# Final

# Site Investigation Report
# Former Printing Plant, Building 143 Basement, Parcel 138(7) and the UST at the Administration Building, Building 143, Parcel 37(7)

## Fort McClellan
## Calhoun County, Alabama

**Prepared for:**

**U.S. Army Corps of Engineers, Mobile District**
**109 St. Joseph Street**
**Mobile, Alabama 36602**

**Prepared by:**

**IT Corporation**
**312 Directors Drive**
**Knoxville, Tennessee 37923**

**Task Order CK05 and CK08**
**Contract No. DACA21-96-D-0018**
**IT Project No. 774645**

**October 2000**

**Revision 0**

# Table of Contents

**Page**

## *Table of Contents* *(Continued)*

**Page**

## *List of Appendices*

## List of Tables



## List of Figures

## *List of Acronyms*

See Attachment 1 – List of Abbreviations and Acronyms

# *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 143 Basement, Parcel 138(7) and the underground storage tank (UST) closure assessment for the UST at the Administrative Building, Building 143, Parcel 37(7). Hereafter these investigations will be referred to as the Former Printing Plant, Building 143, at Fort McClellan, Calhoun County, Alabama. These investigations were conducted to determine whether chemical constituents are present at the Former Printing Plant, Building 143 and, if present, whether the concentrations would present an unacceptable risk to human health or the environment. Investigation activities at the Former Printing Plant, Building 143 consisted of the sampling and analyses of four surface soil samples, seven subsurface soil samples, and two groundwater samples. In addition, one permanent well was 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 the 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 to determine if the metals detected in site media are within natural background concentrations. SVOC concentrations exceeding SSSLs and ESVs in surface and depositional soil samples were compared to PAH background screening values where available.

The potential impact to human receptors is expected to be minimal. With the exception of chromium and iron in one subsurface soil sample, the metals concentrations that exceeded residential human health SSSLs were within background concentrations for all other samples and thus, do not pose an unacceptable risk to future human receptors. The concentration of benzo(a)pyrene exceeded the residential human health SSSL and was below the polynuclear aromatic hydrocarbon background level at two surface soil sample locations. However, benzo(a)pyrene is a constituent of both asphalt and heating oil (which was used at the Former

Printing Plant, Building 143). The compound was not detected in any of the collected subsurface samples, indicating that these sample locations may have been influenced by runoff from nearby asphalt. Given the limited impacted area, benzo(a)pyrene is not expected to pose an unacceptable risk to human health in the residential land-use scenario. The concentrations of 1,4-dichlorobenzene, a compound usually used as an insecticide, and 4-methylphenol, a compound usually used in manufacturing and metal parts cleaning, exceeded residential human health SSSLs in one of the two groundwater samples. The groundwater sampled from the well likely represents surface water runoff that accumulated in backfill material from a removed UST. While it is possible that 1,4-dichlorobenzene and 4-methylphenol could have been used at Building 143, it was not detected in any surface or subsurface soil samples. Because the sampled well will not serve as a potable water source, the potential for human exposure is expected to be extremely low.

Several metals and four SVOCs were detected in site media at concentrations exceeding ESVs; however, the potential impact to ecological receptors is expected to be minimal. This is based on the limited impacted area and the future land use of the Former Printing Plant, Building 143, which is expected to be residential according to the 1997 *Fort McCellan Comprehensive Reuse Plan*. Under this land-use scenario, substantial ecological habitat is not expected to be present and, consequently, is expected to be minimally impacted.

Based on the results of the SI, past operations at the Former Printing Plant, Building 143 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 and the environment in the residential land-use scenario. Therefore, IT recommends "No Further Action" and unrestricted reuse with regards to hazardous, toxic, and radiological waste at the Former Printing Plant, Building 143.

# 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 IT Corporation (IT) to provide environmental services for the site investigation (SI) of the Former Printing Plant, Building 143 Basement, Parcel 138(7), under Contract Number DACA21-96-D-0018, Task Order CK05. The USACE also contracted IT to provide environmental services for an underground storage tank (UST) closure assessment at the Administrative Building, Building 143, Parcel 37(7), under Contract Number DACA21-96-D-0018, Task Order CK08.

This SI report has been prepared to present specific information and results compiled from the SI and UST closure assessment, including field sampling and analysis and monitoring well installation activities conducted at the Former Printing Plant, Building 143 Basement, Parcel 138(7) and the UST at the Administrative Building, Building 143, Parcel 37(7), hereafter referred to as Former Printing Plant, Building 143.

## 1.1 Project Description

The Former Printing Plant, Building 143, was identified as an area to be investigated prior to property transfer. The Former Printing Plant, Building 143, 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.

A site-specific field sampling plan (SFSP) attachment and a site-specific safety and health plan (SSHP) attachment was finalized in October 1998 for Parcel 138(7) (IT, 1998a) and in September 1999 (IT, 1999) for Parcel 37(7). The SFSPs and SSHPs were prepared to provide technical guidance for sample collection and analysis at the Former Printing Plant, Building 143. The SFSPs were used in conjunction with the SSHPs 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 (SHP) and quality assurance plan (QAP).

The investigation activities included fieldwork to collect four surface soil samples, seven subsurface soil samples, and two groundwater samples. Data from the investigation were used to determine whether potential site-specific chemicals are present at the Former Printing Plant, Building 143, 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 143, 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.

The UST closure assessment at Parcel 37(7) was designed to collect data from soil and groundwater samples to determine if past UST operations have impacted soil and groundwater. Additional sampling and analysis have been completed so a closure report can be performed and the property transferred as part of the Former Printing Plant, Building 143, SI.

### *1.3 Site Description and History*

The Former Printing Plant, Building 143 Basement, is located in the central part of the Main Post

(Figure 1-1). Printing operations began at an unknown time and ended in 1969. No evidence remains of printing operations at this location (ESE, 1998). There are no sinks and/or floor drains in the basement. Potential printing materials used at the facility may have included petroleum hydrocarbons, printing fluids, solvents (including tetrachloroethene and petroleum naphtha), metals, and inks. The study area in and around Building 143 covers approximately 1 acre. 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.

A vaulted 4,000-gallon heating oil UST, Parcel 37(7), abutts Building 143 (Figure 1-2). The UST was installed in 1996 to replace a UST which was removed at that time (IT, 1998c). According to the closure report prepared by Theta Technologies, Inc., product odor was not detected within the excavation and the removed tank appeared to be in good condition (IT, 1999). The depth to groundwater was estimated to be greater than 5 feet below the bottom of the tank when the tank excavation pit was extended an additional 5 feet in an attempt to verify depth to groundwater. Soil samples were collected and screened for organic vapors; no evidence of contamination was observed. Groundwater samples were not collected. The excavated soil was returned to the open tank hold upon completion of the tank removal. Presently, two shallow wells are located adjacent to the UST. The purpose of the wells is unknown but may be for leak detection monitoring. Well construction details for the two wells are not available and records for the two wells were not found at FTMC. Inspection of the wells during field investigations indicated that both wells have screens within 1 to 3.5 feet below ground surface (bgs).

Site elevation is approximately 790 to 795 feet above sea level as established by the National Geodetic Vertical Datum. The South Branch of Cane Creek is located at least 600 feet to the northeast of the site, while Remount Creek is located at least 1,250 feet west of the site. There are numerous subsurface structures, such as sanitary or storm sewers, adjacent to Building 143. Figure 1-2 is a site map showing subsurface features, topographic features, and site boundaries.

The soil type at the Former Printing Plant, Building 143 Basement, 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. 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).

site was identified as a CERFA site, where hazardous substances were possibly stored, released, or disposed of and/or the migration of hazardous substances is suspected, but the site is either not evaluated or requires additional evaluation to determine the environmental condition of the site. Printing operations in the Building 143 Basement began at an unknown date and ended in 1969. Presently, there is not any evidence of printing operations at this location. Currently, the site has unrestricted access.

A former heating oil UST adjacent to Administration Building, Building 143, Parcel 37(7), was removed and replaced in 1996 (IT, 1999). Soil samples were field screened during replacement and evidence of soil contamination was not observed. Neither soil nor groundwater samples were collected for analyses. Surface soil, subsurface soil, and groundwater are the media of potential concern.

These CERFA parcels are classified as a Category 7 sites because various types of materials, equipment, vehicles, hazardous materials, and hazardous wastes have been stored, and some of these materials may possibly have been released onto the site or to the environment, and/or were disposed on site property. The Former Printing Plant, Building 143 Basement and the UST at the Administration Building, Building 143, lack adequate documentation and, therefore, require additional evaluation to determine the environmental condition of the parcels.

# 3.0 Current Site Investigation Activities

## 3.1 Environmental Sampling

The environmental sampling performed during the investigations at the Former Printing Plant, Building 143 Basement, 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 walkover, and by reviewing historical documents pertaining to activities conducted at the site. The sample locations, media, and rationale are summarized in Table 3-1. Sampling locations are shown on Figure 3-1. Samples were submitted for laboratory analyses of site-related parameters listed in Section 3.3. Sample collection documentation and logs are included in Appendix A and Appendix B, respectively. The sample location survey coordinates are summarized in Appendix C.

### 3.1.1 Surface Soil Sampling

Surface soil samples were collected from four locations at the Former Printing Plant, Building 143 Basement. Soil sampling locations and rationale are presented in Table 3-1. Sampling locations are shown on Figure 3-1. Sample designations and quality assurance/quality control (QA/QC) samples 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, site topography, and buried and overhead utilities.

***Sample Collection.*** Surface soil samples were collected from the upper 1 foot of soil by either direct-push technology or 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.

## Table 3-1

## Sampling Locations and Rationale
## Former Printing Plant, Building 143
## Fort McClellan, Calhoun County, Alabama

| Sample Designation | Media Sampled | Sample Location Rationale |
|---|---|---|
| PPMP-138-GP01 | Surface soil<br>Subsurface soil | Surface soil and subsurface soil samples were collected near the southeast door of Building 143. Sample location represents an exit point (via foot traffic) for site-specific chemicals to be deposited onto surface or subsurface soil. |
| PPMP-138-GP02 | Surface soil<br>Subsurface soil | Surface soil and subsurface soil samples were collected near the southwest corner of Building 143. Sample location represents an exit point (via foot traffic) for site-specific chemicals to be deposited onto surface or subsurface soil. |
| PPMP-138-GP03 | Surface soil<br>Subsurface soil | Surface soil and subsurface soil samples were collected near the northwest corner of Building 143. Sample location represents an exit point (via foot traffic) for site-specific chemicals to be deposited onto surface or subsurface soil. Sample location is near underground structures; foundations, tanks, water/sewer lines that may encourage infiltration or runoff into the subsurface soil. |
| PPMP-138-GP04 | Surface soil<br>Subsurface soil | Surface soil and subsurface soil samples were collected near the northeast corner of Building 143. Sample location represents an exit point (via foot traffic) for site-specific chemicals to be deposited onto surface or subsurface soil. Sample location is near probable underground structures; foundations, tanks, water/sewer lines that may encourage infiltration or runoff into the subsurface soil. |
| PPMP-138-MW01 | Groundwater | A groundwater sample was collected from an existing monitoring well located on the west side of the existing heating oil underground storage tank (UST). Based on the depth to water in PPMP-138-MW01 and the lack of groundwater encountered during boring activities in native material at Parcel 138, the groundwater elevation measured in PPMP-138-MW01 likely represents surface water present in the UST backfill material. A record of the previous designation of this well is not available. |
| UST-37-GP01 | Subsurface soil | Soil boring for subsurface soil sample was placed topographically downgradient of the 4,000 gallon heating oil UST. Sample data indicates if subsurface soil contamination exists from previous leaks or spills. |
| UST-37-GP02 | Subsurface soil | Soil boring for subsurface soil sample was placed topographically upgradient of the 4,000 gallon heating oil UST. Sample data indicates if subsurface soil contamination exists upgradient of UST as shown on Figure 3-1. |
| UST-37-MW01 | Subsurface soil<br>Groundwater | A groundwater sample was collected from a new permanent monitoring well located downgradient of the former and existing heating oil USTs. Sample data indicates if either subsurface soil or groundwater contamination exists from previous leaks or spills. The monitoring well data is used to provide information on the groundwater quality in the residuum aquifer. |

**Table 3-2**

**Surface and Subsurface Soil Sample Designations and QA/QC Sample Quantities**
**Former Printing Plant, Building 143**
**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-138-GP01 | PPMP-138-GP01-SS-KE0001-REG | 0- 1 | | | PPMP-138-GP01-SS-KE0001-MS | TCL VOCs, TCL SVOCs |
| | PPMP-138-GP01-DS-KE0002-REG | 6-8 | | | PPMP-138-GP01-SS-KE0001-MSD | TAL Metals |
| PPMP-138-GP02 | PPMP-138-GP02-SS-KE0003-REG | 0 - 1 | | | | TCL VOCs, TCL SVOCs |
| | PPMP-138-GP02-DS-KE0004-REG | 2-3 | | | | TAL Metals |
| PPMP-138-GP03 | PPMP-138-GP03-SS-KE0005-REG | 0 - 1 | | | | TCL VOCs, TCL SVOCs |
| | PPMP-138-GP03-DS-KE0006-REG | 9-12 | PPMP-138-GP03-DS-KE0007-FD | PPMP-138-GP03-DS-KE0008-FS | | TAL Metals |
| PPMP-138-GP04 | PPMP-138-GP04-SS-KE0009-REG | 0 - 1 | | | | TCL VOCs, TCL SVOCs |
| | PPMP-138-GP04-DS-KE0010-REG | 6-9 | | | | TAL Metals |
| UST-37-MW01 | UST-37-MW01-DS-CJ0027-REG | 9-10 | | | | BTEX, PAH, and Pb |
| UST-37-GP01 | UST-37-GP01-DS-CJ0028-REG | 10-12 | | | | BTEX, PAH, and Pb |
| UST-37-GP02 | UST-37-GP02-DS-CJ0029-REG | 10-12 | | | | BTEX, PAH, and Pb |

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
BTEX - Benzene, toluene, ethyl benzene, and total xylenes
PAH - Polynuclear aromatic hydrocarbons
Pb - lead

### 3.1.2 Subsurface Soil Sampling

Subsurface soil samples were collected from seven soil boring locations, shown on Figure 3-1, at the Former Printing Plant, Building 143 Basement. 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 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 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 for volatile organic vapors. The sample displaying the highest reading was selected and sent to the laboratory for analysis; however, at those locations where PID readings were not greater than background, the deepest sample interval above the saturated zone 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 constructed a detailed boring log for each soil boring. The lithological log for each borehole is included in Appendix B.

Unless the boring was used to install a monitoring well, the borehole was abandoned at the completion of soil sampling with hydrated bentonite chips. The borehole abandonment procedures summarized in Appendix B of the SAP (IT, 2000a) were used.

### 3.1.3 Well Installation

One permanent well was installed in the residuum groundwater zone at the Former Printing Plant, Building 143, in addition to the two existing wells to collect groundwater samples for laboratory analysis. The two existing wells are associated with Parcel 138(7) and for the purpose of the SI data management were designated PPMP-138-MW01 and PPMP-138-MW02. The

third well was installed during the UST closure assessment and is associated with Parcel 37(7). Its designation is UST-37-MW01. The well/groundwater sample locations are shown on Figure 3-1. Table 3-3 summarizes the known construction details of the wells installed at the Former Printing Plant, Building 143. A well construction log for UST-37-MW01 is included in Appendix B.

The well installation for UST-37-MW01 was accomplished in December 1999 by Miller Drilling with a hollow-stem auger rig following procedures outlined in Section 4.7 of the SAP (IT, 2000a). The borehole was advanced with a 4.25-inch inside diameter (ID) hollow-stem auger from ground surface to the first water-bearing zone in residuum at the well location. The borehole was augered to the depth of direct-push sampler refusal and soil 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 the borehole is included in Appendix B.

Upon reaching the target depth, a 10- or 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 permanent well surface completion included installing a concrete pad and metal access plate.

## Table 3-3

## Well Construction Summary
## Former Printing Plant, Building 143
## Fort McClellan, Calhoun County, Alabama

| Well | Northing | Easting | Ground Elevation (ft msl) | TOC Elevation (ft msl) | Well Depth (ft bgs) | Screen Length (ft) | Screen Interval (ft bgs) | Sump Interval (ft bgs) | Well Material |
|---|---|---|---|---|---|---|---|---|---|
| PPMP-138-MW01 | 1169951.58 | 667766.81 | 793.34 | 792.67 | 10.40 | NA | NA | NA | 4" ID PVC SCH 40 |
| PPMP-138-MW02 | 1169952.06 | 667784.81 | 793.38 | 792.49 | 6.25 | NA | NA | NA | 4" ID PVC SCH 40 |
| UST-37-MW01 | 1169969.117 | 667768.159 | 793.16 | 792.89 | 39 | 15 | 23 - 38 | 38 - 39 | 2" ID PVC SCH 40 |

Wells PPMP-138-MW01and PPMP-138-MW02 are existing wells associated with Parcel 138(7). No well installation documentation was found.
PPMP-138-MW02 did not contain enough groundwater to collect a sample.
Well UST-37-MW01 was installed with an auger drill rig using a 4.25-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 North American Vertical Datum of 1988 (NAV88).
TOC - top of casing
4" ID Sch. 40 PVC - 4-inch diameter, Schedule 40, polyvinyl chloride
2" ID Sch. 40 PVC - 2-inch diameter, Schedule 40, polyvinyl chloride
ft bgs - feet below ground surface
msl - mean sea level
NA - not available

Well UST-37-MW01 was 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 (NTU) or until a maximum of 4 hours. The well development logs are included in Appendix D.

### *3.1.4 Water Level Measurements*

The depth to groundwater was measured in the wells at the Former Printing Plant, Building 143, in March 2000 following procedures outlined in Section 4.18 of the SAP (IT, 2000a). Depth to groundwater was measured with an electronic water level meter in PPMP-138-MW01 and UST-37-MW01. Existing well PPMP138-MW-02 did not have a measurable column of water to gauge a water elevation. 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 polyvinyl chloride well casing. A summary of groundwater level measurements is presented in Table 3-4.

### *3.1.5 Groundwater Sampling*

A total of two groundwater samples were collected at the Former Printing Plant, Building 143, one sample from the existing well (PPMP-138-MW01) and one from the installed permanent well (UST-37-MW01). The other existing well, PPMP-138-MW02, did not contain enough groundwater to collect a representative sample. 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 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 including temperature, pH, specific conductivity, oxidation-reduction potential, and turbidity stabilized. Purging and sampling were performed with a submersible pump or a Geotech® Dual Head peristaltic pump equipped with 0.25-inch ID 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 Table 3-5 using the methods outlined in Section 3.3.

## Table 3-4

## Groundwater Elevations
## Former Printing Plant, Building 143
## 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-138-MW01 | 14-Mar-00 | 12.38 | 792.67 | 793.34 | 780.29 |
| UST-37-MW01 | 13-Mar-00 | 12.52 | 792.89 | 793.16 | 780.37 |

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 143**
**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-138-MW01 | PPMP-138-MW01-GW-KE3001-REG | 7-10[a] | PPMP-138-MW01-GW-KE3003-FD | PPMP-138-MW01-GW-KE3004-FS | PPMP-138-MW01-GW-KE3001-MS<br>PPMP-138-MW01-GW-KE3001-MSD | TCL VOCs, TCL SVOCs<br>Total TAL Metals |
| UST-37-MW01 | UST-37-MW01-GW-CJ3029-REG | 23-38 | UST-37-MW01-GW-CJ3030-FD | UST-37-MW01-GW-CJ3031-FS | | BTEX, PAH, and Pb |

[a] PPMP-138-MW01 is an existing well and no installation documentation was found. The sample depth is estimated based on visual inspection. The actual depth to water was 6.63 feet bgs as recorded on the sample collection log (Appendix A).

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
BTEX - Benzene, toluene, ethylbenzene, and total xylenes
PAH - Polynuclear aromatic hydrocarbons
Pb - lead

## Table 3-6

## Groundwater Field Parameters
## Former Printing Plant, Building 143
## 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-138-MW01 | 22-Feb-99 | GW | 562 | 0.62 | -146.2 | 15.38 | 0.6 | 7.28 |
| UST-37-MW01 | 01-Feb-00 | GW | 75 | 0.33 | 305 | 17.7 | 15.3 | 5.1 |

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

### 3.2 Surveying of Sample Locations

New and existing 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, 1983. Elevations were referenced to the North American Vertical Datum of 1988. Horizontal coordinates and elevations are included in Appendix C.

### 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 at the Former Printing Plant, Building 143 were analyzed for the following parameters:

- Target compound list (TCL) VOCs - Method 5035/8260B
- Benzene, toluene, ethyl benzene, and xylenes (BTEX) - Method 8021B
- TCL semivolatile organic compounds (SVOC) - Method 8270C
- PAHs - Method 8310
- Target analyte list (TAL) metals - Method 6010B/7000
- Lead - Method 6010B.

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 Chapter 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 143, was segregated as follows:

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

Solid IDW was stored inside the fenced area surrounding Buildings 335 and 336 in lined 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 143, 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*

One variance to the SFSP was recorded during completion of the SI at the Former Printing Plant, Building 143 Basement. The variance did not alter the intent of the investigation or the sampling

## Table 3-7

## Variance to the Site-Specific Field Sampling Plan
## Former Printing Plant, Building 143
## Fort McClellan, Calhoun County, Alabama

| Variance to the SFSP | Justification for Variance | Impact to Site Investigation |
|---|---|---|
| A groundwater sample was not collected from existing monitoring well PPMP-138-MW02. | Existing monitoring well designated PPMP-138-MW02 located on the east side of the heating oil UST was dry. Several attempts were made to sample the well, but each attempt was unsuccessful. | None. Monitoring well PPMP-138-MW01, which is located on the west side of the heating oil UST, was sampled and provided water data near the existing heating oil UST. |

rationale presented in Table 4-2 of the SFSP (IT, 1998a). The variance to the SFSP is summarized in Table 3-7 and included in Appendix G.

### *3.6.2 Nonconformances*

There were not any nonconformances to the SFSP recorded during completion of the SI at the Former Printing Plant, Building 143.

### *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 and UST closure assessment work plan; the FTMC SAP and QAP; and standard, accepted methods and procedures. Sample collection logs pertaining to the collection of these 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 from the SI performed at the Former Printing Plant, Building 143 Basement, Parcel 138(7). Data validation was not required per the SSFP (IT, 1999) on the analytical data from the closure assessment performed for the UST at the Administration Building, Building 143, Parcel 37(7). This is reflected in the data validation qualifier column where the qualifier "NV" is reported for these data indicating that the Parcel 37(7) data is "not validated."

Appendix F consists of a data validation summary report that was prepared to discuss the results of the validation performed on Parcel 138(7) data. Selected results were rejected or otherwise qualified based on the implementation of accepted data validation procedures and practices. These qualified parameters are highlighted in the report. The validation-assigned qualifiers were added to the FTMC IT Environmental Management System™ database for tracking and reporting. The qualified data were used in 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 143, 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 southwest of the Main Post as mapped by Warman and Causey (1962) and Osborne and Szabo (1984) and immediately 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 underlying Former Printing Plant, Building 143, are mapped as Montevallo (MtD3) (U.S. Department of Agriculture, 1961). Montevallo soils are severely eroded, shaly silty clay soils formed in the residuum of interbedded shale and fine-grained sandstone or limestone. Montevallo soils underlying Parcels 138(7) and 37(7) typically consist of clay with silt, sand, and shale.

Bedrock beneath the Former Printing Plant, Building 143, is mapped as the Mississippian/Ordovician Floyd and Athens 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.

Six borings and one monitoring well were installed at Former Printing Plant, Building 143, to collect lithologic data, characterize the underlying geology, and collect groundwater samples. The total depths of the six borings ranged from 6 to 12 feet bgs. Sand, with silt and some gravel from the ground surface to 4 feet bgs and 3.5 feet bgs in borings PPMP-138-GP01 and PPMP-138-GP02, respectively, overlies a brown mottled clay layer. The clay varies in thickness from 3.5 feet to 3 feet in borings PPMP-138-GP01 and PPMP-138-GP02, respectively. Soft weathered shale was encountered at 7.5 feet bgs and 5.5 feet bgs in borings PPMP-138-GP01 and

PPMP-138-GP02, respectively. Sand with some silt to 3 feet bgs, overlies silt to 7.5 feet bgs and 7 feet bgs in borings PPMP-138-GP03 and PPMP-138-GP04, respectively. Brown mottled clay was encountered from 7.5 feet bgs to 12 feet bgs, and 7 feet bgs to 8.5 feet bgs, respectively, in borings PPMP-138-GP03 and PPMP-138-GP04. Red sandstone was encountered in boring PPMP-138-GP04 from 8.5 to 9 feet bgs. Based on boring data from nearby parcels, red sandstone is not associated with Mississippian/Ordovician Floyd and Athens Shale, undifferentiated. Therefore, the observation of red sandstone in boring PPMP-138-GP04 likely represents fill material.

Boring UST-37-GP01 and UST-37-GP02 consisted of brown silt, clay, sand mixtures with some gravel in the upper 4 feet. Weathered shale was not encountered.

Monitoring well UST-37-MW01 was installed through sandy clays and silty clays with some grave to a depth of 14 feet bgs. Weathered red to dark brown and gray shale was encountered at 19 feet bgs and confirmed to the boring terminus at 38 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.

There are not any natural surface water drainage features in the vicinity of the Former Printing Plant, Building 143. The South Branch of Cane Creek is over 600 feet to the northeast of the site, and Remount Creek is over 1,250 feet west of the site. However, there are numerous subsurface structures, such as sanitary or storm sewers, adjacent to Building 143.

### *4.2.2 Hydrogeology*

During boring installation activities, groundwater was not encountered in the residuum to a depth of 12 feet bgs.

The static groundwater level was measured in wells PPMP-138-MW01 and UST-37-MW01 on March 13 and 14, 2000 as summarized on Table 3-4. Well PPMP-138-MW02 did not have a

measurable water column. Monitoring wells installed at adjacent parcels had static groundwater levels measured 10- to 15-feet deeper than that observed in PPMP-138-MW01. Based on the depth to water in PPMP-138-MW01 and the lack of groundwater encountered during SI boring activities in native material at Parcel 138(7), the groundwater elevation measured in PPMP-138-MW01 likely represents surface water present in the UST backfill material.

# 5.0 Summary of Analytical Results

The results of the chemical analyses of samples collected at the Former Printing Plant, Building 143, 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 concentrations exceeding the SSSLs and ESVs were subsequently compared to background metals screening values (background concentrations) (SAIC, 1998) in Appendix H 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*

Four surface soil samples were collected for chemical analyses at the Former Printing Plant, Building 143. Surface soil samples were collected from the upper 1 foot of soil at various locations across the parcel, as shown on Figure 3-1. One of the four samples (PPMP-138-GP04) was collected directly beneath asphalt pavement at Parcel 138(7). Analytical results were compared to residential human health and ecological SSSLs and background concentrations, as presented in Table 5-1.

***Metals.*** Nineteen metals were detected in surface soil samples collected at the Former Printing Plant, Building 143. The sodium results were flagged with a "B" data qualifier indicating that the sodium was also detected in an associated laboratory or field blank sample. The beryllium, chromium, cobalt, lead, mercury, and vanadium results were flagged with a "J" data qualifier signifying that the results were greater than the method detection limit (MDL) but less than the RL. In addition, the magnesium, nickel, and potassium results were flagged with a "J" data qualifier in at least one of the four surface samples.

Aluminum, arsenic, iron, and manganese concentrations exceeded residential human health SSSLs and ESVs but were within background concentrations. Six metals (beryllium, copper, lead, mercury, selenium, and zinc) were detected at concentrations exceeding ESVs and background screening values but below residential human health SSSLs.

***Volatile Organic Compounds.*** Five VOCs, including acetone, bromomethane, methylene chloride, p-cymene, and toluene, were detected in surface soil samples collected at the Former Printing Plant, Building 143. Three of the VOCs (acetone, bromomethane, and methylene chloride) results were flagged with a "B" data qualifier indicating that these compounds were also detected in an associated laboratory or field blank sample. The compounds p-cymene (PPMP-138-GP02) and toluene (PPMP-138-GP03) were each detected in only one sample. The toluene result was flagged with a "J" data qualifier signifying that the result was greater than the MDL but less than the RL.

**Table 5-1**

**Surface Soil Analytical Results**
**Former Printing Plant, Building 143**
**Fort McClellan, Calhoun County, Alabama**



| | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Parcel: | PPMP-138 | | | | | PPMP-138 | | | | | PPMP-138 | | | | | PPMP-138 | | | | |
| | | | | Sample Location: | PPMP-138-GP01 | | | | | PPMP-138-GP02 | | | | | PPMP-138-GP03 | | | | | PPMP-138-GP04 | | | | |
| | | | | Sample Number: | KE0001 | | | | | KE0003 | | | | | KE0005 | | | | | KE0009 | | | | |
| | | | | Sample Date: | 19-Jan-99 | | | | | 19-Jan-99 | | | | | 19-Jan-99 | | | | | 19-Jan-99 | | | | |
| | | | | 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 | 9.35E+03 | | | YES | YES | 7.50E+03 | | | | YES | 1.28E+04 | | | YES | YES | 1.38E+04 | | | YES | YES |
| Arsenic | mg/kg | 1.37E+01 | 4.26E-01 | 1.00E+01 | 9.50E+00 | | | YES | | 1.01E+01 | | | YES | YES | 4.30E+00 | | | YES | | 4.60E+00 | | | YES | |
| Barium | mg/kg | 1.24E+02 | 5.47E+02 | 1.65E+02 | 1.14E+02 | | | | | 7.76E+01 | | | | | 4.82E+01 | | | | | 8.87E+01 | | | | |
| Beryllium | mg/kg | 8.00E-01 | 9.60E+00 | 1.10E+00 | 5.80E-01 | J | | | | 5.80E-01 | J | | | | 4.20E-01 | J | | | | 1.50E+00 | J | YES | | YES |
| Calcium | mg/kg | 1.72E+03 | NA | NA | 3.89E+03 | | YES | | | 7.87E+02 | | | | | 6.79E+03 | | YES | | | 1.77E+04 | | YES | | |
| Chromium | mg/kg | 3.70E+01 | 2.32E+01 | 4.00E-01 | 1.82E+01 | J | | | YES | 1.36E+01 | J | | | YES | 1.74E+01 | J | | | YES | 1.81E+01 | J | | | YES |
| Cobalt | mg/kg | 1.52E+01 | 4.68E+02 | 2.00E+01 | 4.40E+00 | J | | | | 5.60E+00 | J | | | | 2.20E+00 | J | | | | 1.70E+00 | J | | | |
| Copper | mg/kg | 1.27E+01 | 3.13E+02 | 4.00E+01 | 2.94E+01 | | YES | | | 7.78E+01 | | YES | | YES | 9.10E+00 | | | | | 1.73E+01 | | YES | | |
| Iron | mg/kg | 3.42E+04 | 2.34E+03 | 2.00E+02 | 1.50E+04 | | | YES | YES | 1.34E+04 | | | YES | YES | 1.84E+04 | | | YES | YES | 2.56E+04 | | | YES | YES |
| Lead | mg/kg | 4.01E+01 | 4.00E+02 | 5.00E+01 | 7.18E+01 | J | YES | | YES | 6.99E+01 | J | YES | | YES | 7.90E+00 | J | | | | 1.74E+01 | J | | | |
| Magnesium | mg/kg | 1.03E+03 | NA | 4.40E+05 | 5.61E+02 | J | | | | 2.43E+02 | J | | | | 9.84E+02 | | | | | 2.86E+03 | | YES | | |
| Manganese | mg/kg | 1.58E+03 | 3.63E+02 | 1.00E+02 | 5.48E+02 | | | YES | YES | 8.42E+02 | | | YES | YES | 5.78E+01 | | | | | 1.52E+02 | | | | YES |
| Mercury | mg/kg | 8.00E-02 | 2.33E+00 | 1.00E-01 | 1.00E-02 | J | | | | 1.70E-01 | J | YES | | YES | 5.30E-02 | J | | | | 4.60E-02 | J | | | |
| Nickel | mg/kg | 1.03E+01 | 1.54E+02 | 3.00E+01 | 5.80E+00 | | | | | 5.40E+00 | | | | | 4.70E+00 | | | | | 4.50E+00 | J | | | |
| Potassium | mg/kg | 8.00E+02 | NA | NA | 1.68E+02 | J | | | | 1.80E+02 | J | | | | 4.96E+02 | J | | | | 6.68E+02 | | | | |
| Selenium | mg/kg | 4.80E-01 | 3.91E+01 | 8.10E-01 | 1.20E+00 | | YES | | YES | 8.30E-01 | | YES | | YES | 9.40E-01 | | YES | | YES | 1.70E+00 | | YES | | YES |
| Sodium | mg/kg | 6.34E+02 | NA | NA | 6.99E+01 | B | | | | 9.06E+01 | B | | | | 9.79E+01 | B | | | | 1.42E+02 | B | | | |
| Vanadium | mg/kg | 5.88E+01 | 5.31E+01 | 2.00E+00 | 2.61E+01 | J | | | YES | 1.96E+01 | J | | | YES | 2.97E+01 | J | | | YES | 3.20E+01 | J | | | YES |
| Zinc | mg/kg | 4.06E+01 | 2.34E+03 | 5.00E+01 | 7.12E+01 | | YES | | YES | 6.72E+01 | | YES | | YES | 1.96E+01 | | | | | 2.05E+01 | | | | |
| **SEMIVOLATILE ORGANIC COMPOUNDS** | | | | | | | | | | | | | | | | | | | | | | | | |
| Anthracene | mg/kg | 9.35E-01 | 2.33E+03 | 1.00E-01 | 9.20E-02 | J | | | | ND | | | | | ND | | | | | ND | | | | |
| Benzo(a)anthracene | mg/kg | 1.19E+00 | 8.51E-01 | 5.21E+00 | 3.20E-01 | J | | | | 5.00E-02 | B | | | | ND | | | | | 2.80E-01 | J | | | |
| Benzo(a)pyrene | mg/kg | 1.42E+00 | 8.51E-02 | 1.00E-01 | 2.90E-01 | J | | YES | YES | 5.00E-02 | J | | | | ND | | | | | 2.50E-01 | J | | YES | YES |
| Benzo(b)fluoranthene | mg/kg | 1.66E+00 | 8.51E-01 | 5.98E+01 | 3.90E-01 | | | | | 7.80E-02 | J | | | | ND | | | | | 3.20E-01 | J | | | |
| Benzo(ghi)perylene | mg/kg | 9.55E-01 | 2.32E+02 | 0.00E+00 | 1.70E-01 | J | | | | ND | | | | | ND | | | | | ND | | | | |
| Benzo(k)fluoranthene | mg/kg | 1.45E+00 | 8.51E+00 | 1.48E+02 | 1.50E-01 | J | | | | ND | | | | | ND | | | | | ND | | | | |
| Carbazole | mg/kg | NA | 3.11E+01 | NA | 6.90E-02 | J | | | | ND | | | | | ND | | | | | ND | | | | |
| Chrysene | mg/kg | 1.40E+00 | 8.61E+01 | 4.73E+00 | 3.20E-01 | J | | | | 5.90E-02 | B | | | | ND | | | | | 3.00E-01 | J | | | |
| Fluoranthene | mg/kg | 2.03E+00 | 3.09E+02 | 1.00E-01 | 7.40E-01 | | | | YES | 1.00E-01 | J | | | YES | ND | | | | | 7.10E-01 | J | | | YES |
| Fluorene | mg/kg | 6.67E-01 | 3.09E+02 | 1.22E+02 | 4.20E-02 | J | | | | ND | | | | | ND | | | | | ND | | | | |
| Indeno(1,2,3-cd)pyrene | mg/kg | 9.37E-01 | 8.51E-01 | 1.09E+02 | 1.80E-01 | J | | | | ND | | | | | ND | | | | | ND | | | | |
| Phenanthrene | mg/kg | 1.08E+00 | 2.32E+03 | 1.00E-01 | 4.50E-01 | | | | YES | 5.40E-02 | J | | | | ND | | | | | 5.00E-01 | J | | | YES |
| Pyrene | mg/kg | 1.63E+00 | 2.33E+02 | 1.00E-01 | 5.20E-01 | J | | | YES | 7.60E-02 | J | | | | ND | | | | | 5.20E-01 | J | | | YES |
| bis(2-Ethylhexyl)phthalate | mg/kg | NA | 4.52E+01 | 9.30E-01 | 4.50E-02 | J | | | | 1.60E-01 | J | | | | ND | | | | | ND | | | | |
| **VOLATILE ORGANIC COMPOUNDS** | | | | | | | | | | | | | | | | | | | | | | | | |
| Acetone | mg/kg | NA | 7.76E+02 | 2.50E+00 | 9.40E-03 | B | | | | 4.60E-02 | B | | | | 1.20E-02 | B | | | | 6.20E-02 | B | | | |
| Bromomethane | mg/kg | NA | 1.09E+01 | NA | 2.50E-03 | B | | | | 1.70E-03 | B | | | | 1.60E-03 | B | | | | 2.10E-03 | B | | | |
| Methylene chloride | mg/kg | NA | 8.41E+01 | 2.00E+00 | 3.20E-03 | B | | | | 3.20E-03 | B | | | | 1.90E-03 | B | | | | 3.10E-03 | B | | | |
| Toluene | mg/kg | NA | 1.55E+03 | 5.00E-02 | ND | | | | | ND | | | | | 4.40E-03 | J | | | | ND | | | | |
| p-Cymene | mg/kg | NA | 1.55E+03 | NA | ND | | | | | 1.50E-02 | | | | | ND | | | | | ND | | | | |

**Table 5-1**

**Surface Soil Analytical Results**
**Former Printing Plant, Building 143**
**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 143**
**Fort McClellan, Calhoun County, Alabama**



| | | | | Parcel: | UST-37 | | | UST-37 | | | | UST-37 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Sample Location: | UST-37-GP01 | | | UST-37-GP02 | | | | UST-37-MW01 | | | |
| | | | | Sample Number: | CJ0028 | | | CJ0029 | | | | CJ0027 | | | |
| | | | | Sample Date: | 09-Nov-99 | | | 10-Nov-99 | | | | 10-Nov-99 | | | |
| | | | | Sample Depth (Feet): | 10-12 | | | 10-12 | | | | 9-10 | | | |
| **Parameter** | **Units** | **BKG[a]** | **SSSL[b]** | **Result** | **Qual** | **>BKG** | **>SSSL** | **Result** | **Qual** | **>BKG** | **>SSSL** | **Result** | **Qual** | **>BKG** | **>SSSL** |
| **METALS** | | | | | | | | | | | | | | | |
| Lead (only) | mg/kg | 3.85E+01 | 4.00E+02 | 1.21E+01 | NV | | | 1.02E+01 | NV | | | 6.20E+00 | NV | | |
| Aluminum | mg/kg | 1.36E+04 | 7.80E+03 | NR | | | | NR | | | | NR | | | |
| Arsenic | mg/kg | 1.83E+01 | 4.26E-01 | NR | | | | NR | | | | NR | | | |
| Barium | mg/kg | 2.34E+02 | 5.47E+02 | NR | | | | NR | | | | NR | | | |
| Beryllium | mg/kg | 8.60E-01 | 9.60E+00 | NR | | | | NR | | | | NR | | | |
| Calcium | mg/kg | 6.37E+02 | NA | NR | | | | NR | | | | NR | | | |
| Chromium | mg/kg | 3.83E+01 | 2.32E+01 | NR | | | | NR | | | | NR | | | |
| Cobalt | mg/kg | 1.75E+01 | 4.68E+02 | NR | | | | NR | | | | NR | | | |
| Copper | mg/kg | 1.94E+01 | 3.13E+02 | NR | | | | NR | | | | NR | | | |
| Iron | mg/kg | 4.48E+04 | 2.34E+03 | NR | | | | NR | | | | NR | | | |
| Lead | mg/kg | 3.85E+01 | 4.00E+02 | NR | | | | NR | | | | NR | | | |
| Magnesium | mg/kg | 7.66E+02 | NA | NR | | | | NR | | | | NR | | | |
| Manganese | mg/kg | 1.36E+03 | 3.63E+02 | NR | | | | NR | | | | NR | | | |
| Mercury | mg/kg | 7.00E-02 | 2.33E+00 | NR | | | | NR | | | | NR | | | |
| Nickel | mg/kg | 1.29E+01 | 1.54E+02 | NR | | | | NR | | | | NR | | | |
| Potassium | mg/kg | 7.11E+02 | NA | NR | | | | NR | | | | NR | | | |
| Selenium | mg/kg | 4.70E-01 | 3.91E+01 | NR | | | | NR | | | | NR | | | |
| Sodium | mg/kg | 7.02E+02 | NA | NR | | | | NR | | | | NR | | | |
| Thallium | mg/kg | 1.40E+00 | 5.08E-01 | NR | | | | NR | | | | NR | | | |
| Vanadium | mg/kg | 6.49E+01 | 5.31E+01 | NR | | | | NR | | | | NR | | | |
| Zinc | mg/kg | 3.49E+01 | 2.34E+03 | NR | | | | NR | | | | NR | | | |
| **SEMIVOLATILE ORGANIC COMPOUNDS** | | | | | | | | | | | | | | | |
| Fluoranthene | mg/kg | NA | 3.09E+02 | ND | | | | ND | | | | ND | | | |
| **VOLATILE ORGANIC COMPOUNDS** | | | | | | | | | | | | | | | |
| 1,1,2,2-Tetrachloroethane | mg/kg | NA | 3.13E+00 | NR | | | | NR | | | | NR | | | |
| Acetone | mg/kg | NA | 7.76E+02 | NR | | | | NR | | | | NR | | | |
| Bromomethane | mg/kg | NA | 1.09E+01 | NR | | | | NR | | | | NR | | | |
| Methylene chloride | mg/kg | NA | 8.41E+01 | NR | | | | NR | | | | NR | | | |
| p-Cymene | mg/kg | NA | 1.55E+03 | NR | | | | NR | | | | NR | | | |
| **BTEX** | | | | | | | | | | | | | | | |
| Benzene | mg/kg | NA | 2.17E+01 | 1.30E-02 | NV | | | ND | | | | ND | | | |
| Ethylbenzene | mg/kg | NA | 7.77E+02 | 2.50E-02 | NV | | | ND | | | | ND | | | |
| Xylene, Total | mg/kg | NA | 1.55E+04 | 5.90E-02 | NV | | | 1.40E-02 | NV | | | 1.10E-02 | NV | | |

## Table 5-2

## Subsurface Soil Analytical Results
## Former Printing Plant, Building 143
## Fort McClellan, Calhoun County, Alabama



| | | | | Parcel: | PPMP-138 | | | | PPMP-138 | | | | PPMP-138 | | | | PPMP-138 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Sample Location: | PPMP-138-GP01 | | | | PPMP-138-GP02 | | | | PPMP-138-GP03 | | | | PPMP-138-GP04 | | | |
| | | | | Sample Number: | KE0002 | | | | KE0004 | | | | KE0006 | | | | KE0010 | | | |
| | | | | Sample Date: | 19-Jan-99 | | | | 19-Jan-99 | | | | 19-Jan-99 | | | | 19-Jan-99 | | | |
| | | | | Sample Depth (Feet): | 6-8 | | | | 2-3 | | | | 9-12 | | | | 6-9 | | | |
| **Parameter** | **Units** | **BKG[a]** | **SSSL[b]** | | **Result** | **Qual** | **>BKG** | **>SSSL** | **Result** | **Qual** | **>BKG** | **>SSSL** | **Result** | **Qual** | **>BKG** | **>SSSL** | **Result** | **Qual** | **>BKG** | **>SSSL** |
| **METALS** | | | | | | | | | | | | | | | | | | | | |
| Lead (only) | mg/kg | 3.85E+01 | 4.00E+02 | | NR | | | | NR | | | | NR | | | | NR | | | |
| Aluminum | mg/kg | 1.36E+04 | 7.80E+03 | | 1.18E+04 | | | YES | 7.54E+03 | | | | 7.74E+03 | | | | 1.28E+04 | | | YES |
| Arsenic | mg/kg | 1.83E+01 | 4.26E-01 | | 8.40E+00 | | | YES | 3.00E+00 | | | YES | 3.00E+00 | | | YES | 5.00E+00 | | | YES |
| Barium | mg/kg | 2.34E+02 | 5.47E+02 | | 2.33E+01 | J | | | 4.05E+01 | | | | 1.46E+01 | J | | | 2.51E+01 | | | |
| Beryllium | mg/kg | 8.60E-01 | 9.60E+00 | | 4.30E-01 | J | | | 3.60E-01 | J | | | 1.90E-01 | J | | | 2.80E-01 | J | | |
| Calcium | mg/kg | 6.37E+02 | NA | | 3.57E+02 | J | | | 4.26E+02 | J | | | 1.07E+03 | | YES | | 1.07E+03 | | YES | |
| Chromium | mg/kg | 3.83E+01 | 2.32E+01 | | 4.11E+01 | J | YES | YES | 8.30E+00 | J | | | 1.14E+01 | J | | | 1.64E+01 | J | | |
| Cobalt | mg/kg | 1.75E+01 | 4.68E+02 | | 1.10E+00 | J | | | 2.40E+00 | J | | | 7.10E-01 | J | | | 1.80E+00 | J | | |
| Copper | mg/kg | 1.94E+01 | 3.13E+02 | | 2.67E+01 | | YES | | 7.20E+00 | | | | 4.70E+00 | | | | 7.50E+00 | | | |
| Iron | mg/kg | 4.48E+04 | 2.34E+03 | | 6.95E+04 | | YES | YES | 8.91E+03 | | | YES | 1.48E+04 | | | YES | 2.24E+04 | | | YES |
| Lead | mg/kg | 3.85E+01 | 4.00E+02 | | 1.39E+01 | J | | | 1.02E+01 | J | | | 5.50E+00 | J | | | 9.20E+00 | J | | |
| Magnesium | mg/kg | 7.66E+02 | NA | | 1.22E+02 | J | | | 1.95E+02 | J | | | 2.59E+02 | J | | | 4.34E+02 | J | | |
| Manganese | mg/kg | 1.36E+03 | 3.63E+02 | | 2.02E+01 | | | | 8.92E+01 | | | | 1.25E+01 | J | | | 7.02E+01 | | | |
| Mercury | mg/kg | 7.00E-02 | 2.33E+00 | | 4.20E-02 | J | | | 3.70E-02 | J | | | 4.20E-02 | J | | | 7.60E-02 | J | YES | |
| Nickel | mg/kg | 1.29E+01 | 1.54E+02 | | 1.40E+00 | J | | | 3.00E+00 | J | | | 1.80E+00 | J | | | 2.90E+00 | J | | |
| Potassium | mg/kg | 7.11E+02 | NA | | 3.54E+02 | J | | | 1.19E+02 | J | | | 2.29E+02 | J | | | 3.51E+02 | J | | |
| Selenium | mg/kg | 4.70E-01 | 3.91E+01 | | 3.50E+00 | | YES | | 7.70E-01 | | YES | | 7.80E-01 | | YES | | 8.40E-01 | | YES | |
| Sodium | mg/kg | 7.02E+02 | NA | | 8.04E+01 | B | | | 6.74E+01 | B | | | 6.94E+01 | B | | | 8.58E+01 | B | | |
| Thallium | mg/kg | 1.40E+00 | 5.08E-01 | | 7.00E-01 | B | | YES | ND | | | | ND | | | | ND | | | |
| Vanadium | mg/kg | 6.49E+01 | 5.31E+01 | | 5.09E+01 | J | | | 1.46E+01 | J | | | 2.12E+01 | J | | | 3.41E+01 | J | | |
| Zinc | mg/kg | 3.49E+01 | 2.34E+03 | | 2.01E+01 | | | | 3.26E+01 | | | | 8.30E+00 | | | | 2.14E+01 | | | |
| **SEMIVOLATILE ORGANIC COMPOUNDS** | | | | | | | | | | | | | | | | | | | | |
| Fluoranthene | mg/kg | NA | 3.09E+02 | | ND | | | | 4.10E-02 | J | | | ND | | | | ND | | | |
| **VOLATILE ORGANIC COMPOUNDS** | | | | | | | | | | | | | | | | | | | | |
| 1,1,2,2-Tetrachloroethane | mg/kg | NA | 3.13E+00 | | ND | | | | 3.20E-03 | J | | | ND | | | | ND | | | |
| Acetone | mg/kg | NA | 7.76E+02 | | 1.20E-02 | B | | | 4.20E-01 | J | | | 9.10E-03 | B | | | 1.20E-01 | J | | |
| Bromomethane | mg/kg | NA | 1.09E+01 | | 2.60E-03 | B | | | 2.10E-03 | B | | | 1.80E-03 | B | | | 2.10E-03 | B | | |
| Methylene chloride | mg/kg | NA | 8.41E+01 | | 3.60E-03 | B | | | 2.70E-03 | B | | | 2.10E-03 | B | | | 2.90E-03 | B | | |
| p-Cymene | mg/kg | NA | 1.55E+03 | | ND | | | | 4.80E-02 | | | | ND | | | | ND | | | |
| **BTEX** | | | | | | | | | | | | | | | | | | | | |
| Benzene | mg/kg | NA | 2.17E+01 | | NR | | | | NR | | | | NR | | | | NR | | | |
| Ethylbenzene | mg/kg | NA | 7.77E+02 | | NR | | | | NR | | | | NR | | | | NR | | | |
| Xylene, Total | mg/kg | NA | 1.55E+04 | | NR | | | | NR | | | | NR | | | | NR | | | |

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.

NR - Not requested. UST-37 samples were analyzed for BTEX, PAHs, and lead. PPMP-138 samples were analyzed for TAL metals and TCL VOCs/SVOCs.

BTEX - Benzene, toluene, ethyl benzene, and total xylenes

NA - Not available
mg/kg - Milligrams

ND - Not detected
NV - Not validated
Qual - Data validat
B - Analyte detecte
greater than th
J - Result is greate
less than or eq

**Table 5-2**

**Subsurface Soil Analytical Results**
**Former Printing Plant, Building 143**
**Fort McClellan, Calhoun County, Alabama**



| | | | |
|---|---|---|---|
| | | | **Parcel:** |
| | | | **Sample Location:** |
| | | | **Sample Number:** |
| | | | **Sample Date:** |
| | | | **Sample Depth (Feet):** |
| **Parameter** | **Units** | **BKG[a]** | **SSSL[b]** |
| **METALS** | | | |
| Lead (only) | mg/kg | 3.85E+01 | 4.00E+02 |
| Aluminum | mg/kg | 1.36E+04 | 7.80E+03 |
| Arsenic | mg/kg | 1.83E+01 | 4.26E-01 |
| Barium | mg/kg | 2.34E+02 | 5.47E+02 |
| Beryllium | mg/kg | 8.60E-01 | 9.60E+00 |
| Calcium | mg/kg | 6.37E+02 | NA |
| Chromium | mg/kg | 3.83E+01 | 2.32E+01 |
| Cobalt | mg/kg | 1.75E+01 | 4.68E+02 |
| Copper | mg/kg | 1.94E+01 | 3.13E+02 |
| Iron | mg/kg | 4.48E+04 | 2.34E+03 |
| Lead | mg/kg | 3.85E+01 | 4.00E+02 |
| Magnesium | mg/kg | 7.66E+02 | NA |
| Manganese | mg/kg | 1.36E+03 | 3.63E+02 |
| Mercury | mg/kg | 7.00E-02 | 2.33E+00 |
| Nickel | mg/kg | 1.29E+01 | 1.54E+02 |
| Potassium | mg/kg | 7.11E+02 | NA |
| Selenium | mg/kg | 4.70E-01 | 3.91E+01 |
| Sodium | mg/kg | 7.02E+02 | NA |
| Thallium | mg/kg | 1.40E+00 | 5.08E-01 |
| Vanadium | mg/kg | 6.49E+01 | 5.31E+01 |
| Zinc | mg/kg | 3.49E+01 | 2.34E+03 |
| **SEMIVOLATILE ORGANIC COMPOUNDS** | | | |
| Fluoranthene | mg/kg | NA | 3.09E+02 |
| **VOLATILE ORGANIC COMPOUNDS** | | | |
| 1,1,2,2-Tetrachloroethane | mg/kg | NA | 3.13E+00 |
| Acetone | mg/kg | NA | 7.76E+02 |
| Bromomethane | mg/kg | NA | 1.09E+01 |
| Methylene chloride | mg/kg | NA | 8.41E+01 |
| p-Cymene | mg/kg | NA | 1.55E+03 |
| **BTEX** | | | |
| Benzene | mg/kg | NA | 2.17E+01 |
| Ethylbenzene | mg/kg | NA | 7.77E+02 |
| Xylene, Total | mg/kg | NA | 1.55E+04 |

per kilogram

tion qualifier
ed in laboratory or field blank at concentration
ne reporting limit (and greater than zero).
er than stated method detection limit but
ual to specified reporting limit.

## Table 5-3

## Groundwater Analytical Results
## Former Printing Plant, Building 143
## Fort McClellan, Calhoun County, Alabama

| | | | | Parcel: | UST-37 | | | PPMP-138 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Sample Location: | UST-37-MW01 | | | PPMP-138-MW01 | | | |
| | | | | Sample Number: | CJ3029 | | | KE3001 | | | |
| | | | | Sample Date: | 01-Feb-00 | | | 22-Feb-99 | | | |
| **Parameter** | **Units** | **BKG[a]** | **SSSL[b]** | **Result** | **Qual** | **>BKG** | **>SSSL** | **Result** | **Qual** | **>BKG** | **>SSSL** |
| **METALS** | | | | | | | | | | | |
| Aluminum | mg/L | 2.34E+00 | 1.56E+00 | NR | | | | 4.21E-02 | J | | |
| Arsenic | mg/L | 1.78E-02 | 4.00E-05 | NR | | | | 1.14E-02 | | | YES |
| Barium | mg/L | 1.27E-01 | 1.10E-01 | NR | | | | 3.94E-02 | J | | |
| Calcium | mg/L | 5.65E+01 | NA | NR | | | | 3.93E+01 | | | |
| Iron | mg/L | 7.04E+00 | 4.69E-01 | NR | | | | 2.34E+00 | | | YES |
| Magnesium | mg/L | 2.13E+01 | NA | NR | | | | 1.42E+01 | | | |
| Manganese | mg/L | 5.81E-01 | 7.35E-02 | NR | | | | 1.25E-01 | J | | YES |
| Potassium | mg/L | 7.20E+00 | NA | NR | | | | 1.16E+01 | | YES | |
| Sodium | mg/L | 1.48E+01 | NA | NR | | | | 1.47E+01 | | | |
| **SEMIVOLATILE ORGANIC COMPOUNDS** | | | | | | | | | | | |
| 4-Methylphenol | mg/L | NA | 7.68E-03 | NR | | | | 2.80E-02 | J | | YES |
| **VOLATILE ORGANIC COMPOUNDS** | | | | | | | | | | | |
| 1,4-Dichlorobenzene | mg/L | NA | 1.75E-03 | NR | | | | 4.90E-03 | J | | YES |
| Methylene chloride | mg/L | NA | 7.85E-03 | NR | | | | 3.80E-03 | J | | |
| Toluene | mg/L | NA | 2.59E-01 | NR | | | | 2.40E-02 | J | | |
| p-Cymene | mg/L | NA | 2.26E-01 | NR | | | | 8.00E-02 | J | | |
| **BTEX** | | | | | | | | | | | |
| Benzene | mg/L | NA | 1.40E-03 | 3.80E-04 | NV | | | NR | | | |

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.

BTEX - Benzene, toluene, ethyl benzene, and total xylenes

NR - Not requested. UST-37 samples were analyzed for BTEX, PAHs, and lead. PPMP-138 samples were analyzed for TAL metals and TCL VOCs/SVOCs.

NA - Not available

mg/kg - Milligrams per kilogram

ND - Not detected

NV - Not validated

Qual - Data validation qualifier

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.

None of the VOCs detected in surface soils was present at a concentration exceeding residential human health SSSLs or ESVs.

***Semivolatile Organic Compounds.*** Fourteen SVOCs, thirteen PAH compounds and bis (2-ethylhexyl)phathalate, were detected in surface soil samples collected at the Former Printing Plant, Building 143. Anthracene, benzo(g,h,i)perylene, benzo(k)fluoranthene, carbazole, fluorene, and indeno(1,2,3cd)pyrene were detected only in the sample collected at PPMP-138-GP01, which contained all of the detected SVOCs. No SVOCs were detected in the sample collected from location PPMP-138-GP03.

The concentration of benzo(a)pyrene at sample locations PPMP-138-GP01 and PPMP-138-GP04 exceeded residential human health SSSLs and ESVs. Also at these sample locations, three other SVOCs (fluoranthene, phenanthrene, and pyrene) were detected at concentrations exceeding ESVs but were below residential human health SSSLs. None of the PAH concentrations exceeded the established background screening values.

### *5.2 Subsurface Soil Sample Results*

Seven subsurface soil samples were collected for chemical analyses at the Former Printing Plant, Building 143. Three subsurface soil samples are associated with the UST closure assessment at Parcel 37(7) and were analyzed for lead, PAH compounds, and BTEX compounds. The four subsurface soil samples associated with the SI at Parcel 138(7) were analyzed for TAL metals, TCL VOCs, and TCL SVOCs. All 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.*** Lead was detected at all three sample locations associated with the UST at Parcel 37(7); however, none of the concentrations exceeded residential human health SSSLs. Twenty metals were detected in the four subsurface soil samples from the Former Printing Plant, Parcel 138(7), borings. Beryllium, chromium, cobalt, lead, magnesium, mercury, nickel, potassium, and vanadium results were flagged with a "J" data qualifier signifying that the results were greater than the MDL but less than the RL. Barium and calcium results were also flagged with a "J" data qualifier in two of the four samples. The sodium and thallium results were flagged with a "B" data qualifier signifying that sodium and thallium were also detected in an associated laboratory or field blank sample.

Aluminum, arsenic, chromium, iron, and thallium were detected in subsurface soils at concentrations exceeding residential human SSSLs. With the exception of chromium and iron in one of the samples, the concentrations of these metals were below background concentrations. Chromium and iron concentrations exceeded residential human health SSSLs and background concentrations at sample location PPMP-138-GP01. However, the chromium concentration (41.1 mg/kg) was within the range of chromium background values (5.5 to 55 mg/kg) determined by SAIC (1998). The iron concentration was within the same order of magnitude as the background concentration.

***Volatile Organic Compounds.*** Benzene, ethyl benzene, and total xylenes were detected at all three subsurface soil samples associated with the UST at Parcel 37(7). Five VOCs, including 1,1,2,2-tetrachloroethane, acetone, bromomethane, methylene chloride, and p-cymene, were detected in four subsurface soil samples collected at the Former Printing Plant, Parcel 138(7). The bromomethane and methylene chloride results were flagged with a "B" data qualifier signifying that these compounds were also detected in an associated laboratory or field blank sample. In addition, acetone results were flagged with a "B" data qualifier or a "J" data qualifier signifying that the results were greater than the MDL but less than the RL. The VOCs p-cymene and 1,1,2,2-tetrachloroethane were each detected in only one sample; the 1,1,2,2-tetrachloroethane result was flagged with a "J" data qualifier. The VOC p-cymene, detected in the subsurface sample from PPMP-138-GP02, was also detected in the surface soil sample from PPMP-138-GP02.

None of the VOCs detected in subsurface soils was present at a concentration exceeding residential human health SSSLs.

***Semivolatile Organic Compounds.*** No PAH compounds were detected in the three subsurface soil samples associated with the UST at Parcel 37(7). Fluoranthene was detected at one subsurface soil sample location (PPMP-138-GP02) at the Former Printing Plant, Parcel 138(7). The fluoranthene result was flagged with a "J" data qualifier signifying that the result was greater than the MDL but less than the RL. SVOCs were not detected at any of the other subsurface soil sample locations.

The fluoranthene concentration at sample location PPMP-138-GP02 was below the residential human health SSSL.

### *5.3 Groundwater Sample Results*

One existing well (PPMP-138-MW01) and one permanent well (UST-37-MW01) were sampled at the Former Printing Plant, Building 143, at the locations shown on Figure 3-1. Analytical results were compared to residential human health SSSLs and background concentrations, as presented in Table 5-3. As discussed in Section 4.2.2, water sampled from PPMP-138-MW01 likely represents surface water present in the UST backfill material. Groundwater sample from well UST-37-MW01 was analyzed for lead, PAH compounds, and BTEX. The groundwater sample from well PPMP-138-MW01 was analyzed for TAL metals, TCL VOCs, and TCL SVOCs.

***Metals.*** Lead was not detected in the groundwater sample for UST-37-MW01. Nine metals were detected in well PPMP-138-MW01. The aluminum, barium, and manganese results were flagged with a "J" data qualifier signifying that the results were greater than the MDL but less than the RL.

Arsenic, iron, and manganese concentrations exceeded residential human health SSSLs but were within background concentrations.

***Volatile Organic Compounds.*** Benzene was the only VOC detected in the groundwater sample from well UST-37-MW01. Its concentration was below the residential human health SSSL. Four VOCs, including 1,4-dichlorobenzene, methylene chloride, p-cymene, and toluene, were detected in the groundwater sample from PPMP-138-MW01. The VOC results were flagged with a "J" data qualifier signifying that the results were greater than the MDL but less than the RL.

The concentration of 1,4-dichlorobenzene (0.0049 milligrams per liter [mg/L]) exceeded the residential human health SSSL for cancer but was below the noncancer SSSL.

***Semivolatile Organic Compounds.*** No PAH compounds were detected in the groundwater sample collected from UST-37-MW01. The SVOC 4-methylphenol was the only SVOC detected in groundwater from PPMP-138-MW01. The 4-methylphenol result was flagged with a "J" data qualifier signifying that the result was greater than the MDL but less than the RL.

The concentration of 4-methylphenol (0.028 mg/L) exceeded the residential human health SSSL (0.00769 mg/L).

# 6.0 Summary and Conclusions and Recommendations

In accordance with Contract Number DACA21-96-D-0018, Task Order CK05, IT completed an SI at the Former Printing Plant, Building 143 Basement, Parcel 138(7) and the UST closure assessment for the UST at the Administrative Building, Building 143, Parcel 37(7), at Fort McClellan (FTMC), Calhoun County, Alabama. These investigations were conducted to determine whether chemical constituents are present at the Former Printing Plant, Building 143, and, if present, whether the concentrations would present an unacceptable risk to human health or the environment. Investigation activities at the Former Printing Plant, Building 143, consisted of the sampling and analyses of four surface soil samples, seven subsurface soil samples, and two groundwater samples. In addition, one permanent well was 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. The analytical results were compared to human health SSSLs and ESVs. 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 BRAC Environmental Restoration Program at FTMC. Additionally, metals results exceeding the SSSLs and ESVs were compared to media-specific background metals concentrations to determine if the metals detected in site media are within natural background concentrations (SAIC, 1998). SVOC concentrations exceeding SSSLs and ESVs in surface and depositional soil samples were compared to PAH background screening values where available (IT, 2000b). The findings are summarized as follows:

- Aluminum, arsenic, iron, and manganese were detected in surface soils at concentrations exceeding residential human health SSSLs and ESVs but within background concentrations. Six metals (beryllium, copper, lead, mercury, selenium, and zinc) were detected in surface soil samples at concentrations exceeding ESVs and background concentrations but below residential human health SSSLs. The PAH benzo(a)pyrene was detected at two surface soil sample locations (PPMP-138-GP01 and PPMP-138-GP04) at concentrations exceeding its residential human health SSSL and ESV. Three other PAHs (fluoranthene, phenanthrene, and pyrene) were also detected at sample locations PPMP-138-GP01 and PPMP-138-GP04 at concentrations exceeding ESVs but were below residential human health SSSLs. None of the detected PAH concentrations exceeded their background screening values.

- Chromium and iron were detected in one subsurface soil sample (PPMP-138-GP01) at concentrations exceeding residential human health SSSLs and background concentrations. Aluminum, arsenic, and thallium were detected in subsurface soils at concentrations exceeding residential human health SSSLs but within background concentrations. VOCs and SVOCs were not detected in subsurface soil samples at concentrations exceeding residential human health SSSLs.

- Arsenic, iron, and manganese were detected in groundwater at concentrations exceeding residential human health SSSLs but within background concentrations. The VOC 1,4-dichlorobenzene and the SVOC 4-methylphenol were detected in the groundwater sample at concentrations exceeding residential human health SSSLs.

Although several metals and four PAHs were detected in site media at concentrations exceeding ecological ESVs, the potential impact to ecological receptors is expected to be minimal. This is based on the limited impacted area and the future land use of the Former Printing Plant, Building 143, which is expected to be residential 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, consequently, is expected to be minimally impacted.

The potential impact to human receptors is also expected to be minimal. With the exception of chromium and iron in one subsurface soil sample (PPMP-138-GP01), metals concentrations exceeding residential human health SSSLs were within background concentrations for all other samples and thus do not pose an unacceptable risk to future human receptors. The chromium concentration at sample location PPMP-138-GP01 was within the range of chromium values determined by SAIC. The iron concentration at sample location PPMP-138-GP01 was within the same order of magnitude as the background concentration. Although the concentration of benzo(a)pyrene exceeded the residential human health SSSL at two surface soil sample locations, the compound was not detected in any of the subsurface samples collected at the Former Printing Plant, Building 143. Given the limited impacted area, benzo(a)pyrene is not expected to pose an unacceptable risk to human health in the residential land use scenario.

Concentrations of 4-methylphenol and 1,4-dichlorobenzene exceeded residential human health SSSLs in the groundwater sample; however, the water sampled from the well likely represents surface water runoff present in the UST backfill material. The VOC 1,4-dichlorobenzene is mainly used as an insecticide and may have been used at Building 143 in this capacity. The SVOC 4-methylphenol is a common industrial chemical used in manufacturing including metal parts cleaning and may have been used in the Former Printing Plant in this capacity. None of the

surface or subsurface soil samples show detected quantities of either 1,4-dichlorobenzene or 4-methylphenol, however. Furthermore, because well PPMP-138-MW01 will not serve as a potable water source, the potential for human exposure is expected to be extremely low.

Based on the results of the SI, past operations at the Former Printing Plant, Building 143, 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 and 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 143, for both Parcels 138(7) and 37(7).

# 7.0 References


Cloud, P. E., Jr., 1966, ***Bauxite Deposits in the Anniston, Fort Payne and Ashville Areas, Northeast Alabama,*** U. S. Geological Survey Bulletin 1199-O, 35 p.

Environmental Science and Engineering, Inc. (ESE), 1998, ***Final Environmental Baseline Survey, Fort McClellan, Alabama***, prepared for U.S. Army Environmental Center, Aberdeen Proving Ground, Maryland, January.

Fort McClellan (FTMC), 1997, ***Fort McClellan Comprehensive Reuse Plan,*** prepared under contract to the Calhoun County Commision, November.

IT Corporation (IT), 2000a, ***Final Installation-Wide Sampling and Analysis Plan, Fort McClellan, Calhoun County, Alabama***, March.

IT Corporation (IT), 2000b, ***Final Human Health and Ecological Screening Values and PAH Background Summary Report, Fort McClellan, Calhoun County, Alabama***, July.

IT Corporation (IT), 1999, ***Final Site-Specific Field Sampling Plan and Site-Specific Safety and Health Plan Attachments for Underground Storage Tank Closure Assessments, Fort McClellan, Calhoun County, Alabama***, September.

IT Corporation (IT), 1998a, ***Final Site-Specific Field Sampling Plan Attachment for Former Printing Plant, Building 143 Basement, Parcel 138(7), Fort McClellan, Calhoun County, Alabama,*** December.

IT Corporation (IT), 1998b, ***Final Installation-Wide Work Plan, Fort McClellan, Calhoun County, Alabama***, October.

IT Corporation (IT), 1998c, Letter to Ellis Pope from Jeanne Yacoub, "Procedures for Temporary Residuum Monitoring Well Installation, Conversion, and Abandonment", November.

Moser, P. H. and S.S. DeJarnette, 1992, ***Groundwater Availability in Calhoun County, Alabama***, Geological Survey of Alabama Special Map 228.

Osborne, W. E., 1999, Personal Communication with John Hofer, IT Corporation.

Osborne, W. E., Irving, G. D., and Ward, W. E., 1997, ***Geologic Map of the Anniston 7.5' Quadrangle, Calhoun County, Alabama,*** Alabama Geologic Survey Preliminary Map, 1 sheet.

Osborne, W. Edward and Michael W. Szabo, 1984, ***Stratigraphy, Structure, and Geohydrologic Significance of the Jacksonville Fault, Calhoun County,*** Alabama.

Osborne, W. E., Szabo, M. W., Copeland, C. W. Jr., and Neathery, T. L., 1989, ***Geologic Map of Alabama,*** Alabama Geologic Survey Special Map 221, scale 1:500,000, 1 sheet.

Science Applications International Corporation, 1998, ***Final Background Metals Survey Report, Fort McClellan, Alabama***, July.

Szabo, M. W., Osborne, W. E., Copeland, C. W., Jr., and Neathery, T. L., compilers, 1988, ***Geologic Map of Alabama***, Alabama Geological Survey Special Map 220, scale 1:250,000, 5 sheets.

U.S. Army Corps of Engineers (USACE), 1994, ***Requirements for the Preparation of Sampling and Analysis Plans***, Engineer Manual EM 200-1-3, September 1.

U.S. Department of Agriculture, 1961, ***Soil Survey, Calhoun County, Alabama***, Soil Conservation Service, Series 1958, No. 9, September.

Warman, J. C, and Causey, L. V., 1962, ***Geology and Ground-Water Resources of Calhoun County, Alabama,*** Alabama Geological Survey County Report 7, 77 p.

# APPENDIX A

# SAMPLE COLLECTION LOGS

# CHAIN OF CUSTODY FORMS

# APPENDIX B

# BORING LOGS

# APPENDIX C

# SURVEY DATA

# Appendix C

## Survey Data
## Former Printing Plant, Building 143
## Fort McClellan, Calhoun County Alabama

| Sample Location | Northing | Easting | Ground Elevation (ft msl) | Top of Casing Elevation (ft msl) |
|---|---|---|---|---|
| PPMP-138-GP01 | 1169895.91 | 667837.79 | 796.34 | NA |
| PPMP-138-GP02 | 1169863.04 | 667758.42 | 796.21 | NA |
| PPMP-138-GP03 | 1169946.59 | 667722.97 | 793.59 | NA |
| PPMP-138-GP04 | 1169979.87 | 667788.27 | 793.69 | NA |
| PPMP-138-MW01 | 1169951.58 | 667766.81 | 793.34 | 792.67 |
| PPMP-138-MW02 | 1169952.06 | 667784.81 | 793.38 | 792.49 |
| UST-37-GP01 | 1169954.816 | 667788.261 | 793.13 | NA |
| UST-37-GP02 | 1169936.811 | 667756.721 | 793.56 | NA |
| UST-37-MW01 | 1169969.117 | 667768.159 | 793.16 | 792.89 |
| UST-37-MW01(SS) | 1169961.546 | 667771.446 | 793.00 | NA |

Horizontal coordinates were referenced to the U.S. State Plane Coordinate System, Alabama East Zone, North American Datum (NAD83), 1983

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

ft msl - Feet mean sea level.
NA - Not available, well not installed.

# APPENDIX D

# WELL DEVELOPMENT LOGS

# APPENDIX E

# SUMMARY OF VALIDATED ANALYTICAL DATA

# APPENDIX F

# DATA VALIDATION SUMMARY REPORT

# APPENDIX G

# VARIANCES/NONCONFORMANCES

# APPENDIX H

# SUMMARY STATISTICS FOR BACKGROUND MEDIA, FORT MCCLELLAN, ALABAMA

# 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 |