Final

Site Investigation Report
Trenches West of Iron Mountain Road, Parcel 500(7)

Fort McClellan
Calhoun County, Alabama

Prepared for:

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Task Order CK05
Contract No. DACA21-96-D-0018
IT Project No. 774645

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Revision 0

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Executive Summary

In accordance with Contract Number DACA21-96-D-0018, Task Order CK05, IT Corporation conducted a site investigation (SI) at the Trenches West of Iron Mountain Road, Parcel 500(7), at Fort McClellan in Calhoun County, Alabama. The SI was conducted to determine whether chemical constituents are present at the site and, if present, whether the concentrations present an unacceptable risk to human health or the environment. The SI at the Trenches West of Iron Mountain Road, Parcel 500(7), consisted of the sampling and analysis of six surface soil samples, six subsurface soil samples, and two groundwater samples. In addition, three permanent groundwater monitoring wells were installed in the residuum groundwater zone to facilitate groundwater sample collection and to provide site-specific geological and hydrogeological characterization information.

Chemical analysis of samples collected at the Trenches West of Iron Mountain Road, Parcel 500(7), indicates that metals, volatile organic compounds (VOC), and semivolatile organic compounds (SVOC) were detected in site media. Explosive compounds were not detected in any of the samples collected at the site. To evaluate whether the detected constituents pose an unacceptable risk to human health or the environment, analytical results were compared to human health site-specific screening levels (SSSL), ecological screening values (ESV), and background screening values for Fort McClellan.

The potential threat to human health is expected to be very low. Although the site is projected to be incorporated into the Eastern Bypass, the analytical data were screened against residential human health SSSLs to evaluate the site for unrestricted land reuse. With the exception of iron in one surface soil sample, the metals that exceeded SSSLs in soils were below their respective background concentration or within the range of background values and thus do not pose an unacceptable risk to future human receptors. VOC and SVOC concentrations in soils were below SSSLs.

In groundwater, thallium (one location) was present at a concentration exceeding the SSSL and the range of background values. VOC concentrations in groundwater were below SSSLs, and SVOCs were not detected in groundwater. Consequently, the overall impact to groundwater at the Trenches West of Iron Mountain Road, Parcel 500(7), is negligible and the potential threat to human health is expected to be very low.

With the exception of beryllium (three locations), iron (one location), and nickel (one location) in surface soils, the metals that exceeded ESVs were below their respective background concentration or within the range of background values. VOC and SVOC concentrations in site media were below ESVs. Based on the low levels of metals, VOCs, and SVOCs detected, the potential threat to ecological receptors is expected to be very low.

Based on the results of the SI, past operations at the Trenches West of Iron Mountain Road, Parcel 500(7), do not appear to have adversely impacted the environment. The metals and chemical constituents detected in site media do not pose an unacceptable risk to human health and the environment. Therefore, IT Corporation recommends "No Further Action" and unrestricted land reuse with regard to hazardous, toxic, and radioactive waste at the Trenches West of Iron Mountain Road, Parcel 500(7).

1.0 Introduction

The U.S. Army has selected Fort McClellan (FTMC) located in Calhoun County, Alabama, for closure by the Base Realignment and Closure (BRAC) Commission under Public Laws 100-526 and 101-510. The 1990 Base Closure Act, Public Law 101-510, established the process by which U.S. Department of Defense (DOD) installations would be closed or realigned. The BRAC Environmental Restoration Program requires investigation and cleanup of federal properties prior to transfer to the public domain. The U.S. Army is conducting environmental studies of the impact of suspected contaminants at parcels at FTMC under the management of the U.S. Army Corps of Engineers (USACE)-Mobile District. The USACE contracted IT Corporation (IT) to perform the site investigation (SI) at the Trenches West of Iron Mountain Road, Parcel 500(7), under Contract Number DACA21-96-D-0018, Task Order CK05.

This SI report presents specific information and results compiled from the SI, including field sampling and analysis and monitoring well installation activities, conducted at the Trenches West of Iron Mountain Road, Parcel 500(7).

1.1 Project Description

The Trenches West of Iron Mountain Road, Parcel 500(7), was identified as an area to be investigated prior to property transfer. The site was classified as a Category 7 site in the environmental baseline survey (EBS) (Environmental Science and Engineering, Inc. [ESE], 1998). Category 7 sites are areas that have not been evaluated and/or that require further evaluation.

A site-specific field sampling plan (SFSP) attachment (IT, 1999) and a site-specific safety and health plan (SSHP) attachment were finalized in October 1999. The SFSP and SSHP were prepared to provide technical guidance for sample collection and analysis at the Trenches West of Iron Mountain Road, Parcel 500(7). 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). The SAP includes the installation-wide safety and health plan (SHP) and quality assurance plan (QAP).

The SI included fieldwork to collect six surface soil samples, six subsurface soil samples, and two groundwater samples to determine whether potential site-specific chemicals are present at

the site and to provide data useful for supporting any future corrective measures and closure activities.

1.2 Purpose and Objectives

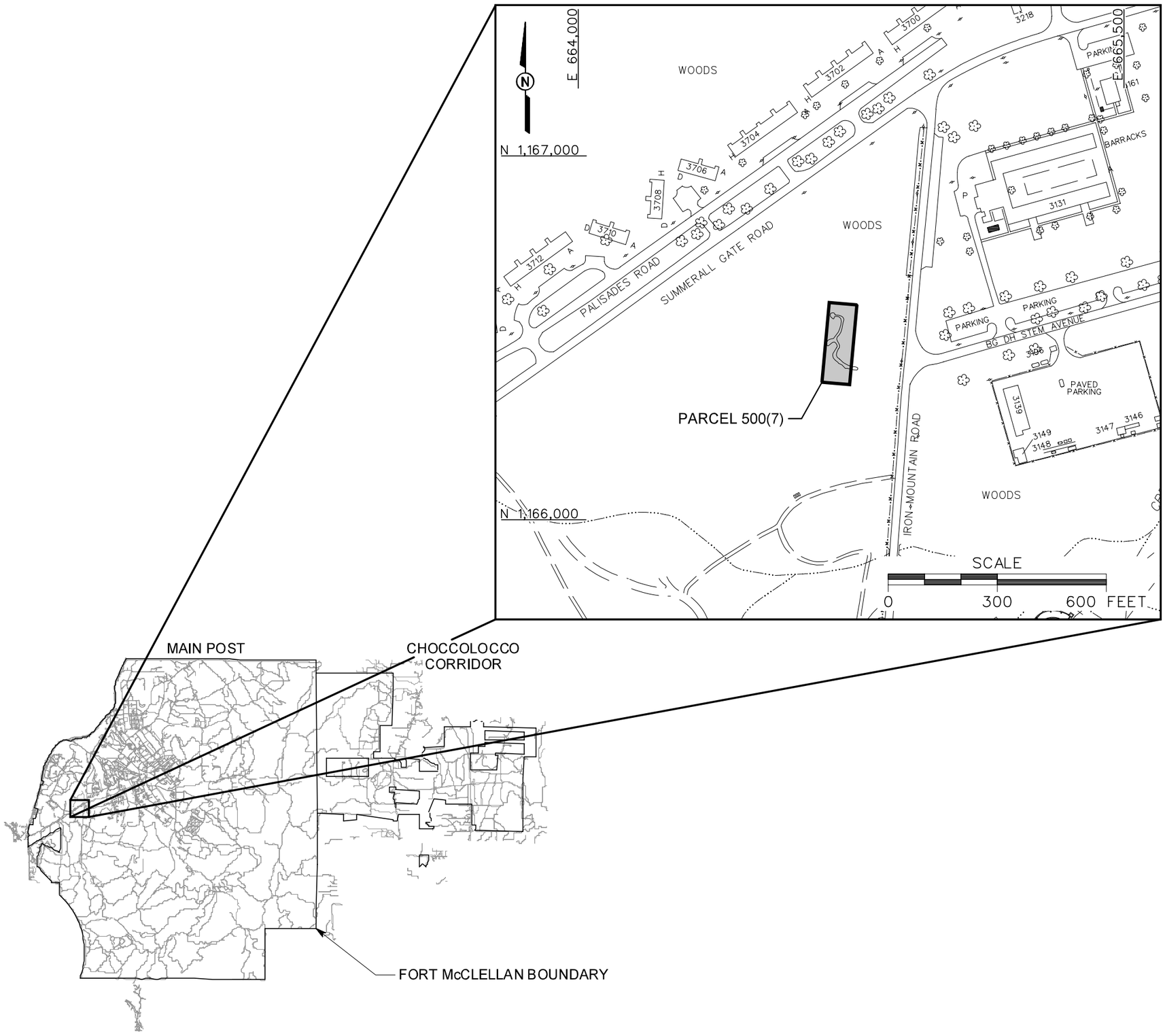
The SI program was designed to collect data from site media and provide a level of defensible data and information in sufficient detail to determine whether chemical constituents are present at the Trenches West of Iron Mountain Road, Parcel 500(7), at concentrations that present an unacceptable risk to human health or the environment. The conclusions of the SI 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 IT as part of the human health and ecological risk evaluations associated with SIs being performed under the BRAC Environmental Restoration Program at FTMC. The SSSLs and ESVs background screening values are presented in the *Final Human Health and Ecological Screening Values and 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).

Based on the conclusions presented in this SI report, the BRAC Cleanup Team will decide either to propose "No Further Action" at the site or to conduct additional work at the site.

1.3 Site Description and History

The Trenches West of Iron Mountain Road site (Parcel 500[7]) is located in the west-central area of the FTMC Main Post (Figure 1-1). The site is approximately 200 feet west of the intersection of Iron Mountain Road and BG D.H. Stem Avenue (formerly 23rd Street) (Figure 1-2). The system of trenches extends over an area approximately 200 feet long by 50 feet wide. The trenches were discovered by Alabama Department of Environmental Management (ADEM) personnel and were confirmed by IT during a site visit to the Former Fog Oil Storage Area West of the Skeet Range, Parcel 122(7) (located just south of the trenches). Information regarding the activities conducted at this site or potential site-specific chemicals was not available.

Site elevation ranges from approximately 830 feet to approximately 845 feet above mean sea level. The site slopes primarily from west to east. Surface water runoff flows to the east. Parcel 500(7) falls within the "Possible Explosive Ordnance Impact Area" shown on Plate 10 of the FTMC Archive Search Report, Maps (USACE, 1998). Therefore, IT conducted unexploded ordnance (UXO) avoidance activities, including surface sweeps and downhole surveys of soil borings.



LEGEND

- UNIMPROVED ROADS AND PARKING
- PAVED ROADS AND PARKING
- BUILDING
- TREES / TREELINE
- PARCEL BOUNDARY
- SURFACE DRAINAGE / CREEK
- MANMADE SURFACE DRAINAGE FEATURE
- FENCE
- UTILITY POLE

FIGURE 1-1
SITE LOCATION MAP
TRENCHES WEST OF IRON MOUNTAIN ROAD
PARCEL 500(7)

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

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E 664,700

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N 1,166,600

N 1,166,300

875

850

825

800

3704

3706

3708

3131

3139

3149

PALISADES ROAD

SUMMERALL GATE ROAD

IRON MOUNTAIN ROAD

BG DH STEM AVENUE

PARKING

PARCEL 500(7)

TRENCHES

LEGEND

- UNIMPROVED ROADS AND PARKING
- PAVED ROADS AND PARKING
- BUILDING
- TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 5 FOOT)
- TREES / TREELINE
- PARCEL BOUNDARY
- MANMADE SURFACE DRAINAGE FEATURE
- FENCE
- UTILITY POLE
- SANITARY SEWER LINE
- STORM DRAINAGE LINE

SCALE

0 100 200 FEET

FIGURE 1-2
SITE MAP
TRENCHES WEST OF IRON MOUNTAIN ROAD
PARCEL 500(7)

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

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2.0 Previous Investigations

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 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 require additional evaluation.

The EBS was conducted in accordance with the Community Environmental Response Facilitation Act (CERFA) (CERFA-Public Law 102-426) protocols and DOD policy regarding contamination assessment. Record searches and reviews were performed on all reasonably available documents from FTMC, ADEM, U.S. Environmental Protection Agency (EPA) Region IV, and Calhoun County, as well as a database search of Comprehensive Environmental Response, Compensation, and Liability Act-regulated substances, petroleum products, and Resource Conservation and Recovery Act-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. There are not any records indicating that any releases occurred at this site.

The Trenches West of Iron Mountain Road, Parcel 500(7), was identified as a Category 7 CERFA site: areas that are not evaluated or require additional evaluation. The site lacked adequate documentation and, therefore, required evaluation to determine the environmental condition of the parcel. There have not been any other investigations identified for the Trenches West of Iron Mountain Road, Parcel 500(7).

3.0 Current Site Investigation Activities

This chapter summarizes SI activities conducted by IT at the Trenches West of Iron Mountain Road, Parcel 500(7), including UXO avoidance, investigation for fill material, environmental sampling and analysis, and groundwater monitoring well installation activities.

3.1 UXO Avoidance

UXO avoidance was performed at the Trenches West of Iron Mountain Road, Parcel 500(7), following methodology outlined in Section 4.1.7 of the SAP (IT, 2000a). IT UXO personnel used a Schonstedt Heliflux Magnetic Locator to perform a surface sweep of the parcel prior to site access. After the parcel was cleared for access, sample locations were cleared using a Foerster Ferex Electromagnetic Detector following procedures outlined in Section 4.1.7.3 of the SAP (IT, 2000a).

3.2 Investigation for Fill Material in Trenches

Three soil borings were advanced within the trenches to determine if fill material was present (Figure 3-1). The soil borings (FTA-500-PH01 through FTA-500-PH03) were advanced with a 3-inch-diameter stainless-steel hand auger to a depth of approximately 3 feet. Fill material was not encountered in any of the soil borings. The soil boring logs are included in Appendix B.

3.3 Environmental Sampling

The environmental sampling performed during the SI at the Trenches West of Iron Mountain Road, Parcel 500(7), included the collection of surface soil samples, subsurface soil samples, and groundwater samples for chemical analysis. The sample locations were determined by observing site physical characteristics during a site walkover and by reviewing historical documents pertaining to activities conducted at the site. 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 3.5.

3.3.1 Surface Soil Sampling

Six surface soil samples were collected at the Trenches West of Iron Mountain Road, Parcel 500(7), at the locations shown on Figure 3-1. Soil sampling locations and rationale are presented in Table 3-1. Sample designations and quality assurance/quality control (QA/QC) samples are

Table 3-1

Sampling Locations And Rationale
Trenches West of Iron Mountain Road, Parcel 500(7)
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Media	Sample Location Rationale
FTA-500-GP01	Surface soil and subsurface soil	Surface and subsurface soil samples were collected in the northwest portion of the Trenches West of Iron Mountain Road to determine if potential site-specific chemicals have impacted site media.
FTA-500-GP02	Surface soil and subsurface soil	Surface and subsurface soil samples were collected in the middle portion of the Trenches West of Iron Mountain Road to determine if potential site-specific chemicals have impacted site media.
FTA-500-GP03	Surface soil and subsurface soil	Surface and subsurface soil samples were collected in the southern portion of the trenches to determine if potential site-specific chemicals have impacted site media.
FTA-500-GP04	Surface soil and subsurface soil	Surface and subsurface soil samples were collected in the southern portion of the trenches to determine if potential site-specific chemicals have impacted site media.
FTA-500-MW01	Surface soil, subsurface soil, and groundwater	Surface soil, subsurface soil, and groundwater samples were collected downgradient (east) of the northern portion of the trenches to determine if potential site-specific chemicals have impacted site media.
FTA-500-MW02	Surface soil, subsurface soil, and groundwater	Surface soil, subsurface soil, and groundwater samples were collected downgradient (east) of the southern portion of the trenches to determine if potential site-specific chemicals have impacted site media.

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N 1,166,700

E 664,500

E 664,900

850

825

PARCEL 500(7)

FTA-500-MW03

FTA-500-GP01

FTA-500-MW01

FTA-500-PH03

TRENCHES

FTA-500-GP02

FTA-500-PH02

FTA-500-GP03

FTA-500-MW02

FTA-500-PH01

FTA-500-GP04

IRON MOUNTAIN ROAD

N 1,166,300

LEGEND

- UNIMPROVED ROADS AND PARKING
- PAVED ROADS AND PARKING
- BUILDING
- TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 5 FOOT)
- TREES / TREELINE
- PARCEL BOUNDARY
- MANMADE SURFACE DRAINAGE FEATURE
- FENCE
- UTILITY POLE
- RESIDUUM MONITORING WELL LOCATION
- SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION
- GROUNDWATER, SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION
- HAND AUGER SOIL BORING LOCATION

SCALE

0 50 100 FEET

FIGURE 3-1
SAMPLE LOCATION MAP
TRENCHES WEST OF IRON MOUNTAIN ROAD
PARCEL 500(7)

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

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listed in Table 3-2. Soil sampling locations were determined in the field by the on-site geologist based on UXO avoidance activities, sampling rationale, and site topography.

Sample Collection. Surface soil samples were collected from the upper 1 foot of soil with either a direct-push technology (DPT) sampling system or a 3-inch-diameter stainless-steel hand auger following the methodology specified in Section 4.9.1.1 of the SAP (IT, 2000a). Surface soil samples were collected by first removing surface debris (e.g., rocks or vegetation) from the immediate sample area. The soil was then collected with the sampling device and screened with a photoionization detector (PID) in accordance with Section 4.7.1.1 of the SAP (IT, 2000a). Samples for volatile organic compound (VOC) analysis were collected directly from the sampler using three EnCore® samplers. The remaining portion of the sample was transferred to a clean stainless-steel bowl, homogenized, and placed in the appropriate sample containers. The samples were analyzed for the parameters listed in Table 3-2 using methods outlined in Section 3.5. Sample collection logs are included in Appendix A.

3.3.2 Subsurface Soil Sampling

Subsurface soil samples were collected from each of six soil borings at the Trenches West of Iron Mountain Road, Parcel 500(7) as shown on Figure 3-1. Subsurface soil sampling locations and rationale are presented in Table 3-1. Subsurface soil sample designations, depths, and QA/QC samples are listed in Table 3-2. Soil boring sampling locations were determined in the field by the on-site geologist based on UXO avoidance activities, sampling rationale, and site topography. IT contracted TEG, Inc., a DPT subcontractor, to assist in subsurface soil sample collection.

Sample Collection. Subsurface soil samples were collected from soil borings at depths greater than 1 foot below ground surface in the unsaturated zone. The soil borings were advanced and soil samples collected using the DPT sampling procedures specified in Section 4.9.1.1 of the SAP (IT, 2000a). Sample collection logs are included in Appendix A.

Subsurface soil samples were collected continuously until direct-push sampler refusal was encountered. Samples were field-screened using a PID in accordance with Section 4.7.1.1 of the SAP (IT, 2000a) to measure for volatile organic vapors. The soil sample displaying the highest reading was selected and sent to the laboratory for analysis; however, at those locations where PID readings were not greater than background, the deepest soil sample interval above the saturated zone was submitted for analysis. Samples for VOC analysis were collected directly

Table 3-2

Soil Sample Designations and QA/QC Samples
Trenches West of Iron Mountain Road, Parcel 500(7)
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Designation	Sample Depth (ft. bgs)	QA/QC Samples			Analytical Suite
			Field Duplicates	Field Splits	MS/MSD	
FTA-500-GP01	FTA-500-GP01-SS-CG0001-REG	0-1				TCL VOCs, TCL SVOCs, TAL Metals, Explosives
	FTA-500-GP01-DS-CG0002-REG	2-4				TCL VOCs, TCL SVOCs, TAL Metals, Explosives
FTA-500-GP02	FTA-500-GP02-SS-CG0003-REG	0-1				TCL VOCs, TCL SVOCs, TAL Metals, Explosives
	FTA-500-GP02-DS-CG0004-REG	2-4				TCL VOCs, TCL SVOCs, TAL Metals, Explosives
FTA-500-GP03	FTA-500-GP03-SS-CG0005-REG	0-1				TCL VOCs, TCL SVOCs, TAL Metals, Explosives
	FTA-500-GP03-DS-CG0006-REG	2-3.5				TCL VOCs, TCL SVOCs, TAL Metals, Explosives
FTA-500-GP04	FTA-500-GP04-SS-CG0007-REG	0-1				TCL VOCs, TCL SVOCs, TAL Metals, Explosives
	FTA-500-GP04-DS-CG0008-REG	2-3				TCL VOCs, TCL SVOCs, TAL Metals, Explosives
FTA-500-MW01	FTA-500-MW01-SS-CG0009-REG	0-1			FTA-500-MW01-SS-CG0009-MS FTA-500-MW01-SS-CG0009-MSD	TCL VOCs, TCL SVOCs, TAL Metals, Explosives
	FTA-500-MW01-DS-CG0010-REG	6-8				TCL VOCs, TCL SVOCs, TAL Metals, Explosives
FTA-500-MW02	FTA-500-MW02-SS-CG0011-REG	0-1	FTA-500-MW02-SS-CG0012-FD	FTA-500-MW02-SS-CG0013-FS		TCL VOCs, TCL SVOCs, TAL Metals, Explosives
	FTA-500-MW02-DS-CG0014-REG	2-4				TCL VOCs, TCL SVOCs, TAL Metals, Explosives

FD - Field duplicate.
FS - Field split.
ft. bgs - Feet below ground surface.
MS/MSD - Matrix spike/matrix spike duplicate.
QA/QC - Quality assurance/quality control.
REG - Field sample.
SVOC - Semivolatile organic compound.
TAL - Target analyte list.
TCL - Target compound list.
VOC - Volatile organic compound.

from the sampler using three EnCore samplers. The remaining portion of the sample was transferred to a clean stainless-steel bowl, homogenized, and placed in the appropriate sample containers. The samples were analyzed for the parameters listed in Table 3-2 using methods outlined in Section 3.5. The on-site geologist constructed a detailed boring log for each soil boring. The lithological log for each borehole is included in Appendix B.

At the completion of soil sampling, boreholes were abandoned with bentonite pellets and hydrated with potable water following borehole abandonment procedures summarized in Appendix B of the SAP (IT, 2000a).

3.3.3 Well Installation

Three permanent monitoring wells were installed in the residuum groundwater zone at the Trenches West of Iron Mountain Road, Parcel 500(7), to collect groundwater samples for laboratory analysis. However, groundwater was not encountered in monitoring well FTA-500-MW03; therefore, a groundwater sample was not collected at this location. The well locations are shown on Figure 3-1. Table 3-3 summarizes construction details of the permanent wells installed at the site. The well construction logs are included in Appendix B.

IT contracted Miller Drilling, Inc. to install the permanent wells using a hollow-stem auger rig. The wells were installed following procedures outlined in Section 4.7 and Appendix C of the SAP (IT, 2000a). The borehole at each location was advanced with a 4.25-inch inside diameter (ID) hollow-stem auger from ground surface to the first water-bearing zone in residuum at the well location. The borehole was augered to the depth of DPT refusal, and soil samples were collected from that depth to the bottom of the borehole. A 2-foot-long, 2-inch ID carbon steel split-spoon sampler was driven at 5-foot intervals to collect residuum for observing and describing lithology. Where split-spoon refusal was encountered, the auger was advanced until the first water-bearing zone was encountered. The on-site geologist logging the auger boreholes continued the lithological log for each borehole from the depth of split-spoon sampler refusal to the bottom of the auger borehole by logging the auger drill cuttings. 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 geologic and hydrogeologic information. At monitoring well FTA-500-MW03, hollow-stem auger refusal was encountered prior to reaching

Table 3-3

Monitoring Well Construction Summary
Trenches West of Iron Mountain Road, Parcel 500(7)
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
FTA-500-MW01	1166537.70	664764.50	832.66	834.19	57	20	34 - 54	2" ID Sch. 40 PVC
FTA-500-MW02	1166428.74	664781.73	835.32	836.91	79	30	49 - 79	2" ID Sch. 40 PVC
FTA-500-MW03	1166553.74	664543.92	874.47	876.63	97	15	79.8 - 94.8	4" ID Sch. 80 PVC

Permanent wells installed using hollow-stem auger and/or air rotary.
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.
4" ID Sch. 80 PVC - 4-inch inside diameter, Schedule 80, polyvinyl chloride.
bgs - Below ground surface.
ft - Feet.
amsl - Above mean sea level.
TOC - Top of casing.

bedrock; therefore, drilling continued using air-rotary drilling techniques until bedrock was encountered. The lithological log for each borehole is included in Appendix B.

Upon reaching the target depth at FTA-500-MW01 and FTA-500-MW02, a 20- or 30-foot length of 2-inch ID, 0.010-inch continuous slot, Schedule 40 polyvinyl chloride (PVC) screen with a 3-inch PVC end cap or a 3-foot PVC sump was placed through the auger to the bottom of the borehole. The screen and end cap/sump were attached to 2-inch ID, flush-threaded Schedule 40 PVC riser. After air-rotary drilling was completed at FTA-500-MW03, a 15-foot length of 4-inch ID, 0.010-inch continuous slot, Schedule 80 PVC screen with a 3-inch PVC end cap was installed to the bottom of the borehole. A sand 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 3 feet above the top of the well screen as the augers were removed. The wells were surged using a solid PVC surge block for approximately 10 minutes, or until no more settling of the filter sand occurred inside the borehole. A bentonite seal consisting of approximately 3 feet of bentonite pellets was placed immediately on top of the filter sand and hydrated with potable water. At well locations where the bentonite seal was installed below the water table surface, the bentonite pellets were allowed to hydrate in the groundwater. Bentonite seal placement and hydration followed procedures in Appendix C of the SAP (IT, 2000a). The wells were then grouted to ground surface, and a concrete surface pad was installed. A locking well cap was placed on the PVC well casing.

Monitoring wells FTA-500-MW01 and FTA-500-MW02 were developed by surging and pumping with a 2-inch diameter submersible pump in accordance with methodology outlined in Section 4.8 and Appendix C of the SAP (IT, 2000a). 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 was performed until the water turbidity was less than or equal to 20 nephelometric turbidity units (NTU), or for a maximum of 8 hours. Groundwater was not encountered in monitoring well FTA-500-MW03; therefore, the well was not developed. The well development logs for wells FTA-500-MW01 and FTA-500-MW02 are included in Appendix C.

3.3.4 Water Level Measurements

The depth to groundwater was measured in temporary, permanent, and existing monitoring wells at FTMC on March 13 and 14, 2000, following procedures outlined in Section 4.18 of the SAP (IT, 2000a). Depth to groundwater was measured with electronic water level meters. Each meter probe and cable were cleaned before and after use at each well following decontamination methodology presented in Section 4.10 of the SAP (IT, 2000a). Measurements were referenced to the top of each well casing. A summary of groundwater level measurements for the Trenches West of Iron Mountain Road, Parcel 500(7), and nearby Parcel 147(7) is presented in Table 3-4. Groundwater was not encountered in monitoring well FTA-500-MW03; therefore, no groundwater elevation data are available.

3.3.5 Groundwater Sampling

Groundwater samples were collected from two of the three permanent wells (FTA-500-MW01 and FTA-500-MW02) installed during the SI at the locations shown on Figure 3-1. A groundwater sample was not collected from monitoring well FTA-500-MW03 because the well did not contain groundwater. The groundwater sampling locations and rationale are listed in Table 3-1. The groundwater sample designations and QA/QC samples are listed in Table 3-5.

Sample Collection. Groundwater sampling was performed following procedures outlined in Section 4.9.1.4 of the SAP (IT, 2000a). Groundwater was sampled 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. Purging and sampling were performed with a submersible pump equipped with Teflon™ tubing. 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 3.5.

3.4 Surveying of Sample Locations

Sample locations were surveyed using global positioning system survey techniques described in Section 4.3 of the SAP and conventional civil survey techniques described in Section 4.19 of the SAP (IT, 2000a). 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.

Table 3-4

Groundwater Elevations
Trenches West of Iron Mountain Road, Parcel 500(7) and Vicinity
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)
FTA-500-MW01	14-Mar-00	46.45	834.19	832.66	787.74
FTA-500-MW02	14-Mar-00	49.49	836.91	835.32	787.42
FTA-147-GP01	14-Mar-00	4.43	794.22	794.62	789.79
FTA-147-GP02	14-Mar-00	4.33	794.49	794.84	790.16
FTA-147-GP04	14-Mar-00	6.39	797.01	793.9	790.62
FTA-147-GP05	14-Mar-00	5.47	795.02	792.96	789.55
FTA-147-GP07	14-Mar-00	4.79	794.21	794.39	789.42
FTA-147-GP08	14-Mar-00	7.85	791.7	791.91	783.85
FTA-147-GP09	14-Mar-00	3.00	791.16	790.87	788.16
FTA-147-GP10	14-Mar-00	4.15	795.65	795.32	791.50
FTA-147-GP11	14-Mar-00	6.08	796.09	796.45	790.01

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

Table 3-5

Groundwater Sample Designations and QA/QC Samples
Trenches West of Iron Mountain Road, Parcel 500(7)
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Designation	QA/QC Samples			Analytical Suite
		Field Duplicates	Field Splits	MS/MSD	
FTA-500-MW01	FTA-500-MW01-GW-CG3001-REG			FTA-500-MW01-GW-CG3001-MS FTA-500-MW01-GW-CG3001-MSD	TCL VOCs, TCL SVOCs, TAL Metals, Explosives
FTA-500-MW02	FTA-500-MW02-GW-CG3002-REG	FTA-500-MW02-GW-CG3003-FD	FTA-500-MW02-GW-CG3004-FS		TCL VOCs, TCL SVOCs, TAL Metals, Explosives

Groundwater samples were collected from the approximate midpoint of the saturated screened interval of the monitoring well.

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

Table 3-6

Groundwater Field Parameters
Trenches West of Iron Mountain Road, Parcel 500(7)
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)
FTA-500-MW01	4-Jul-00	0.017	7.67	190	20.2	9.1	4.11
FTA-500-MW02	15-Jun-00	0.095	3.09	140	20.1	240	5.35

°C - Degrees Celsius.
mg/L - Milligrams per liter.
mS/cm - Millisiemens per centimeter.
mV - Millivolts.
NTU - Nephelometric turbidity units.
ORP - Oxidation-reduction potential.
SU - Standard units.

3.5 Analytical Program

Samples collected during the SI were analyzed for various chemical parameters based on the potential site-specific chemicals and on EPA, ADEM, FTMC, and USACE requirements. The samples collected at the Trenches West of Iron Mountain Road, Parcel 500(7), were analyzed for the following parameters:

- Target compound list (TCL) VOCs - EPA Method 8260B
- TCL semivolatile organic compounds (SVOC) - EPA Method 8270C
- Target analyte list metals - EPA Method 6010B/7000
- Nitroaromatic and nitramine explosives - EPA Method 8330.

The samples were analyzed using EPA SW-846 methods, including Update III methods where applicable, as presented in Table 6-1 in Appendix B of the SAP (IT, 2000a). Data were reported and evaluated in accordance with Corps of Engineers South Atlantic Savannah Level B criteria (USACE, 1994) and the stipulated requirements for the generation of definitive data (Section 3.1.2 of Appendix B of the SAP [IT, 2000a]). Chemical data were reported via hard-copy data packages by the laboratory using Contract Laboratory Program-like forms. These packages were validated in accordance with EPA National Functional Guidelines by Level III criteria. A summary of validated data is included in Appendix E. The Data Validation Summary Report is included as Appendix F.

3.6 Sample Preservation, Packaging, and Shipping

Sample preservation, packaging, and shipping followed requirements specified in Section 4.13.2 of the SAP (IT, 2000a). Sample containers, sample volumes, preservatives, and holding times for the analyses required in this SI are listed in Section 5.0, Table 5-1, of Appendix B of the SAP (IT, 2000a). Sample documentation and chain-of-custody records were completed as specified in Section 4.13 of the SAP (IT, 2000a).

Completed analysis request and chain-of-custody records (Appendix A) were secured and included with each shipment of sample coolers to Quanterra Environmental Services in Knoxville, Tennessee. Split samples were shipped to the USACE South Atlantic Division Laboratory in Marietta, Georgia.

3.7 Investigation-Derived Waste Management and Disposal

Investigation-derived waste (IDW) was managed and disposed as outlined in Appendix D of the SAP (IT, 2000a). The IDW generated during the SI at the Trenches West of Iron Mountain Road, Parcel 500(7), was segregated as follows:

- Drill cuttings
- Purge water from well development and sampling activities, and decontamination fluids
- Personal protective equipment.

Solid IDW was stored inside the fenced area surrounding Buildings 335 and 336 in lined roll-off bins prior to characterization and final disposal. Solid IDW was characterized using toxicity characteristic leaching procedure analyses. Based on the results, drill cuttings, and personal protective equipment generated during the SI were disposed as nonregulated waste at the Industrial Waste Landfill on the Main Post of FTMC.

Liquid IDW was contained in the existing 20,000-gallon sump associated with the Building T-338 vehicle washrack. Liquid IDW was characterized by VOC, SVOC, and metals analyses. Based on the analyses, liquid IDW was discharged as nonregulated waste to the FTMC wastewater treatment plant on the Main Post.

3.8 Variances/Nonconformances

One variance to the SFSP was recorded during completion of the SI at the Trenches West of Iron Mountain Road, Parcel 500(7). The variance did not alter the intent of the investigation or the sampling rationale presented in the SFSP (IT, 1999). The variance is summarized in Table 3-7 and is included in Appendix G.

There were not any nonconformances to the SFSP recorded during completion of the SI.

3.9 Data Quality

The field sample analytical data are presented in tabular form in Appendix E. The field samples were collected, documented, handled, analyzed, and reported in a manner consistent with the SI work plan; the FTMC SAP and quality assurance plan; and standard, accepted methods and

Table 3-7

Variance to the Site-Specific Field Sampling Plan
Trenches West of Iron Mountain Road, Parcel 500(7)
Fort McClellan, Calhoun County, Alabama

Variance to the SFSP	Justification for Variance	Impact to Site Investigation
The SFSP proposed collection of a groundwater sample from monitoring well FTA-500-MW03. The well was installed but a groundwater sample was not collected.	Permanent monitoring well FTA-500-MW03 was installed; however, groundwater was not present in sufficient quantity to allow the collection of a groundwater sample.	The location of permanent monitoring well FTA-500-MW03 is hydraulically upgradient of the site. The other two wells are downgradient of the site and would indicate the presence of contaminants if present. Therefore, the inability to collect a groundwater sample from FTA-500-MW03 had no impact to the site investigation.

SFSP – Site-specific field sampling plan.

procedures. As discussed in Section 3.8, one variance to the SFSP was recorded during completion of the SI. However, the variance did not impact the usability of the data.

Data Validation. A complete (100 percent) Level III data validation effort was performed on the reported analytical data. Appendix F consists of a data validation summary report that discusses the results of the validation. Selected results were rejected or otherwise qualified based on the implementation of accepted data validation procedures and practices. These qualified parameters are highlighted in the report. The validation-assigned qualifiers were added to the FTMC IT Environmental Management System™ database for tracking and reporting. The qualified data were used in comparisons to the site-specific screening levels (SSSL) and ecological screening values (ESV). Rejected data (assigned an "R" qualifier) were not used in comparisons to the SSSLs and ESVs.

The data presented in this report, except where qualified, meet the principle data quality objective for this SI.

4.0 Site Characterization

Subsurface investigations performed at the Trenches West of Iron Mountain Road, Parcel 500(7), provided soil 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 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 (Szabo 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 is comprised of dark gray, medium- to thick-bedded, fossiliferous, argillaceous to silty limestone with chert nodules. These limestone units are mapped together as undifferentiated at FTMC and 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 al., 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 (Szabo et al., 1988). This unit locally occurs 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 on the basis of fossil data.

The Jacksonville Thrust Fault is the most significant structural geologic feature in the vicinity 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).

4.1.2 Site Geology

Soils at the Trenches West of Iron Mountain Road, Parcel 500(7), are mapped as Anniston and Allen gravelly loams, 10 to 15 percent slopes, eroded (AcD2). This mapping unit consists of friable soils that have developed in old alluvium on foot slopes and along the base of mountains. Severely eroded benches and shallow gullies are common in many areas. The color of the surface soil ranges from very dark brown and dark brown to reddish brown and dark reddish brown. The texture of subsoil ranges from light clay loam to clay or silty clay loam. Infiltration and runoff are medium, permeability is moderate, and the capacity for available moisture is high. Organic matter is moderately low (U.S. Department of Agriculture, 1961).

As shown on Figure 4-1, bedrock beneath Parcel 500(7) is mapped as the Ordovician Little Oak and Newala Limestones (Osborne et al., 1997). In addition, a splay of the Pell City thrust fault is present just west of Parcel 500(7) and extends north-south. The Cambrian Shady Dolomite is exposed west of the splay fault (Osborne et al., 1997). The area just north of Parcel 500(7) is mapped as the undifferentiated Mississppian/Ordovician Floyd and Athens Shale. The Shady

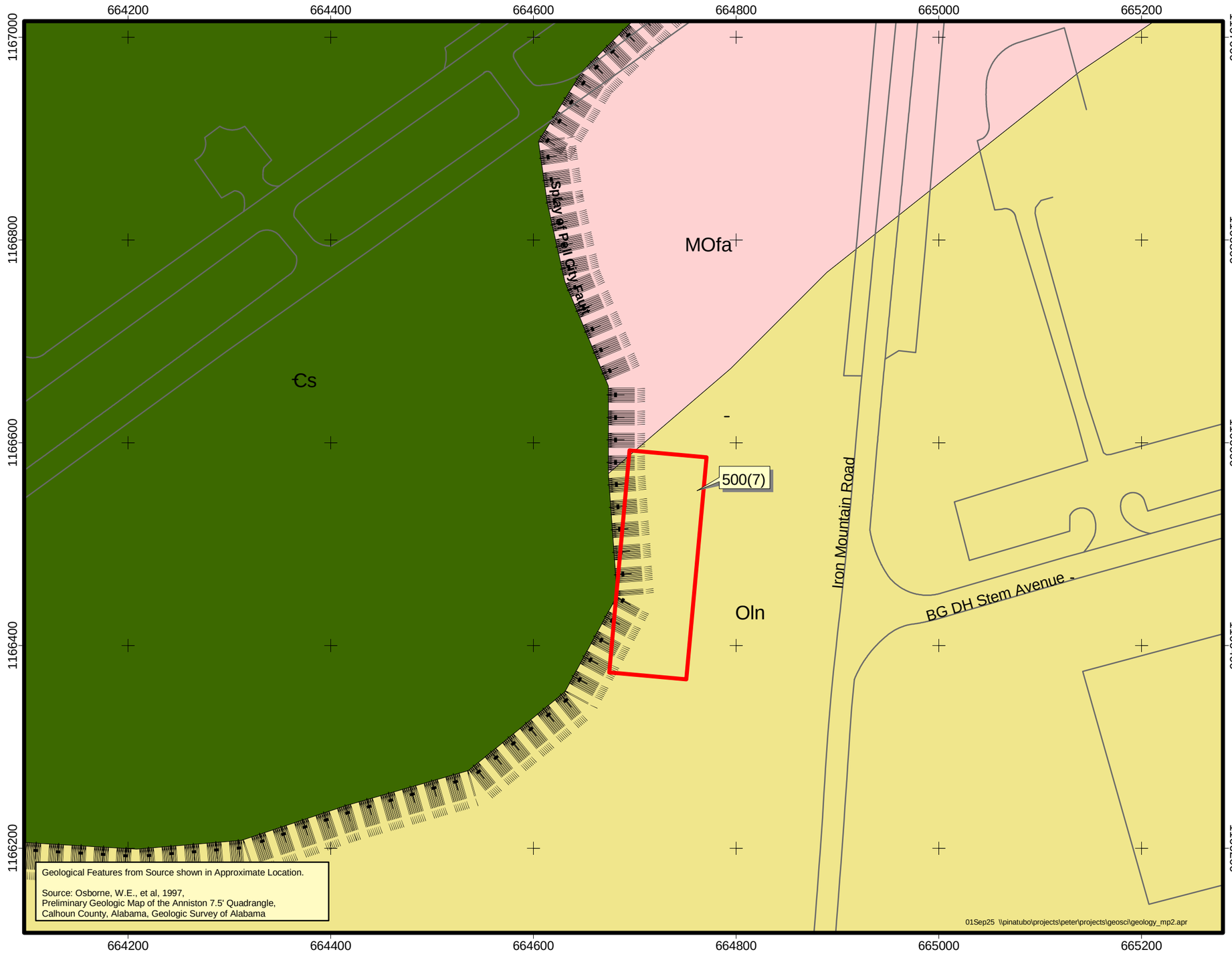

Figure 4-1

Site Geologic Map Trenches West of Iron Mountain Road Parcel 500(7)

Legend

- CERFA Parcel 500(7)
- Roads
- Splay Fault

Geology

- Cs — Cambrian - Shady Dolomite
- MOfa — Mississippian/Ordovician - Floyd & Athens Shale, Undifferentiated
- Oln — Ordovician - Little Oak and Newala Limestones

0 60 120

Alabama State Plane feet, NAD83

Fort McClellan
Environmental Office

N

September 2001

U.S. Army Corps of Engineers
Mobile District
Fort McClellan
Calhoun County, Alabama
Contract No. DACA21-96-D-0018

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Dolomite consists of interlayered bluish-gray or pale yellowish-gray sandy dolomitic limestone and siliceous dolomite with coarsely crystalline, porous chert. The Athens Shale consists of dark-gray to black shale and graptolitic shale with localized interbedded dark gray limestone; the Floyd Shale consists of thin-bedded, fissile, brown to black shale with thin, intercalated limestone layers and interbedded sandstone. The Newala Limestone consists of light- to dark-gray, micritic, thick-bedded limestone with minor dolomite. The Little Oak Limestone is composed of dark gray, medium- to thick-bedded, fossiliferous, argillaceous to silty limestone with chert nodules.

The soil encountered during the DPT and drilling activities at the Trenches West of Iron Mountain Road, Parcel 500(7), ranged from a light-brown to reddish-orange clay with some silt and sand. The clay and silt were found from ground surface to approximately 57 feet bgs in FTA-500-MW01, from ground surface to approximately 79 feet bgs in FTA-500-MW02, and from ground surface to approximately 97 feet bgs in FTA-500-MW03. At FTA-500-MW03, chert fragments, indicative of the Shady Dolomite, were found from approximately 74 to 97 feet bgs. Hollow-stem auger refusal was encountered at 57 feet bgs in FTA-500-MW01, and at 79 feet bgs on limestone in FTA-500-MW02. Air-rotary refusal was encountered on limestone at 97 feet bgs in FTA-500-MW03.

4.2 Site Hydrology

4.2.1 Surface Hydrology

Precipitation in the form of rainfall averages about 54 inches annually in Anniston, Alabama, with infiltration rates annually exceeding evapotranspiration rates (U.S. Department of Commerce, National Oceanic and Atmospheric Administration, 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 towards the Coosa River on the western boundary of Calhoun County.

Site elevation at the Trenches West of Iron Mountain Road, Parcel 500(7), ranges from approximately 830 to 845 feet above mean sea level. The land surface at the site slopes to the east. Surface water runoff follows the general topography and flows to the east.

4.2.2 Hydrogeology

On March 14, 2000, static groundwater levels were measured in permanent monitoring wells at the site and in wells at nearby Parcel 147(7) (Table 3-4). A groundwater elevation map was constructed using the March 2000 data, as shown on Figure 4-2. The groundwater elevation map shows that groundwater flow in the vicinity of Parcel 500(7) is predominately to the east.

DRAFT. CHCK. BY:
ENGR. CHCK. BY: S. MORAN
PROJ. MGR.: J. YACOUB
INITIATOR: D. LAMB
DWG. NO.: ...\774645es.754
PROJ. NO.: 774645

09/26/01 09:43:52 AM
STARTING DATE: 04/17/01
DRAWN BY: D. BOMAR
DATE LAST REV.:
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N
3704
PALISADES ROAD
SUMMERALL GATE ROAD
N 1,166,900
E 664,700
E 665,700
790
788
786
784
782
780
825
850
800
3131
PARCEL 500(7)
IRON MOUNTAIN ROAD
FTA-500-MW03⊕
(DRY)
TRENCHES
FTA-500-MW01
(787.74)
G.W. FLOW
FTA-500-MW02
(787.42)
BG DH STEM AVENUE
3196
FTA-147-GP08
(783.85)
FTA-147-GP01
(789.79)
FTA-147-GP02
(790.16)
3139
FTA-147-GP11
(790.01)
FTA-147-GP07
(789.42)
3146
3147
3148
3149
FTA-147-GP09(W)
(788.16)
FTA-147-GP10(W)
(791.50)
FTA-147-GP05
(789.55)
FTA-147-GP04
(790.62)
PARCEL 147(7)
REMOUNT CREEK
N 1,166,000

LEGEND

- UNIMPROVED ROADS AND PARKING
- PAVED ROADS AND PARKING
- BUILDING
- TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 25 FOOT)
- GROUNDWATER ELEVATION CONTOURS ((DASHED WHERE INFERRED)
- (783.85) GROUNDWATER ELEVATION (FT MSL) (MARCH 14, 2000)
- G.W. FLOW GROUNDWATER FLOW DIRECTION
- TREES / TREELINE
- PARCEL BOUNDARY
- SURFACE DRAINAGE / CREEK
- MANMADE SURFACE DRAINAGE FEATURE
- FENCE
- UTILITY POLE
- RESIDUUM MONITORING WELL LOCATION
- GROUNDWATER SAMPLE LOCATION
- GROUNDWATER, SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION
- GROUNDWATER AND SURFACE SOIL SAMPLE LOCATION

SCALE
0 120 240 FEET

FIGURE 4-2
GROUNWATER ELEVATION MAP TRENCHES WEST OF IRON MOUNTAIN ROAD PARCEL 500(7)

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

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5.0 Summary of Analytical Results

The results of the chemical analysis of samples collected at the Trenches West of Iron Mountain Road, Parcel 500(7), indicates that metals, VOCs, and SVOCs were detected in site media. Explosives were not detected in any of the samples collected at the site. To evaluate whether the detected constituents present an unacceptable risk to human health and the environment, analytical results were compared to the human health SSSLs and ESVs for FTMC. The SSSLs and ESVs were developed by IT for human health and ecological risk evaluations as part of the ongoing SIs being performed under the BRAC Environmental Restoration Program at 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). Summary statistics for background metals samples collected at FTMC (SAIC, 1998) are included in Appendix H.

Six compounds were quantified by both SW-846 Method 8260B (as VOC) and Method 8270C (as SVOC), including 1,2,4-trichlorobenzene, 1,4-dichlorobenzene, 1,3-dichlorobenzene, 1,2-dichlorobenzene, hexachlorobutadiene, and naphthalene. Method 8260B yields a reporting limit of 0.005 milligrams per kilogram (mg/kg), while Method 8270C has a reporting limit of 0.330 mg/kg, which is typical for a soil matrix sample. Because of the direct nature of the Method 8260B analysis and its resulting lower reporting limit, this method should be considered superior to Method 8270C when quantifying low levels (0.005 to 0.330 mg/kg) of these compounds. Method 8270C and its associated methylene chloride extraction step is superior, however, when dealing with samples that contain higher concentrations (greater than 0.330 mg/kg) of these compounds. Therefore all data were considered, and none were categorically excluded. Data validation qualifiers were helpful in evaluating the usability of data, especially if calibration, blank contamination, precision, or accuracy indicator anomalies were encountered. The validation qualifiers and concentrations reported (e.g., whether concentrations were less than or greater than 0.330 mg/kg) were used to determine which analytical method was likely to return the more accurate result.

The following sections and Tables 5-1 through 5-3 summarize the results of the comparisons of detected constituents to the SSSLs, ESVs, and background screening values. Complete analytical results are presented in Appendix E.

Table 5-1

Surface Soil Analytical Results
Trenches West of Iron Mountain Road, Parcel 500(7)
Fort McClellan, Calhoun County, Alabama

Parcel					FTA-500					FTA-500					FTA-500				
Sample Location					FTA-500-GP01					FTA-500-GP02					FTA-500-GP03				
Sample Number					CG0001					CG0003					CG0005				
Sample Date					9-Dec-99					9-Dec-99					9-Dec-99				
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	5.65E+03	J			YES	7.41E+03	J			YES	7.42E+03	J			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	7.90E+00			YES		5.00E+00			YES		1.13E+01			YES	YES
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	6.67E+01	J				6.79E+01	J				4.52E+01	J			
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	7.70E-01	J				8.80E-01	J	YES			1.40E+00	J	YES		YES
Calcium	mg/kg	1.72E+03	NA	NA	5.98E+02	J				1.72E+02	J				2.97E+02	J			
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	8.90E+00	J			YES	1.30E+01	J			YES	1.05E+01	J			YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	1.01E+01	J				1.38E+01	J				2.02E+01	J	YES		YES
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	1.04E+01	J				6.80E+00	J				2.29E+01	J	YES		
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	2.11E+04	J		YES	YES	2.19E+04	J		YES	YES	3.21E+04	J		YES	YES
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	1.47E+01	J				1.04E+01	J				1.79E+01	J			
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	2.69E+02	J				3.15E+02	J				3.52E+02	J			
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	6.28E+02	J		YES	YES	6.24E+02	J		YES	YES	5.93E+02	J		YES	YES
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	1.00E-01		YES		YES	8.20E-02	B	YES			5.00E-02	B			
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	9.80E+00					1.09E+01		YES			2.20E+01		YES		
Potassium	mg/kg	8.00E+02	NA	NA	7.45E+02					5.65E+02					8.90E+02		YES		
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00	1.40E+00	B		YES	YES	1.20E+00	B		YES	YES	1.00E+00	B		YES	YES
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	1.91E+01	J			YES	2.57E+01	J			YES	2.88E+01	J			YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	3.55E+01	J				2.15E+01	J				8.62E+01	J	YES		YES
VOLATILE ORGANIC COMPOUNDS																			
1,2,4-Trimethylbenzene	mg/kg	NA	3.88E+02	1.00E-01	ND					ND					1.90E-03	J			
1,2-Dichloroethane	mg/kg	NA	6.93E+00	4.00E-01	ND					ND					2.20E-03	J			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	ND					ND					9.30E-03	J			
Acetone	mg/kg	NA	7.76E+02	2.50E+00	4.60E-02					3.80E-02					2.90E-01	J			
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00	4.10E-03	B				4.20E-03	B				5.70E-03	B			
Trichlorofluoromethane	mg/kg	NA	2.33E+03	1.00E-01	3.30E-03	J				3.00E-03	J				1.90E-03	J			
p-Cymene	mg/kg	NA	1.55E+03	NA	ND					ND					ND				
SEMIVOLATILE ORGANIC COMPOUNDS																			
bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	9.30E-01	ND					ND					ND				

Table 5-1

Surface Soil Analytical Results
Trenches West of Iron Mountain Road, Parcel 500(7)
Fort McClellan, Calhoun County, Alabama

Parcel					FTA-500					FTA-500					FTA-500				
Sample Location					FTA-500-GP04					FTA-500-MW01					FTA-500-MW02				
Sample Number					CG0007					CG0009					CG0011				
Sample Date					9-Dec-99					9-Dec-99					14-Dec-99				
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	9.42E+03	J		YES	YES	1.02E+04	J		YES	YES	8.63E+03	J		YES	YES
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00	ND					ND					9.40E-01	J			
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	1.74E+01		YES	YES	YES	6.00E+00			YES		1.77E+01	J	YES	YES	YES
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	5.26E+01	J				1.06E+02	J				7.28E+01	J			
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	1.50E+00	J	YES		YES	1.00E+00	J	YES			1.20E+00	J	YES		YES
Calcium	mg/kg	1.72E+03	NA	NA	1.51E+02	J				1.63E+02	J				4.08E+02	J			
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	1.36E+01	J			YES	1.38E+01	J			YES	8.28E+01	J	YES	YES	YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	2.63E+01	J	YES		YES	1.65E+01	J	YES			2.56E+01	J	YES		YES
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	3.20E+01	J	YES			6.90E+00	J				1.42E+01	J	YES		
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	3.78E+04	J	YES	YES	YES	1.62E+04	J		YES	YES	7.03E+04	J	YES	YES	YES
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	1.89E+01	J				1.53E+01	J				2.68E+01	J			
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	4.45E+02	J				4.57E+02	J				3.88E+02	J			
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	7.66E+02	J		YES	YES	1.20E+03	J		YES	YES	1.19E+03	J		YES	YES
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	7.80E-02	B				6.80E-02	B				6.00E-02	B			
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	3.18E+01		YES		YES	1.09E+01		YES			1.74E+01		YES		
Potassium	mg/kg	8.00E+02	NA	NA	9.99E+02		YES			4.38E+02	J				6.05E+02	J			
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00	1.30E+00	B		YES	YES	1.80E+00	B		YES	YES	1.90E+00	B		YES	YES
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	3.35E+01	J			YES	2.18E+01	J			YES	4.98E+01	J			YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	1.01E+02	J	YES		YES	2.95E+01	J				7.02E+01	J	YES		YES
VOLATILE ORGANIC COMPOUNDS																			
1,2,4-Trimethylbenzene	mg/kg	NA	3.88E+02	1.00E-01	ND					ND					ND				
1,2-Dichloroethane	mg/kg	NA	6.93E+00	4.00E-01	ND					ND					ND				
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	1.40E-02	J				ND					5.00E-03	J			
Acetone	mg/kg	NA	7.76E+02	2.50E+00	3.10E-01					1.00E-01					1.30E-01	J			
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00	5.20E-03	B				4.00E-03	B				6.30E-03	B			
Trichlorofluoromethane	mg/kg	NA	2.33E+03	1.00E-01	2.90E-03	J				ND					ND				
p-Cymene	mg/kg	NA	1.55E+03	NA	5.20E-03	J				8.90E-04	J				3.00E-02	J			
SEMIVOLATILE ORGANIC COMPOUNDS																			
bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	9.30E-01	ND					ND					1.20E-01	B			

Table 5-1

Surface Soil Analytical Results
Trenches West of Iron Mountain Road, Parcel 500(7)
Fort McClellan, Calhoun County, Alabama

Analyses performed using U.S. Environmental Protection Agency (EPA) SW-846 analytical methods, including Update III methods where applicable.

[a] Bkg - Background. Concentration listed is two times (2x) the arithmetic mean of background metals concentration given in Science Applications International Corporation (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 Corporation (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 (and greater than zero).

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

mg/kg - Milligrams per kilogram.

NA - Not available.

ND - Not detected.

Qual - Data validation qualifier.

Table 5-2

Subsurface Soil Analytical Results
Trenches West of Iron Mountain Road, Parcel 500(7)
Fort McClellan, Calhoun County, Alabama

Parcel Sample Location Sample Number Sample Date Sample Depth (Feet)				FTA-500 FTA-500-GP01 CG0002 9-Dec-99 2-4				FTA-500 FTA-500-GP02 CG0004 9-Dec-99 2-4				FTA-500 FTA-500-GP03 CG0006 9-Dec-99 2 - 3.5			
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**Result**	**Qual**	**>BKG**	**>SSSL**	**Result**	**Qual**	**>BKG**	**>SSSL**	**Result**	**Qual**	**>BKG**	**>SSSL**
METALS															
Aluminum	mg/kg	1.36E+04	7.80E+03	6.11E+03	J			9.11E+03	J		YES	5.92E+03	J		
Arsenic	mg/kg	1.83E+01	4.26E-01	9.40E+00			YES	6.00E+00			YES	1.17E+01			YES
Barium	mg/kg	2.34E+02	5.47E+02	7.73E+01	J			2.55E+01	J			1.67E+01	J		
Beryllium	mg/kg	8.60E-01	9.60E+00	1.10E+00	J	YES		7.20E-01	J			1.60E+00	J	YES	
Calcium	mg/kg	6.37E+02	NA	1.93E+02	J			3.19E+01	J			ND			
Chromium	mg/kg	3.83E+01	2.32E+01	1.97E+01	J			2.05E+01	J			8.80E+00	J		
Cobalt	mg/kg	1.75E+01	4.68E+02	1.42E+01	J			4.90E+00	J			9.00E+00	J		
Copper	mg/kg	1.94E+01	3.13E+02	1.52E+01	J			1.85E+01	J			2.74E+01	J	YES	
Iron	mg/kg	4.48E+04	2.34E+03	3.61E+04	J		YES	3.54E+04	J		YES	3.64E+04	J		YES
Lead	mg/kg	3.85E+01	4.00E+02	1.64E+01	J			9.20E+00	J			1.67E+01	J		
Magnesium	mg/kg	7.66E+02	NA	2.18E+02	J			3.17E+02	J			1.81E+02	J		
Manganese	mg/kg	1.36E+03	3.63E+02	8.27E+02	J		YES	1.49E+02	J			2.25E+02	J		
Mercury	mg/kg	7.00E-02	2.33E+00	1.60E-01		YES		6.50E-02	B			3.70E-02	B		
Nickel	mg/kg	1.29E+01	1.54E+02	1.50E+01		YES		1.02E+01				2.34E+01		YES	
Potassium	mg/kg	7.11E+02	NA	8.58E+02		YES		1.34E+03		YES		7.68E+02		YES	
Thallium	mg/kg	1.40E+00	5.08E-01	1.00E+00	B		YES	5.60E-01	B		YES	9.50E-01	B		YES
Vanadium	mg/kg	6.49E+01	5.31E+01	2.82E+01	J			4.19E+01	J			3.01E+01	J		
Zinc	mg/kg	3.49E+01	2.34E+03	5.37E+01	J	YES		2.99E+01	J			9.52E+01	J	YES	
VOLATILE ORGANIC COMPOUNDS															
Acetone	mg/kg	NA	7.76E+02	ND				2.30E-02				1.70E-02	J		
Methylene chloride	mg/kg	NA	8.41E+01	4.80E-03	B			4.00E-03	B			5.80E-03	B		
Trichlorofluoromethane	mg/kg	NA	2.33E+03	3.70E-03	J			3.40E-03	J			3.10E-03	J		

Table 5-2

Subsurface Soil Analytical Results
Trenches West of Iron Mountain Road, Parcel 500(7)
Fort McClellan, Calhoun County, Alabama

Parcel				FTA-500				FTA-500				FTA-500			
Sample Location				FTA-500-GP04				FTA-500-MW01				FTA-500-MW02			
Sample Number				CG0008				CG0010				CG0014			
Sample Date				10-Dec-99				9-Dec-99				10-Dec-99			
Sample Depth (Feet)				2-3				6-8				2-4			
Parameter	Units	BKG[a]	SSSL[b]	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL
METALS															
Aluminum	mg/kg	1.36E+04	7.80E+03	5.84E+03	J			9.66E+03	J		YES	1.04E+04	J		YES
Arsenic	mg/kg	1.83E+01	4.26E-01	1.56E+01			YES	1.88E+01		YES	YES	1.61E+01			YES
Barium	mg/kg	2.34E+02	5.47E+02	1.39E+01	J			3.95E+01	J			4.34E+01	J		
Beryllium	mg/kg	8.60E-01	9.60E+00	2.00E+00	J	YES		1.60E+00	J	YES		1.40E+00	J	YES	
Calcium	mg/kg	6.37E+02	NA	1.85E+01	J			6.49E+01	J			2.33E+02	J		
Chromium	mg/kg	3.83E+01	2.32E+01	8.40E+00	J			1.82E+01	J			1.25E+01	J		
Cobalt	mg/kg	1.75E+01	4.68E+02	1.29E+01	J			1.02E+01	J			2.25E+01	J	YES	
Copper	mg/kg	1.94E+01	3.13E+02	2.95E+01	J	YES		2.60E+01	J	YES		1.93E+01	J		
Iron	mg/kg	4.48E+04	2.34E+03	3.87E+04	J		YES	4.41E+04	J		YES	3.25E+04	J		YES
Lead	mg/kg	3.85E+01	4.00E+02	1.28E+01	J			1.98E+01	J			1.67E+01	J		
Magnesium	mg/kg	7.66E+02	NA	2.54E+02	J			3.87E+02	J			5.85E+02	J		
Manganese	mg/kg	1.36E+03	3.63E+02	2.16E+02	J			4.50E+02	J		YES	6.23E+02	J		YES
Mercury	mg/kg	7.00E-02	2.33E+00	4.00E-02	B			6.50E-02	B			7.50E-02	B	YES	
Nickel	mg/kg	1.29E+01	1.54E+02	3.20E+01		YES		2.38E+01		YES		2.24E+01		YES	
Potassium	mg/kg	7.11E+02	NA	7.08E+02				8.18E+02		YES		6.70E+02			
Thallium	mg/kg	1.40E+00	5.08E-01	8.70E-01	B		YES	1.60E+00	B	YES	YES	1.30E+00	B		YES
Vanadium	mg/kg	6.49E+01	5.31E+01	2.60E+01	J			3.87E+01	J			3.24E+01	J		
Zinc	mg/kg	3.49E+01	2.34E+03	1.20E+02	J	YES		8.55E+01	J	YES		6.83E+01	J	YES	
VOLATILE ORGANIC COMPOUNDS															
Acetone	mg/kg	NA	7.76E+02	ND				ND				4.60E-02			
Methylene chloride	mg/kg	NA	8.41E+01	5.50E-03	B			8.60E-03	B			5.10E-03	B		
Trichlorofluoromethane	mg/kg	NA	2.33E+03	ND				1.00E-02	J			4.40E-03	J		

Analyses performed using U.S. Environmental Protection Agency (EPA) SW-846 analytical methods, including Update III methods where applicable.

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

[b] Residential human health site-specific screening level (SSSL) as given in IT Corporation (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 (and greater than zero).

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

mg/kg - Milligrams per kilogram.

NA - Not available.

ND - Not detected.

Qual - Data validation qualifier.

Table 5-3

Groundwater Analytical Results
Trenches West of Iron Mountain Road, Parcel 500(7)
Fort McClellan, Calhoun County, Alabama

Parcel				FTA-500				FTA-500			
Sample Location				FTA-500-MW01				FTA-500-MW02			
Sample Number				CG3001				CG3002			
Sample Date				4-Jul-00				15-Jun-00			
Parameter	Units	BKG[a]	SSSL[b]	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL
METALS											
Aluminum	mg/L	2.34E+00	1.56E+00	3.01E-01	B			3.12E+00		YES	YES
Barium	mg/L	1.27E-01	1.10E-01	1.36E-02	J			3.80E-02	J		
Beryllium	mg/L	1.24E-03	3.12E-03	ND				1.00E-03	J		
Calcium	mg/L	5.65E+01	NA	5.07E-01	B			1.27E+01			
Chromium	mg/L	NA	4.69E-03	ND				1.63E-02			YES
Cobalt	mg/L	2.34E-02	9.39E-02	4.90E-03	J			3.60E-03	J		
Copper	mg/L	2.55E-02	6.26E-02	ND				6.30E-03	B		
Iron	mg/L	7.04E+00	4.69E-01	1.51E-01	B			6.91E+00			YES
Magnesium	mg/L	2.13E+01	NA	2.79E-01	B			1.74E+00	J		
Manganese	mg/L	5.81E-01	7.35E-02	1.41E-01			YES	3.58E-01			YES
Nickel	mg/L	NA	3.13E-02	2.80E-03	J			2.07E-02	J		
Potassium	mg/L	7.20E+00	NA	1.76E+00	J			3.04E+00	J		
Sodium	mg/L	1.48E+01	NA	8.34E-01	J			1.43E+00	J		
Thallium	mg/L	1.45E-03	1.02E-04	5.40E-03	J	YES	YES	4.80E-03	B	YES	YES
Vanadium	mg/L	1.70E-02	1.10E-02	ND				8.70E-03	J		
Zinc	mg/L	2.20E-01	4.69E-01	5.80E-03	J			5.01E-02	B		
VOLATILE ORGANIC COMPOUNDS											
Acetone	mg/L	NA	1.56E-01	1.40E-03	B			ND			
Chloromethane	mg/L	NA	3.92E-03	ND				1.50E-04	J		

Analyses performed using U.S. Environmental Protection Agency (EPA) SW-846 analytical methods, including Update III methods where applicable.

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

[b] Residential human health site-specific screening level (SSSL) as given in IT Corporation (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 (and greater than zero).

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

mg/L - Milligrams per liter.

NA - Not available.

ND - Not detected.

Qual - Data validation qualifier.

5.1 Surface Soil Analytical Results

Six surface soil samples were collected for chemical analysis at the Trenches West of Iron Mountain Road, Parcel 500(7). Surface soil samples were collected from the upper 1 foot of soil at the locations shown on Figure 3-1. Analytical results were compared to residential human health SSSLs, ESVs, and metals background concentrations, as presented in Table 5-1.

Metals. Nineteen metals were detected in surface soil samples collected at the Trenches West of Iron Mountain Road, Parcel 500(7). Five of the mercury results and all of the thallium results were flagged with a "B" data qualifier, signifying that these metals were also detected in an associated laboratory or field blank sample. Sample location FTA-500-MW02 contained all of the nineteen detected metals. The remaining sample locations each contained all of the detected metals except antimony.

The concentrations of six metals (aluminum, arsenic, chromium, iron, manganese, and thallium) exceeded SSSLs. Of these metals, arsenic (FTA-500-GP04 and FTA-500-MW02), chromium (FTA-500-MW02), and iron (FTA-500-GP04 and FTA-500-MW02) concentrations also exceeded their respective background concentrations. With the exception of the iron result at FTA-500-MW02, the concentrations of these metals were within the range of background values determined by SAIC (1998) (Appendix H). The iron concentration (70,300 mg/kg) exceeded the range of background values for iron in surface soils (34,200 to 56,300 mg/kg).

The following metals were detected at concentrations exceeding ESVs and their respective background concentrations: arsenic (two locations), beryllium (three locations), chromium (one location), cobalt (three locations), iron (two locations), mercury (one location), nickel (one location), and zinc (three locations). With the exception of beryllium (FTA-500-GP03, FTA-500-GP04, and FTA-500-MW02), iron (FTA-500-MW02), and nickel (FTA-500-GP04), the concentrations of these metals were within the range of background values determined by SAIC (1998). The beryllium concentrations were 1.4 mg/kg, 1.5 mg/kg, and 1.2 mg/kg respectively, the iron concentration was 70,300 mg/kg, and the nickel concentration was 31.8 mg/kg. The range of background concentrations for these metals is 0.062 to 0.87 mg/kg for beryllium, 2,510 to 56,300 mg/kg for iron, and 1.8 to 22 mg/kg for nickel.

Volatile Organic Compounds. Seven VOCs were detected in surface soil samples collected at the Trenches West of Iron Mountain Road, Parcel 500(7). The methylene chloride results

were flagged with a "B" data qualifier, signifying that this compound was also detected in an associated laboratory or field blank sample. Sample location FTA-500-GP03 contained six of the seven detected VOCs. VOC concentrations in the surface soil samples ranged from 0.00089 to 0.31 mg/kg.

The VOC concentrations in surface soils were below SSSLs and ESVs.

Semivolatile Organic Compounds. One SVOC (bis[2-ethylhexyl]phthalate) was detected in one surface soil sample (FTA-500-MW02) collected at the Trenches West of Iron Mountain Road, Parcel 500(7). The bis(2-ethylhexyl)phthalate result was flagged with a "B" data qualifier, signifying that the compound was also detected in the associated laboratory or field blank sample.

The bis(2-ethylhexyl)phthalate concentration was below the SSSL and the ESV.

5.2 Subsurface Soil Analytical Results

Six subsurface soil samples were collected for chemical analysis at the Trenches West of Iron Mountain Road, Parcel 500(7). Subsurface soil samples were collected at depths greater than 1 foot bgs at the locations shown on Figure 3-1. Analytical results were compared to residential human health SSSLs and metals background concentrations, as presented in Table 5-2.

Metals. Eighteen metals were detected in subsurface soil samples collected at the Trenches West of Iron Mountain Road, Parcel 500(7). The thallium results and five of the mercury results were flagged with a "B" data qualifier, signifying that these metals were also detected in an associated laboratory or field blank sample. Five of the six subsurface soil samples contained all of the detected metals.

The concentrations of aluminum (three locations), arsenic (six locations), iron (six locations), manganese (three locations), and thallium (six locations) exceeded SSSLs. With the exception of arsenic and thallium at sample location FTA-500-MW01, these metals concentrations were below their respective background concentrations. The arsenic and thallium results, however, were within the range of background values determined by SAIC (1998) (Appendix H).

Volatile Organic Compounds. Three VOCs (acetone, methylene chloride, and trichlorofluoromethane) were detected in subsurface soil samples collected at the Trenches West of Iron Mountain Road, Parcel 500(7). The methylene chloride results were flagged with a "B" data qualifier, signifying that this compound was also detected in an associated laboratory or field blank sample. VOC concentrations in the subsurface soil samples ranged from 0.0031 to 0.046 mg/kg.

The VOC concentrations in subsurface soils were below SSSLs.

Semivolatile Organic Compounds. SVOCs were not detected in the subsurface soil samples collected at the Trenches West of Iron Mountain Road, Parcel 500(7).

5.3 Groundwater Analytical Results

Groundwater samples were collected from two of the three permanent monitoring wells (FTA-500-MW01 and FTA-500-MW02) installed at the Trenches West of Iron Mountain Road, Parcel 500(7). The well locations are shown on Figure 3-1. Analytical results were compared to residential human health SSSLs and metals background concentrations, as presented in Table 5-3.

Metals. Sixteen metals were detected in groundwater samples collected at the Trenches West of Iron Mountain Road, Parcel 500(7). The following results were flagged with a "B" data qualifier in the groundwater sample collected at FTA-500-MW01: aluminum, calcium, iron, and magnesium. The following results were flagged with a "B" qualifier in the groundwater sample collected at FTA-500-MW02: copper, thallium, and zinc. A "B" data qualifier signifies that the metal was also detected in an associated laboratory or field blank sample. The sample collected at FTA-500-MW02 contained each of the sixteen detected metals.

Aluminum (FTA-500-MW02), chromium (FTA-500-MW02), iron (FTA-500-MW02), manganese (both locations), and thallium (both locations) concentrations exceeded SSSLs. Of these metals, the aluminum and thallium results also exceeded their respective background concentrations. With the exception of thallium in FTA-500-MW01, the results were within the range of background values determined by SAIC (1998) (Appendix H). The thallium concentration in FTA-500-MW01 (0.0054 milligrams per liter [mg/L]) marginally exceeded the range of background values for thallium in groundwater (0.00146 to 0.0053 mg/L).

Volatile Organic Compounds. Two VOCs (acetone and chloromethane) were detected in groundwater samples collected at the Trenches West of Iron Mountain Road, Parcel 500(7). Acetone was detected only in FTA-500-MW01 and the analytical result was flagged with a "B" data qualifier, signifying that this compound was also detected in an associated laboratory or field blank sample. Chloromethane was detected only in FTA-500-MW02.

The VOC concentrations in groundwater were below SSSLs.

Semivolatile Organic Compounds. SVOCs were not detected in the groundwater samples collected at the Trenches West of Iron Mountain Road, Parcel 500(7).

6.0 Summary, Conclusions, and Recommendations

IT, under contract with USACE, completed an SI at the Trenches West of Iron Mountain Road, Parcel 500(7), at FTMC in Calhoun County, Alabama. The SI was conducted to determine whether chemical constituents are present at the site at concentrations that present an unacceptable risk to human health or the environment. The SI at the Trenches West of Iron Mountain Road, Parcel 500(7), consisted of the sampling and analysis of six surface soil samples, six subsurface soil samples, and two groundwater samples. In addition, three permanent monitoring wells were installed in the residuum groundwater zone to facilitate groundwater sample collection and provide site-specific geological and hydrogeological characterization information.

Chemical analysis of samples collected at the Trenches West of Iron Mountain Road, Parcel 500(7), indicates that metals, VOCs, and SVOCs were detected in site media. Explosive compounds were not detected in any of the samples collected at the site. Analytical results were compared to the human health SSSLs and ESVs for FTMC. The SSSLs and ESVs were developed by IT for human health and ecological risk evaluations as part of the ongoing SIs being performed under the BRAC Environmental Restoration Program at FTMC. Additionally, metals concentrations exceeding SSSLs and ESVs were compared to media-specific background screening values (SAIC, 1998).

The potential threat to human health is expected to be very low. Although the site is projected to be incorporated into the Eastern Bypass, the analytical data were screened against residential human health SSSLs to evaluate the site for unrestricted land reuse. With the exception of iron in one surface soil sample, the metals that exceeded SSSLs in soils were below their respective background concentration or within the range of background values and thus do not pose an unacceptable risk to future human receptors. VOC and SVOC concentrations in soils were below SSSLs.

In groundwater, thallium (one location) was present at a concentration exceeding the SSSL and the range of background values. VOC concentrations in groundwater were below SSSLs, and SVOCs were not detected in groundwater. Consequently, the overall impact to groundwater at the site is negligible and the potential threat to human health is expected to be very low.

With the exception of beryllium (three locations), iron (one location), and nickel (one location) in surface soils, the metals that exceeded ESVs were below their respective background concentration or within the range of background values. VOC and SVOC concentrations in site media were below ESVs. Based on the low levels of metals, VOCs, and SVOCs detected, the potential threat to ecological receptors is expected to be very low.

Based on the results of the SI, past operations at the Trenches West of Iron Mountain Road, Parcel 500(7), do not appear to have adversely impacted the environment. The metals and chemical constituents detected in site media do not pose an unacceptable risk to human health and the environment. Therefore, IT recommends "No Further Action" and unrestricted land reuse with regard to hazardous, toxic, and radioactive waste at the Trenches West of Iron Mountain Road, Parcel 500(7).

7.0 References

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ATTACHMENT 1

LIST OF ABBREVIATIONS AND ACRONYMS

List of Abbreviations and Acronyms

2,4-D	2,4-dichlorophenoxyacetic acid
2,4,5-T	2,4,5-trichlorophenoxyacetic acid
2,4,5-TP	silvex
3D	3D International Environmental Group
Abs	skin absorption
Amsl	above mean sea level
AC	hydrogen cyanide
AcB2	Anniston and Allen gravelly loams, 2 to 6 percent slopes, eroded
AcC2	Anniston and Allen gravelly loams, 6 to 10 percent slopes, eroded
AcD2	Anniston and Allen gravelly loams, 10 to 15 percent slopes, eroded
AcE2	Anniston and Allen gravelly loams, 15 to 25 percent slopes, eroded
ACGIH	American Conference of Governmental Industrial Hygienists
ADEM	Alabama Department of Environmental Management
AEC	U.S. Army Environmental Center
AEL	airborne exposure limit
AHA	ammunition holding area
AL	Alabama
amb.	amber
ANAD	Anniston Army Depot
AOC	area of concern
APT	armor-piercing tracer
ARAR	applicable or relevant and appropriate requirement
AREE	area requiring environmental evaluation
ASP	Ammunition Supply Point
ASR	Archives Search Report
AST	aboveground storage tank
ASTM	American Society for Testing and Materials
ATV	all-terrain vehicle
AWWSB	Anniston Water Works and Sewer Board
'B'	Analyte detected in laboratory or field blank at concentration greater than the reporting limit (and greater than zero)
BCF	blank correction factor
BCT	BRAC Cleanup Team
BEHP	bis(2-ethylhexyl)phthalate
BFB	bromofluorobenzene
BFE	base flood elevation
BG	Bacillus globigii
bgs	below ground surface
BHC	betahexachlorocyclohexane
bkg	background
bls	below land surface
BOD	biological oxygen demand
BRAC	Base Realignment and Closure
Braun	Braun Intertec Corporation
BSC	background screening criterion
BTAG	Biological Technical Assistance Group
BTEX	benzene, toluene, ethyl benzene, and xylenes
BTOC	below top of casing
BTV	background threshold value
BW	biological warfare
BZ	breathing zone; 3-quinuclidinyl benzilate
C	ceiling limit value
Ca	carcinogen
CAB	chemical warfare agent breakdown products
CAMU	corrective action management unit
CCAL	continuing calibration
CCB	continuing calibration blank
CD	compact disc
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERFA	Community Environmental Response Facilitation Act
CESAS	Corps of Engineers South Atlantic Savannah
CG	carbonyl chloride (phosgene)
CFC	chlorofluorocarbon
ch	inorganic clays of high plasticity
CHPPM	U.S. Army Center for Health Promotion and Preventive Medicine
CK	cyanogen chloride
cl	inorganic clays of low to medium plasticity
Cl.	chlorinated
CLP	Contract Laboratory Program
CN	chloroacetophenone
CNB	chloroacetophenone, benzene, and carbon tetrachloride
CNS	chloroacetophenone, chloropicrin, and chloroform
Co-60	cobalt-60
COC	chain of custody; contaminant of concern
COE	Corps of Engineers
Con	skin or eye contact
COPC	contaminant of potential concern
COPEC	contaminant of potential environmental concern
CRL	certified reporting limit
CRZ	contamination reduction zone
Cs-137	cesium-137
CS	ortho-chlorobenzylidene-malononitrile
CSEM	conceptual site exposure model
ctr.	container
CWA	chemical warfare agent
CWM	chemical warfare material; clear, wide mouth
CX	dichloroformoxime
'D'	duplicate; dilution
DAF	dilution-attenuation factor
DANC	decontamination agent, non-corrosive
°C	degrees Celsius
°F	degrees Fahrenheit
DCE	dichloroethene
DDD	dichlorodiphenyldichloroethane
DDE	dichlorodiphenyldichloroethene
DDT	dichlorodiphenyltrichloroethane
DEH	Directorate of Engineering and Housing
DEP	depositional soil
DI	deionized
DIMP	di-isopropylmethylphosphonate
DMMP	dimethylmethylphosphonate
DOD	U.S. Department of Defense
DOJ	U.S. Department of Justice
DOT	U.S. Department of Transportation
DP	direct-push
DPDO	Defense Property Disposal Office
DPT	direct-push technology
DQO	data quality objective
DRMO	Defense Reutilization and Marketing Office
DRO	diesel range organics
DS	deep (subsurface) soil
DS2	Decontamination Solution Number 2
DWEL	drinking water equivalent level
E&E	Ecology and Environment, Inc.
EBS	environmental baseline survey
EE/CA	engineering evaluation and cost analysis
Elev.	elevation
EM	electromagnetic
EM31	Geonics Limited EM31 Terrain Conductivity Meter
EM61	Geonics Limited EM61 High-Resolution Metal Detector
EOD	explosive ordnance disposal
EODT	explosive ordnance disposal team
EPA	U.S. Environmental Protection Agency
EPC	exposure point concentration
EPIC	Environmental Photographic Interpretation Center
ER	equipment rinsate
ESE	Environmental Science and Engineering, Inc.
ESN	Environmental Services Network, Inc.
ESV	ecological screening value
Exp.	explosives
E-W	east to west
EZ	exclusion zone
FAR	Federal Acquisition Regulations
FB	field blank
FD	field duplicate
FedEx	Federal Express, Inc.
FEMA	Federal Emergency Management Agency
FFE	field flame expedient
Fil	filtered
Flt	filtered
FML	flexible membrane liner
FMP 1300	Former Motor Pool 1300
FOMRA	Former Ordnance Motor Repair Area
Foster Wheeler	Foster Wheeler Environmental Corporation

List of Abbreviations and Acronyms *(Continued)*

Frtn	fraction
FS	field split; feasibility study
FSP	field sampling plan
ft	feet
ft/ft	feet per foot
FTA	Fire Training Area
FTMC	Fort McClellan
FTRRA	FTMC Reuse & Redevelopment Authority
g	gram
G-856	Geometrics, Inc. G-856 magnetometer
G-858G	Geometrics, Inc. G-858G magnetic gradiometer
gal	gallon
gal/min	gallons per minute
GB	sarin
gc	clay gravels; gravel-sand-clay mixtures
GC	gas chromatograph
GC/MS	gas chromatograph/mass spectrometer
GCR	geosynthetic clay liner
GFAA	graphite furnace atomic absorption
GIS	Geographic Information System
gm	silty gravels; gravel-sand-silt mixtures
gp	poorly graded gravels; gravel-sand mixtures
gpm	gallons per minute
GPR	ground-penetrating radar
GPS	global positioning system
GS	ground scar
GSA	General Services Administration; Geologic Survey of Alabama
GSBP	Ground Scar Boiler Plant
GSSI	Geophysical Survey Systems, Inc.
GST	ground stain
GW	groundwater
gw	well-graded gravels; gravel-sand mixtures
HA	hand auger
HCl	hydrochloric acid
HD	distilled mustard
HDPE	high-density polyethylene
Herb.	herbicides
HNO_3	nitric acid
hr	hour
H&S	health and safety
HSA	hollow-stem auger
HTRW	hazardous, toxic, and radioactive waste
‘I’	out of control, data rejected due to low recovery
ICAL	initial calibration
ICB	initial calibration blank
ICP	inductively-coupled plasma
ICRP	International Commission on Radiological Protection
ICS	interference check sample
ID	inside diameter
IDL	instrument detection limit
IDLH	immediately dangerous to life or health
IDM	investigative-derived media
IDW	investigation-derived waste
ILCR	incremental lifetime cancer risk
IMPA	isopropylmethyl phosphonic acid
IMR	Iron Mountain Road
in.	inch
Ing	ingestion
Inh	inhalation
IP	ionization potential
IPS	International Pipe Standard
IRDMIS	Installation Restoration Data Management Information System
ISCP	Installation Spill Contingency Plan
IT	IT Corporation
ITEMS	IT Environmental Management System ™
‘J’	estimated concentration
JeB2	Jefferson gravelly fine sandy loam, 2 to 6 percent slopes, eroded
JeC2	Jefferson gravelly fine sandy loam, 6 to 10 percent slopes, eroded
JfB	Jefferson stony fine sandy loam, 0 to 10 percent slopes have strong slopes
JPA	Joint Powers Authority
K	conductivity
L	lewisite; liter
LC_{50}	lethal concentration for 50 percent of population tested
LD_{50}	lethal dose for 50 percent of population tested
l	liter
LCS	laboratory control sample
LEL	lower explosive limit
LOAEL	lowest-observed-adverse-effects-level
LT	less than the certified reporting limit
LUC	land-use control
LUCAP	land-use control assurance plan
LUCIP	land-use control implementation plan
max	maximum
MCL	maximum contaminant level
MDC	maximum detected concentration
MDL	method detection limit
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
mg/m^3	milligrams per cubic meter
mh	inorganic silts, micaceous or diatomaceous fine, sandy or silt soils
MHz	megahertz
µg/g	micrograms per gram
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
µmhos/cm	micromhos per centimeter
min	minimum
MINICAMS	miniature continuous air sampling system
ml	inorganic silts and very fine sands
mL	milliliter
mm	millimeter
MM	mounded material
MOGAS	motor vehicle gasoline
MPA	methyl phosphonic acid
MR	molasses residue
MS	matrix spike
mS/cm	millisiemens per centimeter
MSD	matrix spike duplicate
MTBE	methyl tertiary butyl ether
msl	mean sea level
MtD3	Montevallo shaly, silty clay loam, 10 to 40 percent slopes , severely eroded
mV	millivolts
MW	monitoring well
NA	not applicable; not available
NAD	North American Datum
NAD83	North American Datum of 1983
NAVD88	North American Vertical Datum of 1988
NCP	National Contingency Plan
ND	not detected
NE	no evidence; northeast
ne	not evaluated
NFA	No Further Action
ng/L	nanograms per liter
NGVD	National Geodetic Vertical Datum
NIC	notice of intended change
NIOSH	National Institute for Occupational Safety and Health
NPDES	National Pollutant Discharge Elimination System
No.	number
NOAA	National Oceanic and Atmospheric Administration
NOAEL	no-observed-adverse-effects-level
NR	not requested; not recorded
ns	nanosecond
N-S	north to south
NS	not surveyed
nT	nanotesla
NTU	nephelometric turbidity unit
nv	not validated
O&G	oil and grease
O&M	operating and maintenance
OD	outside diameter
OE	ordnance and explosives
oh	organic clays of medium to high plasticity
ol	organic silts and organic silty clays of low plasticity
OP	organophosphorus
ORP	oxidation-reduction potential

List of Abbreviations and Acronyms *(Continued)*

OSHA	Occupational Safety and Health Administration
OWS	oil/water separator
oz	ounce
PA	preliminary assessment
PAH	polynuclear aromatic hydrocarbon
Parsons	Parsons Engineering Science, Inc.
Pb	lead
PCB	polychlorinated biphenyl
PCE	perchloroethene
PCP	pentachlorophenol
PDS	Personnel Decontamination Station
PEL	permissible exposure limit
Pest.	pesticides
PFT	portable flamethrower
PG	professional geologist
PID	photoionization detector
PkA	Philo and Stendal soils local alluvium, 0 to 2 percent slopes
POL	petroleum, oils, and lubricants
PP	peristaltic pump
ppb	parts per billion
PPE	personal protective equipment
ppm	parts per million
PPMP	Print Plant Motor Pool
ppt	parts per thousand
PRG	preliminary remediation goal
PSSC	potential site-specific chemical
pt	peat or other highly organic silts
PVC	polyvinyl chloride
QA	quality assurance
QA/QC	quality assurance/quality control
QAP	installation-wide quality assurance plan
QC	quality control
QST	QST Environmental, Inc.
qty	quantity
Qual	qualifier
'R'	rejected data; resample
RAO	removal action objective
RBC	risk-based concentration
RCRA	Resource Conservation and Recovery Act
RDX	cyclonite
RfD	reference dose
ReB3	Rarden silty clay loams
REG	regular field sample
REL	recommended exposure limit
RFA	request for analysis
RGO	remedial goal option
RI	remedial investigation
RL	reporting limit
RPD	relative percent difference
RRF	relative response factor
RSD	relative standard deviation
RTK	real-time kinematic
SAD	South Atlantic Division
SAE	Society of Automotive Engineers
SAIC	Science Applications International Corporation
SAP	installation-wide sampling and analysis plan
sc	clayey sands; sand-clay mixtures
Sch.	schedule
SD	sediment
SDG	sample delivery group
SDZ	safe distance zone; surface danger zone
SEMS	Southern Environmental Management & Specialties, Inc.
SFSP	site-specific field sampling plan
SGF	standard grade fuels
SHP	installation-wide safety and health plan
SI	site investigation
SL	standing liquid
SLERA	screening-level ecological risk assessment
sm	silty sands; sand-silt mixtures
SM	Serratia marcescens
SOP	standard operating procedure
sp	poorly graded sands; gravelly sands
SP	submersible pump
Sr-90	strontium-90
SRA	streamlined human health risk assessment
Ss	stony rough land, sandstone series
SS	surface soil
SSC	site-specific chemical
SSHO	site safety and health officer
SSHP	site-specific safety and health plan
SSL	soil screening level
SSSL	site-specific screening level
SSSSL	site-specific soil screening level
STB	supertropical bleach
STC	source term concentrations
STEL	short-term exposure limit
STOLS	Surface Towed Ordnance Locator System®
Std. units	standard units
SU	standard unit
SVOC	semivolatile organic compound
SW	surface water
SW-846	U.S. EPA's *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods*
SWPP	storm water pollution prevention plan
SZ	support zone
TAL	target analyte list
TAT	turn around time
TB	trip blank
TCA	trichloroethane
TCDD	2,3,7,8-tetrachlorodibenzo-p-dioxin
TCDF	tetrachlorodibenzofurans
TCE	trichloroethene
TCL	target compound list
TCLP	toxicity characteristic leaching procedure
TDGCL	thiodiglycol
TDGCLA	thiodiglycol chloroacetic acid
TERC	Total Environmental Restoration Contract
TIC	tentatively identified compound
TLV	threshold limit value
TN	Tennessee
TOC	top of casing; total organic carbon
TPH	total petroleum hydrocarbons
TRADOC	U.S. Army Training and Doctrine Command
TRPH	total recoverable petroleum hydrocarbons
TWA	time-weighted average
UCL	upper confidence limit
UCR	upper certified range
'U'	not detected above reporting limit
USACE	U.S. Army Corps of Engineers
USACHPPM	U.S. Army Center for Health Promotion and Preventive Medicine
USAEC	U.S. Army Environmental Center
USAEHA	U.S. Army Environmental Hygiene Agency
USACMLS	U.S. Army Chemical School
USAMPS	U.S. Army Military Police School
USATEU	U.S. Army Technical Escort Unit
USATHAMA	U.S. Army Toxic and Hazardous Material Agency
USCS	Unified Soil Classification System
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
UST	underground storage tank
UTL	upper tolerance level
UXO	unexploded ordnance
VOA	volatile organic analyte
VOC	volatile organic compound
VOH	volatile organic hydrocarbon
VQlfr	validation qualifier
VQual	validation qualifier
VX	nerve agent (O-ethyl-S-[diisopropylaminoethyl]-methylphosphonothiolate)
Weston	Roy F. Weston, Inc.
WP	installation-wide work plan
WS	watershed
WSA	Watershed Screening Assessment
WWI	World War I
WWII	World War II

XRF	x-ray fluorescence
yd^3	cubic yards

SAIC – Data Qualifiers, Codes and Footnotes, 1995 Remedial Investigation

N/A – Not analyzed

ND – Not detected

Boolean Codes

- LT – Less than the certified reporting limit

Flagging Codes

- 9 – Non-demonstrated/validated method performed for USAEC
- B – Analyte found in the method blank or QC blank
- C – Analysis was confirmed
- D – Duplicate analysis
- I – Interfaces in sample make quantitation and/or identification to be suspicious
- J – Value is estimated
- K – Reported results are affected by interfaces or high background
- N – Tentatively identified compound (match greater than 70%)
- Q – Sample interference obscured peak of interest
- R – Non-target compound analyzed for but not detected (GC/MS methods)
- S – Non-target compound analyzed for and detected (GC/MS methods)
- T – Non-target compound analyzed for but not detected (non GC/MS methods)
- U – Analysis in unconfirmed
- Z – Non-target compound analyzed for and detected (non-GC/MS methods)

Qualifiers

- J – The low-spike recovery is low
- N – The high-spike recovery is low
- R – Data is rejected