Resource Conservation Recovery Act Facility Investigation (RFI)
Impact Area South of Prisoner-of-War Training Facility
Former Rifle/Machine Gun Ranges Parcels 100Q and 101Q
McClellan, Anniston, Alabama

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AAR	After Action Report
ADEM	Alabama Department of Environmental Management
amsl	above mean sea level
ARBCA	Alabama Risk-Based Corrective Action Guidance Manual
Army	United States Department of the Army
ASTM	American Society for Testing and Materials
BGR	Bains Gap Road
bgs	below ground surface
BHCD	betahexachlorocyclohexane
BRAC	Base Realignment and Closure
BTV	background threshold values
CA	Cleanup agreement
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERFA	Community Environmental Response Facilitation Act
cm	centimeters
CMIP	Corrective Measures Implementation Plan
CMIR	Corrective Measures Implementation Report
COC	Constituent of concern
COPC	Constituent of potential concern
COPEC	Constituent of potential ecological concern
DDT	4,4'dichlorodiphenyltrichloroethane
DOD	United States Department of Defense
DPT	direct-push technology
EBS	*Final Environmental Baseline Survey, Fort McClellan, Alabama*
Eco-RBRGs	ecological risk-based remedial goals
Eco-SSLs	Ecological Soil Screening Levels
EPA	U.S. Environmental Protection Agency
EPIC	Environmental Photographic Interpretation Center
ESCA	Environmental Services Cooperative Agreement
ESE	Environmental Science & Engineering, Inc.
ESN	Environmental Services Network, Inc
ESV	Ecological screening value
FOSET	Finding of Suitability for Early Transfer
FOST	Finding of Suitability for Transfer
ft	feet
FTMC	Former Fort McClellan
GPS	Global Positioning System
HHRA	Human Health Risk Assessment
HI	Hazard index
HQ	Hazard quotient
IASPOW	Impact Area South of Prisoner-of-War Training Facility
ID	inside diameter
IDW	Investigative derived waste
IELCR	Individual Excess Lifetime Cancer Risk
ILCR	Incremental lifetime cancer risk

IMR	Iron Mountain Road
IT	IT Corporation, Inc.
JPA	Anniston-Calhoun County Fort McClellan Development Joint Powers Authority
LANL	Los Alamos National Laboratories
LOAEL	Lowest Observed Adverse Effect Level
LUC	Land Use Control
McClellan	McClellan, Anniston, Alabama
MCPP	2-(2-Methyl-4-chlorophenoxy)propionic acid
MDA	McClellan Development Authority
MDC	Maximum detected concentration
MES	Matrix Environmental Services, LLC
mg/kg	milligram per kilogram
mg/L	milligrams per liter
mm	millimeter
MOUT	Military Operations in Urban Terrain
MRS	Munitions Response Site
NOAEL	no-observed-adverse-effect-levels
PAH	Polynuclear aromatic hydrocarbon
PERA	Preliminary Ecological Risk Assessment
PID	photoionization detector
POW	Prisoner-of-war
PPE	personal protective equipment
PRA	Preliminary Risk Assessment
PVC	polyvinyl chloride
QAP	*Quality Assurance Plan*
RC	Representative Concentration
RCRA	Resource Conservation Recovery Act
RFI	RCRA Facility Investigation
RSL	Regional Screening Level
SAIC	Science Applications International Corporation
SAP	*Installation-Wide Sampling and Analysis Plan*
SFSP	Site-specific Field Sampling Plan
Shaw	Shaw Environmental, Inc.
SI	Site Investigation
Site	Former Rifle/Machine Gun Ranges, Parcels 100Q and 101Q
SRA	Screening Risk Assessment
SSHP	Site-specific Safety and Health Plan
SSSL	Site-Specific Screening Level
SVOC	semi volatile organic compounds
UCL	Upper confidence limit
US	United States
USACE	United States Army Corps of Engineers
USCS	Unified Soil Classification System
USDA	United States Department of Agriculture
UXO	Unexploded Ordnance
VOC	Volatile Organic Compound

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EXECUTIVE SUMMARY

The Impact Area South of Prisoner-of-War Training Facility (IASPOW), Former Rifle/Machine Gun Ranges, Parcels 100Q and 101Q (Site) is located in the north-central portion of the Main Post of the former Fort McClellan (FTMC), south of Falcon Road and Gobbler Road (Figure 1-1), Anniston, Alabama. The impact area was identified during a site walk conducted by Shaw Environmental, Inc (Shaw) personnel in October 2001. The area of investigation, and the subject of this Resource Conservation Recovery Act (RCRA) Facility Investigation (RFI), is an approximately 3.3-acre rectangular area identified from aerial photographs (Figure 1-2).

In 2003 Shaw conducted a site investigation (SI) at the IASPOW to determine whether chemical constituents are present at the site at concentrations that pose an unacceptable risk to human health or the environment. The Draft SI Report was submitted to both the Alabama Department of Environmental Management (ADEM) and the U.S. Environmental Protection Agency (EPA) in September 2003. Comments on the Draft SI were generated by both ADEM and EPA; however, the draft report was not finalized by the United States Department of the Army (Army) due to the transfer of portions of the former FTMC (including the IASPOW) to the Anniston-Calhoun County Fort McClellan Development Joint Powers Authority (JPA) in September 2003 as part of the implementation of the Environmental Services Cooperative Agreement (ESCA) between the Army and the JPA. The JPA entered into a Cleanup Agreement (CA) with ADEM in 2003 (Facility ID No. AL4 210 020 562) to complete environmental services and achieve site closeout in accordance with the requirements of the ESCA. The CA was issued under the authority of RCRA resulting in the finalization of the Draft SI as an RFI.

The findings of the SI were used as the basis for this RFI. The SI consisted of the collection and analysis of 22 surface soil samples, 20 subsurface soil samples, and 4 groundwater samples. In addition, two permanent monitoring wells were installed at the site to facilitate groundwater sample collection and to provide site-specific geological and hydrogeological characterization information. In response to comments generated by ADEM, supplemental sampling that consisted of 5-point composite samples for both surface soil and subsurface soil were collected and analyzed in January 2022 at 3 of the original soil sampling locations that reported the highest measured concentrations of metals in the SI. Given the SI data were approximately 20 years older it was of questionable validity to combine the two data sets; therefore data evaluations in this RFI are presented for the older set using prior accepted methodologies and the more recent data was evaluated in accordance with current Alabama Risk-Based Corrective Action (ARBCA) guidance (ADEM, 2017). We note the conclusions of the Draft SI were corroborated by the supplemental sampling in this RFI.

Chemical analysis of samples collected at the IASPOW associated with the 2003 Draft SI indicates that metals, explosives, volatile organic compounds (VOC), pesticides, and herbicides were detected in the various site media. To evaluate whether the detected constituents pose an unacceptable risk to human health or the environment, the analytical results were compared to site-specific screening levels (SSSL), ecological screening values (ESV), and background screening values for Fort McClellan in the SI. Site metals data were further evaluated using statistical and geochemical methods to determine if the metals were site related. A preliminary

risk assessment (PRA) and preliminary ecological risk assessment (PERA) were also performed to further characterize the potential threat to human health and the environment.

The PRA identified three metals (antimony, arsenic, and lead) as constituent of potential concern (COPC) in soil. The metals are known to be constituents of bullets, and expended bullets and bullet fragments were observed on the surface over a substantial portion of the site. Groundwater COPCs were four organochlorine pesticides (aldrin, dieldrin, heptachlor epoxide, and beta-hexachlorocyclohexane), and one explosive compound (4-amino-2,6-dinitrotoluene). The PRA concluded that the IASPOW in its current state can be released for its intended industrial use, but not for residential (or unrestricted) use.

The PERA identified two metals (lead and copper) and one VOC (trichloroethene) as chemicals of potential ecological concern in surface soil. Exposures to subsurface soil and groundwater were considered unlikely for ecological receptors at this site. The PERA concluded that the metals have the potential to pose ecological risk. The trichloroethene is unlikely to pose ecological risk because of its isolated nature and relatively low detected concentration. The site is not expected to provide viable ecological habitat in the projected industrial reuse scenario. Therefore, the potential future threat to ecological receptors is considered low.

A Screening Risk Assessment (SRA) was prepared to address ADEM's concerns on the PERA and to include human health screening. The SRA at the Site was based on the results for surface and subsurface soil samples collected during 2022 supplemental soil sampling, and was conducted in accordance with ARBCA. ARBCA has a specific human health risk assessment (HHRA) process and references EPA guidance for ecological risk assessment. The ecological risk screening follows the steps outlined in EPA Region 4 Ecological Risk Assessment Supplemental Guidance to Ecological Risk Assessment Guidance to Superfund (EPA 2018).

Regarding the Human Health Screening, the only constituent with a maximum concentration that exceeded both EPA Regional Screening Levels (RSLs) and background threshold values (BTVs) was arsenic. One result (15 milligram per kilogram [mg/kg]) exceeded the BTV of 13.7 mg/kg at one location in subsurface soil. Arsenic is not a typical firing range contaminant, and the only exceedance was in a subsurface sample, suggesting that the observation is not related to past use.

Regarding the Ecological Screening, a number of analytes exceeded both ESVs and BTVs (common nutritional elements calcium, magnesium, potassium and sodium are not included in risk assessments). However, antimony, copper, lead, and zinc did not exceed the Ecological Risk-Based Remedial Goals (Eco-RBRGs) and are therefore screened out. The remaining chemicals with maximum concentrations over ESVs or lacking ESVs for ecological risk are:

- Aluminum
- Iron
- Manganese
- Mercury
- Selenium
- Thallium

- Vanadium

As noted in the SRA, most of the constituents of concern (COCs) were below BTVs and did not exhibit a pattern of contamination (surficial deposition) likely to be related to Site activities. Additionally, the Site will be redeveloped as a solar array (industrial reuse), and its primary function will not be as habitat. The key ecological concerns would be if there were excessive high concentrations or bioconcentrators that could move up into the food chain as a result of incidental wildlife contact. These conditions do not exist, and, in fact, the COC concentrations appear to be background. Therefore, no ecological risk is predicted.

Based on the results of the RFI, past operations at the IASPOW have impacted the environment. The site is unsuitable for unrestricted reuse (i.e., residential). However, the site does not pose an unacceptable risk to human health or the environment in the projected (industrial) land reuse scenario. Therefore, No Further Action with Land Use Controls (LUCs) is recommended for the site.

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1.0 INTRODUCTION

Matrix Environmental Services, LLC (MES) has prepared this Resource Conservation Recovery Act (RCRA) Facility Investigation (RFI) Report to summarize environmental investigations at the Impact Area South of Prisoner-of-War Training Facility (IASPOW), Former Rifle/Machine Gun Ranges, Parcels 100Q and 101Q, within McClellan, Anniston, Alabama (McClellan) formerly known as Fort McClellan. Figure 1-1 shows a map of McClellan. Figure 1-2 shows a parcel location map of Parcels 100Q and 101Q.

This work is being performed on behalf of the McClellan Development Authority (MDA) after assuming from the United States (U.S.) Department of the Army (Army) the responsibility for environmental closure of certain sites at McClellan. Transfer of these sites to the MDA was conducted pursuant to Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 120(h)(3)(C) which allows federal agencies to transfer contaminated property before all necessary cleanup has taken place.

The basis for the cleanup effort at these parcels is an Environmental Services Cooperative Agreement (ESCA) DASW01-03-2-001 effective September 30, 2003 between the MDA (formerly the Anniston-Calhoun County Fort McClellan Development Joint Powers Authority (JPA)) and the Army (Army, 2003) which was superseded by ESCA Agreement W9128F-07-2-0163 on September 11, 2007 and its subsequent modifications (Army, 2007). In addition, the MDA negotiated a Cleanup Agreement (CA), amended most recently in July 2019, with the Alabama Department of Environmental Management (ADEM) that describes the responsibilities for completing the investigation and remediation of potentially impacted sites at McClellan (ADEM, 2003, 2005, 2009, 2011, and 2014). Property that was determined by the Army and ADEM to be suitable for transfer (i.e., "clean property") was transferred to the JPA under a Finding of Suitability for Transfer (FOST). Subsequently, remaining contaminated property was transferred to the JPA under a Finding of Suitability for Early Transfer (FOSET). The basis for the continuing cleanup effort at these FOSET parcels is the execution of the ESCA and the CA.

Information contained in the following sections are adapted from previous work performed by Shaw Environmental, Inc. (Shaw), formerly IT Corporation, Inc. (IT), (Shaw, 2003) and MES.

1.1 Project Description

Parcels 100Q and 101Q were identified as areas to be investigated prior to property transfer. The parcels were classified as Category 1 Qualified parcels in the environmental baseline survey (EBS) (Environmental Science and Engineering, Inc. [ESE], 1998). Category 1 Qualified parcels are areas that have no evidence of CERCLA-related hazardous substances or petroleum product storage, release, or disposal but that do have other environmental or safety concerns. Parcels 100Q and 101Q were qualified because of their use as weapons ranges.

A site-specific field sampling plan (SFSP) and a site-specific safety and health plan (SSHP) were finalized in January 2002 (IT, 2002a). The SFSP and SSHP were prepared to provide technical guidance for sample collection and analysis at the Former Rifle/Machine Gun Ranges, Parcels

100Q and 101Q. The SFSP was used in conjunction with the SSHP as attachments to the installation-wide work plan (IT, 1998), and the installation-wide sampling and analysis plan (SAP) (IT, 2000a; IT, 2002b). The SAP includes the installation-wide safety and health plan and quality assurance plan (QAP).

The SI included fieldwork to collect 22 surface soil samples, 20 subsurface soil samples, and 4 groundwater samples. Data from the field investigation were used to determine whether potential site-specific chemicals are present at the IASPOW. In response to comments generated by ADEM, supplemental sampling that consisted of 5-point composite samples for both surface soil and subsurface soil were collected and analyzed in January 2022 at 3 of the original soil sampling locations that reported the highest measured concentrations of lead and copper in the SI.

1.2 Purpose and Objectives

The RFI was designed to collect data from site media and provide a level of defensible data and information in sufficient detail to determine whether chemical constituents are present at IASPOW at concentrations that present an unacceptable risk to human health or the environment. The conclusions of the RFI in Chapter 6.0 are based on the comparison of the analytical results to human health site-specific screening levels (SSSL), ecological screening values (ESV), and background screening values for FTMC. The SSSLs and ESVs were developed by Shaw as part of the human health and ecological risk evaluations associated with SIs being performed under the Base Realignment and Closure (BRAC) Environmental Restoration Program at FTMC. The SSSLs and ESVs are presented in the Final Human Health and Ecological Screening Values and Polynuclear Aromatic Hydrocarbon (PAH) Background Summary Report (IT, 2000b). Background metals screening values are presented in the Final Background Metals Survey Report, Fort McClellan, Alabama (Science Applications International Corporation [SAIC], 1998). Site metals data were further evaluated using statistical and geochemical methods to determine if the metals were site related. A preliminary risk assessment (PRA) and a preliminary ecological risk assessment (PERA) were also performed to further characterize human health and ecological risks, respectively, as part of the SI.

A Screening Risk Assessment (SRA) was then prepared to address ADEM's concerns on the PERA and to include human health screening. The SRA at the Site was based on the results for surface and subsurface soil samples collected during the 2022 supplemental soil sampling and was conducted in accordance with ARBCA. ARBCA has a specific human health risk assessment (HHRA) process and references United States Environmental Protection Agency (EPA) guidance for ecological risk assessment. The ecological risk screening follows the steps outlined in EPA Region 4 Supplemental Guidance (EPA 2018).

1.3 Site Description and History

The IASPOW is located in the north-central portion of the Main Post of FTMC, south of Fa1con Road and Gobbler Road (Figure 1-1). The impact area was identified during a site walk conducted by Shaw personnel in October 2001. The area of investigation is an approximately 3.3-acre rectangular area with expended bullets and bullet fragments present on the surface, a

possible target berm, and some disturbed areas identified from aerial photographs (Figure 1-2). According to the EBS, the range was identified by the Environmental Photographic Interpretation Center (EPIC) (U.S. Environmental Protection Agency [EPA], 1990). Presently, the area is mostly covered with trees and brush; however, grass is found along the northern portion of the site. The topography in the area of investigation gently slopes to the northwest. Site elevation ranges from approximately 775 to 800 feet (ft) above mean sea level (amsl).

The IASPOW is located within the range fans for the Former Rifle/Machine Gun Ranges, Parcels 100Q and 101Q. According to the EBS, Parcels 100Q and 101Q are two of seven former rifle/machine gun ranges that were identified on the northern Main Post. The dates of operation and types of specific ordnance fired at these ranges are unknown. According to historical maps, four of these ranges were in use in 1917 and three of the ranges appeared on maps from 1959 and 1966 (ESE, 1998). Based on the presence of .30-caliber, 5.56-millimeter (mm), and 7.62-mm bullets observed during the October 2001 site walk, it is assumed that small-arms weapons were used most recently at these ranges.

Impact areas for Parcels 100Q and 101Q were not identified in the EBS. However, based on the orientation of the range fans and firing lines presented in the EBS, the direction of fire for the Former Rifle/Machine Gun Ranges, Parcels 100Q and 101Q, was to the southeast toward the area of this investigation. This SI addressed only the area identified as the IASPOW. The firing line areas for Parcels 100Q and 101Q, including the former prisoner-of-war (POW) training facility, were investigated and reported separately (IT, 2002c). Available aerial photographs were reviewed to reveal any land-use activity in the area of investigation, as summarized below.

1937. The 1937 photograph shows the area of investigation as densely wooded.

1940 and 1944. The 1940 and 1944 photographs show ground disturbance within and around the area of investigation. Many of the trees within the area of investigation have been removed.

1954 and 1961. Throughout this period, an increase in vegetation was noted within the area of investigation, suggesting decreased activity. However, significant activity was noted outside the area of investigation within Parcels 100Q and 101Q. A new road was identified on the 1961 photograph running from Falcon Road along the western boundary of the area of investigation.

1964. The 1964 aerial photograph (Figure 1-3) show a decrease in vegetation in the central portion of Parcel 100Q and most of the area of investigation. A new loop road was observed overlapping a section of the area of investigation. A cleared/disturbed area, possibly representing a target area, was also noted near the central portion of the area of investigation.

1969. The 1969 photograph shows a continued increase in range activity within the area of investigation and at Parcel 100Q.

1973. The 1973 photograph (Figure 1-4) shows a distinct circular area of disturbance, probably a target area, within the northeastern portion of the area of investigation. The photograph shows continued range activity along firing lines for Parcel 100Q.

1976. The 1976 photograph shows the two disturbed areas identified in the 1973 aerial photograph. However, an increase in ground cover was present across the area of investigation and Parcel 100Q, suggesting a decline in range use.

1982, 1994, and 1998. The 1982 photograph (Figure 1-5) reveals the POW training facility. The facility was also observed on the 1994 and 1998 photographs. The POW training facility was located along the northwestern site boundary and within the range fans for Parcels 100Q and 101Q. Therefore, the ranges were abandoned by the year 1982. The POW training facility was removed in 1999.

Review of the available aerial photographs suggests that range activity occurred at the IASPOW primarily from about 1954 to sometime between 1973 and 1982, when the POW training facility was built.

2.0 ENVIRONMENTAL BASELINE SURVEY

An EBS was conducted by ESE to document current environmental conditions of all FTMC property (ESE, 1998). The study was to identify sites that, based on available information, have no history of contamination and comply with U.S. Department of Defense (DOD) guidance for fast-track cleanup at closing installations. The EBS also provides a baseline picture of FTMC properties by identifying and categorizing the properties by 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 requite additional 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 = Unexploded ordnance (UXO)
- CWM = Chemical warfare material.

The EBS was conducted in accordance with CERFA protocols (CERFA-Public Law 102-426) and DOD policy regarding contamination assessment. Record searches and reviews were performed on all reasonably available documents from FTMC, ADEM, EPA Region 4, and Calhoun County, as well as a database search of CERCLA-regulated substances, petroleum products, and RCRA-regulated facilities.

Available historical maps and aerial photographs were reviewed to document historical land uses. Personal and telephone interviews of past and present FTMC employees and military personnel were conducted. In addition, visual site inspections were conducted to verify conditions of specific property parcels.

Parcels 100Q and 101Q were identified as CERFA Category 1 Qualified parcels in the EBS. Category 1 Qualified parcels are areas where no known or recorded storage, release, or disposal (including migration) of hazardous substances or petroleum products has occurred but which have other environmental or safety concerns. Parcels 100Q and 101Q were qualified because constituent of potential concern (COPC) may be present at the site as a result of historical range activities. Therefore, the parcels required additional evaluation to determine their environmental condition.

3.0 INVESTIGATION AND REMEDIATION ACTIVITIES

This chapter summarizes investigation activities conducted by Shaw at the IASPOW, Former Rifle/Machine Gun Range, Parcels 100Q and 101Q, including environmental sampling and analysis, and groundwater monitoring well installation activities. This chapter also summarizes supplemental soil sampling, bullet pickup, and munitions remediation performed by MES. Shaw conducted the SI in two phases. Phase I field activities performed in January 2002 consisted of the collection and analysis of 11 surface soil samples, 8 subsurface soil samples, and 2 groundwater samples (IT, 2002a). Two monitoring wells were also installed during Phase I activities. During Phase II activities completed in October 2002, Shaw collected 11 additional surface soil samples, 12 subsurface soil samples, and resampled both monitoring wells previously installed at the site. Phase II sampling was performed to confirm the presence of organic compounds detected in groundwater and to determine the extent of lead detected in Phase I soil samples.

MES completed supplemental soil sampling in January 2022, in response to ADEM's comments dated June 25, 2020, and a subsequent phone conversation on August 17, 2021. MES collected additional surface and subsurface soil samples for metals at the locations of the three highest lead (Figure 5-1) and copper concentrations (Figure 5-2) identified during the SI. The principal purpose of the updated investigation was to provide current data for the SRA. Additional discussion appears in Section 5.7.

3.1 Munitions Remediation and Bullet Pickup

The IASPOW was also included in the MDA's remediation of Munitions Response Sites 12 and 13 (MRSs 12 and 13). Specifically, the IASPOW is included in MRS 12, Tract 12D. Tract 12 D was a surface clearance area. ADEM concurred with the After Action Report (AAR) submitted for MRSs 12 and 13 dated March 2014 on June 5, 2014.

The MDA completed the removal of bullets and bullet fragments from the IASPOW and documented this activity in a Corrective Measures Implementation Report (CMIR) Former Rifle/Machine Gun Ranges (Firing Line Areas), Parcels 100Q and 101Q dated September 2014. ADEM issued a concurrence with the CMIR for Parcels 100Q and 101Q in April 2015.

3.2 Environmental Sampling

Environmental sampling performed by Shaw during the 2002 SI at the IASPOW included the collection of surface soil samples, subsurface soil samples, and groundwater samples for chemical analysis. Sample locations were determined by observing site physical characteristics during a site walkover and by reviewing historical documents and aerial photographs. The sample locations, media, and rationale are summarized in Table 3-1. Sampling locations are shown on Figure 3-1. Samples were submitted for laboratory analysis of site-related parameters listed in Section 3.4. Shaw contracted Environmental Services Network, Inc (ESN), a direct-push technology (DPT) subcontractor, to assist in surface and subsurface soil sample collection.

MES, in response to ADEM's comments dated June 25, 2020, and a subsequent phone conversation on August 17, 2021, provided the following action plan regarding the IASPOW.

MES collected additional surface and subsurface soil samples for metals at the locations of the three highest lead concentrations identified during the SI (Figure 5-1). Specifically, these locations are identified (along with the corresponding lead concentrations in mg/kg) as IMP-IASPOW-GP15 (809), IMP-IASPOW-GP12 (515), and IMP-IASPOW-GP10 (422). MES collected 5-point composite samples as close to the exact same locations as possible with the center point being the original location identified in the SI. MES prepared a twenty-five square foot grid for the composite sample (5X5). A portion of each aliquot collected was retained for future analysis, if necessary.

MES then used the updated (2022) metals data to perform a SRA (including human health) to determine the suitability for future land use of the IASPOW Area as "industrial". The results of these efforts coupled with the previous work are discussed in this RFI report.

3.2.1 Surface Soil Sampling

Twenty-two surface soil samples (0 to 1 foot below ground surface [bgs]) were collected as part of the SI at the IASPOW, as shown on Figure 3-1. Soil sampling locations and rationale are presented in Table 3-1. Sample designations and analytical parameters are listed in Table 3-2. Soil sampling locations were determined in the field by the on-site geologist based on Unexploded Ordnance (UXO) avoidance activities, sampling rationale, presence of surface structures, site topography, and Phase I sample results.

In the supplemental January 2022 sampling event, three 5-point composite surface soil samples were collected and analyzed for metals at locations in Figure 5.1 discussed above. The results of this sampling event are presented in Table 5-4.

Sample Collection. Surface soil samples during the SI were collected from the uppermost foot of soil using a stainless-steel hand auger or a DPT sampling system. Samples were collected by first removing surface debris (e.g., rocks, vegetation) from the immediate sample area. The soil was collected with the sampling device and screened with a photoionization detector (PID). As necessary, the soil fraction for volatile organic compound (VOC) analysis was collected directly from the sampler using three EnCore® samplers. The remaining soil was then transferred to a clean stainless-steel bowl, homogenized, and placed in the appropriate sample containers. Sample collection logs are included in Appendix A. The samples were analyzed for the parameters listed in Table 3-2 using methods outlined in Section 3.4.

In the January 2022 supplemental sampling event, a 5-point composite sample was collected from the locations identified as IMP-IASPOW-GP15, IMP-IASPOW-GP12, and IMP-IASPOW-GP10 in the 2002 sampling event. The samples were collected from 0 to 1 foot bgs by hand auguring. The sampling locations were collected at the same locations as the 2002 sampling event and were located using a Trimble R2 within 10 centimeters (cm). The center point of the 5-point composite samples was the GPS location and the 4 additional points were 5 ft north, east,

west, and south. The samples were homogenized and screened so that no rocks or projectile fragments were included.

3.2.2 Subsurface Soil Sampling

A total of 20 subsurface soil samples ranging in depth from 2 to 6 feet bgs were collected during the SI from 19 soil borings at the IASPOW, as shown on Figure 3-1. Subsurface soil sampling locations and rationale are presented in Table 3-1. Sample designations, depths, and analytical parameters are listed in Table 3-2. Soil boring locations were determined in the field by the on-site geologist based on UXO avoidance activities, sampling rationale, presence of surface structures, site topography, and Phase I sample results.

In the supplemental January 2022 sampling event, three 5-point composite subsurface soil samples were collected from a depth of 3 to 4 feet bgs and analyzed for metals at locations in Figure 5.1 discussed above. The results of this sampling event are presented in Table 5-4.

Sample Collection. During the SI, subsurface soil samples were collected from soil borings at depths greater than 1 ft bgs in the unsaturated zone. The soil borings were advanced and samples collected using a stainless-steel hand auger or a DPT sampling system.

In the January 2022 supplemental sampling event, a 5-point composite sample was collected from the locations identified as IMP-IASPOW-GP15, IMP-IASPOW-GP12, and IMP-IASPOW-GP10 in the 2002 sampling event. The samples were collected from 3 to 4 feet bgs by hand auguring. The sampling locations were the same locations as the 2002 sampling event and were located using a Trimble R2 within 10 cm. The center point of the 5-point composite samples was the GPS location and the 4 additional points were 5 ft north, east, west, and south. The samples were homogenized and screened so that no rocks or projectile fragments were included.

3.2.3 Monitoring Well Installation

Two permanent groundwater monitoring wells were installed in the saturated zone at the IASPOW to collect groundwater samples for laboratory analysis. The well locations are shown on Figure 3-1. Table 3-3 summarizes construction details of the wells installed at the site. The well construction logs are included in Appendix B.

Shaw contracted Miller Drilling Company to install the permanent wells with a hollow-stem auger drill rig at two of the DPT soil boring locations (IMP-IASPOW-MW01 and IMP--IASPOW-MW02). The borehole at each well location was advanced with a 4.25-inch inside diameter (ID) hollow-stem auger from ground surface to the saturated zone. The borehole was augered to the completion depth of the DPT boring, and samples were collected from that depth to the bottom of the borehole. A 2-ft-long, 2-inch ID carbon steel split-spoon sampler was driven at 5-ft intervals to collect residuum for observing and describing lithology. The drill cuttings were logged to determine lithologic changes and the approximate depth of groundwater encountered during drilling. This information was used to determine the optimal placement of the monitoring well screen interval and to provide site-specific geological and hydrogeological information. The on-site geologist constructed a detailed lithological log for each soil boring.

Soil characteristics were described using the "Burmeister Identification System" described in Hunt (1986) and the Unified Soil Classification System (USCS) as outlined in the American Society for Testing and Materials (ASTM) Method D 2488 (ASTM, 2000). The boring log for each borehole is included in Appendix B.

Upon reaching the target depth in each borehole, a 20-foot length of 2-inch ID, 0.010-inch continuous slot, Schedule 40 polyvinyl chloride (PVC) screen with an end cap was placed through the auger to the bottom of the borehole. The screen and end cap were attached to 2-inch ID, flush-threaded Schedule 40 PVC riser. A filter pack consisting of number 1 filter sand (environmentally safe, clean fine sand, sieve size 20 to 40) was tremied around the well screen to approximately 5 ft above the top of the well screen as the augers were removed. The filter pack also included a 5-ft layer of extra fine sand (sieve size 30 to 70). A bentonite seal, consisting of approximately 3 ft of bentonite pellets, was placed immediately on top of the filter sand and hydrated with potable water. At wells where the bentonite seal was installed below the water table surface, the bentonite pellets were allowed to hydrate in the groundwater. The bentonite seal placement and hydration followed procedures in the SAP. Bentonite-cement grout was tremied into the remaining annular space of the well. The well surface completion included installing a protective steel casing and concrete surface pad around the PVC well casing. A well cap was placed on the PVC riser and a lock was placed on the protective steel casing.

The monitoring wells were developed by surging and pumping with a 2-inch-diameter submersible pump. The submersible pump used for well development was moved in an up-and-down fashion to encourage any residual well installation materials to enter the well. These materials were then pumped out of the well in order to re-establish the natural hydraulic flow conditions. Development continued for a maximum of eight hours. The well development logs are included in Appendix C.

3.2.4 Water Level Measurements

The depth to groundwater was measured in permanent wells at the site and vicinity on July 26, 2002. Depth to groundwater was measured with an electronic water level meter. Measurements were referenced to the top of the PVC well casing. A summary of groundwater level measurements for the IASPOW is presented in Table 3-4.

3.2.5 Groundwater Sampling

A total of four groundwater samples were collected from the two monitoring wells installed at the IASPOW. The wells were sampled during SI Phase I and Phase II activities. The well/groundwater sampling locations are shown on Figure 3-1. The groundwater sampling locations and rationale are listed in Table 3-1. Sample designations and analytical parameters are listed in Table 3-5.

Groundwater samples were collected using a submersible bladder pump equipped with Teflon tubing. Groundwater samples were collected after purging a minimum of three well volumes and after field parameters (i.e., temperature, pH, dissolved oxygen, specific conductivity, oxidation-

reduction potential, and turbidity) stabilized. Field parameters were measured using a calibrated water-quality meter.

Field parameter readings are summarized in Table 3-6. Sample collection logs are included in Appendix A. The samples were analyzed for the parameters listed in Table 3-5 using methods outlined in Section 3.4.

3.3 Surveying of Sample Location

Sample locations were surveyed during the SI using global positioning system survey techniques and conventional civil survey techniques. Horizontal coordinates were referenced to the U.S. State Plane Coordinate System, Alabama East Zone, North American Datum of 1983. Elevations were referenced to the North American Vertical Datum of 1988. Horizontal coordinates and elevations are included in Appendix D. During the 2022 sampling event, the center point of each 5-point composite corresponding to a 2002 sample location was located using a Trimble R2 with a 10 cm positioning accuracy.

3.4 Analytical Program

Samples collected during the SI were analyzed for various chemical and physical parameters based on potential site-specific chemicals and on EPA, ADEM, FTMC, and United States Army Core of Engineers (USACE) requirements. Samples collected at the IASPOW were analyzed for the following parameters using EPA SW-846 methods:

- Target analyte list metals -EPA Method 6010B/7000
- Nitroaromatic and nitramine explosives -EPA Method 8330.

In addition, a minimum of ten percent of the samples were analyzed for the following additional parameters:

- Target compound list VOCs -EPA Method 8260B
- Target compound list semi volatile organic compounds (SVOC) -EPA Method 8270C
- Chlorinated pesticides -EPA Method 8081 A
- Chlorinated herbicides -EPA Method 8151 A
- Organophosphorous pesticides -EPA Method 8141 A.

Phase II soil samples were analyzed for the following parameters:

- Target analyte list metals -EPA Method 6010B/7000.

Phase II groundwater samples were analyzed for the following parameters:

• Nitroaromatic and nitramine explosives -EPA Method 8330
• Chlorinated pesticides -EPA Method 8081A
• Organophosphorous pesticides -EPA Method 8141A.

Supplemental soil samples collected in 2022 were analyzed for metals by EPA Methods 6020B and 7471B.

3.5 Variances/Nonconformances

One variance to the SFSP was recorded during completion of the SI at IASPOW. The variance did not alter the intent of the investigation or the sampling rationale presented in the SFSP (IT, 2002b). The variance is summarized in Table 3-7 and the variance report is included in Appendix E. No nonconformances to the SFSP were recorded during completion of the SI.

3.6 Analytical Data Quality

The analytical data for the SI are presented in tabular form in Appendix F. The data validation results for the SI data are summarized in quality assurance reports, which include the data validation summary reports (Appendix G). Selected results were qualified based on the implementation of accepted data validation procedures and practices. These qualified parameters are highlighted in the report.

Laboratory analytical data for the 2022 sampling event are included in Appendix F. MES conducted a data quality review (Appendix G) to assess compliance with quality assurance objectives, and to assess hard copy and electronic deliverable consistency and integrity. Selected results were qualified based on the implementation of accepted data validation procedures and practices. These qualified parameters are highlighted in the report. Based on this review, the analytical data were determined to be adequate to fulfill program objectives and can be used to determine nature and extent of metals concentrations in soils.

3.7 Monitoring Well Abandonment

MES submitted a request to abandon groundwater monitoring wells IMP-IASPOW-MW01 and IMP-IASPOW-MW02 on March 21, 2016. ADEM concurred with MES's plan to abandon the two wells in a letter dated July 20, 2017.

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4.0 SITE CHARACTERIZATION

Subsurface investigations performed at the Impact Area South of Former POW Training Facility, Former Rifle/Machine Gun Ranges, Parcels l00Q and l0lQ, provided soil, geologic, and groundwater data used to characterize the geology and hydrogeology of the site.

4.1 Regional and Site Geology

4.1.1 Regional Geology

Calhoun County includes parts of two physiographic provinces, the Piedmont Upland Province and the Valley and Ridge Province. The Piedmont Upland Province occupies the extreme eastern and southeastern portions of the county and is characterized by metamorphosed sedimentary rocks. The generally accepted range in age of these metamorphics is Cambrian to Devonian. The majority of Calhoun County, including the Main Post of FTMC, lies within the Appalachian fold-and-thrust structural belt (Valley and Ridge Province) where southeastward-dipping thrust faults with associated minor folding are the predominant structural features. The fold-and-thrust belt consists of Paleozoic sedimentary rocks that have been asymmetrically folded and thrust-faulted, with major structures and faults striking in a northeast-southwest direction.

Northwestward transport of the Paleozoic rock sequence along the thrust faults has resulted in the imbricate stacking of large slabs of rock, referred to as thrust sheets. Within an individual thrust sheet, smaller faults may splay off the larger thrust fault, resulting in imbricate stacking of rock units within an individual thrust sheet (Osborne and Szabo, 1984). Geologic contacts in this region generally strike parallel to the faults, and repetition of lithologic units is common in vertical sequences. Geologic formations within the Valley and Ridge Province portion of Calhoun County have been mapped by Warman and Causey (1962), Osborne and Szabo (1984), and Moser and Dejarnette (1992) and vary in age from Lower Cambrian to Pennsylvanian.

The basal unit of the sedimentary sequence in Calhoun County is the Cambrian Chilhowee Group. The Chilhowee Group consists of the Cochran, Nichols, Wilson Ridge, and Weisner Formations (Osborne and Szabo, 1984) but in Calhoun County is either undifferentiated or divided into the Cochran and Nichols Formations and an upper, undifferentiated Wilson Ridge and Weisner Formation. The Cochran is composed of poorly sorted arkosic sandstone and 36 conglomerate with interbeds of greenish gray siltstone and mudstone. Massive to laminated greenish gray and black mudstone makes up the Nichols Formation, with thin interbeds of siltstone and very fine-grained sandstone (Osborne et al., 1988). These two formations are mapped only in the eastern part of the county.

The Wilson Ridge and Weisner Formations are undifferentiated in Calhoun County and consist of both coarse-grained and fine-grained clastics. The coarse-grained facies appears to dominate the unit and consists primarily of coarse-grained, vitreous quartzite and friable, fine-to coarse-grained, orthoquartzitic sandstone, both of which locally contain conglomerate. The fine-grained facies consists of sandy and micaceous shale and silty, micaceous mudstone, which are locally interbedded with the coarse clastic rocks. The abundance of orthoquartzitic sandstone and quartzite suggests that most of the Chilhowee Group bedrock in the vicinity of FTMC belongs to the Weisner Formation (Osborne and Szabo, 1984).

The Cambrian Shady Dolomite overlies the Weisner Formation northeast, east, and southwest of the Main Post and consists of interlayered bluish gray or pale yellowish gray sandy dolomitic limestone and siliceous dolomite with coarsely crystalline, porous chert (Osborne et al., 1989). A variegated shale and clayey silt have been included within the lower part of the Shady Dolomite (Cloud, 1966). Material similar to this lower shale unit was noted in core holes drilled by the Alabama Geologic Survey on FTMC (Osborne and Szabo, 1984). The character of the Shady Dolomite in the FTMC vicinity and the true assignment of the shale at this stratigraphic interval are still uncertain (Osborne, 1999).

The Rome Formation overlies the Shady Dolomite and locally occurs to the northwest and southeast of the Main Post, as mapped by Warman and Causey (1962) and Osborne and Szabo (1984), and immediately to the west of Reilly Airfield (Osborne and Szabo, 1984). The Rome Formation consists of variegated, thinly interbedded grayish-red-purple mudstone, shale, siltstone, and greenish red and light gray sandstone, with locally occurring limestone and dolomite. The Conasauga Formation overlies the Rome Formation and occurs along anticlinal axes in the northeastern portion of Pelham Range (Warman and Causey, 1962; Osborne and Szabo, 1984) and the northern portion of the Main Post (Osborne et al., 1997). The Conasauga Formation is composed of dark gray, finely to coarsely crystalline, medium-to thick-bedded dolomite with minor shale and chert (Osborne et al., 1989).

Overlying the Conasauga Formation is the Knox Group, which is composed of the Copper Ridge and Chepultepec dolomites of Cambro-Ordovician age. The Knox Group is undifferentiated in Calhoun County and consists of light medium gray, fine to medium crystalline, variably bedded to laminated, siliceous dolomite and dolomitic limestone that weather to a chert residuum (Osborne and Szabo, 1984). The Knox Group underlies a large portion of the Pelham Range area.

The Ordovician Newala and Little Oak Limestones overlie the Knox Group. The Newala Limestone consists of light to dark gray, micritic, thick-bedded limestone with minor dolomite. The Little Oak Limestone consists of dark gray, medium-to thick-bedded, fossiliferous, argillaceous to silty limestone with chert nodules. These limestone units are mapped as undifferentiated at FTMC and in other parts of Calhoun County. The Athens Shale overlies the Ordovician limestone units. The Athens Shale consists of dark gray to black shale and graptolitic shale with localized interbedded dark gray limestone (Osborne et ai., 1989). These units occur within an eroded "window" in the uppermost structural thrust sheet at FTMC and underlie much of the developed area of the Main Post.

Other Ordovician-aged bedrock units mapped in Calhoun County include the Greensport Formation, Colvin Mountain Sandstone, and Sequatchie Formation. These units consist of various siltstones, sandstones, shales, dolomites, and limestones and are mapped as one, undifferentiated unit in some areas of Calhoun County. The only Silurian-age sedimentary formation mapped in Calhoun County is the Red Mountain Formation. This unit consists of interbedded red sandstone, siltstone, and shale with greenish gray to red silty and sandy limestone.

The Devonian Frog Mountain Sandstone consists of sandstone and quartzitic sandstone with shale interbeds, dolomudstone, and glauconitic limestone (Osborne et ai., 1988). This unit occurs locally in the western portion of Pelham Range.

The Mississippian Fort Payne Chert and the Maury Formation overlie the Frog Mountain Sandstone and are composed of dark to light gray limestone with abundant chert nodules and greenish gray to grayish red phosphatic shale, with increasing amounts of calcareous chert toward the upper portion of the formation (Osborne and Szabo, 1984). These units occur in the northwestern portion of Pelham Range. Overlying the Fort Payne Chert is the Floyd Shale, also of Mississippian age, which consists of thin-bedded, fissile brown to black shale with thin intercalated limestone layers and interbedded sandstone. Osborne and Szabo (1984) reassigned the Floyd Shale, which was mapped by Warman and Causey (1962) on the Main Post of FTMC, to the Ordovician Athens Shale based on fossil data.

The Pennsylvanian Parkwood Formation overlies the Floyd Shale and consists of a medium to dark gray, silty, clay shale and mudstone with interbedded light to medium gray, very fine to fine grained argillaceous, micaceous sandstone. Locally the Parkwood Formation also contains beds of medium-to dark-gray argillaceous, bioclastic to cherty limestone and beds of clayey coal up to a few inches thick (Raymond et al., 1988). The Parkwood Formation in Calhoun County is generally found within a structurally complex area known as the Coosa deformed belt. In the deformed belt, the Parkwood Formation and Floyd Shale are mapped as undifferentiated because their lithologic similarity and significant deformation make it impractical to map the contact (Thomas and Drahovzal, 1974; Osborne et al., 1988). The undifferentiated Parkwood Formation and Floyd Shale are found throughout the western quarter of Pelham Range.

The Jacksonville thrust fault is the most significant structural geologic feature in the vicinity of the Main Post of FTMC, both for its role in determining the stratigraphic relationships in the area and for its contribution to regional water supplies. The trace of the fault extends northeastward for approximately 39 miles between Bynum, Alabama, and Piedmont, Alabama. The fault is interpreted as a major splay of the Pell City fault (Osborne and Szabo, 1984). The Ordovician sequence that makes up the Eden thrust sheet is exposed at FTMC through an eroded window, or fenster, in the overlying thrust sheet. Rocks within the window display complex folding, with the folds being overturned and tight to isoclinal. The carbonates and shales locally exhibit well-developed cleavage (Osborne and Szabo, 1984). The FTMC window is framed on the northwest by the Rome Formation; north by the Conasauga Formation; northeast, east, and southwest by the Shady Dolomite, and southeast and southwest by the Chilhowee Group (Osborne et al., 1997). Two small klippen of the Shady Dolomite, bounded by the Jacksonville fault, have been recognized adjacent to the Pell City fault at the FTMC window (Osborne et al., 1997).

The Pell City fault serves as a fault contact between the bedrock within the FTMC window and the Rome and Conasauga Formations. The trace of the Pell City fault is also exposed approximately nine miles west of the FTMC window on Pelham Range, where it traverses northeast to southwest across the western quarter of Pelham Range. Here, the trace of the Pell City fault marks the boundary between the Pell City thrust sheet and the Coosa deformed belt.

The eastern three-quarters of Pelham Range is located within the Pell City thrust sheet, while the remaining western quarter of Pelham is located within the Coosa deformed belt. The Pell City thrust sheet, a large-scale thrust sheet containing Cambrian and Ordovician rock, is relatively less structurally complex than the Coosa deformed belt (Thomas and Neathery, 1982). The Pell City thrust sheet is exposed between the traces of the Jacksonville and Pell City faults along the western boundary of the FTMC window and along the trace of the Pell City fault on Pelham Range (Thomas and Neathery, 1982; Osborne et al., 1988). The Coosa deformed belt is a narrow (approximately 5 to 20 miles wide) northeast-to-southwest-trending linear (approximately 90 miles in length) zone of complex structure consisting mainly of thin, imbricate thrust slices. The structure within these imbricate thrust slices is often internally complicated by small-scale folding and additional thrust faults (Thomas and Drahovzal, 1974).

4.1.2 Site Geology

Soils at the IASPOW fall mainly into four mapping units: Cumberland gravelly loam, Anniston and Allen gravelly loam, Anniston gravelly clay loam, and Stony Rough Land sandstone (U.S. Department of Agriculture [USDA], 1961).

The Cumberland gravelly loam consists of deep, well-drained soils that have generally developed in old alluvium that washed from soils derived mainly from limestone, cherty limestone, shale, and sandstone. The surface soil of the Cumberland gravelly loam ranges from very dark brown to reddish brown. The subsoil ranges from dark red to red in color and from silt clay loam to clay in texture. The thickness of the alluvium ranges from 2 to greater than 15 ft. Some areas included in this soil mapping unit have a silt loam to gravelly fine sandy loam surface soil which is generally underlain in places by beds of gravel or sand. Infiltration of this soil type is medium, runoff is medium, permeability is moderate, and the capacity for available moisture is high (USDA, 1961).

The Anniston and Allen gravelly loam consists of deep, strongly acid, well-drained soils that have developed in old local alluvium. The parent material washed from adjacent, higher lying soils that developed from weathered sandstone, shale, and quartzite. The surface horizon of the Anniston and Allen gravelly loam is very dark to dark grayish-brown fine sandy loam or loam. the subsoil is dark red fine sandy clay loam. Fragments of sandstone and quartzite are found on the surface and throughout the soil. Infiltration and runoff of this soil type are medium, permeability is moderate, and the capacity for available moisture is high (USDA, 1961).

The Anniston gravelly clay loam consists of friable, medium to strongly acidic, deep, well-drained soils that have developed in old local alluvium on the foot slopes and along the base of larger hills in the region. The parent material for the Anniston gravelly clay loam is washed from adjacent, higher-lying soils that developed from weathered sandstone, shale, and quartzite. Sandstone and quartzite gravel, cobbles, and fragments as much as 8 inches in diameter are on the surface and throughout the soil. The surface soil of this unit is a reddish-brown gravelly clay loam 4 to 6 inches thick. In most places, it is underlain by red or dark reddish brown gravelly clay loam. In this unit, infiltration is moderately low and the capacity for available moisture is low (USDA, 1961).

The Stony Rough Land sandstone consists of rough, mountainous areas with many outcrops of sandstone and quartzite bedrock, loose rock fragments, and scattered patches of sandy soil material. Slopes are generally more than 25 percent. The soil material is generally shallow over bedrock. Runoff is high, infiltration is slow, and the capacity for available moisture is low (USDA,1961).

Bedrock at the site is mapped as the Cambrian Conasauga Formation, as shown as Figure 4-1 (Osborne et al., 1997). The Conasauga Formation consists of varying proportions of limestone, dolomite, and shale (Raymond et al., 1988). The upper part of the formation is mapped as a light to dark gray, medium to thick-bedded dolostone. Dark greenish gray, dusky yellow and pale olive shales and mudstones are found in the lower part of the formation, and locally contain interbeds of limestone (sometimes cherty) and rare siltstone. Limestone interbeds are medium to dark gray, thin to medium bedded, micritic, argillaceous, and locally oolitic or oncolitic (Raymond et al., 1988). South of the IASPOW, the Jacksonville Fault thrusts the Undifferentiated Cambrian Chilhowee Group over the Cambrian Conasauga Formation (Osborne et al., 1997).

A geologic cross section was constructed using hollow-stem auger boring data collected at the IASPOW, Parcel 101Q, and the Area North of MOUT (Military Operations in Urban Terrain), as shown on Figure 4-2. The residuum at the IASPOW and surrounding area consists predominantly of yellowish orange to reddish brown clay with some silt and sand, and trace quartz-rich gravel. Bedrock was not encountered during monitoring well installation at the IASPOW.

4.2 Site Hydrology

4.2.1 Surface Hydrology

Precipitation in the form of rainfall averages about 53 inches annually in Anniston, Alabama, with infiltration rates annually exceeding evapotranspiration rates (U.S. Department of Commerce, 1998). The major surface water features at the Main Post of FTMC include Remount Creek, Cane Creek, and Cave Creek. These waterways flow in a general northwest to westerly direction toward the Coosa River on the western boundary of Calhoun County.

Ground elevation within the area of investigation ranges from approximately 775 to 800 ft amsl Surface water runoff at the site follows the topography and flows in a northwesterly direction toward Reilly Lake. Surface water features are not located within the area of investigation at the IASPOW.

4.2.2 Hydrogeology

Static groundwater levels were measured in the monitoring wells at IASPOW on July 26, 2002, as summarized in Table 3-4. Groundwater elevations were calculated by measuring the depth to groundwater relative to the surveyed top-of-casing elevations. A groundwater elevation map (Figure 4-3) was constructed using the July 26, 2002 water-level data from the IASPOW and surrounding parcels. Groundwater flow at the site is to the northwest, generally following topography.

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5.0 SUMMARY OF ANALYTICAL RESULTS

The results of the chemical analysis of samples collected at the IASPOW, Former Rifle/Machine Gun Ranges, Parcels 100Q and 101Q, indicate that metals, VOCs, pesticides, and explosives were detected in the site media. SVOCs and explosive compounds were not detected in any of the samples collected. To evaluate whether the detected constituents present an unacceptable risk to human health and the environment, the analytical results were compared to the human health SSSLs and ESVs for FTMC. Metals concentrations exceeding the SSSLs and ESVs were subsequently compared to metals background screening values to determine if the metals concentrations are within natural background concentrations (SAIC, 1998).

Site metals data were also evaluated using statistical and geochemical methods to determine if the metals were site related (Appendix H). In addition, risk evaluations, as described further below, were performed to further characterize the potential threat to human health and ecological receptors.

The following sections and Tables 5-1 through 5-3 summarize the results from the SI of the comparison of detected constituent concentrations to the SSSLs, ESVs, and background screening values also referred to as background threshold values (BTVs). SSSLs and ESVs were developed by IT (2000b) in previous risk evaluations for the Site. BTVs were developed by SAIC (1998) as part of a detailed statistical and geochemical analysis of soil metals.

Table 5-4 summarizes the results from the supplemental (2022) sampling and comparison of detected constituent concentrations to current ESVs, Ecological Risk-Based Remedial Goals (Eco-RBRGs), EPA Regional Screening Levels (RSLs) for human health, and BTVs. Eco-RBRGs were developed by Shaw for the four key metals of concern (antimony, copper, lead and zinc).

Complete analytical results are presented in Appendix F.

5.1 Surface Soil Analytical Results

Twenty-two surface soil samples were collected for chemical analysis at the IASPOW. Surface soil samples were collected from the uppermost foot of soil at the locations shown on Figure 3-1. Metals, VOCs, and one pesticide were detected in surface soils. Analytical results were compared to residential human health SSSLs, ESVs, and metals background screening values as presented in Table 5-1.

Metals. All of the surface soil samples were analyzed for metals. A total of 21 metals were detected in the samples. The concentrations of seven metals (aluminum, antimony, arsenic, chromium, iron, lead, and manganese) exceeded SSSLs. Of these, the following metals also exceeded their respective background concentrations in one or more samples:

- Aluminum (16,800 to 32,000 mg/kg) exceeded its SSSL (7,803 mg/kg) and background (16,306 mg/kg) at 20 sample locations.

- Antimony (5.41 mg/kg) exceeded its SSSL (3.11 mg/kg) and background (1.99 mg/kg) at sample location IMP-IASPOW-GP15. The result was flagged with a "1" data qualifier, indicating that the concentration was estimated.
- Arsenic (16.6 and 13.8 mg/kg) exceeded its SSSL (0.43 mg/kg) and background (13.7 mg/kg) at two sample locations (IMP-IASPOW-GP07 and IMP-IASPOWGP09).
- Chromium (37.7 mg/kg) exceeded its SSSL (23.2 mg/kg) and background (37.0 mg/kg) at sample location IMP-IASPOW-GP06.
- Iron (39,800 and 45,400 mg/kg) exceeded its SSSL (2,345 mg/kg) and background (34,154 mg/kg) at two sample locations (IMP-IASPOW-GP07 and IMP-IASPOWGP20).
- Lead (422,515, and 809 mg/kg) exceeded its SSSL (400 mg/kg) and background (40 mg/kg) at three sample locations (IMP-IASPOW-GPI0, IMP-IASPOW-GPI2, and IMP-IASPOW-GPI5). Figure 5-1 shows the distribution of lead in surface soil.
- Manganese (1,600 to 3,190 mg/kg) exceeded its SSSL (363 mg/kg) and background (1,579 mg/kg) at 12 sample locations.

Fifteen metals were detected at concentrations exceeding ESVs: aluminum, antimony, arsenic, beryllium, chromium, cobalt, copper, iron, lead, manganese, mercury, selenium, silver, vanadium, and zinc. Of these, all but vanadium also exceeded their respective background concentrations in one or more samples:

- Aluminum (16,800 to 32,000 mg/kg) exceeded its ESV (50 mg/kg) and background (16,306 mg/kg) at 20 sample locations.
- Antimony (5.41 mg/kg) exceeded its ESV (3.5 mg/kg) and background (1.99 mg/kg) at sample location IMP-IASPOW-GPI5. The result was flagged with a "1" data qualifier, indicating that the concentration was estimated.
- Arsenic (16.6 and 13.8 mg/kg) exceeded its ESV (10 mg/kg) and background (13.7 mg/kg) at two sample locations (IMP-IASPOW-GP07 and IMP-IASPOW-GP09).
- Beryllium (1.15 to 1.57 mg/kg) exceeded its ESV (1.1 mg/kg) and background (0.8 mg/kg) at four sample locations.
- Chromium (37.7 mg/kg) exceeded its ESV (0.4 mg/kg) and its background (37 mg/kg) at sample location IMP-IASPOW-GP06.
- Cobalt (23.4 mg/kg) exceeded its ESV (20 mg/kg) and background (15.2 mg/kg) at sample location IMP-IASPOW-GP05.
- Copper (41.8 to 200 mg/kg) exceeded its ESV (40 mg/kg) and background (12.7 mg/kg) at seven sample locations.
- Iron (39,800 and 45,400 mg/kg) exceeded its ESV (200 mg/kg) and its background (34,154 mg/kg) at two sample locations (IMP-IASPOW-GP07 and IMP-IASPOWGP20).
- Lead (52.9 to 809 mg/kg) exceeded its ESV (50 mg/kg) and background (40 mg/kg) at 17 sample locations.
- Manganese (1,600 to 3,190 mg/kg) exceeded its ESV (100 mg/kg) and background (1,579 mg/kg) at 12 sample locations.
- Mercury (0.11 mg/kg) exceeded its ESV (0.1 mg/kg) and background (0.08 mg/kg) at sample location IMP-IASPOW-GP05. The result was "J" flagged.
- Selenium (1.05 to 2.08 mg/kg) exceeded its ESV (0.81 mg/kg) and background (0.48 mg/kg) at 11 locations. Nine of the results were flagged with a "B" data qualifier,

signifying that selenium was also detected in an associated laboratory or field blank sample.
- Silver (2.13 mg/kg) exceeded its ESV (2.0 mg/kg) and background (0.36 mg/kg) at sample location IMP-IASPOW-GP05. The result was "J" flagged.
- Zinc (55.4 mg/kg) exceeded its ESV (50 mg/kg) and background (40.6 mg/kg) at sample location IMP-IASPOW-GP07. The result was "J" flagged.

Metal Results from January 2022 sampling event.
Three composite surface soil samples were collected for metals chemical analysis. Surface soil samples were collected from the uppermost foot of soil at the locations previously described. Metals were detected in surface soils., analytical results were compared to industrial EPA RSLs (based on proposed industrial Site use), current EPA Region 4 ESVs, Eco-RBRGs, and BTVs, as presented in Table 5-4.

A total of 23 metals were detected in the samples. Arsenic was the only metal that exceeded the industrial RSL. The following metals exceeded their respective background concentrations in one or more samples.

- Antimony (5 to 6.9 mg/kg) exceeded background (1.99 mg/kg) at all three sample locations.
- Copper (87 to 120 mg/kg) exceeded background (12.7 mg/kg) at all three sample locations.
- Lead (280 to 500 mg/kg) exceeded background (40 mg/kg) at all three sample locations.
- Manganese (1,900 to 2,500 mg/kg) exceeded background (1,580 mg/kg) at sample locations IA-GP10COMP-2021 and IA-GP15COMP-2021.
- Nickel (11 mg/kg) exceeded background (10.3 mg/kg) at sample location IA-GP15COMP-2021.
- Selenium (1.8 to 3.6 mg/kg) exceeded background (0.48 mg/kg) at all three sample locations.
- Zinc (59 mg/kg) exceeded background (40.6 mg/kg) at sample location IA-GP15COMP-2021.

Ten metals were detected at concentrations exceeding ESVs: antimony, chromium, copper, lead, manganese, mercury, selenium, thallium, vanadium, and zinc. Of these, all but chromium, mercury, thallium, and vanadium also exceeded their respective background concentrations in one or more samples.

- Antimony (5 to 6.9 mg/kg) exceeded its ESV (0.27 mg/kg) and background (1.99 mg/kg) at all three sample locations.
- Chromium (26 mg/kg) exceeded its ESV (23 mg/kg) at sample location IA-GP12COMP-2021. The result was "J" flagged.
- Copper (87 to 120 mg/kg) exceeded its ESV (28 mg/kg) and background ((12.7 mg/kg) at all three sample locations.
- Lead (280 to 500 mg/kg) exceeded its ESV (11 mg/kg) and background (40 mg/kg) at all three sample locations.

- Manganese (1,900 to 2,500 mg/kg) exceeded its ESV (220 mg/kg) at all three sample locations and background (1,580 mg/kg) at sample locations IA-GP10COMP-2021 and IA-GP15COMP-2021.
- Mercury (0.032 to 0.043 mg/kg) exceeded its ESV (0.013 mg/kg) at all three sample locations.
- Selenium (1.8 to 3.6 mg/kg) exceeded its ESV (0.52 mg/kg) and background (0.48 mg/kg) at all three sample locations.
- Thallium (0.21 to 0.33 mg/kg) exceeded its ESV (0.05 mg/kg) at all three sample locations.
- Vanadium (24 to 43 mg/kg) exceeded its ESV (7.8 mg/kg) at all three sample locations. Sample location IA-GP10COMP-2021 was "J" flagged.
- Zinc (59 mg/kg) exceeded its ESV (46 mg/kg) and background (40.6 mg/kg) at sample location IA-GP15COMP-2021.

Volatile Organic Compounds. Three surface soil sample locations (IMP-IASPOW-GP04, IMP-IASPOW-GPI4, and IMP-IASPOW-MW02) were analyzed for VOCs. A total of six VOCs were detected in the samples at concentrations below SSSLs. The concentration of trichloroethene (0.0019 mg/kg) slightly exceeded its ESV (0.001 mg/kg) at sample location IMPIASPOW-MW02. The result was "J" flagged, indicating that the concentration was estimated.

Semivolatile Organic Compounds. Three surface soil sample locations (IMP-IASPOWGP04, IMP-IASPOW-GPI4, and IMP-IASPOW-MW02) were analyzed for SVOCs. SVOCs were not detected in the samples.

Pesticides. Three surface soil sample locations (IMP-lASPOW-GP04, lMP-lASPOW-GP14, and lMP-lASPOW-MW02) were analyzed for pesticides. One pesticide (4,4'-dichlorodiphenyltrichloroethane [DDT]) was detected at one sample location (IMP-lAS POW GP14) at a concentration below its SSSL and ESV.

Herbicides. Three surface soil sample locations (IMP-lASPOW-GP04, lMP-lASPOW-GP14, and lMP-lASPOW-MW02) were analyzed for herbicides. Herbicides were not detected in the samples.

Explosives. Twelve surface soil samples were analyzed for explosives. Explosives were not detected in the samples.

5.2 Subsurface Soil Analytical Results

Twenty subsurface soil samples were collected for chemical analysis at the IASPOW. Subsurface soil samples were collected at depths greater than 1 ft bgs at the locations shown on Figure 3-1. Metals, VOCs, and one herbicide were detected in subsurface soils. Analytical results were compared to residential human health SSSLs and metals background screening values, as presented in Table 5-2.

Metals. All of the subsurface soil samples were analyzed for metals. A total of 21 metals were detected in the samples. The concentrations of eight metals (aluminum, antimony, arsenic,

chromium, iron, lead, manganese, and vanadium) exceeded their respective SSSLs. Of these, six metals also exceeded their respective background concentrations:

- Aluminum (14,800 to 31,600 mg/kg) exceeded its SSSL (7,803 mg/kg) and background (13,591 mg/kg) at 20 sample locations.
- Antimony (1,330 and 5.39 mg/kg) exceeded its SSSL (3.11 mg/kg) and background (1.31 mg/kg) at two sample locations (IMP-lASPOW-GP03 and IMPIASPOW-GP14). Both results were "J" flagged.
- Arsenic (117 mg/kg) exceeded its SSSL (0.4 mg/kg) and background (18.3 mg/kg) at sample location lMP-lASPOW-GP03.
- Chromium (71.8 and 44 mg/kg) exceeded its SSSL (23.2 mg/kg) and background (38.3 mg/kg) at two sample locations (IMP-lASPOW-GP18 and lMP-lASPOWGP20). Both results were "J" flagged.
- Lead (429 and 22,000 mg/kg) exceeded its SSSL (400 mg/kg) and background (38.5 mg/kg) at two sample locations (IMP-IASPOW-GP02 and IMP-IASPOWGP03).
- Manganese (1,560 and 1,610 mg/kg) exceeded its SSSL (363 mg/kg) and background (1,355 mg/kg) at two sample locations (IMP-IASPOW-GP02 and IMP-IASPOW -GP20).

Metal Results from the January 2022 sampling event.

Three composite subsurface soil samples were collected for metals chemical analysis. Subsurface soil samples were collected from 3 to 4 feet bgs at the locations previously described. Metals were detected in subsurface soils. Analytical results were compared to industrial EPA RSLs, ESVs, Eco-RBRGs, and BTVs as presented in Table 5-4.

A total of 22 metals were detected in the samples. Arsenic was the only metal that exceeded the industrial RSL. The following metals exceeded their respective background concentrations in one or more samples.

- Aluminum (19,000 mg/kg) exceeded background (16,300 mg/kg) at sample locations IA-GP10COMP-20212 and IA-GP15COMP-20212.
- Arsenic (15 mg/kg) exceeded background (13.7 mg/kg) at sample location IA-GP15COMP-20212.
- Iron (46,000 mg/kg) exceeded background (34,200 mg/kg) at sample location IA-GP15COMP-20212.
- Mercury (0.096 to 0.13 mg/kg) exceeded background (0.08 mg/kg) at sample locations IA-GP10COMP-20212 and IA-GP15COMP20212.
- Selenium (0.76 to 1.1 mg/kg) exceeded background (0.48 mg/kg) at all three sample locations.
- Vanadium (74 mg/kg) exceeded background (58.8 mg/kg) at sample location IA-GP15COMP-20212.

Eight metals were detected at concentrations exceeding ESVs: antimony, chromium, lead, manganese, mercury, selenium, thallium, and vanadium. Of these, all but antimony, chromium,

lead, manganese, and thallium also exceeded their respective background concentrations in one or more samples.

- Antimony (0.48 to 1 mg/kg) exceeded its ESV (0.27 mg/kg) at all three sample locations. All three samples were “J” flagged.
- Chromium (37 mg/kg) exceeded its ESV (23 mg/kg) at sample location IA-GP15COMP-20212. The result was "J" flagged.
- Lead (24 to 30 mg/kg) exceeded its ESV (11 mg/kg) at sample locations IA-GP10COMP-20212 and IA-GP15COMP-20212.
- Manganese (420 to 1,200 mg/kg) exceeded its ESV (220 mg/kg) at sample locations IA-GP10COMP-20212 and IA-GP15COMP-20212.
- Mercury (0.046 to 0.13 mg/kg) exceeded its ESV (0.013 mg/kg) at all three sample locations and background (0.08 mg/kg) at sample locations IA-GP10COMP-20212 and IA-GP15COMP-20212.
- Selenium (0.76 to 1.1 mg/kg) exceeded its ESV (0.52 mg/kg) and background (0.48 mg/kg) at all three sample locations.
- Thallium (0.18 to 0.3 mg/kg) exceeded its ESV (0.05 mg/kg) at all three sample locations.
- Vanadium (32 to 74 mg/kg) exceeded its ESV (7.8 mg/kg) at all three sample locations and background (58.8 mg/kg) at sample location IA-GP15COMP-20212.

Volatile Organic Compounds. Three subsurface soil sample locations (IMP-IASPOWGP04, IMP-IASPOW-GP14, and IMP-IASPOW-MW02) were analyzed for VOCs. Two VOCs (acetone and methylene chloride) were detected in the samples at concentrations below their respective SSSLs. The methylene chloride results were flagged with a "B" data qualifier, signifying that methylene chloride was also detected in an associated laboratory or field blank sample.

Semivolatile Organic Compounds. Three subsurface soil sample locations (IMPIASPOW-GP04, IMP-IASPOW-GP14, and IMP-IASPOW-MW02) were analyzed for SVOCs. SVOCs were not detected in the samples.

Pesticides. Three subsurface soil sample locations (IMP-IASPOW-GP04, IMP-IAS POWGP14, and IMP-IASPOW-MW02) were analyzed for pesticides. Pesticides were not detected in the samples.

Herbicides. Three subsurface soil sample locations (IMP-IASPOW-GP04, IMP-IASPOWGP14, and IMP-IASPOW-MW02) were analyzed for herbicides at IASPOW. One herbicide (2-(2-Methyl-4-chlorophenoxy)propionic acid [MCPP]) was detected at two locations (IMP-IASPOW-GP04 and IMP-IASPOW-MW02) at concentrations below its SSSL. Both results were flagged with a "J" data qualifier, indicating that the concentrations were estimated.

Explosives. Nine subsurface soil samples were analyzed for explosives at the IASPOW. Explosives were not detected in the samples.

5.3 Groundwater Analytical Results

Four groundwater samples were collected for chemical analysis at the IASPOW, at the two locations shown on Figure 3-1. Metals, explosives, and pesticides were detected in groundwater. Analytical results were compared to residential human health SSSLs and metals background screening values, as presented in Table 5-3.

Metals. The two Phase I groundwater samples were analyzed for metals. A total of 10 metals were detected in the samples. The concentrations of three metals (arsenic, iron, and manganese) exceeded their respective SSSLs, but only manganese (0.64 milligrams per liter [mg/L]) exceeded both its SSSL (0.07 mg/L) and its background concentration (0.58 mg/L) at sample location IMP-IASPOW-MW02.

Volatile Organic Compounds. One groundwater sample location (IMP-IASPOW-MW02) was analyzed for VOCs during Phase I. VOCs were not detected in the sample.

Semivolatile Organic Compounds. One groundwater sample location (IMP-IASPOWMW02) was analyzed for SVOCs during Phase I. SVOCs were not detected in the sample.

Pesticides. Three of the four groundwater samples (one Phase I sample and both Phase II samples) collected at the IASPOW were analyzed for pesticides. A total of 12 pesticides were detected in the samples. Four pesticides (aldrin, dieldrin, heptachlor epoxide, and beta-hexachlorocyclohexane (BHCD) were detected at concentrations exceeding their respective SSSLs:

- Aldrin (0.00008 mg/L) exceeded its SSSL (0.000003 mg/L) at IMP-IASPOWMW02. The result was flagged with a "J" data qualifier, indicating that the 21 concentration was estimated.
- Beta-BHC (0.000069 mg/L) exceeded its SSSL (0.000036 mg/L) at IMPIASPOW-MW02. The result was "J" flagged.
- Dieldrin (0.00016 mg/L) exceeded its SSSL (0.000004 mg/L) at IMP-IASPOWMW02. The result was "J" flagged.
- Heptachlor epoxide (0.000021 to 0.000034 mg/L) exceeded its SSSL (0.000006 mg/L) at IMP-IASPOW-MWOI and IMP-IASPOW-MW02. All of the results were "J" flagged.

Herbicides. One groundwater sample location (IMP-IASPOW-MW02) was analyzed for herbicides during Phase I. Trace level estimated detections of 2,4-DB (0.00028J mg/L) and Dinoseb (0.00016J mg/L) were reported in the duplicate sample. The trace concentrations of Dinoseb are an order of magnitude lower than the tapwater EPA RSL (0.0015 mg/L). There are no RSLs for 2,4-DB however, the chemical is similar to 2,4-D which has a tapwater RSL of 0.017 mg/L which is well above the measured trace concentration observed.

Explosives. All of the groundwater samples were analyzed for explosives. A total of two explosives (4-amino-2,6-dinitrotoluene and 2-nitrotoluene) were detected in the Phase I samples. The concentrations of 4-amino-2,6-dinitrotoluene (0.00045 and 0.0011 mg/L) exceeded its SSSL

(0.000093 mg/L) in both IMP-IASPOW-MW01 and IMP-IASPOW-MW02, respectively. However, explosives were not detected in the Phase II samples.

5.4 Statistical and Geochemical Evaluation of Metals Data

Site metals data were further evaluated using statistical and geochemical methods to determine if the metals were site-related. This multi-tiered approach is described in the technical memorandum "Selecting Site-Related Chemicals for Human Health and Ecological Risk Assessments for FTMC: Revision 2" (Shaw, 2003). The statistical and geochemical evaluations determined that nearly all metals detected in the site media are present at naturally occurring levels (Appendix H). However, copper and lead have anomalously high concentrations in both the surface and subsurface soil intervals and should be considered suspect.

5.5 Preliminary Risk Assessment

A PRA was performed as part of the SI to characterize the potential threat to human health from exposure to environmental media at the IASPOW. The PRA approach was developed at the request of EPA and ADEM to provide fast and inexpensive estimation of risk for relatively simple sites. It was derived from the SRA protocol developed for FTMC and documented in the installation-wide work plan (IT, 1998). A PRA is a simplified version of an SRA, differing primarily in that the maximum detected concentration (MDC) rather than an estimate of average is adopted as the source-term concentration for use in the risk assessment. However, a PRA is more conservative than an SRA and is generally more protective. The PRA prepared as part of the SI for the IASPOW is included as Appendix I. It discusses the environmental media of interest, selection of site-related chemicals, selection of COPCs, risk characterization, and conclusions.

The foundation of the PRA is the SSSL, which incorporates all the exposure and toxicological assumptions and precision of a complete baseline risk assessment. SSSLs are receptor-, medium- and chemical-specific risk-based concentrations that are used to screen media to select COPCs and to characterize the risk, i.e., compute the incremental lifetime cancer risk (ILCR) and hazard index (HI) for noncancer effects associated with exposure to site media. We note that SSSLs have been supplanted by RSLs.

The SSSLs applied to a given site represent the most highly exposed receptor scenario for each of several plausible uses for the site. For the IASPOW, three receptor scenarios were evaluated: groundskeeper, construction worker, and resident. COPCs were selected from the site-related chemical with the appropriate SSSL. Chemicals that were identified as not being site related were dropped from further consideration because their presence was not attributed to site activities. The COPCs selected in this manner are the chemicals in each medium that may contribute significantly to cancer risk or to the potential for noncancer effects. As noted above, the MDC was selected as the source-term concentration for use in risk characterization. ILCR and HI values were estimated for each COPC in each medium and were summed to obtain total ILCR and HI values for each receptor.

Three metals (antimony, arsenic, and lead) were selected at COPCs in soil. Four organochlorine pesticides (aldrin, dieldrin, heptachlor epoxide, and beta-BHC) and the explosive compound 4-amino-2,6-dinitrotoluene were identified as COPCs in groundwater. The PRA concluded that the IASPOW can be released in its present condition for industrial use without further action, but not for residential or unrestricted use. The PRA noted two sources of uncertainty: (1) future health risks associated with metals in soil may increase as bullets and fragments degrade over time; and (2) the source of pesticides and explosive compounds detected in groundwater is unclear.

5.6 Preliminary Ecological Risk Assessment

Similar to the PRA for human health, a PERA was performed to further characterize the potential threat to ecological receptors from exposure to environmental media at the IASPOW. The PERA approach was derived from the screening-level ecological risk assessment protocol developed for FTMC and documented in the installation-wide work plan (IT, 1998). The PERA for IASPOW performed as part of the SI is included as Appendix J. It discusses the ecological habitat, environmental media of interest and data selection, selection of constituents of potential ecological concern (COPEC), risk characterization, and conclusions.

The medium of interest at the IASPOW is surface soil. Exposures to subsurface soil and groundwater are unlikely for ecological receptors at this site. In order to determine whether constituents detected in the site samples have the potential to pose adverse ecological risks, screening-level hazard quotients were developed via a three-step process as follows:

1) Comparison to ESVs
2) Identification of essential macronutrients
3) Comparison to naturally occurring background concentrations.

The ESVs represent the most conservative values available from various literature sources and have been selected to be protective of the most sensitive ecological assessment endpoints. The ESVs were developed specifically for FTMC in conjunction with EPA Region 4 and are presented in the Final Human Health and Ecological Screening Values and PAH Background Summary Report (IT, 2000b). The ESVs are based on no-observed-adverse-effect-levels (NOAEL), when available. If a NOAEL-based ESV was not available for a certain constituent, then the most health-productive value available from the scientific literature was used. If a constituent was detected at a maximum concentration that exceeded its ESV, was not an essential macronutrient, and was greater than the naturally occurring levels at FTMC, then it was selected as a COPEC for further ecological risk characterization. Updated ESVs are available, as discussed in Section 5.7.

The PERA identified two metals (lead and copper) and one VOC (trichloroethene) as COPECs in surface soil at the IASPOW. The PERA concluded that lead and copper have the potential to pose ecological risk. The pattern of lead and copper concentrations were characterized to identify distinct areas of contamination that are consistent with past site usage. Because of the isolated nature of the detected trichloroethene in soil and its relatively low detected concentration, the PERA concluded that the trichloroethene is not likely to pose an unacceptable risk to ecological receptors.

5.7 Screening Risk Assessment

5.7.1 Introduction

ADEM and EPA issued comments on the SI in December 2003, which included comments on the PERA. It was not until correspondence in 2017 that it became apparent that due to the timing of the Site transfer to the JPA in 2003, these comments had never been transmitted to MDA. In May 2018, ADEM issued a request for additional information on activities at the Site. MES complied with a response dated June 25, 2020. A revised PERA was included with the June 2020 correspondence. The revised PERA referenced updated ESVs (from EPA Region 4) and provided a detailed analysis of the ecological significance of the COPECs. This PERA concluded that there was no unacceptable ecological risk.

In August 2021, ADEM issued comments to MES, which were followed by a phone conversation between MES and ADEM. ADEM's key concern was the age of the soil database, which prompted MES to perform the supplemental sampling that has been detailed above. This updated SRA has been prepared to address ADEM's concerns on the PERA. A human health screening is also included to update the PRA.

The updated SRA at the Site was based on the results for surface and subsurface soil samples collected during the SI and was conducted in accordance with Alabama Risk-Based Corrective Action Revision 3.0 (ADEM, 2017). ARBCA has a specific HHRA process and references EPA guidance for ecological risk assessment. The ecological risk screening follows the steps outlined in EPA Region 4 Supplemental Guidance (EPA, 2018). This process is more rigorous than what was followed in the original PERA and reflects the evolution of the ecological risk process over the years.

The terminology used here follows ARBCA guidance, which differs slightly from EPA's definition of the terms. COPCs or COPECs are the universe of identified constituents that may be of concern at the Site based on past activities and known influences. For this evaluation, metals in soil represent the COPCs. These were most recently sampled and analyzed in January 2022. A constituent of concern (COC) is a constituent that is retained after the screening and subjected to further risk evaluation.

The current Site soil database (Table 5-4) consists of samples classified as "surface" and "subsurface," collected from 0 to 1 foot and 3 to 4 feet bgs, respectively.

5.7.2 Identification of Screening Levels

ESVs for soil have been published by EPA (EPA, 2018). As described in the guidance, these ESVs include the EPA Ecological Soil Screening Levels (Eco-SSLs) as well as other sources. They were developed to protect plants, soils invertebrates, and avian and mammalian wildlife. The final ESV is the lowest of the various ecological endpoints.

ARBCA guidance calls for the use of the EPA RSLs for the protection of human health (EPA, 2021). The RSLs are the lower of the values for cancer and noncancer effects. Per ADEM

guidance, initial screening is performed at target risks of one in a million (1E-06) Individual Excess Lifetime Cancer Risk (IELCR) for the cancer endpoint and 0.1 Hazard Quotient (HQ) for noncancer. These targets are 10 times lower (more conservative) than the final ARBCA risk limits. The RSLs used for this SRA were for commercial/industrial receptors as the Site is not targeted for residential use. The RSLs include incidental ingestion, dermal contact and inhalation of suspended soil particles (and volatilization, where applicable) and are based on 250 days of exposure for 25 years.

Ecological risk assessments were conducted by Shaw for the Iron Mountain Road (IMR) (Screening-Level Ecological Risk Assessment for the Iron Mountain Road Ranges (IT, 2002d) and Bains Gap Road (BGR) Ranges at McClellan. The results of the screening-level risk assessments and the problem formulation and study designs for the IMR and BGR Ranges are documented in the *Baseline Ecological Risk Assessment Problem Formulation and Study Design for the Iron Mountain Road Ranges* (IT, 2002e), the *Data Evaluation Report and Screening Level Ecological Risk Assessment for the Bains Gap Road Ranges* (IT, 2002f), and the *Baseline Ecological Risk Assessment Problem Formulation and Study Design for Bains Gap Road Ranges* (Shaw, 2003b). Based on these studies, Eco-RBRGs were developed as documented by the *Identification of Ecological Risk-Based Remedial Goals, Iron Mountain Road and Bains Gap Road Ranges* (Shaw, 2010). These Eco-RBRGs were developed to be protective of the sensitive receptors potentially present at the IMR and BGR Ranges. The Eco-RBRGs for soil, as shown in Table 1, are 18 mg/kg for antimony, 334 mg/kg for copper, 500 mg/kg for lead, and 100 mg/kg for zinc.

These EcoRBRGs were based on site-specific studies of soil toxicity performed for the McClellan Site. Therefore, they are considered valid independent of the changes in EPA ESVs.

5.7.3 Calculation of Representative Concentrations

Representative Concentrations (RCs) per ARBCA represent the chemical concentrations in environmental media that may come in contact with a receptor. The RC is a value that reflects a conservative estimate of average over the area of interest. As described below, for certain COPCs, RCs were calculated as part of the screening process. Per ARBCA, either the maximum concentrations or the 95th Upper Confidence Limit (UCL) about the means can serve as the RC. EPA ProUCL Version 5.1.002 Statistical Software for Environmental Applications for Data Sets with and without Nondetect Observations (EPA 2015) recommends a minimum of eight to 10 samples, and ARBCA specifies that 30 to 50 observations are preferred. Given the limited number of 2022 observations (six samples from three locations, and only three surficial samples), UCLs were not calculated as the RCs for this step of the risk process; therefore, the maximum was used.

5.7.4 Screening Process

The SRA consists of the steps described below and as illustrated in Figure 5-3. The Site is slated for redevelopment as a solar panel array. The area will be maintained as such, and there will be no development that would result in significant vertical soil mixing. Therefore, soils are expected to remain at their current depth. For this reason, subsurface soils, which are several

times deeper than the biotic zone, are unlikely to present an ecological exposure concern to either humans or wildlife. Given the history of the Site as a firing range, deposition would have been expected to have been surficial, so the shallower soils are also most representative of potential Site impacts.

Ecological Risk

The steps for screening ecological risk are listed below:

- Compare data for each contaminant to EPA soil ESVs and BTVs documented in the *Final Background Metals Survey Report* (SAIC, 1998). BTVs have been previously developed for this Site. If the maximum detected concentration does not exceed both the ESV and BTV, the constituent drops out of the ecological risk process.
- Compare remaining COPECs to Eco-RBRGs (described further below) to identify the constituents that may pose an ecological risk. Eco-RBRGs are available for antimony, copper, lead, and zinc. If the maximum detected concentration does not exceed an Eco-RBRG, the constituent drops out of the ecological risk process. The remaining constituents are COCs for ecological risk.
- Calculate RCs for the remaining COCs. The derivation of the RC is described in ARBCA and discussed further below.
- Compare RCs to ESVs and BTVs. If the RC does not exceed both the ESV and BTV, the constituent drops out of the ecological risk process.
- For COCs that have RCs above both ESVs and BTVs, perform further ecological risk evaluation.

Human Health Risk

The steps for screening human health risk are listed below:

- Compare data for each contaminant to EPA soil to EPA nonresidential RSLs and BTVs. If the maximum detected concentration does not exceed both the RSL and the BTV, the constituent drops out of the human health risk process. The remaining constituents are COCs for human health risk.
- Compare the RCs for the COCs to the RSLs and BTVs. If the RC does not exceed both the RSL and BTV, the constituent drops out of the human health risk process.
- For COCs that have RCs above both RLS and BTVs, perform further human health risk evaluation.

5.7.5 Ecological Screening

As shown in Table 5-4, a number of analytes exceeded both ESVs and BTVS (common nutritional elements calcium, magnesium, potassium and sodium are not included in risk assessments). However, antimony, copper, lead, and zinc did not exceed the Eco-RBRGs and are therefore screened out. The remaining chemicals with maximum concentrations over ESVs or lacking ESVs for ecological risk are:

- Aluminum
- Iron
- Manganese

- Mercury
- Selenium
- Thallium
- Vanadium

These are evaluated further in the ecological risk process.

5.7.6 Human Health Screening

The only constituent with a maximum concentration that exceeded both RSLs and BTVs was arsenic. One result (15 mg/kg) exceeded the BTV of 13.7 mg/kg at one location (IA-GP15COMP-20212) in subsurface soil. Arsenic is not a typical firing range contaminant, and the only exceedance was in a subsurface sample, suggesting that the observation is not related to past use.

The ARBCA risk limit is 1E-05. Screening is performed at 1E-06 to account for additivity. However, arsenic is the only carcinogenic COC. Therefore, the risk-based concentration for arsenic would be the lower of the IELCR 1E-05 value (30 mg/kg) and the HQ 0.1 value (48 mg/kg). The maximum observed is well below 30 mg/kg and therefore arsenic at the Site does not contribute to risk above ARBCA risk limits.

No further human health evaluation is required.

5.7.7 Ecological Risk Evaluation

The following section provides additional evaluation of the COCs for ecological risk. ARBCA (ADEM, 2017) defines surficial soil as 0 to 1 foot bgs. EPA (EPA, 2015) identified the target terrestrial biotic zone for ecological risk assessment purposes as up to 25 to 30 cm (one ft). Given that no vertical soil mixing is expected, only the surficial samples are assumed to represent an ecological exposure concern. This evaluation also considers the geochemical and statistical analyses that were performed specifically for this Site several years subsequent to the development of the BTVs as part of the SI (Appendix H).

Aluminum**:**
Two subsurface samples, IA-GP10COMP-20212 and IA-GP15COMP-20212, both at 19,000 mg/kg, exceeded the BTV of 16,300 mg/kg. Because the surface samples are all below the BTV, aluminum is not considered an ecological risk concern.

Iron:
One subsurface sample, IA-GP15COMP-20212, at 46,000 mg/kg, exceeded the BTV of 34,200 mg/kg. Because the surface samples are all below the BTV, iron is likely to be background. Iron is not considered an ecological risk concern.

Manganese:

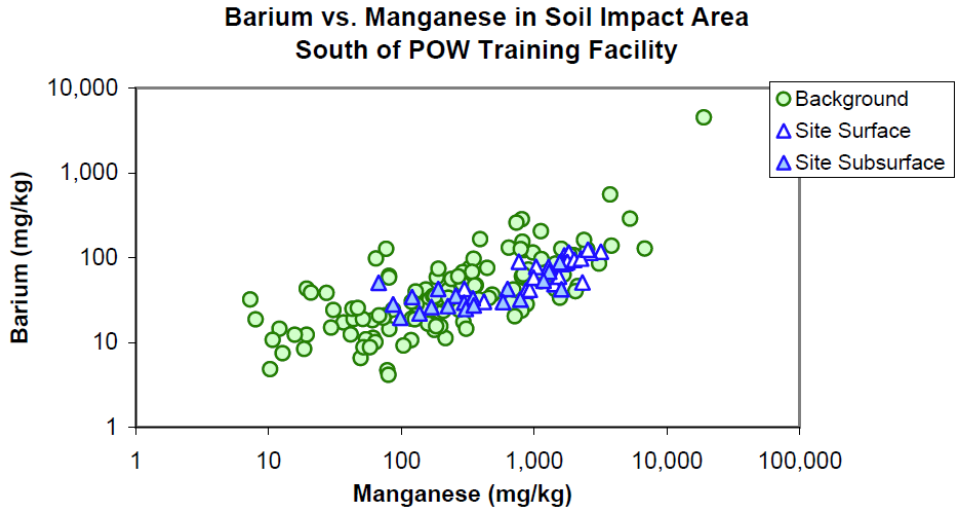
Two surface samples, IA-GP10COMP-2021 (2,500 mg/kg) and IA-GP15COMP-2021 (1,900 mg/kg) exceeded the BTV of 1,580 mg/kg. There is no Eco-RBRG. The EPA EcoSSLs for manganese (*Interim Final Ecological Soil Screening Levels for Manganese* [EPA 2007a]) for wildlife are 4,300 mg/kg for birds and 4,000 mg/kg for mammals, neither of which is exceeded by the maximum observed. The EcoSSLs for plants (220 mg/kg) and invertebrates (450 mg/kg) are lower. The ESV is the lowest of these.

Given the uncertainty associated with this range of ESVs, additional sources of benchmarks were consulted. The Los Alamos National Laboratories (LANL) ECORISK Database, Release 3.0 (LANL 2011) maintains a large database of screening levels. NOAELs and Lowest Observed Adverse Effect Levels (LOAELs) in soil for manganese are:

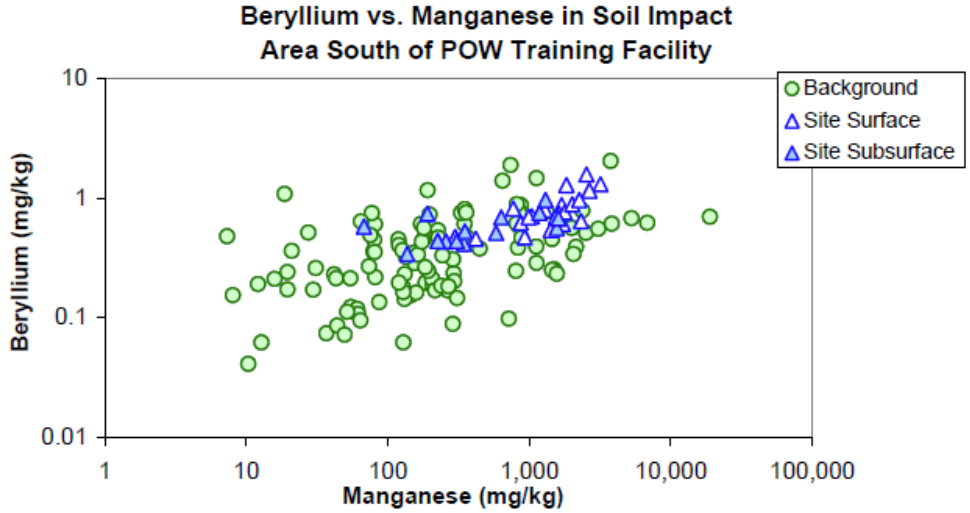
American kestrel (Avian intermediate carnivore)	24,000 mg/kg to 60,000 mg/kg (NOAEL); 50,000 mg/kg to 120,000 mg/kg (LOAEL)
American robin (Avian herbivore)	1,300 mg/kg to 2,200 mg/kg NOAEL; 2,700 mg/kg to 4,700 mg/kg LOAEL)
Deer mouse (Mammalian omnivore)	1,400 mg/kg (NOAEL); 5,400 mg/kg (LOAEL)
Desert cottontail (Mammalian herbivore)	2,000 mg/kg (NOAEL); 7,500 mg/kg (LOAEL)
Earthworm (Soil-dwelling invertebrate)	450 mg/kg (NOAEL); 4,500 mg/kg (LOAEL)
Plant	220 (NOAEL); 1,100 (LOAEL)

Consistent with EPA's EcoSSLs, most of these values are well above the observed concentrations and support a conclusion of no ecological risk for birds and mammals. For earthworms, the screening levels are lower. However, the LOAELs are generally above the maximum reported concentrations.

Manganese concentrations are slightly higher in surface than subsurface soils, suggesting that historical activities could have contributed some enrichment. However, the average concentration of manganese in surface soils, 1,900 mg/kg, is only slightly higher than the BTV. Detailed geochemical evaluation performed as part of the SI (Shaw, 2003c) concluded that manganese in Site soils is background. This determination was based on the correlation between manganese and other associated trace elements. Manganese oxides are common in soil and have an affinity to adsorb specific trace elements such as barium and beryllium. As shown below, the positive correlation between barium and beryllium and manganese, with no outliers on the plots, indicate a natural source for both of these elements. Because manganese presence represents a background condition, it is not a risk concern in Site soils.



From Appendix H, Attachment 1, Figure 4



From Appendix H, Attachment 1, Figure 5

Mercury: Two subsurface samples, IA-GP10COMP-20212, at 0.096 mg/kg, and IA-GP15COMP-20212, at 0.13 mg/kg, slightly exceeded the BTV of 0.08 mg/kg. Because the surface samples are all below the BTV, mercury is not considered an ecological risk.

Selenium: Selenium exceeded the BTV of 0.48 mg/kg in both surface and subsurface soil samples at each location tested. Concentrations are slightly higher in surface than subsurface soils, suggesting that historical activities could have contributed some enrichment. The ESV of 0.52 mg/kg is the EPA EcoSSL for plants (*Interim Final Ecological Soil Screening Levels for* Selenium [EPA 2007b]). The mammalian EcoSSL is slightly higher (0.63 mg/kg), followed by the EcoSSLs for birds (1.2 mg/kg) and invertebrates (4.1 mg/kg).

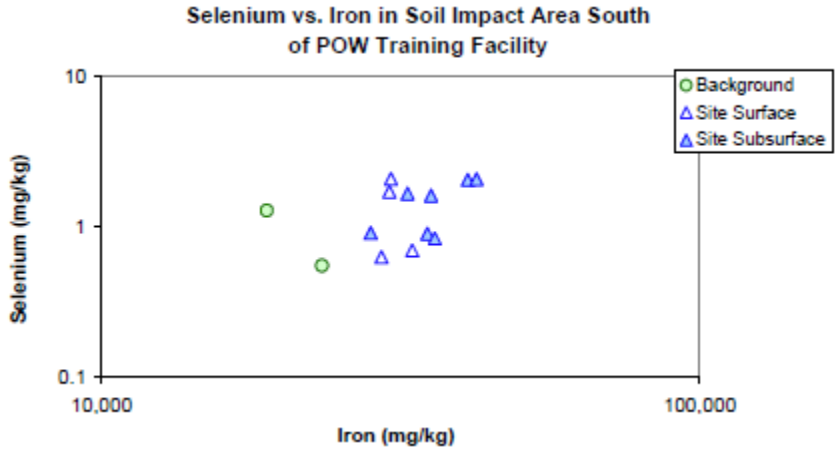
The LANL benchmarks are as follows:

American kestrel (Avian intermediate carnivore)	3.7 mg/kg to 74 mg/kg (NOAEL); 7.5 mg/kg to 140 mg/kg (LOAEL)

American robin (Avian herbivore)	0.71 mg/kg to 0.98mg/kg (NOAEL); 1.4 mg/kg to 1.9 mg/kg (LOAEL)
Deer mouse (Mammalian omnivore)	0.82 mg/kg (NOAEL); 1.2 mg/kg LOAEL
Desert cottontail (Mammalian herbivore)	2.2 mg/kg (NOAEL); 3.4 mg/kg (LOAEL)
Shrew (Mammalian insectivore)	0.7 mg/kg (NOALE); 1 mg/kg ((LOAEL)
Earthworm (Soil-dwelling invertebrate)	4.1 mg/kg (NOAEL); 41 mg/kg (LOAEL)
Plant (Terrestrial autotroph - producer)	0.52 mg/kg (NOAEL); 3 mg/kg (LOAEL)
Red fox ((Mammalian top carnivore)	92 mg/kg (NOAEL); 130 mg/kg (LOAEL)

Most, but not all, of these screening levels are above the concentrations observed. The lowest screening levels are for plants, which are not likely a concern due to anticipated cover with managed plants.

As with manganese, the geochemical evaluation performed as part of the SI (Shaw 2003b) concluded that selenium in Site soils is background. Selenium has a strong affinity to adsorb on iron oxides in toxic soils, so a positive correlation between selenium and iron is expected for uncontaminated soil samples. The plot (below) of selenium versus iron reveals a generally linear trend and samples with high selenium generally have proportionally higher iron and lie on the linear trend. These observations indicate that selenium detected in the samples is associated with iron oxides and is naturally occurring.



From Appendix H, Attachment 1, Figure 14

Thallium: There is not a BTV for thallium; however, concentrations are quite consistent across the samples, indicating a background condition.

Vanadium: One subsurface sample, IA-GP15COMP-20212, at 74 mg/kg, exceeded the BTV of 58.8 mg/kg. The other observations were well below the BTV. Vanadium concentrations were higher overall in the subsurface, suggesting that the concentrations do not derive from the Site activities.

As noted, most of the COCs were below BTVs and did not exhibit a pattern of contamination (surficial deposition) likely to be related to Site activities. Additionally, the Site will be redeveloped as a solar array, and its primary function will not be as habitat. The key ecological concerns would be if there were excessive high concentrations or bioconcentrators that could move up into the food chain as a result of incidental wildlife contact. These conditions do not exist, and, in fact, the COC concentrations appear to be background. Therefore, no ecological risk is predicted.

5.7.8 Uncertainty Analysis

Uncertainty is a component of any risk assessment and is the result of several factors. Due to the complexity and individuality of each environmental risk assessment, a certain amount of uncertainty is expected. The following includes a discussion on sources of uncertainty for this risk assessment.

- Screening levels are intended to be conservative. They can rule out but not predict risk. At a screening level, concentrations above screening levels, especially only slightly or moderately, do not provide a conclusion about risk for either human or ecological receptors.
- Some metals that were ascertained to be naturally occurring during the metals statistical evaluations had concentrations above ESVs, which contribute to risk and are not related to Site activities. Naturally occurring metal concentrations such as these may result in an overestimation of increased risk related to Site activities.
- Temporal variation habitat condition and species present at the Site can be a potential source of uncertainty when inferring (a) the existence of potential (unknown) ecological receptor species; and (b) potential (unknown) exposure pathways (i.e., most ecological receptors have a large enough home range that precludes them from being exposed to the specific areas of contaminated surface soil for their entire lifetimes).
- Bioavailability cannot be assessed using screening levels. However, bioavailability from soils may be limited, reducing potential effects.

The estimation of ecological risk is likely biased high as a result of risk contributed by naturally occurring metals, sporadic low metal concentrations, and conservative estimates of habitat condition and species present that may or may not be representative of actual ecological Site conditions.

5.7.9 SRA Conclusions

Based on the conservative screening evaluation for nonresidential use, there is no anticipated human health risk above ARBCA risk limits.

The majority of COCs in soil are below BTVs or exhibit a pattern indicating they are unlikely to be related to Site releases. Localized risk to select receptors groups could not be eliminated based on comparison to screening levels for manganese (invertebrates) and selenium (insectivorous mammals).

For perspective, however, the Eco-RBRGs for the four metals for which they have been developed are 2 to 67 times above the ESVs orders. These ratios suggest that actual impacts occur above the screening levels, as expected.

6.0 SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Shaw completed an SI at the IASPOW at FTMC in Calhoun County, Alabama. The SI was conducted to determine whether chemical constituents are present at the site at concentrations that pose an unacceptable risk to human health or the environment. The SI consisted of the collection and analysis of 22 surface soil samples, 20 subsurface soil samples, and 4 groundwater samples. In addition, two permanent monitoring wells were installed at the site to facilitate groundwater sample collection and to provide site-specific geological and hydrogeological characterization information.

Chemical analysis of samples collected at the IASPOW indicates that metals, explosives, VOCs, pesticides, and herbicides were detected in site media. To evaluate whether the detected constituents pose an unacceptable risk to human health or the environment, the analytical results were compared to SSSLs, ESVs, and background screening values for FTMC. Site metals data were further evaluated using statistical and geochemical methods to determine if the metals were site related. A PRA and PERA were also performed to further characterize the potential threat to human health and the environment.

The PRA identified three metals (antimony, arsenic, and lead) as COPCs in soil. The metals are known to be constituents of bullets, and expended bullets and bullet fragments were observed on the surface over a substantial portion of the site. Groundwater COPCs were four organochlorine pesticides (aldrin, dieldrin, heptachlor epoxide, and beta-BHC), and the explosive compound 4-amino-2,6-dinitrotoluene. The PRA concluded that the IASPOW in its current state can be released for industrial use, but not for residential (or unrestricted) use.

The PERA identified two metals (lead and copper) and one VOC (trichloroethene) as chemicals of potential ecological concern in surface soil. Exposures to subsurface soil and groundwater were considered unlikely for ecological receptors at this site. The PERA concluded that the metals have the potential to pose ecological risk; however, the trichloroethene is unlikely to pose a ecological risk because of its isolated nature and relatively low detected concentration. The future industrial use of the site, however, will likely preclude the availability of suitable habitat for ecological receptors. Therefore, the potential threat to ecological receptors is expected to be low in the projected reuse scenario.

A SRA was prepared to address ADEM's concerns on the PERA and to include human health screening. The SRA at the Site was based on the results for surface and subsurface soil samples collected during the 2022 supplemental soil sampling and was conducted in accordance with Alabama Risk-Based Corrective Action (ADEM, 2017). ARBCA has a specific HHRA process and references EPA guidance for ecological risk assessment. The ecological risk screening follows the steps outlined in EPA Region 4 Supplemental Guidance (EPA 2018).

Regarding the Human Health Screening, the only constituent with a maximum concentration that exceeded both EPA RSLs and BTVs was arsenic. One result (15 mg/kg) exceeded the BTV of 13.7 mg/kg at one location in subsurface soil. Arsenic is not a typical firing range contaminant, and the only exceedance was in a subsurface sample, suggesting that the observation is not related to past use.

Regarding the Ecological Screening, a number of analytes exceeded both ESVs and BTVS (common nutritional elements calcium, magnesium, potassium and sodium are not included in risk assessments). However, antimony, copper, lead, and zinc did not exceed the -RBRGs and are therefore screened out. The remaining chemicals with maximum concentrations over ESVs or lacking ESVs for ecological risk are:

- Aluminum
- Iron
- Manganese
- Mercury
- Selenium
- Thallium
- Vanadium

As noted in the SRA, most of the COCs were below BTVs and did not exhibit a pattern of contamination (surficial deposition) likely to be related to Site activities. Additionally, the Site will be redeveloped as a solar array (industrial reuse), and its primary function will not be as habitat. The key ecological concerns would be if there were excessive high concentrations or bioconcentrators that could move up into the food chain as a result of incidental wildlife contact. These conditions do not exist, and, in fact, the COC concentrations appear to be background. Therefore, no ecological risk is predicted.

Based on the results of the RFI, past operations at the IASPOW have impacted the environment. The site is unsuitable for unrestricted reuse (i.e., residential). However, the site does not pose an unacceptable risk to human health or the environment in the projected (industrial) land reuse scenario. Therefore, No Further Action with Land Use Controls is recommended for the site.

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Tables

Table 3-1

Sampling Locations and Rationale
Impact Area South of POW Training Facility
Former Rifle/Machine Gun Ranges, Parcels 100Q and 101Q
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Media	Sample Location Rationale
IMP-IASPOW-GP01	Surface soil subsurface soil	Surface and subsurface soil samples were collected in the southwestern portion of the area of investigation because review of aerial photographs showed ground surface disturbance. Soil samples were analyzed to determine if potential site-specific chemicals (PSSC) are present at the site.
IMP-IASPOW-GP02	Surface soil subsurface soil	Surface and subsurface soil samples were collected in the southwestern portion of the area of investigation within an area where expended rounds were observed during the site walk. Soil samples were analyzed to determine if PSSCs are present at the site.
IMP-IASPOW-GP03	Surface soil subsurface soil	Surface and subsurface soil samples (2) were collected in the central portion of the area of investigation within an area where rounds were observed during the site walk. Also, aerial photograph review showed ground disturbance. Soil samples were analyzed to determine if PSSCs are present at the site.
IMP-IASPOW-GP04	Surface soil subsurface soil	Surface and subsurface soil samples were collected in the central portion of the area of investigation because it is located downslope of a possible target berm observed during the site walk. Soil samples were analyzed to determine if PSSCs are present at the site.
IMP-IASPOW-GP05	Surface soil subsurface soil	Surface and subsurface soil samples were collected in the northern portion of the area of investigation within an area where expended rounds were observed during the site walk. Also, review of aerial photographs showed ground surface disturbance. Soil samples were analyzed to determine if PSSCs are present at the site.
IMP-IASPOW-GP06	Surface soil subsurface soil	Surface and subsurface soil samples were collected along the northeastern boundary of the area of investigation because review of aerial photographs showed ground surface disturbance. Soil samples were analyzed to determine if PSSCs are present at the site.
IMP-IASPOW-GP07	Surface soil	Surface soil sample was collected from the southwestern end of a possible target berm identified during the site walk. Soil samples were analyzed to determine if PSSCs are present at the site.
IMP-IASPOW-GP08	Surface soil	Surface soil sample was collected from the middle portion of a possible target berm identified during the site walk. Soil samples were analyzed to determine if PSSCs are present at the site.
IMP-IASPOW-GP09	Surface soil	Surface soil sample was collected from the northeastern end of a possible target berm identified during the site walk. Also, review of aerial photographs showed ground surface disturbance in the area. Soil samples were analyzed to determine if PSSCs are present at the site.
IMP-IASPOW-GP10	Surface soil subsurface soil	Surface and subsurface soil samples were collected in the west-central portion of the area of investigation along the southern edge of an area containing a significant amount of expended rounds of ammunition. Soil samples were analyzed to determine if PSSCs are present at the site.
IMP-IASPOW-GP11	Surface soil subsurface soil	Surface and subsurface soil samples were collected in the central portion of the area of investigation along the northern edge of an area containing a significant amount of expended rounds of ammunition. Soil samples were analyzed to determine if PSSCs are present at the site.
IMP-IASPOW-GP12	Surface soil subsurface soil	Surface and subsurface soil samples were collected in the central portion of the area of investigation within an area containing a significant amount of expended ammunition. Soil samples were analyzed to determine if PSSCs are present at the site.
IMP-IASPOW-GP13	Surface soil subsurface soil	Surface and subsurface soil samples were collected in the north-central portion of the area of investigation along the northern edge of an area containing a significant amount of expended rounds of ammunition. Soil samples were analyzed to determine if PSSCs are present at the site.
IMP-IASPOW-GP14	Surface soil subsurface soil	Surface and subsurface soil samples were collected in the northeastern portion of the area of investigation in the northeastern corner of an area containing a significant amount of expended rounds of ammunition. Soil samples were analyzed to determine if PSSCs are present at the site.
IMP-IASPOW-GP15	Surface soil subsurface soil	Surface and subsurface soil samples were collected in the northeastern portion of the area of investigation in the northern edge of an area that appears disturbed in historical aerial photographs. Soil samples were analyzed to determine if PSSCs are present at the site.

Table 3-1

Sampling Locations and Rationale
Impact Area South of POW Training Facility
Former Rifle/Machine Gun Ranges, Parcels 100Q and 101Q
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Media	Sample Location Rationale
IMP-IASPOW-GP16	Surface soil subsurface soil	Surface and subsurface soil samples were collected to the east of the area of near an area that appears disturbed in historical aerial photographs. Soil samples were analyzed to determine if PSSCs are present at the site.
IMP-IASPOW-GP17	Surface soil subsurface soil	Surface and subsurface soil samples were collected in the southeastern corner of the area of investigation near an area that appears disturbed in historical aerial photographs. Soil samples were analyzed to determine if PSSCs are present at the site.
IMP-IASPOW-GP18	Surface soil subsurface soil	Surface and subsurface soil samples were collected in the eastern portion of the area of investigation between two areas that appear disturbed in historical aerial photographs. Soil samples were analyzed to determine if PSSCs are present at the site.
IMP-IASPOW-GP19	Surface soil subsurface soil	Surface and subsurface soil samples were collected in the southeastern portion of the area of investigation near a possible target berm and an area that appears disturbed in aerial photographs. Soil samples were analyzed to determine if PSSCs are present at the site.
IMP-IASPOW-GP20	Surface soil subsurface soil	Surface and subsurface soil samples were collected in the south-central portion of the area of investigation near a possible target berm. Soil samples were analyzed to determine if PSSCs are present at the site.
IMP-IASPOW-MW01	Surface soil subsurface soil groundwater	Surface soil, subsurface soil, and groundwater samples were collected from the central portion of the area of investigation, potentially downgradient of a possible target berm observed during the site walk. Soil and groundwater samples were analyzed to determine if PSSCs are present at the site.
IMP-IASPOW-MW02	Surface soil subsurface soil groundwater	Surface soil, subsurface soil, and groundwater samples were collected from the southwestern portion of the area of investigation near an area where expended rounds were observed during the site walk. Soil and groundwater samples were analyzed to determine if PSSCs are present at the site.

Table 3-2

Soil Sample Designations and Analytical Parameters
Impact Area South of POW Training Facility
Former Rifle/Machine Gun Ranges, Parcels 100Q and 101Q
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Designation	Sample Depth (ft)	QA/QC Samples		Analytical Parameters
			Field Duplicates	MS/MSD	
IMP-IASPOW-GP01	IMP-IASPOW-GP01-SS-QG0001-REG	0-1			TAL Metals and Explosives
	IMP-IASPOW-GP01-DS-QG0002-REG	3-4			
IMP-IASPOW-GP02	IMP-IASPOW-GP02-SS-QG0003-REG	0-1			TAL Metals and Explosives
	IMP-IASPOW-GP02-DS-QG0004-REG	3-4			
IMP-IASPOW-GP03	IMP-IASPOW-GP03-SS-QG0005-REG	0-1			TAL Metals and Explosives
	IMP-IASPOW-GP03-DS-QG0006-REG	3-4			
	IMP-IASPOW-GP03-DS-QG0045-REG	4-6	IMP-IASPOW-GP03-DS-QG0046-FD		TAL Metals
IMP-IASPOW-GP04	IMP-IASPOW-GP04-SS-QG0007-REG	0-1			TAL Metals, Explosives, VOCs, SVOCs, Pesticides, and Herbicides
	IMP-IASPOW-GP04-DS-QG0008-REG	3-4	IMP-IASPOW-GP04-DS-QG0009-FD		
IMP-IASPOW-GP05	IMP-IASPOW-GP05-SS-QG0010-REG	0-1			TAL Metals and Explosives
	IMP-IASPOW-GP05-DS-QG0011-REG	3-4			
IMP-IASPOW-GP06	IMP-IASPOW-GP06-SS-QG0012-REG	0-1			TAL Metals and Explosives
	IMP-IASPOW-GP06-DS-QG0013-REG	3-4			
IMP-IASPOW-GP07	IMP-IASPOW-GP07-SS-QG0014-REG	0-1			TAL Metals and Explosives
IMP-IASPOW-GP08	IMP-IASPOW-GP08-SS-QG0015-REG	0-1			TAL Metals and Explosives
IMP-IASPOW-GP09	IMP-IASPOW-GP09-SS-QG0016-REG	0-1			TAL Metals and Explosives
IMP-IASPOW-GP10	IMP-IASPOW-GP10-SS-QG0022-REG	0-1			TAL Metals
	IMP-IASPOW-GP10-DS-QG0023-REG	3-4			
IMP-IASPOW-GP11	IMP-IASPOW-GP11-SS-QG0024-REG	0-1			TAL Metals
	IMP-IASPOW-GP11-DS-QG0025-REG	3-4			
IMP-IASPOW-GP12	IMP-IASPOW-GP12-SS-QG0026-REG	0-1			TAL Metals
	IMP-IASPOW-GP12-DS-QG0027-REG	3-4			
IMP-IASPOW-GP13	IMP-IASPOW-GP13-SS-QG0028-REG	0-1			TAL Metals
	IMP-IASPOW-GP13-DS-QG0029-REG	3-4			
IMP-IASPOW-GP14	IMP-IASPOW-GP14-SS-QG0030-REG	0-1			TAL Metals, Explosives, VOCs, SVOCs, Pesticides, and Herbicides
	IMP-IASPOW-GP14-DS-QG0031-REG	2-4	IMP-IASPOW-GP14-DS-QG0032-FD	IMP-IASPOW-GP14-DS-QG0031-MS/MSD	
IMP-IASPOW-GP15	IMP-IASPOW-GP15-SS-QG0033-REG	0-1			TAL Metals
	IMP-IASPOW-GP15-DS-QG0034-REG	3-4			

Table 3-2

Soil Sample Designations and Analytical Parameters
Impact Area South of POW Training Facility
Former Rifle/Machine Gun Ranges, Parcels 100Q and 101Q
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Designation	Sample Depth (ft)	QA/QC Samples		Analytical Parameters
			Field Duplicates	MS/MSD	
IMP-IASPOW-GP16	IMP-IASPOW-GP16-SS-QG0035-REG	0-1			TAL Metals
	IMP-IASPOW-GP16-DS-QG0036-REG	3-4			
IMP-IASPOW-GP17	IMP-IASPOW-GP17-SS-QG0037-REG	0-1			TAL Metals
	IMP-IASPOW-GP17-DS-QG0038-REG	3-4			
IMP-IASPOW-GP18	IMP-IASPOW-GP18-SS-QG0039-REG	0-1			TAL Metals
	IMP-IASPOW-GP18-DS-QG0040-REG	3-4			
IMP-IASPOW-GP19	IMP-IASPOW-GP19-SS-QG0041-REG	0-1			TAL Metals
	IMP-IASPOW-GP19-DS-QG0042-REG	3-4			
IMP-IASPOW-GP20	IMP-IASPOW-GP20-SS-QG0043-REG	0-1			TAL Metals
	IMP-IASPOW-GP20-DS-QG0044-REG	3-4			
IMP-IASPOW-MW01	IMP-IASPOW-MW01-SS-QG0017-REG	0-1			TAL Metals and Explosives
	IMP-IASPOW-MW01-DS-QG0018-REG	3-4			
IMP-IASPOW-MW02	IMP-IASPOW-MW02-SS-QG0019-REG	0-1			TAL Metals, Explosives, VOCs, SVOCs, Pesticides, and Herbicides
	IMP-IASPOW-MW02-DS-QG0020-REG	3-4	IMP-IASPOW-MW02-DS-QG0021-FD	IMP-IASPOW-MW02-DS-QG0020-MS/MSD	

FD - Field duplicate.
MS/MSD - Matrix spike/matrix spike duplicate.
QA/QC - Quality assurance/quality control.
REG - Field sample.
TAL - Target analyte list.
SVOC - Semivolatile organic compound.
VOC - Volatile organic compound.

Table 3-3

Monitoring Well Construction Summary
Impact Area South of POW Training Facility
Former Rifle/Machine Gun Ranges, Parcels 100Q and 101Q
Fort McClellan, Calhoun County, Alabama

Well Location	Northing	Easting	Ground Elevation (ft amsl)	TOC Elevation (ft amsl)	Well Depth (ft bgs)	Screen Length (ft)	Screen Interval (ft bgs)	Well Material
IMP-IASPOW-MW01	1180623.46	676133.59	786.00	788.07	55	20	35 - 55	2" ID Sch. 40 PVC
IMP-IASPOW-MW02	1180468.36	675865.12	778.28	780.33	55	20	35 - 55	2" ID Sch. 40 PVC

Permanent wells installed using hollow-stem auger.
Horizontal coordinates referenced to the U.S. State Plane Coordinate System, Alabama East Zone, North American Datum of 1983 (NAD83).
Elevations referenced to the North American Vertical Datum of 1988 (NAVD88).

2" ID Sch. 40 PVC - 2-inch inside diameter, Schedule 40, polyvinyl chloride.
amsl - Above mean sea level.
bgs - Below ground surface.
ft - Feet

Table 3-4

Groundwater Elevations
Impact Area South of POW Training Facility
Former Rifle/Machine Gun Ranges, Parcels 100Q and 101Q
Fort McClellan, Calhoun County, Alabama

Well Location	Date	Depth to Water (ft BTOC)	Top of Casing Elevation (ft amsl)	Ground Elevation (ft amsl)	Groundwater Elevation (ft amsl)
IMP-IASPOW-MW01	26-Jul-02	25.32	788.07	786.00	762.75
IMP-IASPOW-MW02	26-Jul-02	25.98	780.33	778.28	754.35
HR-100Q-MW01	26-Jul-02	40.29	771.79	769.80	731.50
HR-100Q-MW02	26-Jul-02	26.25	780.10	778.07	753.85
HR-101Q-MW01	26-Jul-02	22.72	777.31	775.11	754.59
HR-NOM-MW03	26-Jul-02	19.35	789.13	787.13	769.78

Elevations referenced to the North American Vertical Datum of 1988.

amsl - Above mean sea level.
BTOC - Below top of casing.
ft - Feet.

Table 3-5

Groundwater Sample Designations and Analytical Parameters
Impact Area South of POW Training Facility
Former Rifle/Machine Gun Ranges, Parcels 100Q and 101Q
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Designation	QA/QC Samples		Analytical Parameters
		Field Duplicates	MS/MSD	
IMP-IASPOW-MW01	IMP-IASPOW-MW01-GW-QG3001-REG			Metals and Explosives
	IMP-IASPOW-MW01-GW-QG3004-REG			Explosives and Pesticides
IMP-IASPOW-MW02	IMP-IASPOW-MW02-GW-QG3002-REG	IMP-IASPOW-MW02-GW-QG3003-FD	IMP-IASPOW-MW02-GW-QG3002-MS/MSD	Metals, Explosives, VOCs, SVOCs, Pesticides, and Herbicides
	IMP-IASPOW-MW02-GW-QG3005-REG	IMP-IASPOW-MW02-GW-QG3006-FD	IMP-IASPOW-MW02-GW-QG3005-MS/MSD	Explosives and Pesticides

FD - Field duplicate.
MS/MSD - Matrix spike/matrix spike duplicate.
QA/QC - Quality assurance/quality control.
REG - Field sample.
SVOC - Semivolatile organic compound.
VOC - Volatile organic compound.

Table 3-6

Groundwater Field Parameters
Impact Area South of POW Training Facility
Former Rifle/Machine Gun Ranges, Parcels 100Q and 101Q
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Date	Specific Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Temperature (°C)	Turbidity (NTU)	pH (SU)
IMP-IASPOW-MW01	23-Apr-02	0.046	4.87	148	22.9	10.0	6.06
	2-Oct-02	0.025	8.67	204	20.8	25	5.94
IMP-IASPOW-MW02	24-Apr-02	0.036	3.90	101	21.8	4.2	5.81
	24-Sep-02	0.032	6.94	201	19.8	8.9	6.06

°C - Degree Celsius.
mg/L - Milligram per liter.
mS/cm - Millisiemen per centimeter.
mV - Millivolt.
NTU - Nephelometric turbidity unit.
ORP - Oxidation-reduction potential.
SU - Standard unit.

Table 3-7

Variance to the Site-Specific Field Sampling Plan
Impact Area South of POW Training Facility
Former/Rifle Machine Gun Ranges, Parcels 100Q and 101Q
Fort McClellan, Calhoun County, Alabama

Variance to the SFSP	Justification for Variance	Impact to Site Investigation
Permanent residuum monitoring well IMP-IASPOW-MW01 was not installed at the proposed location. The monitoring well was installed 15 feet north of the proposed location.	During a site walk performed by Shaw personnel, evidence of lead was visible approximately 15 feet north of the proposed sampling location. Relocation of the soil boring location more accurately determined levels of chemical constituents in site media.	None.

SFSP - Site-Specific Field Sampling Plan.

Table 5-1

Surface Soil Analytical Results
Impact Area South of Former POW Training Facility
Former Rifle/Machine Gun Ranges, Parcels 100Q and 101Q,
Fort McClellan, Calhoun County, Alabama

Sample Location					IMP-IASPOW-GP01					IMP-IASPOW-GP02					IMP-IASPOW-GP03				
Sample Number					QG0001					QG0003					QG0005				
Sample Date					23-Jan-02					23-Jan-02					23-Jan-02				
Sample Depth (Feet)					0- 1					0- 1					0- 1				
Parameter	Units	BKG[a]	SSSL[b]	ESV[b]	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	2.29E+04		YES	YES	YES	8.44E+03			YES	YES	2.65E+04		YES	YES	YES
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00	ND					ND					ND				
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	8.80E+00			YES		4.99E+00			YES		1.34E+01			YES	YES
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	4.08E+01					3.02E+01					7.77E+01				
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	6.18E-01	J				4.55E-01	J				7.93E-01	J			
Calcium	mg/kg	1.72E+03	NA	NA	1.34E+02					1.01E+02	J				3.27E+02				
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	1.28E+01				YES	6.60E+00				YES	1.44E+01				YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	7.13E+00					4.00E+00					8.98E+00				
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	1.28E+01		YES			9.87E+00					3.76E+01		YES		
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	2.61E+04			YES	YES	1.66E+04			YES	YES	2.92E+04			YES	YES
Lead	mg/kg	4.00E+01	4.00E+02	5.00E+01	2.60E+01					2.63E+01					1.10E+02		YES		YES
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	6.65E+02					3.26E+02					1.07E+03		YES		
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	8.68E+02			YES	YES	4.19E+02			YES	YES	1.29E+03			YES	YES
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	6.79E-02	J				ND					4.03E-02	J			
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	1.14E+01		YES			6.42E+00					1.54E+01		YES		
Potassium	mg/kg	8.00E+02	NA	NA	5.81E+02	J				4.33E+02	J				1.03E+03		YES		
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	ND					ND					ND				
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00	1.74E+00	J	YES			ND					1.88E+00	J	YES		
Sodium	mg/kg	6.34E+02	NA	NA	6.58E+01	J				5.93E+01	J				6.43E+01	J			
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	3.66E+01				YES	1.60E+01				YES	3.86E+01				YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	3.79E+01					1.74E+01					4.00E+01				
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	NR					NR					NR				
Acetone	mg/kg	NA	7.76E+02	2.50E+00	NR					NR					NR				
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00	NR					NR					NR				
Tetrachloroethene	mg/kg	NA	1.21E+01	1.00E-02	NR					NR					NR				
Trichloroethene	mg/kg	NA	5.72E+01	1.00E-03	NR					NR					NR				
Trichlorofluoromethane	mg/kg	NA	2.33E+03	1.00E-01	NR					NR					NR				
PESTICIDES																			
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03	NR					NR					NR				

Table 5-1

Surface Soil Analytical Results
Impact Area South of Former POW Training Facility
Former Rifle/Machine Gun Ranges, Parcels 100Q and 101Q,
Fort McClellan, Calhoun County, Alabama

Sample Location					IMP-IASPOW-GP04					IMP-IASPOW-GP05					IMP-IASPOW-GP06				
Sample Number					QG0007					QG0010					QG0012				
Sample Date					24-Jan-02					23-Jan-02					24-Jan-02				
Sample Depth (Feet)					0- 1					0- 1					0- 1				
Parameter	Units	BKG[a]	SSSL[b]	ESV[b]	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	2.17E+04		YES	YES	YES	2.69E+04		YES	YES	YES	3.14E+04		YES	YES	YES
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00	ND					ND					ND				
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	1.00E+01			YES	YES	9.19E+00			YES		1.21E+01	J		YES	YES
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	1.06E+02					5.11E+01					1.18E+02				
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	8.71E-01	J	YES			6.41E-01	J				1.30E+00		YES		YES
Calcium	mg/kg	1.72E+03	NA	NA	3.94E+02					2.31E+02					2.19E+02				
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	1.47E+01				YES	1.99E+01				YES	3.77E+01		YES	YES	YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	9.40E+00					2.34E+01		YES		YES	1.44E+01				
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	5.55E+01		YES		YES	1.48E+01		YES			2.84E+01		YES		
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	2.73E+04			YES	YES	3.31E+04			YES	YES	3.36E+04			YES	YES
Lead	mg/kg	4.00E+01	4.00E+02	5.00E+01	2.25E+02		YES		YES	6.52E+01		YES		YES	1.16E+02		YES		YES
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	7.53E+02					7.88E+02					9.64E+02				
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	1.69E+03		YES	YES	YES	2.32E+03		YES	YES	YES	3.19E+03		YES	YES	YES
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	3.33E-02	J				1.12E-01	J	YES		YES	3.86E-02	J			
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	1.39E+01		YES			1.17E+01		YES			1.68E+01		YES		
Potassium	mg/kg	8.00E+02	NA	NA	7.05E+02					6.69E+02					8.87E+02		YES		
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	ND					6.94E-01	J	YES			ND				
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00	1.80E+00	J	YES			2.13E+00	J	YES		YES	ND				
Sodium	mg/kg	6.34E+02	NA	NA	6.82E+01	J				6.42E+01	J				4.74E+01	J			
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	3.52E+01				YES	4.78E+01				YES	5.29E+01				YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	3.70E+01					3.10E+01					4.66E+01	J	YES		
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	ND					NR					NR				
Acetone	mg/kg	NA	7.76E+02	2.50E+00	1.80E-01	J				NR					NR				
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00	3.00E-03	B				NR					NR				
Tetrachloroethene	mg/kg	NA	1.21E+01	1.00E-02	ND					NR					NR				
Trichloroethene	mg/kg	NA	5.72E+01	1.00E-03	ND					NR					NR				
Trichlorofluoromethane	mg/kg	NA	2.33E+03	1.00E-01	ND					NR					NR				
PESTICIDES																			
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03	ND					NR					NR				

Table 5-1

Surface Soil Analytical Results
Impact Area South of Former POW Training Facility
Former Rifle/Machine Gun Ranges, Parcels 100Q and 101Q,
Fort McClellan, Calhoun County, Alabama

Sample Location					IMP-IASPOW-GP07					IMP-IASPOW-GP08					IMP-IASPOW-GP09				
Sample Number					QG0014					QG0015					QG0016				
Sample Date					23-Jan-02					23-Jan-02					24-Jan-02				
Sample Depth (Feet)					0- 1					0- 1					0- 1				
Parameter	Units	BKG[a]	SSSL[b]	ESV[b]	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	2.45E+04		YES	YES	YES	3.20E+04		YES	YES	YES	3.06E+04		YES	YES	YES
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00	ND					ND					ND				
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	1.66E+01	J	YES	YES	YES	1.04E+01	J		YES	YES	1.38E+01	J	YES	YES	YES
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	1.15E+02					8.99E+01					1.14E+02				
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	1.28E+00		YES		YES	8.13E-01	J	YES			1.15E+00	J	YES		YES
Calcium	mg/kg	1.72E+03	NA	NA	2.34E+02					4.44E+02					1.39E+03				
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	1.67E+01				YES	2.08E+01				YES	2.16E+01				YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	1.09E+01					9.85E+00					1.45E+01				
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	5.36E+01		YES		YES	2.66E+01		YES			3.78E+01		YES		
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	3.98E+04		YES	YES	YES	2.94E+04			YES	YES	3.27E+04			YES	YES
Lead	mg/kg	4.00E+01	4.00E+02	5.00E+01	1.64E+02		YES		YES	6.29E+01		YES		YES	1.93E+02		YES		YES
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	8.96E+02					1.07E+03		YES			1.42E+03		YES		
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	1.83E+03		YES	YES	YES	7.70E+02			YES	YES	2.66E+03		YES	YES	YES
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	4.58E-02	J				5.00E-02	J				4.18E-02	J			
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	1.73E+01		YES			1.53E+01		YES			1.82E+01		YES		
Potassium	mg/kg	8.00E+02	NA	NA	1.02E+03		YES			9.03E+02		YES			1.04E+03		YES		
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	ND					6.27E-01	J	YES			ND				
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00	ND					ND					ND				
Sodium	mg/kg	6.34E+02	NA	NA	4.03E+01	J				4.34E+01	J				5.51E+01	J			
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	4.43E+01				YES	4.63E+01				YES	4.84E+01				YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	5.54E+01	J	YES		YES	4.79E+01	J	YES			4.72E+01	J	YES		
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	NR					NR					NR				
Acetone	mg/kg	NA	7.76E+02	2.50E+00	NR					NR					NR				
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00	NR					NR					NR				
Tetrachloroethene	mg/kg	NA	1.21E+01	1.00E-02	NR					NR					NR				
Trichloroethene	mg/kg	NA	5.72E+01	1.00E-03	NR					NR					NR				
Trichlorofluoromethane	mg/kg	NA	2.33E+03	1.00E-01	NR					NR					NR				
PESTICIDES																			
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03	NR					NR					NR				

Table 5-1

Surface Soil Analytical Results
Impact Area South of Former POW Training Facility
Former Rifle/Machine Gun Ranges, Parcels 100Q and 101Q,
Fort McClellan, Calhoun County, Alabama

Sample Location					IMP-IASPOW-GP10					IMP-IASPOW-GP11					IMP-IASPOW-GP12				
Sample Number					QG0022					QG0024					QG0026				
Sample Date					2-Oct-02					2-Oct-02					2-Oct-02				
Sample Depth (Feet)					0- 1					0- 1					0- 1				
Parameter	Units	BKG[a]	SSSL[b]	ESV[b]	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	1.22E+04			YES	YES	2.32E+04		YES	YES	YES	1.68E+04		YES	YES	YES
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00	ND					ND					ND				
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	4.78E+00			YES		7.09E+00			YES		5.30E+00			YES	
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	8.61E+01					8.44E+01					9.03E+01				
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	6.05E-01	J				7.39E-01	J				6.80E-01	J			
Calcium	mg/kg	1.72E+03	NA	NA	3.69E+02					4.70E+02					3.32E+02				
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	8.80E+00	J			YES	1.82E+01	J			YES	1.39E+01	J			YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	5.60E+00					8.82E+00					7.62E+00				
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	7.49E+01		YES		YES	3.87E+01		YES			1.32E+02		YES		YES
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	1.44E+04			YES	YES	2.51E+04			YES	YES	1.79E+04			YES	YES
Lead	mg/kg	4.00E+01	4.00E+02	5.00E+01	4.22E+02		YES	YES	YES	1.88E+02		YES		YES	5.15E+02		YES	YES	YES
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	4.71E+02					8.65E+02					6.01E+02				
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	1.73E+03		YES	YES	YES	1.62E+03		YES	YES	YES	1.60E+03		YES	YES	YES
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	3.81E-02	B				8.16E-02	B	YES			ND				
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	7.44E+00	J				1.20E+01	J	YES			8.29E+00	J			
Potassium	mg/kg	8.00E+02	NA	NA	6.29E+02					8.67E+02		YES			5.85E+02				
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	1.09E+00	B	YES		YES	1.25E+00	B	YES		YES	1.05E+00	B	YES		YES
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00	ND					ND					ND				
Sodium	mg/kg	6.34E+02	NA	NA	ND					2.50E+01	B				ND				
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	1.98E+01	J			YES	3.69E+01	J			YES	2.72E+01	J			YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	2.71E+01					3.29E+01					4.31E+01		YES		
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	NR					NR					NR				
Acetone	mg/kg	NA	7.76E+02	2.50E+00	NR					NR					NR				
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00	NR					NR					NR				
Tetrachloroethene	mg/kg	NA	1.21E+01	1.00E-02	NR					NR					NR				
Trichloroethene	mg/kg	NA	5.72E+01	1.00E-03	NR					NR					NR				
Trichlorofluoromethane	mg/kg	NA	2.33E+03	1.00E-01	NR					NR					NR				
PESTICIDES																			
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03	NR					NR					NR				

Table 5-1

Surface Soil Analytical Results
Impact Area South of Former POW Training Facility
Former Rifle/Machine Gun Ranges, Parcels 100Q and 101Q,
Fort McClellan, Calhoun County, Alabama

Sample Location					IMP-IASPOW-GP13					IMP-IASPOW-GP14					IMP-IASPOW-GP15				
Sample Number					QG0028					QG0030					QG0033				
Sample Date					2-Oct-02					1-Oct-02					1-Oct-02				
Sample Depth (Feet)					0- 1					0- 1					0- 1				
Parameter	Units	BKG[a]	SSSL[b]	ESV[b]	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	2.26E+04		YES	YES	YES	1.87E+04		YES	YES	YES	1.71E+04		YES	YES	YES
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00	ND					ND					5.41E+00	J	YES	YES	YES
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	6.12E+00			YES		9.35E+00			YES		8.68E+00			YES	
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	7.80E+01					4.89E+01					8.89E+01				
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	7.03E-01	J				5.40E-01	J				7.57E-01	J			
Calcium	mg/kg	1.72E+03	NA	NA	4.62E+02					3.03E+02					5.32E+02				
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	2.06E+01	J			YES	2.40E+01			YES	YES	1.91E+01				YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	7.27E+00					1.15E+01					9.14E+00				
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	6.11E+01		YES		YES	1.36E+01		YES			2.00E+02		YES		YES
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	2.11E+04			YES	YES	3.05E+04			YES	YES	2.64E+04			YES	YES
Lead	mg/kg	4.00E+01	4.00E+02	5.00E+01	3.39E+02		YES		YES	5.29E+01		YES		YES	8.09E+02		YES	YES	YES
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	7.75E+02					5.38E+02					5.71E+02				
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	1.04E+03			YES	YES	1.42E+03	J		YES	YES	1.78E+03	J	YES	YES	YES
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	6.75E-02	B				7.47E-02	J				6.06E-02	J			
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	1.16E+01	J	YES			8.07E+00					8.63E+00				
Potassium	mg/kg	8.00E+02	NA	NA	8.03E+02		YES			5.65E+02	J				5.41E+02	J			
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	1.54E+00	B	YES		YES	2.08E+00		YES		YES	1.33E+00	B	YES		YES
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00	ND					ND					ND				
Sodium	mg/kg	6.34E+02	NA	NA	3.07E+01	B				2.36E+01	B				2.61E+01	B			
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	3.47E+01	J			YES	4.16E+01				YES	3.59E+01				YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	3.39E+01					2.18E+01	J				4.38E+01	J	YES		
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	NR					1.80E-02	J				NR				
Acetone	mg/kg	NA	7.76E+02	2.50E+00	NR					3.30E-01					NR				
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00	NR					ND					NR				
Tetrachloroethene	mg/kg	NA	1.21E+01	1.00E-02	NR					ND					NR				
Trichloroethene	mg/kg	NA	5.72E+01	1.00E-03	NR					ND					NR				
Trichlorofluoromethane	mg/kg	NA	2.33E+03	1.00E-01	NR					2.90E-03	B				NR				
PESTICIDES																			
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03	NR					8.90E-04	J				NR				

Table 5-1

Surface Soil Analytical Results
Impact Area South of Former POW Training Facility
Former Rifle/Machine Gun Ranges, Parcels 100Q and 101Q,
Fort McClellan, Calhoun County, Alabama

Sample Location					IMP-IASPOW-GP16					IMP-IASPOW-GP17					IMP-IASPOW-GP18				
Sample Number					QG0035					QG0037					QG0039				
Sample Date					1-Oct-02					2-Oct-02					2-Oct-02				
Sample Depth (Feet)					0- 1					0- 1					0- 1				
Parameter	Units	BKG[a]	SSSL[b]	ESV[b]	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	2.21E+04		YES	YES	YES	2.61E+04		YES	YES	YES	2.48E+04		YES	YES	YES
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00	ND					ND					ND				
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	8.24E+00			YES		7.72E+00			YES		7.62E+00			YES	
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	4.19E+01					5.97E+01					9.38E+01				
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	4.69E-01	J				6.89E-01	J				8.85E-01	J	YES		
Calcium	mg/kg	1.72E+03	NA	NA	2.15E+02					2.02E+02					4.35E+02				
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	2.20E+01				YES	2.88E+01	J		YES	YES	2.05E+01	J			YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	1.08E+01					9.36E+00					9.74E+00				
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	1.21E+01					3.20E+01		YES			1.57E+01		YES		
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	3.03E+04			YES	YES	3.25E+04			YES	YES	2.53E+04			YES	YES
Lead	mg/kg	4.00E+01	4.00E+02	5.00E+01	4.28E+01		YES			9.79E+01		YES		YES	6.43E+01		YES		YES
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	6.31E+02					7.83E+02					8.45E+02				
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	9.26E+02	J		YES	YES	1.54E+03			YES	YES	2.01E+03		YES	YES	YES
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	9.47E-02	J	YES			7.76E-02	B				5.02E-02	J			
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	9.40E+00					1.12E+01	J	YES			1.22E+01	J	YES		
Potassium	mg/kg	8.00E+02	NA	NA	5.40E+02	J				5.94E+02					7.50E+02				
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	1.71E+00		YES		YES	1.85E+00	B	YES		YES	1.39E+00	B	YES		YES
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00	ND					ND					ND				
Sodium	mg/kg	6.34E+02	NA	NA	2.55E+01	B				2.49E+01	B				2.67E+01	B			
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	4.39E+01				YES	4.78E+01	J			YES	4.01E+01	J			YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	2.49E+01	J				3.12E+01					2.77E+01				
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	NR					NR					NR				
Acetone	mg/kg	NA	7.76E+02	2.50E+00	NR					NR					NR				
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00	NR					NR					NR				
Tetrachloroethene	mg/kg	NA	1.21E+01	1.00E-02	NR					NR					NR				
Trichloroethene	mg/kg	NA	5.72E+01	1.00E-03	NR					NR					NR				
Trichlorofluoromethane	mg/kg	NA	2.33E+03	1.00E-01	NR					NR					NR				
PESTICIDES																			
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03	NR					NR					NR				

Table 5-1

Surface Soil Analytical Results
Impact Area South of Former POW Training Facility
Former Rifle/Machine Gun Ranges, Parcels 100Q and 101Q,
Fort McClellan, Calhoun County, Alabama

Sample Location					IMP-IASPOW-GP19					IMP-IASPOW-GP20				
Sample Number					QG0041					QG0043				
Sample Date					2-Oct-02					2-Oct-02				
Sample Depth (Feet)					0- 1					0- 1				
Parameter	Units	BKG[a]	SSSL[b]	ESV[b]	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV
METALS														
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	3.05E+04		YES	YES	YES	2.03E+04		YES	YES	YES
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00	ND					ND				
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	9.18E+00			YES		8.61E+00			YES	
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	9.79E+01					1.24E+02		YES		
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	9.58E-01	J	YES			1.57E+00		YES		YES
Calcium	mg/kg	1.72E+03	NA	NA	3.47E+02					4.02E+02				
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	1.81E+01	J			YES	1.48E+01	J			YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	1.03E+01					1.15E+01				
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	3.62E+01		YES			4.18E+01		YES		YES
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	2.98E+04			YES	YES	4.54E+04		YES	YES	YES
Lead	mg/kg	4.00E+01	4.00E+02	5.00E+01	1.51E+02		YES		YES	2.54E+02		YES		YES
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	9.64E+02					8.96E+02				
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	2.26E+03		YES	YES	YES	2.54E+03		YES	YES	YES
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	7.43E-02	J				7.97E-02	J			
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	1.57E+01	J	YES			1.72E+01	J	YES		
Potassium	mg/kg	8.00E+02	NA	NA	8.74E+02		YES			1.11E+03		YES		
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	1.80E+00	B	YES		YES	1.94E+00	B	YES		YES
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00	ND					ND				
Sodium	mg/kg	6.34E+02	NA	NA	3.49E+01	B				2.58E+01	B			
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	4.44E+01	J			YES	4.01E+01	J			YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	3.60E+01					4.73E+01		YES		
VOLATILE ORGANIC COMPOUNDS														
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	NR					NR				
Acetone	mg/kg	NA	7.76E+02	2.50E+00	NR					NR				
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00	NR					NR				
Tetrachloroethene	mg/kg	NA	1.21E+01	1.00E-02	NR					NR				
Trichloroethene	mg/kg	NA	5.72E+01	1.00E-03	NR					NR				
Trichlorofluoromethane	mg/kg	NA	2.33E+03	1.00E-01	NR					NR				
PESTICIDES														
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03	NR					NR				

Table 5-1

Surface Soil Analytical Results
Impact Area South of Former POW Training Facility
Former Rifle/Machine Gun Ranges, Parcels 100Q and 101Q,
Fort McClellan, Calhoun County, Alabama

Sample Location					IMP-IASPOW-MW01					IMP-IASPOW-MW02				
Sample Number					QG0017					QG0019				
Sample Date					23-Jan-02					24-Jan-02				
Sample Depth (Feet)					0- 1					0- 1				
Parameter	Units	BKG[a]	SSSL[b]	ESV[b]	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV
METALS														
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	2.05E+04		YES	YES	YES	2.08E+04		YES	YES	YES
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00	ND					ND				
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	5.51E+00	J		YES		8.00E+00	J		YES	
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	4.29E+01					5.81E+01				
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	4.73E-01	J				6.89E-01	J			
Calcium	mg/kg	1.72E+03	NA	NA	7.27E+01	J				1.80E+02				
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	1.46E+01				YES	1.25E+01				YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	4.54E+00					8.97E+00				
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	1.25E+01					1.46E+01		YES		
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	2.20E+04			YES	YES	2.67E+04			YES	YES
Lead	mg/kg	4.00E+01	4.00E+02	5.00E+01	1.46E+01					3.03E+01				
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	6.35E+02					6.79E+02				
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	2.99E+02				YES	9.92E+02			YES	YES
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	3.57E-02	J				4.86E-02	J			
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	8.65E+00					1.19E+01		YES		
Potassium	mg/kg	8.00E+02	NA	NA	6.35E+02					5.64E+02	J			
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	ND					ND				
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00	ND					ND				
Sodium	mg/kg	6.34E+02	NA	NA	3.94E+01	J				3.96E+01	J			
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	3.40E+01				YES	3.68E+01				YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	2.91E+01	J				2.91E+01	J			
VOLATILE ORGANIC COMPOUNDS														
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	NR					ND				
Acetone	mg/kg	NA	7.76E+02	2.50E+00	NR					1.40E-01	J			
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00	NR					3.90E-03	B			
Tetrachloroethene	mg/kg	NA	1.21E+01	1.00E-02	NR					1.20E-03	J			
Trichloroethene	mg/kg	NA	5.72E+01	1.00E-03	NR					1.90E-03	J			YES
Trichlorofluoromethane	mg/kg	NA	2.33E+03	1.00E-01	NR					2.00E-03	J			
PESTICIDES														
4,4'-DDT	mg/kg	NA	1.79E+00	2.50E-03	NR					ND				

Table 5-1

Surface Soil Analytical Results
Impact Area South of Former POW Training Facility
Former Rifle/Machine Gun Ranges, Parcels 100Q and 101Q,
Fort McClellan, Calhoun County, Alabama

Analyses performed using U.S. Environmental Protection Agency (EPA) SW-846 analytical methods.

[a] BKG - Background. Concentration listed is two times (2x) the arithmetic mean of background metals concentration given in SAIC, 1998, *Final Background Metals Survey Report, Fort McClellan, Alabama*, July.

[b] Residential human health site-specific screening level (SSSL) and ecological screening value (ESV) as given in IT, 2000, *Final Human Health and Ecological Screening Values and PAH Background Summary Report, Fort McClellan, Calhoun County, Alabama*, July.

B - Analyte detected in laboratory or field blank at concentration greater than the reporting limit.

J - Compound was positively identified; reported value is an estimated concentration.

mg/kg - Milligrams per kilogram.

NA - Not available.

ND - Not detected.

NR - Not requested.

Qual - Data validation qualifier.

Table 5-2

Subsurface Soil Analytical Results
Impact Area South of Former POW Training Facility
Former Rifle/Machine Gun Ranges, Parcel 100Q and 101Q
Fort McClellan, Calhoun County, Alabama

Sample Location				IMP-IASPOW-GP01				IMP-IASPOW-GP02				IMP-IASPOW-GP03				IMP-IASPOW-GP03			
Sample Number				QG0002				QG0004				QG0006				QG0045			
Sample Date				23-Jan-02				23-Jan-02				23-Jan-02				29-Oct-02			
Sample Depth (Feet)				3 - 4				3 - 4				3 - 4				4 - 6			
Parameter	Units	BKG[a]	SSSL[b]	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL
METALS																			
Aluminum	mg/kg	1.36E+04	7.80E+03	1.52E+04		YES	YES	1.88E+04		YES	YES	1.96E+04		YES	YES	1.98E+04		YES	YES
Antimony	mg/kg	1.31E+00	3.11E+00	ND				ND				1.33E+03	J	YES	YES	ND			
Arsenic	mg/kg	1.83E+01	4.26E-01	5.11E+00			YES	5.55E+00			YES	1.17E+02		YES	YES	7.91E+00			YES
Barium	mg/kg	2.34E+02	5.47E+02	2.63E+01				8.76E+01				6.84E+01				4.26E+01			
Beryllium	mg/kg	8.60E-01	9.60E+00	ND				5.61E-01	J			9.60E-01	J	YES		7.37E-01	J		
Calcium	mg/kg	6.37E+02	NA	4.77E+01	J			3.28E+02				2.02E+02				6.59E+01	J		
Chromium	mg/kg	3.83E+01	2.32E+01	1.07E+01				1.09E+01				1.66E+01				2.54E+01			YES
Cobalt	mg/kg	1.75E+01	4.68E+02	3.09E+00				6.47E+00				8.99E+00				4.51E+00			
Copper	mg/kg	1.94E+01	3.13E+02	7.64E+00				8.14E+01		YES		3.84E+01		YES		1.00E+01			
Iron	mg/kg	4.48E+04	2.34E+03	1.50E+04			YES	1.52E+04			YES	3.31E+04			YES	3.23E+04			YES
Lead	mg/kg	3.85E+01	4.00E+02	1.06E+01				4.29E+02		YES	YES	2.22E+04		YES	YES	1.53E+01			
Magnesium	mg/kg	7.66E+02	NA	4.49E+02				6.81E+02				7.33E+02				6.06E+02			
Manganese	mg/kg	1.36E+03	3.63E+02	1.69E+02				1.56E+03		YES	YES	1.30E+03			YES	1.90E+02			
Mercury	mg/kg	7.00E-02	2.33E+00	5.38E-02	J			3.77E-02	J			4.26E-02	J			4.81E-02	J		
Nickel	mg/kg	1.29E+01	1.54E+02	7.27E+00				1.03E+01				1.31E+01		YES		1.04E+01			
Potassium	mg/kg	7.11E+02	NA	4.89E+02	J			6.59E+02				8.01E+02		YES		1.50E+03		YES	
Selenium	mg/kg	4.70E-01	3.91E+01	ND				ND				ND				2.09E+00	B	YES	
Silver	mg/kg	2.40E-01	3.91E+01	ND				ND				3.01E+00		YES		ND			
Sodium	mg/kg	7.02E+02	NA	5.69E+01	J			6.47E+01	J			6.44E+01	J			2.15E+01	J		
Vanadium	mg/kg	6.49E+01	5.31E+01	2.55E+01				2.65E+01				3.46E+01				3.43E+01			
Zinc	mg/kg	3.49E+01	2.34E+03	1.73E+01				3.93E+01		YES		3.84E+01		YES		2.65E+01			
VOLATILE ORGANIC COMPOUNDS																			
Acetone	mg/kg	NA	7.76E+02	NR				NR				NR				NR			
Methylene chloride	mg/kg	NA	8.41E+01	NR				NR				NR				NR			
HERBICIDES																			
MCPP	mg/kg	NA	7.77E+00	NR				NR				NR				NR			

Table 5-2

Subsurface Soil Analytical Results
Impact Area South of Former POW Training Facility
Former Rifle/Machine Gun Ranges, Parcel 100Q and 101Q
Fort McClellan, Calhoun County, Alabama

Sample Location				IMP-IASPOW-GP04				IMP-IASPOW-GP05				IMP-IASPOW-GP06				IMP-IASPOW-GP10			
Sample Number				QG0008				QG0011				QG0013				QG0023			
Sample Date				24-Jan-02				23-Jan-02				24-Jan-02				2-Oct-02			
Sample Depth (Feet)				3 - 4				3 - 4				3 - 4				3 - 4			
Parameter	Units	BKG[a]	SSSL[b]	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL
METALS																			
Aluminum	mg/kg	1.36E+04	7.80E+03	2.31E+04		YES	YES	3.01E+04		YES	YES	3.16E+04		YES	YES	2.23E+04		YES	YES
Antimony	mg/kg	1.31E+00	3.11E+00	ND				ND				ND				ND			
Arsenic	mg/kg	1.83E+01	4.26E-01	6.56E+00			YES	1.10E+01	J		YES	1.20E+01	J		YES	5.99E+00			YES
Barium	mg/kg	2.34E+02	5.47E+02	3.56E+01				4.29E+01				5.33E+01				3.31E+01			
Beryllium	mg/kg	8.60E-01	9.60E+00	4.33E-01	J			6.88E-01	J			7.48E-01	J			4.13E-01	J		
Calcium	mg/kg	6.37E+02	NA	1.44E+02				1.20E+02	J			8.74E+01	J			1.01E+02	J		
Chromium	mg/kg	3.83E+01	2.32E+01	1.55E+01				1.97E+01				1.88E+01				2.27E+01	J		
Cobalt	mg/kg	1.75E+01	4.68E+02	4.93E+00				1.03E+01				1.80E+01		YES		4.49E+00			
Copper	mg/kg	1.94E+01	3.13E+02	1.18E+01				1.90E+01				1.86E+01				8.81E+00			
Iron	mg/kg	4.48E+04	2.34E+03	2.38E+04			YES	3.51E+04			YES	3.61E+04			YES	2.29E+04			YES
Lead	mg/kg	3.85E+01	4.00E+02	1.71E+01				2.99E+01				4.10E+01		YES		1.87E+01			
Magnesium	mg/kg	7.66E+02	NA	6.33E+02				8.63E+02		YES		8.79E+02		YES		6.22E+02			
Manganese	mg/kg	1.36E+03	3.63E+02	2.58E+02				6.33E+02			YES	1.18E+03			YES	3.46E+02			
Mercury	mg/kg	7.00E-02	2.33E+00	7.36E-02	J	YES		1.09E-01	J	YES		8.11E-02	J	YES		1.48E-01		YES	
Nickel	mg/kg	1.29E+01	1.54E+02	1.17E+01				1.34E+01		YES		1.50E+01		YES		1.01E+01	J		
Potassium	mg/kg	7.11E+02	NA	6.03E+02	J			8.10E+02		YES		8.40E+02		YES		5.58E+02	J		
Selenium	mg/kg	4.70E-01	3.91E+01	ND				8.98E-01	J	YES		8.36E-01	J	YES		1.46E+00	B	YES	
Silver	mg/kg	2.40E-01	3.91E+01	1.91E+00	J	YES		ND				ND				ND			
Sodium	mg/kg	7.02E+02	NA	6.80E+01	J			4.39E+01	J			4.73E+01	J			2.47E+01	B		
Vanadium	mg/kg	6.49E+01	5.31E+01	3.44E+01				5.39E+01			YES	5.97E+01			YES	3.34E+01	J		
Zinc	mg/kg	3.49E+01	2.34E+03	2.81E+01				4.11E+01	J	YES		4.38E+01	J	YES		2.23E+01			
VOLATILE ORGANIC COMPOUNDS																			
Acetone	mg/kg	NA	7.76E+02	1.10E-02	J			NR				NR				NR			
Methylene chloride	mg/kg	NA	8.41E+01	3.40E-03	B			NR				NR				NR			
HERBICIDES																			
MCPP	mg/kg	NA	7.77E+00	7.40E-01	J			NR				NR				NR			

Table 5-2

Subsurface Soil Analytical Results
Impact Area South of Former POW Training Facility
Former Rifle/Machine Gun Ranges, Parcel 100Q and 101Q
Fort McClellan, Calhoun County, Alabama

Sample Location				IMP-IASPOW-GP11				IMP-IASPOW-GP12				IMP-IASPOW-GP13				IMP-IASPOW-GP14			
Sample Number				QG0025				QG0027				QG0029				QG0031			
Sample Date				2-Oct-02				2-Oct-02				2-Oct-02				1-Oct-02			
Sample Depth (Feet)				3 - 4				3 - 4				3 - 4				2 - 4			
Parameter	Units	BKG[a]	SSSL[b]	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL
METALS																			
Aluminum	mg/kg	1.36E+04	7.80E+03	1.96E+04		YES	YES	1.75E+04		YES	YES	1.56E+04		YES	YES	1.95E+04		YES	YES
Antimony	mg/kg	1.31E+00	3.11E+00	ND				ND				ND				5.39E+00	J	YES	YES
Arsenic	mg/kg	1.83E+01	4.26E-01	4.10E+00			YES	3.59E+00			YES	4.26E+00			YES	1.18E+01			YES
Barium	mg/kg	2.34E+02	5.47E+02	2.95E+01				3.45E+01				2.82E+01				2.49E+01			
Beryllium	mg/kg	8.60E-01	9.60E+00	ND				ND				ND				4.36E-01	J		
Calcium	mg/kg	6.37E+02	NA	1.04E+02	J			6.61E+01	J			8.05E+01	J			5.93E+01	J		
Chromium	mg/kg	3.83E+01	2.32E+01	1.30E+01	J			1.75E+01	J			1.80E+01	J			2.15E+01			
Cobalt	mg/kg	1.75E+01	4.68E+02	3.65E+00				1.98E+00	B			2.28E+00	B			7.86E+00	J		
Copper	mg/kg	1.94E+01	3.13E+02	8.12E+00				1.19E+01				9.03E+00				1.08E+01			
Iron	mg/kg	4.48E+04	2.34E+03	1.84E+04			YES	2.00E+04			YES	2.10E+04			YES	4.10E+04			YES
Lead	mg/kg	3.85E+01	4.00E+02	1.64E+01				2.95E+01				9.43E+00				2.03E+01	J		
Magnesium	mg/kg	7.66E+02	NA	6.51E+02				5.79E+02				5.21E+02				4.13E+02			
Manganese	mg/kg	1.36E+03	3.63E+02	2.98E+02				1.21E+02				8.70E+01				3.06E+02	J		
Mercury	mg/kg	7.00E-02	2.33E+00	3.57E-02	B			ND				4.56E-02	B			9.70E-02	J	YES	
Nickel	mg/kg	1.29E+01	1.54E+02	8.20E+00	J			6.41E+00	J			6.74E+00	J			6.25E+00			
Potassium	mg/kg	7.11E+02	NA	4.60E+02	J			9.25E+02		YES		5.19E+02	J			4.65E+02	J		
Selenium	mg/kg	4.70E-01	3.91E+01	1.59E+00	B	YES		1.09E+00	B	YES		1.07E+00	B	YES		2.05E+00		YES	
Silver	mg/kg	2.40E-01	3.91E+01	ND				ND				ND				ND			
Sodium	mg/kg	7.02E+02	NA	2.40E+01	B			2.38E+01	B			ND				ND			
Vanadium	mg/kg	6.49E+01	5.31E+01	2.91E+01	J			3.06E+01	J			3.06E+01	J			5.39E+01			YES
Zinc	mg/kg	3.49E+01	2.34E+03	2.19E+01				1.87E+01				1.77E+01				1.98E+01	J		
VOLATILE ORGANIC COMPOUNDS																			
Acetone	mg/kg	NA	7.76E+02	NR				NR				NR				2.20E-02			
Methylene chloride	mg/kg	NA	8.41E+01	NR				NR				NR				ND			
HERBICIDES																			
MCPP	mg/kg	NA	7.77E+00	NR				NR				NR				ND			

Table 5-2

Subsurface Soil Analytical Results
Impact Area South of Former POW Training Facility
Former Rifle/Machine Gun Ranges, Parcel 100Q and 101Q
Fort McClellan, Calhoun County, Alabama

Sample Location				IMP-IASPOW-GP15				IMP-IASPOW-GP16				IMP-IASPOW-GP17				IMP-IASPOW-GP18			
Sample Number				QG0034				QG0036				QG0038				QG0040			
Sample Date				1-Oct-02				1-Oct-02				2-Oct-02				2-Oct-02			
Sample Depth (Feet)				2 - 4				3 - 4				3 - 4				3 - 4			
Parameter	Units	BKG[a]	SSSL[b]	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL
METALS																			
Aluminum	mg/kg	1.36E+04	7.80E+03	2.12E+04		YES	YES	1.61E+04		YES	YES	1.78E+04		YES	YES	2.24E+04		YES	YES
Antimony	mg/kg	1.31E+00	3.11E+00	ND				ND				ND				ND			
Arsenic	mg/kg	1.83E+01	4.26E-01	9.69E+00			YES	8.92E+00			YES	4.76E+00			YES	8.23E+00			YES
Barium	mg/kg	2.34E+02	5.47E+02	2.99E+01				1.96E+01				2.20E+01				2.73E+01			
Beryllium	mg/kg	8.60E-01	9.60E+00	5.11E-01	J			ND				3.40E-01	J			5.25E-01	J		
Calcium	mg/kg	6.37E+02	NA	1.15E+02	J			5.25E+01	J			4.97E+01	J			6.88E+01	J		
Chromium	mg/kg	3.83E+01	2.32E+01	3.62E+01			YES	2.29E+01				1.44E+01	J			7.18E+01	J	YES	YES
Cobalt	mg/kg	1.75E+01	4.68E+02	1.06E+01				3.03E+00				2.37E+00	B			4.30E+00			
Copper	mg/kg	1.94E+01	3.13E+02	1.34E+01				1.16E+01				9.78E+00				1.19E+01			
Iron	mg/kg	4.48E+04	2.34E+03	4.24E+04			YES	3.56E+04			YES	2.44E+04			YES	3.73E+04			YES
Lead	mg/kg	3.85E+01	4.00E+02	3.04E+01				1.40E+01				1.20E+01				1.93E+01			
Magnesium	mg/kg	7.66E+02	NA	4.65E+02				3.17E+02				4.87E+02				5.61E+02			
Manganese	mg/kg	1.36E+03	3.63E+02	5.83E+02	J		YES	9.81E+01	J			1.37E+02				3.51E+02			
Mercury	mg/kg	7.00E-02	2.33E+00	1.57E-01		YES		9.09E-02	J	YES		4.54E-02	B			8.72E-02	J	YES	
Nickel	mg/kg	1.29E+01	1.54E+02	7.08E+00				4.47E+00				6.73E+00	J			8.76E+00	J		
Potassium	mg/kg	7.11E+02	NA	4.42E+02	J			4.36E+02	J			4.55E+02	J			5.26E+02	J		
Selenium	mg/kg	4.70E-01	3.91E+01	2.07E+00		YES		1.61E+00		YES		1.44E+00	B	YES		1.66E+00	B	YES	
Silver	mg/kg	2.40E-01	3.91E+01	ND				ND				ND				ND			
Sodium	mg/kg	7.02E+02	NA	2.54E+01	B			ND				ND				ND			
Vanadium	mg/kg	6.49E+01	5.31E+01	5.72E+01			YES	5.16E+01				3.70E+01	J			5.23E+01	J		
Zinc	mg/kg	3.49E+01	2.34E+03	2.26E+01	J			2.05E+01	J			2.09E+01				2.45E+01			
VOLATILE ORGANIC COMPOUNDS																			
Acetone	mg/kg	NA	7.76E+02	NR				NR				NR				NR			
Methylene chloride	mg/kg	NA	8.41E+01	NR				NR				NR				NR			
HERBICIDES																			
MCPP	mg/kg	NA	7.77E+00	NR				NR				NR				NR			

Table 5-2

Subsurface Soil Analytical Results
Impact Area South of Former POW Training Facility
Former Rifle/Machine Gun Ranges, Parcel 100Q and 101Q
Fort McClellan, Calhoun County, Alabama

Sample Location				IMP-IASPOW-GP19				IMP-IASPOW-GP20				IMP-IASPOW-MW01				IMP-IASPOW-MW02			
Sample Number				QG0042				QG0044				QG0018				QG0020			
Sample Date				2-Oct-02				2-Oct-02				23-Jan-02				24-Jan-02			
Sample Depth (Feet)				3 - 4				3 - 4				3 - 4				3 - 4			
Parameter	Units	BKG[a]	SSSL[b]	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL
METALS																			
Aluminum	mg/kg	1.36E+04	7.80E+03	2.26E+04		YES	YES	3.05E+04		YES	YES	2.00E+04		YES	YES	1.48E+04	J	YES	YES
Antimony	mg/kg	1.31E+00	3.11E+00	ND				ND				ND				ND			
Arsenic	mg/kg	1.83E+01	4.26E-01	6.04E+00			YES	8.90E+00			YES	7.51E+00	J		YES	4.86E+00	J		YES
Barium	mg/kg	2.34E+02	5.47E+02	2.69E+01				4.25E+01				5.08E+01				3.22E+01	J		
Beryllium	mg/kg	8.60E-01	9.60E+00	4.37E-01	J			6.76E-01	J			5.77E-01	J			ND			
Calcium	mg/kg	6.37E+02	NA	6.77E+01	J			1.45E+02				4.99E+01	B			6.14E+01	B		
Chromium	mg/kg	3.83E+01	2.32E+01	1.81E+01	J			4.40E+01	J	YES	YES	2.26E+01				9.56E+00	J		
Cobalt	mg/kg	1.75E+01	4.68E+02	2.65E+00	B			9.41E+00				2.71E+00				6.81E+00			
Copper	mg/kg	1.94E+01	3.13E+02	1.07E+01				1.14E+01				1.43E+01				8.50E+00	J		
Iron	mg/kg	4.48E+04	2.34E+03	2.81E+04			YES	3.25E+04			YES	2.82E+04			YES	2.17E+04			YES
Lead	mg/kg	3.85E+01	4.00E+02	1.69E+01				3.05E+01				1.01E+01				2.43E+01			
Magnesium	mg/kg	7.66E+02	NA	5.83E+02				8.80E+02		YES		6.17E+02				3.28E+02	J		
Manganese	mg/kg	1.36E+03	3.63E+02	2.25E+02				1.61E+03		YES	YES	6.77E+01				7.87E+02			YES
Mercury	mg/kg	7.00E-02	2.33E+00	6.22E-02	J			8.05E-02	J	YES		ND				6.54E-02	J		
Nickel	mg/kg	1.29E+01	1.54E+02	8.49E+00	J			1.41E+01	J	YES		7.40E+00				5.34E+00	J		
Potassium	mg/kg	7.11E+02	NA	5.40E+02	J			7.26E+02		YES		1.11E+03		YES		3.93E+02	J		
Selenium	mg/kg	4.70E-01	3.91E+01	1.23E+00	B	YES		1.66E+00	J	YES		9.06E-01	J	YES		ND			
Silver	mg/kg	2.40E-01	3.91E+01	ND				ND				ND				ND			
Sodium	mg/kg	7.02E+02	NA	2.54E+01	B			3.62E+01	B			3.61E+01	J			3.46E+01	J		
Vanadium	mg/kg	6.49E+01	5.31E+01	4.05E+01	J			5.53E+01	J		YES	4.15E+01				3.26E+01			
Zinc	mg/kg	3.49E+01	2.34E+03	2.54E+01				3.08E+01				2.58E+01	J			1.60E+01	J		
VOLATILE ORGANIC COMPOUNDS																			
Acetone	mg/kg	NA	7.76E+02	NR				NR				NR				1.10E-02	J		
Methylene chloride	mg/kg	NA	8.41E+01	NR				NR				NR				3.10E-03	B		
HERBICIDES																			
MCPP	mg/kg	NA	7.77E+00	NR				NR				NR				6.00E-01	J		

Table 5-2

Subsurface Soil Analytical Results
Impact Area South of Former POW Training Facility
Former Rifle/Machine Gun Ranges, Parcels 100Q and 101Q
Fort McClellan, Calhoun County, Alabama

Analyses performed using U.S. Environmental Protection Agency (EPA) SW-846 analytical methods.

[a] BKG - Background. Concentration listed is two times (2x) the arithmetic mean of background metals concentration given in SAIC, 1998, *Final Background Metals Survey Report, Fort McClellan, Alabama*, July.

[b] Residential human health site-specific screening level (SSSL) as given in IT, 2000, *Final Human Health and Ecological Screening Values and PAH Background Summary Report, Fort McClellan, Calhoun County, Alabama*, July.

B - Analyte detected in laboratory or field blank at concentration greater than the reporting limit.

J - Compound was positively identified; reported value is an estimated concentration.

mg/kg - Milligrams per kilogram.

NA - Not available.

ND - Not detected.

NR - Not requested.

Qual - Data validation qualifier.

Table 5-3

Groundwater Analytical Results
Impact Area South of POW Training Facility
Former Rifle/Machine Gun Ranges, Parcels 100Q and 101Q
Fort McClellan, Calhoun County, Alabama

Sample Location				IMP-IASPOW-MW01				IMP-IASPOW-MW01				IMP-IASPOW-MW02				IMP-IASPOW-MW02			
Sample Number				QG3001				QG3004				QG3002				QG3005			
Sample Date				23-Apr-02				2-Oct-02				24-Apr-02				24-Sep-02			
Parameter	Units	BKG[a]	SSSL[b]	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL
METALS																			
Aluminum	mg/L	2.34E+00	1.56E+00	3.16E-01				NR				1.74E-01	J			NR			
Arsenic	mg/L	1.78E-02	4.40E-05	2.38E-03	B		YES	NR				ND				NR			
Barium	mg/L	1.27E-01	1.10E-01	7.77E-03	B			NR				1.55E-02				NR			
Calcium	mg/L	5.65E+01	NA	4.99E+00	B			NR				3.52E+00	B			NR			
Cobalt	mg/L	2.34E-02	9.39E-02	ND				NR				1.53E-02	J			NR			
Iron	mg/L	7.04E+00	4.69E-01	6.73E-01	J		YES	NR				1.85E-01	J			NR			
Magnesium	mg/L	2.13E+01	NA	1.61E+00	B			NR				1.23E+00	B			NR			
Manganese	mg/L	5.81E-01	7.35E-02	9.67E-02	J		YES	NR				6.37E-01		YES	YES	NR			
Potassium	mg/L	7.20E+00	NA	1.01E+00	B			NR				1.09E+00	B			NR			
Sodium	mg/L	1.48E+01	NA	1.38E+00	B			NR				1.30E+00	B			NR			
PESTICIDES																			
4,4'-DDD	mg/L	NA	1.83E-04	NR				ND				1.60E-04	J			1.50E-04	J		
Aldrin	mg/L	NA	3.00E-06	NR				ND				8.00E-05	J		YES	ND			
Dieldrin	mg/L	NA	4.00E-06	NR				ND				1.60E-04	J		YES	ND			
Endosulfan I	mg/L	NA	9.35E-03	NR				ND				3.90E-05	J			2.50E-05	J		
Endosulfan II	mg/L	NA	9.35E-03	NR				ND				ND				2.50E-05	J		
Endrin	mg/L	NA	4.48E-04	NR				5.80E-05	J			2.20E-04				1.60E-04	J		
Heptachlor epoxide	mg/L	NA	6.00E-06	NR				2.10E-05	J		YES	3.40E-05	J		YES	3.20E-05	J		YES
alpha-Chlordane	mg/L	NA	1.74E-04	NR				3.90E-05	J			1.50E-04	J			4.70E-05	J		
beta-BHC	mg/L	NA	3.60E-05	NR				ND				6.90E-05	J		YES	ND			
delta-BHC	mg/L	NA	4.49E-04	NR				ND				3.00E-05	J			ND			
gamma-BHC (Lindane)	mg/L	NA	5.00E-05	NR				ND				3.80E-05	J			2.10E-05	J		
gamma-Chlordane	mg/L	NA	1.74E-04	NR				3.70E-05	J			ND				8.10E-05	J		
EXPLOSIVES																			
2-Nitrotoluene	mg/L	NA	1.53E-02	ND				ND				2.10E-03				ND			
4-Amino-2,6-dinitrotoluene	mg/L	NA	9.30E-05	4.50E-04			YES	ND				1.10E-03			YES	ND			

Analyses performed using U.S. Environmental Protection Agency (EPA) SW-846 analytical methods.

[a] BKG - Background. Concentration listed is two times (2x) the arithmetic mean of background metals concentration given in SAIC, 1998, *Final Background Metals Survey Report, Fort McClellan, Alabama*, July.

[b] Residential human health site-specific screening level (SSSL) as given in IT, 2000, *Final Human Health and Ecological Screening Values and PAH Background Summary Report, Fort McClellan, Calhoun County, Alabama*, July.

B - Analyte detected in laboratory or field blank at concentration greater than the reporting limit.

J - Compound was positively identified; reported value is an estimated concentration.

mg/L - Milligrams per liter.

NA - Not available.

ND - Not detected.

NR - Not requested.

Qual - Data validation qualifier.

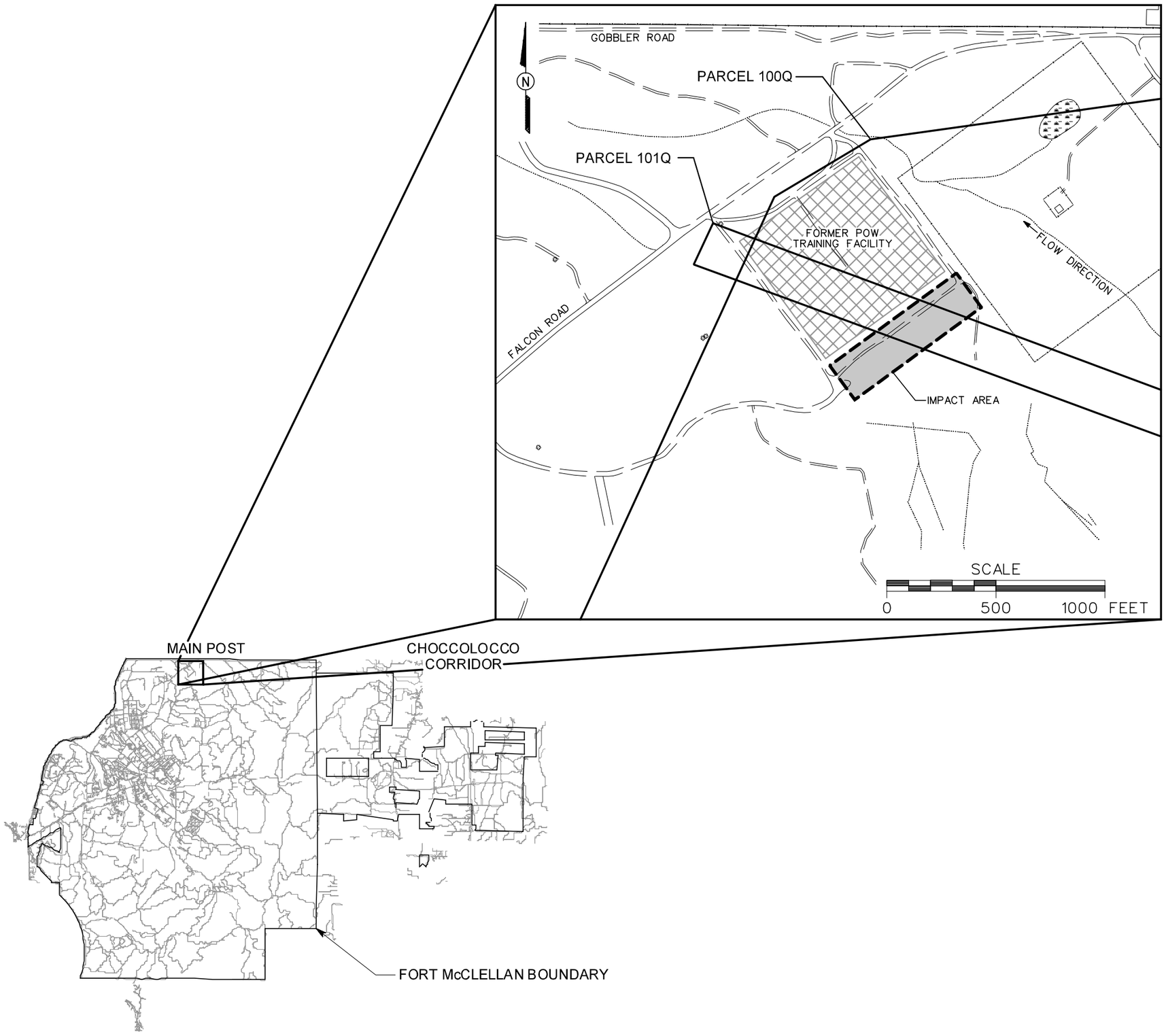
Table 5-4
Screening and Identification of Chemicals of Concern for Human Health and Ecological Risk

Station Name							IA-GP10COMP-2021		IA-GP12COMP-2021		IA-GP15COMP-2021		IA-GP10COMP-20212		IA-GP12COMP-20212		IA-GP15COMP-20212	
Sample Date					Industrial		1/14/22		1/14/22		1/14/22		1/14/22		1/14/22		1/14/22	
QC Sample Code		CAS#	ESV	Eco-RBRG	RSL	BTV	Surface Soil		Surface Soil		Surface Soil		Subsurface Soil		Subsurface Soil		Subsurface Soil	
Analyte	**Units**						**Result**		**Result**		**Result**		**Result**		**Result**		**Result**	
Aluminum	mg/kg	7429-90-5	-	-	110000	16300	9600		11000		12000		***19000***		11000		***19000***	
Antimony	mg/kg	7440-36-0	0.27	18	47	1.99	***5***		***6.9***		***6.8***		0.73	J	0.48	J	1	J
Arsenic	mg/kg	7440-38-2	18	-	3	13.7	8.5		8.8		12		11		6.3		***15***	
Barium	mg/kg	7440-39-3	330	-	22000	124	120		61		90		41		24		32	
Beryllium	mg/kg	7440-41-7	2.5	-	230	0.8	0.72		0.55		0.79		0.44		0.26		0.57	
Cadmium	mg/kg	7440-43-9	0.36	-	10	0.29	0.062		0.045	J	0.087		0.019	J	0.015	U	0.019	J
Calcium	mg/kg	7440-70-2	-	-	-	1720	420		280		490		200		54		120	
Chromium	mg/kg	16065-83-1	23	-	180000	37	10	(J)	26	(J)	23	(J)	18	(J)	18	(J)	37	(J)
Cobalt	mg/kg	7440-48-4	13	-	35	15.2	7.6		8.6		11		9.3		1.9		8.6	
Copper	mg/kg	7440-50-8	28	334	4700	12.7	***87***		***100***		***120***		8.8		7		12	
Iron	mg/kg	7439-89-6	--	-	82000	34200	19000		23000		34000		31000		22000		***46000***	
Lead	mg/kg	7439-92-1	11	500	800	40.1	***280***		***320***		***500***		30		11		24	
Magnesium	mg/kg	7439-95-4	-	-	-	1030	340		370		400		460		280		360	
Manganese	mg/kg	7439-96-5	220	-	2600	1580	***2500***		1300		***1900***		1200		120		420	
Mercury	mg/kg	7439-97-6	0.013	-	4.6	0.08	0.032		0.04		0.043		***0.096***		0.046		***0.13***	
Nickel	mg/kg	7440-02-0	38	-	2200	10.3	7		8.4		***11***		8.4		5		7.3	
Potassium	mg/kg	7440-09-7	-	-	-	800	430		360		360		440		340		330	
Selenium	mg/kg	7782-49-2	0.52	-	580	0.48	***3.6***		***1.8***		***2.1***		***1.1***		***0.76***		***0.86***	
Silver	mg/kg	7440-22-4	4.2	-	580	0.36	0.03	J	0.037	J	0.038	J	0.031	J	0.017	J	0.026	J
Sodium	mg/kg	7440-23-5	-	-	-	634	11	U	12	U	11	J	11	U	10	U	11	U
Thallium	mg/kg	7440-28-0	0.05	-	1.2	3.4	0.21		0.23		0.33		0.3		0.18		0.28	
Tin	mg/kg	7440-31-5	-	-	70000	-	1.5	U	1.7	U	1.5	U	1.6	U	1.4	U	1.5	U
Vanadium	mg/kg	7440-62-2	7.8	-	580	58.8	24	(J)	32		43		46		32		***74***	
Zinc	mg/kg	7440-66-6	46	100	35000	40.6	30		35		***59***		19		13		22	
Miscellaneous Parameters (%)																		
Percent Moisture							16.1		24.4		15		14		13.6		16.5	
Percent Solids							83.9		75.6		85.1		86		86.4		83.5	

Notes:
Non-detects reported to the MDL
Lab Qualifiers:
J - Result is estimated. Detection is between the MDL and RL
U - not detected
Validation Qualifiers (in parentheses):
J - Result is estimated based on data validation.

Value is above ESV
Value is above Eco-RBRG
Value is above RSL
Value is above BTV

Figures



LEGEND

- UNIMPROVED ROADS AND PARKING
- PAVED ROADS AND PARKING
- BUILDING
- MARSH / WETLANDS
- AREA OF INVESTIGATION
- PARCEL BOUNDARY
- FORMER PRISONER OF WAR (POW) TRAINING FACILITY
- SURFACE DRAINAGE / CREEK
- FENCE
- TREES / TREELINE

FIGURE 1-1
SITE LOCATION MAP
IMPACT AREA SOUTH OF POW
TRAINING FACILITY
FORMER RIFLE/MACHINE GUN RANGE
PARCELS 100Q AND 101Q

U. S. ARMY CORPS OF ENGINEERS
MOBILE DISTRICT
FORT McCLELLAN
CALHOUN COUNTY, ALABAMA
Contract No. DACA21-96-D-0018

Shaw™ Shaw Environmental, Inc.

DRAWN BY: dbomar
DATE LAST REV.: 07/22/2003 10:17:59 AM
STARTING DATE: 01/08/03
DRAWN BY: D. BOMAR
PROJ. MGR.: J. YACOUB
INITIATOR: G. SISCO
DRAFT. CHCK. BY:
ENGR. CHCK. BY: S. MORAN
PROJ. NO.: 796887
DWG. NO.: c:\cadd\design\796887es.666

APPROXIMATE LOCATION OF OBSERVED FEATURES

1. .30 CALIBER, 7.62mm AND 5.56mm EXPENDED ROUNDS (BULLETS AND BULLET FRAGMENTS)
2. POSSIBLE TARGET BERM
3. DISTURBED AREAS IDENTIFIED ON AERIAL PHOTOGRAPHS

SOURCE OF AERIAL PHOTOGRAPHS: U.S. ENVIRONMENTAL PROTECTION AGENCY, 1990. INSTALLATION ASSESSMENT ARMY CLOSURE PROGRAM, FORT McCLELLAN, ANNISTON, ALABAMA (TS-PIC-89334), ENVIRONMENTAL PHOTOGRAPHIC INTERPRETATION CENTER (EPIC), ENVIRONMENTAL MONITORING SYSTEMS LABORATORY.

SCALE
0 80 160 FEET

FIGURE 1-2
SITE MAP
IMPACT AREA SOUTH OF POW TRAINING FACILITY
FORMER RIFLE/MACHINE GUN RANGE
PARCELS 100Q AND 101Q

U. S. ARMY CORPS OF ENGINEERS
MOBILE DISTRICT
FORT McCLELLAN
CALHOUN COUNTY, ALABAMA
Contract No. DACA21-96-D-0018

Shaw™ Shaw Environmental, Inc.

DRAFT. CHCK. BY:
ENGR. CHCK. BY: S. MORAN
PROJ. MGR.: J. YACOUB
INITIATOR: G. SISCO
DWG. NO.: ...\796887es.667
DATE LAST REV.:
DRAWN BY:
PROJ. NO.: 796887
STARTING DATE:01/08/03
DRAWN BY: D. BOMAR
08/25/2003 08:47:46 AM
dbomar c:\cadd\design\796887es.667

Figure 1-3

1964 Aerial Photograph

Impact Area South of Former POW Training Facility, Former Rifle/Machine Gun Ranges, Parcels 100Q and 101Q
Fort McClellan, Alabama

Legend

- Area of Investigation
- Fort McClellan Boundary

300 0 300 Feet

NAD83 State Plane Coordinates

N

Shaw™ Shaw Environmental, Inc.

U.S. Army Corps of Engineers Mobile District

Contract No. DACA21-96-D-0018

Figure 1-4

1973 Aerial Photograph

Impact Area South of Former POW Training Facility, Former Rifle/Machine Gun Ranges, Parcels 100Q and 101Q
Fort McClellan, Alabama

Legend

- Area of Investigation
- Fort McClellan Boundary

300 0 300 Feet

NAD83 State Plane Coordinates

N

Shaw™ Shaw Environmental, Inc.

U.S. Army Corps of Engineers Mobile District

Contract No. DACA21-96-D-0018

Figure 1-5

1982 Aerial Photograph

Impact Area South of Former POW Training Facility, Former Rifle/Machine Gun Ranges, Parcels 100Q and 101Q
Fort McClellan, Alabama

Legend

- Area of Investigation
- Fort McClellan Boundary

300 0 300 Feet

NAD83 State Plane Coordinates

N

Shaw™ Shaw Environmental, Inc.

U.S. Army Corps of Engineers Mobile District

Contract No. DACA21-96-D-0018

LEGEND

- UNIMPROVED ROADS AND PARKING
- TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 5 FOOT)
- TREES / TREELINE
- AREA OF INVESTIGATION
- FORMER PRISONER OF WAR (POW) TRAINING FACILITY
- FENCE
- SURFACE SOIL SAMPLE LOCATION
- SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION
- MONITORING WELL / GROUNDWATER, SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION
- EXISTING MONITORING WELL / GROUNDWATER, SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION
- A A' CROSS SECTION LOCATION

APPROXIMATE LOCATION OF OBSERVED FEATURES

1. .30 CALIBER, 7.62mm AND 5.56mm EXPENDED ROUNDS (BULLETS AND BULLET FRAGMENTS)
2. POSSIBLE TARGET BERM
3. DISTURBED AREAS IDENTIFIED ON AERIAL PHOTOGRAPHS

SOURCE OF AERIAL PHOTOGRAPHS: U.S. ENVIRONMENTAL PROTECTION AGENCY, 1990. INSTALLATION ASSESSMENT ARMY CLOSURE PROGRAM, FORT McCLELLAN, ANNISTON, ALABAMA (TS-PIC-89334), ENVIRONMENTAL PHOTOGRAPHIC INTERPRETATION CENTER (EPIC), ENVIRONMENTAL MONITORING SYSTEMS LABORATORY.

SCALE
0 80 160 FEET

FIGURE 3-1
SAMPLE LOCATION MAP
IMPACT AREA SOUTH OF POW TRAINING FACILITY
FORMER RIFLE/MACHINE GUN RANGE
PARCELS 100Q AND 101Q

U. S. ARMY CORPS OF ENGINEERS
MOBILE DISTRICT
FORT McCLELLAN
CALHOUN COUNTY, ALABAMA
Contract No. DACA21-96-D-0018

Shaw™ Shaw Environmental, Inc.

DRAFT. CHCK. BY:
ENGR. CHCK. BY: S. MORAN
PROJ. MGR.: J. YACOUB
INITIATOR: G. SISCO
DRAWN BY: D. BOMAR
STARTING DATE: 01/08/03
DATE LAST REV.:
08/25/2003 09:25:29 AM
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PROJ. NO.: 796887
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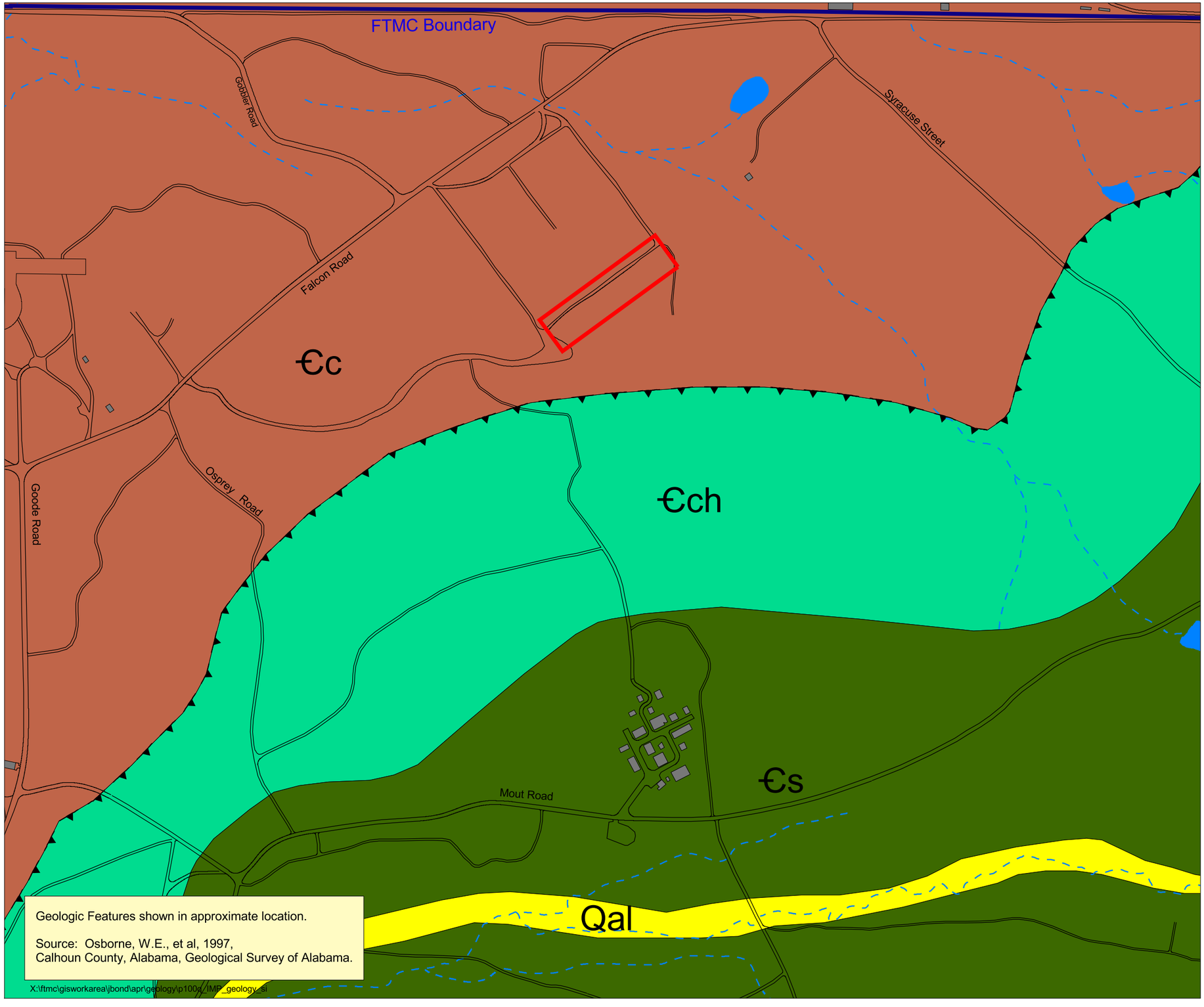


Figure 4-1

Site Geologic Map

Impact Area South of Former POW Training Facility, Former Rifle/Machine Gun Ranges, Parcels 100Q and 101Q, Fort McClellan, Alabama

Legend

- Area of Investigation
- Buildings
- Surface Water Feature (may be ephemeral)
- Roads
- Streams (dashed where intermittent)

Geology

- Qal — Quaternary - Alluvium
- Ꞓc — Cambrian - Conasauga Formation
- Ꞓs — Cambrian - Shady Dolomite
- Ꞓch — Cambrian - Chilhowee Group, undifferentiated
- Thrust Fault (dashed where inferred; barbs on upper plate)

500 0 500 Feet

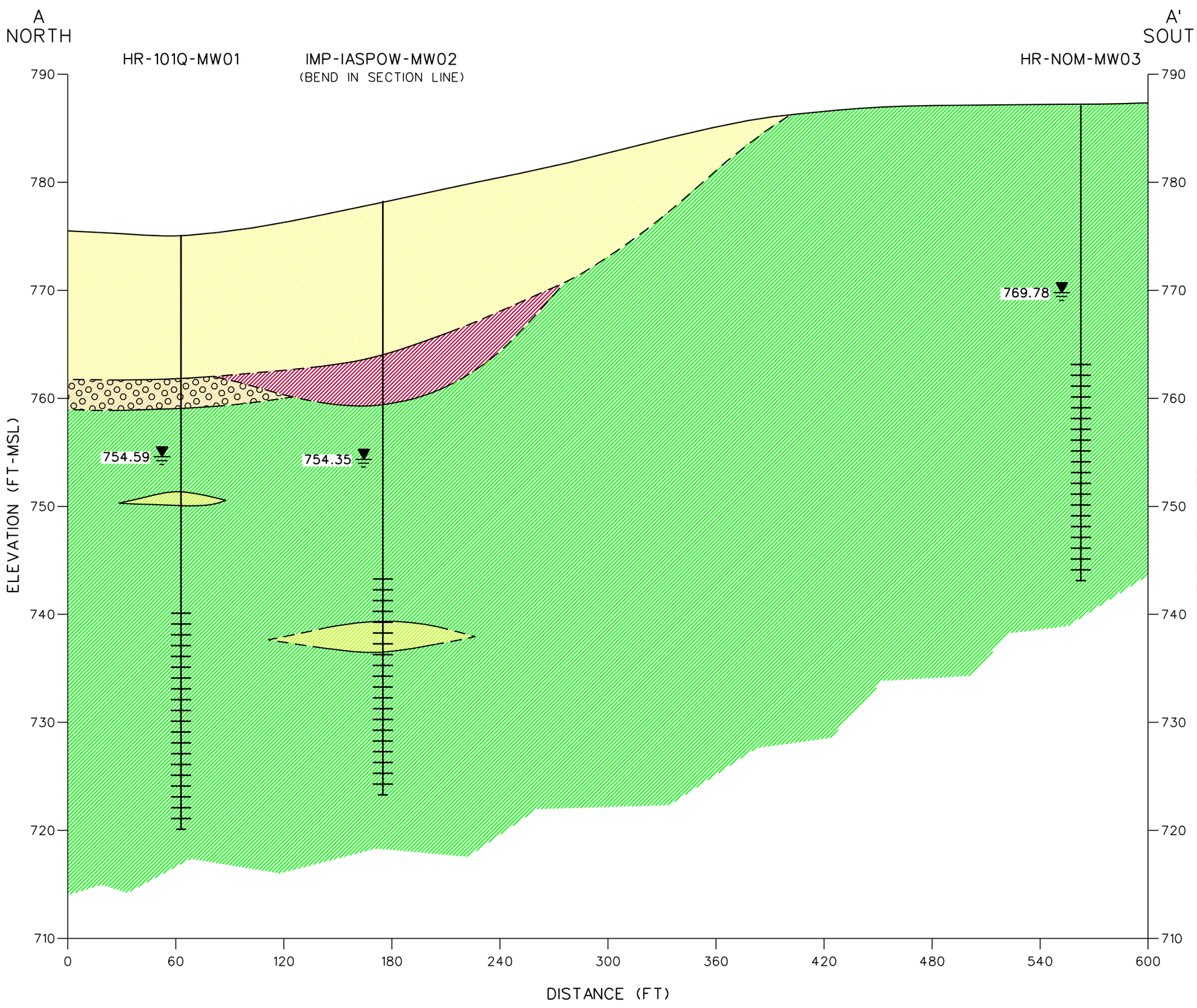
NAD83 State Plane Coordinates

N

Shaw Environmental, Inc.

U.S. Army Corps of Engineers Mobile District

Contract No. DACA21-96-D-0018



LEGEND

- SCREEN INTERVAL
- WATER TABLE (JULY 26, 2002)
- 754.35 GROUNDWATER ELEVATION (FT MSL)
- CONTACT DASHED WHERE INFERRED
- SILT, LITTLE TO SOME CLAY
- SILT AND SAND, SOME CLAY
- GRAVEL AND SAND, SOME CLAY
- CLAY AND SAND, SOME SILT
- CLAY, SOME SAND, SOME TO LITTLE SILT, LITTLE GRAVEL

NOTES:

1. ELEVATIONS ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988.
2. DASHED WHERE INFERRED.
3. SEE FIGURE 3-1 FOR CROSS SECTION LOCATION.

HORIZONTAL
0 60 120 FEET

VERTICAL
0 10 20 FEET

FIGURE 4-2
GEOLOGIC CROSS SECTION A-A'
IMPACT AREA SOUTH OF POW
TRAINING FACILITY
FORMER RIFLE/MACHINE GUN RANGE
PARCELS 100Q AND 101Q

U. S. ARMY CORPS OF ENGINEERS
MOBILE DISTRICT
FORT McCLELLAN
CALHOUN COUNTY, ALABAMA
Contract No. DACA21-96-D-0018

Shaw Environmental, Inc.

DWG. NO.: ...\796887es689 | PROJ. NO.: 796887
INITIATOR: C. LEVAAS | PROJ. MGR.: J. YACOUB
DRAFT. CHCK. BY: | ENGR. CHCK. BY: S. MORAN
DATE LAST REV.: | DRAWN BY:
STARTING DATE: 03/04/03 | DRAWN BY: D. BOMAR
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PROJ. MGR.: J. YACOUB
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E 674,700

E 676,700

N 1,181,400

N 1,180,000

GOBBLER ROAD

FALCON ROAD

FLOW DIRECTION

G.W. FLOW

HR-100Q-MW01
(731.50)

HR-100Q-MW02
(753.85)

HR-101Q-MW01
(754.59)

IMP-IASPOW-MW01
(762.75)

IMP-IASPOW-MW02
(754.35)

HR-NOM-MW03
(769.78)

730

740

750

760

770

775

800

825

LEGEND

- UNIMPROVED ROADS AND PARKING
- PAVED ROADS AND PARKING
- TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 25 FOOT)
- GROUNDWATER ELEVATION CONTOUR (DASHED WHERE INFERRED)
- (731.50) GROUNDWATER ELEVATION (FT MSL) (JULY 26, 2002)
- G.W. FLOW GROUNDWATER FLOW DIRECTION
- TREES / TREELINE
- MARSH / WETLANDS
- AREA OF INVESTIGATION
- SURFACE DRAINAGE / CREEK
- FENCE
- UTILITY POLE
- MONITORING WELL LOCATION

SCALE
0 200 400 FEET

FIGURE 4-3
GROUNDWATER ELEVATION MAP
IMPACT AREA SOUTH OF POW
TRAINING FACILITY
FORMER RIFLE/MACHINE GUN RANGE
PARCELS 100Q AND 101Q

U. S. ARMY CORPS OF ENGINEERS
MOBILE DISTRICT
FORT McCLELLAN
CALHOUN COUNTY, ALABAMA
Contract No. DACA21-96-D-0018

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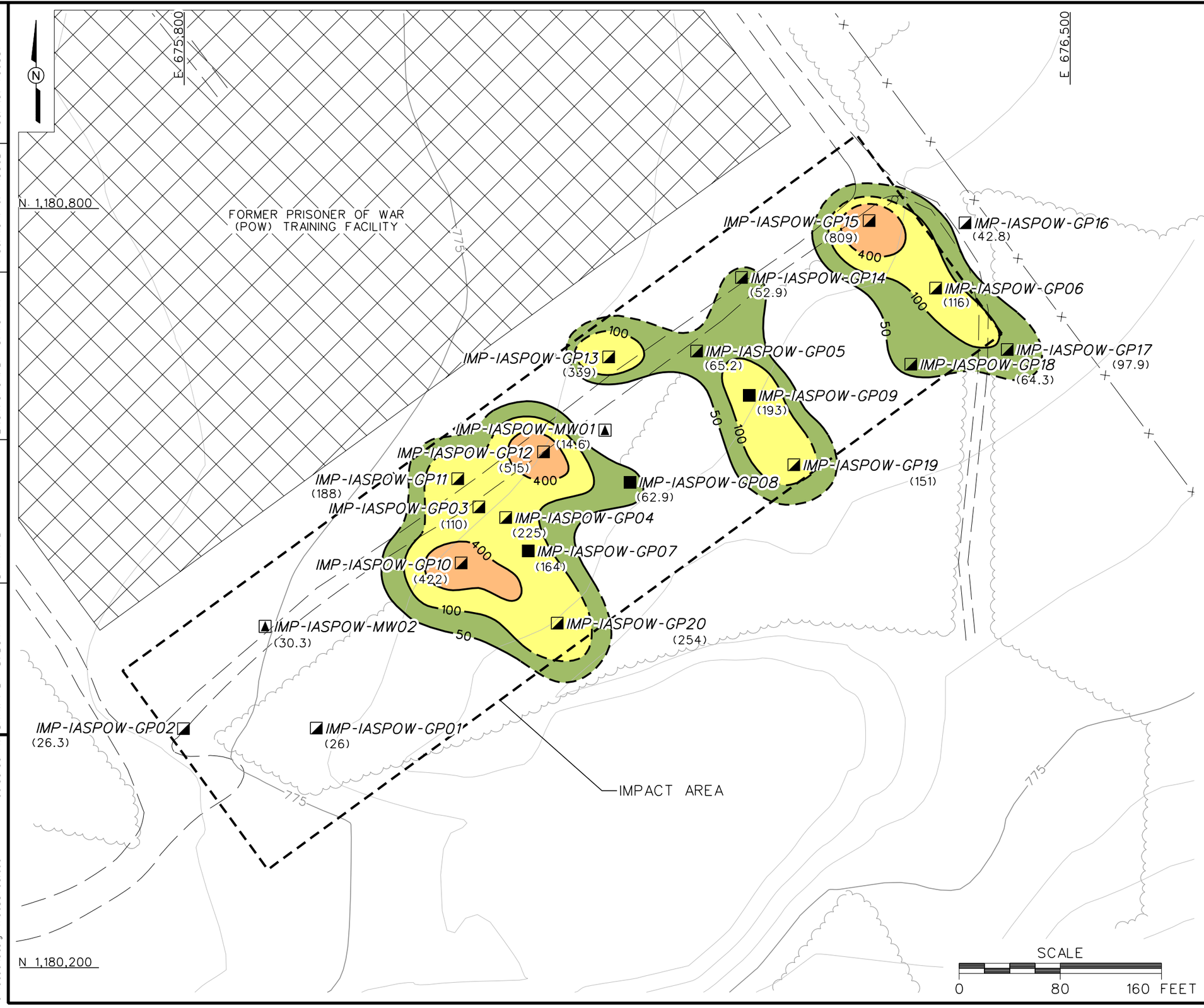

LEGEND

- UNIMPROVED ROADS AND PARKING
- TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 5 FOOT)
- TREES / TREELINE
- AREA OF INVESTIGATION
- FORMER PRISONER OF WAR (POW) TRAINING FACILITY
- FENCE
- SURFACE SOIL SAMPLE LOCATION
- SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION
- MONITORING WELL / GROUNDWATER, SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION
- 50 — LEAD CONCENTRATION (mg/kg) (DASHED WHERE INFERRED)
- (97.9) — CONCENTRATION IN MILLIGRAMS PER KILOGRAM (mg/kg)

NOTES:

1. BACKGROUND VALUE FOR LEAD IN SURFACE SOIL IS 40 mg/kg.
2. ECOLOGICAL SCREENING VALUE (ESV) FOR LEAD IN SURFACE SOIL IS 50 mg/kg.
3. SITE-SPECIFIC SCREENING LEVEL (SSSL) FOR LEAD IN SURFACE SOIL IS 400 mg/kg.

SCALE
0 80 160 FEET

FIGURE 5-1
LEAD IN SURFACE SOIL IMPACT AREA SOUTH OF POW TRAINING FACILITY FORMER RIFLE/MACHINE GUN RANGE PARCELS 100Q AND 101Q

U. S. ARMY CORPS OF ENGINEERS
MOBILE DISTRICT
FORT McCLELLAN
CALHOUN COUNTY, ALABAMA
Contract No. DACA21-96-D-0018

Shaw™ Shaw Environmental, Inc.

DWG. NO.: ...\796887es.669 | PROJ. NO.: 796887
INITIATOR: G. SISCO | PROJ. MGR.: J. YACOUB
DRAFT. CHCK. BY: | ENGR. CHCK. BY: S. MORAN
DATE LAST REV.: | DRAWN BY:
STARTING DATE: 01/08/03 | DRAWN BY: D. BOMAR
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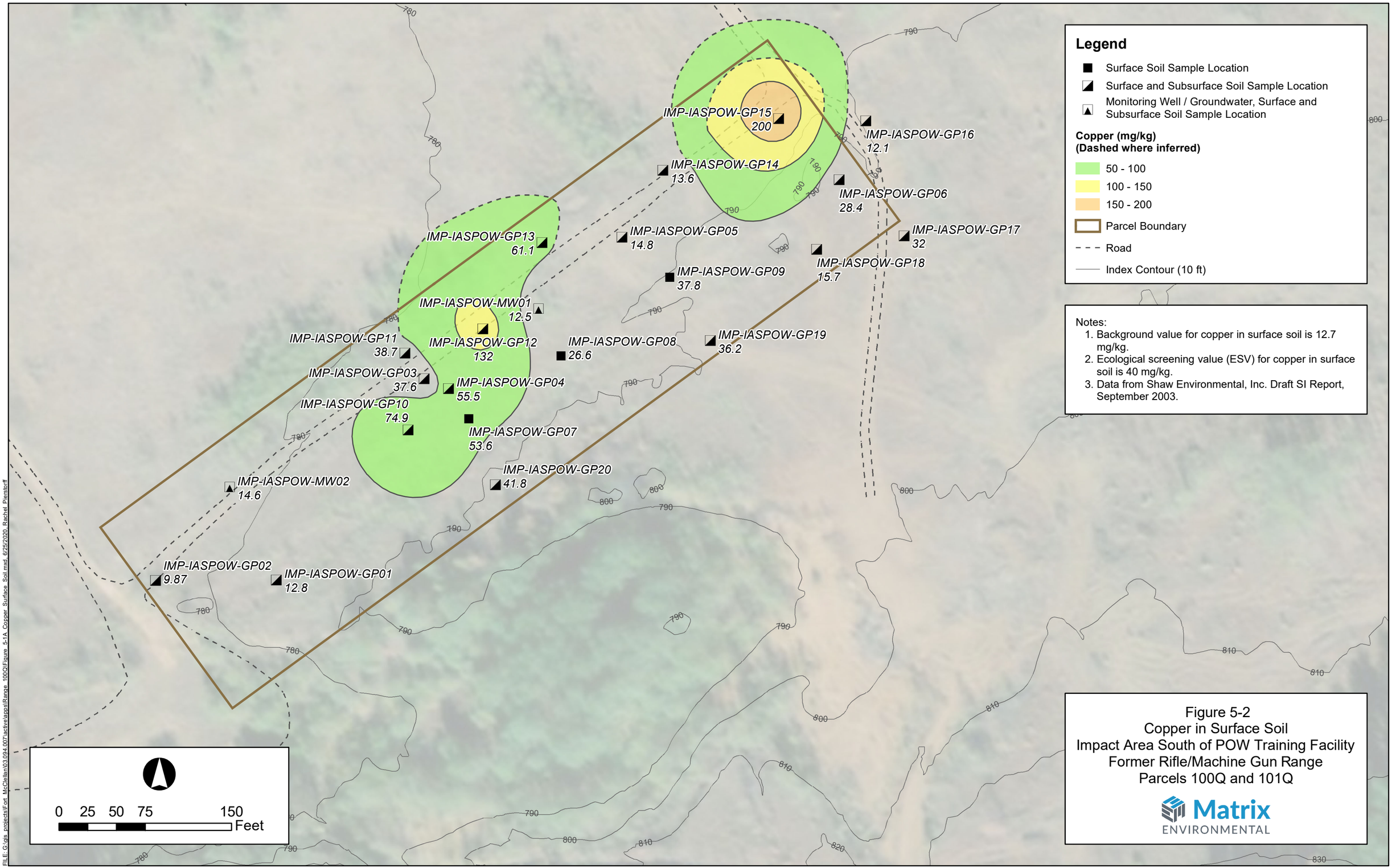


Legend

- Surface Soil Sample Location
- Surface and Subsurface Soil Sample Location
- Monitoring Well / Groundwater, Surface and Subsurface Soil Sample Location

Copper (mg/kg)
(Dashed where inferred)

- 50 - 100
- 100 - 150
- 150 - 200
- Parcel Boundary
- Road
- Index Contour (10 ft)

Notes:

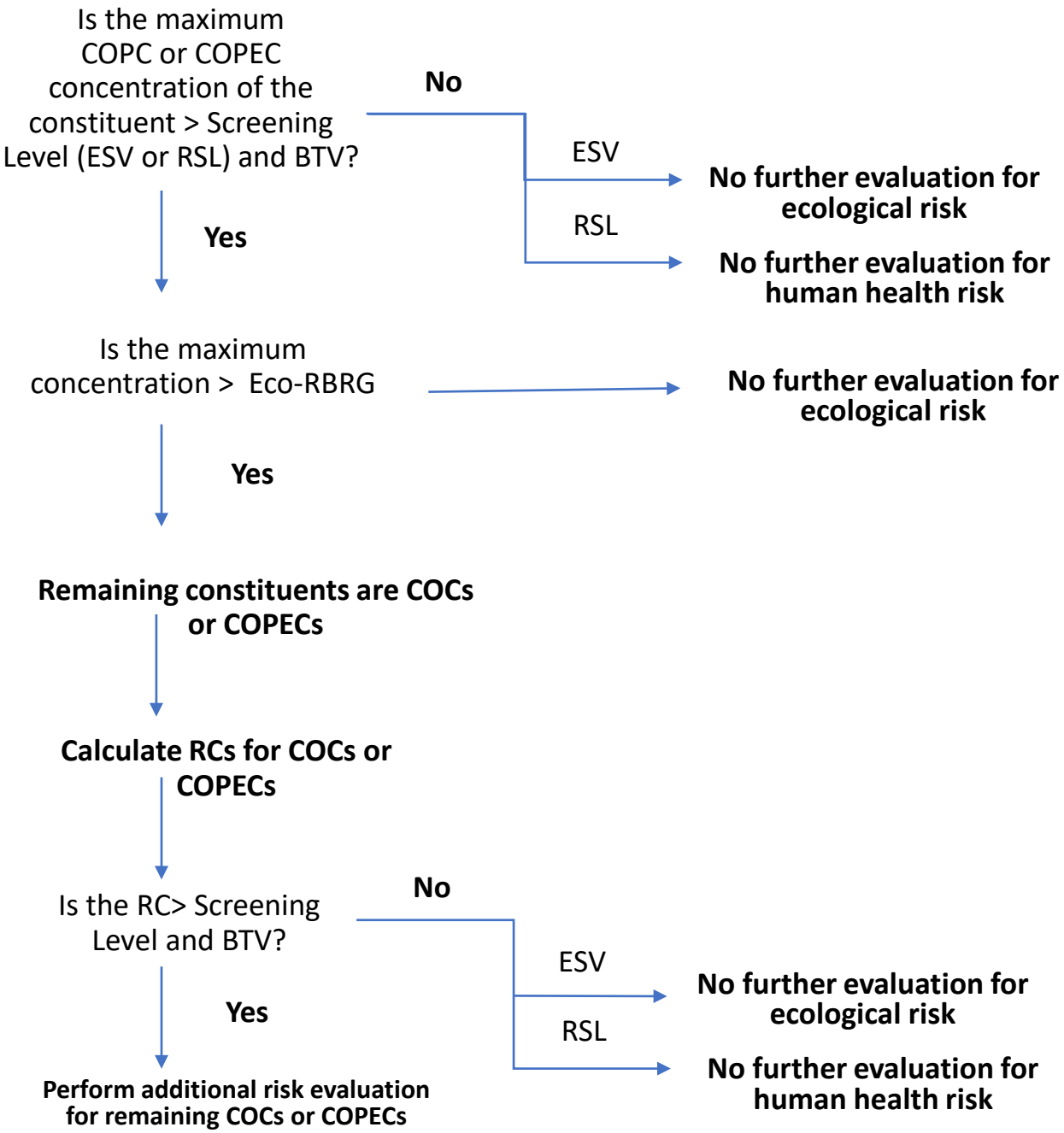
1. Background value for copper in surface soil is 12.7 mg/kg.
2. Ecological screening value (ESV) for copper in surface soil is 40 mg/kg.
3. Data from Shaw Environmental, Inc. Draft SI Report, September 2003.

Figure 5-2
Copper in Surface Soil
Impact Area South of POW Training Facility
Former Rifle/Machine Gun Range
Parcels 100Q and 101Q

Matrix ENVIRONMENTAL

FILE: G:\gis_projects\Fort_McClellan\03.094.007\active\apps\Range_100Q\Figure_5-1A Copper_Surface_Soil.mxd, 6/25/2020, Rachel Pierstorff

Figure 5-3 Data Screening and Risk Process



ESV –	USEPA Ecological Screening Value
RSL –	USEPA Regional Screening Level
Eco-RBRG -	Ecological Risk-Based Remediation Goal
RC –	Representative Concentration
BTV -	Background Threshold Value
COC -	Constituent of Concern
COPEC -	Constituent of Potential Ecological Concern