DAIM-BD-H-MC

12 September 2006

MEMORANDUM FOR RECORD

SUBJECT: Draft Site Investigation Report, Impact Area, North-Central Main Post, Parcel 132Q-X, February 2003

1. Subject draft report will not be finalized by the U.S. Army. It is maintained in the Administrative Record and Information Repositories to provide information collected by the Army prior to implementation of the Environmental Services Cooperative Agreement (ESCA) between the Army and the Anniston-Calhoun County Fort McClellan Development Joint Powers Authority (JPA) executed on 15 September 2003, and as modified on 30 September 2005. The JPA will complete environmental services and achieve site closeout in accordance with the requirements of the ESCA.

2. Point of contact for this action is Lisa Holstein, Transition Force, Fort McClellan, AL, at 256-848-7455.

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A Member of The IT Group

February 18, 2003

IT-MC-CK10-0288
Project No. 796887

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

Contract: **Contract No. DACA21-96-D-0018/CK10**
Fort McClellan, Alabama

Subject: **Draft Site Investigation Report, Impact Area, North-Central Main Post, Parcel 132Q-X**

Dear Mr. Coker:

I am enclosing one copy of the subject document. The Army proposes "No Further Action" and unrestricted land reuse with regard to CERCLA-related hazardous substances at this site. Please review the subject document and provide either a letter of concurrence or written comments with suggested changes.

At your request, I have distributed copies of this document as indicated below. If you have questions, or need further information, please contact me at (770) 663-1429 or Steve Moran at (865) 694-7361.

Sincerely,

Stephen G. Moran Jr

Jeanne A. Yacoub, P.E.
Project Manager

Attachments

Distribution: Lisa Holstein, FTMC (7 copies)
Philip Stroud, ADEM (2 copies)
Doyle Brittain, EPA Region 4 (3 copies)
Hugh Vick, Gannett Flemming (3 copies)
Miki Schneider, JPA (1 copy)

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The Army is not responsible for nor liable for any decisions or actions the recipient, its employees or its agents make or take as a result of the use of this information.

Draft

Site Investigation Report
Impact Area, North-Central Main Post, Parcel 132Q-X

Fort McClellan
Calhoun County, Alabama

Prepared for:

U.S. Army Corps of Engineers, Mobile District
109 St. Joseph Street
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Task Order CK10
Contract No. DACA21-96-D-0018
IT Project No. 796887

February 2002

Revision 0

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Executive Summary

In accordance with Contract Number DACA21-96-D-0018, Task Order CK10, IT Corporation completed a site investigation (SI) at the Impact Area, North-Central Main Post, Parcel 132Q-X at Fort McClellan in Calhoun County, Alabama. The SI was conducted to determine whether chemical constituents are present at the site at concentrations that pose an unacceptable risk to human health or the environment. The SI consisted of the collection and analysis of 11 surface soil samples, 10 subsurface soil samples, and 2 groundwater samples. In addition, 2 permanent monitoring wells were installed in the saturated zone to facilitate groundwater sample collection and to provide site-specific geological and hydrogeological characterization information.

Chemical analysis of samples collected at the site indicates that metals, volatile organic compounds, pesticides, explosive compounds, and one herbicide were detected in site media. 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, and background screening values for Fort McClellan. Although the site is projected for passive recreation reuse, the analytical data were screened against residential human health SSSLs to determine if the site is suitable for unrestricted land reuse.

Chemicals of potential concern (COPC) in soil were limited to four metals (aluminum, barium, iron, and manganese) in one sample each. Aluminum, iron, and manganese, however, are common elements in native soils whose concentrations vary over a wide range. All other aluminum, iron, and manganese results in site media were below background or within the upper background range. Therefore, it is judged that these metals are present in site soils at naturally occurring levels. Barium is retained as a site-related COPC because its maximum detected concentration (1,770 mg/kg) exceeded its SSSL (547 mg/kg) and upper background range (288 mg/kg) in one of 21 soil samples. All other barium results in site media were below SSSLs and/or background levels. Based on its low frequency of detection above screening levels (less than 5 percent), it is concluded that barium does not pose a threat to human health.

Two pesticides (aldrin and beta-BHC) and one explosive compound (4-amino-2,6-dinitrotoluene) were selected as groundwater COPCs because their concentrations exceeded their respective SSSLs in one sample each. The levels of these constituents, however, were very low and were

estimated by the analytical laboratory because the results were below method reporting limits. U.S. Environmental Protection Agency (EPA) maximum contaminant levels (MCL) for drinking water do not exist for any of these compounds. The aldrin result, however, was below EPA Health Advisory values (no Health Advisory values exist for beta-BHC and 4-amino-2,6-dinitrotoluene). Based on their low detected levels, the uncertainty associated with the estimated analytical results, and the relative magnitude of the exceedances, it is concluded that these constituents do not pose an unacceptable risk to human health.

Constituents of potential ecological concern were limited to several metals and one herbicide (2-[2-methyl-4-chlorophenoxy]propionic acid) in surface soil. The metals identified were within their upper background ranges except for barium (in two samples), beryllium (one sample), copper (one sample), lead (three samples), manganese (one sample), mercury (one sample), and selenium (one sample). Only barium, beryllium, and lead had a detection frequency greater than 10 percent. The beryllium results were at or below the two-times-background screening level. The barium (437 milligrams per kilogram [mg/kg] and 1,770 mg/kg) and lead (98 mg/kg, 178 mg/kg, and 385 mg/kg) results remain as constituents of potential ecological concern. Because of the conservatism of the ESVs and the limited distribution in site media, these constituents are not expected to pose a significant threat to ecological receptors.

Based on the results of the SI, past operations at the Impact Area North-Central Main Post, Parcel 132Q-X have impacted the environment. In addition, bullet fragments are present on the ground surface in some areas of the site. However, it is concluded that the metals and chemical compounds 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 CERCLA-related hazardous substances for the area of investigation at the Impact Area North-Central Main Post, Parcel 132Q-X.

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 Impact Area, North-Central Main Post, Parcel 132Q-X, under Contract Number DACA21-96-D-0018, Task Order CK10.

This report presents specific information and results compiled from the SI, including field sampling and analysis, and monitoring well installation activities conducted at Parcel 132Q-X.

1.1 Project Description

The Impact Area, North-Central Main Post, Parcel 132Q-X, was identified as an area to be investigated prior to property transfer. The site was classified as a Category 1 Qualified parcel in the environmental baseline survey (EBS) (Environmental Science and Engineering, Inc. [ESE], 1998). Category 1 Qualified Parcels are areas that have no evidence of Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)-related hazardous substance or petroleum product storage, release, or disposal but that do have other environmental or safety concerns. Parcel 132Q-X was qualified because chemicals of potential concern and unexploded ordnance (UXO) may be present as a result of range activities at the site.

A site-specific field sampling plan (SFSP) (IT, 2002a) and a site-specific safety and health plan (SSHP) were finalized in January 2002. The SFSP and SSHP were prepared to provide technical guidance for sample collection and analysis at Parcel 132Q-X. The SFSP and the SSHP were used as attachments to the installation-wide work plan (IT, 1998) and the installation-wide sampling and analysis plan (SAP) (IT, 2000a; IT, 2002b). The SAP includes the installation-wide safety and health plan and quality assurance plan.

The SI included fieldwork to collect 11 surface soil samples, 10 subsurface soil samples, and 2 groundwater samples to determine whether potential site-specific chemicals are present at the site.

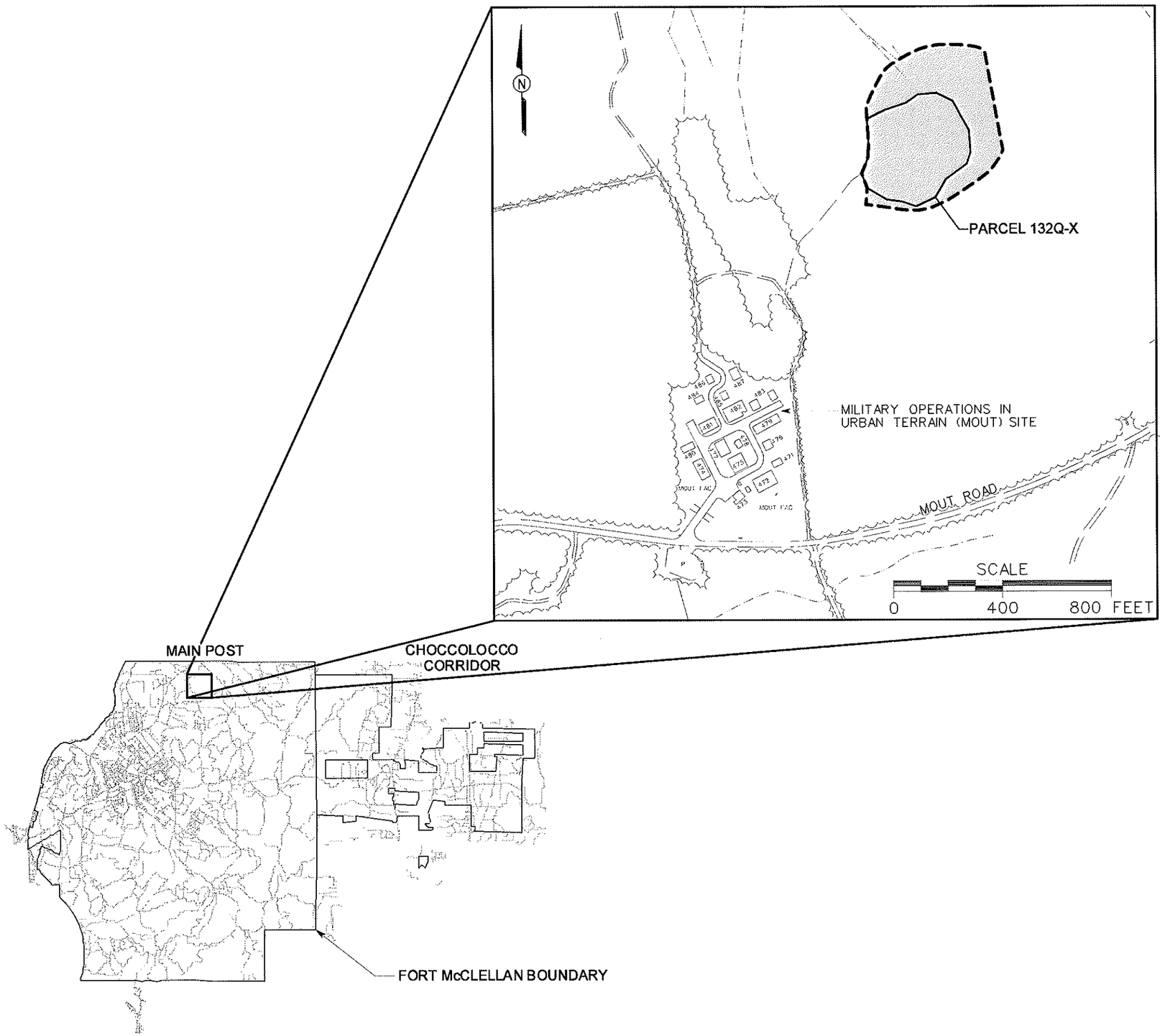
1.2 Purpose and Objectives

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 Impact Area, North-Central Main Post, Parcel 132Q-X, at concentrations that pose 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 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" or to conduct additional work at the site.

1.3 Site Description and History

Impact Area, North-Central Main Post, Parcel 132Q-X, is an approximately 3-acre site located north of Mout Road in the north-central area of the FTMC Main Post (Figure 1-1). Parcel 132Q-X is one of three small impact areas identified within ranges located east of Range 30. The Environmental Photographic Interpretation Center (EPIC) report (EPA, 1990) identified these impact areas from a 1949 aerial photo (Figure 1-2). EPIC states that "craters" were visible within the impact areas; however, craters were not visible in aerial photos from any other year (ESE, 1998). In addition, the 1949 photo shows a ground scar approximately 400 feet in length located about 300 feet northwest of Parcel 132Q-X. According to the *Archives Search Report*, this is the likely impact area for the World War II Machine Gun Range (USACE, 2001). The scar is visible in the 1937 aerial photograph and may have been associated with the World War I 1,000-yard rifle range.



LEGEND

- UNIMPROVED ROADS
- PAVED ROADS AND PARKING
- BUILDING
- TREES / TREELINE
- PARCEL BOUNDARY
- AREA OF INVESTIGATION
- SURFACE DRAINAGE / CREEK

FIGURE 1-1
SITE LOCATION MAP
IMPACT AREA NORTH-CENTRAL
MAIN POST
PARCEL 132Q-X

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

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DRAWN BY: D. BOWAR
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PROJ. NO.: 796887
DWG. NO.: ..\796887es547
DATE LAST REV.:
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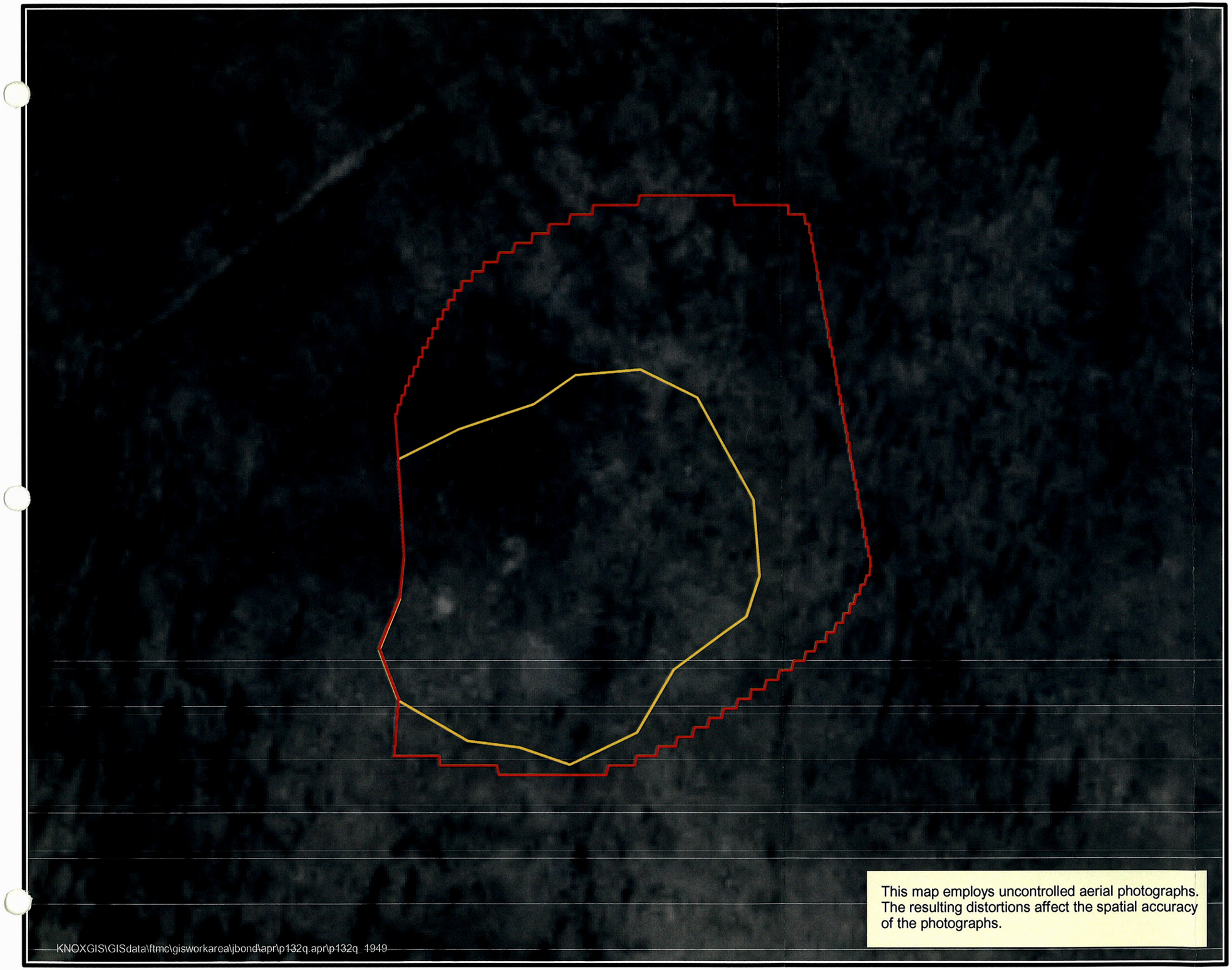
Figure 1-2

1949 Aerial Photograph

Impact Area, North-Central Main Post, Parcel 132Q-X
Fort McClellan, Alabama



Legend

Parcel Boundary

Area of Investigation

0 50 100 Feet

NAD83 State Plane Coordinates

N

This map employs uncontrolled aerial photographs. The resulting distortions affect the spatial accuracy of the photographs.

KNOXGIS\GISdata\ftmc\gisworkarea\jbond\apr\p132q.apr\p132q_1949

U.S. Army Corps of Engineers
Mobile District

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Contract No. DACA21-96-D-0018

The area of investigation was expanded to include features observed during a site walk conducted by IT in November 2001: areas of stressed vegetation, forty-five 55-gallon drums (used as small arms targets), a large ground scar, and bullet fragments were found at and around the parcel (Figure 1-3). The ground scar was estimated to be approximately 130 feet wide at its widest area and approximately 400 feet long. The ground scar was wider at the northwestern end than at the southeastern end. The scar was moderately steep in grade; the maximum depth was estimated to be about 20 feet. Bullet fragments were found on the floor of the ground scar.

FIGURE 1-3
SITE MAP
IMPACT AREA NORTH-CENTRAL
MAIN POST
PARCEL 132Q-X

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.

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

- A = Asbestos (in buildings)
- L = Lead-based paint (in buildings)
- P = Polychlorinated biphenyls
- R = Radon (in buildings)

- RD = Radionuclides/radiological issues
- X = Unexploded ordnance (UXO)
- CWM = Chemical warfare material.

The EBS was conducted in accordance with CERFA protocols (Public Law 102-426) and DOD policy regarding contamination assessment. Record searches and reviews were performed on all reasonably available documents from FTMC, the Alabama Department of Environmental Management (ADEM), the U.S. Environmental Protection Agency (EPA) Region 4, and Calhoun County, as well as a database search of CERCLA-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.

Parcel 132Q-X is an area where no known or recorded storage, release, or disposal (including migration) of hazardous substances or petroleum products has occurred on site property. The parcel, however, was qualified because chemicals of potential concern and UXO may be present as a result of historical range activities. Therefore, the Impact Area, North-Central Main Post, Parcel 132Q-X, required additional evaluation to determine its environmental condition.

3.0 Current Site Investigation Activities

This chapter summarizes SI activities conducted by IT at the Impact Area North-Central Main Post, Parcel 132Q-X, including UXO avoidance activities, environmental sampling and analysis, and groundwater monitoring well installation activities.

3.1 UXO Avoidance

UXO avoidance was performed at Parcel 132Q-X following methodology outlined in the SAP. IT UXO personnel used a low-sensitivity magnetometer to perform a surface sweep of the area of investigation prior to site access. After the site was cleared for access, sample locations were monitored by UXO personnel following procedures outlined in the SAP.

3.2 Environmental Sampling

Environmental sampling performed during the SI at Parcel 132Q-X included the collection of surface soil samples, subsurface soil samples, and groundwater samples for chemical analysis. Sample locations were determined by observing site physical characteristics during a site walk and by reviewing historical documents and aerial photographs 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 3.4.

3.2.1 Surface Soil Sampling

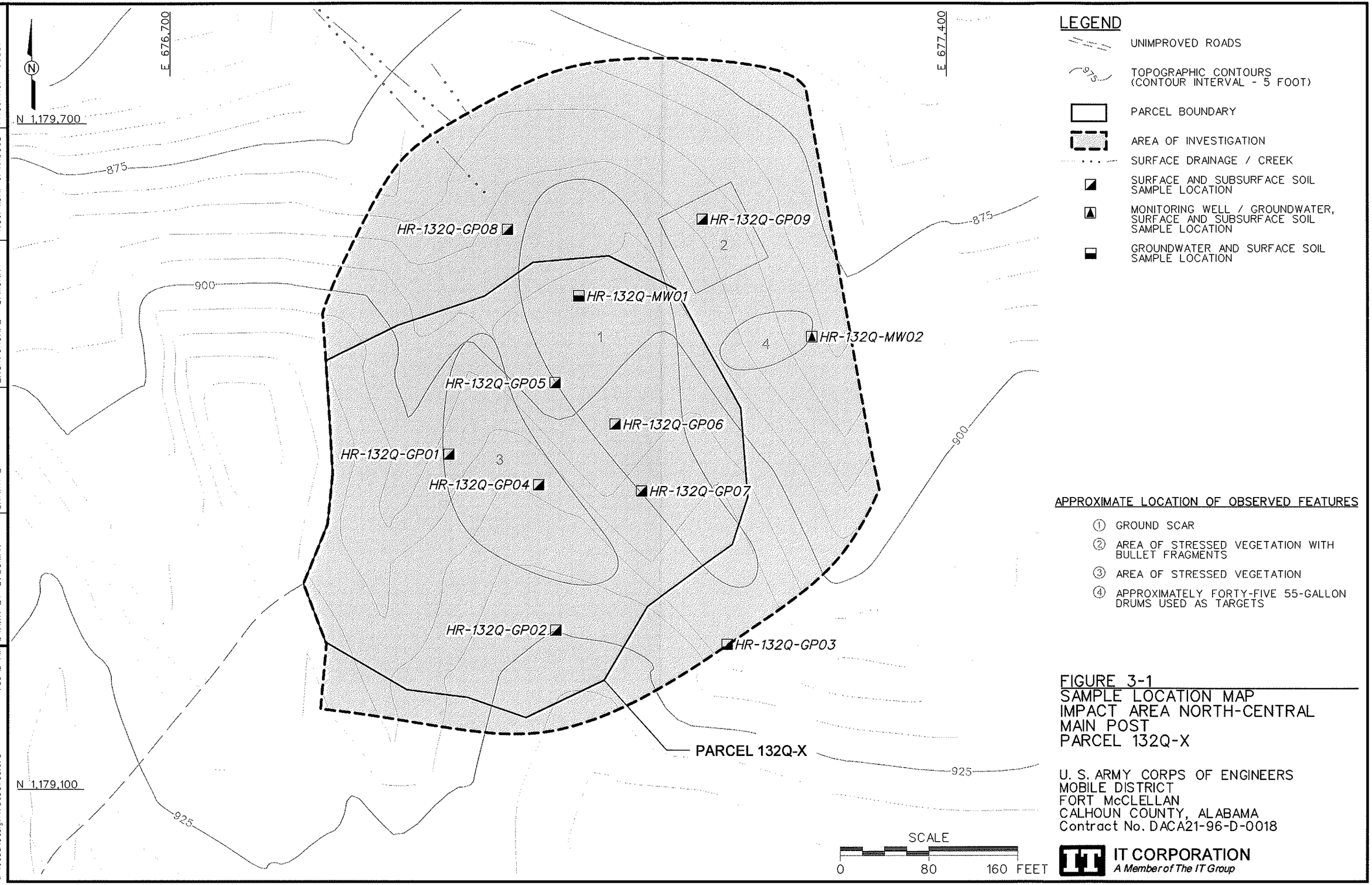
Surface soil samples were collected from 11 locations at Parcel 132Q-X as shown on Figure 3-1. Soil sampling locations and rationale are presented in Table 3-1. Sample designations and analytical parameters are listed in Table 3-2. Soil sampling locations were determined in the field by the on-site geologist based on UXO avoidance activities, sampling rationale, presence of surface structures, and site topography.

Sample Collection. Surface soil samples were collected from the uppermost foot of soil using a stainless-steel hand auger, following the methodology specified in the SAP. Surface soil samples were collected by first removing surface debris (e.g., rocks and vegetation) from the immediate sample area. After the soil was collected with the sampling device, it was screened with a photoionization detector (PID) in accordance with procedures outlined in the SAP. As necessary, the soil fraction for volatile organic compound (VOC) analysis was collected directly

Table 3-1

Sampling Locations and Rationale
Impact Area North-Central Main Post, Parcel 132Q-X
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Media	Sample Location Rationale
HR-132Q-GP01	Surface soil Subsurface soil	Soil boring for surface and subsurface soil samples located in the western portion of the impact area. Sample data will indicate if contaminant releases to the environment have occurred from use of this area and if contaminated soil exists at this site.
HR-132Q-GP02	Surface soil Subsurface soil	Soil boring for surface and subsurface soil samples located in the southern (upslope) portion of the impact area. Sample data will indicate if contaminant releases to the environment have occurred from use of this area and if contaminated soil exists at this site.
HR-132Q-GP03	Surface soil Subsurface soil	Soil boring for surface and subsurface soil samples located in the southern (upslope) portion of the impact area. Sample data will indicate if contaminant releases to the environment have occurred from use of this area and if contaminated soil exists at this site.
HR-132Q-GP04	Surface soil Subsurface soil	Soil boring for surface and subsurface soil samples located in an area of stressed vegetation noted within the impact area. Sample data will indicate if contaminant releases to the environment have occurred from use of this area and if contaminated soil exists at this site.
HR-132Q-GP05	Surface soil Subsurface soil	Soil boring for surface and subsurface soil samples located in the central portion of the area within the impact area. Sample data will indicate if contaminant releases to the environment have occurred from use of this area and if contaminated soil exists at this site.
HR-132Q-GP06	Surface soil Subsurface soil	Soil boring for surface and subsurface soil samples located near the center of a ground scar area within the impact area. Sample data will indicate if contaminant releases to the environment have occurred from use of this area and if contaminated soil exists at this site.
HR-132Q-GP07	Surface soil Subsurface soil	Soil boring for surface and subsurface soil samples located near the ground scar within the impact area. Sample data will indicate if contaminant releases to the environment have occurred from use of this area and if contaminated soil exists at this site.
HR-132Q-GP08	Surface soil Subsurface soil	Soil boring for surface and subsurface soil samples located near the northern end of the ground scar outside the impact area. Sample data will indicate if contaminant releases to the environment have occurred from use of this area and if contaminated soil exists at this site.
HR-132Q-GP09	Surface soil Subsurface soil	Soil boring for surface and subsurface soil samples located in an area showing stressed vegetation and bullet fragments outside the impact area. Sample data will indicate if contaminant releases to the environment have occurred from use of this area and if contaminated soil exists at this site.
HR-132Q-MW01	Surface soil Groundwater	Soil boring and monitoring well for surface soil and groundwater samples located in the northern portion the ground scar within the impact area. Sample data will indicate if contaminant releases to the environment have occurred from use of this area and if contaminated soil or groundwater exists at this site. The monitoring well location will also provide site-specific geological information as well as information about groundwater quality.
HR-132Q-MW02	Surface soil Subsurface soil Groundwater	Soil boring and monitoring well for surface and subsurface soil and groundwater samples located east of the impact area in the vicinity of 55-gallon drums that were used for targets. Sample data will indicate if contaminant releases to the environment have occurred from use of this area and if contaminated soil or groundwater exists at this site. The monitoring well location will also provide site-specific geological information as well as information about groundwater quality.



LEGEND

- UNIMPROVED ROADS
- TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 5 FOOT)
- PARCEL BOUNDARY
- AREA OF INVESTIGATION
- SURFACE DRAINAGE / CREEK
- SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION
- MONITORING WELL / GROUNDWATER, SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION
- GROUNDWATER AND SURFACE SOIL SAMPLE LOCATION

APPROXIMATE LOCATION OF OBSERVED FEATURES

1. GROUND SCAR
2. AREA OF STRESSED VEGETATION WITH BULLET FRAGMENTS
3. AREA OF STRESSED VEGETATION
4. APPROXIMATELY FORTY-FIVE 55-GALLON DRUMS USED AS TARGETS

FIGURE 3-1
SAMPLE LOCATION MAP
IMPACT AREA NORTH-CENTRAL
MAIN POST
PARCEL 132Q-X

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

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PROJ. NO.: 796887
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DATE LAST REV.:
DRAWN BY:
STARTNG DATE: 07/29/03
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Table 3-2

Soil Sample Designations and Analytical Parameters
Impact Area North-Central Main Post, Parcel 132Q-X
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Designation	Sample Depth	QA/QC Samples		Analytical Parameters
			Field Duplicates	MS/MSD	
HR-132Q-GP01	HR-132Q-GP01-SS-PG0006-REG	0-1			Metals and Explosives
	HR-132Q-GP01-DS-PG0007-REG	3-4			
HR-132Q-GP02	HR-132Q-GP02-SS-PG0008-REG	0-1			Metals and Explosives
	HR-132Q-GP02-DS-PG0009-REG	3-4			
HR-132Q-GP03	HR-132Q-GP03-SS-PG0010-REG	0-1			Metals and Explosives
	HR-132Q-GP03-DS-PG0011-REG	2-2.5			
HR-132Q-GP04	HR-132Q-GP04-SS-PG0012-REG	0-1			Metals, VOCs, SVOCs, Pesticides, Herbicides, and Explosives
	HR-132Q-GP04-DS-PG0013-REG	3-4	HR-132Q-GP04-DS-PG0014-FD		
HR-132Q-GP05	HR-132Q-GP05-SS-PG0015-REG	0-1			Metals and Explosives
	HR-132Q-GP05-DS-PG0016-REG	3-4			
HR-132Q-GP06	HR-132Q-GP06-SS-PG0017-REG	0-1			Metals and Explosives
	HR-132Q-GP06-DS-PG0018-REG	3-3.5			
HR-132Q-GP07	HR-132Q-GP07-SS-PG0019-REG	0-1			Metals and Explosives
	HR-132Q-GP07-DS-PG0020-REG	1-1.5			
HR-132Q-GP08	HR-132Q-GP08-SS-PG0021-REG	0-1			Metals and Explosives
	HR-132Q-GP08-DS-PG0022-REG	3-3.5			
HR-132Q-GP09	HR-132Q-GP09-SS-PG0023-REG	0-1			Metals and Explosives
	HR-132Q-GP09-DS-PG0024-REG	3-4			
HR-132Q-MW01	HR-132Q-MW01-SS-PG0001-REG	0-1		HR-132Q-MW01-SS-PG0001-MS/MSD	Metals and Explosives
HR-132Q-MW02	HR-132Q-MW02-SS-PG0003-REG	0-1	HR-132Q-MW02-SS-PG0004-FD		Metals, VOCs, SVOCs, Pesticides, Herbicides, and Explosives
	HR-132Q-MW02-DS-PG0005-REG	3-4			

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

from the sampler using three EnCore® samplers. The remaining soil was then transferred to a clean stainless-steel bowl, homogenized, and placed in the appropriate sample containers. Sample collection logs are included in Appendix A. The samples were analyzed for the parameters listed in Table 3-2 using methods outlined in Section 3.4.

3.2.2 Subsurface Soil Sampling

Subsurface soil samples were collected from 10 soil borings at Parcel 132Q-X, as shown on Figure 3-1. Subsurface soil sampling locations and rationale are presented in Table 3-1. Sample designations, depths, and analytical parameters are listed in Table 3-2. Soil boring locations were determined in the field by the on-site geologist based on UXO avoidance activities, sampling rationale, presence of surface structures, and site topography.

Sample Collection. Subsurface soil samples were collected from soil borings at depths greater than one foot below ground surface (bgs) in the unsaturated zone. The soil borings were advanced and soil samples collected using a stainless-steel hand auger, following procedures specified in the SAP. Sample collection logs are included in Appendix A. The samples were analyzed for the parameters listed in Table 3-2 using methods outlined in Section 3.4.

Subsurface soil samples were collected continuously to 4 feet bgs or until hand-auger refusal was encountered. Samples were field screened using a PID to measure volatile organic vapors. The sample displaying the highest reading was selected and sent to the laboratory for analysis; however, at those locations where PID readings were below background, the deepest sample interval was submitted for analysis. As necessary, the soil fraction for VOC analysis was collected directly from the sampler using three EnCore samplers. The remaining soil was then transferred to a clean stainless-steel bowl, homogenized, and placed in the appropriate sample containers. The on-site geologist constructed a detailed boring log for each soil boring. The boring logs are 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 the SAP.

3.2.3 Monitoring Well Installation

Two permanent monitoring wells were installed in the saturated zone at Parcel 132Q-X to collect groundwater samples for laboratory analysis. The well locations are shown on Figure 3-1.

Table 3-3 summarizes construction details of the monitoring wells installed at the site. The well construction logs are included in Appendix B.

IT contracted Miller Drilling Company to install the permanent wells using a hollow-stem auger drill rig at two of the hand auger soil boring locations (HR-132Q-MW01 and HR-132Q-MW02). The wells were installed following procedures outlined in the SAP. The borehole at each well location was advanced with a 4.25-inch inside diameter (ID) hollow-stem auger from ground surface to the first groundwater-bearing zone in residuum at the well location. Beginning at the completion depth of the hand auger boring, 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. The samples were logged to determine lithologic changes and the approximate depth of groundwater encountered during drilling. This information was used to determine the optimal placement of the monitoring well screen interval and to provide site-specific geological and hydrogeological information. The boring log for each borehole is included in Appendix B.

Upon reaching the target depth in each borehole, a 15- or 20-foot length of 2-inch ID, 0.010-inch continuous slot, Schedule 40 polyvinyl chloride (PVC) screen with a PVC end cap was placed through the auger to the bottom of the borehole. The screen and end cap were attached to 2-inch ID, flush-threaded Schedule 40 PVC riser. A filter pack consisting of Number 1 filter sand (environmentally safe, clean fine sand, sieve size 20 to 40) was tremied around the well screen to approximately 5 feet above the top of the well screen as the augers were removed. At HR-132Q-MW01, the filter pack included an approximately 5-foot layer of extra fine filter sand (sieve size 30 to 70). A bentonite seal, consisting of approximately 3 feet of bentonite pellets, was placed immediately on top of the filter pack and hydrated with potable water. The bentonite seal placement and hydration followed procedures in the SAP. Bentonite-cement grout was tremied into the remaining annular space of the well from the top of the bentonite seal to ground surface. A well cap was placed on the PVC well riser. A locking protective steel casing was placed over the PVC well riser and a concrete pad was constructed around the well. Four protective steel posts were installed around the well pad.

Monitoring well HR-132Q-MW02 was developed by surging and pumping with a submersible pump in accordance with methodology outlined in the SAP. 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 to re-

Table 3-3

Monitoring Well Construction Summary
Impact Area, North-Central Main Post, Parcel 132Q-X
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
HR-132Q-MW01	1179543.18	677069.52	899.88	901.96	59	20	39 - 59	2" ID Sch. 40 PVC
HR-132Q-MW02	1179506.53	677279.63	881.81	883.78	30	15	15 - 30	2" ID Sch. 40 PVC

Permanent wells installed using hollow-stem auger.

Horizontal coordinates referenced to the U.S. State Plane Coordinate System, Alabama East Zone, North American Datum of 1983 (NAD83).
Elevations referenced to the North American Vertical Datum of 1988 (NAVD88).

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

establish the natural hydraulic flow conditions. Development continued until the water turbidity was less than 20 nephelometric turbidity units.

Because the water column in monitoring well HR-132Q-MW01 was insufficient to support pumping with a submersible pump, the well was developed using a dedicated Teflon™ bailer in accordance with methodology outlined in the SAP. Development was considered complete after the well was bailed dry and allowed to recharge three successive times. The well development logs are included in Appendix C.

3.2.4 Water Level Measurements

The depth to groundwater was measured in the permanent wells at the site on July 26, 2002, following procedures outlined in the SAP. Depth to groundwater was measured with an electronic water-level meter. The meter probe and cable were cleaned before use at each well following decontamination methodology presented in the SAP. Measurements were referenced to the top of the PVC well casing, as summarized in Table 3-4.

3.2.5 Groundwater Sampling

Groundwater samples were collected from both of the monitoring wells installed at Parcel 132Q-X. The well/groundwater sample locations are shown on Figure 3-1. The groundwater sampling locations and rationale are listed in Table 3-1. The groundwater sample designations and analytical parameters are listed in Table 3-5.

Sample Collection. The groundwater samples were collected using either a Teflon bailer (HR-132Q-MW01) or a peristaltic pump (HR-132Q-MW02) equipped with Teflon tubing, following the procedures outlined in the SAP. Monitoring well HR-132Q-MW02 was sampled for VOCs using the tube evacuation method following the procedures outlined in the SAP. Groundwater was sampled after purging a minimum of three well volumes and after field parameters (temperature, pH, dissolved oxygen, specific conductivity, oxidation-reduction potential, and turbidity) stabilized. Because HR-132Q-MW01 was sampled using a bailer, turbidity did not stabilize. Therefore, the sample fraction collected for metals analysis was decanted prior to laboratory shipment. Field parameters were measured using a calibrated water-quality meter. Field parameter readings are summarized in Table 3-6. Sample collection logs are included in Appendix A. The samples were analyzed for the parameters listed in Table 3-5 using methods outlined in Section 3.4.

Table 3-4

Groundwater Elevations
Impact Area, North-Central Main Post, Parcel 132Q-X
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)
HR-132Q-MW01	26-Jul-02	56.95	901.96	899.88	845.01
HR-132Q-MW02	26-Jul-02	18.00	883.78	881.81	865.78

Elevations referenced to the North American Vertical Datum of 1988 (NAVD88).

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

Table 3-5

Groundwater Sample Designations and Analytical Parameters
Impact Area, North-Central Main Post, Parcel 132Q-X
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Designation	QA/QC Samples		Analytical Parameters
		Field Duplicates	MS/MSD	
HR-132Q-MW01	HR-132Q-MW01-GW-PG3001-REG			Metals and Explosives
HR-132Q-MW02	HR-132Q-MW02-GW-PG3002-REG	HR-132Q-MW02-GW-PG3003-FD	HR-132Q-MW02-GW-PG3002-MS/MSD	Metals, VOCs, SVOCs, Pesticides, Herbicides, and Explosives

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

Table 3-6

Groundwater Field Parameters
Impact Area, North-Central Main Post, Parcel 132Q-X
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)
HR-132Q-MW01	29-Apr-02	0.050	10.04[a]	99	20.3	>999[a]	7.10
HR-132Q-MW02	25-Apr-02	0.024	7.51	221	17.1	7.7	5.42

[a] Reading is artificially elevated; well was purged and sampled using a bailer.

°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.

3.3 Surveying of Sample Locations

Sample locations were surveyed using global positioning system and conventional civil survey techniques described in the SAP. 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.

3.4 Analytical Program

Samples collected during the SI were analyzed for various chemical parameters based on potential site-specific chemicals and on EPA, ADEM, FTMC, and USACE requirements. Samples collected at Parcel 132Q-X were analyzed for the following parameters using EPA SW-846 methods, including Update III methods where applicable:

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

A minimum of ten percent of the samples were analyzed for the following additional parameters:

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

3.5 Sample Preservation, Packaging, and Shipping

Sample preservation, packaging, and shipping followed requirements specified in the SAP. Sample containers, sample volumes, preservatives, and holding times for the analyses required in this SI are listed in the SAP. Sample documentation and chain-of-custody records were completed as specified in the SAP.

Completed analysis request and chain-of-custody records (Appendix A) were secured and included with each shipment of sample coolers to EMAX Laboratories, Inc. in Torrance, California.

3.6 Investigation-Derived Waste Management and Disposal

Investigation-derived waste (IDW) was managed and disposed as outlined in the SAP. The IDW generated during the SI at Parcel 132Q-X was segregated as follows:

- Drill cuttings
- Purge water from well development, sampling activities, and decontamination fluids
- Spent well materials and 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 analysis. Based on the results, drill cuttings, spent well materials, and personal protective equipment generated during the SI were disposed as nonregulated waste at the Three Corners Landfill located in Piedmont, Alabama.

Liquid IDW was contained in the 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.

3.7 Variances/Nonconformances

No variances or nonconformances to the SFSP were recorded during completion of the SI at Parcel 132Q-X.

3.8 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 procedures. 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 presented in the SAP. Chemical data were reported by the laboratory via hard-copy data packages using Contract Laboratory Program-like forms.

Data Validation. The reported analytical data were validated in accordance with EPA National Functional Guidelines by Level III criteria. The data validation results are summarized in a quality assurance report, which includes the data validation summary report (Appendix F). Selected results were 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 SSSLs and ESVs developed by IT. Rejected data (assigned an "R" qualifier) were not used in the 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 Impact Area North-Central Main Post, Parcel 132Q-X, provided soil, geologic, and groundwater data used to characterize the geology and hydrogeology of the site.

4.1 Regional and Site Geology

4.1.1 Regional Geology

Calhoun County includes parts of two physiographic provinces: the Piedmont Upland Province and the Valley and Ridge Province. The Piedmont Upland Province occupies the extreme eastern and southeastern portions of the county and is characterized by metamorphosed sedimentary rocks. The generally accepted range in age of these metamorphics is Cambrian to Devonian.

The majority of Calhoun County, including the Main Post of FTMC, lies within the Appalachian fold-and-thrust structural belt (Valley and Ridge Province) where southeastward-dipping thrust faults with associated minor folding are the predominant structural features. The fold-and-thrust belt consists of Paleozoic sedimentary rocks that have been asymmetrically folded and thrust-faulted, with major structures and faults striking in a northeast-southwest direction.

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

The basal unit of the sedimentary sequence in Calhoun County is the Cambrian Chilhowee Group. The Chilhowee Group consists of the Cochran, Nichols, Wilson Ridge, and Weisner Formations (Osborne and Szabo, 1984), but in Calhoun County it 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 (Osborne et al., 1988). These two formations are mapped only in the eastern part of the county.

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

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

The Rome Formation overlies the Shady Dolomite and locally occurs to the northwest and southeast of the Main Post, as mapped by Warman and Causey (1962) and Osborne and Szabo (1984), and immediately to the west of Reilly Airfield (Osborne and Szabo, 1984). The Rome Formation consists of variegated, thinly interbedded grayish red-purple mudstone, shale, siltstone, and greenish red and light gray sandstone, with locally occurring limestone and dolomite. Weaver Cave, located approximately one mile west of the northwest boundary of the Main Post, is situated in gray dolomite and limestone mapped as the Rome Formation (Osborne et al., 1997). 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 as undifferentiated at FTMC and in other parts of Calhoun County. The Athens Shale overlies the Ordovician limestone units. The Athens Shale consists of dark gray to black shale and graptolitic shale with localized interbedded dark gray limestone (Osborne et 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 (Osborne, 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 towards the upper portion of the formation (Osborne and Szabo, 1984). These units occur in the northwestern portion of Pelham Range. Overlying the Fort Payne Chert is the Floyd Shale, also of Mississippian age, which consists of thin-bedded, fissile brown to black shale with thin intercalated limestone layers and interbedded sandstone. Osborne and Szabo (1984) reassigned the Floyd Shale, which was mapped by Warman and Causey (1962) on the Main Post of FTMC, to the Ordovician Athens Shale based on fossil data.

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

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

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

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

4.1.2 Site Geology

Soils at Parcel 132Q-X fall into two mapping units: Anniston and Allen gravelly loams, 6 to 10 percent slopes, eroded (AcC2) in the southern portion of the impact area; and Anniston and Allen stony loams, 10 to 25 percent slopes (AdE) in the northern portion of the impact area (U.S. Department of Agriculture [USDA], 1961).

The Anniston and Allen Series of soils consist of strongly acidic, deep, well-drained soils that have developed in old local alluvium. The parent material washed from the adjacent higher-lying Linker, Muskingum, Enders, and Montevallo soils, which developed from weathered sandstone, shale, and quartzite. These sites contain sandstone and quartzite gravel and cobbles, measuring up to 8 inches in diameter, throughout the soil. For this soil series, the depth to bedrock is typically from 2 feet to greater than 10 feet, with depth to water greater than 20 feet. Some severely eroded areas, as well as a few shallow gullies, may be common on the surface for this soil type. The typical soil description is 2 to 10 feet of well-drained stony loam to clay loam over stratified local alluvium; limestone or shale bedrock (USDA, 1961).

Soils on the southern portion of the impact area fall into the Anniston and Allen gravelly loams, 6 to 10 percent slopes, eroded (AcC2). This soil type consists of friable soils that have developed in old alluvium on foot slopes and along the base of mountains. 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 (USDA, 1961).

Soils on the northern portion of the impact area fall into the Anniston and Allen stony loams, 10 to 25 percent slopes (AdE). The surface soil of this mapping unit is very dark brown to very dark grayish-brown stony loam, 4 to 8 inches thick. At a depth of about 10 inches, this material grades to a dark red, or dark reddish-brown stony fine sandy clay loam. The texture of subsoil ranges from light clay loam to clay or silty clay loam. Runoff is generally rapid, permeability is moderate to rapid, and the capacity for available moisture is low to moderate.

Parcel 132Q-X is south of the Jacksonville fault. The fault trace and geologic contacts strike generally northeast to southwest with transport direction of the thrust sheet to the northwest. The bedrock north of the fault is mapped as the Cambrian Conasauga Formation (Osborne et al., 1997). In eastern Alabama, this formation consists of an upper unit of light to dark gray, medium to thick bedded dolostone and a lower unit of dark greenish gray to dusky yellow shales and mudstones with local interbeds of cherty limestone (Raymond et al., 1988). Bedrock south of the fault is mapped as the undifferentiated Cambrian Chilhowee Group (Osborne et al., 1997). The undifferentiated Cambrian Chilhowee Group consists of a basal unit of mudstone, overlain by a unit of greenish gray mudstone with minor siltstone and sandstone. The sequence grades upward into a white to moderate reddish orange friable sandstone and conglomerate containing interbedded gray silty mudstone (Raymond et al., 1988).

The residuum encountered during drilling activities at Parcel 132Q-X consisted of a light brown to yellowish orange to reddish brown clay with varying amounts of sand, silt, and quartz-rich gravel. This description is consistent with the Anniston and Allen Series soils. Bedrock was not encountered during drilling activities at Parcel 132Q-X.

4.2 Site Hydrology

4.2.1 Surface Hydrology

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

Ground elevation within the area of investigation ranges from approximately 870 to 930 feet above mean sea level. Surface water runoff in the area of investigation drains generally to the north-northwest into an intermittent stream that flows to the northwest.

4.2.2 Hydrogeology

Static groundwater levels were measured in monitoring wells at Parcel 132Q-X on July 26, 2002, as summarized in Table 3-4. Groundwater elevations were calculated by measuring the depth to groundwater relative to the surveyed top-of-casing elevations. Based on these water level data, groundwater elevations correspond with topography and flow direction appears to be from the south to the north.

Groundwater was encountered during drilling at HR-132Q-MW01 at 50 feet bgs and at HR-132Q-MW02 at 20 feet bgs. As shown in Table 3-4, static water levels in HR-132Q-MW01 and HR-132Q-MW02 were approximately 57 and 18 feet below top of casing, respectively. Based on the comparison of static water levels and the depth to water observed during drilling activities, groundwater appears to be under confined to semi-confined conditions in the residuum.

5.0 Summary of Analytical Results

The results of the chemical analysis of samples collected at the Impact Area North-Central Main Post, Parcel 132Q-X, indicate that metals, VOCs, pesticides, explosives, and one herbicide were detected in site media. 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 are included in Appendix G. Upper background range (UBR) values are provided herein as additional information for risk managers.

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

5.1 Surface Soil Analytical Results

Eleven surface soil samples were collected for chemical analysis at Parcel 132Q-X. Surface soil samples were collected from the uppermost foot of soil at the locations shown on Figure 3-1. Analytical results were compared to residential human health SSSLs, ESVs, and metals background screening values, as presented in Table 5-1.

Metals. Twenty metals were detected in surface soil samples collected at the site. The concentrations of six metals (aluminum, arsenic, barium, chromium, iron, and manganese) exceeded SSSLs. Of these, aluminum (at HR-132Q-MW02), barium (HR-132Q-MW01), chromium (HR-132Q-GP09), iron (four locations), and manganese (HR-132Q-GP08 and HR-132Q-MW01) also exceeded their respective background values. However, these metals results were within their respective UBRs except for the following:

Table 5-1

Surface Soil Analytical Results
Impact Area, North-Central Main Post, Parcel 132Q-X
Fort McClellan, Calhoun County, Alabama

Sample Location						HR-132Q-GP01						HR-132Q-GP02						HR-132Q-GP03					
Sample Number						PG0006						PG0008						PG0010					
Sample Date						12-Feb-02						12-Feb-02						12-Feb-02					
Sample Depth (Feet)						0- 1						0- 1						0- 1					
Parameter	Units	UBR[a]	BKG[b]	SSSL[c]	ESV[c]	Result	Qual	>UBR	>BKG	>SSSL	>ESV	Result	Qual	>UBR	>BKG	>SSSL	>ESV	Result	Qual	>UBR	>BKG	>SSSL	>ESV
METALS																							
Aluminum	mg/kg	3.99E+04	1.63E+04	7.80E+03	5.00E+01	1.06E+04				YES	YES	7.26E+03					YES	1.39E+04				YES	YES
Arsenic	mg/kg	4.90E+01	1.37E+01	4.26E-01	1.00E+01	3.26E+00				YES		1.48E+00				YES		4.67E+00				YES	
Barium	mg/kg	2.88E+02	1.24E+02	5.47E+02	1.65E+02	6.98E+01						4.41E+01						5.23E+01					
Beryllium	mg/kg	8.70E-01	8.00E-01	9.60E+00	1.10E+00	5.31E-01	J					ND						ND					
Calcium	mg/kg	1.79E+04	1.72E+03	NA	NA	2.81E+02						1.92E+02						5.66E+01	J				
Chromium	mg/kg	1.34E+02	3.70E+01	2.32E+01	4.00E-01	6.94E+00					YES	5.81E+00					YES	1.30E+01					YES
Cobalt	mg/kg	7.10E+01	1.52E+01	4.68E+02	2.00E+01	4.18E+00						2.41E+00						2.48E+00					
Copper	mg/kg	2.40E+01	1.27E+01	3.13E+02	4.00E+01	1.89E+01			YES			7.54E+00						1.87E+01			YES		
Iron	mg/kg	5.63E+04	3.42E+04	2.34E+03	2.00E+02	9.94E+03				YES	YES	4.73E+03				YES	YES	2.74E+04				YES	YES
Lead	mg/kg	8.30E+01	4.01E+01	4.00E+02	5.00E+01	6.56E+01			YES		YES	4.71E+01			YES			6.08E+01			YES		YES
Magnesium	mg/kg	9.60E+03	1.03E+03	NA	4.40E+05	4.41E+02						2.63E+02						3.88E+02					
Manganese	mg/kg	6.85E+03	1.58E+03	3.63E+02	1.00E+02	5.85E+02				YES	YES	1.51E+02					YES	1.91E+02					YES
Mercury	mg/kg	3.20E-01	8.00E-02	2.33E+00	1.00E-01	8.24E-02	J		YES			7.02E-02	J					9.05E-02	J		YES		
Nickel	mg/kg	2.20E+01	1.03E+01	1.54E+02	3.00E+01	7.29E+00						3.51E+00						4.74E+00					
Potassium	mg/kg	6.01E+03	8.00E+02	NA	NA	2.67E+02	J					2.15E+02	J					7.04E+02					
Selenium	mg/kg	1.30E+00	4.80E-01	3.91E+01	8.10E-01	ND						ND						ND					
Silver	mg/kg	1.90E+00	3.60E-01	3.91E+01	2.00E+00	ND						ND						ND					
Sodium	mg/kg	5.63E+02	6.34E+02	NA	NA	3.56E+01	J					4.05E+01	J					3.98E+01	J				
Vanadium	mg/kg	1.58E+02	5.88E+01	5.31E+01	2.00E+00	1.54E+01					YES	1.01E+01					YES	3.28E+01					YES
Zinc	mg/kg	2.09E+02	4.06E+01	2.34E+03	5.00E+01	2.10E+01						1.44E+01						1.83E+01					
VOLATILE ORGANIC COMPOUNDS																							
2-Butanone	mg/kg	NA	NA	4.66E+03	8.96E+01	NR						NR						NR					
Acetone	mg/kg	NA	NA	7.76E+02	2.50E+00	NR						NR						NR					
p-Cymene	mg/kg	NA	NA	1.55E+03	NA	NR						NR						NR					
HERBICIDES																							
MCPP	mg/kg	NA	NA	7.77E+00	1.00E-01	NR						NR						NR					

Table 5-1

Surface Soil Analytical Results
Impact Area, North-Central Main Post, Parcel 132Q-X
Fort McClellan, Calhoun County, Alabama

Sample Location						HR-132Q-GP04						HR-132Q-GP05						HR-132Q-GP06					
Sample Number						PG0012						PG0015						PG0017					
Sample Date						12-Feb-02						11-Feb-02						11-Feb-02					
Sample Depth (Feet)						0- 1						0- 1						0- 1					
Parameter	Units	UBR[a]	BKG[b]	SSSL[c]	ESV[c]	Result	Qual	>UBR	>BKG	>SSSL	>ESV	Result	Qual	>UBR	>BKG	>SSSL	>ESV	Result	Qual	>UBR	>BKG	>SSSL	>ESV
METALS																							
Aluminum	mg/kg	3.99E+04	1.63E+04	7.80E+03	5.00E+01	6.29E+03					YES	6.38E+03					YES	8.62E+03				YES	YES
Arsenic	mg/kg	4.90E+01	1.37E+01	4.26E-01	1.00E+01	5.32E+00				YES		2.52E+00	J			YES		2.51E+00	J			YES	
Barium	mg/kg	2.88E+02	1.24E+02	5.47E+02	1.65E+02	5.83E+01						5.49E+00						9.35E+00					
Beryllium	mg/kg	8.70E-01	8.00E-01	9.60E+00	1.10E+00	6.80E-01	J					5.48E-01	J					8.31E-01	J		YES		
Calcium	mg/kg	1.79E+04	1.72E+03	NA	NA	1.69E+02						1.52E+01	B					5.66E+01	J				
Chromium	mg/kg	1.34E+02	3.70E+01	2.32E+01	4.00E-01	2.49E+01				YES	YES	3.12E+00					YES	4.78E+00					YES
Cobalt	mg/kg	7.10E+01	1.52E+01	4.68E+02	2.00E+01	4.18E+00						2.77E+00						4.51E+00					
Copper	mg/kg	2.40E+01	1.27E+01	3.13E+02	4.00E+01	3.06E+01		YES	YES			2.32E+01			YES			2.98E+01		YES	YES		
Iron	mg/kg	5.63E+04	3.42E+04	2.34E+03	2.00E+02	2.41E+04				YES	YES	3.36E+04				YES	YES	4.09E+04			YES	YES	YES
Lead	mg/kg	8.30E+01	4.01E+01	4.00E+02	5.00E+01	1.78E+02		YES	YES		YES	2.64E+01	J					4.80E+01	J		YES		
Magnesium	mg/kg	9.60E+03	1.03E+03	NA	4.40E+05	2.70E+02						1.13E+02	J					3.10E+02					
Manganese	mg/kg	6.85E+03	1.58E+03	3.63E+02	1.00E+02	4.77E+02				YES	YES	1.64E+02					YES	2.14E+02					YES
Mercury	mg/kg	3.20E-01	8.00E-02	2.33E+00	1.00E-01	6.88E-02	J					7.05E-02	J					1.70E-01			YES		YES
Nickel	mg/kg	2.20E+01	1.03E+01	1.54E+02	3.00E+01	7.11E+00						5.29E+00						7.57E+00					
Potassium	mg/kg	6.01E+03	8.00E+02	NA	NA	1.98E+02	J					4.38E+02	J					5.77E+02	J				
Selenium	mg/kg	1.30E+00	4.80E-01	3.91E+01	8.10E-01	ND						7.20E-01	J		YES			1.46E+00	J	YES	YES		YES
Silver	mg/kg	1.90E+00	3.60E-01	3.91E+01	2.00E+00	ND						ND						ND					
Sodium	mg/kg	5.63E+02	6.34E+02	NA	NA	ND						ND						3.51E+01	J				
Vanadium	mg/kg	1.58E+02	5.88E+01	5.31E+01	2.00E+00	2.26E+01					YES	2.68E+01					YES	3.33E+01					YES
Zinc	mg/kg	2.09E+02	4.06E+01	2.34E+03	5.00E+01	2.72E+01						2.46E+01	J					3.88E+01	J				
VOLATILE ORGANIC COMPOUNDS																							
2-Butanone	mg/kg	NA	NA	4.66E+03	8.96E+01	1.50E-02	J					NR						NR					
Acetone	mg/kg	NA	NA	7.76E+02	2.50E+00	3.50E-01						NR						NR					
p-Cymene	mg/kg	NA	NA	1.55E+03	NA	ND						NR						NR					
HERBICIDES																							
MCPP	mg/kg	NA	NA	7.77E+00	1.00E-01	ND						NR						NR					

Table 5-1

Surface Soil Analytical Results
Impact Area, North-Central Main Post, Parcel 132Q-X
Fort McClellan, Calhoun County, Alabama

Sample Location						HR-132Q-GP07						HR-132Q-GP08						HR-132Q-GP09					
Sample Number						PG0019						PG0021						PG0023					
Sample Date						11-Feb-02						11-Feb-02						12-Feb-02					
Sample Depth (Feet)						0- 1						0- 1						0- 1					
Parameter	Units	UBR[a]	BKG[b]	SSSL[c]	ESV[c]	Result	Qual	>UBR	>BKG	>SSSL	>ESV	Result	Qual	>UBR	>BKG	>SSSL	>ESV	Result	Qual	>UBR	>BKG	>SSSL	>ESV
METALS																							
Aluminum	mg/kg	3.99E+04	1.63E+04	7.80E+03	5.00E+01	3.28E+03					YES	8.67E+03				YES	YES	1.01E+04				YES	YES
Arsenic	mg/kg	4.90E+01	1.37E+01	4.26E-01	1.00E+01	1.44E+00	J			YES		2.80E+00	J			YES		1.07E+01				YES	YES
Barium	mg/kg	2.88E+02	1.24E+02	5.47E+02	1.65E+02	3.77E+01						4.37E+02		YES	YES		YES	6.51E+01					
Beryllium	mg/kg	8.70E-01	8.00E-01	9.60E+00	1.10E+00	ND						1.60E+00		YES	YES		YES	7.06E-01	J				
Calcium	mg/kg	1.79E+04	1.72E+03	NA	NA	ND						3.20E+01	J					3.43E+02					
Chromium	mg/kg	1.34E+02	3.70E+01	2.32E+01	4.00E-01	5.49E+00					YES	6.01E+00					YES	5.98E+01			YES	YES	YES
Cobalt	mg/kg	7.10E+01	1.52E+01	4.68E+02	2.00E+01	1.23E+00	J					2.71E+01			YES		YES	5.42E+00					
Copper	mg/kg	2.40E+01	1.27E+01	3.13E+02	4.00E+01	1.71E+01			YES			3.44E+01		YES	YES			6.00E+01		YES	YES		YES
Iron	mg/kg	5.63E+04	3.42E+04	2.34E+03	2.00E+02	1.25E+04				YES	YES	4.08E+04			YES	YES	YES	3.60E+04			YES	YES	YES
Lead	mg/kg	8.30E+01	4.01E+01	4.00E+02	5.00E+01	3.70E+01	J					9.79E+01	J	YES	YES		YES	5.07E+01			YES		YES
Magnesium	mg/kg	9.60E+03	1.03E+03	NA	4.40E+05	6.46E+01	J					2.08E+02						3.70E+02					
Manganese	mg/kg	6.85E+03	1.58E+03	3.63E+02	1.00E+02	2.09E+02					YES	3.48E+03			YES	YES	YES	6.87E+02				YES	YES
Mercury	mg/kg	3.20E-01	8.00E-02	2.33E+00	1.00E-01	6.64E-02	J					1.76E-01			YES		YES	9.10E-02	B		YES		
Nickel	mg/kg	2.20E+01	1.03E+01	1.54E+02	3.00E+01	1.33E+00	J					1.79E+01			YES			7.86E+00					
Potassium	mg/kg	6.01E+03	8.00E+02	NA	NA	2.44E+02	J					4.52E+02	J					3.21E+02	J				
Selenium	mg/kg	1.30E+00	4.80E-01	3.91E+01	8.10E-01	ND						ND						ND					
Silver	mg/kg	1.90E+00	3.60E-01	3.91E+01	2.00E+00	ND						ND						1.34E+00	J		YES		
Sodium	mg/kg	5.63E+02	6.34E+02	NA	NA	ND						3.82E+01	J					6.39E+01	J				
Vanadium	mg/kg	1.58E+02	5.88E+01	5.31E+01	2.00E+00	1.40E+01					YES	4.01E+01					YES	3.53E+01					YES
Zinc	mg/kg	2.09E+02	4.06E+01	2.34E+03	5.00E+01	5.05E+00	J					5.78E+01	J		YES		YES	3.04E+01					
VOLATILE ORGANIC COMPOUNDS																							
2-Butanone	mg/kg	NA	NA	4.66E+03	8.96E+01	NR						NR						NR					
Acetone	mg/kg	NA	NA	7.76E+02	2.50E+00	NR						NR						NR					
p-Cymene	mg/kg	NA	NA	1.55E+03	NA	NR						NR						NR					
HERBICIDES																							
MCPP	mg/kg	NA	NA	7.77E+00	1.00E-01	NR						NR						NR					

Table 5-1

Surface Soil Analytical Results
Impact Area, North-Central Main Post, Parcel 132Q-X
Fort McClellan, Calhoun County, Alabama

Sample Location						HR-132Q-MW01						HR-132Q-MW02					
Sample Number						PG0001						PG0003					
Sample Date						11-Feb-02						12-Feb-02					
Sample Depth (Feet)						0- 1						0- 1					
Parameter	Units	UBR[a]	BKG[b]	SSSL[c]	ESV[c]	Result	Qual	>UBR	>BKG	>SSSL	>ESV	Result	Qual	>UBR	>BKG	>SSSL	>ESV
METALS																	
Aluminum	mg/kg	3.99E+04	1.63E+04	7.80E+03	5.00E+01	7.56E+03					YES	1.68E+04			YES	YES	YES
Arsenic	mg/kg	4.90E+01	1.37E+01	4.26E-01	1.00E+01	1.66E+00	J			YES		5.23E+00				YES	
Barium	mg/kg	2.88E+02	1.24E+02	5.47E+02	1.65E+02	1.77E+03		YES	YES	YES	YES	7.68E+01					
Beryllium	mg/kg	8.70E-01	8.00E-01	9.60E+00	1.10E+00	1.64E+00		YES	YES		YES	8.46E-01	J		YES		
Calcium	mg/kg	1.79E+04	1.72E+03	NA	NA	1.55E+02						1.31E+02					
Chromium	mg/kg	1.34E+02	3.70E+01	2.32E+01	4.00E-01	1.29E+00	J				YES	9.14E+00					YES
Cobalt	mg/kg	7.10E+01	1.52E+01	4.68E+02	2.00E+01	3.48E+01			YES		YES	6.09E+00					
Copper	mg/kg	2.40E+01	1.27E+01	3.13E+02	4.00E+01	2.70E+01		YES	YES			1.40E+01			YES		
Iron	mg/kg	5.63E+04	3.42E+04	2.34E+03	2.00E+02	3.91E+04			YES	YES	YES	1.79E+04				YES	YES
Lead	mg/kg	8.30E+01	4.01E+01	4.00E+02	5.00E+01	3.85E+02	J	YES	YES		YES	3.44E+01					
Magnesium	mg/kg	9.60E+03	1.03E+03	NA	4.40E+05	1.82E+02						5.06E+02					
Manganese	mg/kg	6.85E+03	1.58E+03	3.63E+02	1.00E+02	1.06E+04		YES	YES	YES	YES	1.33E+03				YES	YES
Mercury	mg/kg	3.20E-01	8.00E-02	2.33E+00	1.00E-01	4.36E-01		YES	YES		YES	8.62E-02	J		YES		
Nickel	mg/kg	2.20E+01	1.03E+01	1.54E+02	3.00E+01	1.20E+01			YES			9.67E+00					
Potassium	mg/kg	6.01E+03	8.00E+02	NA	NA	5.20E+02	J					3.46E+02	J				
Selenium	mg/kg	1.30E+00	4.80E-01	3.91E+01	8.10E-01	ND						ND					
Silver	mg/kg	1.90E+00	3.60E-01	3.91E+01	2.00E+00	ND						ND					
Sodium	mg/kg	5.63E+02	6.34E+02	NA	NA	4.93E+01	J					3.90E+01	J				
Vanadium	mg/kg	1.58E+02	5.88E+01	5.31E+01	2.00E+00	3.29E+01					YES	2.39E+01					YES
Zinc	mg/kg	2.09E+02	4.06E+01	2.34E+03	5.00E+01	5.22E+01	J		YES		YES	2.48E+01					
VOLATILE ORGANIC COMPOUNDS																	
2-Butanone	mg/kg	NA	NA	4.66E+03	8.96E+01	NR						ND					
Acetone	mg/kg	NA	NA	7.76E+02	2.50E+00	NR						6.60E-02					
p-Cymene	mg/kg	NA	NA	1.55E+03	NA	NR						2.40E-03	J				
HERBICIDES																	
MCPP	mg/kg	NA	NA	7.77E+00	1.00E-01	NR						1.20E+00	J				YES

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

[a] UBR - Upper background range as given in Science Applications International Corporation (SAIC), 1998, *Final Background Metals Survey Report, Fort McClellan, Alabama* , July.

[b] BKG - Background. Concentration listed is two times (2x) the arithmetic mean of background metals concentration given in SAIC, 1998.

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

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 an estimated concentration.

mg/kg - Milligrams per kilogram.

NA - Not available.

ND - Not detected.

NR - Not requested.

Qual - Data validation qualifier.

Table 5-2

Subsurface Soil Analytical Results
Impact Area, North-Central Main Post, Parcel 132Q-X
Fort McClellan, Calhoun County, Alabama

Sample Location					HR-132Q-GP01					HR-132Q-GP02					HR-132Q-GP03					HR-132Q-GP04				
Sample Number					PG0007					PG0009					PG0011					PG0013				
Sample Date					12-Feb-02					12-Feb-02					12-Feb-02					12-Feb-02				
Sample Depth (Feet)					3 - 4					3 - 4					3 - 4					3 - 4				
Parameter	Units	UBR[a]	BKG[b]	SSSL[c]	Result	Qual	>UBR	>BKG	>SSSL	Result	Qual	>UBR	>BKG	>SSSL	Result	Qual	>UBR	>BKG	>SSSL	Result	Qual	>UBR	>BKG	>SSSL
METALS																								
Aluminum	mg/kg	2.46E+04	1.36E+04	7.80E+03	2.52E+04		YES	YES	YES	2.32E+04			YES	YES	7.20E+03					1.91E+04			YES	YES
Arsenic	mg/kg	3.80E+01	1.83E+01	4.26E-01	8.41E+00				YES	6.43E+00				YES	2.63E+00				YES	7.85E+00	J			YES
Barium	mg/kg	4.50E+03	2.34E+02	5.47E+02	6.80E+01					2.78E+01					9.09E+00					2.27E+01				
Beryllium	mg/kg	2.00E+00	8.60E-01	9.60E+00	8.09E-01	J				ND					ND					1.50E+00	J		YES	
Calcium	mg/kg	3.65E+03	6.37E+02	NA	1.16E+02	J				5.38E+01	J				5.19E+01	J				1.47E+02				
Chromium	mg/kg	5.50E+01	3.83E+01	2.32E+01	1.48E+01					2.83E+01				YES	1.51E+01					1.50E+01				
Cobalt	mg/kg	9.60E+01	1.75E+01	4.68E+02	8.39E+00					1.33E+00	J				ND					4.35E+00	J			
Copper	mg/kg	6.10E+01	1.94E+01	3.13E+02	1.68E+01					1.40E+01					9.15E+00					3.35E+01	J		YES	
Iron	mg/kg	4.80E+04	4.48E+04	2.34E+03	2.70E+04				YES	2.58E+04				YES	3.04E+04				YES	5.58E+04		YES	YES	YES
Lead	mg/kg	5.00E+02	3.85E+01	4.00E+02	3.17E+01					9.22E+00					1.34E+01					2.80E+01	J			
Magnesium	mg/kg	5.94E+03	7.66E+02	NA	9.97E+02			YES		3.77E+02					1.59E+02					6.41E+02				
Manganese	mg/kg	1.90E+04	1.36E+03	3.63E+02	6.11E+02				YES	8.04E+01					1.85E+01					2.22E+02	J			
Mercury	mg/kg	1.20E-01	7.00E-02	2.33E+00	1.52E-01		YES	YES		1.37E-01		YES	YES		7.43E-02	J		YES		1.73E-01		YES	YES	
Nickel	mg/kg	3.80E+01	1.29E+01	1.54E+02	1.36E+01			YES		8.56E+00					1.41E+00	J				1.80E+01	J		YES	
Potassium	mg/kg	6.15E+03	7.11E+02	NA	7.39E+02			YES		2.34E+02	J				3.96E+02	J				9.32E+02			YES	
Selenium	mg/kg	5.50E-01	4.70E-01	3.91E+01	ND					ND					ND					ND				
Silver	mg/kg	6.60E-01	2.40E-01	3.91E+01	1.46E+00	J	YES	YES		ND					ND					1.54E+00	J	YES	YES	
Sodium	mg/kg	6.43E+02	7.02E+02	NA	4.39E+01	J				3.68E+01	J				ND					3.87E+01	J			
Vanadium	mg/kg	9.90E+01	6.49E+01	5.31E+01	4.01E+01					5.21E+01					3.07E+01					5.77E+01				YES
Zinc	mg/kg	8.90E+01	3.49E+01	2.34E+03	3.69E+01			YES		2.12E+01					7.42E+00					6.77E+01	J		YES	

Table 5-2

Subsurface Soil Analytical Results
Impact Area, North-Central Main Post, Parcel 132Q-X
Fort McClellan, Calhoun County, Alabama

Sample Location					HR-132Q-GP05					HR-132Q-GP06					HR-132Q-GP07				
Sample Number					PG0016					PG0018					PG0020				
Sample Date					11-Feb-02					11-Feb-02					11-Feb-02				
Sample Depth (Feet)					3 - 4					3- 3.5					1- 1.5				
Parameter	Units	UBR[a]	BKG[b]	SSSL[c]	Result	Qual	>UBR	>BKG	>SSSL	Result	Qual	>UBR	>BKG	>SSSL	Result	Qual	>UBR	>BKG	>SSSL
METALS																			
Aluminum	mg/kg	2.46E+04	1.36E+04	7.80E+03	9.12E+03				YES	9.29E+03				YES	4.24E+03				
Arsenic	mg/kg	3.80E+01	1.83E+01	4.26E-01	1.17E+00	J			YES	4.87E-01	J			YES	1.43E+00	J			YES
Barium	mg/kg	4.50E+03	2.34E+02	5.47E+02	6.67E+00					1.63E+01					3.72E+01				
Beryllium	mg/kg	2.00E+00	8.60E-01	9.60E+00	6.03E-01	J				ND					ND				
Calcium	mg/kg	3.65E+03	6.37E+02	NA	2.60E+01	J				2.12E+02					3.74E+01	J			
Chromium	mg/kg	5.50E+01	3.83E+01	2.32E+01	6.61E+00					1.17E+01					9.84E+00				
Cobalt	mg/kg	9.60E+01	1.75E+01	4.68E+02	2.46E+00	J				1.76E+00	J				ND				
Copper	mg/kg	6.10E+01	1.94E+01	3.13E+02	1.92E+01					1.36E+01					2.32E+01			YES	
Iron	mg/kg	4.80E+04	4.48E+04	2.34E+03	3.84E+04				YES	2.79E+04				YES	2.43E+04				YES
Lead	mg/kg	5.00E+02	3.85E+01	4.00E+02	1.83E+01	J				8.36E+00	J				6.41E+01	J		YES	
Magnesium	mg/kg	5.94E+03	7.66E+02	NA	1.62E+02					3.18E+02					4.77E+01	J			
Manganese	mg/kg	1.90E+04	1.36E+03	3.63E+02	8.38E+01					2.38E+01					1.60E+02				
Mercury	mg/kg	1.20E-01	7.00E-02	2.33E+00	8.00E-02	J		YES		1.51E-01		YES	YES		8.94E-02	J		YES	
Nickel	mg/kg	3.80E+01	1.29E+01	1.54E+02	7.03E+00					3.37E+00					7.39E-01	J			
Potassium	mg/kg	6.15E+03	7.11E+02	NA	6.38E+02	J				5.91E+02	J				2.82E+02	J			
Selenium	mg/kg	5.50E-01	4.70E-01	3.91E+01	1.26E+00	J	YES	YES		9.62E-01	J	YES	YES		6.60E-01	J	YES	YES	
Silver	mg/kg	6.60E-01	2.40E-01	3.91E+01	ND					ND					ND				
Sodium	mg/kg	6.43E+02	7.02E+02	NA	4.75E+01	J				3.70E+01	J				ND				
Vanadium	mg/kg	9.90E+01	6.49E+01	5.31E+01	2.52E+01					3.17E+01					2.24E+01				
Zinc	mg/kg	8.90E+01	3.49E+01	2.34E+03	2.44E+01	J				1.49E+01	J				7.69E+00	J			

Table 5-2

Subsurface Soil Analytical Results
Impact Area, North-Central Main Post, Parcel 132Q-X
Fort McClellan, Calhoun County, Alabama

Sample Location					HR-132Q-GP08					HR-132Q-GP09					HR-132Q-MW02				
Sample Number					PG0022					PG0024					PG0005				
Sample Date					11-Feb-02					12-Feb-02					12-Feb-02				
Sample Depth (Feet)					3- 3.5					3 - 4					3 - 4				
Parameter	Units	UBR[a]	BKG[b]	SSSL[c]	Result	Qual	>UBR	>BKG	>SSSL	Result	Qual	>UBR	>BKG	>SSSL	Result	Qual	>UBR	>BKG	>SSSL
METALS																			
Aluminum	mg/kg	2.46E+04	1.36E+04	7.80E+03	6.71E+03					8.13E+03				YES	2.04E+04			YES	YES
Arsenic	mg/kg	3.80E+01	1.83E+01	4.26E-01	4.47E+00	J			YES	3.05E+00				YES	8.52E+00				YES
Barium	mg/kg	4.50E+03	2.34E+02	5.47E+02	1.74E+01					4.04E+01					3.38E+01				
Beryllium	mg/kg	2.00E+00	8.60E-01	9.60E+00	8.73E-01	J		YES		ND					7.11E-01	J			
Calcium	mg/kg	3.65E+03	6.37E+02	NA	3.26E+01	J				1.74E+02					7.82E+01	J			
Chromium	mg/kg	5.50E+01	3.83E+01	2.32E+01	6.58E+00					8.83E+00					4.16E+01			YES	YES
Cobalt	mg/kg	9.60E+01	1.75E+01	4.68E+02	4.14E+00					1.76E+00	J				5.17E+00				
Copper	mg/kg	6.10E+01	1.94E+01	3.13E+02	1.82E+01					4.35E+00					1.63E+01				
Iron	mg/kg	4.80E+04	4.48E+04	2.34E+03	3.75E+04				YES	1.03E+04				YES	4.45E+04				YES
Lead	mg/kg	5.00E+02	3.85E+01	4.00E+02	3.16E+01	J				6.68E+00					1.56E+01				
Magnesium	mg/kg	5.94E+03	7.66E+02	NA	2.92E+02					2.73E+02					5.97E+02				
Manganese	mg/kg	1.90E+04	1.36E+03	3.63E+02	2.06E+02					1.33E+02					2.05E+02				
Mercury	mg/kg	1.20E-01	7.00E-02	2.33E+00	1.50E-01		YES	YES		7.93E-02	B		YES		1.03E-01	J		YES	
Nickel	mg/kg	3.80E+01	1.29E+01	1.54E+02	7.64E+00					3.91E+00					8.77E+00				
Potassium	mg/kg	6.15E+03	7.11E+02	NA	8.98E+02			YES		2.11E+02	J				5.55E+02	J			
Selenium	mg/kg	5.50E-01	4.70E-01	3.91E+01	1.33E+00	J	YES	YES		ND					ND				
Silver	mg/kg	6.60E-01	2.40E-01	3.91E+01	ND					ND					ND				
Sodium	mg/kg	6.43E+02	7.02E+02	NA	4.28E+01	J				3.29E+01	J				4.46E+01	J			
Vanadium	mg/kg	9.90E+01	6.49E+01	5.31E+01	2.91E+01					1.63E+01					5.01E+01				
Zinc	mg/kg	8.90E+01	3.49E+01	2.34E+03	2.47E+01	J				9.23E+00					3.30E+01				

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

[a] UBR - Upper background range as given in Science Applications International Corporation (SAIC), 1998, *Final Background Metals Survey Report, Fort McClellan, Alabama* , July.

[b] BKG - Background. Concentration listed is two times (2x) the arithmetic mean of background metals concentration given in SAIC, 1998.

[c] 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 an estimated concentration.

mg/kg - Milligrams per kilogram.

NA - Not available.

ND - Not detected.

NR - Not requested.

Qual - Data validation qualifier.

Table 5-3

Groundwater Analytical Results
Impact Area, North-Central Main Post, Parcel 132Q-X
Fort McClellan, Calhoun County, Alabama

Sample Location					HR-132Q-MW01					HR-132Q-MW02				
Sample Number					PG3001					PG3002				
Sample Date					29-Apr-02					25-Apr-02				
Parameter	Units	UBR[a]	BKG[b]	SSSL[c]	Result	Qual	>UBR	>BKG	>SSSL	Result	Qual	>UBR	>BKG	>SSSL
METALS														
Aluminum	mg/L	9.60E+00	2.34E+00	1.56E+00	3.11E-01					ND				
Barium	mg/L	4.01E-01	1.27E-01	1.10E-01	1.25E-02					9.73E-03	B			
Calcium	mg/L	4.52E+02	5.65E+01	NA	2.73E+00					1.52E+00	B			
Cobalt	mg/L	2.50E-02	2.34E-02	9.39E-02	1.22E-02	J				ND				
Iron	mg/L	2.58E+01	7.04E+00	4.69E-01	1.11E+00				YES	ND				
Magnesium	mg/L	1.49E+02	2.13E+01	NA	1.20E+00					6.33E-01	B			
Manganese	mg/L	5.82E+00	5.81E-01	7.35E-02	5.61E-01				YES	5.15E-02	J			
Mercury	mg/L	NA	NA	4.69E-04	1.35E-04	J				ND				
Potassium	mg/L	6.85E+01	7.20E+00	NA	1.02E+00	J				ND				
Sodium	mg/L	6.47E+01	1.48E+01	NA	1.43E+00					7.66E-01	B			
VOLATILE ORGANIC COMPOUNDS														
Methylene chloride	mg/L	NA	NA	7.85E-03	NR					4.50E-04	B			
PESTICIDES														
4,4'-DDD	mg/L	NA	NA	1.83E-04	NR					1.80E-04	J			
Aldrin	mg/L	NA	NA	3.90E-06	NR					4.50E-05	J			YES
alpha-Chlordane	mg/L	NA	NA	1.74E-04	NR					8.60E-05	J			
beta-BHC	mg/L	NA	NA	3.60E-05	NR					4.60E-05	J			YES
gamma-BHC (Lindane)	mg/L	NA	NA	5.00E-05	NR					3.10E-05	J			
EXPLOSIVES														
1,3,5-Trinitrobenzene	mg/L	NA	NA	4.69E-02	4.40E-04	J				ND				
2-Nitrotoluene	mg/L	NA	NA	1.53E-02	6.00E-04	J				7.80E-04	J			
4-Amino-2,6-dinitrotoluene	mg/L	NA	NA	9.30E-05	5.40E-04	J			YES	ND				

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

[a] UBR - Upper background range as given in Science Applications International Corporation (SAIC), 1998, *Final Background Metals Survey Report, Fort McClellan, Alabama* , July.

[b] BKG - Background. Concentration listed is two times (2x) the arithmetic mean of background metals concentration given in SAIC, 1998.

[c] 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 an estimated concentration.

mg/L - Milligrams per liter.

NA - Not available.

ND - Not detected.

NR - Not requested.

Qual - Data validation qualifier.

- Barium (1,770 mg/kg) exceeded its SSSL (547 mg/kg) and upper background range (288 mg/kg) at one sample location (HR-132Q-MW01).

- Manganese (10,600 mg/kg) exceeded its SSSL (363 mg/kg) and upper background range (6,850 mg/kg) at one sample location (HR-132Q-MW01).

Fourteen metals were detected at concentrations exceeding ESVs. Of these, the concentrations of twelve metals also exceeded their respective background values in one or more samples. Seven metals results also exceeded their respective upper background ranges. They are:

- Barium (437 mg/kg and 1,770 mg/kg) exceeded its ESV (165 mg/kg) and upper background range (288 mg/kg) at 2 sample locations (HR-132Q-GP08 and HR-132Q-MW01).

- Beryllium (1.6 mg/kg and 1.64 mg/kg) exceeded its ESV (1.1 mg/kg) and upper background range (0.87 mg/kg) at 2 sample locations (HR-132Q-GP08 and HR-132Q-MW01).

- Copper (60 mg/kg) exceeded it ESV (40 mg/kg) and upper background range (24 mg/kg) at one sample location (HR-132Q-GP09).

- Lead (98 to 385 mg/kg) exceeded its ESV (50 mg/kg) and upper background range (83 mg/kg) at 3 sample locations (HR-132Q-GP04, HR-132Q-GP08, and HR-132Q-MW01).

- Manganese (10,600 mg/kg) exceeded its ESV (100 mg/kg) and upper background range (6,850 mg/kg) at one sample location (HR-132Q-MW01).

- Mercury (0.436 mg/kg) exceeded its ESV (0.1 mg/kg) and upper background range (0.32 mg/kg) at one sample location (HR-132 MW01).

- Selenium (1.46 mg/kg) exceeded its ESV (0.81 mg/kg) and upper background range (1.3 mg/kg) at one sample location (HR-132Q-GP06).

Explosives. Explosives were not detected in the surface soil samples.

Volatile Organic Compounds. Two surface soil sample locations (HR-132Q-GP04 and HR-132Q-MW02) were analyzed for VOCs. A total of three VOCs (2-butanone, acetone, and p-cymene) were detected in the samples at concentrations below SSSLs and ESVs (Note: p-cymene does not have an ESV).

Semivolatile Organic Compounds. Two surface soil sample locations (HR-132Q-GP04 and HR-132Q-MW02) were analyzed for SVOCs. SVOCs were not detected in the surface soil samples.

Pesticides. Two surface soil sample locations (HR-132Q-GP04 and HR-132Q-MW02) were analyzed for pesticides. Pesticides were not detected in the surface soil samples.

Herbicides. Two surface soil sample locations (HR-132Q-GP04 and HR-132Q-MW02) were analyzed for herbicides. MCPP was detected at one location (HR-132Q-MW02) at an estimated concentration (1.2 mg/kg) below its SSSL (7.77 mg/kg) but above its ESV (0.1 mg/kg). The MCPP result was flagged with a "J" data qualifier, indicating that the compound was detected at an estimated concentration below the method reporting limit.

5.2 Subsurface Soil Analytical Results

Ten subsurface soil samples were collected for chemical analysis at Parcel 132Q-X. 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. Twenty metals were detected in subsurface soil samples collected at the site. The concentrations of six metals (aluminum, arsenic, chromium, iron, manganese, and vanadium) exceeded SSSLs. Of these, the concentrations of aluminum (four samples), chromium (one sample), and iron (one sample) also exceeded their respective background concentrations. One aluminum result (25,200 mg/kg) and the iron result (55,800 mg/kg) also exceeded their respective UBRs (24,600 mg/kg and 48,000 mg/kg) at HR-132-GP01 and HR-132-GP04, respectively.

Explosives. Explosives were not detected in the subsurface soil samples collected at the site.

Volatile Organic Compounds. Two subsurface soil sample locations (HR-132Q-GP04 and HR-132Q-MW02) were analyzed for VOCs. VOCs were not detected in the subsurface soil samples.

Semivolatile Organic Compounds. Two subsurface soil sample locations (HR-132Q-GP04 and HR-132Q-MW02) were analyzed for SVOCs. SVOCs were not detected in the subsurface soil samples.

Pesticides. Two subsurface soil sample locations (HR-132Q-GP04 and HR-132Q-MW02) were analyzed for pesticides. Pesticides were not detected in the subsurface soil samples.

Herbicides. Two subsurface soil sample locations (HR-132Q-GP04 and HR-132Q-MW02) were analyzed for herbicides. Herbicides were not detected in the subsurface soil samples.

5.3 Groundwater Analytical Results

Two groundwater samples were collected for chemical analysis at Parcel 13Q-X 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 5-3.

Metals. A total of ten metals were detected in the groundwater samples collected at the site. The concentrations of iron (1.11 mg/L) and manganese (0.561 mg/L) exceeded their respective SSSLs (0.469 mg/L and 0.0735 mg/L) in one sample but were below their respective background values.

Explosives. Four explosives were detected in groundwater samples collected at the site. Analytical results from each of the 4 explosive compounds detected were flagged with a "J" data qualifier, indicating that the compounds were detected at estimated concentrations below method reporting limits. The concentration of 4-amino-2,6-dinitrotoluene (0.00054 mg/L) exceeded its SSSL (0.0000936 mg/L) at one sample location (HR-132Q-MW01).

Volatile Organic Compounds. One groundwater sample location (HR-132Q-MW02) was analyzed for VOCs. Methylene chloride (a typical laboratory contaminant) was detected in the sample at a concentration below its SSSL.

Semivolatile Organic Compounds. One groundwater sample location (HR-132Q-MW02) was analyzed for SVOCs. SVOCs were not detected in the sample.

Pesticides. One groundwater sample location (HR-132Q-MW02) was analyzed for pesticides. Five pesticides (4,4'-DDD, aldrin, alpha-chlordane, beta-BHC, and gamma-BHC [Lindane]) were detected in the sample. The aldrin (0.000045 mg/L) and beta-BHC (0.000046 mg/L) results exceeded their respective SSSLs (0.0000039 mg/L and 0.000036 mg/L) in the sample. All of the pesticide results were flagged with a "J" data qualifier, indicating that the compounds were detected at estimated concentrations below method reporting limits.

Herbicides. One groundwater sample location (HR-132Q-MW02) was analyzed for herbicides. Herbicides were not detected in the sample.

6.0 Summary, Conclusions, and Recommendations

Under contract to the USACE, IT completed a SI at the Impact Area North-Central Main Post, Parcel 132Q-X at FTMC in Calhoun County, Alabama. The SI was conducted to determine whether chemical constituents are present at the site at concentrations that pose an unacceptable risk to human health or the environment. The SI consisted of the collection and analysis of 11 surface soil samples, 10 subsurface soil samples, and 2 groundwater samples. In addition, 2 permanent monitoring wells were installed in the saturated zone to facilitate groundwater sample collection and to provide site-specific geological and hydrogeological characterization information.

Chemical analysis of samples collected at the site indicates that metals, VOCs, pesticides, explosives, and one herbicide were detected in site media. Analytical results were compared to SSSLs, ESVs, and background screening values developed for human health and ecological risk evaluations as part of investigations being performed under the BRAC Environmental Restoration Program at FTMC.

Chemicals of potential concern (COPC) in soil were limited to four metals (aluminum, barium, iron, and manganese) in one sample each. Aluminum, iron, and manganese, however, are common elements in native soils whose concentrations vary over a wide range. All other aluminum, iron, and manganese results in site media were below background or within the upper background range. Therefore, it is judged that these metals are present in site soils at naturally occurring levels. Barium is retained as a site-related COPC because its maximum detected concentration (1,770 mg/kg) exceeded its SSSL (547 mg/kg) and upper background range (288 mg/kg) in one of 21 soil samples. All other barium results in site media were below SSSLs and/or background levels. Based on its low frequency of detection above screening levels (less than 5 percent), it is concluded that barium does not pose a threat to human health.

Two pesticides (aldrin and beta-BHC) and one explosive compound (4-amino-2,6-dinitrotoluene) were selected as groundwater COPCs because their concentrations exceeded their respective SSSLs in one sample each. The levels of these constituents, however, were very low and were estimated by the analytical laboratory because the results were below method reporting limits. U.S. Environmental Protection Agency (EPA) maximum contaminant levels (MCL) for drinking water do not exist for any of these compounds. The aldrin result, however, was below EPA

Health Advisory values (no Health Advisory values exist for beta-BHC and 4-amino-2,6-dinitrotoluene). Based on their low detected levels, the uncertainty associated with the estimated analytical results, and the relative magnitude of the exceedances, it is concluded that these constituents do not pose an unacceptable risk to human health.

Constituents of potential ecological concern were limited to several metals and one herbicide (2-[2-methyl-4-chlorophenoxy]propionic acid) in surface soil. The metals identified were within their upper background ranges except for barium (in two samples), beryllium (one sample), copper (one sample), lead (three samples), manganese (one sample), mercury (one sample), and selenium (one sample). Only barium, beryllium, and lead had a detection frequency greater than 10 percent. The beryllium results were at or below the two-times-background screening level. The barium (437 milligrams per kilogram [mg/kg] and 1,770 mg/kg) and lead (98 mg/kg, 178 mg/kg, and 385 mg/kg) results remain as constituents of potential ecological concern. Because of the conservatism of the ESVs and the limited distribution in site media, these constituents are not expected to pose a significant threat to ecological receptors.

Based on the results of the SI, past operations at the Impact Area North-Central Main Post, Parcel 132Q-X have minimally impacted the environment. In addition, bullet fragments are present on the ground surface in some areas of the site. However, the metals and chemical compounds 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 CERCLA-related hazardous substances for the area of investigation at the Impact Area North-Central Main Post, Parcel 132Q-X.

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ATTACHMENT 1

LIST OF ABBREVIATIONS AND ACRONYMS

List of Abbreviations and Acronyms

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

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

GST	ground stain
GW	groundwater
gw	well-graded gravels; gravel-sand mixtures
H&S	health and safety
HA	hand auger
HC	mixture of hexachloroethane, aluminum powder, and zinc oxide (smoke producer)
HCl	hydrochloric acid
HD	distilled mustard (bis-[dichloroethyl]sulfide)
HDPE	high-density polyethylene
HE	high explosive
HEAST	Health Effects Assessment Summary Tables
Herb.	herbicides
HHRA	human health risk assessment
HI	hazard index
HN	hydrogen mustard
H_2O_2	hydrogen peroxide
HPLC	high-performance liquid chromatography
HNO_3	nitric acid
HQ	hazard quotient
HQ_{screen}	screening-level hazard quotient
hr	hour
HRC	hydrogen releasing compound
HSA	hollow-stem auger
HSDB	Hazardous Substance Data Bank
HTRW	hazardous, toxic, and radioactive waste
‘I’	out of control, data rejected due to low recovery
IASPOW	Impact Area South of POW Training Facility
IATA	International Air Transport Authority
ICAL	initial calibration
ICB	initial calibration blank
ICP	inductively-coupled plasma
ICRP	International Commission on Radiological Protection
ICS	interference check sample
ID	inside diameter
IDL	instrument detection limit
IDLH	immediately dangerous to life or health
IDM	investigative-derived media
IDW	investigation-derived waste
IEUBK	Integrated Exposure Uptake Biokinetic
IF	ingestion factor; inhalation factor
ILCR	incremental lifetime cancer risk
IMPA	isopropylmethyl phosphonic acid
IMR	Iron Mountain Road
in.	inch
Ing	ingestion
Inh	inhalation
IP	ionization potential
IPS	International Pipe Standard
IR	ingestion rate
IRDMIS	Installation Restoration Data Management Information System
IRIS	Integrated Risk Information Service
IRP	Installation Restoration Program
IS	internal standard
ISCP	Installation Spill Contingency Plan
IT	IT Corporation
ITEMS	IT Environmental Management System™
‘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
K_d	soil-water distribution coefficient
kg	kilogram
KeV	kilo electron volt
K_{oc}	organic carbon partioning coefficient
K_{ow}	octonal-water partition coefficient
$KMnO_4$	potassium permanganate
L	liter; Lewisite (dichloro-[2-chloroethyl]sulfide)
L/kg/day	liters per kilogram per day
l	liter
LAW	light anti-tank weapon
lb	pound
LBP	lead-based paint
LC	liquid chromatography
LCS	laboratory control sample
LC_{50}	lethal concentration for 50 percent population tested
LD_{50}	lethal dose for 50 percent population tested
LEL	lower explosive limit
LOAEL	lowest-observed-advserse-effects-level
LOEC	lowest-observable-effect-concentration
LRA	land redevelopment authority
LT	less than the certified reporting limit
LUC	land-use control
LUCAP	land-use control assurance plan
LUCIP	land-use control implementation plan
max	maximum
MB	method blank
MCL	maximum contaminant level
MCLG	maximum contaminant level goal
MCPA	4-chloro-2-methylphenoxyacetic acid
MCPP	2-(2-methyl-4-chlorophenoxy)propionic acid
MCS	media cleanup standard
MD	matrix duplicate
MDC	maximum detected concentration
MDCC	maximum detected constituent concentration
MDL	method detection limit
mg	milligrams
mg/kg	milligrams per kilogram
mg/kg/day	milligram per kilogram per day
mg/kgbw/day	milligrams per kilogram of body weight per day
mg/L	milligrams per liter
mg/m^3	milligrams per cubic meter
mh	inorganic silts, micaceous or diatomaceous fine, sandy or silt soils
MHz	megahertz
µg/g	micrograms per gram
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
µmhos/cm	micromhos per centimeter
MEC	munitions and explosives of concern
MeV	mega electron volt
min	minimum
MINICAMS	miniature continuous air monitoring system
ml	inorganic silts and very fine sands
mL	milliliter
mm	millimeter
MM	mounded material
MMBtu/hr	million Btu per hour
MNA	monitored natural attenuation
MnO_4-	permanganate ion
MOA	Memorandum of Agreement
MOGAS	motor vehicle gasoline
MOUT	Military Operations in Urban Terrain
MP	Military Police
MPA	methyl phosphonic acid
MPC	maximum permissible concentration
MPM	most probable munition
MQL	method quantitation limit
MR	molasses residue
MRL	method reporting limit
MS	matrix spike
mS/cm	millisiemens per centimeter
mS/m	millisiemens per meter
MSD	matrix spike duplicate; minimum separation distance
MTBE	methyl tertiary butyl ether
msl	mean sea level
MtD3	Montevallo shaly, silty clay loam, 10 to 40 percent slopes , severely eroded
mV	millivolts
MW	monitoring well
MWI&MP	Monitoring Well Installation and Management Plan
Na	sodium
NA	not applicable; not available
NAD	North American Datum
NAD83	North American Datum of 1983

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

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