Final

Site Investigation Report
Former Printing Plant, Building 144, Parcel 171(7)

Fort McClellan
Calhoun County, Alabama

Prepared for:

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Contract No. DACA21-96-D-0018
IT Project No. 774645

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Revision 1

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Executive Summary

In accordance with Contract Number DACA21-96-D-0018, Task Order CK05, IT Corporation (IT) completed a site investigation (SI) at the Former Printing Plant, Building 144, Parcel 171(7) at Fort McClellan (FTMC), Calhoun County, Alabama. The SI was conducted to determine whether chemical constituents are present at the Former Printing Plant, Building 144, Parcel 171(7) and, if present, whether the concentrations would present an unacceptable risk to human health or the environment. The SI at the Former Printing Plant, Building 144, Parcel 171(7) consisted of the sampling and analyses of three surface soil samples, three subsurface soil samples, and three groundwater samples. In addition, three temporary 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.

The analytical results indicate that metals, volatile organic compounds, and semivolatile organic compounds (SVOC) were detected in environmental media sampled. The analytical results were compared to human health site-specific screening levels (SSSL) and ecological screening values (ESV). These SSSLs and ESVs were developed by IT as part of the human health and ecological risk evaluations associated with SIs being performed under the Base Realignment and Closure Environmental Restoration Program at FTMC. Additionally, metals results exceeding the SSSLs and ESVs were compared to media-specific background metals concentrations. SVOC concentrations exceeding SSSLs and ESVs in surface soil samples were compared to polynuclear aromatic hydrocarbon (PAH) background screening values where available (IT, 2000b).

The potential impact to human receptors is expected to be minimal. The metals detected in site media that exceeded residential human health SSSLs were below the background concentrations, and thus, do not pose an unacceptable risk to future human receptors. The concentration of the PAH benzo(a)pyrene exceeded the residential human health SSSL at one sample location, but was less than the PAH background. Benzo(a)pyrene was not detected in any of the other samples collected at the Former Printing Plant, Building 144, Parcel 171(7). Given the extremely limited impacted area, benzo(a)pyrene is not expected to pose an unacceptable risk to human health in the residential land-use scenario.

Several metals were detected in site media at concentrations exceeding residential human health SSSLs but within background concentrations. Five metals were detected in surface soil samples

at concentrations exceeding ESVs and background concentrations but within the range of measured background values. The PAH benzo(a)pyrene was also detected at one surface soil sample location at a concentration exceeding its residential human health SSSL and ESV but below the background screening level. Benzo(a)pyrene was not detected in any other sample collected at the Former Printing Plant, Building 144, Parcel 171(7). Three other PAH compounds were detected at the same surface soil sample location as benzo(a)pyrene at concentrations exceeding ESVs, but below PAH background screening levels.

Although several metals and four PAHs were detected in site media at concentrations exceeding ESVs, the potential impact to ecological receptors is expected to be minimal. This conclusion is based on the limited impacted area and the future residential land use of the Former Printing Plant, Building 144, Parcel 171(7) (based on the FTMC 1997 *Fort McClellan Comprehensive Reuse Plan*). Under this land-use scenario, substantial ecological habitat is not expected to be present and is expected to be minimally impacted.

Based on the results of the SI, past operations at the Former Printing Plant, Building 144, Parcel 171(7) do not appear to have adversely impacted the environment. Furthermore, the metals and organic compounds detected in site media do not pose an unacceptable risk to human health or the environment in the residential land-use scenario. Therefore, IT recommends "No Further Action" with regard to hazardous, toxic, and radiological waste at the Former Printing Plant, Building 144, Parcel 171(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, Mobile District (USACE). The USACE has contracted with IT Corporation (IT) to perform the site investigation (SI) at the Former Printing Plant, Building 144, Parcel 171(7) through Prime Contract DACA21-96-D-0018, Task Order CK05.

This SI report has been prepared to present specific information and results compiled from the SI, including field sampling and analysis and monitoring well installation activities conducted at the Former Printing Plant, Building 144, Parcel 171(7).

1.1 Project Description

The Former Printing Plant, Building 144, Parcel 171(7) was identified as an area to be investigated prior to property transfer. The Former Printing Plant, Building 144, Parcel 171(7) was identified 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.

A site-specific field sampling plan (SFSP) attachment and a site-specific safety and health plan (SSHP) attachment were finalized in December 1998 (IT, 1998a). The SFSP and SSHP were prepared to provide technical guidance for sample collection and analysis at the Former Printing Plant, Building 144, Parcel 171(7). The SFSP was used in conjunction with the SSHP as attachments to the installation-wide work plan (IT, 1998b) and the installation-wide sampling and analysis plan (SAP) (IT, 2000a). The SAP includes the installation-wide safety and health plan and quality assurance plan.

The SI included field work to collect three surface soil samples, three subsurface soil samples, and three groundwater samples to determine if potential site-specific chemicals are present at the

Former Printing Plant, Building 144, Parcel 171(7), and to provide data useful for supporting any future corrective measures and closure activities.

1.2 Purpose and Objectives

The SI program was designed to collect data from site media and provide a level of defensible data and information in sufficient detail to determine whether chemical constituents are present at the Former Printing Plant, Building 144, Parcel 171(7) at concentrations that would present an unacceptable risk to human health or the environment. The conclusions of the SI in Section 6.0 are based on the comparison of the analytical results to human health site-specific screening levels (SSSL) and ecological screening values (ESV) 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, ESVs, and polynuclear aromatic hydrocarbon (PAH) background screening values are presented in the *Final Human Health and Ecological Screening Values and PAH Background Summary Report* (IT, 2000b). The PAH background screening values were developed by IT at the direction of the BRAC Cleanup Team to address the occurrence of PAH compounds in surface soils as a result of anthropogenic activities at FTMC. Background metals screening values are presented in the final background metals survey report (Science Applications International Corporation [SAIC], 1998).

Based on the conclusions, the BRAC Cleanup Team will decide to propose "No Further Action" at the site or to conduct additional work at the site.

1.3 Site Description and History

The Former Printing Plant, Building 144 is located in the central part of the Main Post (Figure 1-1). The study area in and around Building 144 covers slightly less than 1 acre. An information processing center was recently operated in Building 144 and the site and surrounding area is well developed. The buildings that were previously used for the Post Headquarters, Military Police Station, Personnel Office, and other administrative activities surround the study site. With base closure in September 1999, these activities stopped and the buildings were vacated. Printing operations were conducted on the first floor of Building 144 from 1969 to 1974, however, there is not any evidence remaining of the former printing operations at this location. In 1974, printing operations were moved from Building 144 to Building 2051. Potential printing materials used at this facility may have included petroleum hydrocarbons, printing fluids, solvents (including tetrachloroethene and petroleum naphtha), metals, and inks. Currently, the site has unrestricted

access.

The South Branch of Cane Creek is located at least 600 feet northeast of the site, while Remount Creek is located at least 1,250 feet west of the site. Shallow groundwater at the site is probably controlled by surface drainage and/or topography. Site elevation is approximately 790 to 795 feet above sea level as established by the National Geodetic Vertical Datum. Figure 1-2 is a site map showing Building 144, topographic features, and site boundaries.

The soil type at the Former Printing Plant, Building 144 is Montevallo. Montevallo soils are severely eroded, shaly silty clay soils. These soils are formed either by erosional forces, surface runoff, or natural reworking processes. Colors are typically yellowish-brown. The depth to bedrock is usually 1.5 feet or greater, while the depth to groundwater is typically 20 feet or greater. The high erosion hazard, low capacity for available moisture, and thin root zone make this soil unsuited for cultivation (U.S. Department of Agriculture, 1961).

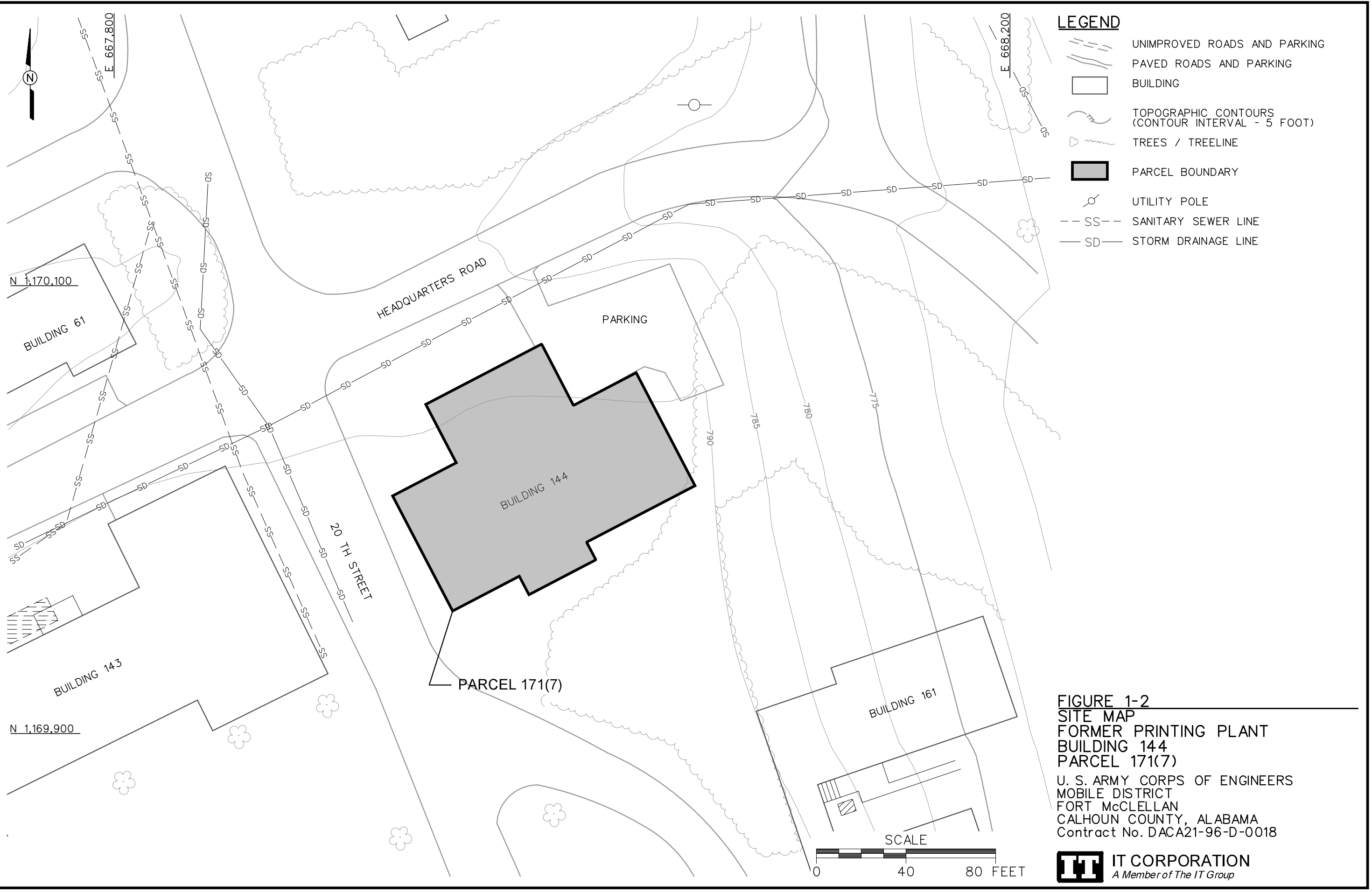

FIGURE 1-2
SITE MAP
FORMER PRINTING PLANT
BUILDING 144
PARCEL 171(7)

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

IT CORPORATION
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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 (including migration) has occurred
2. Areas where only release or disposal of petroleum products has occurred
3. Areas of contamination below action levels
4. Areas where all necessary remedial actions have been taken
5. Areas of known contamination with removal and/or remedial action underway
6. Areas of known contamination where required response actions have not been taken
7. Areas not evaluated or that require further evaluation.

The EBS was conducted in accordance with the Community Environmental Response Facilitation Act (CERFA) (CERFA-Public Law 102-426) protocols and DOD policy regarding contamination assessment. Record searches and reviews were performed on all reasonably available documents from FTMC, 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 historic maps and aerial photographs were reviewed to document historic 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. Information could not be found to indicate that previous investigations were performed at this site.

The Former Printing Plant, Building 144 was identified as a Category 7 CERFA site: areas that are not evaluated or require further evaluation.

3.0 Current Site Investigation Activities

3.1 Environmental Sampling

The environmental sampling performed during the SI at the Former Printing Plant, Building 144, Parcel 171(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 noted during a site walk-over, and by reviewing historical documents pertaining to activities conducted at the site. The sample locations, media, and rationale are summarized in Table 3-1. Samples were submitted for laboratory analyses of site-related parameters listed in Section 3.3.

3.1.1 Surface Soil Sampling

Surface soil samples were collected from three locations at the Former Printing Plant, Building 144, Parcel 171(7), as shown on Figure 3-1. Surface soil sampling locations and rationale are presented in Table 3-1. Surface soil sample designations and quality assurance/quality control (QA/QC) samples are listed in Table 3-2. Surface soil sampling locations were determined in the field by the on-site geologist based on the sampling rationale, presence of surface structures, site topography, and buried and overhead utilities.

Sample Collection. Surface soil samples were collected from the upper 1 foot of soil with a 3-inch diameter stainless-steel hand auger using the methodology specified in Section 4.9 of the SAP (IT, 2000a). Surface soil samples were collected by first removing surface debris, such as rocks and vegetation, from the immediate sample area. The soil was collected with the sampling device and screened with a photoionization detector (PID) in accordance with Section 4.7.1.1 of the SAP (IT, 2000a). Samples for volatile organic compound (VOC) analyses were collected directly from the sampler with three EnCore® samplers. The remaining portion of the sample was transferred to a clean stainless-steel bowl, homogenized, and placed in the appropriate sample containers. The samples were analyzed for the parameters listed in Table 3-2 using methods outlined in Section 3.3. Sample collection logs are included in Appendix A.

3.1.2 Subsurface Soil Sampling

Subsurface soil samples were collected from three soil borings at the Former Printing Plant, Building 144, Parcel 171(7) as shown on Figure 3-1. Subsurface sampling locations and rationale are presented in Table 3-1. Subsurface soil sample designations, depths, and QA/QC samples are listed in Table 3-2. Soil boring sampling locations were determined in the field by the on-site geologist based on the sampling rationale, presence of surface structures, site

Table 3-1

Sampling Locations and Rationale
Former Printing Plant, Building 144, Parcel 171(7)
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Media	Sample Location Rationale
PPMP-171-GP01	Surface Soil Subsurface Soil Groundwater	Surface soil, subsurface soil and groundwater samples were collected at the northeast door of Building 144. Sample location represents an exit point (via foot traffic, etc.) for site-specific contaminants to be deposited onto surface or subsurface soil and from there to groundwater via runoff or percolation.
PPMP-171-GP02	Surface Soil Subsurface Soil Groundwater	Surface soil, subsurface soil and groundwater samples were collected at the northwest door of Building 144. Sample location represents an exit point (via foot traffic, etc) for site-specific contaminants to be deposited onto surface or subsurface soil and from there to groundwater via runoff or percolation.
PPMP-171-GP03	Surface Soil Subsurface Soil Groundwater	Surface soil, subsurface soil and groundwater samples were collected at the south door of Building 144. Sample location represents an exit point (via foot traffic, etc) for site-specific contaminants to be deposited onto surface or subsurface soil and from there to groundwater via runoff or percolation.

Table 3-2

Surface and Subsurface Soil Sample Designations and QA/QC Sample Quantities
Former Printing Plant, Building 144, Parcel 171(7)
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Designation	Sample Depth (ft bgs)	QA/QC Samples			Analytical Suite
			Field Duplicates	Field Splits	MS/MSD	
PPMP-171-GP01	PPMP-171-GP01-SS-KD0001-REG	0 - 1			PPMP-171-GP01-SS-KD0001-MS	TCL VOCs, TCL SVOCs
	PPMP-171-GP01-DS-KD0002-REG	6 - 9			PPMP-171-GP01-SS-KD0001-MSD	TAL Metals
PPMP-171-GP02	PPMP-171-GP02-SS-KD0003-REG	0 - 1				TCL VOCs, TCL SVOCs
	PPMP-171-GP02-DS-KD0004-REG	6 - 9				TAL Metals
PPMP-171-GP03	PPMP-171-GP03-SS-KD0005-REG	0 - 1	PPMP-171-GP03-SS-KD0006-FD	PPMP-171-GP03-SS-KD0007-FS		TCL VOCs, TCL SVOCs
	PPMP-171-GP03-DS-KD0008-REG	9 - 11				TAL Metals

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

LEGEND

- UNIMPROVED ROADS AND PARKING
- PAVED ROADS AND PARKING
- BUILDING
- TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 5 FOOT)
- TREES / TREELINE
- PARCEL BOUNDARY
- UTILITY POLE
- SS — SANITARY SEWER LINE
- SD — STORM DRAINAGE LINE
- GROUNDWATER, SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION

FIGURE 3-1
SAMPLE LOCATION MAP
FORMER PRINTING PLANT
BUILDING 144
PARCEL 171(7)

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

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topography, and buried and overhead utilities. IT contracted TEG, Inc., a direct-push technology subcontractor, to assist in subsurface soil sample collection.

Sample Collection. Subsurface soil samples were collected from soil borings at a depth greater than 1 foot below ground surface (bgs) in the unsaturated zone. The soil borings were advanced and soil samples collected using the direct-push sampling procedures specified in Section 4.9.1.1 of the SAP (IT, 2000a). 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.

Soil samples were collected continuously to 12 feet bgs or until direct-push sampler refusal was encountered. Subsurface soil samples were field screened using a PID in accordance with Section 4.7.1.1 of the SAP (IT, 2000a) to measure samples for volatile organic vapors. The sample showing the highest reading was selected and sent to the laboratory for analysis, however at those locations where PID readings were not greater than background, the deepest sample interval above groundwater was submitted for analyses. Samples to be analyzed for VOCs were collected directly from the sampler with three EnCore® samplers. The remaining portion of the sample was transferred to a clean stainless-steel bowl, homogenized, and placed in the appropriate sample containers. Samples submitted for laboratory analyses are summarized in Table 3-2. The on-site geologist at each borehole constructed a detailed lithological log. The lithological log for each borehole is included in Appendix B.

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

3.1.3 Well Installation

Three temporary wells were installed in the residuum groundwater zone at the Former Printing Plant, Building 144, Parcel 171(7) to collect groundwater samples for laboratory analyses. The well/groundwater sample locations are shown on Figure 3-1. Table 3-3 summarizes the construction details of the temporary wells installed at the Former Printing Plant, Building 144, Parcel 171(7). The temporary well logs are included in Appendix B.

IT contracted Miller Drilling, Inc., to install the temporary wells with a hollow-stem auger rig in January 1999 at the well/groundwater sample 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 boreholes at these locations were advanced with a 4.25-inch inside diameter (ID) hollow-

Table 3-3

Temporary Well Construction Summary
Former Printing Plant, Building 144, Parcel 171(7)
Fort McClellan, Calhoun County, Alabama

Temporary Well	Northing	Easting	Ground Elevation (ft msl)	TOC Elevation (ft msl)	Well Depth (ft bgs)	Screen Length (ft bgs)	Screen Interval (ft bgs)	Sump Interval (ft bgs)	Well Material
PPMP-171-GP01	1170065.97	668013.77	791.91	791.63	40.0	15	24.75 - 39.75	39.75 - 40.00	2" ID Sch. 40 PVC
PPMP-171-GP02	1170034.74	667922.20	793.86	793.54	38.5	15	23.25 - 38.25	38.25 - 38.50	2" ID Sch. 40 PVC
PPMP-171-GP03	1169982.19	668027.55	794.95	794.66	42.5	15	27.25 - 42.25	42.25 - 42.50	2" ID Sch. 40 PVC

All temporary wells installed with an auger drill rig using a 4 1/4-inch inside diameter hollow-stem auger.
Horizontal coordinates were referenced to the U.S. State Plane Coordinate System, Alabama East Zone, North American Datum (NAD83), 1983.
Elevations were 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.
msl - Mean sea level.
TOC - Top of casing.

stem auger from ground surface to the first water-bearing zone in residuum at the well location. The borehole was augered to the depth of direct-push sampler refusal and samples were collected at the depth of direct-push refusal to the bottom of the borehole. A 2-foot long, 2-inch ID carbon steel split-spoon sampler was driven at 5-foot intervals to collect residuum for observing and describing lithology. Where spoon refusal occurred, the auger was advanced until the first water-bearing zone was encountered. The on-site geologist logging the auger boreholes continued the lithological log for each borehole from the depth of split-spoon sampler refusal to the bottom of the auger borehole by logging the auger drill cuttings. The drill cuttings were logged to determine lithologic changes and the approximate depth of groundwater encountered during drilling. This information was used to determine the optimal placement of the monitoring well screen interval and to provide site-specific geologic and hydrogeologic information. The lithological log for each borehole is included in Appendix B.

Upon reaching the target depth, a 15-foot length of 2-inch ID, 0.010-inch factory slotted, Schedule 40 polyvinyl chloride (PVC) screen with a 3-inch 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 number 1 filter sand was tremied around the well screen to approximately 2 feet above the top of the well screen as the augers were removed. The wells were surged approximately 10 minutes, or until no more settling of the filter sand occurred inside the borehole. A bentonite seal, consisting of approximately 2 feet of bentonite chips, was placed immediately on top of the filter sand and hydrated with potable water. If the bentonite seal was installed below the water table surface, the bentonite chips were allowed to hydrate in the groundwater. The bentonite seal placement and hydration followed procedures in Appendix C of the SAP (IT, 2000a). A locking well cap was placed on the PVC well stickup. The temporary well surface completion included attaching plastic sheeting around the PVC riser using duct tape. Additionally, sand bags were used to secure the sheeting to the ground surface around the temporary well.

The temporary 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). Development continued until the water turbidity was equal to or less than 20 nephelometric turbidity units or for a maximum of 4 hours. The well development logs are included in Appendix C.

3.1.4 Water Level Measurements

The depth to groundwater was measured in the temporary wells installed at the Former Printing Plant, Building 144, Parcel 171(7) in April 1999 following procedures outlined in Section 4.18 of the SAP (IT, 2000a). Depth to groundwater was measured with an electronic water level meter. The meter probe and cable were cleaned between use at each well following decontamination methodology presented in Section 4.10 of the SAP (IT, 2000a). Measurements were referenced to the top of the PVC well casing. A summary of groundwater level measurements is presented in Table 3-4.

3.1.5 Groundwater Sampling

Groundwater was sampled from the temporary wells installed at the Former Printing Plant, Building 144, Parcel 171(7). The well/groundwater sampling locations are shown on Figure 3-1. The groundwater sampling locations and rationale are listed in Table 3-1. The groundwater sample designations and QA/QC sample quantities are listed in Table 3-5.

Sample Collection. Groundwater sampling was performed at the temporary well locations following procedures outlined in Section 4.9 of the SAP (IT, 2000a). Groundwater was sampled after purging a minimum three well volumes and field parameters (temperature, pH, specific conductivity, oxidation-reduction (Redox) potential, and turbidity) stabilized. Purging and sampling were performed with a submersible pump equipped with Teflon™ tubing. Field parameters were measured using a Hydrolab® water quality unit and are summarized in Table 3-6. Sample collection logs are included in Appendix A. The samples were analyzed for the parameters listed in Section 3.3.

3.2 Surveying of Sample Locations

Sample locations were surveyed using global positioning system survey techniques described in Section 4.3 of the SAP (IT, 2000a), 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 (NAD83), 1983. Elevations were referenced to the North American Vertical Datum of 1988 (NAVD88). Horizontal coordinates and elevations are included in Appendix D.

3.3 Analytical Program

Samples collected during the SI were analyzed for various chemical properties. The specific suite of analyses performed is based on the potential site-specific chemicals historically at the site and EPA, ADEM, FTMC, and USACE requirements. Samples collected from the Former Printing

Table 3-4

Groundwater Elevations
Former Printing Plant, Building 144, Parcel 171(7)
Fort McClellan, Calhoun County, Alabama

Well Location	Date	Depth to Water (ft BTOC)	Top of Casing Elevation (ft msl)	Ground Elevation (ft msl)	Groundwater Elevation (ft msl)
PPMP-171-GP01	22-Apr-99	25.38	791.63	791.91	766.25
PPMP-171-GP02	22-Apr-99	16.69	793.54	793.86	776.85
PPMP-171-GP03	22-Apr-99	24.75	794.66	794.95	769.91

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

BTOC - Below top of casing.
ft - Feet.
msl - Mean sea level.

Table 3-5

Groundwater Sample Designations and QA/QC Sample Quantities
Former Printing Plant, Building 144, Parcel 171(7)
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Designation	Sample Depth (ft bgs)	QA/QC Samples			Analytical Suite
			Field Duplicates	Field Splits	MS/MSD	
PPMP-171-GP01	PPMP-171-GP01-GW-KD3001-REG	29.60-39.75			PPMP-171-GP01-GW-KD3001-MS PPMP-171-GP01-GW-KD3001-MSD	TCL VOCs, TCL SVOCs TAL Metals
PPMP-171-GP02	PPMP-171-GP02-GW-KD3002-REG	25.85-38.25				TCL VOCs, TCL SVOCs TAL Metals
PPMP-171-GP03	PPMP-171-GP03-GW-KD3003-REG	30.35-42.25	PPMP-171-GP03-GW-KD3004-FD	PPMP-171-GP03-GW-KD3005-FS		TCL VOCs, TCL SVOCs TAL Metals

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

Table 3-6

Groundwater Field Parameters
Former Printing Plant, Building 144, Parcel 171(7)
Fort McClellan, Calhoun County, Alabama

Sample Location	Date	Media	Specific Conductivity (µmhos/cm)	Dissolved Oxygen (ppm)	Redox Potential (mV)	Temperature (^{o}C)	Turbidity (NTUs)	pH (Std units)
PPMP-171-GP01	18-Feb-99	GW	85	0.46	229.40	18.61	201.20	5.14
PPMP-171-GP02	17-Feb-99	GW	100	0.37	115.20	18.35	264.00	5.47
PPMP-171-GP03	18-Feb-99	GW	70	3.10	171.10	18.95	2.03	5.54

^{o}C - Degrees Celsius.
GW - Groundwater.
µmhos/cm - Micromhos per centimeter.
mV - Millivolts.
NTUs - Nephelometric turbidity units.
ppm - Parts per million.
Std units - Standard units.

Plant, Building 144, Parcel 171(7) were analyzed for the following parameters:

- Target compound list VOCs - Method 5035/8260B
- Target compound list semivolatile organic compounds (SVOC) - Method 8270C
- Target analyte list metals - Method 6010B/7000.

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

3.4 Sample Preservation, Packaging, and Shipping

Sample preservation, packaging, and shipping followed requirements specified in Section 4.13.2 of the SAP (IT, 2000a). Sample containers, sample volumes, preservatives, and holding times for the analyses required in this SI are listed in Section 5.0, Table 5-1, of Appendix B of the SAP (IT, 2000a). Sample documentation and chain-of-custodies 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 Quanterra Environmental Services in Knoxville, Tennessee. Split samples were shipped to USACE South Atlantic Division Laboratory in Marietta, Georgia.

3.5 Investigation-Derived Waste Management and Disposal

Investigation-derived waste (IDW) was managed and disposed as outlined in Appendix D of the SAP (IT, 2000a). The IDW generated from the field sampling at the Former Printing Plant, Building 144, Parcel 171(7) was segregated as follows:

- Drill cuttings

- Purge water from well development and 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 rolloff bins prior to characterization and final disposal. Solid IDW was characterized using toxicity characteristic leaching procedure analyses. Based on the results, drill cuttings, spent well materials, and personal protective equipment generated during the SI at the Former Printing Plant, Building 144, Parcel 171(7) were disposed as nonregulated waste at the Industrial Waste Landfill on the Main Post of FTMC.

Liquid IDW was contained in the existing 20,000-gallon sump associated with the Building T-338 vehicle wash rack. 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.

3.6 Variances/Nonconformances

3.6.1 Variances

There were not any variances to the SFSP recorded during completion of the SI at the Former Printing Plant, Building 144, Parcel 171(7).

3.6.2 Nonconformances

There were not any nonconformances to the SFSP recorded during completion of the SI at the Former Printing Plant, Building 144, Parcel 171(7).

3.7 Data Quality

The field sample results 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. Sample collection logs pertaining to the collection of the samples were reviewed and organized for this report and are included in Appendix A. As discussed in Section 3.6, there were not any variances or nonconformances identified either in the field or during the review of sample collection logs that may have impacted the usability of the data.

Data Validation. A complete (100 percent) Level III data validation effort was performed on the reported analytical data. Appendix F consists of a data validation summary report that was

prepared to discuss the results of the validation. Selected results were rejected or otherwise qualified based on the implementation of accepted data validation procedures and practices during the validation effort. 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 the comparison to the SSSLs and ESVs developed by IT. Rejected data (assigned an "R" qualifier) were not used in the comparison 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 Former Printing Plant, Building 144, Parcel 171(7) provided soil, bedrock, and groundwater data. These data were 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 based on fossil data.

The Jacksonville Thrust Fault is the most significant structural geologic feature near 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 underlying the Former Printing Plant, Building 144, Parcel 171(7) are mapped as Montevallo (MtD3) (U.S. Department of Agriculture, 1961). Montevallo soils are severely eroded, shaly silty clay soils. These soils are formed in the residuum of interbedded shale and fine-grained sandstone or limestone.

Bedrock beneath the Former Printing Plant, Building 144, Parcel 171(7) is mapped as the Ordovician/Mississippian Athens Shale, and Floyd Shale, undifferentiated. These units occur within the eroded “window” in the uppermost structural thrust sheet at FTMC and underlie much of the developed area of the Main Post.

Three borings were installed at the Former Printing Plant, Building 144, Parcel 171(7) to collect lithogic data and characterize the underlying geology. Total depth of the borings ranged from 40 to 46 feet bgs across the site. Based on this information, a thin zone of sand and gravel is present from ground surface to an average depth of 1.5 feet bgs and overlies predominately clay and silt deposits. Underlying the clay and silt, weathered black to gray, dry shale was encountered at an average depth of 35 feet bgs.

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. 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 Former Printing Plant, Building 144, Parcel 171(7) follows the site topography and generally flows to the east-northeast. A storm drainage line is located approximately 25 feet from the northwestern side of the Former Printing Plant, Building 144 and also flows to the east-northeast.

4.2.2 Hydrogeology

During boring and well installation activities, groundwater was encountered in the weathered shale.

Static groundwater levels were measured on April 22,1999. Table 3-4 summarizes measured groundwater elevations. Groundwater elevations were calculated by measuring the depth to groundwater relative to the surveyed top-of-casing elevations. A groundwater elevation map constructed from data from April 22, 1999 is shown on Figure 4-1. Based on the April groundwater levels, horizontal groundwater flow is to the northeast, following the general slope of the surface topography, with a gradient of approximately 0.10 feet per foot. Static groundwater levels summarized in Table 3-4 are at shallower depths than depth to water data from the drilling logs (Appendix B).

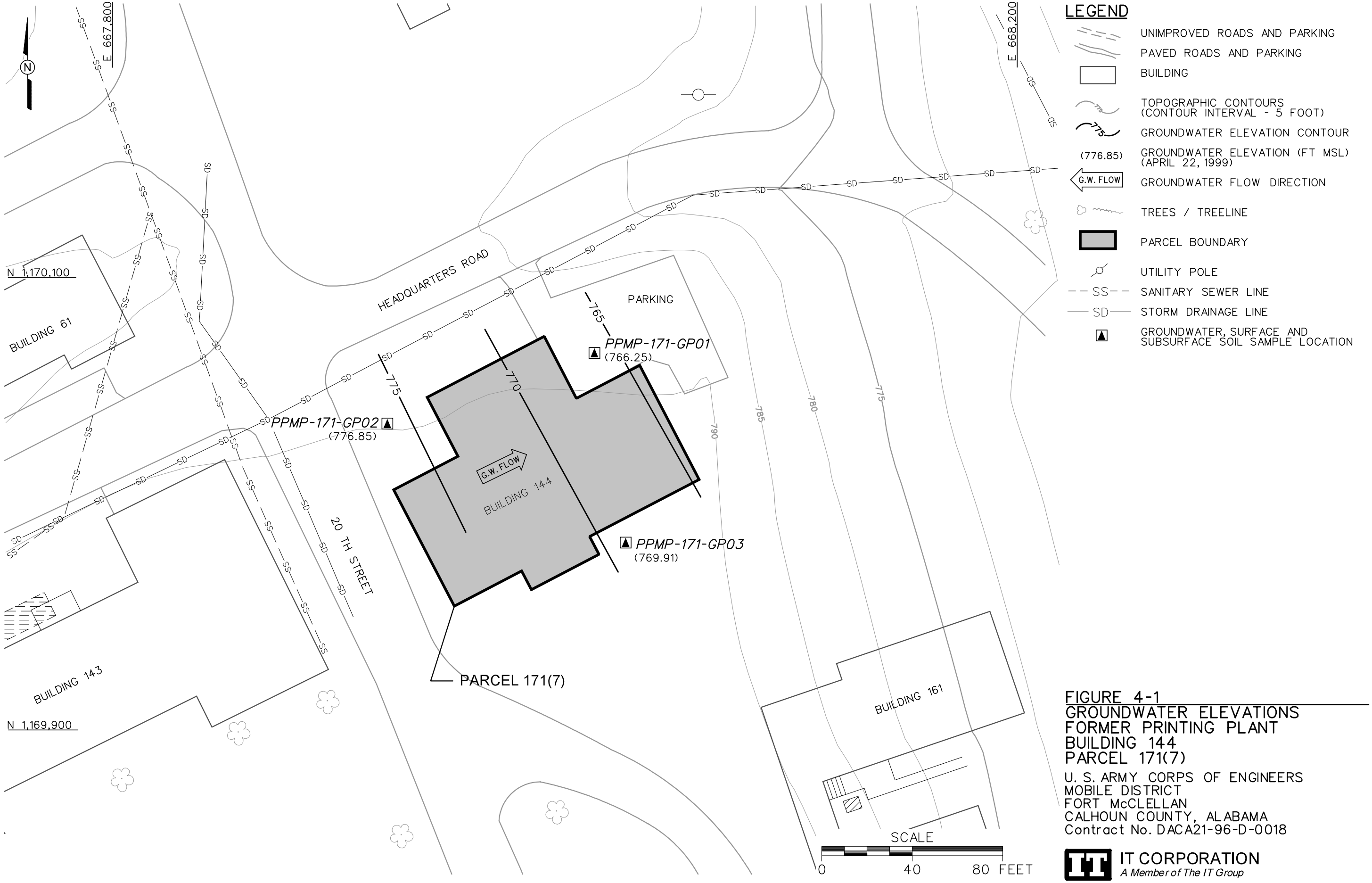

FIGURE 4-1
GROUNDWATER ELEVATIONS
FORMER PRINTING PLANT
BUILDING 144
PARCEL 171(7)

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

DRAFT. CHCK. BY:
ENGR. CHCK. BY: J.JENKINS
INITIATOR:D. HILL
PROJ. MGR.: J.YACOUB
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5.0 Summary of Analytical Results

The results of chemical analyses of samples collected at the Former Printing Plant, Building 144, Parcel 171(7) indicate that metals, VOCs, and SVOCs have been detected in the various site media. To evaluate whether the detected constituents present an unacceptable risk to human health and the environment, detected constituent concentrations were compared to the 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 results exceeding the SSSLs and ESVs were subsequently compared to metals screening values (background concentrations) (SAIC, 1998) in Appendix G to determine if the metals concentrations are below natural background concentrations. Additionally, SVOC concentrations in surface and subsurface soils that exceeded the SSSLs and ESVs were compared to PAH background screening values, where available. The PAH background screening values were derived from PAH analytical data from 18 parcels at FTMC that were determined to represent anthropogenic activity (IT, 2000b). PAH background screening values were developed for 2 categories of surface soils: beneath asphalt and adjacent to asphalt. The PAH background screening values for soils adjacent to asphalt are more conservative PAH background values (i.e., lower) and are the values used herein for comparison.

Six compounds were quantified by both SW-846 Method 8260B (VOCs) and Method 8270C (SVOCs), including 1,2,4-trichlorobenzene, 1,4-dichlorobenzene, 1,3-dichlorobenzene, 1,2-dichlorobenzene, hexachlorobutadiene, and naphthalene. Method 8260B yields a reporting limit (RL) of 0.005 milligrams per kilogram (mg/kg), while Method 8270C has a RL 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 RL, 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 Sample Results

Three surface soil samples were collected for chemical analyses at the Former Printing Plant, Building 144, Parcel 171(7). Surface soil samples were collected from the upper 1 foot of soil at the locations shown on Figure 3-1. Analytical results were compared to residential human health SSSLs, ESVs, and background concentrations, as presented in Table 5-1.

Metals. Twenty metals were detected in surface soil samples collected at the Former Printing Plant, Building 144, Parcel 171(7). With the exception of thallium, the detected metals were present in each of the samples.

The concentrations of arsenic at all three sample locations exceeded the SSSL but were less than the background metals screening level. Aluminum (PPMP-171-GP03), iron (all three locations), and manganese (PPMP-171-GP02, PPMP-171-GP03) concentrations exceeded the SSSLs and ESVs but the concentrations were less than the metals background screening levels. Several metals concentrations exceeded their ESVs including aluminum (PPMP-171-GP01, PPMP-171-GP02), manganese (PPMP-171-GP01), chromium (all three locations), and vanadium (all three locations); however, none of these exceeded their background value. Five metals: lead (PPMP-171-GP02, PPMP-171-GP03), copper (PPMP-171-GP03), mercury (PPMP-171-GP03), selenium (PPMP-171-GP03), and zinc (PPMP-171-GP03) exceeded both ESVs and background screening values; however, the concentrations were within the range of the background values reported by SAIC (Appendix G).

Volatile Organic Compounds. Acetone, bromomethane, and methylene chloride were detected in surface soil samples collected at the Former Printing Plant, Building 144, Parcel 171(7). Every detected VOC was present in each sample, however, the analytical results were flagged with a "B" data qualifier signifying that these compounds were also detected in an associated laboratory or field blank sample. None of the detected VOCs were present at concentrations exceeding residential human health SSSLs or ESVs.

Semivolatile Organic Compounds. Twelve SVOCs (eleven PAH compounds and carbazole) were detected in surface soil samples collected at the Former Printing Plant, Building

Table 5-1

Surface Soil Analytical Results
Former Printing Plant, Building 144, Parcel 171(7)
Fort McClellan, Calhoun County, Alabama

					Parcel:															
					Sample Location:	PPMP-171 PPMP-171-GP01					PPMP-171 PPMP-171-GP02					PPMP-171 PPMP-171-GP03				
					Sample Number:	KD0001					KD0003					KD0005				
					Sample Date:	19-Jan-99					19-Jan-99					19-Jan-99				
					Sample Depth (Feet):	0- 1					0- 1					0- 1				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**Qual**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**Qual**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**Qual**	**>BKG**	**>SSSL**	**>ESV**
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	5.92E+03				YES	7.07E+03				YES	7.89E+03			YES	YES
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	3.50E+00			YES		4.30E+00			YES		8.10E+00			YES	
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	8.31E+01					7.11E+01					1.43E+02		YES		
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	8.20E-01		YES			5.40E-01	J				4.50E-01	J			
Calcium	mg/kg	1.72E+03	NA	NA	3.33E+04		YES			6.90E+02					1.74E+03		YES		
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	1.82E+01	J			YES	6.60E+00	J			YES	1.83E+01	J			YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	1.60E+00	J				3.80E+00	J				4.00E+00	J			
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	5.70E+00					2.77E+01		YES			8.95E+01		YES		YES
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	7.26E+03			YES	YES	9.00E+03			YES	YES	1.52E+04	J		YES	YES
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	2.07E+01					7.75E+01		YES		YES	9.22E+01		YES		YES
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	8.67E+03	J	YES			2.58E+02	J				2.96E+02	J			
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	2.01E+02	J			YES	1.28E+03	J		YES	YES	3.78E+02	J		YES	YES
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	4.60E-02					9.20E-02		YES			1.30E+00		YES		YES
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	5.50E+00					4.30E+00	J				4.80E+00				
Potassium	mg/kg	8.00E+02	NA	NA	6.06E+02					1.15E+02	J				1.93E+02	J			
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	6.00E-01		YES			5.90E-01		YES			9.20E-01		YES		YES
Sodium	mg/kg	6.34E+02	NA	NA	1.66E+02	B				5.40E+01	B				8.61E+01	B			
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00	4.90E-01	B				ND					ND				
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	1.76E+01				YES	1.57E+01				YES	2.27E+01				YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	1.68E+01					2.73E+01					8.62E+01		YES		YES
SEMIVOLATILE ORGANIC COMPOUNDS																			
Anthracene	mg/kg	9.35E-01	2.33E+03	1.00E-01	ND					ND					7.40E-02	J			
Benzo(a)anthracene	mg/kg	1.19E+00	8.51E-01	5.21E+00	ND					ND					3.20E-01	J			
Benzo(a)pyrene	mg/kg	1.42E+00	8.51E-02	1.00E-01	ND					ND					2.60E-01	J		YES	YES
Benzo(b)fluoranthene	mg/kg	1.66E+00	8.51E-01	5.98E+01	ND					4.30E-02	J				3.80E-01	J			
Benzo(ghi)perylene	mg/kg	9.55E-01	2.32E+02	1.19E+02	ND					ND					1.60E-01	J			
Benzo(k)fluoranthene	mg/kg	1.45E+00	8.51E+00	1.48E+02	ND					ND					1.30E-01	J			
Carbazole	mg/kg	NA	3.11E+01	NA	ND					ND					5.40E-02	J			
Chrysene	mg/kg	1.40E+00	8.61E+01	4.73E+00	ND					ND					3.10E-01	J			
Fluoranthene	mg/kg	2.03E+00	3.09E+02	1.00E-01	4.80E-02	J				5.40E-02	J				7.00E-01	J			YES
Indeno(1,2,3-cd)pyrene	mg/kg	9.37E-01	8.51E-01	1.09E+02	ND					ND					1.70E-01	J			
Phenanthrene	mg/kg	1.08E+00	2.32E+03	1.00E-01	ND					ND					3.20E-01	J			YES
Pyrene	mg/kg	1.63E+00	2.33E+02	1.00E-01	4.40E-02	J				4.10E-02	J				5.20E-01	J			YES
VOLATILE ORGANIC COMPOUNDS																			
Acetone	mg/kg	NA	7.76E+02	2.50E+00	1.00E-02	B				8.60E-03	B				1.20E-02	B			
Bromomethane	mg/kg	NA	1.09E+01	NA	2.40E-03	B				2.40E-03	B				1.80E-03	B			
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00	3.40E-03	B				2.50E-03	B				2.60E-03	B			

Table 5-1

Surface Soil Analytical Results
Former Printing Plant, Building 144, Parcel 171(7)
Fort McClellan, Calhoun County, Alabama

Analyses performed by Quanterra Environmental Services 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. For SVOCs, value listed is the background screening criterion for soils adjacent to asphalt 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] Residential human health site-specific screening levels (SSSLs) and ecological screening values (ESVs) 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 - Result is greater than stated method detection limit but less than or equal to specified reporting limit.
mg/kg - Milligrams per kilogram.
NA - Not available.
ND - Not detected.
Qual - Data validation qualifier.

Table 5-2

Subsurface Soil Analytical Results
Former Printing Plant, Building 144, Parcel 171(7)
Fort McClellan, Calhoun County, Alabama

				Sample Location:	PPMP-171			PPMP-171				PPMP-171			
				Parcel:	PPMP-171-GP01			PPMP-171-GP02				PPMP-171-GP03			
				Sample Number:	KD0002			KD0004				KD0008			
				Sample Date:	19-Jan-99			19-Jan-99				19-Jan-99			
				Sample Depth (Feet):	6-9			6-9				9-11			
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**Result**	**Qual**	**>BKG**	**>SSSL**	**Result**	**Qual**	**>BKG**	**>SSSL**	**Result**	**Qual**	**>BKG**	**>SSSL**
METALS															
Aluminum	mg/kg	1.36E+04	7.80E+03	1.31E+04			YES	1.02E+04			YES	1.11E+04			YES
Arsenic	mg/kg	1.83E+01	4.26E-01	5.00E+00			YES	7.60E+00			YES	8.00E+00			YES
Barium	mg/kg	2.34E+02	5.47E+02	5.22E+01				2.70E+01				1.86E+01	J		
Beryllium	mg/kg	8.60E-01	9.60E+00	7.20E-01				8.30E-01				9.40E-01		YES	
Calcium	mg/kg	6.37E+02	NA	2.48E+04		YES		4.02E+02	J			8.99E+01	J		
Chromium	mg/kg	3.83E+01	2.32E+01	2.06E+01	J			2.19E+01	J			2.15E+01	J		
Cobalt	mg/kg	1.75E+01	4.68E+02	1.20E+00	J			2.00E+00	J			1.30E+00	J		
Copper	mg/kg	1.94E+01	3.13E+02	2.90E+01		YES		3.71E+01		YES		3.57E+01		YES	
Iron	mg/kg	4.48E+04	2.34E+03	3.25E+04			YES	4.18E+04			YES	4.22E+04			YES
Lead	mg/kg	3.85E+01	4.00E+02	2.33E+01				2.31E+01				2.09E+01			
Magnesium	mg/kg	7.66E+02	NA	5.64E+02	J			1.70E+02	J			7.05E+01	J		
Manganese	mg/kg	1.36E+03	3.63E+02	7.00E+01	J			1.09E+02	J			9.00E+00	J		
Mercury	mg/kg	7.00E-02	2.33E+00	2.10E-02	J			1.40E-02	J			1.70E-02	J		
Nickel	mg/kg	1.29E+01	1.54E+02	3.50E+00	J			1.19E+01				5.30E+00			
Potassium	mg/kg	7.11E+02	NA	6.45E+02				3.58E+02	J			4.30E+02	J		
Selenium	mg/kg	4.70E-01	3.91E+01	1.60E+00		YES		1.70E+00		YES		2.10E+00		YES	
Sodium	mg/kg	7.02E+02	NA	2.34E+02	J			9.90E+01	B			7.45E+01	B		
Thallium	mg/kg	1.40E+00	5.08E-01	5.80E-01	B		YES	ND				ND			
Vanadium	mg/kg	6.49E+01	5.31E+01	2.92E+01				3.47E+01				3.28E+01			
Zinc	mg/kg	3.49E+01	2.34E+03	3.16E+01				3.85E+01		YES		3.05E+01			
SEMIVOLATILE ORGANIC COMPOUNDS															
Fluoranthene	mg/kg	NA	3.09E+02	4.60E-02	J			4.70E-02	J			ND			
bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	6.10E-02	J			ND				ND			
VOLATILE ORGANIC COMPOUNDS															
Acetone	mg/kg	NA	7.76E+02	7.10E-03	B			7.50E-02	J			1.90E-02	B		
Bromomethane	mg/kg	NA	1.09E+01	2.10E-03	B			2.30E-03	B			2.40E-03	B		
Methylene chloride	mg/kg	NA	8.41E+01	2.70E-03	B			3.10E-03	B			3.20E-03	B		

Table 5-2

Subsurface Soil Analytical Results
Former Printing Plant, Building 144, Parcel 171(7)
Fort McClellan, Calhoun County, Alabama

Analyses performed by Quanterra Environmental Services 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 levels (SSSLs) and ecological screening values (ESVs) 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 - Result is greater than stated method detection limit but less than or equal to specified reporting limit.
mg/kg - Milligrams per kilogram.
NA - Not available.
ND - Not detected.
Qual - Data validation qualifier.

Table 5-3

Groundwater Analytical Results
Former Printing Plant, Building 144, Parcel 171(7)
Fort McClellan, Calhoun County, Alabama

				Parcel:	PPMP-171			PPMP-171				PPMP-171			
				Sample Location:	PPMP-171-GP01			PPMP-171-GP02				PPMP-171-GP03			
				Sample Number:	KD3001			KD3002				KD3003			
				Sample Date:	18-Feb-99			17-Feb-99				18-Feb-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	1.63E+00	J		YES	2.01E+00	J		YES	6.32E-02	B		
Barium	mg/L	1.27E-01	1.10E-01	6.51E-02	J			6.43E-02	J			4.61E-02	J		
Calcium	mg/L	5.65E+01	NA	1.93E+00	J			2.93E+00	J			1.54E+00	J		
Cobalt	mg/L	2.34E-02	9.39E-02	1.07E-02	J			6.70E-03	J			7.30E-03	J		
Iron	mg/L	7.04E+00	4.69E-01	1.72E+00	J		YES	2.48E+00	J		YES	3.84E-01	J		
Magnesium	mg/L	2.13E+01	NA	3.49E+00	J			4.23E+00	J			3.96E+00	J		
Manganese	mg/L	5.81E-01	7.35E-02	9.16E-02			YES	1.49E-01			YES	5.93E-02			
Nickel	mg/L	NA	3.13E-02	2.02E-02	J			1.98E-02	J			2.00E-02	J		
Potassium	mg/L	7.20E+00	NA	8.24E-01	J			8.84E-01	J			ND			
Sodium	mg/L	1.48E+01	NA	7.01E+00				9.15E+00				5.07E+00			
Zinc	mg/L	2.20E-01	4.69E-01	4.84E-02				2.56E-02				2.76E-02			
VOLATILE ORGANIC COMPOUNDS															
Chlorobenzene	mg/L	NA	1.62E-02	8.00E-04	J			ND				ND			

Analyses performed by Quanterra Environmental Services 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 levels (SSSLs) 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 - Result is greater than stated method detection limit but less than or equal to specified reporting limit.

NA - Not available.

mg/L - Milligrams per liter.

ND - Not detected.

Qual - Data validation qualifier.

144, Parcel 171(7). The surface soil collected from sample location PPMP-171-GP03 contained all of the detected SVOCs. None of the other sample locations contained more than three of the detected SVOCs. The SVOC analytical results were flagged with a "J" data qualifier signifying that the result is greater than the method detection limit but less than the specified RL.

The benzo(a)pyrene concentration at sample location PPMP-171-GP03 exceeded both residential human health SSSLs and ESVs. However, the benzo(a)pyrene concentration was less than the PAH background screening value and it was not detected in any of the other surface soil samples. Fluoranthene, phenanthrene, and pyrene concentrations at sample location PPMP-171-GP03 exceeded ESVs but were below PAH background screening values.

5.2 Subsurface Soil Sample Results

Three subsurface soil samples were collected for chemical analyses at the Former Printing Plant, Building 144, Parcel 171(7). Subsurface soil samples were collected at depths greater than 1 foot bgs at the locations shown on Figure 3-1. Analytical results were compared to residential human health SSSLs and background concentrations, as presented in Table 5-2.

Metals. Twenty metals were detected in subsurface soil samples collected at the Former Printing Plant, Building 144, Parcel 171(7). With the exception of thallium, the detected metals were present in each of the samples. The concentrations of four metals (aluminum, arsenic, iron, and thallium) exceeded residential human health SSSLs but were less than background screening values.

Volatile Organic Compounds. Acetone, bromomethane, and methylene chloride were detected in subsurface soil samples collected at the Former Printing Plant, Building 144, Parcel 171(7). Every detected VOC was present in each sample. The bromomethane and methylene chloride analytical results were flagged with a "B" data qualifier signifying that these compounds were also detected in an associated laboratory or field blank sample. None of the detected VOCs were present at concentrations exceeding residential human health SSSLs.

Semivolatile Organic Compounds. Fluoranthene and bis(2-ethylhexyl)phthalate were detected in two of the subsurface soil samples collected at the Former Printing Plant, Building 144, Parcel 171(7). Sample location PPMP-171-GP01 contained both of the detected SVOCs. None of the detected SVOCs was present at concentrations exceeding residential human health SSSLs.

5.3 Groundwater Sample Results

Three monitoring wells were sampled at the Former Printing Plant, Building 144, Parcel 171(7) at the sample locations shown on Figure 3-1. Analytical results were compared to residential human health SSSLs and background concentrations, as presented in Table 5-3.

Metals. Eleven metals, including aluminum, barium, calcium, cobalt, iron, magnesium, manganese, nickel, potassium, sodium, and zinc, were detected in groundwater samples collected at the Former Printing Plant, Building 144, Parcel 171(7). With the exception of potassium, the detected metals were present in each of the samples. Aluminum, iron, and manganese concentrations at two sample locations (PPMP-171-GP01 and PPMP-171-GP02) exceeded residential human health SSSLs but were within background concentrations.

Volatile Organic Compounds. Chlorobenzene was detected at sample location PPMP-171-GP01. VOCs were not detected at the other groundwater sample locations. The chlorobenzene concentration was below the residential human health SSSL.

Semivolatile Organic Compounds. SVOCs were not detected in any of the groundwater samples.

6.0 Summary and Conclusions and Recommendations

IT, under contract with USACE, completed an SI at the Former Printing Plant, Building 144, Parcel 171(7) at FTMC, Calhoun County, Alabama. The SI was conducted to determine whether chemical constituents are present at the Former Printing Plant, Building 144, Parcel 171(7) and, if present, whether the concentrations would present an unacceptable risk to human health or the environment. The SI at the Former Printing Plant, Building 144, Parcel 171(7) consisted of the sampling and analyses of three surface soil samples, three subsurface soil samples, and three groundwater samples. In addition, three monitoring wells were installed in the residuum groundwater zone to facilitate groundwater sample collection and to provide site-specific geological and hydrogeological characterization information.

The analytical results indicate that metals, VOCs, and SVOCs were detected in the environmental media sampled. Analytical results were compared to the 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. Additionally, metals results exceeding the SSSLs and ESVs were compared to media-specific background concentrations (SAIC, 1998). SVOC concentrations exceeding the SSSLs and ESVs in surface soil samples were compared to PAH background screening values where available (IT, 2000b). The findings are summarized as follows:

- Arsenic concentrations at all three sample locations exceeded the SSSL but were less than the background metals screening level. Aluminum, iron, and manganese concentrations exceeded the SSSLs and ESVs, but were less than metals background screening levels. Aluminum, manganese, chromium, and vanadium exceeded their ESVs; however, none of these exceeded their background screening value. Five metals (lead, copper, mercury, selenium, and zinc) exceeded both ESVs and background screening values; however, the concentrations were within the range of background values. The PAH benzo(a)pyrene was detected at one surface soil sample location (PPMP-171-GP03) at a concentration (0.26 mg/kg), exceeding residential human health SSSLs and ESVs, but the concentration was less than the PAH background screening concentration (1.42 mg/kg). Three other PAHs (fluoranthene, phenanthrene, and pyrene) were also detected at sample location PPMP-171-GP03 at concentrations exceeding ESVs but below residential human health SSSLs and PAH background screening levels.

- Aluminum, arsenic, iron, and thallium were detected in subsurface soil samples at concentrations exceeding residential human health SSSLs but below background concentrations. VOCs and SVOCs were not detected in subsurface soil samples at concentrations exceeding residential human health SSSLs.

- Aluminum, iron, and manganese were detected at two groundwater sample locations at concentrations exceeding residential human health SSSLs but below background concentrations. VOCs and SVOCs were not detected in groundwater samples at concentrations exceeding residential human health SSSLs.

The potential impact to human receptors is expected to be minimal. The metals that exceeded residential human health SSSLs were below the background concentrations, and thus, do not pose an unacceptable risk to future human receptors. The concentration of the PAH benzo(a)pyrene exceeded the residential human health SSSL at one sample location, but was less than the background screening level. Benzo(a)pyrene was not detected in any of the other samples collected at the Former Printing Plant, Building 144, Parcel 171(7). Given the extremely limited impacted area, benzo(a)pyrene is not expected to pose an unacceptable risk to human health in the residential land-use scenario.

Although several metals and four SVOCs were detected in site media at concentrations exceeding ESVs, the potential impact to ecological receptors is expected to be minimal. This conclusion is based on the limited area of contamination and the future residential land use of the Former Printing Plant, Building 144 (based on the *Fort McClellan Comprehensive Reuse Plan* [FTMC, 1997]). Under this land-use scenario, substantial ecological habitat is not expected to be present and is expected to be minimally impacted.

Based on the results of the SI, past operations at the Former Printing Plant, Building 144, Parcel 171(7) do not appear to have adversely impacted the environment. Furthermore, the metals and organic compounds detected in site media do not pose an unacceptable risk to human health or the environment in the residential land-use scenario. Therefore, IT recommends "No Further Action" with unrestricted reuse with regards to hazardous, toxic, and radiological waste at the Former Printing Plant, Building 144, Parcel 171(7).

7.0 References

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ATTACHMENT 1

LIST OF ABBREVIATIONS AND ACRONYMS

List of Abbreviations and Acronyms

Abs	skin absorption
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
AEL	airborne exposure limit
AL	Alabama
amb.	Amber
ANAD	Anniston Army Depot
APT	armor piercing tracer
ASP	Ammunition Supply Point
ASR	Archives Search Report, July 1999
AST	aboveground storage tank
ASTM	American Society for Testing and Materials
B	analyte detected in laboratory or field blank at concentration greater than the reporting limit (and greater than zero)
BCT	BRAC Cleanup Team
BFB	bromofluorobenzene
bgs	below ground surface
bkg	background
bls	below land surface
BOD	biological oxygen demand
BRAC	Base Realignment and Closure
Braun	Braun Intertec Corporation
BTEX	benzene, toluene, ethylbenzene, and xylenes
BTOC	below top of casing
BZ	breathing zone
C	ceiling limit value
Ca	carcinogen
CCAL	continuing calibration
CCB	continuing calibration blank
CD	compact disc
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERFA	Community Environmental Response Facilitation Act
CESAS	Corps of Engineers South Atlantic Savannah
CFC	chlorofluorocarbon
CG	cyanogen chloride
ch	inorganic clays of high plasticity
CK	carbonyl 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
COC	chain of custody
COE	Corps of Engineers
Con	skin or eye contact
CRL	certified reporting limit
CRZ	contamination reduction zone
CS	ortho-chlorobenzylidene-malononitrile
CSEM	conceptual site exposure model
ctr.	container
CWA	chemical warfare agent
CWM	chemical warfare materials, clear wide mouth
CX	dichloroformoxime
D	duplicate
DANC	decontamination agent, non-corrosive
ºC	degrees Celsius
ºF	degrees Fahrenheit
DDT	dichlorodiphenyltrichloroethane
DEP	depositional soil
DI	deionized
DIMP	di-isopropylmethylphosphonate
DMMP	dimethylmethylphosphonate
DOD	U.S. Department of Defense
DP	direct-push
DPDO	Defense Property Disposal Office
DQO	data quality objective
DRMO	Defense Reutilization and Marketing Office
DS	deep (subsurface) soil
DS2	Decontamination Solution Number 2
E&E	Ecology and Environment, Inc.
EBS	environmental baseline survey
Elev.	elevation
EM	electromagnetic
EM31	Geonics Limited EM31 Terrain Conductivity Meter
EM61	Geonics Limited EM61 High-Resolution Metal Detector
EOD	explosive and ordnance disposal
EODT	explosive and 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.
ESV	ecological screening value
E-W	east to west
EZ	exclusion zone
FB	field blank
FD	field duplicate
FedEx	Federal Express, Inc.
FFE	field flame expedient
Fil	filtered
Flt	filtered
FMP 1300	Former Motor Pool 1300 Site
Frtn	fraction
FS	field split
ft	feet
ft/ft	feet per foot
FTA	fire training area
FTMC	Fort McClellan
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
GFAA	graphite furnace atomic absorption
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
GSBP	Ground Scar Boiler Plant
GSSI	Geophysical Survey Systems, Inc.
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
ICS	interference check sample
ID	inside diameter
IDL	instrument detection limit
IDLH	immediately dangerous to life or health
IDW	investigation-derived waste
IMPA	isopropylmethyl phosphonic acid
in.	inch
Ing	ingestion

List of Abbreviations and Acronyms (Continued)

Inh	inhalation
IP	ionization potential
IPS	International Pipe Standard
IRDMIS	Installation Restoration Data Management Information System
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
K	conductivity
L	lewisite; liter
LC_{50}	lethal concentration for 50 percent of population tested
LD_{50}	lethal dose for 50 percent of population tested
l	liter
LCS	laboratory control sample
LEL	lower explosive limit
LT	less than the certified reporting limit
max	maximum
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 centimer
min	minimum
MINICAMS	miniature continuous air sampling system
ml	inorganic silts and very fine sands
mL	milliliter
mm	millimeter
MOGAS	motor vehicle gasoline
MPA	methyl phosphonic acid
MR	molasses residue
MS	matrix spike
mS/cm	milliSiemens per centimeter
MSD	matrix spike duplicate
msl	mean sea level
MtD3	Montevallo shaly, silty clay loam, 10 to 40 percent slopes , severely eroded
mV	millivolts
MW	monitoring well
N/A	not applicable; not available
NAD	North American Datum
NAD83	North American Datum of 1983
NAVD88	North American Vertical Datum of 1988
ND	not detected
NE	no evidence
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
No.	number
NOAA	National Oceanic and Atmospheric Administration
NR	not requested
ns	nanosecond
N-S	north to south
nT	nanotesla
NTU	nephelometric turbidity unit
O&G	oil and grease
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
OSHA	Occupational Safety and Health Administration
OWS	oil/water separator
oz	ounce
PAH	polynuclear aromatic hydrocarbon
Pb	lead
PCB	polychlorinated biphenyl
PCE	perchlorethene
PDS	Personnel Decontamination Station
PEL	permissible exposure limit
Pest.	pesticide
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
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
RCRA	Resource Conservation and Recovery Act
ReB3	Rarden silty clay loams
REG	field sample
REL	recommended exposure limit
RFA	request for analysis
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
SEMS	Southern Environmental Management & Specialties
SFSP	site-specific field sampling plan
SGF	standard grade fuels
SHP	installation-wide safety and health plan
SI	site investigation
sm	silty sands; sand-silt mixtures
SOP	standard operating procedure
sp	poorly graded sands; gravelly sands
SP	sump pump
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
SSSL	site-specific screening level
STB	supertropical bleach
STEL	short-term exposure limit
STOLS	Surface Towed Ordnance Locator System®
Std. units	standard units
SU	standard unit
SVOC	semivolatile organic compound
SW	surface water
SW-846	U.S. EPA *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods*
SZ	support zone
TAL	target analyte list

TAT	turn around time
TB	trip blank
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 compounds
TLV	threshold limit value
TN	Tennessee
TOC	top of casing, total organic carbon
TPH	total petroleum hydrocarbons
TRADOC	U.S. Army Training and Doctrine Command
TRPH	total recoverable petroleum hydrocarbons
TWA	time weighted average
UCL	upper confidence limit
UCR	upper certified range
UJ	not detected above reporting limit; result should be estimated
USACE	U.S. Army Corps of Engineers
USAEC	U.S. Army Environmental Center
USAEHA	U.S. Army Environmental Hygiene Agency
USAMCLS	U.S. Army Chemical School
USATEU	U.S. Army Technical Escort Unit
USATHAMA	U.S. Army Toxic and Hazardous Material Agency
USCS	Unified Soil Classification System
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
UST	underground storage tank
UXO	unexploded ordnance
VOA	volatile organic analyte
VOC	volatile organic compound
VOH	volatile organic hydrocarbon
VQlfr	validation qualifier
VQual	validated qualifier
VX	nerve agent (O-ethyl-S- [diisoproplaminoethyl]-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

APPENDIX A

SAMPLE COLLECTION LOGS

APPENDIX B

BORING LOGS AND WELL LOGS

APPENDIX C

WELL DEVELOPMENT LOGS

APPENDIX D

SURVEY DATA

APPENDIX E

SUMMARY OF VALIDATED ANALYTICAL DATA

APPENDIX F

DATA VALIDATION SUMMARY REPORT

APPENDIX G

SUMMARY STATISTICS FOR BACKGROUND MEDIA, FORT MCCLELLAN, ALABAMA