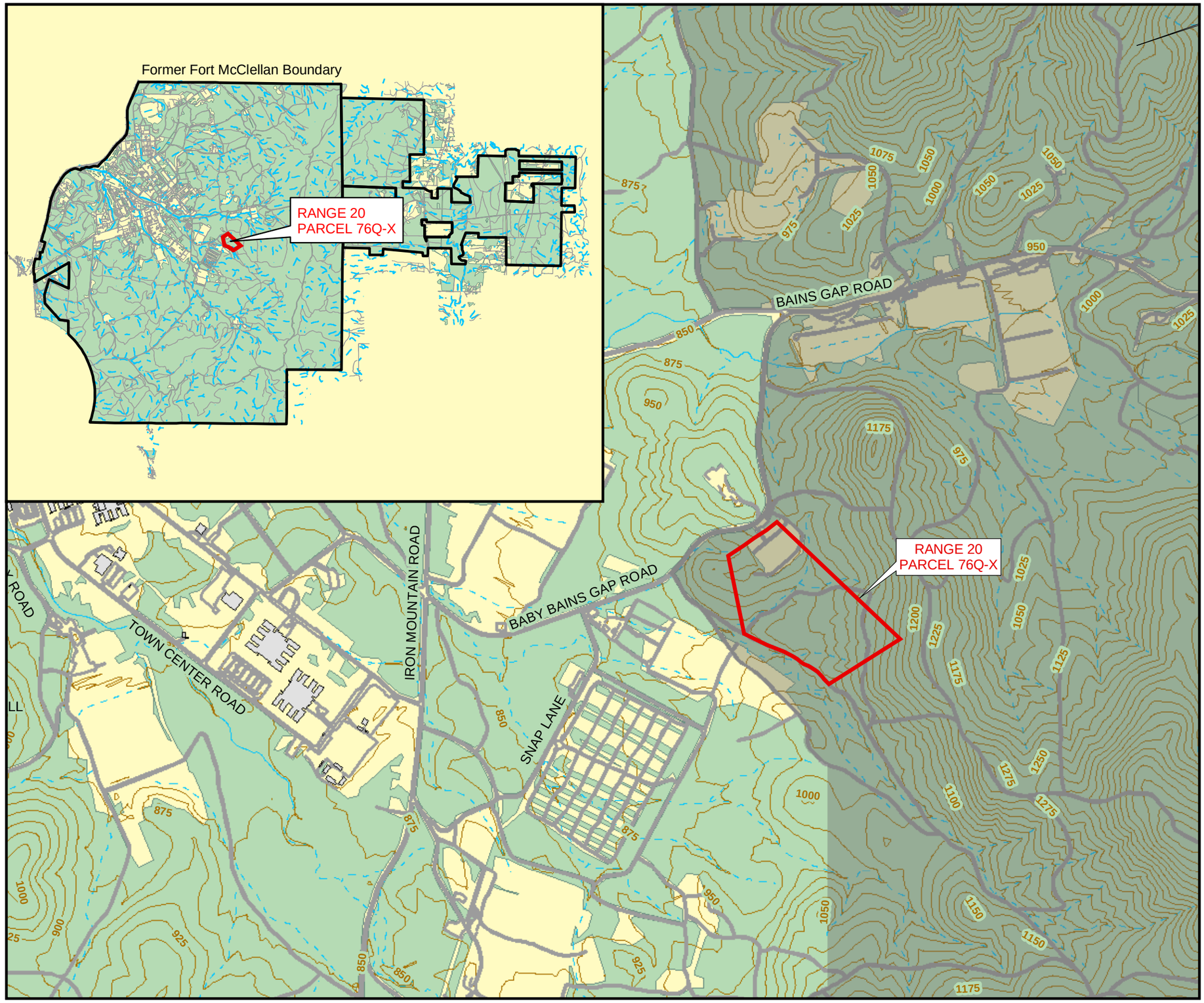
[1] Field duplicate and MS/MSD samples were calculated as a percentage of the field samples collected and were rounded up to the nearest whole number. Equipment blanks will be collected at least once per event whenever sampling equipment is field decontaminated and re-used. They will be repeated weekl No QC was assigned for waste disposal samples.

FIGURES

Figure 1-1

Range 20
Site Location Map

Baby Bains Gap Road Ranges
Fort McClellan, Alabama



Legend

- Range 20 Study Area
- Wooded
- Not Wooded
- United States Fish and Wildlife Service (USFWS) Property
- Building
- Roads
- Surface Drainage Feature (Dashed where intermittent)
- Topographic Contour (25-foot Interval)

1,000 0 1,000 Feet

NAD83 State Plane Coordinates

N

Shaw™ Shaw Environmental, Inc.

U.S. Army Corps of Engineers Mobile District

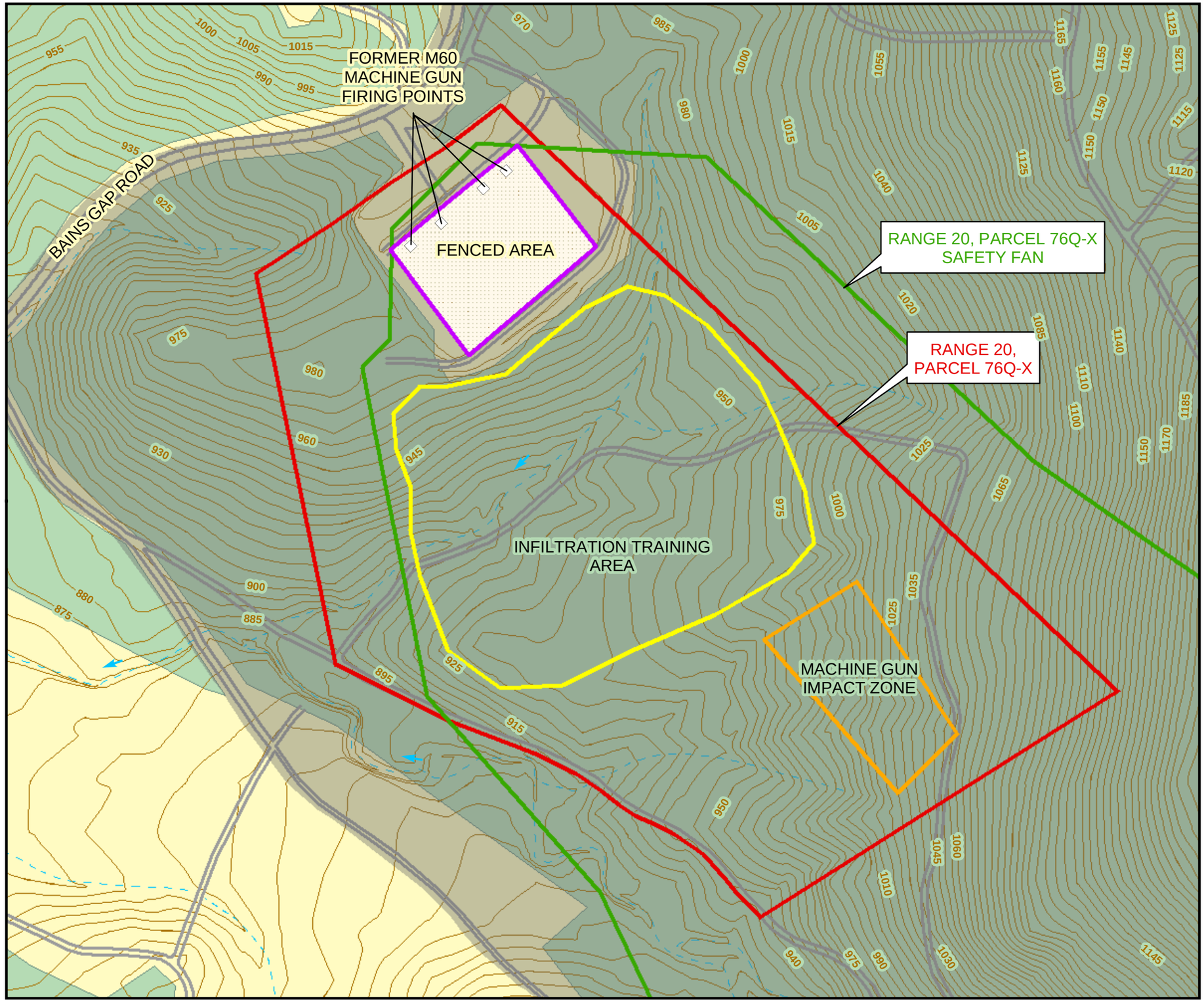
Contract No. DACA21-96-D-0018

e:/ftmc/mxd/range20/fig1_1_site_loc_r20.mxd

Figure 1-2

Range 20, Parcel 76Q-X, Site Map

Baby Bains Gap Road Ranges
Fort McClellan, Alabama



Legend

- Study Area
- Safety Fan
- Infiltration Training Area
- M60 Machine Gun Impact Zone
- Range 20 Fenced Area
- Wooded
- Not Wooded
- United States Fish and Wildlife Service (USFWS) Property
- Roads
- Surface Drainage Feature (Dashed where Intermittent)
- Topographic Contour (5-foot interval)
- Surface Water Flow Direction

200 0 200 Feet

NAD83 State Plane Coordinates

N

Shaw Environmental, Inc.

U.S. Army Corps of Engineers Mobile District

Contract No. DACA21-96-D-0018

e:/ftmc/mxd/range20/fig1_2_site_map_r20.mxd

Figure 2-1

Range 20, Parcel 76Q-X, March 1998 Aerial Photograph

Baby Bains Gap Road Ranges
Fort McClellan, Alabama

Legend

- Study Area
- Safety Fan
- Infiltration Training Area
- M60 Machine Gun Impact Zone
- Range 20 Fenced Area

200 0 200 Feet

NAD83 State Plane Coordinates

N

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U.S. Army Corps of Engineers Mobile District

Contract No. DACA21-96-D-0018

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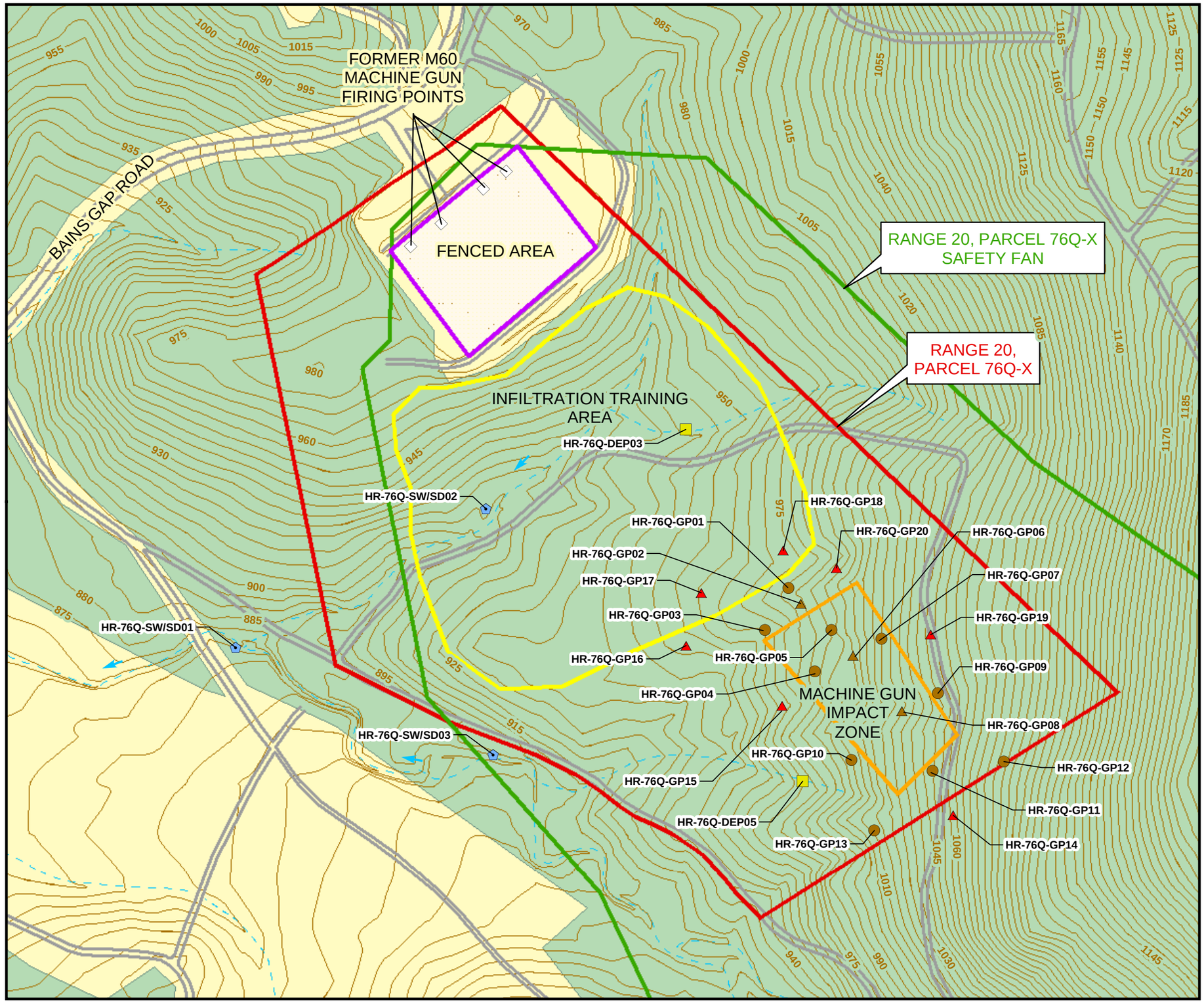
Figure 2-2

Range 20, Parcel 76Q-X, RI Sample Locations

Baby Bains Gap Road Ranges
Fort McClellan, Alabama



Legend

- Depositional Soil Sample Location
- Monitoring Well/ Groundwater, Surface and Subsurface Soil Sample Location
- Surface Soil Sample Location
- Surface and Subsurface Soil Sample Location
- Surface Water/Sediment Sample Location
- XRF Sample Location
- Study Area
- Safety Fan
- Infiltration Training Area
- M60 Machine Gun Impact Zone
- Range 20 Fenced Area
- Wooded / Not Wooded
- Roads
- Surface Drainage Feature (Dashed where Intermittent)
- Topographic Contour (5-foot interval)
- Surface Water Flow Direction

200 0 200 Feet

NAD83 State Plane Coordinates

N

Shaw Environmental, Inc.

U.S. Army Corps of Engineers Mobile District

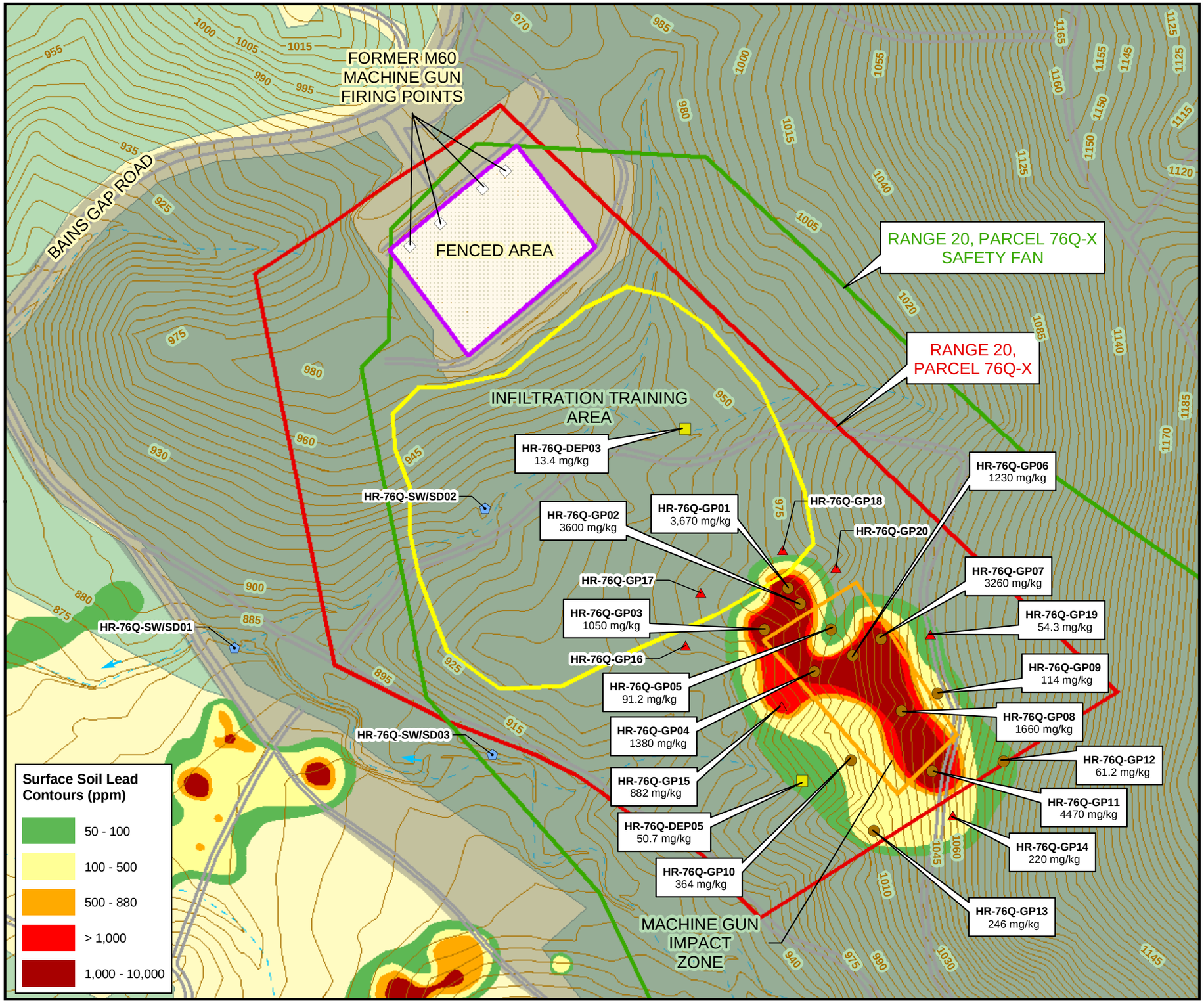
Contract No. DACA21-96-D-0018

e:/ftmc/mxd/range20/fig2_2_samplocs_r20.mxd

Figure 2-3

Range 20, Parcel 76Q-X, Lead in Surface Soil Isocontour Map

Fort McClellan, Alabama



Legend

- Soil Sample
- Depositional Soil Sample
- Surface Water/Sediment Sample
- XRF Location
- Study Area
- Safety Fan
- Infiltration Training Area
- M60 Machine Gun Impact Zone
- Range 20 Fenced Area
- Wooded / Not Wooded
- United States Fish and Wildlife Service (USFWS) Property
- Roads
- Surface Drainage Feature (Dashed where Intermittent)
- Topographic Contour (5-foot interval)
- Surface Water Flow Direction
- mg/kg — Milligram per kilogram (parts per million)

200 0 200 Feet

NAD83 State Plane Coordinates

N

Shaw Environmental, Inc.

U.S. Army Corps of Engineers Mobile District

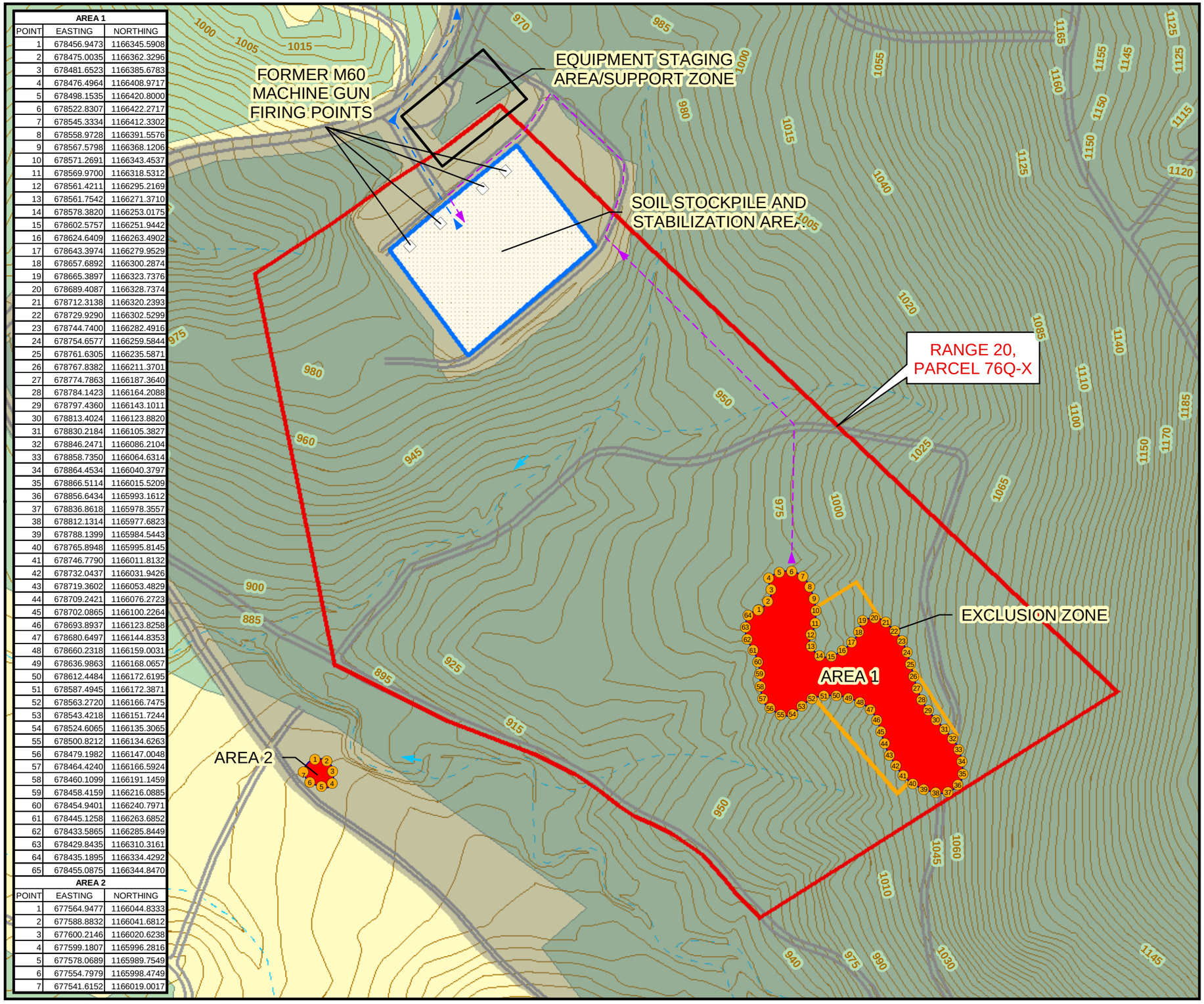
Contract No. DACA21-96-D-0018

e:/ftmc/mxd/range20/fig2_3_lead_r20.mxd

Figure 3-1

Range 20, Parcel 76Q-X, Soil Removal Site Plan

Fort McClellan, Alabama



AREA 1		
POINT	EASTING	NORTHING
1	678456.9473	1166345.5908
2	678475.0035	1166362.3296
3	678481.6523	1166385.6783
4	678476.4964	1166408.9717
5	678498.1535	1166420.8000
6	678522.8307	1166422.2717
7	678545.3334	1166412.3302
8	678558.9728	1166391.5576
9	678567.5798	1166368.1206
10	678571.2691	1166343.4537
11	678569.9700	1166318.5312
12	678561.4211	1166295.2169
13	678561.7542	1166271.3710
14	678578.3820	1166253.0175
15	678602.5757	1166251.9442
16	678624.6409	1166263.4902
17	678643.3974	1166279.9529
18	678657.6892	1166300.2874
19	678665.3897	1166323.7376
20	678689.4087	1166328.7374
21	678712.3138	1166320.2393
22	678729.9290	1166302.5299
23	678744.7400	1166282.4916
24	678754.6577	1166259.5844
25	678761.6305	1166235.5871
26	678767.8382	1166211.3701
27	678774.7863	1166187.3640
28	678784.1423	1166164.2088
29	678797.4360	1166143.1011
30	678813.4024	1166123.8820
31	678830.2184	1166105.3827
32	678846.2471	1166086.2104
33	678858.7350	1166064.6314
34	678864.4534	1166040.3797
35	678866.5114	1166015.5209
36	678856.6434	1165993.1612
37	678836.8618	1165978.3557
38	678812.1314	1165977.6823
39	678788.1399	1165984.5443
40	678765.8948	1165995.8145
41	678746.7790	1166011.8132
42	678732.0437	1166031.9426
43	678719.3602	1166053.4829
44	678709.2421	1166076.2723
45	678702.0865	1166100.2264
46	678693.8937	1166123.8258
47	678680.6497	1166144.8353
48	678660.2318	1166159.0031
49	678636.9863	1166168.0657
50	678612.4484	1166172.6195
51	678587.4945	1166172.3871
52	678563.2720	1166166.7475
53	678543.4218	1166151.7244
54	678524.6065	1166135.3065
55	678500.8212	1166134.6263
56	678479.1982	1166147.0048
57	678464.4240	1166166.5924
58	678460.1099	1166191.1459
59	678458.4159	1166216.0885
60	678454.9401	1166240.7971
61	678445.1258	1166263.6852
62	678433.5865	1166285.8449
63	678429.8435	1166310.3161
64	678435.1895	1166334.4292
65	678455.0875	1166344.8470

AREA 2		
POINT	EASTING	NORTHING
1	677564.9477	1166044.8333
2	677588.8832	1166041.6812
3	677600.2146	1166020.6238
4	677599.1807	1165996.2816
5	677578.0689	1165989.7549
6	677554.7979	1165998.4749
7	677541.6152	1166019.0017

Legend

- Location to be Surveyed and Staked to Demarcate Excavation Area (Coordinates Listed in Table)
- Lead Concentration Above 500 mg/kg (Proposed Soil Removal Area)
- Range 20 RI Study Area
- M60 Machine Gun Impact Zone
- Soil Stabilization Area
- Equipment Staging Area
- Wooded
- Not Wooded
- United States Fish and Wildlife Service (USFWS) Property
- Roads
- Projected Haul Route for Site Dump Trucks to Follow Existing Firebreaks and Roads (Untreated Soil)
- Haul Route for Off-Site Disposal
- Surface Drainage Feature (Dashed where Intermittent)
- Topographic Contour (5-foot interval)
- Surface Water Flow Direction

200 0 200 Feet

NAD83 State Plane Coordinates

N

Shaw Environmental, Inc.

U.S. Army Corps of Engineers Mobile District

Contract No. DACA21-96-D-0018

c:/ftmc/mxd/range20/fig3_1_soil_removal_r20_mar09.mxd

APPENDIX A

SITE SAFETY AND HEALTH PLAN

Site-Specific Safety and Health Plan
Range 20, Infiltration Course, Parcel 76Q-X
Soil Remediation on USFWS Property

Prepared for:

U.S. Army Corps of Engineers, Mobile District
109 St. Joseph Street
Mobile, Alabama 36602

Prepared by:

Shaw Environmental, Inc.
312 Directors Drive
Knoxville, Tennessee 37923

Task Order CK11
Contract No. DACA21-96-D-0018
Project No. 800486

July 2009

Revision 0

The following Safety and Health Plan (SHP) has been designed for the methods presently contemplated by the company for execution of the proposed work. Therefore, the SHP may not be appropriate if the work is not performed by or using the methods presently contemplated by the company. In addition, as the work is performed, conditions different from those anticipated may be encountered and the SHP may have to be modified. Therefore, the company only makes representations or warranties as to the adequacy of the SSHP for currently anticipated activities and conditions. This Site-Specific Safety and Health Plan must be used in conjunction with the Installation-Wide Safety and Health Plan, Revision 1 and the Installation-Wide Ordnance and Explosives Management Plan, Fort McClellan, Alabama.

Site-Specific Safety and Health Plan Attachment Approval
Fort McClellan, Calhoun County, Alabama

I have read and approve this site-specific safety and health plan for the Range 20 soil remediation at Fort McClellan, Calhoun County, Alabama, with respect to project hazards, regulatory requirements, and Shaw procedures.

Steven Moran, PG
Project Manager

7/7/09
Date

Doug Russell
Health & Safety Manager

7/7/09
Date

Jeff Tarr, PG
Site Manager

7/7/09
Date

Acknowledgements

The approved version of this site-specific safety and health plan (SSHP) for the Range 20 soil remediation at Fort McClellan, Alabama, has been provided to the site coordinator. I acknowledge my responsibility to provide the site coordinator with the equipment, materials, and qualified personnel to implement fully all safety requirements in this SSHP attachment. I will formally review this plan with the health and safety staff every 6 months until project completion.

Project Manager — Date: 7/7/09

I acknowledge receipt of this SSHP attachment from the project manager, and that it is my responsibility to explain its contents to all site personnel and cause these requirements to be fully implemented. Any change in conditions, scope of work, or other change that might affect worker safety requires me to notify the project manager and the health and safety manager.

Site Manager — Date: 7/7/09

Site-Specific Safety and Health Plan Acknowledgement Form

I have been informed of, and will abide by the procedures set forth in, this site-specific safety and health plan attachment and lead compliance plan for the Range 20 soil remediation at Fort McClellan, Alabama.

Printed Name	***Signature***	***Representing***	***Date***

Fort McClellan Project Emergency Contacts

Fire Department (on post) 911
Fire Department (off post) ..... (256) 237-3541
Ambulance (off post) 911
Anniston Police Department ..... (256) 238-1800
Northeast Regional Medical Center ..... (256) 235-5121
National Response Center & Terrorist Hotline ..... (800) 424-8802
Poison Control Center ..... (800) 462-0800

Fort McClellan

Range Control Office (Main Post) ..... (256) 847-3585 or (256) 847-3023
Lisa Holstein, Transition Force ..... (256) 848-7455
Security Office ..... (256) 848-5680 or (256) 591-6157
Lee Coker, U.S. Army Corps of Engineers ..... (251) 690-3099

Shaw Environmental, Inc.

Doug Russell, Shaw H&S Manager ..... Direct dial (865) 692-3584
Cell dial (865) 414-9545
Jeff Tarr, Shaw Site Coordinator ..... Direct dial (865) 690-3211
Cell dial (256) 310-4376
Steve Moran, Shaw Project Manager ..... Direct dial (865) 694-7361
Cell dial (865) 607-9148

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3.0 Personal Protective Equipment 5
4.0 Site Monitoring 7
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Attachment 1 – Lead Compliance Plan
Attachment 2 – Site-Specific Munitions and Explosives of Concern (MEC) Safety Plan and Evaluating OE/UXO/CWM Hazards in Support of HTRW Activities
Attachment 3 – Material Safety Data Sheets
Attachment 4 – Incident Reporting Management Procedures - Federal

List of Tables

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1.0 Site Work Plan Summary

Project Objective. Shaw Environmental, Inc. (Shaw) will conduct a removal action of metals impacted soil at Range 20, Parcel 76Q-X at Fort McClellan (FTMC), Alabama. Soil removal will occur at Range 20 as shown on Figure 3-1 in the Interim Removal Action Work Plan. Range 20 was originally investigated as part of the BBGR RI. The total area anticipated for remediation activities is approximately 1.823 acres and falls within the U.S. Fish & Wildlife Service (USFWS) enclave. The work will be performed by Shaw in accordance with the provisions of Prime Contract DACA21-96-D-0018 with the U.S. Army Corps of Engineers (USACE), Mobile District.

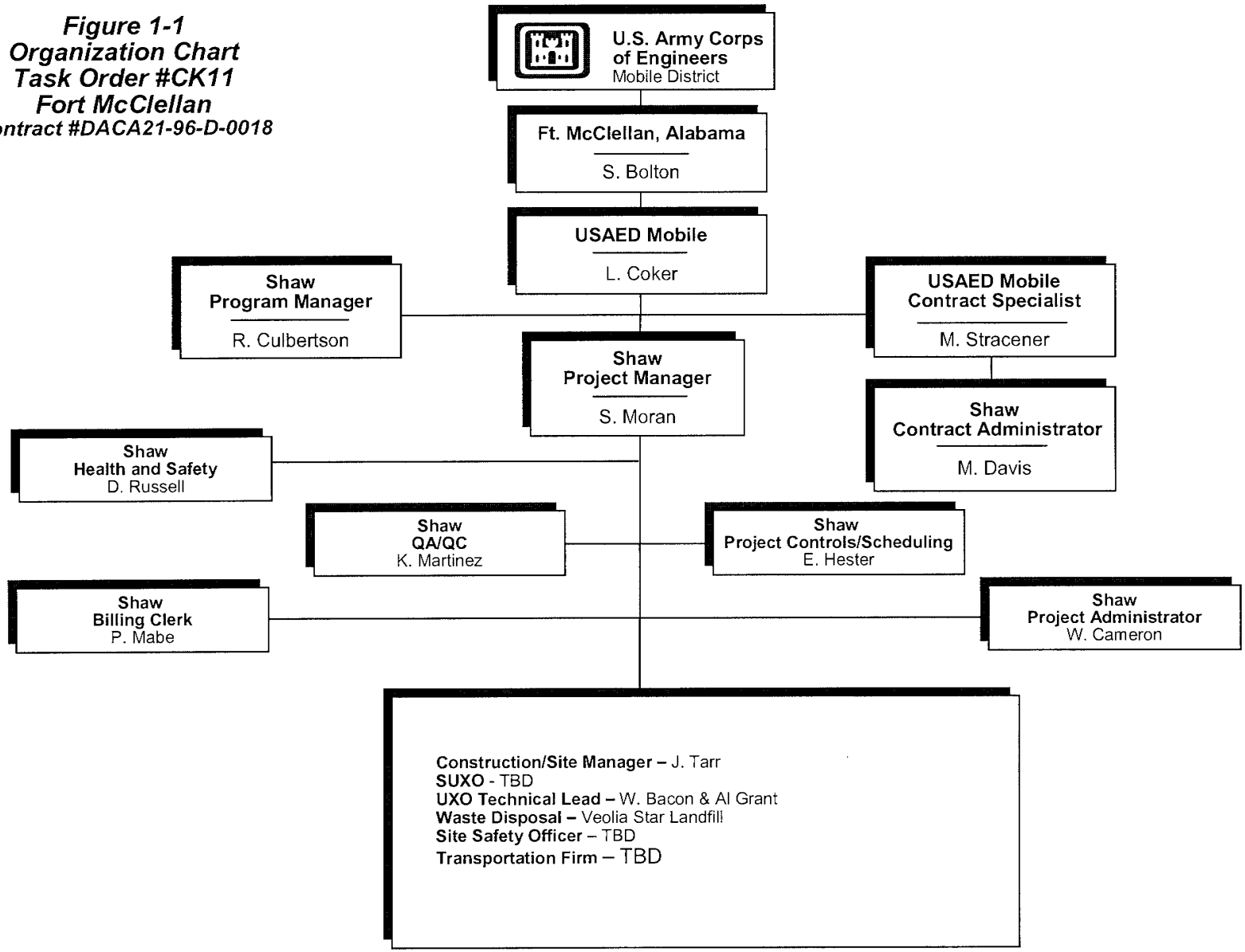
The purpose of this removal action is to excavate and treat soil impacted by lead contamination where concentrations exceed 500 milligrams per kilogram (mg/kg). The area will be surveyed and a sampling grid established. A lead-in-soil delineation phase will be initially performed using XRF to refine the areas of lead-contaminated soil identified in the RI. An Alabama licensed surveyor will survey in the initial sampling boundaries. The initial excavation will remove the first 1-foot of lead contaminated soil. After excavation of the initial 1-foot of soil, a second round of XRF delineation sampling will be performed over the excavated area to determine whether all lead-contaminated soil was removed. This process will continue until all lead-contaminated soil exceeding 500 mg\kg has been removed from Range 20.

Based on existing data and conservatively assuming that up to 2 feet of soil will be removed in the contaminated areas exceeding 500 mg/kg, it is estimated that 5,882 cubic yards of lead-contaminated soil will be excavated during the project. The excavated soil will be loaded into dump trucks and transported to a centralized treatment area within Range 20. The excavated soil will then be segregated into stockpiles of approximately 300-350 cubic yards for stabilization using Portland cement and then composite sampled for disposal. After treatment, the soil will be transported and disposed of in a permitted landfill. The excavated areas will be regraded and reseeded as necessary to prevent erosion.

Project Tasks

- Site surveying and XRF analysis
- Soil removal and treatment
- Post-excavation soil and treated soil sampling and analysis
- Waste characterization
- Transportation and disposal of treated soil

Figure 1-1
Organization Chart
Task Order #CK11
Fort McClellan
Contract #DACA21-96-D-0018



KN9\FTMC\P76Q-X\IRA WP\Final\APA\APA F-R20 SSHP Fig 1-1.ppt\8/12/2004 12:47 PM

- Equipment decontamination
- Site restoration.

Personnel Requirements. Up to 10 employees are anticipated to complete this scope of field work. See Figure 1-1 for an organization chart.

Note: All personnel on this site shall have received training, informational programs, and medical surveillance as outlined in the installation-wide safety and health plan (SHP) for site investigations at FTMC, understand the requirements of this site-specific SHP (SSHP).

This SSHP must be used in conjunction with the FTMC installation-wide SHP and the FTMC Installation-Wide OE Management Plan. Additionally, a Lead Compliance Plan has been developed in accordance with Shaw health and safety procedure *HS502, Lead Compliance,* 29 Code of Federal Regulations (CFR) 1926.62 and EM 385-1-1 Section 06.B.05. The Lead Compliance Plan has been included as Attachment 1 to this SSHP.

2.0 Site Characterization and Analysis

2.1 Anticipated Hazards

The activity hazard analysis in Chapter 5.0 contains project-specific practices utilized to reduce or eliminate anticipated site hazards. The activity hazard analysis (AHA) indicates specific chemical and physical hazards that may be present and encountered during each task from on-site operations. Below each task is a list of hazards and specific actions that will be taken to control the respective hazards. These control measures may include work practice controls, engineering controls, and/or use of appropriate personal protective equipment (PPE). The potential to encounter UXO has been determined to be low based on the anticipated soil excavation depth of 2-feet bgs and previous UXO clearance activities by others. However, *Evaluating OE/UXO/CWM Hazards in Support of HTRW Activities* confirms that the historical records for Range 20 have been reviewed and UXO support is required for site activities. This evaluation and a Site-Specific Munitions and Explosives of Concern (MEC) Safety Plan is presented in Attachment 2. In the event suspect items are encountered during site activities, do not disturb the item and immediately suspend work and contact the Shaw UXO supervisor. Investigation of the suspect item will require approval of an UXO construction support activity.

The toxicological and physical properties of chemicals and information on exposure effects and first-aid are included in Table 2-1.

2.2 General Site Information

The main area of investigation for Range 20 is the M-60 impact zone, a cleared area located approximately 1,200 feet southeast of the firing points on the northwestern face of a hillside shown on Figure 2-1 of the work plan. Historical evidence indicates that the Range 20 orientation has always been to the southeast, towards the northwestern slope of the unnamed hill. The impact zone is visible from the former firing line points and is bare of trees and vegetation. Bullet channels and numerous bullets and bullet fragments were found in this area. No evidence of additional target areas for the M-60 was found during the previous remedial investigation.

Personnel used the area between the M-60 impact zone and the firing point area for "infiltration maneuver training." This area is moderately to densely wooded. Abandoned vehicles, concrete pillboxes, and a mock cemetery that were used for maneuver training are found in this area. According to former FTMC range control personnel, no live ammunition was fired in the

Table 2-1

Toxicological and Physical Properties of Chemicals
Range 20, Parcel 76Q-X Soil Remediation
Fort McClellan, Calhoun County, Alabama

Substance [CAS]	IP[a] (eV)	Odor Threshold (ppm)	Route[b]	Symptoms of Exposure	Treatment	TWA[c]	STEL[d]	Source[e]	IDLH (NIOSH)[f]
Fuel oil (diesel oil, medium)	?	?	Ing Inh Con	Ingestion causes nausea, vomiting, and cramps; depressed central nervous system, headache, coma, death; pulmonary irritation; kidney and liver damage; aspiration causes severe lung irritation, coughing, gagging, dyspnea, sub-sternal stress, pulmonary edema; bronchopneumonia; excited, then depressed, central nervous system.	Eye: Irrigate promptly Skin: Soap wash Breath: Respiratory support Swallow: Immediate medical attention Aspiration: Immediate medical attention			PEL TLV REL	
Gasoline [8006-61-9]	?	0.3	Inh Ing Con	Intoxication, headaches, blurred vision, dizziness, nausea; eye, nose throat irritation; potential kidney and other cancers. Car-cinogenic.	Eye: Irrigate immediately (15 min) Skin: Soap wash promptly Breath: Respiratory support Swallow: Immediate medical attention	300 ppm Ca, lowest feasible conc. (LOQ 15 ppm)	500 ppm	PEL TLV REL	?
Lead {7439-92-1}	N/A	N/A	Inh Ing Con	Lightheadedness; nausea, headache; numbness of the extremities, muscular weak-ness; irritation of the eyes and nose; dermatitis; chemi-cal pneumonia; giddiness.	Eye: Irrigate immediately Skin: Soap wash immediately Breath: Respiratory support Swallow: Immediate medical attention	0.050 mg/m^3 0.050 mg/m^3 0.100 mg/m^3		PEL TLV REL	100 mg/m^3
Motor oil [NA]	?	?	Inh Ing	See oil mist; usually only a problem if misted or ingested.	Eye: Irrigate immediately (15 min) Skin: Soap wash immediately Swallow: Immediate medical attention			PEL TLV REL	

Table 2-1

Toxicological and Physical Properties of Chemicals
Range 20, Parcel 76Q-X Soil Remediation
Fort McClellan, Calhoun County, Alabama

Substance [CAS]	IP[a] (eV)	Odor Threshold (ppm)	Route[b]	Symptoms of Exposure	Treatment	TWA[c]	STEL[d]	Source[e]	IDLH (NIOSH)[f]
Nitric acid [7697-37-2]	11.95	0.3–1	Inh Ing Con	Irritated eyes, mucous membranes, and skin; delayed pulmonary edema, pneumonitis, bronchitis; dental erosion.	Eye: Irrigate immediately Skin: Water flush promptly Breath: Respiratory support Swallow: Immediate medical attention	2 ppm 2 ppm 2 ppm	4 ppm 4 ppm 4 ppm	PEL TLV REL	100 ppm
Portland cement			Inh	Fine gray powder that can be irritating if inhaled or in eyes.	Eye: Irrigate immediately Skin: Soap wash immediately Breath: Respiratory support Swallow: Immediate medical attention		15 mg/m^3/ total dust 5 mg/m^3 respirable fraction	PEL	

[a]IP = Ionization potential (electron volts).
[b]Route = Inh, Inhalation; Abs, Skin absorption; Ing, Ingestion; Con, Skin and/or eye contact.
[c]TWA = Time-weighted average. The TWA concentration for a normal work day (usually 8 or 10 hours) and a 40-hour work week, to which nearly all workers may be repeatedly exposed, day after day without adverse effect.
[d]STEL = Short-term exposure limit. A 15-minute TWA exposure that should not be exceeded at any time during a workday, even if the TWA is not exceeded.
[e]PEL = Occupational Safety and Health Administration (OSHA) permissible exposure limit (29 CFR 1910.1000, Table Z).
AEL = Airborne Exposure Limit.
TLV = American Conference of Governmental Industrial Hygiene (ACGIH) threshold limit value—TWA.
REL = National Institute for Occupational Safety and Health (NIOSH) recommended exposure limit.
[f]IDLH (NIOSH)—Immediately dangerous to life or health (NIOSH). Represents the maximum concentration from which, in the event of respirator failure, one could escape within 30 minutes without a respirator and without experiencing any escape-impairing or irreversible health effects.
NE = No evidence could be found for the existence of an IDLH (NIOSH Pocket Guide to Chemical Hazards, Pub. No. 97-140, 1997).
C = Ceiling limit value which should not be exceeded at any time.
Ca = Carcinogen.
NA = Not applicable.
? = Unknown.
LEL = Lower explosive limits.
LC_{50} = Lethal concentration for 50 percent of population tested.
LD_{50} = Lethal dose for 50 percent of population tested.
NIC = Notice of intended change (ACGIH)

Table 2-1

Toxicological and Physical Properties of Chemicals
Range 20, Parcel 76Q-X Soil Remediation
Fort McClellan, Calhoun County, Alabama

References:

American Conference of Governmental Industrial Hygienists Guide to Occupational Exposure Values, 2007, compiled by the American Conference of Governmental Industrial Hygienists.
Amoore, J. E. Hautula, "Odor as an Aid to Chemical Safety," Journal of Applied Toxicology, 1983.
Clayton, George D., Clayton, F. E., Patty's Industrial Hygiene and Toxicology, 3rd ed., John Wiley & Sons, New York.
Documentation of TLVs and BEIs, American Conference of Governmental Industrial Hygienists, 2007.
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Lewis, Richard J., Sr., 1992, Sax's Dangerous Properties of Industrial Materials, 8th ed., Van Nostrand Reinhold, New York.
Micromedex Tomes Plus (R) System, 1992, Micromedex, Inc.
National Institute for Occupational Safety and Health Pocket Guide to Chemicals, Pub. 2007, No. 90-117, National Institute for Occupational Safety and Health.
Odor Threshold for Chemicals with Established Occupational Health Standards, American Industrial Hygiene Association, 1989.
Respirator Selection Guide, 3M Occupational Health and Safety Division, 2007.
Verschuseren, K., Handbook of Environmental Data on Organic Chemicals, Van Nostrand and Reinhold, 1977.
Warning Properties of Industrial Chemicals—Occupational Health Resource Center, Oregon Lung Association.
Workplace Environmental Exposure Levels, American Industrial Hygiene Association, 1992.

infiltration maneuver training area, only blanks. No indication of bullet impact was noted in this area during previous investigation activities.

Access to the Range 20 firing line area is provided by a short gravel driveway that connects the range to Bains Gap Road. Two tributaries of Ingram Creek cut across the Range 20 infiltration training area, draining runoff water west towards Ingram Creek. The overall elevation of Range 20 ranges from approximately 925 to 1,200 feet above mean sea level. The lowest elevation is found near the tributaries, and the highest elevation is at the top of the hill east of the M-60 impact zone. Ground surface is relatively flat in the M-60 firing point and explosive pit area, with a 75-foot descent to the tributary in the infiltration training area and a steep 1,025-foot rise towards the impact zone hillside southeast of the M-60 firing points.

Duration of Planned Employee Activity. Employee activity duration is anticipated to be approximately 10 weeks.

Pathways for Hazardous Substance Dispersion. Possible pathways for hazardous substances dispersion from soils during the remedial effort is primarily cross contamination, surface runoff, and fugitive dust. Primary routes of exposure are inhalation and ingestion.

2.3 Personnel Decontamination

Personnel decontamination shall be performed in compliance with Section 7.0 Decontamination, in the Installation-Wide SHP.

3.0 Personal Protective Equipment

The work activities will begin in the following levels of protection. Also, a completed description of Level D, Modified Level D, and Level C PPE is provided. Any change in PPE that may be required will require approval by the Shaw H&S manager and project manager.

Task	Initial Level of PPE
Initial UXO avoidance sweep and equipment staging	Level D
Grid layout and XRF analysis	Level D*
Excavation of soil	Modified Level D**
Stabilization of soil	Modified Level D**
Confirmation sampling	Level D*
Equipment decontamination	Modified Level D
Site restoration	Level D

**Initial level will be raised to Level C if real-time respirable dust monitoring levels exceed the action levels identified in Table 4-1. Engineering controls shall be utilized to the fullest extent prior to upgrade in respiratory protection.
Engineering controls shall consist of wetting the work area with a water truck to maintain acceptable dust levels.
*Latex or nitrile gloves shall be used to minimize dermal contact with soil during sampling activities.

Level D. The minimal level of protection that will be required of Shaw personnel at the site will be Level D. The following equipment will be used for Level D protection:

- Coveralls or work clothing
- Leather work gloves (when necessary)
- Steel-toed safety boots
- Safety glasses
- Hard hat
- Hearing protection (when working near/adjacent to operating equipment).
- Latex or Nitrile gloves during sampling activities.

Modified Level D. The following equipment will be used for Level D-Modified protection:

- Permeable Tyvek, Kleenguard, or its equivalent (Saran-coated tyvek for heavy equipment decontamination)

- Latex boot covers
- Nitrile, heavy work, or latex gloves
- Steel-toed safety boots
- Safety glasses
- Hard hat
- Hearing protection (when working near/adjacent to operating equipment)

Note: In addition to modified Level D PPE, the operator of high-pressure water jetting equipment shall wear metatarsal guards for foot protection, shin guards and a face shield.

Level C. Level C protection (or higher level) will not be used unless air-monitoring data indicate the need for upgrade; however, Level C equipment shall be readily available on site. The following equipment will be used for Level C protection:

- National Institute of Occupational Safety and Health/Mine Safety and Health Administration-approved full-face, Survivair air-purifying respirators equipped with P-100 high-efficiency particulate air filter.
- Hooded, permeable Tyvek, taped at gloves, boots, and respirator
- Nitrile gloves (outer)
- Latex or lightweight nitrile gloves (inner)
- Neoprene steel-toed boots or polyvinyl chloride overbooties/steel-toed safety boots
- Hard hat
- Hearing protection (when working near/adjacent to operating equipment).

Note: In addition to Level C PPE, the operator of high-pressure water jetting equipment shall wear metatarsal guards for the feet; shin guards, and a face shield may be used to minimize water spray to the respirator lens and cartridges.

4.0 Site Monitoring

The environmental contaminants of concern to construction workers performing remedial action as previously noted is lead in soil. The highest concentration identified within the impact area of Range 20 was at sample location HR-76Q-GP11 with a total lead concentration of 4,470 mg/kg. This concentration was used to derive a conservative equivalent respirable dust concentration. The OSHA action level for lead is 30 $\mu g/m^3$ while the PEL is 50 $\mu g/m^3$. Using a safety factor of four, a total lead concentration of 4,470 mg/kg, and an action level of 30 $\mu g/m^3$, the respirable dust action level was calculated to be 1.678 mg/m^3.

Integrated personal air sampling will not be required for Range 20. Shaw has negative exposure data assessments from a similar lead remediation project where lead was detected eight times the Range 20 maximum detected lead level. This negative exposure assessment was performed within the last 12 months. However, real time dust monitoring as described below will be required to monitor potential lead and Portland cement exposure.

Continuous real time air monitoring for respirable dust shall be performed by the site safety and health officer or qualified designee using a Data Ram PDR 1000. The Data Ram will be configured to provide a data log. The data log will list total dust concentrations measured every 60 seconds, maximum peak levels and overall average TWA dust concentration. This data log shall be provided to the health and safety manager daily. The monitoring will be required at the excavation site as well as the soil stabilization area. Since Portland cement will be utilized as the stabilization/fixation material respirable dust monitoring will be required during mixing operations. The OSHA PEL for Portland cement is 5 mg/m^3 respirable fraction, therefore the action level with safety factor of four established for lead will provide a safety margin for employee protection to Portland cement while maintaining lead compliance below the lead action level. Material safety data sheets for lead and Portland cement are included as Attachment 3.

Table 4-1 indicates action levels and PPE criteria and Table 4-2 lists the initial air monitoring frequency and location for the Data Ram PDR 1000.

Engineering controls shall be immediately implemented if respirable dust levels reach the action level. If engineering controls do not reduce respirable dust levels then integrated personnel and work area air sampling for lead using approved OSHA or NIOSH methods shall be instituted.

Table 4-1

Action Levels
Range 20, Parcel 76Q-X Soil Remediation
Fort McClellan, Calhoun County, Alabama

When in Level C PPE

Analyte	Action Level[a]	Required Action
Dust	> 3.34 mg/m^3 above background in BZ	Normal operations, initiate dust control to minimize migration.

When in Level D Modified/D PPE

Analyte	Action Level	Required Action[b]
Dust	≥ 1.67 mg/m^3 above background in BZ	Stop work, Initiate dust control, upgrade to Level C PPE if dust control is not effective; Notify H&S Manager

When in Support Zone

Analyte	Action Level	Required Action
Dust	> 0.83 mg/m^3 above background in BZ	Stop work, Initiate dust control

[a] Four instantaneous peaks in any 15-minute period or a sustained reading for 5 minutes in excess of the action level will trigger a response.
[b] Contact with the H&S manager must be made prior to continuance of work. The H&S manager may then initiate perimeter/integrated air sampling along with additional engineering controls.

No one is permitted to downgrade levels of PPE without authorization from the H&S manager.

Table 4-2

Air Monitoring Frequency and Location
Range 20, Parcel 76Q-X Soil Remediation
Fort McClellan, Calhoun County, Alabama

Work Activity	Instrument	Frequency	Location
Staging equipment, UXO avoidance sweeps, grid layout, and XRF sampling	Data Ram	Periodically	Breathing zone (BZ) of employees
Soil excavation and stabilization	Data Ram	Continuously	BZ of employees
Site restoration	Data Ram	Periodically	BZ of employees

Data Ram = Aerosol, respirable (dust) monitor

Employees shall also upgrade PPE to level C until integrated air samples confirm potential exposure below the OSHA action level.

Unexploded Ordnance. If UXO, or any suspect CWM, is encountered, personnel will contact the site manager and UXO specialist immediately. All personnel will immediately evacuate the site and contact the Shaw health and safety manager.

5.0 Activity Hazard Analysis

The attached activity hazard analysis (Table 5-1) is provided for the following activities:

- Lead contaminated soil sampling
- Surveying
- Excavation of contaminated materials
- Treatment of contaminated materials
- Site restoration
- Equipment decontamination.

All injuries and illnesses must be immediately reported to the site manager or the site safety and health officer, who will then notify off-site personnel and organizations as necessary in accordance with Shaw procedure *HS020, Accident Prevention Program: Reporting, Investigation and Review.*

All injuries and illnesses must be immediately reported to the site manager or the SSHO, who will then notify off-site personnel and organizations as necessary in accordance with Shaw health and safety policy *HS020, Accident Prevention Program: Reporting, Investigation and Review*, and the Incident Reporting Management Procedure-Federal. A copy of the Incident Reporting Management Procedure-Federal has been provided in Attachment 4.

If emergency hospital care must be provided, the victim shall be treated at Northeast Regional Medical Center. For non life threatening injuries which may require medical treatment beyond onsite first aid the injured shall be transported by the site manager or site safety and health officer to the nearest Health resources occupational health facility. The nearest occupational clinic is Southern Family Practice and Occupational Medicine.

Directions to the hospital are provided in Figure 5-1 and directions to the occupational clinic are provided in Figure 5-2

Table 5-1

Activity Hazard Analysis
Range 20, Parcel 76Q-X
Lead Contaminated Soil Sampling

Principal Steps	Potential Hazards	Recommended Controls
Sampling	Contact with lead	Wear a pair of chemical protection gloves.
	Back strain	Use care using shovel, lift loaded shovels with legs, not back.
	Inhalation hazard	Avoid creating dust, use water mist to control dust.
	Noise	If noise levels exceed 85 dBA wear hearing protection.
	Heavy lifting	Safe lifting procedures. Loads over 60 lbs. require assistance or mechanical lifting device.
	Slip, trip and fall hazards	Good housekeeping.
	Fire	A dry chemical fire extinguisher will be readily available.
	Radiological (XRF)	XRF operators shall have radiation general awareness training. XRF shall be used in accordance with manufactures safety and operational instructions. Required leak detection swipes shall have been performed. The instrument shall be stored and transported in the manufacturers case.
	UXO	If any suspect items are encountered, contact the UXO supervisor immediately.
Equipment to be Used	**Inspection Requirements**	**Training Requirements**
• Shovels • Trowels • XRF	• Daily or before each use	• Tailgate Safety Meeting • Site-specific training • Hazard waste operations • Lead training • MSDS file

Table 5-1

Activity Hazard Analysis
Range 20, Parcel 76Q-X
Surveying

Activity	Potential Hazards	Recommended Controls
Surveying	Slips, trips, and falls	Good housekeeping, keep work area picked up and as clean as feasible. Continually inspect the work areas for slip, trip, and fall hazards
		When working on uneven surfaces, take care when stepping. Watch where you walk.
	Moving vehicles	The wearing of high visibility vests is required in areas where vehicle traffic may be encountered.
		Flaggers and traffic control devices such as cones and barricades may be needed when working in traffic.
Equipment to be Used • Survey Equipment • PPE	**Inspection Requirements** • None	**Training Requirements** • Tailgate safety meeting • Site specific orientation • Hazard communications

Table 5-1

Activity Hazard Analysis
Range 20, Parcel 76Q-X
Excavation of Contaminated Materials

Activity	Potential Hazards	Recommended Controls
Excavation	Underground utilities	All underground utilities will be located prior to excavating.
	Open excavations	Shaw Procedure HS307 - "Excavation and Trenching" will be adhered to at all times.
	UXO	Do not disturb suspect items. Contact the UXO supervisor immediately.
	Confined spaces	Shaw Procedure HS 300 - "Confined Spaces" will be adhered to at all times.
	Noise	Noise levels above 85 dBA mandates hearing protection. All personnel trained in hearing conservation.
	Heavy equipment operations	Before any machinery or mechanized equipment is placed into service, it shall be inspected and tested by a competent mechanic and certified to be in safe operating condition.
		Equipment shall be inspected before being placed into service and at the beginning of each shift.
		Preventive maintenance procedures recommended by the manufacturer shall be followed.
		A lockout - tagout procedure shall be used for equipment found to be faulty or undergoing maintenance.
		Machinery and mechanized equipment shall be operated only by designated personnel.
		Getting off or on any equipment while it is in motion is prohibited.
		Machinery or equipment requiring an operator shall not be permitted to run unattended.
		Machinery or equipment will not be operated in a manner that will endanger persons or property nor will the safe operating speeds or loads be exceeded.

Table 5-1

Activity Hazard Analysis
Range 20, Parcel 76Q-X
Excavation of Contaminated Materials

Activity	Potential Hazards	Recommended Controls
Excavation (continued)	Heavy equipment operation (continued)	All machinery or equipment will be shut down and positive means taken to prevent its operation while repairs or manual lubrications are being done.
		All repairs on machinery or equipment will be made at a location which provides protection from traffic for repair persons.
		Bulldozer and scraper blades, end-loader buckets, and similar equipment will be either fully lowered or blocked when being repaired or when not in use.
		All self-propelled construction equipment shall be equipped with a back-up alarm.
	Fire	Each bulldozer, backhoe, or other similar equipment will be equipped with at least one dry chemical fire extinguisher having a minimum UL rating of 1A5BC.
	Contact with potentially contaminated materials, pathogens or disease vectors	Real-time air monitoring will take place. Proper personal protective clothing and equipment will be utilized.
		Good housekeeping will be stressed to safe guard against cross contamination of surrounding areas and eliminate safety hazards.
		All site personnel will practice good personal hygiene.
		The work area will be demarcated. All unnecessary personnel will be kept out of the work area and in an upwind location.
		Refer to SHSP for chemical and environmental hazards (Sections 3.24 & 3.2.24, respectively).
	Lead involvement or exposure (hazard)	Personal air samples will be collected to determine an exposure assessment if respirable dust levels reach the established action level.
		Engineering controls will be implemented.

Table 5-1

Activity Hazard Analysis
Range 20, Parcel 76Q-X
Excavation of Contaminated Materials

Activity	Potential Hazards	Recommended Controls
Excavation (continued)	Lead involvement or exposure (hazard) (continued)	Personal hygiene and good housekeeping practices will be followed
		Work zones will be established and clearly marked.
		Lead related training will be required.
		Refer to the SSHP and Lead Compliance Plan for chemical hazard discussion
	Noise	Noise levels above 85 dBA mandates hearing protection.
	Slip, trip, and fall hazards	Good housekeeping, keep work area picked up and as clean as feasible. Continually inspect the work area for slip, trip, and fall hazards.
	Pinch points	Keep feet and hands clear of moving/suspended materials and equipment.
		Beware of contact points.
		Stay alert at all times!
	Strains and sprains	Use proper lifting techniques, lifts greater than 60 lbs. requires assistance or mechanical equipment; size up the lift.
Material hauling	Dump truck operations	Dump truck bodies shall be fully lowered or blocked when maintenance is being performed or when not in use.
		Dump trucks will have back-up alarms.
		A signal person will be used when the point of operation is not in full view of the vehicle, machine or equipment operator; vehicles are backed more than 100 ft; terrain is hazardous; or 2 or more vehicles are backing in the same area.
		Dump trucks will not be loaded in a manner that obscures the operator's view ahead or to either side or that interferes with the safe operation of the vehicle.

Table 5-1

Activity Hazard Analysis
Range 20, Parcel 76Q-X
Excavation of Contaminated Materials

Activity	Potential Hazards	Recommended Controls
Material hauling	Dump truck operations (continued)	The load on every truck will be distributed, checked, tied down, or secured.
		Loads will be covered when there is a hazard of flying/falling dirt, rock, debris, or material.
		All dump trucks will be equipped with a holding device to prevent accidental lowering of the body.
		All hoist levers will be secured to prevent accidental starting or tripping of the mechanism.
		Trip handles for tailgates will be arranged to keep the operator in the clear.
		Dump truck drivers shall have completed Shaw safe driver training
Equipment to be Used	**Inspection Requirements**	**Training Requirements**
• Hand tools • PPE • Heavy equipment • Dump trucks	• Pre-postmaintenance • Visual prior to use.	• Tailgate Safety Meeting • Site specific orientation • Shaw safe driver training • Hazardous waste operations • Hazard communication • Lead Compliance Plan

Table 5-1

Activity Hazard Analysis
Range 20, Parcel 76Q-X
Treatment of Contaminated Soils

Activity	Potential Hazards	Recommended Controls
Placement and mixing of fixation materials	Noise	Noise levels above 85 dBA mandates hearing protection.
	Slip, trip, and fall hazards	Good housekeeping, keep work area picked up and as clean as feasible. Continually inspect the work area for slip, trip, and fall hazards.
	Pinch points	Keep feet and hands clear of moving/suspended materials and equipment.
		Beware of contact points. Stay alert at all times!
	Dust	Utilize all necessary engineering controls to maintain respirable dust below action level.
	Fire	Fire extinguishers shall be suitably placed, distinctly marked, readily accessible, and maintained in a fully charged and operable condition.
	Strains and sprains	Use proper lifting techniques, lifts greater than 60 lbs. require assistance or mechanical equipment. Size up the lift.
	Heavy equipment operations	Before any machinery or mechanized equipment is placed into service, it shall be inspected and tested by a competent mechanic and certified to be in safe operating condition.
		Equipment shall be inspected before being placed into service and at the beginning of each shift.
		Preventive maintenance procedures recommended by the manufacturer shall be followed.
		All lockout-tagout procedure shall be used for equipment found to be faulty or undergoing maintenance.
		Machinery and mechanized equipment shall be operated only by designated personnel.
		Getting off or on any equipment while it is in motion is prohibited.

Table 5-1

Activity Hazard Analysis
Range 20, Parcel 76Q-X
Treatment of Contaminated Soils

Activity	Potential Hazards	Recommended Controls
Placement and mixing of fixation materials (continued)	Heavy equipment operations (continued)	Machinery or equipment requiring an operator shall not be permitted to run unattended.
		Machinery or equipment will not be operated in a manner that will endanger persons or property nor will the safe operating speeds or loads be exceeded.
		All machinery or equipment will be shut down and positive means taken to prevent its operation while repairs or manual lubrications are being done.
		All repairs on machinery or equipment will be made at a location which provides protection from traffic for repair persons.
		Bulldozer and scraper blades, end-loader buckets, and similar equipment will be either fully lowered or blocked when being repaired or when not in use.
	Knife cuts	Cutting strokes will always be away from the body.
		Leather gloves will be worn when cutting.
		Place knife in sheath on holder when not in use.
		Unused knives will never be left with cutting edges exposed.
		Never use a knife that is defective or has a broken blade or handle.
		Never use a knife as a prybar or screwdriver.
		Don't use a dull blade; replace or have sharpened prior to use.
	Pinch points	Keep feet and hands clear of moving/suspended materials and equipment.
		Stay alert at all times!
	Flying debris	Wear safety glasses at all times.

Table 5-1

Activity Hazard Analysis
Range 20, Parcel 76Q-X
Treatment of Contaminated Soils

Activity	Potential Hazards	Recommended Controls
Placement and mixing of fixation materials (continued)	Fire	A dry chemical fire extinguisher with a minimum UL rating of 1A5BC will be readily available.
		No smoking or open flames within 50 ft. of the work area. (Work area will be posted)
		Fire extinguishers shall be suitably placed, distinctly marked, readily accessible, and maintained in a fully charged and operable condition.
		All hoses, couplings, fixtures, etc. shall be properly bonded and grounded.
		Shaw HS314 "Hot Work in Hazardous Locations" Policy and Procedure shall be adhered to at all times.
	Fueling	Only UL/FM approved safety cans shall be used to store fuel.
		Do not refuel equipment while it is operating.
		Fire extinguishers shall be suitably placed, distinctly marked, readily accessible, and maintained in a fully charged and operable condition.
	Faulty or damaged equipment	Before any machinery or mechanized equipment is placed into service, it shall be inspected and tested by a competent mechanic and certified to be in safe operating condition.
		Equipment shall be inspected before being placed into service and at the beginning of each shift.
	Dump truck operations	Dump truck bodies shall be fully lowered or blocked when maintenance is being performed or when not in use.
		Dump trucks will have back-up alarms.

Table 5-1

Activity Hazard Analysis
Range 20, Parcel 76Q-X
Treatment of Contaminated Soils

Activity	Potential Hazards	Recommended Controls
Placement and mixing of fixation materials (continued)	Dump truck operations (continued)	A signal person will be used when the point of operation is not in full view of the vehicle, machine or equipment operator; vehicles are backed more than 100 ft; terrain is hazardous; or 2 or more vehicles are backing in the same area.
		Dump trucks will not be loaded in a manner that obscures the operator's view ahead or to either side or that interferes with the safe operation of the vehicle.
Material hauling	Dump truck operations	The load on every truck will be distributed, checked, tied down, or secured.
		Loads will be covered when there is a hazard of flying/falling dirt, rock, debris, or material.
		All dump trucks will be equipped with a holding device to prevent accidental lowering of the body.
		All hoist levers will be secured to prevent accidental starting or tripping of the mechanism.
		Trip handles for tailgates will be arranged to keep the operator in the clear.
	Mixing operations	Machinery or equipment requiring an operator shall not be permitted to run unattended.
		Machinery or equipment will not be operated in a manner that will endanger persons or property nor will the safe operating speeds or loads be exceeded.
		All machinery or equipment will be shut down and positive means taken to prevent its operation while repairs or manual lubrications are being done.
		All repairs on machinery or equipment will be made at a location which provides protection from traffic for repair persons.

Table 5-1

Activity Hazard Analysis
Range 20, Parcel 76Q-X
Treatment of Contaminated Soils

Activity	Potential Hazards	Recommended Controls
Material hauling (continued)	Mixing operations (continued)	Bulldozer and scraper blades, end-loader buckets, and similar equipment will be either fully lowered or blocked when being repaired or when not in use.
		Before any machinery or mechanized equipment is placed into service, it shall be inspected and tested by a competent mechanic and certified to be in safe operating condition.
		Equipment shall be inspected before being placed into service and at the beginning of each shift.
		Preventive maintenance procedures recommended by the manufacturer shall be followed.
		All lockout-tagout procedure shall be used for equipment found to be faulty or undergoing maintenance.
		Machinery and mechanized equipment shall be operated only by designated personnel.
		Getting off or on any equipment while it is in motion is prohibited.
	Contact with potentially contaminated material	Workers will wear proper protective clothing and equipment.
		All personnel will follow good hygiene practices.
		Dust suppression methods will be installed to prevent generation of airborne dust.
Equipment to be Used • Heavy equipment • PPE • Dump trucks • Air monitors • Hand tools	**Inspection Requirements** • Pre-postmaintenance • Visual prior to use	**Training Requirements** • Tailgate Safety Meeting • Site specific orientation • Lead Compliance Plan • Hazardous waste operations • Hazard communication

Table 5-1

Activity Hazard Analysis
Range 20, Parcel 76Q-X
Backfilling and Site Restoration

Activity	Potential Hazards	Recommended Controls
Backfilling and site restoration	Heavy equipment operations	Before any machinery or mechanized equipment is placed into service, it shall be inspected and tested by a competent mechanic and certified to be in safe operating condition.
	Areas on or adjacent to contaminated material	Implement appropriate level of protection.
		Equipment shall be inspected before being placed into service and at the beginning of each shift.
		Preventive maintenance procedures recommended by the manufacturer shall be followed.
		A lockout - tagout procedure shall be used for equipment found to be faulty or undergoing maintenance.
		Machinery and mechanized equipment shall be operated only by designated personnel.
		Getting off or on any equipment while it is in motion is prohibited.
		Machinery or equipment requiring an operator shall not be permitted to run unattended.
		Machinery or equipment will not be operated in a manner that will endanger persons or property nor will the safe operating speeds or loads be exceeded.
		All machinery or equipment will be shut down and positive means taken to prevent its operation while repairs or manual lubrications are being done.
		All repairs on machinery or equipment will be made at a location which provides protection from traffic for repair persons.

Table 5-1

Activity Hazard Analysis
Range 20, Parcel 76Q-X
Backfilling and Site Restoration

Activity	Potential Hazards	Recommended Controls
Backfilling and site restoration (continued)	Areas on or adjacent to contaminated material (continued)	Bulldozer and scraper blades, end-loader buckets, and similar equipment will be either fully lowered or blocked when being repaired or when not in use.
		All self-propelled construction equipment shall be equipped with a back-up alarm.
	Fire	Each bulldozer, backhoe, or other similar equipment will be equipped with at least one dry chemical fire extinguisher having a minimum UL rating of 1 A5BC.
	Open excavations	Shaw Procedure HS307 "Excavation and Trenching" will be adhered to at all times.
		Excavations will be backfilled as soon as possible.
	Dump truck operations	Dump truck bodies shall be fully lowered or blocked when maintenance is being performed or when not in use.
		Dump trucks will have back-up alarms.
		A signal person will be used when the point of operation is not in full view of the vehicle, machine or equipment operator; vehicles are backed more than 100 ft; terrain is hazardous; or 2 or more vehicles are backing in the same area.
		Dump trucks will not be loaded in a manner that obscures the operator's view ahead or to either side or that interferes with the safe operation of the vehicle.
		The load on every truck will be distributed, checked, tied down, or secured.
		Loads will be covered when there is a hazard of flying/falling dirt, rock, debris, or material.
		All dump trucks will be equipped with a holding device to prevent accidental lowering of the body.
		All hoist levers will be secured to prevent accidental starting or tripping of the mechanism.

Table 5-1

Activity Hazard Analysis
Range 20, Parcel 76Q-X
Backfilling and Site Restoration

Activity	Potential Hazards	Recommended Controls
Backfilling and site restoration (continued)	Dump truck operations (continued)	Trip handles for tailgates will be arranged to keep the operator in the clear.
	Contact with moving equipment	Ground personnel shall wear reflective vests.
	Noise	Noise levels above 85 dBA mandates the use of hearing protection.
Backfill with existing clear materials or borrow material	Confined space hazards and trenching	Excavation and trenching will comply with 29 CFR 1926, USACE (Subpart P and Section 06.I and 25A)
Final grading	Contaminated borrow material	Check historical and analytical data on borrow material
	Noise hazards	Administer hearing protection
	Heavy equipment, travel	Use qualified operators
	Mechanical moving parts, pinch, paint, etc.	Have all guarding in place
		Use lockout/tagout for maintenance
		Assure all emergency stop switches are working
Equipment to be Used	**Inspection Requirements**	**Training Requirements**
• Hand tools • PPE • Heavy equipment	• Pre-postmaintenance • Visual prior to use	• Tailgate Safety Meeting • Site specific orientation • Hazardous waste operations • Hazard communication

Table 5-1

Activity hazard Analysis
Range 20, Parcel 76Q-X
Decontamination of Equipment

Activity	Potential Hazards	Recommended Controls
Job setup for decontamination of equipment	Heavy lifting	Use proper lifting techniques. Lifts greater than 60 lbs. require assistance or mechanical equipment; size-up the lift. Recommend wearing a back support if possible.
	Slip, trip, and fall hazards	Good housekeeping, keep work area picked up and as clean as feasible. Continually inspect the work area for slip, trip and fall hazards.
	Cut hazards	Wear adequate hand protection.
	Lighting	Adequate lighting will be provided to ensure a safe working environment.
	Strains/sprains	When pulling or lifting, do not turn or twist your back.
		Use the proper tool for the task being performed.
	Contact with potentially contaminated materials	Appropriate PPE protection will be required.
		Real time air monitoring will take place during decontamination activities.
		Keep airborne particulates to a minimum.
		Practice good housekeeping, avoid spreading potentially contaminated materials.
	Fueling	Only UL/FM approved safety cans shall be used to store fuel.
		Do not refuel equipment while it is operating.
		Fire extinguishers rated at a minimum of 20BC shall be suitably placed, distinctly marked, readily accessible, and maintained in a fully charged and operable condition.
	Faulty or damaged equipment	Before any machinery or mechanized equipment is placed into service, it shall be inspected and tested by a competent mechanic and certified to be in safe operating condition.

Table 5-1

Activity hazard Analysis
Range 20, Parcel 76Q-X
Decontamination of Equipment

Activity	Potential Hazards	Recommended Controls
Job setup for decontamination of equipment (continued)	Faulty or damaged equipment (continued)	Equipment shall be inspected before being placed into service and at the beginning of each shift.
		Preventive maintenance procedures recommended by the manufacturer shall be followed.
		A lockout - tagout procedure shall be used for equipment found to be faulty or undergoing maintenance.
Pressure washing equipment	High pressures	Shaw Procedure HS303 "Pressured water cleaning and cutting equipment" shall be adhered to at all times.
		The operator shall be thoroughly instructed in handling and operating the gun, nozzle and controls prior to operating the unit.
		Deadman controls shall not be lashed down or rendered inoperative.
		Full Face protection shall be used at all times. This will include safety glasses/goggles and a face shield or a full face respirator.
		The operator shall wear metatarsal covers (guards) at all times
		At no time shall the pressure washer be used to wash/decon personnel.
	Unqualified operators	Machinery and mechanized equipment shall be operated only by designated personnel.
	Out of control equipment	Machinery or equipment requiring an operator shall not be permitted to run unattended.
		Machinery or equipment will not be operated in a manner that will endanger persons or property nor will the safe operating speeds or loads be exceeded.
	Noise	Sound levels above 85 dBA mandates hearing protection.

Table 5-1

Activity hazard Analysis
Range 20, Parcel 76Q-X
Decontamination of Equipment

Activity	Potential Hazards	Recommended Controls
Pressure washing equipment	Activation during repairs	All machinery or equipment will be shut down and positive means taken to prevent its operation while repairs or manual lubrications are being done.
	Pinch points	Keep feet and hands clear of moving/suspended materials and equipment.
		Stay alert at all times!
	Falling objects	Hardhats, remove unsecured tools and materials before operating equipment.
	Falling objects	Stay alert and clear of materials suspended overhead.
	Flying debris	Splash shield will be used.
	Contact with potentially contaminated materials	Appropriate PPE will be required.
	Hot work (hot water/steam cleaning)	Shaw Procedure HS314 "Hot Work in Hazardous Locations" will be adhered to at all times during any operations involving hot work.
Stage-setup equipment for pumping liquids	Pinch points	Keep hands, fingers, and feet clear of moving parts.
	Heavy lifting	Any lifting over 60 lbs requires assistance or the use of a mechanical lifting device.
	Moving equipment	Signal person will assist in positioning equipment.
	Contact with potentially contaminated materials	Real time air monitoring will take place. Appropriate PPE protection will be required.
	Faulty equipment	Equipment will be inspected prior to being placed into service and at the beginning of each shift.
	Pressurized systems	All discharge hoses and connections shall be routinely inspected.
	Noise	Sound levels above 85 dBA mandates hearing protection.

Table 5-1

Activity hazard Analysis
Range 20, Parcel 76Q-X
Decontamination of Equipment

Activity	Potential Hazards	Recommended Controls
Pumping liquids	Fire	A dry chemical fire extinguisher with a minimum UL rating of 1A5BC will be readily available.
	Refueling	Proper bonding and grounding. Only UL/FM approved safety cans will be used.
	Noise	Noise levels above 85 dBA mandates hearing protection.
	Heavy equipment operations	Before any machinery or mechanized equipment is placed into service, it shall be inspected and tested by a competent mechanic and certified to be in safe operating condition.
		Equipment shall be inspected before being placed into service and at the beginning of each shift.
		Preventive maintenance procedures recommended by the manufacturer shall be followed.
		A lockout - tagout procedure shall be used for equipment found to be faulty or undergoing maintenance.
Loadout of equipment		Machinery and mechanized equipment shall be operated only by designated personnel.
		Getting on or off any equipment while it is in motion is prohibited.
		Machinery or equipment requiring an operator shall not be permitted to run unattended.
		Machinery or equipment will not be operated in a manner that will endanger persons or property nor will the safe operating speeds or loads be exceeded.

Table 5-1

Activity hazard Analysis
Range 20, Parcel 76Q-X
Decontamination of Equipment

Activity	Potential Hazards	Recommended Controls
Loadout of equipment (continued)	Heavy equipment operations (continued)	All machinery or equipment will be shutdown and positive means taken to prevent its operation while repairs or manual lubrications are being done.
		All repairs on machinery or equipment will be made at a location which provides protection from traffic for repair persons.
		All self-propelled construction equipment shall be equipped with a back-up alarm.
	Fire	Each bulldozer, backhoe, or other similar equipment will be equipped with at least one dry chemical fire extinguisher having a minimum UL rating of 1A5BC.
	Truck and equipment traffic	Site personnel will wear orange safety vests to identify themselves to traffic.
		Load out area will be properly demarcated. Ground personnel to make eye contact with equipment/vehicle operators prior to traffic zone entry. Ground personnel will avoid blind spots directly in front of and directly behind equipment/vehicles.
	Slip, trip, and fall hazards	Good housekeeping, keep work area picked up and as clean as feasible. Continually inspect the work area for slip, trip, and fall hazards. Look where you step, ensure safe footing when climbing on/off equipment etc.
	Pinch points	Keep feet and hands clear of moving/suspended materials and equipment.
		Beware of contact points. Stay alert at all times!
	Strains/sprains	Use proper lifting techniques. Lifts greater than 60 lbs require assistance or mechanical equipment. Size-up the lift. When pulling on materials, pull in a straight line. Do not twist and pull simultaneously.

Table 5-1

Activity hazard Analysis
Range 20, Parcel 76Q-X
Decontamination of Equipment

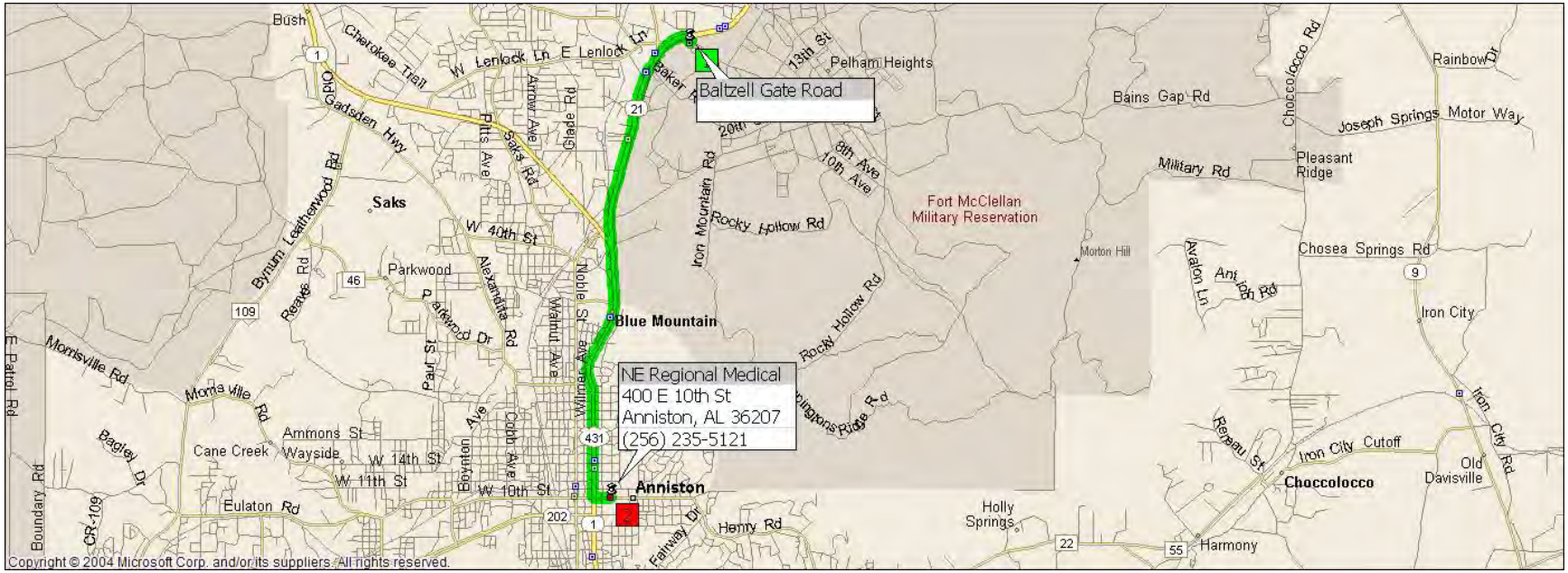
Activity	Potential Hazards	Recommended Controls
Loadout of equipment (continued)	Ropes, slings, chains, and hooks	The use of ropes, slings, and chains shall be in accordance with the safe recommendations of their manufacturer.
		Rigging equipment shall not be loaded in excess of its recommended safe working load.
		The use of open hooks is prohibited in rigging to lift any load where there is danger of relieving the tension on the hook due to the load or hook catching or fouling.
		Hooks, shackles, rings, pad eyes, and other fittings that show excessive wear or that have been bent, twisted, or otherwise damaged shall be removed from service.
		Rigging equipment for material handling shall be inspected prior to use on each shift and as necessary during its use to insure that it is safe. Defective rigging equipment shall be removed from service.
		Rigging equipment, when not is use, shall be removed from the immediate work area and properly stored so as not to present a hazard.
		Taglines shall be used to control the loads being handled by hoisting equipment.
	Hoisting equipment	All hoisting equipment shall be capable of passing a performance (operating) test prior to being placed into service.
		At no time shall the hoisting equipment be loaded in excess of the manufacturers rating except during performance tests.
		While hoisting equipment is in operation, the operator shall not perform any other work and he/she shall not leave his/her position at the controls until the load has been safely landed or returned to the ground.

Table 5-1

Activity hazard Analysis
Range 20, Parcel 76Q-X
Decontamination of Equipment

Activity	Potential Hazards	Recommended Controls
Loadout of equipment (continued)	Hoisting equipment (continued)	A standard signal system shall be used on all hoisting equipment.
	Heat	Be aware of warning signs of these conditions
	Insects, spiders, and snakes	Inspect work area carefully and avoid placing hands and feet into concealed areas.
	Cut hazards	Wear adequate hand protection.
	Falling objects	Hardhat, stay alert and clear of materials suspended overhead, steel-toed boots.
Equipment to be Used	**Inspection Requirements**	**Training Requirements**
• Hand tools • PPE • Heavy equipment • Pressure Washer	• Pre-postmaintenance • Visual prior to use	• Tailgate Safety Meeting • Site specific orientation • Hazardous waste operations • Hazard communication • Pressure washer training

Figure 5-1 Hospital Route Map

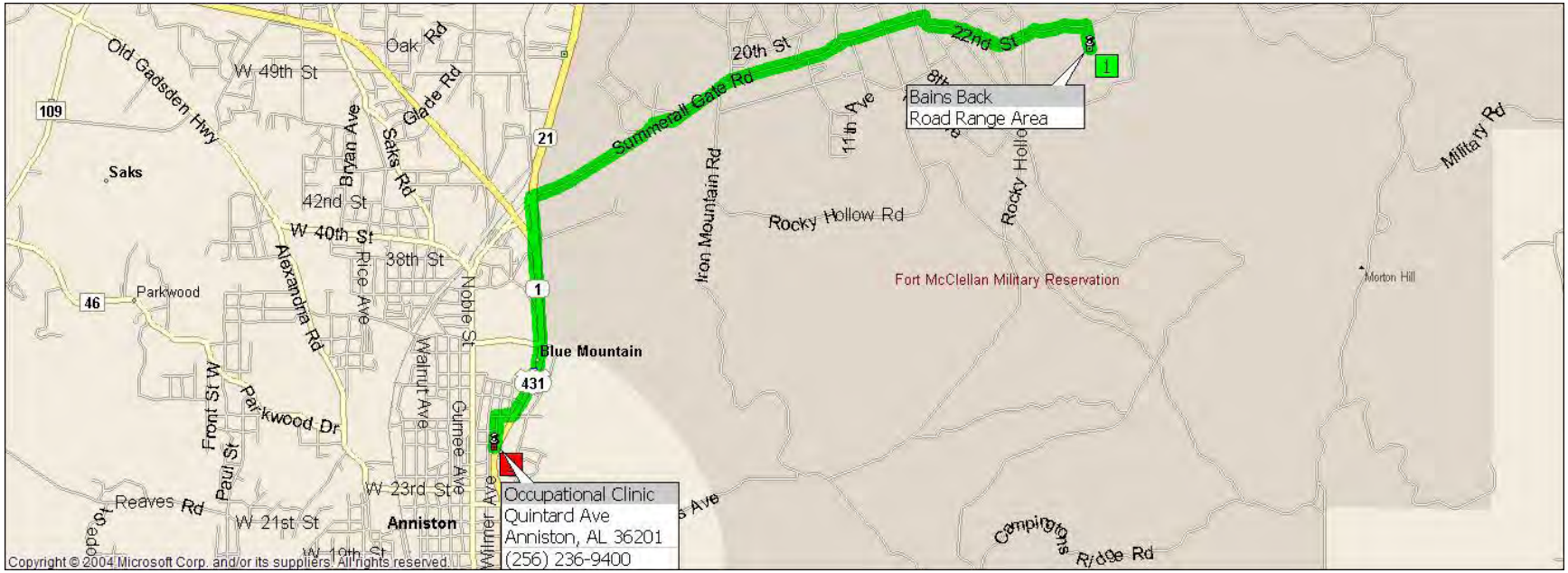


Mile	Instruction	For
0.0	**Depart Baltzell Gate Road on Local road(s) (North)**	**54 yds**
0.1	Turn LEFT (West) onto Baltzell Gate Rd	153 yds
0.1	Turn LEFT (West) onto SR-21 [Jacksonville State University Hwy]	2.5 mi
2.7	Merge onto US-431 [SR-1]	2.6 mi
5.2	Turn LEFT (East) onto E 10th St	0.2 mi
5.4	**Arrive NE Regional Medical [400 E 10th St, Anniston, AL 36207]**	

SUMMARY

Driving distance: 5.4 miles
Trip duration: 9 minutes
Driving time: 9 minutes

Figure 5-2 Clinic Route Map



Mile	Instruction	For
0.0	**Depart Bains Back on Local road(s) (North)**	**0.1 mi**
0.1	Turn LEFT (West) onto Local road(s)	0.4 mi
0.5	Road name changes to 22nd St	0.4 mi
1.0	Bear LEFT (West) onto 21st St	0.1 mi
1.1	Bear RIGHT (North-West) onto MacArthur Ave, then immediately turn LEFT (West) onto 12th St	0.1 mi
1.2	Road name changes to 21st St	0.2 mi
1.4	Road name changes to 12th Ave	0.3 mi
1.8	Bear RIGHT (West) onto Summerall Gate Rd	2.0 mi
3.7	Road name changes to Local road(s)	21 yds
3.7	Turn LEFT (South) onto SR-21 [Jacksonville State University Hwy]	0.4 mi
4.1	Merge onto US-431 [SR-1]	0.9 mi
5.1	Turn RIGHT (West) onto E 28th St	153 yds
5.1	Turn LEFT (South) onto Quintard Ave	0.2 mi
5.3	**Arrive Occupational Clinic [Quintard Ave, Anniston, AL 36201]**	

SUMMARY

Driving distance: 5.3 miles
Trip duration: 17 minutes
Driving time: 17 minutes

ATTACHMENT 1

LEAD COMPLIANCE PLAN

Lead Compliance Plan
Range 20, Infiltration Course, Parcel 76Q-X
Soil Remediation on USFWS Property

Prepared for:

U.S. Department of the Army
Mobile District, Corps of Engineers,
109 St. Joseph Street
Mobile, Alabama 36602

Prepared by:

Shaw Environmental, Inc.
312 Directors Drive
Knoxville, Tennessee 37923

Contract Number DACA21-96-D-0018
Task Order CK11
Shaw Project No. 800486

July 2009

Revision 0

Acknowledgements

The approved version of this installation-wide safety and health plan amendment related to control of potential lead exposure from remediation activities at Range 20, Fort McClellan, Alabama has been provided to the site coordinator. I acknowledge my responsibility to provide the site coordinator with the equipment, materials, and qualified personnel to implement fully all safety requirements in this amendment. I will formally review this plan with the health and safety staff every 6 months until project completion.

Steven Moran, Shaw Project Manager — Date: 7/7/09

I acknowledge receipt of this amendment from the project manager, and that it is my responsibility to explain its contents to all site personnel and cause these requirements to be fully implemented. Any change in conditions, scope of work, or other change that might affect worker safety requires me to notify the project manager and the health and safety manager.

Jeff Tarr, Shaw Site Manager — Date: 7/7/09

Safety and Health Plan
Acknowledgement Form

I have been informed of, and will abide by the procedures set forth in this lead compliance plan related to control of potential lead exposure at Range 20, Fort McClellan, Alabama. By signing this acknowledgement form, I certify receipt of hazard communication training required for safe execution of my tasks and acknowledge review and understanding to the requirements of this site-specific safety and health plan.

Name Printed	Date	Signature	Representing

Reviews and Approvals

I have read and approve this lead compliance plan for Range 20, Fort McClellan, Alabama, with respect to project hazards, regulatory requirements, and Shaw E&I, Inc. policies and procedures.

Steven Moran, Project Manager
Shaw Environmental, Inc.

7/7/09
Date

Doug Russell, Health and Safety Manager
Shaw Environmental, Inc.

7/7/09
Date

Jeff Tarr, Site Manager
Shaw Environmental, Inc.

7/7/09
Date

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1.0 Purpose

This Lead Compliance Plan (LCP), in conjunction with the Site-Specific Safety and Health Plan (SSHP), is intended to ensure that safe working conditions exist during certain lead related activities. The LCP describes the requirements and procedures to be used while performing specific activities and includes:

- Responsibilities of persons on site
- Training Program
- Medical Surveillance Program
- Hazard Analysis/Assessment
- Hazard Control Measures
- Personnel Protection Program
- Decontamination Procedures
- Industrial Hygiene Monitoring Program.

The LCP will, in conjunction with the SSHP, provide all the necessary procedures and guidelines for safe work and will comply with the occupational safety and health standards for lead in 29 Code of Federal Regulations (CFR) 1926.62 and in EM 385-1-1 06.B.05.

This LCP covers the construction activities associated with the investigation, testing, removal or encapsulation of materials or soil containing inorganic lead ("lead") which have the potential to expose personnel to lead at or above the action level of 0.030 milligrams per cubic meter of air (mg/m^3) or elevate an individual's blood lead level above 30 micrograms per deciliter of blood (μg/dL). Lead is primarily present in contaminated soils found at Range 20. The lead is generally in the form of bullet residue from former operations that under gross observation is indistinguishable from surrounding soil.

The scope of this LCP is consistent with that detailed in 29 CFR 1926.62. Organic lead compounds such as tetraethyl lead and tetramethyl lead are excluded. Implementation of this LCP is required when the exposure action level (0.030 mg/m^3) is, or may be, reached **or** employee blood lead levels exceed 30 μg/dL. The regulatory limit for airborne concentration of inorganic lead is 0.05 mg/m^3 and the acceptable concentration of lead in blood is 40 μg/dL or less. However, it is recommended in 29 CFR 1926.62 that blood lead levels not exceed 30 μg/dL in those workers (both male and female) who intend to have children to minimize adverse reproductive health effects to the parents and developing fetus.

2.0 References

This LCP, when accompanied by the Installation-wide Safety and Health Plan and the SSHP, complies with applicable Federal Occupational Safety and Health Administration (OSHA), United States Environmental Protection Agency (USEPA) regulations. This LCP follows the guidelines established in the following documents:

- ***Standard Operating Safety Guides*** (USEPA July 1986);
- ***Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*** (National Institute for Occupational Safety and Health [NIOSH] 86-116);
- Title 29 of the Code of Federal Regulations, Part 1926 (29 CFR 1926) (OSHA Occupational Safety and Health Standards - Construction Industry).
- United States Army Corps of Engineers Safety and Health Requirements Manual, EM 385-1-1, most current edition.

The contents of this LCP, when accompanied by the Installation-wide Safety and Health Plan and the Project SSHP, are consistent with, or supplement, all of the appropriate Shaw E&I (Shaw) corporate Health and Safety Policies and Procedures.

3.0 Definitions

Metallic lead: All inorganic lead compounds and organic lead soaps. Organic lead compounds are excluded from this definition.

Permissible Exposure Limit (PEL): 50 micrograms/cubic meter calculated as an 8 hour time weighted average.

Action Level: 30 micrograms/cubic meter calculated as an 8 hour time weighted average.

Competent Person: An individual who is capable of identifying existing and predictable lead hazards in the surroundings or working conditions and who has authorization to take prompt corrective measures to eliminate them.

Compliance Program: A written program identifying various practices, activities, technologies and schedules that will be utilized to achieve compliance with the OSHA PEL and Action Level.

4.0 General

All persons on site are responsible for continuous adherence to safety and health procedures during the performance of any work. In no case may work be performed in a manner which conflicts with the intent of, or the inherent safety precautions expressed in, this LCP. After due warning, persons who violate any procedure may be dismissed from the site, terminated, or have their contract revoked. Blatant disregard or repeated infractions of safety and health policies are grounds for immediate dismissal or removal from the site. Safety and health responsibilities for those responsible or governed by this LCP are detailed in the following sections.

All Shaw and contractor personnel governed by this LCP are required to participate in a review of and acknowledge their understanding of this LCP, the Installation-wide Health and Safety Plan and the appropriate SSHP.

Persons on site are required to immediately report any of the following to their Supervisor and/or the Site Superintendent/Project Manager:

- Accidents and injuries, no matter how minor
- Unexpected or uncontrolled release of lead contaminated materials or other chemical substances
- Any signs or symptoms of chemical or physical trauma
- Any unsafe or malfunctioning equipment
- Any changes to site conditions or working procedures which may affect the safety and health of project personnel
- Any deviation of required work practices which may contribute to lead exposure.

5.0 Training Program

5.1 General Requirements

All applicable training requirements identified in the SSHP will be met. Additional requirements, established in 29 CFR 1926.62, as outlined below, will be met.

Subcontractors performing activities covered by this LCP must provide verification of all required training before work may begin.

5.2 Lead Training Requirements

A pre-project meeting will be held prior to work beginning in any area covered by this LCP. Those required to attend include: Project Management and work crew (including subcontractor employees) and project SSHO.

The pre-project meeting will review, at a minimum, the following:

- The contents of this LCP and the SSHP
- The contents of 29 CFR 1926.62 including the written compliance program specified in 29 CFR 1926.62 (e)(2)
- The specific nature of the operations which could result in exposure to lead above the action level (i.e., project work plan)
- Hazards associated with exposure to lead
- The purpose, proper selection, fitting, use, and limitations of respirators
- Methods of controlling exposure to lead: including work area controls, personal protective equipment, decontamination and hygiene procedures, and safe work practices
- Purpose and description of the LCP Medical Surveillance Program, medical removal protection program and medical treatment available as described in 29 CFR 1926.62
- Purpose and description of the LCP industrial hygiene monitoring program
- Instructions to project personnel that chelating agents should not routinely be used to remove lead from their bodies and should not be used at all except under the direction of a licensed physician

- Employee's rights as described in 29 CFR 1926.59 and 29 CFR 1910.1020.

5.3 Access to Information and Training Materials

A copy of the 29 CFR 1926.62 standard and its appendices will be made readily available to all affected employees. Documentation of all training conducted in compliance with this LCP will be kept in a central file at Shaw's project management office. Access to these records will be made available upon request.

6.0 Medical Surveillance Program

6.1 General Program

The applicable medical examinations identified in the SSHP will be provided to all project personnel covered by this LCP. Contractors must provide documentation to the SSHO that these exams have been successfully completed by all crew members assigned to work areas governed by this LCP before work may begin.

6.2 Lead Program

A LCP Medical Surveillance Program shall be established, in compliance with 29 CFR 1926.62, for persons potentially occupationally exposed to lead during work activities according to the following guidelines:

Biological Monitoring

- Persons supporting work activities identified as having lead exposure potential
- Persons identified by the health and safety manager to be in a "lead sensitive" job category
- Persons occupationally exposed any day at or above the action level for lead (0.030 mg/m^3).

Lead Specific Medical Exam

- Persons identified to be in a "lead sensitive" job category
- Persons occupationally exposed at or above the action level for lead (0.030 mg/m^3)
- Persons for whom biological monitoring has indicated lead or zinc protoporphyrin levels beyond established acceptable levels
- Persons showing signs or symptoms associated with lead intoxication
- Persons in work areas covered by this LCP requesting medical advice concerning the effects of current or past lead exposures
- Persons in work areas covered by this LCP, with a confirmed pregnancy

- Persons in work areas covered by this LCP demonstrating difficulty breathing during use of respiratory protective equipment.

This LCP Medical Surveillance Program shall be provided to employees by Shaw. Where this LCP Medical Surveillance Program and the Medical Program required by 29 CFR 1926.65, 1910.120, are duplicated, efforts shall be made to utilize available medical information. Where the programs differ, the most conservative program requirements, in terms of the patient, shall be met. A list of current program participants will be maintained by the health and safety manager and the SSHO.

Subcontractors must provide documentation that their employees participate in a Medical Surveillance Program for Lead which meets or exceeds the Shaw Program described in this LCP.

6.2.1 Lead Program Exam Content

Biological Monitoring. The biological monitoring aspect of the LCP Medical Surveillance Program will consist of blood sampling and analysis for lead and zinc protoporphyrin (ZPP) levels.

Lead Specific Medical Exam. The Lead Specific Medical Exam aspect of the LCP Medical Surveillance Program will be managed by Health Resources and is consistent with applicable regulations. At a minimum, the exam contains the following:

- A detailed work history and a medical history, with particular attention to past lead exposure (occupational and non-occupational), personal habits (smoking, hygiene, etc) and past gastrointestinal, hematologic, renal, cardiovascular, reproductive and neurological concerns

- A thorough physical examination, with particular attention to teeth, gums, hematologic, gastrointestinal, renal, cardiovascular, and neurological systems

- Blood pressure measurement

- Blood sample and analysis to determine:

  - Blood lead levels

  - Hemoglobin and hematocrit determinations, red cell indices, and examination of peripheral smear morphology

- Zinc protoporphyrin
- Blood urea nitrogen
- Serum creatinine.

- A routine urinalysis with microscopic examination
- Any laboratory or other test relevant to lead exposure which the examining physician deems necessary by sound medical practice
- A pregnancy test, if appropriate.

The following information will be provided to the examining physician by the health and safety manager:

- A copy of 29 CFR 1926.62
- A description of the person's anticipated or actual job duties as they relate to the potential exposure
- Anticipated and/or actual exposure levels to lead and any other toxic substances (as appropriate)
- A description of personal protective equipment to be used
- Occupation history, if available.

6.2.2 Lead Program Exam Frequency

Biological monitoring will be performed every 2 months for the first 6 months, and every 6 months thereafter, while the activity which required the monitoring is being performed. Should the activity requiring the monitoring not last over a two month period, an initial exam and an exam at the end of the activity will be conducted for those who do not perform lead abatement activities on a regular basis. All employees that test at 30 µg of lead/100 grams of blood or higher will submit to a monthly test until the level decreases.

The Lead Specific Medical Exam shall be performed at least annually for those employees having the potential to be exposed or who had exposure. The exam will also be made available as medically appropriate to persons who have either been removed from exposure to lead due to a risk of sustaining material impairment to health, or otherwise been limited pursuant to a final medical determination.

6.2.3 Exit Exam

If a Shaw or subcontractor employee covered by this LCP transfers to a non-lead area, terminates, or completes the contracted project within six months of the due date of the physical , an exit exam will be given in accordance with Shaw Procedures HS100 and this LCP. It is the responsibility of the PM and/or the employee's immediate supervisor to notify the health and safety manager within a reasonable time period (one week) prior to transfer, termination, or completion of contracted work to allow for the necessary arrangements. Employees refusing an exit exam will be sent a certified letter stating the exam is available at time of end of service to the project.

6.2.4 Chelation

In accordance with 29 CFR 1926.62, Shaw shall assure that affected project personnel do not engage in prophylactic chelation at any time. If therapeutic or diagnostic chelation is required as a result of workplace exposure to lead, Shaw shall assure that it be done under the supervision of a licensed physician, in a clinical setting, with thorough and appropriate medical monitoring, and that the person is notified in writing prior to its occurrence.

6.4 Notification of Results

Shaw will obtain a written medical opinion from Health Resources, in the form of a Medical Summary Report (MSR) which contains the following information:

- The physician's opinion as to whether the employee has any detected medical condition which would place the employee at increased risk of material impairment of the employee's health from exposure to lead
- Any recommended special protective measures to be provided to the employee, or limitations to be placed upon the employee's exposure to lead
- Any recommended limitation upon the employee's use of respirators, including determination of whether the employee can wear a powered air purifying respirator (PAPR) if a physician determines that the employee cannot wear a negative pressure respirator
- The results of the blood lead and other biological exam determinations.

A representative of the H&S Department will communicate medical results and any restrictions/recommendations through the Medical Summary Report per Shaw Procedure HS100. It is the responsibility of Health Resources to communicate, in writing, all medical findings,

determinations, and opinions relating to an employee's potential or real exposure to the health and safety manager in a timely manner so that any necessary arrangements to mitigate the exposure, establish an air monitoring program and observe work restrictions established by the physician can be made.

6.5 Interpretation of Results

6.5.1 Multiple Physician Review

Because Shaw has selected the physician to conduct the examinations for the LCP, persons participating in the program may designate a second physician:

- To review any findings, determinations or recommendations of the initial physician
- To conduct such examinations, consultations, and laboratory tests as the second physician deems necessary to facilitate the review.

The participant has a right to this second physician review after each occasion that the Shaw selected physician conducts a medical examination or consultation related to this LCP. This second opinion will be provided at no cost to the participant. The participant will be provided a written reminder of this right at the time the appointment is kept (Figure 2). However, the participant must do the following within 15 days after the receipt of the Shaw selected physician's written opinion in order to qualify for the second opinion:

- Inform the health and safety manager, in writing, that they intend to seek a second medical opinion
- Initiate steps to make an appointment with the physician of their choice.

6.5.2 Medical Removal

Any employee with an elevated blood lead (at or above 30 μg/dL) will be removed from any potential or real exposure to lead and additional medical evaluations performed. Any employee whose medical evaluation results in a medical finding, determination, or opinion that the employee has a detected medical condition which places the employee at increased risk of material impairment to health from exposure to lead shall be temporarily removed from any potential or real exposure to lead. Persons with elevated blood lead levels will not be required to enter the exclusion zones.

Shaw will provide a Shaw Associate up to 18 months of medical removal protection benefits on each occasion that an employee is removed from exposure to lead or otherwise limited pursuant to this LCP. This means that, as long as the job the employee was removed from continues, the employee shall retain the total normal earnings, seniority and other employment rights and benefits of a Shaw Associate. This includes the employee's right to their former job status as though the employee had not been medically removed or otherwise medically limited.

6.5.3 Medical Restrictions

Where a medical determination results in any recommended special protective measures for the employee, or limitations on the employee's exposure to lead, Shaw shall implement and act consistent with the recommendation. The employee's supervisor, as well as appropriate members of project management will be informed of any medical restrictions so that compliance with those restrictions may be assured.

6.5.4 Return to Former Job Status

The employee who has been medically removed from activities which may have resulted in lead exposure may be returned to former job status when:

- Two consecutive blood sampling events indicate that the employee's blood lead level is at or below 30 μg/dL
- A subsequent medical determination results in a medical finding, determination, or opinion that the employee no longer has a detected medical condition which places the employee at increased risk of material impairment to health from exposure to lead.

Any limitations placed on an employee or any special protective measures provided will be removed upon receipt of a medical determination result which indicates that those limitations or measures are no longer needed. The employee must provide appropriate documentation of medical clearance to the health and safety manager and SSHO and cannot return to work activities covered by this LCP until a Return to Work Authorization has been completed by the Shaw physician. A copy of the authorization form is in Shaw procedures.

6.6 Recordkeeping

Medical records will be maintained in accordance with Shaw Procedures HS102 and 104 and 29 CFR 1926.62 section (n).

6.7 Qualifying Activities and Job Titles

6.7.1 Activities

Activities which are covered by this LCP and qualify for participation in the LCP Medical Surveillance Program include:

- Hazardous waste operations in the LCP Work Areas
- Handling of materials from the LCP Work Areas
- Engineering activities involving lead containing materials/waste
- Construction activities involving lead containing materials/waste
- Sampling activities which list lead or lead compounds as a constituent
- Other activities which involve the potential contact with lead containing materials/waste.

6.7.2 Job Titles/Groups

Persons potentially exposed to contaminated soil or other potentially contaminated material shall be included in the LCP Medical Surveillance Program.

7.0 Lead Exposure Potential, Routes of Entry and Assessment

7.1 Exposure Potential and Routes of Entry

7.1.1 Exposure Potential

Selected work activities will, as previously described in SSHP, may require contact with soil, dust, and potentially other substances that may be contaminated with lead, or lead containing materials. The anticipated primary route of exposure will be inhalation and possible skin contact with contaminated materials.

7.1.1.1 Chemical Identification

- Chemical formula for Lead is Pb.
- Appearance of Pb: heavy, soft gray ductile solid.
- Current OSHA Permissible Exposure Limit (PEL) for lead is 0.05 mg/m^3.
- The action level for inorganic lead in air is 0.030 mg/m^3.

Pure lead is a metal at room temperature and pressure and is a basic chemical element. It can combine with other substances to form other lead compounds, such as tetraethyl lead (TEL) or tetramethyl lead (TML).

7.1.1.2 Health Risk Information

Lead is very toxic to the body, especially the nervous system. Health effects from lead exposure include nervousness, sleep disturbances, learning disabilities, and behavior abnormalities. Research indicates that adverse health effects from exposure to lead can occur at levels lower than previously recognized. Lead is especially toxic to children because their nervous system is more vulnerable.

7.1.2 Routes of Exposure

All forms of lead can be absorbed into the body by inhalation (breathing) and ingestion (eating). Inorganic lead is not absorbed through the skin such as TEL, which is readily absorbed through the skin. When lead is scattered in the air as a dust, fume, or mist, it can be inhaled and absorbed through the lungs and upper respiratory tract. Inhalation of airborne lead is generally the most important source of occupational lead absorption. Lead can affect the body if it is inhaled, comes in contact with the eyes or skin, or is swallowed. It may readily enter the body through

the skin. Lead is also absorbed through the digestive system if swallowed. If you handle food, cigarettes, chewing tobacco, or make-up with hands contaminated with lead, it will contribute to an exposure through ingestion.

A significant portion of the lead that is inhaled or ingested can get into the blood stream. Once in the blood stream, lead is circulated throughout the body and stored in various organs and body tissues. Some of this lead is quickly filtered and excreted, but some remains in the blood and other tissues. As exposure to lead continues, the amount stored in the body will increase if the body is absorbing more lead than excreting. Even though there is no awareness of immediate symptoms of disease, the lead stored in the body tissue can be slowly causing irreversible damage.

7.1.2.1 Short-Term (Acute) Overexposure

Lead is a potent, systemic poison that serves no known useful function once absorbed by your body. Taken in large enough doses, lead can kill you in a matter of days. A condition affecting the brain called acute encephalopathy may arise which develops quickly to seizures, coma and death from cardio-respiratory arrest. Short term occupational exposures of this magnitude are highly unusual, but not impossible. Similar forms of encephalopathy may arise from extended chronic exposure to lower doses of lead. There is no sharp dividing line between rapidly developing acute effects of lead and chronic effects which take longer to acquire.

7.1.2.2 Long-Term (Chronic) Overexposure

Chronic overexposure to lead may result in severe damage to your blood-forming, nervous, urinary and reproductive systems. Some common symptoms of chronic overexposure include loss of appetite, metallic taste in the mouth, anxiety, constipation, nausea, pallor, excessive tiredness, weakness, insomnia, headache, nervous irritability, muscle and joint pain or soreness, fine tremors, numbness, dizziness, hyperactivity and colic. In lead colic there may be severe abdominal pain. Damage to the central nervous system in general and the brain (encephalopathy) in particular are among the most severe forms of lead poisoning.

The absorption by humans of a sufficient quantity of tetraethyl lead either briefly at a high rate or for prolonged periods at a lower rate may cause intoxication. The onset of symptoms may be delayed for up to eight days after termination of exposure. The milder toxic effects are difficulty in sleeping, tiredness, wild dreams, anxiety, trembling, spasms, slow heart beat, low body temperature, paleness, nausea and loss of appetite. More severe intoxication causes episodes of disorientation, hallucinations, grimacing, and intense activity which requires that the person be

restrained. These episodes may convert into manic or violent convulsive seizures which may end in unconsciousness or death. Organic lead may cause irritation of the eyes.

Chronic overexposure to lead also results in kidney damage with few, if any, symptoms appearing until permanent damage has occurred.

Chronic overexposure to lead impairs the reproductive systems of both men and women. Overexposure to lead may result in decreased sex drive, impotence and sterility in men. Lead can alter the structure of sperm cells raising the risk of birth defects. Lead exposure may result in decreased fertility and abnormal menstrual cycles in women. Lead is also toxic to the developing fetus and can result in birth defects, mental retardation and behavioral disorders.

Personnel shall inform their supervisor and SSHO of any non-visual effects of toxic exposure such as:

- Headache, dizziness, blurred vision, insomnia, numbness
- Nausea, cramps, muscle or joint pain
- Metallic taste, loss of appetite
- Irritation of the eyes, skin or respiratory tract.

7.1.2.3 Health Protection

The measurement of the body's blood lead level is the most useful indicator of the amount of lead being absorbed by an individual. The best way to prevent all forms of lead-related impairments and diseases - both short and long term - is to maintain the blood lead level below 30 μg/dl. The provisions of the OSHA lead standard and Shaw's LCP are designed with this end in mind. Medical surveillance, respiratory protection guidelines, work practices, and hygiene standards are all part of the design to control exposure to lead to a safe level. Shaw has the prime responsibility to provide a healthy work place, but all employees have a responsibility to follow safety and health procedures and practices.

7.2 Exposure Assessment

It is required that the SSHP address lead exposure conditions during tasks involving lead containing coatings, paints, soils and any additional aspects of construction/demolition or remediation activities. 29 CFR 1926.62 (d) is to be reviewed and the required lead exposure assessment will incorporate the PPE and respiratory protection for specific tasks.

7.2.1 Exposure Monitoring

Exposure monitoring will be conducted for exposure assessment of tasks utilizing full shift personnel sampling of each job classification and each work area.

7.2.2 Compliance Program

This document fulfills the requirement for a written compliance program to be developed prior to the initiation of any lead construction related tasks. The elements of this program are those identified as 29 CFR 1926.62 (e)(2).

8.0 Hazard Control Program, Treatment Methods and Disposal

8.1 Hazardous Chemical Exposure

Personal protective equipment (PPE) will be utilized to minimize worker exposure to lead or lead containing compounds when engineering or administrative controls are not feasible. Engineering controls may include ventilation equipment, working upwind, dust control, and vapor suppression techniques. Engineering controls are the preferred methods for hazard control. Administrative controls include reducing the duration of a single worker's exposure by increasing the number of operators and rotating them. Rotation is not recommended as it increases the numbers of persons potentially exposed. PPE includes such items as chemical resistant coveralls, respiratory and hearing protection, monitoring equipment and safety gear. Selection of appropriate PPE will be made by the SSHO, under the supervision of the health and safety manager, and will be based on knowledge of the chemical and physical state of the lead compounds, concentration in air/materials potentially contacted, duration of exposure, nature of the activities to be conducted in the work area, potential safety hazards, additional potential chemical hazards, and the construction and material of the PPE being considered. The health and safety manager will have final authority on PPE selection and makes initial decisions on PPE selection.

8.2 Hygiene Practices and Housekeeping

In addition to the decontamination procedures detailed in the SSHP, lead-associated housekeeping procedures detailed in 29 CFR 1926.62 (h), and the following hygiene and housekeeping practices will be followed:

- Clean change areas shall be maintained in the Support (Clean) Zone (SZ).
- Do not dry sweep, shovel or handle lead contaminated materials where the potential for airborne dust generation is likely.
- Shower facilities shall be maintained and available at all times during field work covered by the LCP if potential lead exposure exceeds the action level listed in the SSHP related to specific tasks to be performed.
- Vacuum use shall be with HEPA filtration only.
- An adequate supply of cleansing agents and towels shall be maintained.

- Compressed air shall not be used where lead contaminated materials may be generated in air.

- All reusable clothing materials shall be laundered.

- A Decontamination Station will be available in the Contamination Reduction Zone (CRZ) for all projects covered by this LCP.

- Food, beverage, and tobacco products shall not be present or consumed in the Exclusion Zone (EZ) or the CRZ.

- Project personnel will wash their hands, forearm, face and neck before eating, drinking, smoking or applying cosmetics.

- No used protective clothing or equipment is permitted inside the support zone clean areas without being properly decontaminated.

- Appropriate PPE and/or work clothes for use during project activities shall be provided by Project Management if required based on potential for exposure as noted in the SSHP for the task.

- Project personnel shall shower at the end of the shift before leaving the site as determined by the SSHO or health and safety manager.

- An adequate supply of potable water shall be provided at the work site.

- Portable containers used to dispense drinking water shall be capable of being tightly closed, and equipped with a tap. Water shall not be dipped from the container.

- Containers used to distribute drinking water shall be clearly marked and not used for any other purpose.

- Single service cups (to be used only once) will be supplied. A sanitary container for the unused cups and a receptacle for disposing of the used cups shall be provided.

8.3 Lead Waste

Lead containing waste (whether wet or dry) resulting from the movement or demolition of building components, or equipment will be segregated by waste stream, packaged appropriately and disposed of in accordance with the waste acceptance criteria of the disposal site.

9.0 Work Area Control

9.1 General

The Hazard Control Program for the project is detailed in the Installation-wide Safety and Health Plan and SSHP. The SSHP will detail the control program, based on all site hazards, including those related to lead exposure. This LCP details the control program required for work areas where lead exposure is expected or anticipated.

The work areas covered by this LCP will be delineated into exclusion zones. These zones are defined and described in the installation-wide health and safety plan. The SSHO shall record in the Field Activity Daily Log all persons entering a work area supported by this LCP. The Entry Log shall be maintained at each work area. At the end of each shift, the Entry Logs will be turned into the Site Administrative Assistant for filing.

9.2 Work Zones and Signs

Prior to work beginning, the SM/PM will classify the work area into three zones as required if an employee's exposure to lead exceeds the PEL: (1) Exclusion Zone (EZ), (2) Contamination Reduction Zone (CRZ), and (3) Support (Clean) Zone (SZ). The purpose of this classification is to reduce the accidental spread of hazardous substances between contaminated and clean areas. The establishment of work zones will help ensure that; personnel are properly protected against potential hazards present, work activities and contamination are confined to appropriate areas, and personnel can be located and evacuated in an emergency. The EZ will be identified by some physical means (such as barrier tape) and labeled with the following warning sign:

WARNING
LEAD WORK AREA
POISON
NO SMOKING OR EATING

Only Shaw personnel, contractors and authorized visitors who have completed the 40-hour Hazardous Waste Operations training course (or equivalent) and meet the additional requirements of the Exclusion Zone (e.g., Lead Safety Training) will be allowed within the area.

9.3 Personnel Protection Program (PPE)

9.3.1 Acceptable Contaminant Concentrations

- Current OSHA PEL for lead is 0.05 mg/m^3.
- The action level for inorganic and organic lead compounds is 0.030 mg/m^3

9.3.2 Personal Protective Equipment (PPE)

Personal protective equipment (PPE) will be assigned according to project tasks and work areas.

The health and safety manager has the only authority to downgrade PPE levels. This type of change will be based on a minimum of two consecutive sets of integrated monitoring data (no less than one and no more than three work days apart), or real-time monitoring which indicate that airborne contaminant concentrations are below current action levels recommended/required by appropriate agencies.

9.3.2.1 Levels of Protection

Project-specific personnel protective equipment requirements are given in the SSHP related to a specific task.

9.3.2.2 PPE Selection Criteria

PPE will be selected based on the level of hazard to which the workers may be exposed. Criteria will generally relate to physical condition of the lead and the potential to create respirable dusts. Downgrading of the PPE levels will not be made without the approval of the health and safety manager.

9.4 Respiratory Protection Program

The Respiratory Protection Program detailed in the SSHP shall be followed. Respiratory protection procedures detailed in 29 CFR 1926.62 shall also be followed. The following additions are required for work covered by this LCP.

- Air-purifying respirators will be cleaned with mild soap and warm water daily by the wearer. The respirator will be air-dried before being reassembled and stored in a sealable container in the SZ. Employees responsible for such activity will be given adequate training annually by the SSHO.

- Respirators will not be placed in unprotected areas of potential contamination when not in use.

- Qualified project personnel will have an assigned air purifying respirator when use is required.

- Qualified personnel will have been fit tested and certified in the use of air purifying respirators within the past 12 months. Fit test and respirator qualification cards or certifications must be available prior to commencing work covered by this LCP.

- Within the past year, project personnel assigned to use respiratory protection must have been medically certified as being capable of wearing a respirator. Documentation of the medical certification must be available to the SSHO prior to commencement of site work.

- Project personnel scheduled to wear a respirator will be clean shaven. Mustaches and side burns are permitted, but they must not interfere with the face-to-face piece seal of the respirator.

- Respirators will be inspected and a positive and negative pressure test performed prior to each use by the user.

- After each use, the respirator will be wiped with a disinfectant cleansing wipe. The respirator will also be thoroughly cleaned at the end of the work shift. The respirator will be stored in a clean sealable plastic bag.

9.5 Decontamination Program

The decontamination program has been designed to eliminate the spread of hazardous material contamination beyond the CRZ and to reduce that contamination to a minimum outside the Exclusion Zone. By following decontamination procedures and reducing the spread of contamination, the risk of exposure to contaminants while removing protective clothing is also reduced and good personal hygiene practices are enhanced.

The procedures listed in the SSHP for personnel decontamination will be implemented based on the required level of protection. Procedures for equipment decontamination are also outlined. Modification to these procedures or the program must be approved, in writing, by the health and safety manager and communicated to all project personnel prior to implementation.

10.0 Industrial Hygiene Monitoring Program

The health and safety manager shall be responsible for determining method, type, and extent of industrial hygiene (IH) monitoring to be conducted prior to initiating project activities. The monitoring program detailed in the SSHP shall be followed. In addition, the following LCP Air Monitoring Program shall be implemented.

10.1 IH Monitoring Schedule

The health and safety manager will determine the type and extent of exposure monitoring to be conducted based on the project site-specific conditions. The SSHO compiles data for the health and safety manager to review as needed.

10.1.1 New Project Phase

Monitoring will be conducted at the beginning of each project phase to: (1) evaluate effectiveness of protective equipment assigned, (2) assess current hazard potentials, and (3) evaluate operation exposures. For projects covered by this LCP, this will include, as a minimum, integrated sampling for inorganic lead.

10.1.2 Safety and Health Assessment

Monitoring will be repeated, as appropriate, to provide the health and safety manager adequate information to make accurate assessments concerning the safety and health of persons on site. For projects covered by this LCP, this will include, as a minimum, integrated sampling for inorganic lead and real-time monitoring for total dust levels.

10.1.3 Condition Change

Monitoring will be conducted at any time project conditions change which may affect the exposure of persons in a work area. A change in condition may include, but is not limited to:

- Weather changes
- Worker complaints/concerns
- Variation in work plan/procedures.

Monitoring to be conducted will be determined by the health and safety manager and based on the type of condition and the level of change. Real time dust monitoring results which exceed the action levels established in the SSHP will automatically trigger the initiation of integrated air sampling.

11.0 Lead Management Plan Amendments

All changes to this LCP must be made in writing. The health and safety manager must approve, by signature, any changes (excluding those exempted below) prior to implementation. Upon submittal and approval, changes will be communicated to all site personnel and contractors before actual field implementation. Those changes which do not require prior approval from the health and safety manager to be implemented by the SSHO include:

- PPE level upgrade
- Changes in decontamination procedures during an emergency or injury related incident
- Changes required by state, local, and federal law which require immediate action.

These changes shall be documented by the SSHO.

ATTACHMENT 2

SITE-SPECIFIC MUNITIONS AND EXPLOSIVES OF CONCERN SAFETY PLAN AND EVALUATING OE/UXO/CWM IN SUPPORT OF HTRW ACTIVITIES

Site-Specific Munitions and Explosives of Concern Safety Plan
Range 20, Infiltration Course, Parcel 76Q-X
Soil Remediation on USFWS Property

Fort McClellan
Calhoun County, Alabama

July 2008

Submitted to:

U.S. Army Corps of Engineers – Mobile District
109 St. Joseph Street
Mobile, Alabama 36602

and

U.S. Army Contracting Agency
4118 Susquehanna Avenue
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and

Fort McClellan Army National Guard Training Center
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Prepared by:

Shaw Environmental, Inc.
312 Directors Drive
Knoxville, Tennessee 37923

Munitions and Explosives of Concern (MEC) Safety Plan

Soil Remediation at Range 20, Parcel 76Q-X Fort McClellan, Alabama

I have read and approve this site-specific MEC safety plan for the soil remediation at Range 20, Infiltration Course, Parcel 76Q-X at Fort McClellan located in Anniston, Alabama, with respect to project hazards, regulatory requirements, and Shaw unexploded ordnance (UXO) procedures.

William B. Bacon.
Munitions Technical Director

17 November 2008
Date

Winston D. Russell
Health & Safety Manager

21-November-08
Date

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Attachment 1 - FTMC UXO Supplementary Procedures

List of Acronyms

FTMC	Fort McClellan
IT	IT Corporation
MEC	Munitions and Explosives of Concern
OE	ordnance and explosives
SAP	Installation-Wide Sampling and Analysis Plan
Shaw	Shaw Environmental, Inc.
USACE	U.S. Army Corps of Engineers
UXO	unexploded ordnance
XRF	x-ray fluorescence

1.0 Introduction

This document defines anomaly avoidance procedures for activities to be performed by Shaw Environmental, Inc. (Shaw) unexploded ordnance (UXO) personnel in conjunction with the soil remediation to be conducted at Range 20, Parcel 76Q-X located at Fort McClellan in Anniston, Alabama. This document is not a stand-alone document and must be used in conjunction with the FTMC Installation-Wide Sampling and Analysis Plan (SAP), which includes an Ordnance and Explosives (OE) Management Plan, and the *FTMC UXO Supplementary Procedures* (Shaw, 2002), included as Attachment 1.

Shaw UXO personnel will perform visual surveys, using hand-held magnetometers and metal detectors, to support soil sampling for XRF analysis, brush clearing, tree removal, road construction \ revitalization, soil excavation and soil stabilization field activities. The main objective of the field project is to remediate soil contaminated with lead exceeding 500 mg/kg. The purpose is to avoid munitions and explosives of concern (MEC) (formerly referred to as OE) during the fieldwork at Range 20, Parcel 76Q-X. Intrusive anomaly investigation is not authorized for this site work.

Shaw conducted a remedial investigation in several stages from July 2001 to September 2002. The investigations conducted for the BBGR Ranges comprised several ranges including Range 20, Parcel 76Q-X. The RI field activities included surface and subsurface soil sampling, XRF screening and analysis, surface water sampling and sediment sampling at Range 20. This interim soil removal and remediation project at Range 20 will be conducted at the M-60 impact zone, a sparsely vegetated area located approximately 1,200 feet southeast of the firing points on the northwestern face of a hillside (shown on Figure 2-1 of the work plan). The impact zone is visible from the former firing line points and is bare of trees with sparse vegetation. Bullet channels and numerous bullets and bullet fragments were found in this area. No evidence of additional target areas for the M-60 was found during previous investigations.

Personnel used the area between the M-60 impact zone and the firing point area for "infiltration maneuver training." This area is moderately to densely wooded. Abandoned vehicles, concrete pillboxes, and a mock cemetery that were used for maneuver training are found in this area. According to former FTMC range control personnel, no live ammunition was fired in the infiltration maneuver training area, only blanks. No indication of bullet impact was noted in this area during investigation activities. Access to the Range 20 firing line area is provided by a short

gravel driveway that connects the range to Bains Gap Road. The overall elevation of Range 20 ranges from approximately 925 to 1,200 feet amsl.

2.0 UXO Personnel

UXO personnel will be qualified per Department of Defense Explosive Safety Board Technical Paper 18, *Minimum Qualifications for Unexploded Ordnance (UXO) Technicians and Personnel,* and conform with the requirements of Engineer Pamphlet 75-1-2 *Munitions and Explosives of Concern (MEC) Support During Hazardous, Toxic, and Radioactive Waste (HTRW) and Construction Activities* (U.S. Army Corps of Engineers, 2004) and the SAP (IT, 2000; IT, 2002b) for FTMC. A UXO team will be on site during all sampling or intrusive activities. One team member must be at lease a UXO Technician II.

3.0 Responsibilities

The onsite UXO specialists will provide MEC avoidance, explosive ordnance recognition, location, and safety functions for Shaw employees and any subcontractors during soil sampling, XRF screening, brush clearing, tree removal and soil stabilization activities. Additional field activities at this site will include building roads from the M-60 impact area to the soil treatment area, collection of soil samples from the excavation area, egress to and from the site and coordination with other UXO contractors at FTMC.

4.0 Authority

Shaw UXO personnel are authorized to perform MEC avoidance activities only. UXO personnel are not permitted to initiate MEC investigative or disposal activities.

5.0 UXO Avoidance Procedures to Support HTRW Activities at FTMC

The scope of work for soil remediation activities at Range 20 includes the following UXO tasks:

- Provide surveys for all intrusive field activities (e.g., surveying grid locations, road construction, and staking soil sample locations).

- Provide MEC avoidance support during the collection of all soil sampling activities.
- Provide MEC avoidance support during soil excavation, stabilization and hauling activities.

Since these areas may contain MEC contamination, the UXO team must conduct a surface access survey for MEC before any type of activities commence. This includes foot and vehicular traffic. UXO avoidance activities will include:

a) Access Corridors, Excavation Areas, and Sampling Sites

(1) The UXO team will conduct access surveys of the footpaths and vehicular lanes approaching and leaving the site. Access surveys will begin in a known clear area and proceed by the most direct route to the site. The boundaries of the access route and site will be marked with white tape or white pin flags. The access survey will include the M-60 impact area and soil stabilization \ treatment area.

(2) If a MEC item is found during the survey, the location will be conspicuously marked with a red pin flag and avoided by altering the route. Additionally, UXO personnel will complete the Shaw "Unexploded Ordnance Report Form." Subsurface anomalies will be marked with a yellow flag.

(3) The boundaries of the access route and soil sampling/excavation areas will be recorded in the Shaw "UXO Sketch Log" by the UXO technician. Additionally, anomaly locations will be recorded on this form.

(4) Instrumentation used at this site may include the Schonstedt GA72, the CST Corporation Magna-Trak 102, or the Whites Spectrum XLT Metal Detector. All equipment will be operated as specified in the appropriate operator's manual. All equipment will be function tested prior to use following the procedure in paragraph 3.2, *FTMC UXO Supplementary Procedures* and the manufacturer's instructions.

(5) Footpath lanes will be a minimum of three feet wide. As necessary, the access route will be twice as wide as the widest vehicle that will use the route.

(6) If surface MEC or subsurface anomalies are encountered that cannot be avoided, the access route will be diverted to avoid contact. No personnel will be allowed outside of the surveyed areas without a UXO escort. No unescorted access will be permitted inside the corridor area until a survey has been completed and the boundaries established.

(7) The UXO specialists will survey the soil sampling/excavation areas for any indication of MEC. Sampling is not permitted at any location where an anomaly has been detected.

(8) Vehicles whose movement would disturb the soil are authorized for use only in areas that have been surveyed and in which no anomalies have been detected.

(9) If grading or soil movement is required to support access corridor development, sampling location or excavation, the UXO specialists will perform a survey. After an area has been surveyed and no anomalies have been detected, soil can be removed at a rate of no more than one foot per cut. If additional grading or soil removal is required, another survey will be performed after each one foot of soil has been removed. This includes the actual excavation area located within the M-60 impact area.

(10) Erosion and weathering will typically cause some MEC items to leach to the surface or otherwise be uncovered. In cases where access corridors or sampling locations have not been surveyed or traversed for a period of time, additional surveys may be required. The decision to perform follow-on surveys will be made by the UXO specialists in consultation with the Site Supervisor. The decision will be based on factors such as the amount of time since the last survey was performed, the weather during this period, the terrain in the area of concern, the former use of the area, and both the type and quantity of MEC found during initial surveys.

b) Vegetation Removal

In cases where removal of large trees or other vegetation is required to support access or sampling operations, the procedures in paragraph 4.2, *FTMC UXO Supplementary Procedures* will be followed.

c) Magnetometer/Metal Detector Checkout and Field Procedures

The procedures in paragraph 3.0, *FTMC UXO Supplementary Procedures* will be followed.

d) UXO Logbooks and Documentation

All UXO personnel identified in paragraph 5.0, *FTMC UXO Supplementary Procedures* will maintain a logbook in accordance with that procedure.

6.0 Safety

In addition to the requirements of the site-specific safety and health plan prepared for this site, the UXO personnel will ensure the following:

- The onsite UXO specialists will monitor all site soil sampling, XRF screening, road building/revitalization, brush and tree removal, soil excavation\removal, and soil stabilization activities to ensure compliance with applicable safety requirements.
- The onsite UXO specialists are responsible for any site-specific UXO training.
- The onsite UXO specialists will advise project personnel regarding all evacuation and/or exclusion zones as appropriate. The UXO specialists will ensure that only required personnel are present on site.

7.0 Quality

The onsite UXO specialists will follow quality control instructions and procedures listed in Section 9.0 of the Installation-wide OE Management Plan (contained in Volume IV of the SAP) and the *FTMC UXO Supplementary Procedures,* as appropriate to this task. The onsite UXO specialists will also use the "UXO Avoidance Quality Control Report" to document their activities. Copies of this form will be provided to the Shaw quality assurance representative or site superintendent upon request.

8.0 References

Environmental Science and Engineering, Inc. (ESE), 1998, ***Final Environmental Baseline Survey, Fort McClellan, Alabama***, prepared for U.S. Army Environmental Center, Aberdeen Proving Ground, Maryland, January.

IT Corporation (IT), 2002b, ***Draft Installation-Wide Sampling and Analysis Plan, Fort McClellan, Calhoun County, Alabama***, Revision 3, February.

IT Corporation (IT), 2000, ***Final Installation-Wide Sampling and Analysis Plan, Fort McClellan, Calhoun County, Alabama***, March.

Shaw Environmental, Inc. (Shaw), 2002, ***FTMC UXO Supplementary Procedures***, October.

U. S. Army Corps of Engineers (USACE), 2004, ***Munitions and Explosives of Concern (MEC) Support During Hazardous, Toxic, and Radioactive Waste (HTRW) and Construction Activities,*** Engineer Pamphlet (EP) 75-1-2, 1 August.

ATTACHMENT 1

FTMC UXO SUPPLEMENTARY PROCEDURES

FTMC UXO SUPPLEMENTARY PROCEDURES

Subject: Ordnance and Explosives

1.0 INTRODUCTION

Shaw Environmental, Inc. (Shaw), formerly IT Corporation, has been retained by Fort McClellan under the Management of the U.S. Army Corps of Engineers (USACE)-Mobile District to provide environmental services related to the impact of suspected contaminants at Fort McClellan, Alabama under Task Order CK11, contract No. DACA21-96-D-0018. The Installation-Wide Ordnance and Explosives (OE) Management Plan for Fort McClellan (FTMC) was prepared by Shaw and submitted as a final document in March 2000. The Installation-Wide OE Management Plan was prepared to provide general guidance for conducting unexploded ordnance (UXO) work associated with hazardous, toxic, and radiological waste (HTRW) investigations and remedial activities currently in progress at FTMC. Shaw prepares site-specific field sampling, health and safety, and UXO safety plans for sites where fieldwork will occur that may potentially contain OE. A UXO Safety Plan is not prepared for sites that are not reported to be in areas containing OE.

1.1 Purpose

This document is intended to provide procedures to the field staff that outline UXO operations and clarify activities currently permitted under "anomaly avoidance." The document is not intended to replace any of the project documents currently approved; rather, it is intended to complement those documents with additional information that allows successful completion of the job.

2.0 FTMC EMPLOYEE ORIENTATION/TRAINING AND CERTIFICATION

The Shaw FTMC orientation program is designed to:

- Indoctrinate new employees to FTMC-unique procedures
- Verify compliance with regulatory certification requirements
- Provide continuing instruction and updating in UXO fundamentals to sustain readiness to safely perform UXO tasks

These standard policies and procedures are applicable to all members of Shaw Environmental, Inc. except where superseded or modified by the member Company.

2.1 Responsibilities

The Shaw OE Service Center Operations Manager will oversee the training programs and maintain a master record of UXO employee training and certification status.

The UXO person designated as the senior Shaw UXO individual at FTMC will schedule the orientation listed below.

The FTMC UXO Safety Officer will:

- Conduct all UXO-specific orientation and training at FTMC
- Certify that each new UXO employee is capable of performing UXO work activities at FTMC
- Maintain FTMC training files and records on each UXO technician on site reflecting his or her current training status.

2.2 UXO Employee Orientation

Every UXO employee assigned to FTMC will receive a site-specific UXO orientation in addition to training required by the Occupational Health and Safety Administration (OSHA). This orientation will include, as a minimum, the following topics:

- Local emergency response drills and procedures
- Personal protective equipment (PPE) and personnel decontamination procedures
- Ordnance recognition/UXO expected to be encountered at FTMC
- Equipment safety
- FTMC site orientation
- Chemical warfare material (CWM) awareness and procedures
- Communications procedures
- FTMC Logbook/data recording procedures
- Shaw administrative policies and procedures
- Magnetometer checkout procedures
- Accident reporting procedures.

Upon completion of the UXO employee orientation, the FTMC UXO Safety Officer will monitor the performance of the new hire for at least three workdays while conducting typical UXO activities. The FTMC UXO Safety Officer will then certify that the individual is capable of performing UXO activities at FTMC based upon satisfactory performance of the three-day period. A copy of this certification will be maintained in the individual's site FTMC training file (see example at Attachment 1).

2.3 UXO Sustainment Training

All UXO technicians have had the OSHA 40-hour hazardous waste operations and emergency response (HAZWOPER) course in order to be initially certified at FTMC. They are also required to maintain the certification with an 8-hour OSHA refresher course on an annual basis. Additionally, all Shaw FTMC UXO personnel will have 8 hours of site-specific annual UXO sustainment training. This training can be performed incrementally (2 hours every quarter) at the discretion of the site superintendent in coordination with the FTMC Shaw UXO Safety Officer. Topics will include, but are not limited to, the following subjects:

- Site-specific environmental hazards
- Site-specific UXO hazards, ordnance fuzing, functioning and precautions
- Topics which the Shaw UXO Team Leader or Shaw Safety UXO Officer determines necessary to support FTMC UXO activities

Sustainment training will be conducted for a period of no less than 8 hours. Daily safety briefings, tailgate safety meetings, and other required site-specific training are not a substitute for this training. The purpose of this training is to provide each UXO employee with site-specific UXO training over and above OSHA requirements. The site-specific UXO training will be recorded in the project file and the UXO employee's personnel file.

3.0 FTMC MAGNETOMETER/METAL DETECTOR FUNCTION TEST AND FIELD PROCEDURES

This section provides FTMC magnetometer/metal detector function tests and operating procedures to be employed at all work sites that have been identified as requiring avoidance support.

3.1 Geophysical Test Plot

The purpose of a test plot is to provide a consistent environment where the equipment can be evaluated. This plot will be established as follows

- The test plot is currently located in a clear area off Bains Gap Road on Main Post. This test plot is used by all UXO contractors including Shaw UXO personnel and Shaw UXO subcontracted personnel.

- The test plot will contain inert ordnance items at depths and attitudes characteristic of previous ordnance encounters at FTMC. Examples of test items include: a 37mm APT buried at a depth of eight inches and in a 45-degree, nose-down attitude; an aluminum alloy snap flare buried four inches in a horizontal attitude; a 60mm mortar twelve inches deep and in a 60-degree, nose-down attitude; a 2.36-inch rocket at a depth of twelve inches and in a 60-degree, nose-down attitude; and a 75mm canister projectile buried eight inches deep in a horizontal attitude. Each burial location will be marked with a wooden stake located to the east of the object. Each stake will be tagged or marked to denote the depth, type of item, and orientation of the item. The site will utilize native soils; no fill material will be brought in from another area. Sand may be used to cover the area to mitigate the effects of wet weather.

- For downhole magnetometer testing, a length of 2-inch PVC pipe will be buried to a depth of 48 inches. The location of the test item, similar in size and mass to a 2.36 inch rocket, will be marked with a wooden stake tagged to denote the depth, type of item, orientation, and reference number assigned. This item will be buried at a depth of twelve inches.

3.2 Magnetometer/Metal Detector Check-Out Procedures

- Prior to field use, all magnetometers and metal detectors will be set up following the guidelines in the manufacturer's operating manual for the specific instrument used. Instrumentation used at this site will include the Schonstedt GA 72, the CST Corporation Magna-Trak 102, or White's Spectrum XLT Metal Detector. Additionally, the Schonstedt MG-220 or MG-230 will be set up for downhole monitoring. All equipment will be operated in a manner consistent with instructions contained in the appropriate operator's manual. All equipment will be function-tested prior to use. The White's Metal Detector will be used in conjunction with hand-

held magnetometers in areas of high concentrations of rocks with a magnetic signature, to assist in eliminating anomalies created by "hot rocks." The operating manual for each of the instruments used at FTMC will be available for use with the equipment.

- Once the instrument has been determined to be working according to the manufacturer's operating manual, the operator will perform a function test on the FTMC geophysical test plot using the detection methods described in the manual. A function test will consist of using the instrument over a minimum of three test sources. The same sources will be used during each function test to ensure consistency. The instrument detection indicator, as described in the operator's manual, will be noted in the instrument logbook. For site checks, a 6-inch length of 1/2-inch steel reinforcing rod will be available to each operator at the work site.

- Instruments that fail to reproduce a detection indication consistent with previous tests will be checked to ensure that the power supply or batteries are sufficient. If the power supply is determined to be sufficient and the operator cannot find a fault in accordance with the operator's manual, the instrument will be tagged and removed from service.

- Function tests will be performed each morning before the equipment is put into service.

- If an instrument is determined to be working improperly, the FTMC UXO Team Leader and the site superintendent will be immediately notified. Any activities performed using that instrument since its last positive test procedure will be considered invalid and will require reevaluation.

- Upon completion of the function test, the function test will be secured in the operator's Daily Field Log Book.

- After an instrument has been function-tested at the beginning of each day, the instrument will be checked at least once during every hour of use or each time the instrument is turned on after having been turned off. This check will consist of dropping the 6-inch length of 1/2-inch reinforcing rod in a clear area and passing the detector over the rod in a manner consistent with the operator's instructions. The instrument indication will be compared to the indication produced during the morning function test.

Instruments that fail to produce a consistent indication will be checked and removed from service as required.

3.3 Equipment Documentation

Each piece of equipment will be assigned a logbook noting the make, model, manufacturer, and serial number of the equipment. The following information will be recorded:

- Factory (off-site) maintenance
- On-site repair activities
- Other actions which could alter the performance of the instrument

The Shaw FTMC Quality Control (QC) Officer will perform random audits of equipment function tests and will record the fact that the test was performed in accordance with these procedures.

3.4 Magnetometer/Metal Detector Field Procedures

All intrusive field actives in potential OE areas (e.g., digging, fence post driving, grading, well installation or excavation) will be preceded by a UXO sweep. Each hole made in areas where OE may potentially be found will have a check immediately over the spot of the intrusion. Magnetometer operations at FTMC will assume a detection depth of one foot when surveying an area for excavation.

All magnetometers and metal detectors will be operated in accordance with the manufacturers specifications and procedures.

When surveying a potential area for a sampling well, an area of sufficient size will be surveyed to allow for installation of required pads and bollards. After the well is installed, the location of bollards will be adjusted as required if an anomaly is detected during the bollard installation process.

The White's Metal Detector will be used to augment the magnetometers on sites where "hot rocks" are suspected. The purpose of using the metal detector in addition to the magnetometers is to eliminate the probability of "hot rocks."

4.0 FTMC ACCESS CLEARANCES, VEGETATION REMOVAL, AND ROAD MAINTENANCE

This section is designed to provide specific procedures regarding activities associated with the building of access corridors, vegetation removal, and road maintenance in support of FTMC operations.

4.1 Access Corridors

The purpose of access corridors is to enable Shaw personnel access to well and/or other types of sampling sites within FTMC. Access corridors will be created by marking the route, both length and width, in which a UXO survey has been performed. The marking method will be defined in each site-specific UXO safety plan. No unescorted access is permitted until a corridor has been established. If an anomaly is detected during the survey or during a subsequent excavation, it must be avoided, since investigation is not authorized. The route will be altered to avoid the anomaly for FTMC activities. A magnetometer is considered to reliably detect anomalies to a depth of one foot.

The size of each area to be surveyed is dependent on the type and quantity of equipment expected to be used on that site. The UXO survey crew will follow the procedures outlined in the site-specific UXO safety plan to determine the dimensions of the area to be surveyed. Normally, the width of the access route will be at least twice as wide as the widest vehicle that will use the route; footpaths will be a minimum of 3 feet wide.

Tracked or other vehicles that disturb the soil are authorized for use only in areas that have been surveyed and no anomalies have been detected.

Erosion and weathering will typically cause some UXO items to leach to the surface or otherwise be uncovered. In cases where access corridors or sampling sites have not been surveyed or traversed for a period of time, additional UXO surveys may be required. The decision regarding the performance of additional surveys will be made by the FTMC UXO team leader and the Shaw FTMC UXO Safety Officer. The site superintendent will be notified of this decision. This decision will be based on, but not limited to, such factors as: the amount of time since the last survey was performed; the weather during this period; the terrain in the area of concern; and the type and quantity of UXO found during initial surveys.

4.2 Vegetation Removal

In cases where removal of large trees or other types of vegetation is required, the following procedures will be followed:

- The UXO technician will survey around the base of the tree or vegetation, and, if no anomaly is detected, direct the bulldozer or other equipment to proceed. If an anomaly is detected, the location will be recorded and marked and another route will be selected. The size of the area to be surveyed will depend on the size of the suspected root system of the tree to be removed.

- Once the tree has been pushed over, the UXO technician will survey around the root ball and the area in and around the hole. If an anomaly is detected, the anomaly will be recorded and marked and an alternate route will be selected. If no anomaly is detected, the UXO technician will direct the equipment operator to proceed with the excavation.

4.3 Road Maintenance

Remote range roads and trails frequently require a certain amount of repair to remain passable. This section describes authorized actions regarding the maintenance of dirt or gravel range roads by Shaw UXO personnel.

- Bulldozers or grader-type equipment is authorized to repair roads and trails as long as a UXO survey has been performed and no anomalies have been detected.

- The UXO technician will observe the blade of the equipment as the earth is moved. If a potential UXO is uncovered, the UXO technician will signal the equipment operator to immediately stop the equipment. The UXO technician will then attempt to visually identify the object. If the object cannot be positively identified as a non-hazardous item, the equipment will be moved, the location of the object marked and recorded on the Shaw FTMC Unexploded Ordnance Report Form (Attachment 2), and the route changed to avoid the object. If no suspicious objects are detected, the equipment will continue to move earth at a rate of <u>no more than one foot of depth at a time.</u> If, more grading is required after the first past is complete the UXO technician will perform another survey. If no anomalies are detected, the equipment can repeat the grading process. If an anomaly is detected, the operation will be halted and the route changed.

- After an area has been surveyed and no anomalies have been detected, soil can be removed at a rate of no more than one foot per lift. If additional grading is required, a survey will be performed after each one-foot increment the soil has been removed.

- **Earth may not, at any time, be moved at a rate of more than one foot in each lift.**

5.0 FTMC UXO LOG BOOKS

All UXO team leaders or UXO technicians supporting HTRW operations will maintain a logbook. The purpose of the logbook is to record UXO actions and activities taken at each work site.

5.1 Responsibilities

UXO personnel will maintain an individual daily logbook of work activities.

The logbooks will be routinely inspected weekly by the UXO QC Officer and will be made available to the FTMC site superintendent upon request. Copies will be made daily and filed in the Shaw Field Project office.

Logbooks will contain bound and numbered pages. Entries will be on successive pages as work is performed. The individual using the logbook will sign the page after the last entry for that page has been made. Logbooks are part of the project legal file and will be filed with the project files upon completion of each investigation.

5.2 Data Requirements

As a minimum, individual logbooks will contain the following information:

- Date, time and location of UXO activities
- Personnel involved in the activities
- UXO activities performed, including UXO/anomalies found
- A description of areas swept

- A record of the magnetometer or other equipment used, including instrument serial number

- Weather conditions.

Shaw UXO personnel will utilize the Shaw FTMC Unexploded Ordnance Report Form (Attachment 2) to document the discovery of UXO/OE items.

The Shaw FTMC QC Officer will utilize the Shaw FTMC UXO Avoidance Quality Control Report (Attachment 3) to document checks of field activities.

Additionally, UXO personnel will complete Shaw FTMC Form UXO Sketch Log (Attachment 4) and Shaw FTMC Unexploded Ordnance Report Form. The UXO Sketch Log will contain a description of activities, including the dimensions of the area surveyed. A description of the length and width will be recorded, as well as the manner in which the survey was performed. These forms will be completed as required and presented to the site superintendent.

ATTACHMENT 1

FTMC Employee Certification (Example)

I certify that (name of individual) has fulfilled all UXO orientation requirements and has been observed by me for a period of 3 work days and is therefore eligible to perform UXO activities at FTMC.

_____

William B. Beacon
Munitions Technical Director

ATTACHMENT 2

Unexploded Ordnance Report Form

Report Tracking Number:

Discovery and Reporting Time

Time of Discovery	
Date	Time

Time Reported to Base Transition Force	
Date	Time

Employee Name:_____

Reported to FTMC Transitional Force Personnel

Name:_____

Location of Ordnance

Location, Description, and Parcel Number:

Coordinates of Ordnance:	State Plane Coordinates	
	Northing	Easting

Picture Taken of Ordnance			
Yes	No	Date	Time

Written Description and/or Sketch of Ordnance:

Corrective Action Taken by Fort McClellan Transition Force

Date	

ATTACHMENT 3

UXO Quality Control Report

Project Location: _____ **Date:** _____

Work Site Location: _____ **Day:** _____

1. **Personnel Involved:**

_____
_____
_____
_____
_____

2. **Description of Work Being Performed:**

_____
_____
_____
_____
_____

3. **Equipment Utilized:**

_____
_____
_____
_____
_____

4. **Comments:**

_____
_____
_____
_____
_____

_____ **Completed By**

_____ **Printed Name & Title**

_____ **Signature**

_____ **Date**

ATTACHMENT 4

UXO Sketch Location Log

District:_____ **Hole Number:**_____ **Date:**_____

Company Name: Shaw Environmental, Inc. **Subcontractor:**_____

Parcel Location:_____ Well Location:_____ Date Started:_____ Date Completed:_____

Type of UXO Work Being Performed:

Most Probable Munition:	
Down-Hole Depth Achieved for UXO Avoidance:	
Total Number of Surface UXO Marked:	
Total Number of Anomalies Marked:	

Location Sketch/Comments:	**Not to Scale**
Signature of UXO Technician:	Date:

Evaluating OE/UXO/CWM Hazards in Support of HTRW Activities

Site Name: Range 20, Parcel 76Q-X

Job Number: 800486

Date: November 13, 2008

Name of person completing form: Jeffrey Tarr

Title: Site Manager \ Geologist

Signature: _____

	Yes	No
1a. Have the historical records available for this HTRW site been reviewed?	☒	☐

If the answer to **1a.** is yes, proceed to **1b.**
If the answer to **1a.** is no, review site information prior to completing this form.

	Yes	No
1b. Is there recent information (site walk, worker interviews, etc.) that indicates a potential OE/CWM hazard at this site?	☒	☐

Proceed to **2.**

2. According to the records review, is this site known or suspected to have been used for:

	Yes	No
2a. Manufacturing, production, or shipping of conventional or chemical warfare materiel (CWM) OE:	☐	☒
Live fire testing of any ordnance:	☒	☐
Conventional or CWM OE training:	☒	☐
Storage of conventional or CWM OE:	☐	☒
Disposal or demilitarization of conventional or CWM OE:	☐	☒
Other (specify):		

	Yes	No
2b. Manufacturing, production, or shipping of chemical agent:	☐	☒
Research or testing of chemical agent:	☐	☒
Chemical agent related training:	☐	☒
Storage of chemical agent:	☐	☒
Disposal or demilitarization of chemical agent:	☐	☒
Other (specify):		

Any **2a** question answered "YES" indicates UXO support is required for all site activities. If all **2a** questions are answered "NO", UXO support may not be required. Refer to Installation-Wide Safety and Health Plan (SHP) for additional information concerning UXO support. Proceed to question **2b.**

Any **2b** question answered "YES" requires the remainder of this form to be completed. If all **2b** questions are answered "NO", real-time monitoring for chemical agent will not be required and completing the remainder of this form is not required. Refer to SHP for additional information concerning agent monitoring.

Additional space for notes and explanations on page 4.
Continue to page 2 of 4 –

3. For sites where the manufacturing, testing, storage, or disposal of CWM is suspected:	**Yes**	**No**
Is there evidence that the CWM is/was containerized in potentially unexploded ordnance:	☐	☒
Is there evidence that the CWM is/was containerized in nonexplosive containers:	☐	☒
Is there evidence that the CWM is open to the environment (i.e., in an open container or free liquid/solid in the soil/water):	☐	☒
Is there evidence that the CWM hazard has been removed from the site or that the site has been decontaminated:	☐	☒
Has the site been previously monitored or sampled for chemical agent or agent breakdown products:	☐	☒
For any "YES" above, was the agent or breakdown product identified?	☐	☒

For any "Yes", list types of agent (mustard, lewisite, etc.) and the form (in ordnance, in drum, etc.) the CWM is expected to be found (or state "unknown"):

List agent breakdown products identified:

N/A

4. Defining the Potential for the Presence of CWM:	**Agent Monitoring Requirements for Site Activities:**
4a. High Presence Potential – Definition: CWM is known or highly suspected to be present at the site in a condition (within ordnance and/or nonexplosive container, or in an uncontainerized form in sufficient volume that weathering of the product has not rendered it harmless) that will cause potential harm to personnel if it is encountered.	Mandatory personal and perimeter air monitoring using the DAAMS, MINICAMS, and RTAP collection/analysis methods with off-site surety laboratory confirmation of all environmental samples. Specific monitoring criteria (equipment types and sampling station placement, percentage of personnel monitored, etc.) to be established in the Site Specific Safety and Health Plan (SSHP).
4b. Moderate Presence Potential - Definition: CWM is suspected to have been present at the site, but has been previously removed and/or decontaminated, or has been open to the environment such that it is expected to have degraded and been rendered harmless.	The need for personal and perimeter air monitoring using the DAAMS, MINICAMS, and RTAP collection/analysis methods with off-site surety laboratory confirmation of all environmental samples will be reviewed on a site-by-site basis. Specific monitoring criteria (equipment types and sampling station placement, percentage of personnel monitored, etc.) to be established in the Site Specific Safety and Health Plan (SSHP).
4c. Low Presence Potential – Definition: No indications that CWM will be present in quantity or reactivity (in munitions, projectiles, drums, etc.).	No specific personal or area monitoring for chemical agents required beyond what is specified in the SHP.

Continue to page 3 of 4 -

Evaluating OE/UXO/CWM Hazards in Support of HTRW Activities

Site Name: Range 20, Parcel 76Q-X

Job Number: 800486

Date: Nov. 13, 2008

Based on the information available for this site, including information gathered during completion of this form, the potential for CWM to be present at this site, as defined above, is expected to be: *LOW*

Exceptions/Explanations: (additional space for notes and explanations on page 4)

5. Based on the information provided in questions 1 through 5, above, the following guidelines will be used for establishing PPE requirements for activities to be performed at this site; Specific details are provided in the SSHP:

5a. High Exposure Potential - High exposure potential is determined by evaluating the potential presence of CWM in conjunction with the task(s) to be performed, as well as the specific location and duration of the task(s).	Subject to review by the Shaw health and safety manager, PPE for all personnel in the exclusion zone at a site identified as having a "High Exposure Potential" will be Level B (supplied air) or Level C (full-face respirator with HEPA/Acid Gas/OV cartridges w/ emergency egress hood) and chemically resistant coveralls. Specific PPE requirements are in the SSHP for this site.
5b. Moderate Exposure Potential - Moderate exposure potential is determined by evaluating the potential presence of CWM in conjunction with the task(s) to be performed, as well as the specific location and duration of the task(s).	Subject to review by the Shaw health and safety manager, PPE for all personnel in the exclusion zone at a site identified as having a "Moderate Exposure Potential" will be Modified Level D (disposable coveralls and emergency egress hood) carried by all personnel. Specific PPE requirements are in the SSHP for this site.
5c. Low Exposure Potential - Low exposure potential is determined by evaluating the potential presence of CWM in conjunction with the task(s) to be performed, as well as the specific location and duration of the task(s).	Subject to review by the Shaw health and safety manager, no additional PPE requirements above those stated in the SSHP are needed for sites identified as having "Low Exposure Potential." Specific PPE requirements are in the SSHP for this site.

Based on all available information, the exposure potential at this site is considered to be: *LOW*

Exceptions/Explanations: (see page 4)

Review Signatures:

Shaw Munitions Technical Director ___ Date: 17 Nov 2008 Shaw H&S Specialist _____ Date: 11-21-08

Site Name: Range 20, Parcel 76Q-X

Job Number: 800486

Date: Nov. 13, 2008

Additional Notes and Explanations:

The Range 20 Infiltration Course, Parcel 76Q-X was reportedly constructed in 1980. Range 20 is approximately 33.4 acres and extends over the entire range, including the M-60 impact area (1.7 acres). The range safety fan extends to the southeast, covering an area of approximately 1,613 acres. For this interim removal action, the area requiring soil removal [lead concentrations above 500 milligrams / kilogram (mg/kg)] is the impact area. Shaw conducted a remedial investigation at the Baby Bains Gap Road (BBGR) Ranges which included Range 20 in several stages from July 2001 through September 2002. The investigation at Range 20 included the collection of surface soil, subsurface soil, surface water and sediment samples including numerous samples in the impact area. It should be noted that a separate contractor is scheduled to remove all ordnance at Range 20 as part of the Military Munitions Response Program (MMRP). Shaw will not proceed with the lead-in-soil removal project until after the ordnance removal is complete.

A review of aerial photographs was conducted prior to the remedial investigation. The December 1982 aerial photographs and prior photographs do not show any development or activity in the area. However, Range 20 is very evident on the February 1994 and March 1998 aerial photographs. The M-60 machine gun impact area is a cleared area southeast of the range and is prominent on both photographs including 15 circular pits arranged in five staggered rows north of the semicircular road. Weapons fired at this range include M-60 (.308 caliber) machine gun and M-60 with tracer. The Environmental Baseline Survey reports that dynamite, trinitrotoluene (TNT), and C4 were used in explosive pits for artillery impact simulation and may have been used in demolition training. The Archives Search Report (ASR) states that the area near Range 20 was historically used as Old Range 27, which appeared on the 1958 FTMC range map as Close Combat 1 & 2. Old Range 27 included a safety fan that was similar to ranges where live-fire rifle and machine gun training was conducted. Old Range 27 was abandoned in 1967. The ASR also indicates that Range 20 was constructed within the World War I Artillery Impact Area.

The potential to encounter UXO has been determined to be low based on the anticipated soil excavation depth of 2-feet bgs and previous UXO clearance activities by others. However, as a standard precaution, UXO avoidance support is required for site activities.

ATTACHMENT 3

MATERIAL SAFETY DATA SHEETS

AMES METAL PRODUCTS
LEAD SHOT Revised: 01/01/1989

MSDS Contents

SECTION I
SECTION II - HAZARDOUS INGREDIENTS
SECTION III - PHYSICAL DATA
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SECTION VI - HEALTH HAZARD DATA
SECTION VII - PROTECTION MEASURES
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SECTION X - SARA TITLE III INFORMATION
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SECTION XII - TRANSPORTATION INFORMATION (172.101)
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MATERIAL SAFETY DATA SHEET

AMES

AMES METAL PRODUCTS CO.

THIS MATERIAL SAFETY DATA SHEET COMPLIES WITH OSHA HAZARD COMMUNICATION STANDARD 29CFR 1910.1200

PRODUCT: LEAD SHOT

CODE: 2004

COMMON NAME OR SYNONYMS:
DROP, BUCK, FREE FLOW TYPE SHOT AND LEAD BALLS - ALL SIZES

SECTION I

MANUFACTURERS NAME:

4323 SOUTH WESTERN BOULEVARD
CHICAGO, ILLINOIS 60609

PHONE 773-523-3230
FAX 312-523-3854

INFORMATION PHONE: TOLL FREE/OUTSIDE IL

EMERGENCY PHONE: 1-800-255-6937

CHEMTREC: 800-424-9300

PREPARATION DATE: JANUARY 1989

SECTION II - HAZARDOUS INGREDIENTS

INGREDIENT	CAS NO.	OSHA PEL	ACGIH TLV	OTHER	WT. PERCENT
LEAD	7439-92-1	0.05 MG/M3	0.15 MG/M3	--	99.9+

ADDITIONAL INFORMATION:
OSHA ACTION LEVEL FOR LEAD 0.03 MG/M3 (SEE 29 CFR 1910.1025)

SECTION III - PHYSICAL DATA

APPEARANCE & ODOR (AT NORMAL CONDITIONS):
SOLID SPHERES - SILVER METALLIC TO GRAY METALLIC METAL - NO ODOR

SPECIFIC GRAVITY (H2O=1):	11.34
MELTING POINT (DEGREES C):	328
BOILING POINT (DEGREES C):	1744
SOLUBILITY IN WATER:	INSOLUBLE
EVAPORATION RATE (BUTYL ACETATE=1):	NOT APPLICABLE
VAPOR DENSITY (AIR = 1):	NOT APPLICABLE
VAPOR PRESSURE (MMHG):	NOT APPLICABLE
pH:	NOT APPLICABLE

SECTION IV - FIRE & EXPLOSION HAZARD DATA

FLASH POINT:	NON-FLAMMABLE
FLAMMABLE LIMITS:	NOT APPLICABLE
EXTINGUISHING MEDIA:	NO SPECIFIC AGENTS RECOMMENDED

SPECIAL FIRE FIGHTING PROCEDURES:
IF INVOLVED IN FIRE, USE FULL PROTECTIVE CLOTHING AND NIOSH/MSHA APPROVED
SELF-CONTAINED BREATHING APPARATUS OPERATED IN A POSITIVE-PRESSURE MODE.

UNUSUAL FIRE & EXPLOSION HAZARDS: NONE

SECTION V - REACTIVITY DATA

STABILITY: STABLE

CONDITIONS TO AVOID: NOT APPLICABLE

INCOMPATIBILITY:
STRONG OXIDIZERS, HYDROGEN PEROXIDE, ACTIVE METALS - SODIUM, POTASSIUM. POWDERED LEAD FUSED WITH AMMONIUM NITRATE MAY CAUSE A VIOLENT REACTION.

HAZARDOUS DECOMPOSITION PRODUCTS:
AT TEMPERATURES ABOVE THE MELTING POINT LEAD OXIDE FUMES MAY BE EVOLVED.

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR.

SECTION VI - HEALTH HAZARD DATA

EXPOSURE TO THE SOLID FORM OF THIS PRODUCT PRESENTS FEW HEALTH HAZARDS IN
ITSELF. HOWEVER, NORMAL HANDLING OR PROCESSING OF THIS MATERIAL MAY RESULT IN
THE GENERATION OF LEAD DUSTS AND/OR FUMES.

ROUTES OF ENTRY:
INHALATION OF DUST/FUME & INGESTION OF DUST FROM PROCESSING OR MELTING OF SHOT.

SYMPTOMS & EFFECTS OF OVEREXPOSURE:
CHRONIC (PROLONGED) OVEREXPOSURE TO LEAD CAN RESULT IN SYSTEMIC-LEAD POISONING
WITH SYMPTOMS OF METALLIC TASTE, ANEMIA, INSOMNIA, WEAKNESS, CONSTIPATION,
ABDOMINAL PAN, GASTROINTESTINAL DISORDERS, JOINT AND MUSCLE PAINS, AND MUSCULAR
WEAKNESS, AND MAY CAUSE DAMAGE TO THE BLOOD-FORMING , NERVOUS, KIDNEYS, &
REPRODUCTIVE SYSTEMS. DAMAGE MAY INCLUDE REDUCED FERTILITY IN BOTH MEN AND
WOMEN, DAMAGE TO THE FETUS OF EXPOSED PREGNANT WOMEN, ANEMIA, MUSCULAR WEAKNESS
& KIDNEY DISFUNCTION.

ACUTE (SEVERE SHORT-TERM) OVEREXPOSURE TO LEAD MAY LEAD TO CENTRAL NERVOUS
SYSTEM DISORDERS, CHARACTERIZED BY DROWSINESS, SEIZURES, COMA & DEATH. IT
SHOULD BE RECOGNIZED THAT EXPOSURES OF THIS MAGNITUDE IN AN INDUSTRIAL ENVIRONMENT ARE EXTREMELY UNLIKELY.

MEDICAL CONDITIONS POSSIBLY AGGRAVATED BY EXPOSURE:
DISEASES OF THE BLOOD AND BLOOD FORMING ORGANS, KIDNEYS, NERVOUS & POSSIBLE
REPRODUCTIVE SYSTEMS.

CARCINOGENICITY: NOT LISTED AS A CARCINOGEN BY NTP, IARC, OSHA

EMERGENCY & FIRST AID PROCEDURES:

SKIN: NORMAL HYGIENE PROCEDURES - WASH WITH SOAP AND WATER.

EYES:
FLUSH WELL WITH RUNNING WATER TO REMOVE PARTICULATE. IF IRRITATION PERSISTS GET
MEDICAL ATTENTION.

INHALATION: REMOVE FROM EXPOSURE. GET MEDICAL ATTENTION.

INGESTION:
GIVE WATER; INDUCE VOMITING IN A CONSCIOUS INDIVIDUAL; GET MEDICAL ATTENTION.

SECTION VII - PROTECTION MEASURES

RESPIRATORY PROTECTION:
RESPIRATORY PROTECTION IS REQUIRED WHERE AIRBORNE EXPOSURES EXCEED OSHA/ACGIH
PERMISSIBLE AIR CONCENTRATIONS. RESPIRATOR SELECTION SHALL BE MADE IN ACCORDANCE WITH THE OCCUPATIONAL EXPOSURE STANDARD FOR LEAD, 29 CFR 1910.1025.

VENTILATION:
VENTILATION, AS DESCRIBED IN "INDUSTRIAL VENTILATION, A MANUAL OF RECOMMENDED
PRACTICE", BY THE AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS, IS
RECOMMENDED TO MAINTAIN EXPOSURE LEVELS BELOW THE PERMISSIBLE EXPOSURE LIMITS
(PEL'S) OR THRESHOLD LIMIT VALUES (TLV'S) SPECIFIED BY OSHA OR OTHER LOCAL OR
STATE REGULATIONS.

PROTECTIVE GLOVES:
RECOMMENDED FOR PROLONGED CONTACT/HEAT. REQUIRED ABOVE THE LEAD PEL.

EYE PROTECTION:
SAFETY GLASSES OR GOGGLES ARE RECOMMENDED WHERE THE POSSIBILITY EXISTS OF
GETTING DUST PARTICLES IN THE EYES. SAFETY GLASSES OR GOGGLES WITH FACESHIELD
ARE RECOMMENDED AROUND MOLTEN METAL.

OTHER PROTECTIVE EQUIPMENT:
FULL PROTECTIVE CLOTHING AND SHOES ARE REQUIRED FOR EMPLOYEE EXPOSURE ABOVE THE
LEAD PEL. OTHER SAFETY EQUIPMENT SHOULD BE WORN AS APPROPRIATE FOR THE WORK
ENVIRONMENT. KEEP WORK CLOTHING SEPARATE FROM STREET CLOTHES.

WORK/HYGIENIC PRACTICES:
DO NOT PERMIT EATING, DRINKING, OR THE USE OF COSMETICS OR TOBACCO PRODUCTS

WHILE HANDLING OR PROCESSING MATERIAL OR IN LEAD WORK AREAS. PRACTICE GOOD
PERSONAL HYGIENE PROCEDURES. WASH HANDS AND FACE THOROUGHLY BEFORE EATING,
DRINKING, APPLYING COSMETICS OR USING TOBACCO PRODUCTS. FULL PROTECTIVE
CLOTHING IS TO BE WORN BY WORKERS EXPOSED TO CONCENTRATIONS OF LEAD DUST/FUME
ABOVE THE PEL, AND SHOWERING IS REQUIRED BEFORE CHANGING INTO STREET CLOTHES.
KEEP WORK CLOTHING SEPARATE FROM STREET CLOTHES. WORK CLOTHES AND EQUIPMENT
SHOULD REMAIN IN DESIGNATED LEAD CONTAMINATED AREAS AND NEVER TAKEN HOME OR
LAUNDERED WITH PERSONAL CLOTHING. AVOID INHALATION AND INGESTION OF PRODUCT,
AND ACTIVITIES WHICH GENERATE DUST OR FUMES. KEEP MELTING TEMPERATURES AS LOW
AS POSSIBLE TO MINIMIZE THE GENERATION OF FUMES.

SECTION VIII - PRECAUTIONS FOR SAFE HANDLING & USE

PRECAUTIONS TO BE TAKEN IN HANDLING & STORING:
PRACTICE GOOD HOUSEKEEPING PROCEDURES TO PREVENT DUST ACCUMULATIONS. KEEP
MATERIAL DRY. AVOID STORAGE NEAR INCOMPATIBLE MATERIALS (SEE SECTION V). KEEP
PRODUCT AWAY FROM CHILDREN & THEIR ENVIRONMENT, FEED PRODUCTS AND FOOD PRODUCTS.

OTHER PRECAUTIONS:
SPECIAL ATTENTION IS DRAWN TO THE REQUIREMENTS OF THE OSHA LEAD STANDARD
(1910.1025) AND RESPIRATOR STANDARD (1910.134) SHOULD AIRBORNE EXPOSURES EXCEED
THE OSHA ACTION LEVEL (AL) OR PEL.

SECTION IX - SPILL OR LEAK PROCEDURES

SPILL OR LEAK PROCEDURES:
1) MATERIAL IN DUST FORM - MINIMIZE EXPOSURE. CLEAN UP USING DUSTLESS METHODS
(I.E. VACUUM). DO NOT USE COMPRESSED AIR.

2) PLACE IN CLOSED LABELED CONTAINERS FOR RECYCLING OR DISPOSAL.

3) KEEP OUT OF WATERWAYS.

NOTE:
CLEAN UP PERSONNEL SHOULD WEAR PROTECTIVE CLOTHING AND RESPIRATORY PROTECTION
WHERE DUST/FUME EXPOSURE EXISTS.

OTHER PROCEDURES:
WE RECOMMEND THAT THE PURCHASER ESTABLISH A SPILL PREVENTION, CONTROL AND

COUNTER MEASURE PLAN. THIS PLAN SHOULD INCLUDE PROCEDURES FOR PROPER STORAGE AS
WELL AS CLEAN-UP OF SPILLS OR LEAKS. THE PROCEDURES SHOULD CONFORM TO SAFE
PRACTICES AND PROVIDE FOR PROPER RECOVERY AND/OR DISPOSAL. DEPENDING ON THE
QUANTITY SPILLED, NOTIFICATION TO THE NATIONAL RESPONSE CENTER (800-424-8802)
MAY BE REQUIRED IN CASE OF HAZARDOUS SUBSTANCES. (SEE EPA AND DOT REGULATIONS;
ALSO VARIOUS STATE AND LOCAL REGULATIONS.)

WASTE DISPOSAL METHODS:
MAY HAVE VALUE ON A RECYCLED BASIS. IF DISPOSED OF, DISPOSE OF IN A PERMITTED
DISPOSAL SITE IN ACCORDANCE WITH ALL FEDERAL, STATE AND LOCAL DISPOSAL OR
DISCHARGE REGULATIONS.

SECTION X - SARA TITLE III INFORMATION

THIS PRODUCT/MIXTURE CONTAINS THE FOLLOWING TOXIC CHEMICAL(S) SUBJECT TO THE
REPORTING REQUIREMENTS OF SECTION 313 OF TITLE III OF THE SUPER FUND AMENDMENTS
AND REAUTHORIZATION ACT OF 1986 AND 40 CFR PART 372. THE PERCENT BY WEIGHT OF
EACH TOXIC CHEMICAL AND ITS ASSOCIATED CHEMICAL ABSTRACT SYSTEM (CAS) NUMBER
ARE TO BE FOUND IN SECTION II OF THIS MATERIAL SAFETY DATA SHEET.

CHEMICAL NAME	EHS RQ (LBS) (*1)	EHS TPQ (LBS) (*2)	SEC.313 (*3)	313 CATEGORY (*4)	311/312 CATEGORIES (*5)
LEAD	NOT APPLICABLE	NOT APPLICABLE	YES	LEAD	H-1, H-2

FOOTNOTES

=REPORTABLE QUANTITY OF EXTREMELY HAZARDOUS SUBSTANCE, SECTION 302.

*2=THRESHOLD PLANNING QUANTITY, EXTREMELY HAZARDOUS SUBSTANCE, SECTION 302.

*3=TOXIC CHEMICAL, SECTION 313

*4=CATEGORY AS REQUIRED BY SECTION 313 (40 CFR 372.42). MUST BE USED ON TOXIC
RELEASE FORM.

*5=HAZARD CATEGORY FOR SARA SECTION 311/312:

HEALTH

H-1 = IMMEDIATE (ACUTE) HEALTH HAZARD

H-2 = DELAYED (CHRONIC) HEALTH HAZARD

PHYSICAL

P-3 = FIRE HAZARD

P-4 = SUDDEN RELEASE OF PRESSURE HAZARD

P-5 = REACTIVE HAZARD

SECTION XI - CERCLA INFORMATION

THIS PRODUCT/MIXTURE CONTAINS THE FOLLOWING CHEMICALS SUBJECT TO THE RELEASE
REPORTING REQUIREMENTS OF SECTION 302.

CHEMICAL NAME	RQ (LBS) (*1)	
LEAD	1.0	CERCLA STATUTORY RQ

FOOTNOTES

*1 = REPORTABLE QUANTITY (RQ) UNDER CERCLA SECTION 302. SPILLS TO THE ENVIRONMENT EXCEEDING THE REPORTABLE QUANTITY IN ANY 24 HOUR PERIOD MUST BE
REPORTED TO THE NATIONAL RESPONSE CENTER (800-424-8802). NO REPORTING OF
RELEASES OF THE HAZARDOUS SUBSTANCE(S) IS REQUIRED IF THE DIAMETER OF THE
PIECES OF THE SOLID METAL(S) RELEASED IS EQUAL TO OR EXCEEDS 100 MICROMETERS
(0.004 INCHES).

SECTION XII - TRANSPORTATION INFORMATION (172.101)

DOT SHIPPING NAME:
THIS PRODUCT IS NOT REGULATED BY THE DOT AS SHIPPED. THIS MATERIAL IS ONLY
REGULATED BY THE DOT IF IN A POWDER FORM WITH A PARTICLE SIZE LESS THAN 100
MICROMETERS. (0.0040 INCHES).

HAZARD CLASS:	NOT APPLICABLE
UN/ID NO:	NOT APPLICABLE
DOT LABEL(S):	NOT APPLICABLE

SECTION XIII - ADDITIONAL INFORMATION

OSHA BIOLOGICAL LIMIT FOR BLOOD LEAD LEVEL IS A 3 SAMPLE/6 MONTH AVERAGE OF 50
MCG PER 100G (OR HIGHER) OF WHOLE BLOOD AND/OR TWO(2) CONSECUTIVE SAMPLES OF 60
MCG PER 100G (OR HIGHER). SEE OSHA STANDARD 29 CFR 1910.1025 FOR FURTHER
INFORMATION.

LEAD AND ITS COMPOUNDS HAS TENTATIVELY BEEN FOUND TO BE A CLASS B-2 CARCINOGEN
BY THE USEPA CARCINOGEN ASSESSMENT GROUP. IARC LISTS LEAD AND ITS COMPOUNDS AS
A TERATOGEN.

THIS MATERIAL SAFETY DATA SHEET IS OFFERED SOLELY FOR YOUR INFORMATION, CONSIDERATION AND INVESTIGATION. AMES METAL PRODUCTS CO. PROVIDES NO WARRANTIES, EITHER EXPRESS OR IMPLIED, AND ASSUMES NO RESPONSIBILITIES FOR THE
ACCURACY OR COMPLETENESS OF THE DATA CONTAINED IN THIS DOCUMENT. THE DATA IN
THIS MATERIAL SAFETY DATA SHEET RELATES ONLY TO THIS PRODUCT AND DOES NOT
RELATE TO USE IN COMBINATION WITH ANY OTHER MATERIAL OR IN ANY PROCESS.

WARNING:
THIS PRODUCT CONTAINS A CHEMCIAL OR CHEMICALS KNOWN TO THE STATE OF CALIFORNIA
TO:

A) CAUSE CANCER OR

B) CAUSE BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM.
(22 CAL. CODE 12601 (B) (5)

ALAMO CEMENT
CEMENT, PORTLAND **Revised: 03/04/1991**

MSDS Contents

SECTION I
SECTION II - HAZARDOUS INGREDIENTS
SECTION III - PHYSICAL DATA
SECTION IV - FIRE AND EXPLOSION HAZARD DATA
SECTION V - HEALTH HAZARD DATA
SECTION VI - REACTIVITY DATA
SECTION VII - SPILL OR LEAK PROCEDURES
SECTION VIII - SPECIAL PROTECTION INFORMATION
SECTION IX - SPECIAL PRECAUTIONS

U.S. DEPARTMENT OF LABOR
OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION

OMB NO 1218-0074
EXPIRATION DATE 05/31/86

MATERIAL SAFETY DATA SHEET

REQUIRED UNDER USDL SAFETY AND HEALTH REGULATIONS FOR SHIPYARD EMPLOYMENT
(29 CFR 1915)

3/4/91

SECTION I

MANUFACTURER'S NAME: ALAMO CEMENT

ADDRESS (NUMBER, STREET, CITY, STATE AND ZIP CODE):
P.O. BOX 34807
SAN ANTONIO, TX 78233

EMERGENCY TELEPHONE NO.

CHEMICAL NAME AND SYNONYMS: CEMENT

TRADE NAME AND SYNONYMS: CEMENT, PORTLAND

CHEMICAL FAMILY: CEMENT, CALCIUM

FORMULA: SILICATES & ALUMINATES

SECTION II - HAZARDOUS INGREDIENTS

PAINTS, PRESERVATIVES AND SOLVENTS	%	TLV (UNITS)
PIGMENTS	N/A	
CATALYST	N/A	
VEHICLE	N/A	
SOLVENTS	N/A	
ADDITIVES	N/A	
OTHERS	N/A	

ALLOYS AND METALLIC COATINGS	%	TLV (UNITS)
BASE METAL	N/A	
ALLOYS	N/A	
METALLIC COATINGS	N/A	
FILLER METAL PLUS COATING OR CORE FLUX	N/A	
OTHERS	N/A	

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES

	%	TLV (UNITS)
N/A		

SECTION III - PHYSICAL DATA

BOILING POINT (DEG. F):	N/A
SPECIFIC GRAVITY (H2O = 1):	3.17
VAPOR PRESSURE (MM HG.):	N/A
PERCENT VOLATILE BY VOLUME (%):	0.0
VAPOR DENSITY (AIR = 1):	N/A
EVAPORATION RATE (= 1):	0.0
SOLUBILITY IN WATER:	50% - 80%
APPEARANCE AND ODOR:	GREY, NO ODOR

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASHPOINT (METHOD USED): N/A

FLAMMABLE LIMITS: LEL: UEL:

EXTINGUISHING MEDIA: N/A

SPECIAL FIRE FIGHTING PROCEDURES: N/A

UNUSUAL FIRE AND EXPLOSION HAZARDS: NONE

SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE:

EFFECTS OF OVEREXPOSURE: MAY CAUSE SLIGHT SKIN IRRITATION OR DRYING OUT AS
A RESULT OF PROLONGED OVEREXPOSURE.

EMERGENCY FIRST AID PROCEDURES: WASH WITH EYE WASH IF DUST GETS IN EYE,
SEE PHYSICIAN. WASH HANDS AND SKIN WITH SOAP AND WATER, USE NORMAL HAND
MOISTURIZING CREAM IF SKIN IS DRY OR CHAPPED.

SECTION VI - REACTIVITY DATA

STABILITY:
UNSTABLE ( )
STABLE (X)

CONDITIONS TO AVOID:

INCOMPATIBILITY (MATERIALS TO AVOID):

HAZARDOUS DECOMPOSITION PRODUCTS: NONE

HAZARDOUS POLYMERIZATION:
MAY OCCUR ( )
WILL NOT OCCUR (X)

CONDITIONS TO AVOID:

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: SHOVEL OR SWEEP
UP AND RE-USE, IF POSSIBLE; OTHERWISE, DISPOSE OF AS AN AGGREGATE AND AVOID
WATER DUE TO CEMENT'S NATURE OF HARDENING IN CONTACT WITH WATER.

WASTE DISPOSAL METHOD: SEE ABOVE

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (SPECIFY TYPE): OSHA-MSHA APPROVED SILICA DUST RESPIRATOR

VENTILATION: SUBJECT TO LOCAL CODES
LOCAL EXHAUST:
MECHANICAL (GENERAL):
SPECIAL:
OTHER:

PROTECTIVE GLOVES: COTTON OR NORMAL RUBBER GLOVES

EYE PROTECTION: STANDARD SAFETY GLASSES

OTHER PROTECTIVE EQUIPMENT: USE CLOTHING AS NECESSARY TO AVOID SKIN CONTACT

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: PROTECT FROM MOISTURE

OTHER PRECAUTIONS:

ATTACHMENT 4

INCIDENT REPORTING MANAGEMENT PROCEDURES – FEDERAL

Shaw™
Shaw E & I, Inc.

Incident Reporting and Management Procedure - Federal

Action	Who? *When?*	Under what circumstances?	How?	Notes:
1. Notify Supervisor for all incidents **(no matter how minor)**	Injured person, first person recognizing incident, driver/passenger, or employee causing damage *Immediately*	**All incidents no matter how minor**	In person or by telephone	
2. For ***life-threatening injuries/illnesses*** - contact local emergency personnel	Site Supervisor *Immediately (concurrently with next step if injury or illness)*	In case of serious injury or illness requiring off-site medical care	Via ambulance	Site Supervisor or Site Safety Officer must immediately go to emergency care facility.
For ***non life-threatening injuries/illnesses*** - transport injured person to doctor at an occupational medical facility	Site Supervisor *Immediately (concurrently with next step if injury or illness)*		Via vehicle	Site Supervisor or Site Safety Officer must transport and stay with injured person until released from care
For ***vehicle accidents*** – make scene safe, notify police, aid injured parties	Driver/passenger *Immediately*			
For ***equipment/property damage*** - make scene safe, prevent further damage or injuries	Employee causing damage *Immediately*			
3. Notify Health Resources **(for injuries/illnesses to Shaw employees only)**	Site Supervisor *Immediately, prior to transporting the injured employee, unless injuries are life threatening*	◆ Serious injury requiring off-site medical care ◆ If employee states that he/she has been exposed to any chemical or biological substance	**800-350-4511** **Note: Outside Continental US call** **781-935-8581**	◆ Not required for temporary agency and contract labor ◆ Provide name of injured employee, name and phone # of treating medical facility, description of the incident ◆ Health Resources will help with medical facility coordination and follow-up care
4. Notify Regional/Program H&S Manager	Site Supervisor *Immediately (concurrently with providing transportation to occupational medical facility or EMS transport to hospital)*	All incidents	See Federal Incident Notification and Communication Contact List (attached)	◆ Contact should be made prior to sending the individual for medical care ◆ Regional/Program H&S Manager will notify Dave Mummert or Mike Zustra as appropriate

Incident Reporting and Management Procedure – Federal (continued)

Action	Who? *When?*	Under what circumstances?	How?	Notes:
5. Notify Shaw Notification Hotline/Help Desk	Site Supervisor *As soon as possible. Prior to sending an individual for medical treatment*	◆ Illness and/or injury (doctors cases and above) ◆ Property damage (damage > $2,500.00) ◆ Vehicle accidents (All) ◆ Criminal activity (i.e. bomb threat, theft) ◆ Natural disaster (all) ◆ Explosion and/or fires (damage > $2,500.00 or result in injury) ◆ Environmental spills/releases (incidents that requires regulatory notification or have an offsite impact) ◆ Regulatory agency visit ◆ Fatalities	Shaw Notification Hotline/Help Desk Phone Number **866-299-3445** **Note: Outside the Continental US call** **225-215-5056**	
6. Complete forms: ***Injuries and illnesses*** ◆ Authorization for Release of Protected Medical Information ◆ Authorization for Treatment of Occupational Injury/Illness ◆ Return-To-Work Examination Form ***and*** fax to Health Resources ***and*** fax to Loss Prevention Manager (Casey Parker)	Injured employee and medical facility personnel (Site Supervisor is responsible for verifying forms are completed) *Prior to leaving medical facility*	◆ Serious injury requiring off-site medical care ◆ If employee states that he/she has been exposed to any chemical or biological substance	Fax to Health Resources at 800-853-2641 Fax to Loss Prevention Manager (Casey Parker at 225-987-3080)	Site Supervisor or Site Safety Officer must take these forms with him/her to occupational medical facility or hospital (Contained in HS 020)
7. Call Project Manager and notify of incident	Site Supervisor *As soon as reasonably possible*			Project Manager will report incident to upper levels of Operations/Business Line Management

Incident Reporting and Management Procedure – Federal (continued)

Action	Who? When?	Under what circumstances?	How?	Notes:
8. Call back Regional/Program H&S Manager to report on status of ***injured/ill employee***	Site Supervisor *Prior to employee leaving medical facility*	All injuries and illnesses requiring off-site medical care	See Federal Incident Notification and Communication Contact List (attached)	
9. Complete forms: ***OSHA Recordable Cases*** Supervisor's Employee Injury/Illness Report Form Injured Employee Statement Witness Statement Form(s) ***First Aid Cases*** Supervisor's Employee Injury/Illness Report Injured Employee Statement Witness Statement Form(s) **Fax completed forms** to Shaw Corporate Claims and Regional/Program H&S Manager and Health Resources.	♦ Site Supervisor ♦ Witnesses *As soon as possible – no later than 24 hours*	All injuries, illnesses, and first aide cases	Shaw Corporate Claims Department Fax (225-932-2636) Health Resources Fax 800-853-2641 See Federal Incident Notification and Communication Contact List (attached)	Site Supervisor should have these forms with him/her at all times (Contained in HS 020)
10. Complete forms: ***Chargeable Vehicle Accidents*** Vehicle Accident Report Witness Statement Form(s) Driving Record Certification (Procedure HS800) ***Non-Chargeable Vehicle Accidents*** Vehicle Accident Report Witness Statement Form(s) ***Equipment, Property Damage and General Liability Incidents*** Equipment, Property Damage and General Liability Loss Report Witness Statement Form(s) **Fax completed forms** to Shaw Corporate Claims and Regional/Program H&S Manager.	♦ Site Lead / Supervisor ♦ Witnesses *As soon as possible – no later than 24 hours*	All vehicle accidents and /or all property damage	Shaw Corporate Claims Department (225-932-2636) See Federal Incident Notification and Communication Contact List (attached)	Supervisor should have these forms with him/her at all times (Contained in HS 020)

Incident Reporting and Management Procedure – Federal (continued)

Action	Who? *When?*	Under what circumstances?	How?	Notes:
11. Complete forms: ***OSHA Recordable Cases*** Incident Investigation Report ***First Aid Cases*** Incident Investigation Report ***Chargeable Vehicle Accidents*** Incident Investigation Report ***Non-Chargeable Vehicle Accidents*** Incident Investigation Report ***Equipment, Property Damage and General Liability Incidents*** Incident Investigation Report ***Near Miss*** Incident Investigation Report Fax completed forms to Regional/Program H&S Manager	Site Supervisor *As soon as possible – no later than 72 hours of incident*		Shaw Corporate Claims Department (225-932-2636) See Federal Incident Notification and Communication Contact List (attached)	Supervisor should have these forms with him/her at all times (Contained in HS 020)
12. Perform "Accident Review Board" (ARB) and fax to Regional/Program H&S Manager.	Site Supervisor/Project Manager *Within 10 days of incident*	OSHA Recordable Cases Chargeable Vehicle Accidents		ARB must include: Regional Manager, Project Manager, Employee's Direct Supervisor, Regional/Program H&S Manager, and Employee(s) involved in the incident. Lost time injuries will require Bill Winkler and Mike Zustra.

FEDERAL INCIDENT NOTIFICATION AND COMMUNICATION CONTACT LIST

Project Number: 800486 Project: Range 20 Soil Remediation Office: Fort McClellan Field Office Facility Location: Aniston AL

Name	Phone Number(s)	Fax Number	E-mail
Shaw Notification Hotline / Helpdesk	866-299-3445 225-215-5056 (Outside Continental US)	N/A	N/A
Health Resources	800-350-4511	800-853-2641	
Shaw Corporate Claims Department		225-932-2636	
Program/Project H&S Manager – Doug Russell	865-692-3584 (office) / 865-414-9545 (cell)	865-690-3626	winston.russell@shawgrp.com
East Region Army H&S Manager - Doug Russell	865-692-3584	865-690-3626	winston.russell@shawgrp.com
Shaw E&I H&S Director – Mike Zustra	614-834-4819 (office) / 740-215-3431 (cell)	614-834-4819	mike.zustra@shawgrp.com
ERC Division H&S Manager-Dave Mummert	419-425-6129 (office) / 419-348-1544 (cell)	419-425-6039	david.mummert@shawgrp.com
Project Manager – Steve Moran	865-694-7361 (office) / 865-607-9148 (cell)	865-690-3626	steve.g.moran@shawgrp.com
Program Manager/ROM – Bob Culbertson	865-694-4702 (office) / 865-717-3293 (cell)	865-690-3626	bob.culbertson@shawgrp.com
Loss Prevention Manager (Casey Parker)	225-932-2763 (office) / 225-405-1246 (cell)	225-987-3080	casey.parker@shawgrp.com

Note: Notifications to operations chain will be verbal and as soon as reasonably possible, but no later than 24-hours following the incident.

APPENDIX B

XRF STANDARD OPERATION PROCEDURES

STANDARD OPERATING PROCEDURE
SCREENING LEVEL METALS ANALYSIS USING
INNOV-X PORTABLE X-RAY FLUORESCENCE INSTRUMENT

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Attachment A - Field Forms

1.0 Scope and Application

The following standard operating procedure (SOP) describes the steps required to use an Innov-x X-ray Fluorescence (XRF) instrument for the screening level analysis of metals in soils and sediments. The SOP is based on the Draft U.S. Environmental Protection Agency (EPA) SW-846 Method 6200 (1996 and 1998) with minor modifications based on Shaw Environmental, Inc.'s (Shaw) experience with the Innov-x. This type of XRF instrument uses state-of-the art x-ray tube technology instead of radioactive sources to generate the radiation needed to cause metals fluorescence.

The SOP is applicable to in situ (direct analysis) and ex situ (analysis of samples) detection and quantification of XRF target metals (Table 1) in soil and sediment matrices. Data from XRF analysis using this SOP is considered to be "screening level" only and is useful for initial screening and contaminant delineation. "Screening level" data generated by the XRF should not be used for risk assessments and never used for waste disposal. Matrix effects, lack of sample preparation, and interferences may affect comparability with fixed-base laboratory methods for metals analysis.

The detection limits achieved with the XRF are dependent on the analyte of interest, the type of detector, the strength of the source, count times, matrix affects, and interferences. Table 1 summarizes the detection limits that are typically achievable in "blank" soil matrices (i.e., silica sand). Actual detection limits in site soils may be higher.

This SOP is prepared specifically for the Innov-x XRF instrument. The general approach described in the procedure is also applicable to other x-ray tube-based instruments with modification for their particular equipment specifications and requirements. In all cases, the instrument manufacturer's directions and instructions will be followed.

Use of this SOP should be restricted to personnel trained and knowledgeable in the operation of an XRF instrument or under the supervision of personnel who are trained and knowledgeable in the operation of an XRF instrument.

2.0 Method Summary

2.1 Principles of Operation

XRF is a nondestructive qualitative and quantitative analytical technique used to determine the

Table 1. Typical Reporting Limits in Silica Sand Blank, 21 Metals Detected by Innov-x XRF

Metal	Average RL (ppm)	RSD
Arsenic	3.66	2.8%
Lead	5.14	3.0%
Copper	14.7	2.6%
Nickel	29.7	1.6%
Zinc	6.51	4.5%
Chromium	69.2	3.9%
Mercury	7.34	3.3%
Antimony	56.2	0.9%
Tin	51.7	3.2%
Cadmium	31.1	1.0%
Silver	31.1	0.8%
Selenium	2.31	3.2%
Titanium	480	2.8%
Manganese	36.1	4.3%
Iron	28.7	4.7%
Cobalt	2.00	5.2%
Rubidium	1.97	2.2%
Strontium	2.55	2.0%
Zirconium	4.10	1.4%
Molybdenum	16.2	1.2%
Barium	178	2.6%

RL - reporting limit.
ppm - part-per-million.
RSD - relative standard deviation.

Based on 17 replicate measurements of SiO2 blank sand.
Actual RL in soil matrices will be higher.

metal components of samples. The Innov-x XRF uses a high-energy, x-ray tube to produce the radiation necessary to irradiate samples. The metal atoms in the sample either absorb or reflect the x-rays. When an atom absorbs the source x-rays, a shifting of electrons occurs between electron shells. The rearrangement of electrons results in the emission of x-rays, or fluorescence and each element present emits a characteristic x-ray line spectrum. The element may be identified by the energy of the wavelength. Fluorescent and reflected (backscattered) x-rays enter through a detector window where their energies are converted to electric pulses. The number of counts at a given energy per unit of time is representative of the analyte concentration. An onboard data processor converts the detector signals into useable information: elements present, their concentrations in parts-per-million, and the standard deviation (error) of the measurement.

2.2 Instrument Description

The Innov-x XRF instrument is a new design that incorporates new technology into XRF field instrumentation. The technological improvements of this instrument over existing XRF machines are many. These include the use of a high energy x-ray tube instead of sealed radioactive sources; the use of an integrated personal data assistant (PDA) to control the instrument and capture and report data; and an improved detector and electronics that help increase instrument sensitivity and shorten the instrument time required to perform the analysis. The XRF also comes with an separate test stand to aid in sample presentation and analysis. The machine itself has a similar design to a portable power drill, allowing one-handed operation by the analyst. Innov-x has included a handle-mounted battery pack and a instrument trigger. The x-ray tube assembly is mounted above the handle, sending the x-rays along the instrument barrel towards the Kapton film window which directly interfaces with the sample to be analyzed at the end of XRF. The instrument detector is also mounted at this end of the instrument, sending it's signals back to the onboard data processor which in turn reports the calculated results to the PDA. The PDA is mounted to the top of the instrument in a special socket and can be removed and/or re-inserted during use without turning the XRF off.

The instrument instruction manual should be thoroughly reviewed for first time users and referred to by the analyst for project-specific instrument set up. This SOP will review typical setup and operation only.

2.3 Sample Preparation Procedures

Sample preparation is dependent on the mode of analysis. For samples analyzed in the field, rock and vegetative matter will be removed as the sample is homogenized. If any metal debris

(such as bullets or bullet fragments) are present in the sample, they will be identified by the analyst and removed by hand. The amount and type of metal debris observed will be recorded on the sample analysis form or sample collection log.

Direct "In Situ" Analysis. To protect the Innov-x XRF analysis window from damage, this SOP recommends placing the homogenized material for analysis inside a plastic Ziplock bag. The Ziplocks used should be non-textured plastic, storage or freezer bags, either one quart or one pint size. Once the material is in the bag, the analyst will compress and smooth the material inside the bag's interior surface using his gloved hands forcing the material to the bottom of the bag working the material into a consistent sample interface for analysis. If the bag has any printing on the front side, the analyst will turn the bag over and analyze the sample through the reverse (unprinted) side.

Onsite Laboratory Preparation. For samples analyzed in a laboratory environment: (a) rock, vegetative matter, and metal debris will be removed as the sample is homogenized; (b) an aliquot of sample will be placed in a disposable, oven-safe container and dried; (c) after cooling, the sample will be crushed with a ceramic pestle if necessary, and passed through a ASTM No. 10 (2-mm) wire mesh sieve and onto a piece of wax paper. After sieving, samples may be transferred to a Ziplock bag for analysis or placed into plastic XRF cups and sealed using Mylar film supplied by the instrument manufacturer.

2.4 Sample Analysis

Sample analysis begins by exposing the sample to primary radiation from the source. The Innov-x has two options for sample presentation to the instrument – direct analysis or the integrated test stand.

Direct Analysis. If direct analysis with the Innov-x is performed, the analyst will ensure the instrument window is in direct, stable contact with the sample bag or cup so that the instrument window and the sample surface are properly aligned. The analyst will initiate the analysis by depressing (and releasing) the XRF trigger mechanism as he holds the instrument down against the sample bag or cup. The instrument will perform an initial "safety check" and then open the shutter allowing the analysis to begin. The analyst must hold the instrument upright and maintain a steady contact with the sample while the instrument is in the "on" position. The XRF has a flashing red strobe light mounted on the top of the instrument and a small LCD display on the rear of the instrument. While taking a direct reading, the light will flash and the LCD display will show a counter of the total seconds elapsed. The analyst must not move the instrument during direct analysis until the sequence is complete and the shutter closes automatically.

Significantly moving the instrument or sample during direct analysis would invalidate the run and potentially expose the user to x-rays, though the safety lock of the Innov-x would immediately engage and stop the run when the instrument stopped detecting sample fluorescence (i.e., the sample has been removed).

Test Stand Analysis. Using the integrated test stand, the instrument is mounted in a cradle and the instrument window fits into a slot beneath the test platform so the XRF window faces "up." The PDA is removed from the XRF in this configuration and is remotely attached to the instrument via data cable. The analyst places the bagged or cupped soil on the test platform directly over the XRF window of the unit, the test stand's protective cover is closed over the analysis area, and the analysis is started using the PDA. The test stand includes a red light mounted on top of the stand that will flash when analysis is underway. When analyzing the sample, the test stand cover must remain closed to reduce radiation risk to the analyst. Once the analysis run is complete, the PDA display changes and the red light returns to steady.

Either method can be used to analyze samples prepared in bags or in XRF cups. The test stand is very convenient when a single analytical station can be set up in the field and ex situ samples collected and brought to the station for prep and analysis. If the instrument must be moved from place to place for "in situ" type readings, then a direct analysis should be performed. It is key that the analyst lock the instrument trigger (via the PDA) prior to moving the instrument if the distances between sample locations is great. In this manner the XRF can be safely transported without having to power down the instrument between readings.

During the analysis, the instrument will constantly update the PDA to show the elapsed count time of the run, the concentration and standard deviation of the metals detected, and the detection limit of the metals which are not detected. The analyst should monitor this display, but operating in the default, standard mode, Innov-x programming will discontinue the analysis run when 90 seconds has elapsed. In approximately 90 seconds, the Innov-x has reached the lower reporting limits routinely achievable. If required, the XRF run time can be extended via the PDA analytical programming to marginally lower the reporting limits further. Check the instrument manual for instructions. The needs of the project and the objective of the XRF measurement will be taken into account by the analyst to determine the length of analysis.

3.0 Interferences

3.1 Physical Matrix Effects

Physical matrix effects result from variations in parameters such as moisture, particle size, uniformity, and homogeneity, and sample position.

3.1.1 Moisture Content

Overall error from moisture is minimal for soil with moisture contents of 5% to 20%. Drying in a commercial toaster or laboratory oven can minimize error. No sample will be analyzed in situ if it contains greater than 20% moisture (i.e., the soil is visually wet or contains any free water). In-the-field measurements can be performed on soil that is dried by squeezing the material through paper towels or coffee filters to remove water from the samples prior to analysis. Alternatively, the sample can be collected in the field and brought into the onsite laboratory for oven drying. If necessary, the samples will be dried for 4 to 8 hours at 120 degrees Celsius (or as needed) to remove moisture.

3.1.2 Particle Size, Uniformity, and Homogeneity

To minimize the analytical error attributable to particle size, uniformity and homogeneity laboratory prepared samples will be crushed, sieved and homogenized as part of the sample preparation process. Crushing will be performed using a ceramic pestle (or soil grinder, if needed). Crushed material will be passed through an ASTM No. 10 (2-mm pore size) standard sieve to remove small rock and debris. Finer size sieves may be used also depending on the project objectives. Once crushed and sieved, the material that passes through the sieve is piled onto a sheet of wax paper where it is homogenized and blended by using a rolling action. Prepared samples can be covered with a sheet of Mylar film for direct analysis or placed into Ziplock bag.

3.1.3 Sample Position

Inconsistent positioning of samples is a potential source of error. The x-ray signal decreases as the distance from the source increases. The window of the XRF should be in direct contact with the soil bag, cup window, or sampled surface. The analyst must make sure that if performing direct analysis, the instrument window stays in constant, even contact with the sample analysis surface.

3.2 Chemical Matrix Effects

Concentrations of certain elements interfere with others. The effects may occur as peak overlaps, x-ray absorption, or x-ray enhancement. The Innov-x has advanced programming present to minimize these effects, however they cannot be eliminated entirely.

Common matrix effects include: a high lead concentration elevates the detection limit of arsenic or biases the result high; iron may interfere with the quantification of copper and cobalt, and the

presence of vanadium may affect chromium quantification. Consult the instrument manual if these conditions exist at the site.

4.0 Safety

When in the field, the instrument will be operated in compliance with the manufacturer's recommended procedures found in the instrument manual**. Under no circumstances will the XRF instrument case be opened or serviced by the analyst.** If the instrument malfunctions, the Shaw Equipment Division and manufacturer will be contacted for further instructions.

The safety procedures found in the instrument manual will be explicitly followed. These include:

- Trigger/shutter lockout will be engaged (via the PDA) when the instrument is not in use. If not in use for longer than 1-2 hours, the analyst should power down the instrument to reduce heat buildup and save battery power. If the XRF is not mounted in the test stand, it should be secured and stored inside the case.

- The analyst will always be aware of the position and angle of the x-rays.

- The analyst will operate the instrument only on a stable, flat surface when performing a measurement. If the test stand is used, the test stand should be placed on stable surface (field table, truck tailgate, e.g.).

- The analysis area will be separate from other work areas and dedicated to sample preparation and analysis.

- Leak detection testing within the last six months shall be performed on the XRF and certificates of analysis included in the shipping container. Required licensing documentation and storage requirements shall be enforced.

- When the XRF is not in use for long time periods, it will be stored in its original shipping container.

Shaw's health and safety personnel and a certified health physicist have reviewed instrument safety procedures of the Innov-x XRF while in operation. Human exposure to radiation is typically measured in rems or in one-thousandths of a rem, called millirem (mR). The allowable limit in the U.S. for occupational exposure is 5,000 mR/year for a whole-body or 50,000 mR for shallow penetration of extremities. Exposure from a properly used Innov-x will be less than 50 mR per year, even if the instrument is used 2,000 hours per year. Therefore, radiation safety badges or dosimetry monitoring are not required if the procedures are followed.

5.0 Equipment and Supplies

- XRF analyzer - An XRF analyzer should have two major components: the integrated instrument (batteries, x-ray tube, trigger, window, detector, and PDA) and the optional test stand and cables.
- Calibration verification standards (blank soil and certified standard reference materials)
- Spare battery and a charger
- PDA cradle and cables for connection to laptop
- Sampling and homogenizing tools (examples: steel trowel, hand rake, spoon, hand auger, disposable wooden spatulas)
- Oven-safe drying containers (disposable aluminum pans)
- Ziplock storage bags
- Wax paper
- Drying oven
- Kapton/Mylar x-ray window film, XRF cups, and glass wool
- Mortar and pestle
- Sieve and sieve brushes
- Laboratory scoopula
- Waste container (for material that does not pass sieve)
- Indelible marking pens

- Paper toweling, disposable wipes
- Gloves, safety glasses, and dust mask (if crushing and sieving fine dried soils)

6.0 Standards

6.1 Standard Reference Materials

Standard reference materials (SRMs) are prepared soil samples containing certified concentrations of metals in soil or sediment. Typically SRMs are purchased from the National Institute of Standards and Technology (NIST) or commercial supplier such as Environmental Resource Associates (ERA). They are used for accuracy and performance checks of XRF analyses. Three standards containing the analytes of interest at low, medium, and high levels are recommended to verify the instrument performance. Historical concentrations at the site and the concentrations of any project-specific regulatory clean up or remedial goals or action levels of the analytes of interest will be evaluated in the selection of SRMs.

Site-specific SRMs made up of a site soil which are prepared (dried, crushed, and sieved), thoroughly homogenized, and split with fixed-base laboratory for comparison analysis are not typically used to support XRF projects that generate data of "screening level" quality. If sufficient number of analytical replicates (minimum of 3 per sample) is performed at the fixed-base laboratory, the average result may be acceptable to use as a "certified" standard if the replicates agree within a 15% relative standard deviation.

6.2 Blanks

A blank sample of "clean" quartz or silica dioxide sand that is free of any of the analytes of interest at the detection limits is required. Usually this material will be supplied by the instrument manufacturer.

7.0 Quality Control

7.1 Data

All field data sheets and quality control data should be maintained for reference or inspection.

7.2 Calibration

Instrument calibration should follow the calibration procedures outlined in the manufacturer's operator's manual. The Innov-x instrument undergoes a system check during start up or when the instrument is reset. An energy calibration using the stainless steel coupon (if using the test stand) or clip (direct analysis) is required after a successful system check.

7.3 Calibration Verification Checks

A calibration verification is performed using SRMs to check the accuracy of the instrument and to assess the stability and analysis of analytes of interest. Check samples should be analyzed at least at the beginning of each day. Additional checks may be analyzed during the day and at the end of the day. The count time of the calibration check should approximate the analysis time of the field samples (i.e., 90 seconds of elapsed time is the default).

In general, the measured value for each target analyte should be less than 20% difference (%D) from the certified value. The %D is defined as the absolute difference divided by the certified value and is expressed as a percent. If the %D falls outside this range, the check should be reanalyzed. If the value is outside the acceptable range again, the analyst should note this condition on the calibration log form. At very low concentrations near in the detection limit, exceedances of the 20% criterion are not uncommon. Depending on the objective of the XRF measurements, the analyst should consider increasing the count time of the verification check (and also the field samples) to determine if the XRF measurement accuracy would improve with increased exposure.

7.4 Blanks

A blank sample of quartz or silica dioxide sand should be analyzed at the beginning of each day. No analytes of interest should be detected above the typical detection limit (Table 1).

7.5 Detection Limits

The Innov-x XRF calculates and reports the detection limit for each metal on a sample-specific basis. These are based on the standard deviation of the measurement. Three times the standard deviation is the typical detection limit (e.g. reported along with a “<LOD” result). The XRF reported standard deviation can be theoretically decreased by increasing the instrument count time as appropriate to meet the objectives of the work. The Innov-x default for analysis is 90 seconds of elapsed time.

Typical limits are shown on Table 1 for a blank, silica sand matrix.

8.0 Procedure

Before operating any XRF instrument, consult the manufacturer's manual.

8.1 Instrument Warm-up and Operating Environment

After installing a newly charged battery, turn the instrument on and allow it to warm-up for at least fifteen minutes. The instrument performs best in a dry, temperature-controlled environment. The Innov-x can be operated in light to moderate rain (as long as the instrument and sample remain dry) and in relatively high ambient temperatures. Caution should be taken to protect the PDA from direct exposure to strong sunlight (by covering the instrument screen or operating in the shade). If the internal temperature of the XRF exceeds operating specifications, the instrument will show a warning message on the display screen and shut down. If this occurs, the analyst should leave the instrument off and remove the XRF to a lower temperature environment (interior of an air conditioned building or car) for 15 to 30 minutes and then restarted.

8.2 Internal Calibration

Check the PDA clock date/time before beginning analysis. Adjust the time for the local time zone if needed. Either assemble and mount the XRF in the test stand or if the instrument will be used to collect direct measurements, immediately begin the automated internal calibration/equipment check sequence of the XRF. Use the stainless steel coupon (disk) in test stand mode or use the “clip on” attachment for direct analysis when prompted to do the energy calibration. Document that the instrument passes the energy calibration check.

8.3 Blank Analysis

After completing a successful internal/energy calibration sequence, analyze a quartz or silica dioxide sand blank. If the XRF is mounted in the test stand, the polyethylene sample cup is placed directly over the instrument window with the cup’s Mylar film facing down. Close the test stand cover and initiate analysis using the PDA touch screen. In direct analysis mode, position the cup with the film window facing up and align the XRF window over the cup. Hold the instrument in place and depress (and release) the trigger to start analysis.

The XRF will open the shutter and test for the presence of the sample. If the sample is in place and fluorescence is detected, the instrument will begin analysis. The instrument-mounted or test stand-mounted red light will flash to indicate the analysis is underway. After a count time of at

least 60 seconds (or 90 seconds of actual elapsed clock time), the analysis will be automatically terminated with the PDA control. Generally speaking, once the run has started, it must be completed before disengaging the XRF from the sample. If the cup is moved or the test stand cover is opened during a run, the XRF will stop the run and report an error message on the PDA. This is not recommended, as radiation exposure potentially exists. A PDA-based control button can also terminate the run early if required.

When the run is complete, the PDA will display the final XRF results of the run and allow the text entry into data fields designed to identify the run. For the calibration blank and standards, use the pop-up keypad on the PDA to type the identifying information into these fields for data log storage. When the data are transferred electronically, these fields are transferred along with the analytical results to help identify the sample.

Record results on calibration form (Attachment A) or a project-specific form may be used instead.

8.4 Calibration Check Verification

After successful analysis of a blank, analysis of a series three concentration level SRMs is recommended (low, medium and high level) depending on project objectives and the availability of SRMs. The sample cup containing the SRM is analyzed in the same manner as the blank. After a count time of at least 60 seconds (90 seconds of elapsed time), the analysis will be automatically terminated unless this is reset manually. Record identifying sample information with the PDA popup key pad and on the Calibration Form (Attachment A). A project-specific form may be used instead.

8.5 Sample Analysis

After successful verification of calibration, sample analysis can begin. Follow the procedures described in Sections 2.3 and 2.4. After a count time of at least 60 seconds (90 seconds elapsed time), the analysis will be automatically terminated unless this is reset manually. Record identifying sample information with the PDA popup key pad and on a data form (Attachment A). Ensure that the sample depth of take is recorded in one of the fields to help identify the sample as well. A project-specific form may be used instead.

Immediately after analysis, the prepared sample can be archived for up to 6 months at room temperature for later confirmation analysis at a fixed-based laboratory. It is recommended that the sample be secured in an Ziplock storage bag and placed in a cooler for storage for archive. If

the sample is to be sent for fixed-base laboratory analysis, then no further processing is necessary. The sample can be transferred into the appropriate sample container for labeling and shipping off site.

Following sample preparation and analysis, all disposable materials that have come in contact with the soil will be discarded appropriately. Materials that are reusable will be decontaminated using brushes, disposable wipes, paper toweling, and air drying.

8.6 Post-Sample Analysis Calibration Check Verification

After analysis of project samples, the calibration should be verified at the end of the analysis cycle to document instrument stability. Repeat step 8.3 in total or use a blank and the low or mid-level SRM. The necessity of this check depends on the project objectives.

9.0 Data Analysis

Forms. All data from the XRF is manually captured and reported by the analyst using project-specific forms or logbook. Forms will be used to record the sample collection, preparation, and analysis and XRF instrument calibration. Attachment A contains example forms.

Electronic Data. The XRF is capable of storing results and spectra for thousands of samples. Data is stored in the PDA by analysis date. At the end of each day's analysis, the PDA should be removed from the XRF and placed in the cradle attached to the laptop. Using provided software, the data will be downloaded to the PDA hard drive and then transferred to the laptop as a ".CSV" file. This type of file can be directly imported into Excel for data manipulation and reporting. Downloads will occur according to project-specific requirements.

10.0 Waste Management

No liquid waste should be generated from the analysis of soils by XRF. All sample debris, personal protective equipment, and laboratory waste will be collected and disposed in compliance with project-specific waste management practices. Archived soil samples can be held for up to 6 months at room temperature without preservation before disposal.

11.0 References

U.S. Environmental Protection Agency (EPA), 1996, Region 1, EPA-New England, ***Standard Operating Procedure for Elemental Analysis using the X-MET 920 Field X-ray Fluorescence Analyzer***, October 1996.

U. S. Environmental Protection Agency (EPA), 1998, Test Methods for Evaluating Solid Waste, Physical/Chemical Properties, SW-846, Method 6200, ***Field Portable X-Ray Fluorescence Spectrometry for the Determination of Elemental Concentrations in Soil and Sediment***, January 1998.

ATTACHMENT A

FIELD FORMS

Shaw Environmental & Infrastructure, Inc.

XRF Calibration Form

Site Name - City, State

Project No: Add Number | Contract Title / Client Name | Cost Code: Add Number

1. Initial Calibration Data: Date: _____ Check PDA clock on XRF.

Is XRF warm-up >15 min? **Yes** **No** Time: _____ Agree? **Yes** **No**

Internal calibration complete? **Yes** **No** Comments: _____

Record energy resolution: _____ eV

2. Start-of-Day Calibration: **Innov-x Instrument** Serial Number _____

Blank - SiO_2, **Count: _____sec**

Element	Conc (ppm) Certified	Conc (ppm) Detected	< RLs Accept?
As	**< 5**		
Pb	**< 8**		
Cu	**< 20**		

Other metals: Zn (<10) _____, Ni (<40) _____,

Hg(<10) ____, Cr (<80) _____

Moderate Lead-NIST 2711, **Count: ___ sec**

Element	Conc (ppm) Certified	Conc (ppm) Detected	% D Accept?
As	105		
Pb	1,162		
Cu	114		

Other metals: Zn (350.4) _____ , Ni (<50) _____,

Hg (<35)____, Cr (<300)_____

Low Lead-NIST 2586, **Count: ____ sec**

Element	Conc (ppm) Certified	Conc (ppm) Detected	% D Accept?
As	18.9		
Pb	432		
Cu	81 *		

Other metals: Zn (352) _____, Ni (75*) _____,

Hg(<35) ____, Cr (301)_____

High Lead-NIST 2710, **Count: ___ sec**

Element	Conc (ppm) Certified	Conc (ppm) Detected	% D Accept?
As	626		
Pb	5,532		
Cu	2,950		

Other metals: Zn(6,952) _____ , Ni (14.3) _____,

Hg(32.6)____, Cr(<300) _____

Comments: * Not a NIST certified value. %D = difference of certified and measured values, divided by certified value. Expressed as %.

Shaw Environmental & Infrastructure, Inc.

XRF Calibration Form

Site Name - City, State

Project No: Add Number | Contract Title / Client Name | Cost Code: Add Number

3a. Continuing Calibration Data: Date: _____ Check XRF clock.

Is XRF warm-up >15 min? **Yes** **No** **N/A** Time: _____ Agree? **Yes** **No**

Internal calibration complete? **Yes** **No** Comments: _____

Record energy resolution: _____ eV Source Strength: _____ mCi

3b. Continuing Calibration Data: Date: _____ Check XRF clock.

Is XRF warm-up >15 min? **Yes** **No** **N/A** Time: _____ Agree? **Yes** **No**

Internal calibration complete? **Yes** **No** Comments: _____

Record energy resolution: _____ eV

Shaw Environmental & Infrastructure, Inc.

XRF Calibration Form

Site Name - City, State

Project No: Add Number | Contract Title / Client Name | Cost Code: Add Number

4. End-of-Day Calibration: Date: _____ Check XRF clock.

Is XRF warm-up >15 min? **Yes** **No** **N/A** Time: _____ Agree? **Yes** **No**

Internal calibration complete? **Yes** **No** Comments: _____

Record energy resolution: _____ eV Source Strength: _____ mCi

Blank - SiO_2, **Count: _____sec**

Element	Conc (ppm) Certified	Conc (ppm) Detected	< DLs Accept?
As	**< 5**		
Pb	**< 8**		
Cu	**< 20**		

Other metals: Zn (<10) _____, Ni (<40) _____,

Hg(<10) ____, Cr (<80) _____

Moderate Lead-NIST 2711, **Count: ___ sec**

Element	Conc (ppm) Certified	Conc (ppm) Detected	% RPD Accept?
As	105		
Pb	1,162		
Cu	114		

Other metals: Zn (350.4) _____ , Ni (<50) _____,

Hg (<35)____, Cr (<300)_____

Low Lead-NIST 2586, **Count: ____ sec**

Element	Conc (ppm) Certified	Conc (ppm) Detected	% RPD Accept?
As	18.9		
Pb	432		
Cu	81 *		

Other metals: Zn (352) _____, Ni (75*) _____,

Hg(<35) ____, Cr (301)_____

High Lead-NIST 2710, **Count: ___ sec**

Element	Conc (ppm) Certified	Conc (ppm) Detected	% RPD Accept?
As	626		
Pb	5,532		
Cu	2,950		

Other metals: Zn(6,952) _____ , Ni (14.3) _____,

Hg(32.6)____, Cr(<300) _____

Comments: * Not a NIST certified value. %D = difference of certified and measured values, divided by certified value. Expressed as %.

Form Completed by:

_____

Signature Date

Shaw Environmental & Infrastructure, Inc.

XRF Laboratory Sample Results Form

Site Name - City, State

Project No: Add Number Contract Title / Client Name Cost Code: Add Number

1. General Sample Location and Identification

(circle one): **Floor Sidewall Other**

(if "other" describe): _____

Sample Loc/Description: _____ _____ to _____

(location) (type) (excavation depth, ft)

Location comments: _____ Date: _____ Time: ____ : ____

Sample Number: [ ] Associated QC: _____

2. Sample Preparation:

(Check all that apply)

In situ	Drying	Crushing	Coarse Sieve
(pan prep)	(Temp: ____ C for ___ hrs)		(#10, 2 mm)

Sample Prep Comments / Tar Observed? _____

3. Analytical Results: (all units are ppm)

Measurement No.: _____

Measurement Date: _____ Count Time: _____ sec

Time: _____ Elapsed Time: _____ sec

	Original Analysis		Dup Analysis*		RPD	
	Conc	Std Dev	Conc	Std Dev	%	Comment
As						
Pb						
Cu						
Zn						

* If performed

Other Metals (Ni, Hg, Cr): _____

Comments: _____

4. Analytical Team:

Form Completed by

_____ _____

Signature Date

XRF Summary of Results
Site Name - City, State

Location ID		Sampling Data		Prep			XRF Data		Conc (ppm)					Split to	Other
Location	No.	Date	Time	Pan	Lab	Frag?	Read No.	Count (sec)	As	Std	Pb	Std	Other Metals	Lab	Comments