Final

Site Investigation Report
Ground Scar with Small Pit North of Landfill No. 3
Parcel 155(7)

Fort McClellan
Calhoun County, Alabama

Prepared for:

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Task Order CK08
Contract No. DACA21-96-D-0018
IT Project No. 783149

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Revision 0

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Executive Summary

In accordance with Contract Number DACA21-96-D-0018, Task Order CK08, IT Corporation (IT) completed a site investigation (SI) at the Ground Scar with Small Pit North of Landfill No. 3, Parcel 155(7), at Fort McClellan in Calhoun County, Alabama. The SI was conducted to determine whether chemical constituents are present at the site and, if present, whether the concentrations present an unacceptable risk to human health or the environment. The SI at the Ground Scar with Small Pit North of Landfill No. 3, Parcel 155(7), consisted of the sampling and analysis of four surface soil samples, two subsurface soil samples, and three groundwater samples. In addition, three permanent groundwater monitoring wells were installed at the site to facilitate groundwater sample collection and to provide geological and hydrogeological characterization information. As part of this investigation, IT incorporated data previously collected by QST Environmental, Inc. at the Ground Scar with Small Pit North of Landfill No. 3, Parcel 155(7).

The analytical results indicate that metals, volatile organic compounds (VOC), semivolatile organic compounds (SVOC), and pesticides were detected in the various site media. In addition, two herbicides were detected in one surface soil sample. Polychlorinated biphenyls and nitroaromatic explosive compounds were not detected in any of the samples collected at the site. To evaluate whether the detected constituents present an unacceptable risk to human health or the environment, the analytical results were compared to human health site-specific screening levels (SSSL), ecological screening values (ESV), and background screening values for Fort McClellan.

The potential impact to human receptors is expected to be minimal. Although the site is projected for active recreation reuse, the analytical data were screened against residential human health SSSLs to evaluate the site for possible unrestricted land reuse. The metals that exceeded SSSLs in site media were below their respective background concentrations and, therefore, do not pose an unacceptable risk to future human receptors. VOC, SVOC, pesticide, and herbicide concentrations in site media were below SSSLs except for one pesticide in one groundwater sample.

One pesticide (aldrin) was detected in one groundwater sample at an estimated concentration (0.000031 milligrams per liter [mg/L]) exceeding its SSSL (0.0000039 mg/L). The pesticide was

not detected in any of the other samples collected at the site. Although a U.S. Environmental Protection Agency (EPA) drinking water standard does not exist for aldrin, the pesticide's estimated concentration was below established EPA health advisory values. Based on its low estimated concentration and lack of distribution at the site, it is concluded that exposure to aldrin in groundwater does not represent an unacceptable human health risk.

The potential threat to ecological receptors is also expected to be low. The metals that exceeded ESVs were below their respective background concentrations or within the range of background values. Two VOCs (tetrachloroethene and trichloroethene) and two herbicides (dichloroprop and MCPA) exceeded ESVs in surface soils. The concentrations of trichloroethene and MCPA, however, were estimated at levels close to their respective reporting limits. In addition, the concentration of dichloroprop was flagged with a "B" data qualifier indicating that the compound was also detected in a laboratory method blank sample. The concentration of tetrachloroethene (0.013 milligrams per kilogram [mg/kg]) was within the same order of magnitude as its ESV (0.010 mg/kg). Therefore, these compounds are not expected to pose a significant threat to ecological receptors.

Based on the results of the SI, past operations at the Ground Scar with Small Pit North of Landfill No. 3, Parcel 155(7), do not appear to have adversely impacted the environment. The metals and chemical compounds detected in site media do not pose an unacceptable risk to human health or the environment. Therefore, IT recommends "No Further Action" and unrestricted land reuse at the Ground Scar with Small Pit North of Landfill No. 3, Parcel 155(7).

1.0 Introduction

The U.S. Army has selected Fort McClellan (FTMC) located in Calhoun County, Alabama, for closure by the Base Realignment and Closure (BRAC) Commission under Public Laws 100-526 and 101-510. The 1990 Base Closure Act, Public Law 101-510, established the process by which U.S. Department of Defense (DOD) installations would be closed or realigned. The BRAC Environmental Restoration Program requires investigation and cleanup of federal properties prior to transfer to the public domain. The U.S. Army is conducting environmental studies of the impact of suspected contaminants at parcels at FTMC under the management of the U.S. Army Corps of Engineers (USACE), Mobile District. The USACE contracted IT Corporation (IT) to provide environmental services for completion of the site investigation (SI) at the Ground Scar with Small Pit North of Landfill No. 3, Parcel 155(7), under Contract Number DACA21-96-D-0018, Task Order CK08.

The U.S. Army Environmental Center (AEC) originally contracted QST Environmental, Inc. (QST) to perform the SI at the Ground Scar with Small Pit North of Landfill No. 3, Parcel 155(7). QST prepared an SI work plan (QST, 1998) and conducted field activities in May 1998. QST collected soil samples and installed two of three proposed temporary monitoring wells using direct-push technology (DPT). However, the DPT wells did not produce sufficient groundwater for sampling. Therefore, the USACE contracted IT to install three permanent groundwater monitoring wells for the collection of groundwater samples.

This SI report summarizes field activities, including field sampling and analysis and monitoring well installation activities, and data compiled by IT and QST for the SI conducted at the Ground Scar with Small Pit North of Landfill No. 3, Parcel 155(7).

1.1 Project Description

The Ground Scar with Small Pit North of Landfill No. 3, Parcel 155(7), was identified as an area to be investigated prior to property transfer. The site was classified as a Category 7 site in the environmental baseline survey (EBS) (Environmental Science and Engineering, Inc. [ESE], 1998). Category 7 sites are areas that are not evaluated and/or that require further evaluation.

IT performed fieldwork in accordance with the installation-wide work plan (IT, 1998) and the installation-wide sampling and analysis plan (SAP) (IT, 2000a). The SAP includes both the

installation-wide safety and health plan and the quality assurance plan. Sample locations and analytical parameters were specified in the QST work plan (QST, 1998).

The SI included fieldwork to collect four surface soil samples (QST), two subsurface soil samples (QST), and three groundwater samples (IT). The analytical results were used to determine if potential site-specific chemicals are present at the Ground Scar with Small Pit North of Landfill No. 3, Parcel 155(7).

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 Ground Scar with Small Pit North of Landfill No. 3, Parcel 155(7), at concentrations that present an unacceptable risk to human health or the environment. The conclusions of the SI in Chapter 6.0 are based on the comparison of the analytical results to human health site-specific screening levels (SSSL), ecological screening values (ESV), and background screening values for FTMC. The SSSLs and ESVs were developed by IT as part of the human health and ecological risk evaluations associated with SIs being performed under the BRAC Environmental Restoration Program at FTMC. The SSSLs and ESVs are presented in the *Final Human Health and Ecological Screening Values and PAH Background Summary Report* (IT, 2000b). Background metals screening values are presented in the *Final Background Metals Survey Report, Fort McClellan, Alabama* (Science Applications International Corporation [SAIC], 1998).

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

1.3 Site Description and History

The Ground Scar with Small Pit North of Landfill No. 3, Parcel 155(7), is located approximately 100 feet west of Gobbler Road in the extreme northwest corner of the FTMC Main Post (Figure 1-1). Aerial photographs taken in 1964 reveal a ground scar roughly oval in shape at a location north of Landfill No. 3. At the time of the EBS site visit in 1998, the site was observed to be heavily wooded and designated with signs: "Off Limits Except for Training" (ESE, 1998). The EBS field team discovered a single well-defined pit measuring approximately 4 feet wide, 4 feet long, and 1 foot deep. The pit and signs appeared to post-date the ground scar. The EBS field team stated that the pit resembled an archeological test pit. Several other poorly defined

LEGEND

- UNIMPROVED ROADS AND PARKING
- PAVED ROADS AND PARKING
- PARCEL BOUNDARY
- SURFACE DRAINAGE / CREEK
- FENCE
- UTILITY POLE

FIGURE 1-1
SITE LOCATION MAP
GROUND SCAR WITH SMALL PIT
NORTH OF LANDFILL NO. 3
PARCEL 155(7)

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

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depressions were also observed during the site visit. No evidence of disposal activities was observed during the SI site visit. No other information was available regarding activities at this site (ESE, 1998).

Parcel 155(7) is approximately 120 feet wide by 240 feet long and covers an area of approximately 0.5 acres. Site elevation is approximately 730 feet above mean sea level (Figure 1-2).

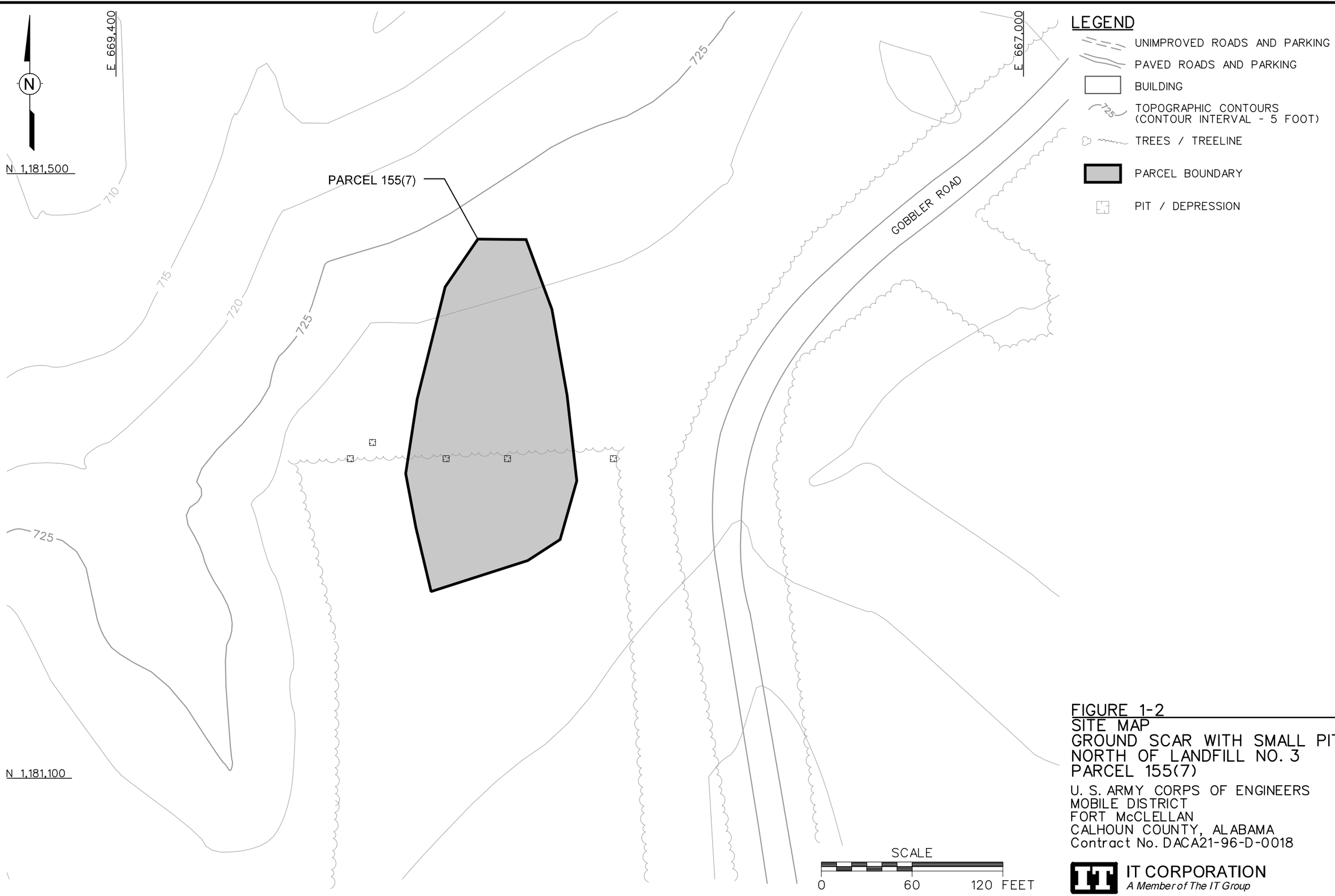

FIGURE 1-2
SITE MAP
GROUND SCAR WITH SMALL PIT
NORTH OF LANDFILL NO. 3
PARCEL 155(7)

U. S. ARMY CORPS OF ENGINEERS
MOBILE DISTRICT
FORT McCLELLAN
CALHOUN COUNTY, ALABAMA
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2.0 Previous Investigations

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

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

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

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

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

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

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

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

The EBS was conducted in accordance with Community Environmental Response Facilitation Act (CERFA) protocols (CERFA-Public Law 102-426) and DOD policy regarding contamination assessment. Record searches and reviews were performed on all reasonably available documents from FTMC, the Alabama Department of Environmental Management (ADEM), the U.S. Environmental Protection Agency (EPA) Region IV, and Calhoun County, as well as a database search of Comprehensive Environmental Response, Compensation, and Liability Act-regulated substances, petroleum products, and Resource Conservation and Recovery Act-regulated facilities. Available historical maps and aerial photographs were reviewed to document historical land uses. Personal and telephone interviews of past and present

FTMC employees and military personnel were conducted. In addition, visual site inspections were conducted to verify conditions of specific property parcels.

Previous investigations to document site environmental conditions have not been conducted at the Ground Scar with Small Pit North of Landfill No. 3, Parcel 155(7). Therefore, the site was classified as a Category 7 CERFA site: areas that are not evaluated or require further evaluation.

3.0 Current Site Investigation Activities

This chapter summarizes SI activities conducted by IT and QST at the Ground Scar with Small Pit North of Landfill No. 3, Parcel 155(7), including environmental sampling and analysis, and groundwater monitoring well installation activities.

3.1 Environmental Sampling

The environmental sampling performed during the SI at the Ground Scar with Small Pit North of Landfill No. 3, Parcel 155(7), included the collection of surface soil samples, subsurface soil samples, and groundwater samples for chemical analysis. The sample locations were determined by observing site physical characteristics during a site walkover and by reviewing historical aerial photographs. The sample locations, media, and rationale are summarized in Table 3-1. Samples collected by IT are designated with the prefix "GSBP-155", and samples collected by QST are designated with the prefix "SI15." Sampling locations are shown on Figure 3-1. Samples were submitted for laboratory analysis of site-related parameters listed in Section 3.3.

3.1.1 Surface Soil Sampling

QST collected four surface soil samples during the SI at the Ground Scar with Small Pit North of Landfill No. 3, Parcel 155(7). Soil sampling locations and rationale are presented in Table 3-1. Sampling locations are shown on Figure 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 the sampling rationale, presence of surface structures, and site topography.

Surface soil samples were collected from 0 to 1 foot below ground surface (bgs) using either a DPT sampling system or a stainless-steel hand auger in accordance with the QST work plan (QST, 1998). Sample collection logs are included in Appendix A. The samples were analyzed for parameters listed in Table 3-2 using methods outlined in Section 3.3.

3.1.2 Subsurface Soil Sampling

QST collected subsurface soil samples from two soil borings at the Ground Scar with Small Pit North of Landfill No. 3, Parcel 155(7), as shown on Figure 3-1. Subsurface soil sampling locations and rationale are presented in Table 3-1. Subsurface soil sample designations, depths, and analytical parameters are listed in Table 3-2. Soil boring sampling locations were determined in the field by the on-site geologist based on the sampling rationale, presence of surface structures, and site topography.

E 669,400

E 667,000

N 1,181,500

N 1,181,100

PARCEL 155(7)

GOBBLER ROAD

710

715

720

725

A

A'

GSBP-155-MW03

SI15-SS03

SI15-SS01

SI15-SS02

SI15-SS04

GSBP-155-MW01

GSBP-155-MW02

LEGEND

- UNIMPROVED ROADS AND PARKING
- PAVED ROADS AND PARKING
- BUILDING
- TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 5 FOOT)
- TREES / TREELINE
- PARCEL BOUNDARY
- PIT / DEPRESSION
- WELL / GROUNDWATER SAMPLE LOCATION
- SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION
- SURFACE SOIL SAMPLE LOCATION
- A A' CROSS SECTION LOCATION

SCALE

0 60 120 FEET

FIGURE 3-1
SAMPLE LOCATION MAP
GROUND SCAR WITH SMALL PIT
NORTH OF LANDFILL NO. 3
PARCEL 155(7)

U. S. ARMY CORPS OF ENGINEERS
MOBILE DISTRICT
FORT McCLELLAN
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Table 3-1

Sampling Locations and Rationale
Ground Scar with Small Pit North of Landfill No. 3, Parcel 155(7)
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Media	Sample Location Rationale
GSBP-155-MW01	Groundwater	A groundwater sample was collected from a permanent monitoring well installed near a depression in the central portion of the parcel to determine potential impacts to the local aquifer.
GSBP-155-MW02	Groundwater	A groundwater sample was collected from a permanent monitoring well installed adjacent to the pit located along the western boundary of the parcel to determine potential impacts to the local aquifer.
GSBP-155-MW03	Groundwater	A groundwater sample was collected from a permanent monitoring well installed north (downgradient) of the pits/depressions to determine potential impacts to the local aquifer.
SI15-SS01	Surface soil Subsurface soil	Surface and subsurface soil samples were collected adjacent to a depression located in the central portion of the parcel to determine impacts to the area.
SI15-SS02	Surface soil Subsurface soil	Surface and subsurface soil samples were collected within a pit located along the western boundary of the parcel to determine impacts to the area.
SI15-SS03	Surface soil	A surface soil sample was collected from the central portion of the parcel, downslope of the pits/depressions to determine impacts to the area.
SI15-SS04	Surface soil	A surface soil sample was collected between two depressions along the eastern boundary of the parcel to determine impacts to the area.

Table 3-2

Soil Sample Designations and Analytical Parameters
Ground Scar with Small Pit North of Landfill No. 3, Parcel 155(7)
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Designation	Sample Depth (ft. bgs)	QA/QC Samples[a]			Analytical Suite
			Field Duplicates	Field Splits	MS/MSD	
SI15-SS01	SI15-SS01A SI15-SS01B	0-1 3-4				VOCs, SVOCs, Metals, PCBs, Pesticides, Herbicides[b], Explosives, TOC
SI15-SS02	SI15-SS02A SI15-SS02B	0-1 3-4				VOCs, SVOCs, Metals, PCBs, Pesticides, Herbicides[b], Explosives, TOC[c]
SI15-SS03	SI15-SS03	0-1				VOCs, SVOCs, Metals, PCBs, Pesticides, Herbicides, Explosives
SI15-SS04	SI15-SS04	0-1				VOCs, SVOCs, Metals, PCBs, Pesticides, Herbicides, Explosives

[a] No QA/QC samples specified in QST work plan (QST, 1998).
[b] Surface soil sample only.
[c] Subsurface soil sample only.

ft. bgs - Feet below ground surface.
MS/MSD - Matrix spike/matrix spike duplicate.
PCB - Polychlorinated biphenyl.
QA/QC - Quality assurance/quality control.
TAL - Target analyte list.
VOC - Volatile organic compound.
SVOC - Semivolatile organic compound.
TOC - Total organic carbon.

QST contracted Graves Service Company, Inc. to complete the soil borings using DPT in accordance with the QST work plan (QST, 1998). Subsurface soil samples were collected at a depth of 3 to 4 feet bgs in each of two soil borings (SI15-SS01 and SI15-SS02). 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 3.3.

3.1.3 Well Installation

IT installed three permanent groundwater monitoring wells at the Ground Scar with Small Pit North of Landfill No. 3, Parcel 155(7), as shown on Figure 3-1. QST installed two temporary wells using DPT and attempted installation of a third well. However, groundwater was not encountered in any of the DPT wells/borings and no groundwater samples were collected by QST. Table 3-3 summarizes construction details of the wells installed at the Ground Scar with Small Pit North of Landfill No. 3, Parcel 155(7). The well construction logs are included in Appendix B.

IT Well Installation. IT contracted Miller Drilling, Inc. to install the wells with a hollow-stem auger rig at the locations shown on Figure 3-1. The wells were installed following procedures outlined in Section 4.7 and Appendix C of the SAP (IT, 2000a). The borehole at each location was advanced with a 4.25-inch inside diameter (ID) hollow-stem auger from ground surface to the first water-bearing zone in residuum. A 2-foot-long, 2-inch ID carbon steel split-spoon sampler was driven at 5-foot intervals to collect residuum for observing and describing lithology. Where split-spoon refusal was encountered, the auger was advanced until the first water-bearing zone was encountered. The on-site geologist constructed a lithological log for the borehole by logging the soil from the split-spoon sampler and the auger drill cuttings. The soil was 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 lithological log for each borehole is included in Appendix B.

Upon reaching the target depth in each borehole, a 10- or 20-foot length of 2-inch ID, 0.010-inch continuous-slot Schedule 40 polyvinyl chloride (PVC) screen with a PVC end cap (or sump) was placed through the auger to the bottom of the borehole. The screen and end cap (or sump) 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 3 feet above the top of the well screen as the augers were removed. The well was surged using a solid PVC surge block for approximately 10 minutes, or until no

Table 3-3

Monitoring Well Construction Summary
Ground Scar with Small Pit North of Landfill No. 3, Parcel 155(7)
Fort McClellan, Calhoun County, Alabama

Well Location	Northing	Easting	Ground Elevation (ft amsl)	TOC Elevation (ft amsl)	Well Depth (ft bgs)	Screen Length (ft)	Screen Interval (ft bgs)	Well Material
GSBP-155-MW01	1181305.02	669661.48	740.44	742.38	56.7	10	46.3 - 56.3	2" ID Sch. 40 PVC
GSBP-155-MW02	1181317.51	669573.43	740.84	742.98	54	20	32.0 - 52.0	2" ID Sch. 40 PVC
GSBP-155-MW03	1181367.18	669688.22	740.22	742.16	53	10	42.6 - 52.6	2" ID Sch. 40 PVC
SI15-GWS01*	1181418.49	669703.50	NS	NS	19.5	19.5	0.0 - 19.5	1" ID Sch. 40 PVC
SI15-GWS02*	1181419.00	669608.56	NS	NS	15	10	5.0 - 15.0	1" ID Sch. 40 PVC

Permanent monitoring wells installed by IT using hollow-stem augers except as noted by *.
* Temporary well installed by QST using direct-push technology.
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.
1" ID Sch. 40 PVC - 1-inch inside diameter, Schedule 40, polyvinyl chloride.

bgs - Below ground surface.
ft - Feet.
amsl - Above mean sea level.
NS - Not surveyed.

more settling of the filter sand occurred inside the borehole. A bentonite seal, consisting of approximately 2 feet of bentonite pellets, was placed immediately on top of the sand pack and hydrated with potable water. If the bentonite seal was installed below the water table surface, the bentonite pellets were allowed to hydrate in the groundwater. The bentonite seal placement and hydration followed procedures in Appendix C of the SAP (IT, 2000a). Bentonite-cement grout was tremied into the remaining annular space of the well from the top of the bentonite seal to approximately ground surface. A locking well cap was placed on the PVC well casing. The well surface completion included placing a protective steel casing over the PVC riser and installing a concrete pad around the protective steel casing. Concrete-filled protective steel posts were placed around the well pad.

The wells were developed by surging and pumping with a submersible pump in accordance with methodology outlined in Section 4.8 and Appendix C of the SAP (IT, 2000a). The submersible pump used for well development was moved in an up-and-down fashion to encourage any residual well installation materials to enter the well. These materials were then pumped out of the well in order to re-establish the natural hydraulic flow conditions. Development continued until the water turbidity was equal to or less than 20 nephelometric turbidity units (NTU) or for a maximum of 8 hours. The well development logs are included in Appendix C.

QST Well Installation. QST installed two temporary monitoring wells in the residuum groundwater zone at the Ground Scar with Small Pit North of Landfill No. 3, Parcel 155(7), using DPT. An attempt was made to install a third well; however, the borehole was dry and the well was not set. The temporary wells were installed in accordance with procedures outlined in the QST work plan (QST, 1998). Table 3-3 summarizes construction details of the wells installed by QST at the site. The well construction logs are included in Appendix B.

QST contracted Graves Service Company, Inc. to install the temporary wells (SI15-GWS01 and SI15-GWS02) using DPT. The temporary wells were installed, purged, sampled, and removed within 24 hours. Initially, a 2-inch-diameter borehole for each temporary well was installed using DPT. The 2-inch borehole was advanced up to 5 feet into the uppermost water-bearing zone. Soil descriptions were prepared by the QST geologist and are presented in Appendix B of this SI report. Upon reaching the target depth in each borehole, a 10- or 20-foot length of 1-inch (nominal) diameter Schedule 40 PVC slotted screen (0.010-inch) was attached to a 1-inch (nominal) PVC riser (except SI15-GWS01) and lowered into the borehole. A sand pack consisting of 20/40 silica sand was placed into the annular space to the ground surface.

3.1.4 Water Level Measurements

Groundwater level measurements were recorded in wells at Parcel 155(7) and adjacent parcels on March 13 and 14, 2000. Water levels were measured following procedures outlined in Section 4.18 of the SAP (IT, 2000a). The depth to groundwater was measured with an electronic water level meter. Measurements were referenced to the top of the well casing (Table 3-4).

3.1.5 Groundwater Sampling

IT collected groundwater samples from each of the three permanent monitoring wells installed at the Ground Scar with Small Pit North of Landfill No. 3, Parcel 155(7). The well/groundwater sampling locations are shown on Figure 3-1. Monitoring well GSBP-155-MW01 was originally sampled (sample number BQ3042) in December 1999. However, the well was not developed prior to sampling. Therefore, the well was developed and re-sampled (sample number BQ3042R) in August 2001. 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.

Groundwater sample collection was performed following procedures outlined in Section 4.9.1.4 of the SAP (IT, 2000a). Groundwater was sampled after purging a minimum of three well volumes and after field parameters (temperature, pH, dissolved oxygen, specific conductivity, oxidation-reduction potential, and turbidity) stabilized. Purging and sampling were performed with either a submersible pump or a bladder pump equipped with Teflon™ tubing. Field parameters were measured using a calibrated water-quality meter. Field parameter readings are summarized in Table 3-6. Sample collection logs are included in Appendix A. The samples were analyzed for the parameters listed in Table 3-5 using methods outlined in Section 3.3.

3.2 Surveying of Sample Locations

IT sample locations were surveyed using global positioning system survey techniques described in Section 4.3 of the SAP, and conventional civil survey techniques described in Section 4.19 of the SAP (IT, 2000a). Horizontal coordinates were referenced to the U.S. State Plane Coordinate System, Alabama East Zone, North American Datum of 1983. Elevations were referenced to the North American Vertical Datum of 1988. Horizontal coordinates and elevations are included in Appendix D.

QST surveyed sample locations using global positioning system survey techniques or traditional surveying techniques described in the QST work plan (QST, 1998). Map coordinates for each

Table 3-4

Groundwater Elevations
Ground Scar with Small Pit North of Landfill No. 3, Parcel 155(7) and Vicinity
Fort McClellan, Calhoun County, Alabama

Well Location	Date	Depth to Water (ft BTOC)	Top of Casing Elevation (ft amsl)	Ground Elevation (ft amsl)	Groundwater Elevation (ft amsl)
GSBP-155-MW01	14-Mar-00	36.19	742.38	740.44	706.19
GSBP-155-MW02	14-Mar-00	38.86	742.98	740.84	704.12
GSBP-155-MW03	14-Mar-00	41.10	742.16	740.22	701.06
OLF-G15	14-Mar-00	17.00	735.45	732.92	718.45
PPMP-229-GP07	13-Mar-00	21.95	744.04	741.37	722.09

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
Ground Scar with Small Pit North of Landfill No. 3 Parcel 155(7)
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Designation	QA/QC Samples[a]			Analytical Suite
		Field Duplicates	Field Splits	MS/MSD	
GSBP-155-MW01	GSBP-155-MW01-GW-BQ3042R-REG				TCL VOCs, TCL SVOCs, TAL Metals, Pesticides, PCBs, Explosives
GSBP-155-MW02	GSBP-155-MW02-GW-BQ3043-REG				TCL VOCs, TCL SVOCs, TAL Metals, Pesticides, PCBs, Explosives
GSBP-155-MW03	GSBP-155-MW03-GW-BQ3044-REG				TCL VOCs, TCL SVOCs, TAL Metals, Pesticides, PCBs, Explosives

[a] No QA/QC samples specified in QST work plan (QST, 1998).

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

MS/MSD - Matrix spike/matrix spike duplicate.
PCBs - Polychlorinated biphenyls.
QA/QC - Quality assurance/quality control.
REG - Regular field sample.
SVOC - Semivolatile organic compound.
TAL - Target analyte list.
TCL - Target compound list.
VOC - Volatile organic compound.

Table 3-6

Groundwater Field Parameters
Ground Scar with Small Pit North of Landfill No. 3, Parcel 155(7)
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Date	Specific Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Temperature (°C)	Turbidity (NTU)	pH (SU)
GSBP-155-MW01	27-Aug-01	0.038	11.86[a]	219	23.1	9.9	5.25
GSBP-155-MW02	10-Dec-99	0.063	3.85	315	16.8	21	5.88
GSBP-155-MW03	13-Dec-99	0.025	3.92	315	17.5	26	5.45

[a] Dissolved oxygen content artificially elevated as a result of air mixing from bladder pump into flow-through cell.

°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.

sample location were determined using a Universal Transverse Mercator or State Planar grid to within ±3 feet (±1 meter).

3.3 Analytical Program

Samples collected during the SI were analyzed for various chemical parameters based on the potential site-specific chemicals and on EPA, ADEM, FTMC, and USACE requirements. Target analyses for samples collected at the Ground Scar with Small Pit North of Landfill No. 3, Parcel 155(7), included:

- Target compound list volatile organic compounds (VOC) – EPA Method 8260B
- Target compound list semivolatile organic compounds (SVOC) – EPA Method 8270C
- Target analyte list metals – EPA Method 6010B/7471
- Nitroaromatic and nitramine explosives – EPA Method 8330
- Polychlorinated biphenyls (PCB) – EPA Methods 8081A and 8082
- Organochlorine pesticides – EPA Method 8081A
- Chlorinated herbicides – EPA Method 8150
- Total organic carbon (TOC) – EPA Method 9060 (three soil samples).

The samples were analyzed using EPA SW-846 methods, including Update III Methods where applicable.

3.4 Sample Preservation, Packaging, and Shipping

IT preserved, packaged, and shipped samples following requirements specified in Section 4.13.2 of the SAP (IT, 2000a). Sample containers, sample volumes, preservatives, and holding times for the analyses required in this SI are listed in Chapter 5.0, Table 5-1, of Appendix B of the SAP (IT, 2000a). Sample documentation and chain-of-custody records were recorded as specified in Section 4.13 of the SAP (IT, 2000a). Completed analysis request and chain-of-custody records (Appendix A) were secured and included with each shipment of sample coolers to the analytical laboratory.

QST preserved, packaged, and shipped samples following guidelines specified in the QST work plan (QST, 1998).

3.5 Investigation-Derived Waste Management and Disposal

IT-Generated Investigation-Derived Waste. IT investigation-derived waste (IDW) was managed and disposed as outlined in Appendix D of the SAP (IT, 2000a). The IDW generated

during the SI at the Ground Scar with Small Pit North of Landfill No. 3, Parcel 155(7), was segregated as follows:

- Purge water from well development, sampling activities, and decontamination fluids
- Spent well materials and personal protective equipment
- Drill cuttings

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 (TCLP) analyses. Based on the results, drill cuttings and personal protective equipment generated during the SI at the Ground Scar with Small Pit North of Landfill No. 3, Parcel 155(7), were disposed as nonregulated waste at the Industrial Waste Landfill on the Main Post of FTMC.

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.

QST-Generated Investigation-Derived Waste. QST-generated IDW was managed and disposed as outlined in the QST work plan (QST, 1998).

3.6 Variances/Nonconformances

Neither IT nor QST documented any variances or nonconformances during completion of the SI at the Ground Scar with Small Pit North of Landfill No. 3, Parcel 155(7).

3.7 Data Quality

IT Data. 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 (Section 3.1.2 of Appendix B of the SAP [IT, 2000a]). Chemical data were reported via hard-copy data packages by the laboratory using Contract Laboratory Program-like forms. A summary of validated analytical data is included in Appendix E. A complete (100 percent) Level III data validation effort was performed on the reported analytical data. Appendix F includes data validation summary reports

that discuss the results of the IT data validation. Selected results were rejected or otherwise qualified based on the implementation of accepted data validation procedures and practices. These qualified parameters are highlighted in the report. The validation-assigned qualifiers were added to the FTMC IT Environmental Management System™ (ITEMS) database for tracking and reporting.

QST Data. QST data were submitted to the Installation Restoration Data Management Information System (IRDMIS) database at the conclusion of SI field activities. Hard-copy data packages were sent to the AEC in Edgewood, Maryland, for storage. IT retrieved the electronic data via IRDMIS and the original data packages from the AEC for evaluation. From the IRDMIS data, IT was able to identify the key fields of information and translate the data into the ITEMS database.

The field sample analytical data are presented in tabular form in Appendix E. QST hard-copy analytical data packages were validated during a complete (100 percent) Level III data validation effort. Appendix F includes a data validation summary report that discusses the results of the QST data validation. Selected results were rejected or qualified based on the implementation of accepted data validation procedures and practices. These qualified parameters are highlighted in the data validation report. In addition, during the validation, the electronic results were compared to the hard-copy results. Concentrations in the database were corrected where necessary and validation qualifiers added to the QST data using ITEMS to reflect the findings summarized in the QST data validation report.

After the QST data validation was complete and the results were updated, the QST and IT data were merged using ITEMS for inclusion in this SI report. The combined validated analytical data are presented in tabular form in Appendix E. The qualified data were used in the comparison to the SSSLs and ESVs developed by IT. The IT and QST 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 Ground Scar with Small Pit North of Landfill No. 3, Parcel 155(7), 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 is comprised of the Cochran, Nichols, Wilson Ridge, and Weisner Formations (Osborne and Szabo, 1984), but in Calhoun County is either undifferentiated or divided into the Cochran and Nichols Formations and an upper undifferentiated Wilson Ridge and Weisner Formation. The Cochran is composed of poorly sorted arkosic sandstone and conglomerate with interbeds of greenish-gray siltstone and mudstone. Massive to laminated,

greenish-gray and black mudstone makes up the Nichols Formation with thin interbeds of siltstone and very fine-grained sandstone (Szabo et al., 1988). These two formations are mapped only in the eastern part of the county.

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

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

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

Overlying the Conasauga Formation is the Knox Group, which is composed of the Copper Ridge and Chepultepec dolomites of Cambro-Ordovician age. The Knox Group is undifferentiated in

Calhoun County and consists of light medium gray, fine to medium crystalline, variably bedded to laminated, siliceous dolomite and dolomitic limestone that weathers to a chert residuum (Osborne and Szabo, 1984). The Knox Group underlies a large portion of the Pelham Range area.

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

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

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

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

the Floyd Shale, which was mapped by Warman and Causey (1962) on the Main Post of FTMC, to the Ordovician Athens Shale on the basis of fossil data.

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

4.1.2 Site Geology

Soils at the Ground Scar with Small Pit North of Landfill No. 3, Parcel 155(7), are mapped as the Cumberland gravelly loam, 2 to 6 percent slopes, eroded. The Cumberland series of soils consist of deep, well drained, soils that formed on stream terraces from old general alluvium that washed from soils derived mainly from limestone and cherty limestone and, to a lesser extent, from shale and sandstone. Chert, sandstone, and quartzite gravel and cobbles are found throughout the soil (U.S. Department of Agriculture, 1961).

Bedrock in the vicinity of the Ground Scar with Small Pit North of Landfill No. 3, Parcel 155(7), is mapped as the Cambrian Rome Formation and Cambrian Conasauga Formation. The Rome Formation consists of variegated thinly interbedded grayish-red-purple mudstone, shale, siltstone, and greenish-red and light-gray sandstone, with locally occurring limestone and dolomite. The Conasauga Formation is composed of dark-gray, finely to coarsely crystalline, medium- to thick-bedded dolomite with minor shale and chert (Osborne et al., 1989).

Figure 4-1 is a geologic cross section constructed from the hollow-stem auger boring data collected during the SI. As shown on Figure 4-1, residuum beneath the Ground Scar with Small Pit North of Landfill No. 3, Parcel 155(7), consists predominantly of silt and clay interbedded with weathered siltstone and mudstone. The depth to first encountering the weathered siltstone ranged from 20 to 33 feet bgs across the site.

LEGEND

- SCREEN INTERVAL
- WATER TABLE (MARCH 14, 2000)
- 706.19 GROUNDWATER ELEVATION (FT MSL)
- SILT AND CLAY
- SILT, SANDY
- SILT, GRAVELLY
- MUDSTONE, WEATHERED
- SILTSTONE, WEATHERED

NOTES:

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

HORIZONTAL

0 20 40 FEET

FIGURE 4-1
GEOLOGIC CROSS SECTION A-A'
GROUND SCAR WITH SMALL PIT
NORTH OF LANDFILL NO. 3
PARCEL 155(7)

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

IT CORPORATION
A Member of The IT Group

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STARTING DATE: 08/08/01
DRAWN BY: D. BOMAR
PROJ. MGR.: J. YACOUB
INITIATOR: G. SISCO
DRAFT. CHCK. BY:
ENGR. CHCK. BY: S. MORAN
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In boring GSBP-155-MW02, weathered siltstone, approximately one-foot thick, was encountered at 33 feet bgs. Weathered rock was not encountered again in GSBP-155-MW02. In borings GSBP-155-MW01 and GSBP-155-MW03, the depth of the weathered transitional zone (interbedded siltstone and mudstone with clay and silt interbeds) extended from approximately 25 and 20 feet bgs, respectively, to the bottom of each borehole. Competent bedrock was not encountered during drilling at the site.

4.2 Site Hydrology

4.2.1 Surface Hydrology

Precipitation in the form of rainfall averages about 54 inches annually in Anniston, Alabama, with infiltration rates annually exceeding evapotranspiration rates (U.S. Department of Commerce, 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.

Surface runoff at the Ground Scar with Small Pit North of Landfill No. 3, Parcel 155(7), follows the general topography and flows to the north-northwest.

4.2.2 Hydrogeology

On March 13 and 14, 2000, static groundwater levels were measured in the permanent wells at the site and in wells at adjacent parcels (Table 3-4). Based on these groundwater elevation data, groundwater flow at the site is predominantly to the north (Figure 4-2).

During hollow-stem auger well installation activities, groundwater was encountered in residuum at depths ranging from 32 to 53 feet bgs. The static groundwater levels measured in the monitoring wells (Table 3-4) were approximately 3 to 17 feet above the depth to water data from the corresponding boring logs. This indicates that the groundwater has an upward hydraulic gradient and is under semiconfined conditions.

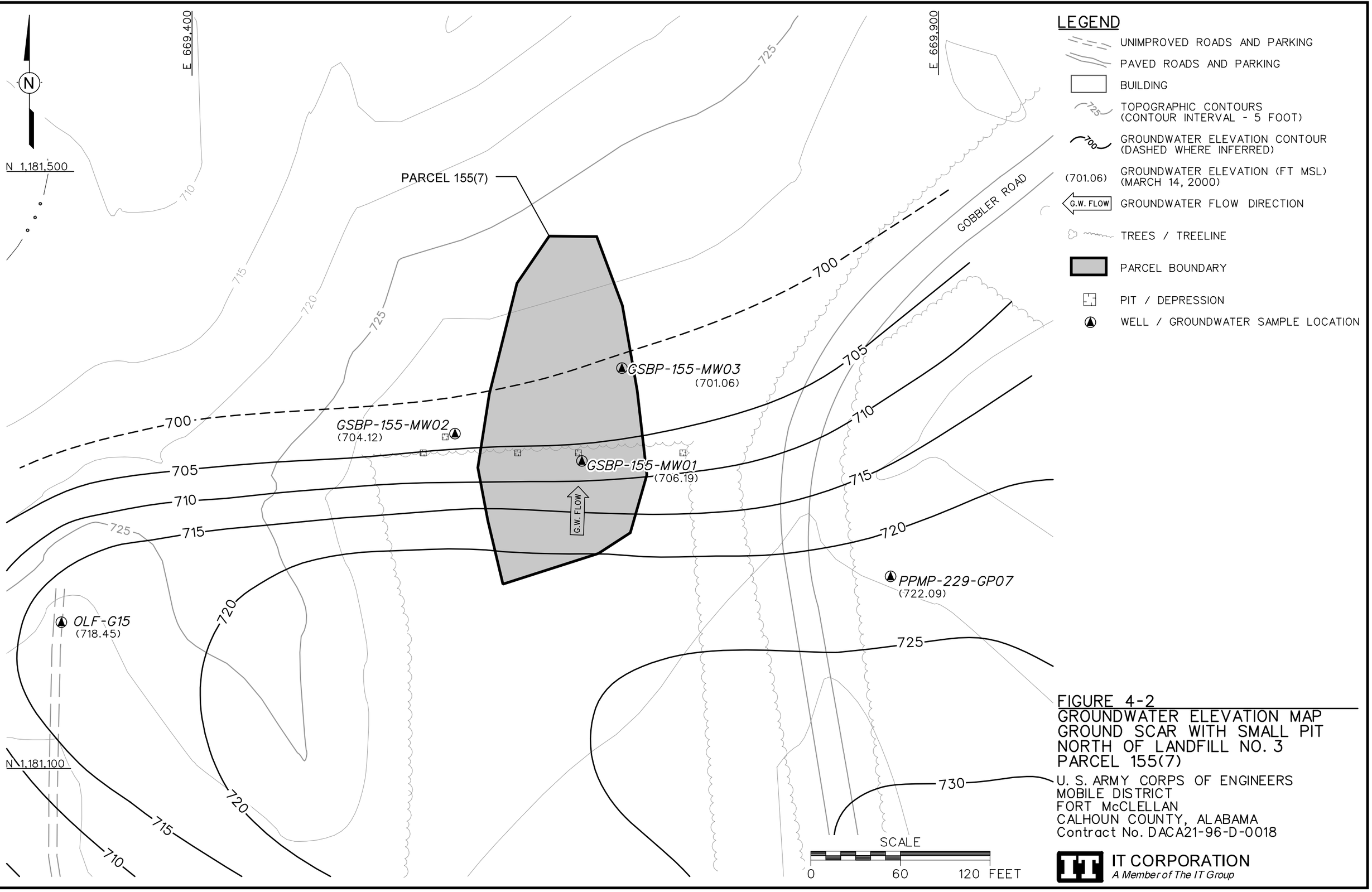

FIGURE 4-2
GROUNDWATER ELEVATION MAP
GROUND SCAR WITH SMALL PIT
NORTH OF LANDFILL NO. 3
PARCEL 155(7)

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

IT CORPORATION
A Member of The IT Group

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5.0 Summary of Analytical Results

The results of the chemical analyses of samples collected at the Ground Scar with Small Pit North of Landfill No. 3, Parcel 155(7), indicate that metals, VOCs, SVOCs, and pesticides were detected in the environmental media sampled. In addition, two herbicide compounds were detected in one surface soil sample. Neither PCBs nor explosive compounds were detected in any of the samples collected. To evaluate whether the detected constituents present an unacceptable risk to human health or the environment, the analytical results were compared to human health SSSLs and ESVs. 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.

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

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

5.1 Surface Soil Analytical Results

Four surface soil samples were collected for chemical analysis at the Ground Scar with Small Pit North of Landfill No. 3, Parcel 155(7). Surface soil samples were collected from the upper one 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. Nineteen metals were detected in the surface soil samples collected at the Ground Scar with Small Pit North of Landfill No. 3, Parcel 155(7). The concentrations of aluminum (at two locations), arsenic (four locations), and iron (four locations) exceeded SSSLs. However, the concentrations of these metals were below their respective background concentrations.

The concentrations of seven metals (aluminum, chromium, iron, manganese, mercury, selenium, and vanadium) exceeded ESVs. With the exception of mercury (SI15-SS01) and selenium (two locations), the concentrations of these metals were below their respective background concentrations. The mercury and selenium results were within the range of background values determined by SAIC (1998) (Appendix G).

Volatile Organic Compounds. Nine VOCs were detected in surface soil samples collected at the site. The methylene chloride results were flagged with a "B" data qualifier signifying that this compound was also detected in an associated laboratory or field blank sample. VOC concentrations in the surface soil samples ranged from 0.0012 mg/kg to 0.48 mg/kg.

The VOC concentrations in surface soils were below SSSLs. The concentrations of tetrachloroethene (SI15-SS04) and trichloroethene (four locations) exceeded ESVs. The tetrachloroethene and trichloroethene concentrations ranged from 0.0026 mg/kg to 0.013 mg/kg.

Semivolatile Organic Compounds. One SVOC (bis[2-ethylhexyl]phthalate) was detected in three of the four surface soil samples collected at the Ground Scar with Small Pit North of Landfill No. 3, Parcel 155(7). The bis(2-ethylhexyl)phthalate results were flagged with a "B" data qualifier signifying that this compound was also detected in an associated laboratory or field blank sample.

Table 5-1

Surface Soil Analytical Results
Ground Scar with Small Pit North of Landfill No. 3, Parcel 155(7)
Fort McClellan, Calhoun County, Alabama

Parcel					GSBP-155					GSBP-155					GSBP-155					GSBP-155				
Sample Location					SI15-SS01					SI15-SS02					SI15-SS03					SI15-SS04				
Sample Number					15-SS01A					15-SS02A					15-SS03					15-SS04				
Sample Date					15-May-98					15-May-98					15-May-98					15-May-98				
Sample Depth (Feet)					0-1					0-1					0-1					0-1				
Parameter	Units	BKG[a]	SSSL[b]	ESV[b]	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV
METALS																								
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	1.08E+04			YES	YES	7.37E+03				YES	9.15E+03			YES	YES	5.96E+03				YES
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	2.71E+00			YES		2.09E+00			YES		2.53E+00			YES		2.04E+00			YES	
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	2.12E+01					2.31E+01					2.09E+01					3.14E+01				
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	1.53E-01					1.98E-01					1.74E-01					2.17E-01				
Calcium	mg/kg	1.72E+03	NA	NA	8.73E+01					1.03E+02					1.62E+02					2.49E+02				
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	1.53E+01				YES	8.25E+00				YES	1.02E+01				YES	7.15E+00				YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	5.42E-01					1.87E+00					1.39E+00					3.03E+00				
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	6.37E+00					3.63E+00					4.98E+00					2.93E+00				
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	1.89E+04			YES	YES	8.47E+03			YES	YES	1.39E+04			YES	YES	7.91E+03			YES	YES
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	6.84E+00					6.27E+00					7.76E+00					1.04E+01				
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	3.30E+02					2.75E+02					3.48E+02					2.38E+02				
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	7.90E+00					8.25E+01					3.01E+01					1.84E+02				YES
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	1.42E-01		YES		YES	5.94E-02					4.98E-02					3.47E-02				
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	1.53E+00					2.09E+00					2.20E+00					2.06E+00				
Potassium	mg/kg	8.00E+02	NA	NA	5.19E+02					2.64E+02					3.59E+02					2.28E+02				
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	1.19E+00		YES		YES	5.76E-01		YES			9.13E-01		YES		YES	6.20E-01		YES		
Sodium	mg/kg	6.34E+02	NA	NA	1.18E+02					1.21E+02					9.27E+01					1.30E+02				
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	3.07E+01				YES	1.54E+01				YES	2.20E+01				YES	1.52E+01				YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	6.01E+00					6.49E+00					6.84E+00					6.50E+00				
VOLATILE ORGANIC COMPOUNDS																								
1,1,1-Trichloroethane	mg/kg	NA	1.55E+03	1.00E-01	5.20E-03					5.50E-03					5.30E-03					5.80E-03				
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	4.20E-03	J				1.70E-02	J				6.20E-03	J				ND				
Acetone	mg/kg	NA	7.76E+02	2.50E+00	ND					4.80E-01					1.40E-01					2.40E-01				
Ethylbenzene	mg/kg	NA	7.77E+02	5.00E-02	2.30E-03	J				1.80E-03	J				2.20E-03	J				3.20E-03	J			
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00	5.70E-03	B				4.60E-03	B				5.50E-03	B				6.00E-03	B			
Tetrachloroethene	mg/kg	NA	1.21E+01	1.00E-02	9.30E-03					7.20E-03					8.70E-03					1.30E-02				YES
Toluene	mg/kg	NA	1.55E+03	5.00E-02	1.80E-03	J				1.20E-03	J				1.60E-03	J				1.70E-03	J			
Trichloroethene	mg/kg	NA	5.72E+01	1.00E-03	2.70E-03	J			YES	2.60E-03	J			YES	2.70E-03	J			YES	3.60E-03	J			YES
Xylene, Total	mg/kg	NA	1.55E+04	5.00E-02	1.00E-02					8.00E-03					9.20E-03					1.40E-02				
SEMIVOLATILE ORGANIC COMPOUNDS																								
bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	9.30E-01	5.10E-02	B				8.40E-02	B				ND					2.80E-02	B			
PESTICIDES																								
4,4'-DDE	mg/kg	NA	1.79E+00	2.50E-03	ND					ND					ND					1.63E-03				
HERBICIDES																								
Dichloroprop	mg/kg	NA	6.21E+00	1.00E-01	ND					ND					1.95E-01	B			YES	ND				
MCPA	mg/kg	NA	3.88E+00	1.00E-01	ND					ND					5.47E-01	J			YES	ND				

Table 5-1

Surface Soil Analytical Results
Ground Scar with Small Pit North of Landfill No. 3, Parcel 155(7)
Fort McClellan, Calhoun County, Alabama

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

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

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

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

J - The compound was positively identified; the reported value is an estimated concentration.

mg/kg - Milligrams per kilogram.

NA - Not available.

ND - Not detected.

Qual - Data validation qualifier.

Table 5-2

Subsurface Soil Analytical Results
Ground Scar with Small Pit North of Landfill No. 3, Parcel 155(7)
Fort McClellan, Calhoun County, Alabama

Parcel				GSBP-155				GSBP-155			
Sample Location				SI15-SS01				SI15-SS02			
Sample Number				15-SS01B				15-SS02B			
Sample Date				15-May-98				15-May-98			
Sample Depth (Feet)				3 - 4				3 - 4			
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**Result**	**Qual**	**>BKG**	**>SSSL**	**Result**	**Qual**	**>BKG**	**>SSSL**
METALS											
Aluminum	mg/kg	1.36E+04	7.80E+03	7.53E+03				6.67E+03			
Arsenic	mg/kg	1.83E+01	4.26E-01	4.68E+00			YES	2.08E+00			YES
Barium	mg/kg	2.34E+02	5.47E+02	1.43E+01				2.22E+01			
Beryllium	mg/kg	8.60E-01	9.60E+00	2.03E-01				1.56E-01			
Calcium	mg/kg	6.37E+02	NA	2.75E+01				8.11E+01			
Chromium	mg/kg	3.83E+01	2.32E+01	1.19E+01				1.04E+01			
Cobalt	mg/kg	1.75E+01	4.68E+02	3.58E-01				1.78E+00			
Copper	mg/kg	1.94E+01	3.13E+02	5.38E+00				3.56E+00			
Iron	mg/kg	4.48E+04	2.34E+03	1.91E+04			YES	7.89E+03			YES
Lead	mg/kg	3.85E+01	4.00E+02	6.09E+00				7.11E+00			
Magnesium	mg/kg	7.66E+02	NA	1.67E+02				2.67E+02			
Manganese	mg/kg	1.36E+03	3.63E+02	1.19E+01				3.56E+01			
Mercury	mg/kg	7.00E-02	2.33E+00	1.90E-02	J			4.33E-02			
Nickel	mg/kg	1.29E+01	1.54E+02	1.19E+00				2.22E+00			
Potassium	mg/kg	7.11E+02	NA	5.97E+02				2.22E+02			
Selenium	mg/kg	4.70E-01	3.91E+01	1.30E+00		YES		ND			
Sodium	mg/kg	7.02E+02	NA	8.72E+01				1.11E+02			
Vanadium	mg/kg	6.49E+01	5.31E+01	2.63E+01				1.44E+01			
Zinc	mg/kg	3.49E+01	2.34E+03	4.66E+00				6.11E+00			
VOLATILE ORGANIC COMPOUNDS											
1,1,1-Trichloroethane	mg/kg	NA	1.55E+03	7.90E-03				1.20E-02			
1,2-Dichloroethene	mg/kg	NA	7.00E+01	ND				5.30E-04	J		
2-Butanone	mg/kg	NA	4.66E+03	4.00E-03	J			5.00E-03	J		
Ethylbenzene	mg/kg	NA	7.77E+02	2.10E-03	J			2.80E-03	J		
Methylene chloride	mg/kg	NA	8.41E+01	8.10E-03	B			1.30E-02	B		
Tetrachloroethene	mg/kg	NA	1.21E+01	9.20E-03				1.30E-02			
Toluene	mg/kg	NA	1.55E+03	1.30E-03	J			2.20E-03	J		
Trichloroethene	mg/kg	NA	5.72E+01	3.90E-03	J			5.40E-03			
Xylene, Total	mg/kg	NA	1.55E+04	8.80E-03				1.20E-02			
SEMIVOLATILE ORGANIC COMPOUNDS											
bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	ND				3.40E-02	B		

Table 5-2

Subsurface Soil Analytical Results
Ground Scar with Small Pit North of Landfill No. 3, Parcel 155(7)
Fort McClellan, Calhoun County, Alabama

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

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

[b] Residential human health site-specific screening level (SSSL) 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 - The compound was positively identified; the reported value is an estimated concentration.

mg/kg - Milligrams per kilogram.

NA - Not available.

ND - Not detected.

Qual - Data validation qualifier.

Table 5-3

Groundwater Analytical Results
Ground Scar with Small Pit North of Landfill No. 3, Parcel 155(7)
Fort McClellan, Calhoun County, Alabama

Sample Location				GSBP-155-MW01				GSBP-155-MW02				GSBP-155-MW03			
Sample Number				BQ3042R				BQ3043				BQ3044			
Sample Date				27-Aug-01				10-Dec-99				13-Dec-99			
Parameter	Units	BKG[a]	SSSL[b]	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL
METALS															
Aluminum	mg/L	2.34E+00	1.56E+00	2.14E+00			YES	1.52E+00				1.28E+00			
Barium	mg/L	1.27E-01	1.10E-01	2.24E-02				3.42E-02	J			2.02E-02	J		
Beryllium	mg/L	1.24E-03	3.12E-03	ND				7.60E-04	B			5.00E-04	B		
Calcium	mg/L	5.65E+01	NA	4.82E-01	B			2.82E+00	J			6.46E-01	J		
Chromium	mg/L	NA	4.69E-03	ND				4.80E-03	J		YES	4.40E-03	J		
Cobalt	mg/L	2.34E-02	9.39E-02	ND				2.30E-03	J			ND			
Iron	mg/L	7.04E+00	4.69E-01	1.39E+00			YES	1.45E+00			YES	9.55E-01			YES
Lead	mg/L	7.99E-03	1.50E-02	ND				3.00E-03				ND			
Magnesium	mg/L	2.13E+01	NA	1.26E+00				4.44E+00	J			1.13E+00	J		
Manganese	mg/L	5.81E-01	7.35E-02	2.84E-02				2.11E-01			YES	3.46E-02			
Nickel	mg/L	NA	3.13E-02	ND				4.10E-03	B			4.40E-03	B		
Potassium	mg/L	7.20E+00	NA	4.77E+00	J			4.05E+00	J			3.79E+00	J		
Sodium	mg/L	1.48E+01	NA	1.08E+00				1.24E+00	B			1.04E+00	B		
Vanadium	mg/L	1.70E-02	1.10E-02	ND				2.60E-03	J			2.00E-03	J		
Zinc	mg/L	2.20E-01	4.69E-01	6.72E-03	J			9.90E-03	J			8.30E-03	J		
VOLATILE ORGANIC COMPOUNDS															
Acetone	mg/L	NA	1.56E-01	3.50E-03	B			ND				7.40E-04	B		
Chloromethane	mg/L	NA	3.92E-03	ND				2.40E-04	B			1.60E-04	B		
Methylene chloride	mg/L	NA	7.85E-03	1.80E-04	B			ND				ND			
PESTICIDES															
4,4'-DDD	mg/L	NA	1.83E-04	ND				2.90E-05	J			ND			
Aldrin	mg/L	NA	3.92E-06	ND				3.10E-05	J		YES	ND			
delta-BHC	mg/L	NA	4.49E-04	ND				2.10E-05	J			ND			
gamma-BHC (Lindane)	mg/L	NA	5.03E-05	ND				3.00E-05	J			ND			

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

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

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

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

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

mg/L - Milligrams per liter.

NA - Not available.

ND - Not detected.

Qual - Data validation qualifier.

The bis(2-ethylhexyl)phthalate concentrations were below the SSSL and ESV.

Pesticides. One pesticide (4,4'-dichlorodiphenyldichloroethene [DDE]) was detected in one surface soil sample (SI15-SS04) at the Ground Scar with Small Pit North of Landfill No. 3, Parcel 155(7). The 4,4'-DDE concentration was below the SSSL and ESV.

Herbicides. Two herbicides (dichloroprop and 4-chloro-2-methylphenoxyacetic acid [MCPA]) were detected in one surface soil sample (SI15-SS03). The dichloroprop result was flagged with a "B" data qualifier signifying that this compound was also detected in a laboratory method blank sample. The herbicide concentrations were below SSSLs but exceeded ESVs.

Total Organic Carbon. One surface soil sample (SI15-SS01A) was analyzed for TOC content. The TOC concentration in the sample was 4,030 mg/kg, as summarized in Appendix E.

5.2 Subsurface Soil Analytical Results

Two subsurface soil samples were collected for chemical analysis at the Ground Scar with Small Pit North of Landfill No. 3, Parcel 155(7). Subsurface soil samples were collected at a depth of 3 to 4 feet bgs at the locations shown on Figure 3-1. Analytical results were compared to residential human health SSSLs and metals background screening values, as presented in Table 5-2.

Metals. Nineteen metals were detected in subsurface soil samples collected at the Ground Scar with Small Pit North of Landfill No. 3, Parcel 155(7). The concentrations of two metals (arsenic and iron) exceeded SSSLs but were below their respective background concentrations.

Volatile Organic Compounds. Nine VOCs were detected in subsurface soil samples collected at the Ground Scar with Small Pit North of Landfill No. 3, Parcel 155(7). The methylene chloride results were flagged with a "B" data qualifier signifying that this compound was also detected in an associated laboratory or field blank sample. VOC concentrations in the subsurface soil samples ranged from 0.00053 mg/kg to 0.013 mg/kg.

The VOC concentrations in subsurface soils were below SSSLs.

Semivolatile Organic Compounds. The SVOC bis(2-ethylhexyl)phthalate was detected in one sample (SI15-SS02B) at a concentration below its SSSL.

Total Organic Carbon. Both subsurface soil samples were analyzed for TOC content. TOC concentrations in the samples were 2,010 mg/kg and 2,780 mg/kg, as presented in Appendix E.

5.3 Groundwater Analytical Results

Three groundwater samples were collected at the Ground Scar with Small Pit North of Landfill No. 3, Parcel 155(7), at the locations shown on Figure 3-1. Analytical results were compared to residential human health SSSLs and metals background screening values, as presented in Table 5-3.

Metals. Fifteen metals were detected in groundwater samples collected at the site. The concentrations of four metals (aluminum, chromium, iron, and manganese) exceeded SSSLs. However, the concentrations of these metals were below their respective background concentrations (note: a background value for chromium was not available). The chromium result (0.0048 milligrams per liter [mg/L]), which was flagged with a "J" data qualifier, marginally exceeded its SSSL (0.00469 mg/L).

Volatile Organic Compounds. Three VOCs (acetone, chloromethane, and methylene chloride) were detected in groundwater samples collected at the site. The VOC analytical results were flagged with a "B" data qualifier indicating that these compounds were also detected in an associated laboratory or field blank sample. VOC concentrations in the groundwater samples ranged from 0.00016 mg/L to 0.0035 mg/L. VOC concentrations in groundwater were below SSSLs.

Semivolatile Organic Compounds. SVOCs were not detected in the groundwater samples collected at the site.

Pesticides. Four pesticides (4,4,'-DDD, aldrin, delta-BHC, and gamma-BHC) were detected in one of the groundwater samples (GSBP-155-MW02) collected at the site. Pesticides were not detected in the other two groundwater samples. The pesticide results were flagged with a "J" data qualifier indicating that the compounds were positively identified but the concentrations were estimated. The pesticide concentrations ranged from 0.000021 mg/L to 0.000031 mg/L. Only the aldrin result (0.000031 mg/L) exceeded its SSSL (0.0000039 mg/L).

6.0 Summary, Conclusions, and Recommendations

IT, under contract with the USACE, completed an SI at the Ground Scar with Small Pit North of Landfill No. 3, Parcel 155(7), at FTMC in Calhoun County, Alabama. The SI was conducted to determine whether chemical constituents are present at the site at concentrations that present an unacceptable risk to human health or the environment. The SI at the Ground Scar with Small Pit North of Landfill No. 3, Parcel 155(7), consisted of the sampling and analysis of four surface soil samples, two subsurface soil samples, and three groundwater samples. In addition, three permanent groundwater monitoring wells were installed in the residuum groundwater zone to facilitate groundwater sample collection and to provide site-specific geological and hydrogeological characterization information. As part of the investigation, IT incorporated data previously collected by QST at the Ground Scar with Small Pit North of Landfill No. 3, Parcel 155(7).

Chemical analysis of samples collected at the Ground Scar with Small Pit North of Landfill No. 3, Parcel 155(7), indicates that metals, VOCs, SVOCs, and pesticides were detected in the various site media. In addition, two herbicides were detected in one surface soil sample. Neither PCBs nor explosive compounds were detected in any of the samples collected at the site. Analytical results were compared to the human health SSSLs and ESVs for FTMC. The SSSLs and ESVs were developed by IT for human health and ecological risk evaluations as part of the ongoing SIs being performed under the BRAC Environmental Restoration Program at FTMC. Additionally, metals concentrations exceeding SSSLs and ESVs were compared to media-specific background screening values (SAIC, 1998).

The potential impact to human receptors is expected to be minimal. Although the site is projected for active recreation reuse, the analytical data were screened against residential human health SSSLs to evaluate the site for possible unrestricted land reuse. The metals that exceeded SSSLs in site media were below their respective background concentrations and, therefore, do not pose an unacceptable risk to future human receptors. VOC, SVOC, pesticide, and herbicide concentrations in site media were below SSSLs except for one pesticide in one groundwater sample.

One pesticide (aldrin) was detected in one groundwater sample at an estimated concentration (0.000031 mg/L) exceeding its SSSL (0.0000039 mg/L). The pesticide was not detected in any

of the other samples collected at the site. Although an EPA drinking water standard does not exist for aldrin, the pesticide's estimated concentration was below established EPA health advisory values (EPA, 2000). Based on its low estimated concentration and lack of distribution at the site, it is concluded that exposure to aldrin in groundwater does not represent an unacceptable human health risk.

The potential threat to ecological receptors is also expected to be low. The metals that exceeded ESVs were below their respective background concentrations or within the range of background values. Two VOCs (tetrachloroethene and trichloroethene) and two herbicides (dichloroprop and MCPA) exceeded ESVs in surface soils. The concentrations of trichloroethene and MCPA, however, were estimated at levels close to their respective reporting limits. In addition, the dichloroprop result was flagged with a "B" data qualifier indicating that the compound was also detected in a laboratory method blank sample. The concentration of tetrachloroethene (0.013 mg/kg) was within the same order of magnitude as its ESV (0.010 mg/kg). Therefore, these compounds are not expected to pose a significant threat to ecological receptors.

Based on the results of the SI, past operations at the Ground Scar with Small Pit North of Landfill No. 3, Parcel 155(7), do not appear to have adversely impacted the environment. The metals and chemical compounds detected in site media do not pose an unacceptable risk to human health or the environment. Therefore, IT recommends "No Further Action" and unrestricted land reuse at the Ground Scar with Small Pit North of Landfill No. 3, Parcel 155(7).

7.0 References

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ATTACHMENT 1

LIST OF ABBREVIATIONS AND ACRONYMS

List of Abbreviations and Acronyms

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

List of Abbreviations and Acronyms *(Continued)*

Flt	filtered
FML	flexible membrane liner
FMP 1300	Former Motor Pool 1300
FOMRA	Former Ordnance Motor Repair Area
Foster Wheeler	Foster Wheeler Environmental Corporation
Frtn	fraction
FS	field split; feasibility study
FSP	field sampling plan
ft	feet
ft/ft	feet per foot
FTA	Fire Training Area
FTMC	Fort McClellan
FTRRA	FTMC Reuse & Redevelopment Authority
g	gram
G-856	Geometrics, Inc. G-856 magnetometer
G-858G	Geometrics, Inc. G-858G magnetic gradiometer
gal	gallon
gal/min	gallons per minute
GB	sarin
gc	clay gravels; gravel-sand-clay mixtures
GC	gas chromatograph
GC/MS	gas chromatograph/mass spectrometer
GCR	geosynthetic clay liner
GFAA	graphite furnace atomic absorption
GIS	Geographic Information System
gm	silty gravels; gravel-sand-silt mixtures
gp	poorly graded gravels; gravel-sand mixtures
gpm	gallons per minute
GPR	ground-penetrating radar
GPS	global positioning system
GS	ground scar
GSA	General Services Administration; Geologic Survey of Alabama
GSBP	Ground Scar Boiler Plant
GSSI	Geophysical Survey Systems, Inc.
GST	ground stain
GW	groundwater
gw	well-graded gravels; gravel-sand mixtures
HA	hand auger
HCl	hydrochloric acid
HD	distilled mustard
HDPE	high-density polyethylene
Herb.	herbicides
HNO_3	nitric acid
hr	hour
H&S	health and safety
HSA	hollow-stem auger
HTRW	hazardous, toxic, and radioactive waste
‘I’	out of control, data rejected due to low recovery
ICAL	initial calibration
ICB	initial calibration blank
ICP	inductively-coupled plasma
ICRP	International Commission on Radiological Protection
ICS	interference check sample
ID	inside diameter
IDL	instrument detection limit
IDLH	immediately dangerous to life or health
IDM	investigative-derived media
IDW	investigation-derived waste
ILCR	incremental lifetime cancer risk
IMPA	isopropylmethyl phosphonic acid
IMR	Iron Mountain Road
in.	inch
Ing	ingestion
Inh	inhalation
IP	ionization potential
IPS	International Pipe Standard
IRDMIS	Installation Restoration Data Management Information System
IRP	Installation Restoration Program
ISCP	Installation Spill Contingency Plan
IT	IT Corporation
ITEMS	IT Environmental Management System ™
‘J’	estimated concentration
JeB2	Jefferson gravelly fine sandy loam, 2 to 6 percent slopes, eroded
JeC2	Jefferson gravelly fine sandy loam, 6 to 10 percent slopes, eroded
JfB	Jefferson stony fine sandy loam, 0 to 10 percent slopes have strong slopes
JPA	Joint Powers Authority
K	conductivity
L	lewisite; liter
LC_{50}	lethal concentration for 50 percent of population tested
LD_{50}	lethal dose for 50 percent of population tested
l	liter
LBP	lead-based paint
LCS	laboratory control sample
LEL	lower explosive limit
LOAEL	lowest-observed-advserse-effects-level
LT	less than the certified reporting limit
LUC	land-use control
LUCAP	land-use control assurance plan
LUCIP	land-use control implementation plan
max	maximum
MCL	maximum contaminant level
MCPA	4-chloro-2-methylphenoxyacetic acid
MDC	maximum detected concentration
MDL	method detection limit
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
mg/m^3	milligrams per cubic meter
mh	inorganic silts, micaceous or diatomaceous fine, sandy or silt soils
MHz	megahertz
µg/g	micrograms per gram
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
µmhos/cm	micromhos per centimeter
min	minimum
MINICAMS	miniature continuous air monitoring system
ml	inorganic silts and very fine sands
mL	milliliter
mm	millimeter
MM	mounded material
MMBtu/hr	million Btu per hour
MOGAS	motor vehicle gasoline
MPA	methyl phosphonic acid
MPM	most probable munition
MR	molasses residue
MS	matrix spike
mS/cm	millisiemens per centimeter
MSD	matrix spike duplicate
MTBE	methyl tertiary butyl ether
msl	mean sea level
MtD3	Montevallo shaly, silty clay loam, 10 to 40 percent slopes , severely eroded
mV	millivolts
MW	monitoring well
NA	not applicable; not available
NAD	North American Datum
NAD83	North American Datum of 1983
NAVD88	North American Vertical Datum of 1988
NCP	National Contingency Plan
ND	not detected
NE	no evidence; northeast
ne	not evaluated
NEW	net explosive weight
NFA	No Further Action
ng/L	nanograms per liter
NGVD	National Geodetic Vertical Datum
NIC	notice of intended change
NIOSH	National Institute for Occupational Safety and Health
NPDES	National Pollutant Discharge Elimination System
No.	number
NOAA	National Oceanic and Atmospheric Administration
NOAEL	no-observed-adverse-effects-level
NR	not requested; not recorded
ns	nanosecond
N-S	north to south
NS	not surveyed

List of Abbreviations and Acronyms *(Continued)*

nT	nanotesla
NTU	nephelometric turbidity unit
nv	not validated
O&G	oil and grease
O&M	operating and maintenance
OB/OD	open burning/open detonation
OD	outside diameter
OE	ordnance and explosives
oh	organic clays of medium to high plasticity
ol	organic silts and organic silty clays of low plasticity
OP	organophosphorus
ORP	oxidation-reduction potential
OSHA	Occupational Safety and Health Administration
OWS	oil/water separator
oz	ounce
PA	preliminary assessment
PAH	polynuclear aromatic hydrocarbon
Parsons	Parsons Engineering Science, Inc.
Pb	lead
PCB	polychlorinated biphenyl
PCE	perchloroethene
PCP	pentachlorophenol
PDS	Personnel Decontamination Station
PEL	permissible exposure limit
PES	potential explosive site
Pest.	pesticides
PETN	pentarey thritol tetranitrate
PFT	portable flamethrower
PG	professional geologist
PID	photoionization detector
PkA	Philo and Stendal soils local alluvium, 0 to 2 percent slopes
POL	petroleum, oils, and lubricants
PP	peristaltic pump
ppb	parts per billion
PPE	personal protective equipment
ppm	parts per million
PPMP	Print Plant Motor Pool
ppt	parts per thousand
PRG	preliminary remediation goal
PSSC	potential site-specific chemical
pt	peat or other highly organic silts
PVC	polyvinyl chloride
QA	quality assurance
QA/QC	quality assurance/quality control
QAP	installation-wide quality assurance plan
QC	quality control
QST	QST Environmental, Inc.
qty	quantity
Qual	qualifier
‘R’	rejected data; resample
RAO	removal action objective
RBC	risk-based concentration
RCRA	Resource Conservation and Recovery Act
RD	remedial design
RDX	cyclonite
RfD	reference dose
ReB3	Rarden silty clay loams
REG	regular field sample
REL	recommended exposure limit
RFA	request for analysis
RGO	remedial goal option
RI	remedial investigation
RL	reporting limit
RPD	relative percent difference
RRF	relative response factor
RSD	relative standard deviation
RTK	real-time kinematic
SAD	South Atlantic Division
SAE	Society of Automotive Engineers
SAIC	Science Applications International Corporation
SAP	installation-wide sampling and analysis plan
sc	clayey sands; sand-clay mixtures
Sch.	schedule
SD	sediment
SDG	sample delivery group
SDZ	safe distance zone; surface danger zone
SEMS	Southern Environmental Management & Specialties, Inc.
SFSP	site-specific field sampling plan
SGF	standard grade fuels
SHP	installation-wide safety and health plan
SI	site investigation
SL	standing liquid
SLERA	screening-level ecological risk assessment
sm	silty sands; sand-silt mixtures
SM	Serratia marcescens
SOP	standard operating procedure
sp	poorly graded sands; gravelly sands
SP	submersible pump
Sr-90	strontium-90
SRA	streamlined human health risk assessment
Ss	stony rough land, sandstone series
SS	surface soil
SSC	site-specific chemical
SSHO	site safety and health officer
SSHP	site-specific safety and health plan
SSL	soil screening level
SSSL	site-specific screening level
SSSSL	site-specific soil screening level
STB	supertropical bleach
STC	source term concentrations
STEL	short-term exposure limit
STOLS	Surface Towed Ordnance Locator System®
Std. units	standard units
SU	standard unit
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*
SWPP	storm water pollution prevention plan
SZ	support zone
TAL	target analyte list
TAT	turn around time
TB	trip blank
TCA	trichloroethane
TCDD	2,3,7,8-tetrachlorodibenzo-p-dioxin
TCDF	tetrachlorodibenzofurans
TCE	trichloroethene
TCL	target compound list
TCLP	toxicity characteristic leaching procedure
TDGCL	thiodiglycol
TDGCLA	thiodiglycol chloroacetic acid
TERC	Total Environmental Restoration Contract
TIC	tentatively identified compound
TLV	threshold limit value
TN	Tennessee
TNT	trinitrotoluene
TOC	top of casing; total organic carbon
TPH	total petroleum hydrocarbons
TRADOC	U.S. Army Training and Doctrine Command
TRPH	total recoverable petroleum hydrocarbons
TSCA	Toxic Substances Control Act
TWA	time-weighted average
UCL	upper confidence limit
UCR	upper certified range
‘U’	not detected above reporting limit
USACE	U.S. Army Corps of Engineers
USACHPPM	U.S. Army Center for Health Promotion and Preventive Medicine
USAEC	U.S. Army Environmental Center
USAEHA	U.S. Army Environmental Hygiene Agency
USACMLS	U.S. Army Chemical School
USAMPS	U.S. Army Military Police School
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

USCS	Unified Soil Classification System
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
UST	underground storage tank
UTL	upper tolerance level
UXO	unexploded ordnance
UXOQCS	UXO Quality Control Supervisor
UXOSO	UXO safety officer
VOA	volatile organic analyte
VOC	volatile organic compound
VOH	volatile organic hydrocarbon
VQlfr	validation qualifier
VQual	validation qualifier
VX	nerve agent (O-ethyl-S-[diisopropylaminoethyl]-methylphosphonothiolate)
Weston	Roy F. Weston, Inc.
WP	installation-wide work plan
WS	watershed
WSA	Watershed Screening Assessment
WWI	World War I
WWII	World War II
XRF	x-ray fluorescence
yd^3	cubic yards

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

N/A – Not analyzed

ND – Not detected

Boolean Codes

- LT – Less than the certified reporting limit

Flagging Codes

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

Qualifiers

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