Final

Site Investigation Report
Former Printing Plant, Building 3183, Parcel 162(7)

Fort McClellan
Calhoun County, Alabama

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Executive Summary

In accordance with Contract Number DACA21-96-D-0018, Task Order CK05, IT Corporation completed a site investigation (SI) at the Former Printing Plant, Building 3183, Parcel 162(7) at Fort McClellan, Calhoun County, Alabama. The SI was conducted to determine whether chemical constituents are present at the Former Printing Plant, Building 3183, Parcel 162(7) and, if present, whether the concentrations would present an unacceptable risk to human health or the environment. The SI at the Former Printing Plant, Building 3183, Parcel 162(7) consisted of the sampling and analyses of four surface soil samples, four subsurface soil samples, and three groundwater samples. In addition, three groundwater monitoring wells were installed in the residuum groundwater zone to facilitate groundwater sample collection and to provide site-specific geological and hydrogeological characterization information.

Chemical analyses of samples collected at the Former Printing Plant, Building 3183, Parcel 162(7) indicate that metals, volatile organic compounds, and semivolatile organic compounds (SVOC) were detected in the environmental media sampled. To evaluate whether detected constituents pose an unacceptable risk to human health or the environment, analytical results were compared to site-specific screening levels (SSSL), ecological screening values and background screening values for Fort McClellan.

The potential impact to human receptors is expected to be minimal. With the exception of iron in subsurface soils, the metals that exceeded residential human health SSSLs were within background concentrations or the range of background values, and thus do not pose an unacceptable risk to future human receptors. The SVOC carbazole was detected in one groundwater sample at a concentration slightly exceeding the residential human health SSSL. Given the extremely limited impacted area, carbazole is not expected to pose an unacceptable risk to human health.

Several metals were detected in surface soils at concentrations exceeding ESVs and background concentrations. In addition, the concentrations of two volatile organic compounds and six SVOCs exceeded ecological screening values. However, the potential impact to ecological receptors is expected to be minimal based on the existing viable habitat. The site is a well-developed area and is projected for continued industrial/business use. Consequently, viable ecological habitat is not expected to increase.

Based on the results of the SI, past operations at the Former Printing Plant, Building 3183, Parcel 162(7) do not appear to have adversely impacted the environment. The metals and organic compounds detected in site media do not pose an unacceptable risk to human health or the environment in either the industrial/business or residential land-use scenario. Therefore, IT Corporation recommends "No Further Action" and unrestricted reuse with regard to hazardous, toxic, and radioactive waste at the Former Printing Plant, Building 3183, Parcel 162(7).

1.0 Introduction

The U.S. Army has selected Fort McClellan (FTMC) located in Calhoun County, Alabama, for closure by the Base Realignment and Closure (BRAC) Commission under Public Laws 100-526 and 101-510. The 1990 Base Closure Act, Public Law 101-510 established the process by which U.S. Department of Defense (DOD) installations would be closed or realigned. The BRAC Environmental Restoration Program requires investigation and cleanup of federal properties prior to transfer to the public domain. The U.S. Army is conducting environmental studies of the impact of suspected contaminants at parcels at FTMC under the management of the U.S. Army Corps of Engineers (USACE), Mobile District. The USACE contracted with IT Corporation (IT) to perform the site investigation (SI) at the Former Printing Plant, Building 3183, Parcel 162(7) under Prime Contract Number DACA21-96-D-0018, Task Order CK05.

This SI report presents specific information and results compiled from the SI, including field sampling and analysis and monitoring well installation activities conducted at the Former Printing Plant, Building 3183, Parcel 162(7).

1.1 Project Description

The Former Printing Plant, Building 3183, Parcel 162(7) was identified as an area to be investigated prior to property transfer. The Former Printing Plant, Building 3183, Parcel 162(7) 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 were finalized in December 1998 (IT, 1998a). The SFSP and SSHP provide technical guidance for sample collection and analysis at the Former Printing Plant, Building 3183, Parcel 162(7). The SFSP was used in conjunction with the SSHP as attachments to the installation-wide work plan (IT, 1998b), and the installation-wide sampling and analysis plan (SAP) (IT, 2000a). The SAP includes the installation-wide safety and health plan and quality assurance plan.

The SI included fieldwork to collect four surface soil samples, four subsurface soil samples, and three groundwater samples. Data from the field investigation were used to determine whether

potential site-specific chemicals are present at the Former Printing Plant, Building 3183, Parcel 162(7).

1.2 Purpose and Objectives

The SI program was designed to collect data from site media and provide a level of defensible data and information in sufficient detail to determine whether chemical constituents are present at the Former Printing Plant, Building 3183, Parcel 162(7) at concentrations that would present an unacceptable risk to human health or the environment. The conclusions of the SI in Section 6.0 are based on the comparison of the analytical results to human health site-specific screening levels (SSSL), ecological screening values (ESV), and background screening values for FTMC. The SSSLs and ESVs were developed by IT as part of the human health and ecological risk evaluations associated with SIs being performed under the BRAC Environmental Restoration Program at FTMC. The SSSLs, 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 (BCT) 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, Fort McClellan, Alabama* (Science Applications International Corporation [SAIC], 1998).

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

1.3 Site Description and History

The Former Printing Plant, Building 3183 is located in the east-central part of the Main Post (Figure 1-1). The study area in and around Building 3183 covers approximately 1 acre and is well developed and occupied. A small concrete block storage building (Building 3171) is located within this parcel as shown on Figure 1-1. The U.S. Army Military Police School (USAMPS) Museum (Building 3182), a General Purpose Storage Installation (Building 3170), and a Battalion Headquarters (Building 3160) are located to the east, west, and northwest of Building 3183. These buildings are not listed in the Community Environmental Response Facilitation Act (CERFA) parcel list as needing investigation. Buildings 3192, 3182, 3181, and 3180 are all to the east and northeast of Building 3183.

In the area near the Former Printing Plant, the Old Toxic Training Area, Parcel 188(7) has been identified for further investigation. Parcel 188(7) is an area of approximately 1 acre where chemical warfare material (CWM) detection and decontamination training may have been performed during the late 1950s and early 1960s. This parcel lies to the south and east of Parcel 162(7) across an unnamed paved road. Parcel 188(7) is one parcel that has been combined with a number of other possible CWM sites on the Main Post that have had a SI and are now scheduled for a remedial investigation (IT, 2000c).

In addition to Parcel 188(7), other environmental work has been collected near the Former Printing Plant. According to the EBS, Building 3182 was a radiological training building that housed the Calibration Laboratory W operation from the late 1950s or early 1960s to 1973 (ESE, 1998). In 1973, the U.S. Army Environmental Hygiene Agency (USAEHA) conducted a survey that indicated fixed radiological contamination was present in the building. Building remediation involving floor tile removal was conducted in 1973, confirmatory samples were collected, and the building was given clearance for unrestricted use. The building was most recently used to house the USAMPA museum, offices, and classrooms. Since the EBS, Building 3182 was resurveyed in November 1999 by Allied Technology Group (2000).

Building 3183, which was built in 1955, was the location of a printing plant at FTMC until summer 1999, and has only been used for printing operations. Prior to 1994, the printing operation used and stored solvents, petroleum hydrocarbons, and inks. These potential substances include perchloroethylene, petroleum naphtha, and potassium ferrocyanide (ESE, 1998). These solvents were stored in 55-gallon drums in a chemical storage area that is bermed with concrete. In 1994, the printing process changed to a less hazardous dry process. Printing wastes from the old process were stored in this building until 1995. It is believed that all wastes have been disposed (ESE, 1998). A floor drain is not present in the chemical storage area and the concrete berm is approximately 6 inches high at the doorstep (ESE, 1998). This area was most recently used to store containers of waste oil. During the June 1998 IT site visit, a steam pit was observed on the north side of the building (Figure 1-2). The steam pit appears to be part of the building heating system and not related to the former printing operations.

Surface drainage features in the vicinity of the site drain towards the north to Remount Creek. South Branch Cane Creek is situated 900 feet east-southeast of the site. An aqueduct traverses the Main Post from southwest to northeast and is 800 feet north-northwest of Building 3183 at its closest point. Shallow groundwater at the site is probably controlled by surface drainage and/or

topography and likely flows north or northeast. Site elevation ranges from 795 to 805 feet above sea level as established by the National Geodetic Vertical Datum. Figure 1-2 is a site map showing topographic features and site boundaries.

The soil type at the Printing Plant, Building 3183, is the Anniston and Allen gravelly loam, which is a friable, deep, strongly acid, well-drained soil that has developed in old local alluvium. This soil is formed either by erosional forces, surface runoff, or natural, reworking processes. The surface horizon is usually a very dark brown loam or dark grayish-brown sandy loam, while the subsoil is a dark red sandy clay loam. Sandstone and quartzite gravel and cobbles, as much as 8 inches in diameter, are on the surface and throughout the soil. Although erosion is a problem, this soil type can be productive in areas with little or no slope (U.S. Department of Agriculture, 1961).

2.0 Previous Investigations

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

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

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

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

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

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

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

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

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

site inspections were conducted to verify conditions of specific property parcels. The Former Printing Plant, Building 3183, Parcel 162(7) was identified as a Category 7 CERFA parcel: areas that are not evaluated or require further evaluation. Previous environmental studies have not been conducted at this site.

3.0 Current Site Investigation Activities

This chapter summarizes SI activities conducted by IT at the Former Printing Plant, Building 3183, Parcel 162(7), including environmental sampling and analysis and groundwater monitoring well installation activities.

3.1 Environmental Sampling

The environmental sampling performed during the SI at the Former Printing Plant, Building 3183, Parcel 162(7) included the collection of surface soil samples, subsurface soil samples, and groundwater samples for chemical analysis. The sample locations were determined by observing site physical characteristics noted during a site walk over and by reviewing historical documents pertaining to activities conducted at the site. The sample locations, media, and rationale are summarized in Table 3-1. Samples were submitted for laboratory analyses of site-related parameters listed in Section 3.3.

3.1.1 Surface Soil Sampling

Surface soil samples were collected from four locations at the Former Printing Plant, Building 3183, Parcel 162(7), as shown on Figure 3-1. Surface soil sampling locations and rationale are presented in Table 3-1. Surface soil sample designations and quality assurance/quality control (QA/QC) samples are listed in Table 3-2. Surface soil sampling locations were determined in the field by the on-site geologist based on the sampling rationale, presence of surface structures, site topography, and buried and overhead utilities.

Sample Collection. Surface soil samples were collected from the upper 1 foot of soil with a 3-inch diameter stainless-steel hand auger using the methodology specified in Section 4.9 of the SAP (IT, 2000a). Surface soil samples were collected by first removing surface debris, such as rocks and vegetation, from the immediate sample area. At sample locations PPMP-162-GP03 and PPMP-162-GP04, a small section of pavement and subpavement were cut and removed before the samples were collected. 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
Printing Plant, Building 3183, Parcel 162(7)
Fort McClellan, Calhoun County, Alabama

Sample Designation	Sample Media	Sample Location Rationale
PPMP-162-GP01	Surface Soil Subsurface Soil Groundwater	Direct-push samples were collected at the northeast corner of the study parcel. Due to the proximity of underground utilities and the underground steam pit tank, this sampling location represents a potential location for contaminant infiltration to the subsoil or groundwater.
PPMP-162-GP02	Surface Soil Subsurface Soil Groundwater	Direct-push samples were collected at the northwest corner of the study parcel. This sampling location represents a likely point for the collection and infiltration of runoff at the site due to the proximity of sewer lines and underground utilities.
PPMP-162-GP03	Surface Soil Subsurface Soil Groundwater	Direct-push samples were collected at the southwest corner of the study parcel, near the west loading dock. This sampling location represents a likely point for the collection and infiltration of contaminants at the site.
PPMP-162-GP04	Surface Soil Subsurface Soil	Direct-push samples were collected at the southeast corner of the study parcel, near the east loading dock. This sampling location represents a likely point for the collection and infiltration of contaminants at the site.

Table 3-2

Surface Soil and Subsurface Soil Sample Designations and QA/QC Samples
Printing Plant, Building 3183, Parcel 162(7)
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Designation	Sample Depth (ft bgs)	QA/QC Samples			Analytical Suite
			Field Duplicates	Field Splits	MS/MSD	
PPMP-162-GP01	PPMP-162-GP01-SS-KG0001-REG	0-1			PPMP-162-GP01-SS-KG0001-MS	TCL VOCs, TCL SVOCs,
	PPMP-162-GP01-DS-KG0002-REG	9-12			PPMP-162-GP01-SS-KG0001-MSD	TAL Metals, Cyanide
PPMP-162-GP02	PPMP-162-GP02-SS-KG0003-REG	0-1				TCL VOCs, TCL SVOCs,
	PPMP-162-GP02-DS-KG0004-REG	9-12				TAL Metals, Cyanide
PPMP-162-GP03	PPMP-162-GP03-SS-KG0005-REG	0-1				TCL VOCs, TCL SVOCs,
	PPMP-162-GP03-DS-KG0006-REG	6-9				TAL Metals, Cyanide
PPMP-162-GP04	PPMP-162-GP04-SS-KG0007-REG	0-1	PPMP-162-GP04-SS-KG0008-FD	PPMP-162-GP04-SS-KG0009-FS		TCL VOCs, TCL SVOCs,
	PPMP-162-GP04-DS-KG0010-REG	9-12				TAL Metals, Cyanide

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.

3.1.2 Subsurface Soil Sampling

Subsurface soil samples were collected from four soil borings at the Former Printing Plant, Building 3183, Parcel 162(7) as shown on Figure 3-1. Subsurface sampling locations and rationale are presented in Table 3-1. Subsurface soil sample designations, depths, and QA/QC samples are listed in Table 3-2. Soil boring sampling locations were determined in the field by the on-site geologist based on the sampling rationale, presence of surface structures, site topography, and buried and overhead utilities. IT contracted TEG, Inc., a direct-push technology subcontractor, to assist in subsurface soil sample collection.

Sample Collection. Subsurface soil samples were collected from soil borings at a depth greater than 1 foot below ground surface (bgs) in the unsaturated zone. The soil borings were advanced and soil samples collected using the direct-push sampling procedures specified in Section 4.9.1.1 of the SAP (IT, 2000a). Sample collection logs are included in Appendix A. The samples were analyzed for the parameters listed in Table 3-2 using methods outlined in Section 3.3.

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

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

3.1.3 Well Installation

Three temporary wells were installed in the residuum groundwater zone at the Former Printing Plant, Building 3183, Parcel 162(7) to collect groundwater samples for laboratory analyses. The well/groundwater sample locations are shown on Figure 3-1. Table 3-3 summarizes construction

Table 3-3

Temporary Well Construction Summary
Printing Plant, Building 3183, Parcel 162(7)
Fort McClellan, Calhoun County, Alabama

Temporary Well	Northing	Easting	Ground Elevation (ft msl)	TOC Elevation (ft msl)	Well Depth (ft bgs)	Screen Length (ft)	Screen Interval (ft bgs)	Well Material
PPMP-162-GP01	1167263.09	668098.45	806.36	806.99	14.00	10	3.75 - 13.75	2" ID Sch. 40 PVC
PPMP-162-GP02	1167231.97	667980.68	804.27	806.44	14.15	10	3.75 - 13.75	2" ID Sch. 40 PVC
PPMP-162-GP03	1167118.66	668026.14	804.42	804.21	15.50	10	5.25 - 15.25	2" ID Sch. 40 PVC

All temporary wells installed with an auger drill rig using 4.25-inch inside diameter hollow-stem auger.
Horizontal coordinates 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).
2" ID Sch. 40 PVC - 2-inch inside diameter, Schedule 40, polyvinyl chloride.
bgs - Below ground surface.
ft - Feet.
msl - Mean sea level.
TOC - Top of casing.

details of the temporary wells installed at the Former Printing Plant, Building 3183, Parcel 162(7). The temporary well construction logs are included in Appendix B.

IT contracted Miller Drilling, Inc., to install the temporary wells with a hollow-stem auger rig in January 1999 at the well/groundwater sample locations shown on Figure 3-1. The wells were installed following procedures outlined in Section 4.7 and Appendix C of the SAP (IT, 2000a). The boreholes at these locations were advanced with a 4.25-inch inside diameter (ID) hollow-stem auger from ground surface to the first water-bearing zone in residuum at the well location. The borehole was augered to the depth of direct-push sampler refusal and samples were collected at the depth of direct-push refusal to the bottom of the borehole. A 2-foot long, 2-inch ID carbon steel split spoon sampler was driven at 5-foot intervals to collect residuum for observing and describing lithology. Where spoon refusal was encountered, the auger was advanced until the first water-bearing zone was encountered. The on-site geologist logging the auger boreholes at the Former Printing Plant, Building 3183, Parcel 162(7) continued the detailed lithological log for each borehole from the depth of split-spoon refusal to the bottom of the auger borehole by logging the auger drill cuttings. The drill cuttings were logged to determine lithologic changes and the approximate depth of groundwater encountered during drilling. This information was used to determine the optimal placement of the monitoring well screen interval and to provide site-specific geologic and hydrogeologic information. The lithological log for each borehole is included in Appendix B.

Upon reaching the target depth, a 10-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 (environmentally safe, clean fine sand, sieve size 20 to 40) 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 using a solid PVC surge block, 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. A locking well cap was placed on the PVC well casing. The temporary well surface completion included attaching plastic sheeting around the PVC riser using duct tape. Additionally, sand bags were used to secure the sheeting to the ground surface around the temporary well.

The 2-inch diameter temporary wells that were installed using hollow-stem augers were developed by surging and pumping with a submersible pump in accordance with methodology

outlined in Section 4.8 and Appendix C of the SAP (IT, 2000a). The submersible pump being used for well development is moved in an up and down fashion to encourage any residual well installation materials to enter the well. These materials are then pumped out of the well in order to re-establish the natural hydraulic flow conditions. Development was performed until the water turbidity was equal to or less than 20 nephelometric turbidity units or for a maximum of 4 hours. The well development logs are included in Appendix C.

3.1.4 Water Level Measurements

The depth to groundwater was measured in the temporary wells installed at the Former Printing Plant, Building 3183, Parcel 162(7) on March 14, 2000 following procedures outlined in Section 4.18 of the SAP (IT, 2000a). Near Parcel 162(7), water levels in the wells at the Former Motor Pool Area 3100, Parcel 146(7) were also measured on March 14, 2000. Depth to groundwater was measured with an electronic water level meter. The meter probe and cable were cleaned between use at each well following decontamination methodology presented in Section 4.10 of the SAP (IT, 2000a). Measurements were referenced to the top of the PVC casing. A summary of groundwater level measurements from both parcels is presented in Table 3-4.

3.1.5 Groundwater Sampling

Groundwater was sampled from the three temporary wells installed at the Former Printing Plant, Building 3183, Parcel 162(7). The well/groundwater sampling locations are shown on Figure 3-1. The groundwater sampling locations and rationale are listed in Table 3-1. The groundwater sample designations and QA/QC samples are listed in Table 3-5.

Sample Collection. Groundwater sampling was performed at the temporary well locations following procedures outlined in Section 4.9.1.4 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 equipped with Teflon™ tubing. Field parameters were measured using a calibrated water quality meter. Field parameter readings are summarized in Table 3-6. Sample collection logs are included in Appendix A. The samples were analyzed for the parameters listed in Table 3-5 using methods outlined in Section 3.3.

As shown on Table 3-5, location PPMP-162-GP02 was not sampled for semivolatile organic compounds (SVOC) or cyanide analysis as planned because of poor recharge encountered during purging and sampling of the well. Well GP02 was purged dry during sampling. After repeated

Table 3-4

Groundwater Elevations
Printing Plant, Building 3183, Parcel 162(7)
Fort McClellan, Calhoun County, Alabama

Well Location	Date	Depth to Water (ft BTOC)	Top of Casing Elevation (ft msl)	Ground Elevation (ft msl)	Groundwater Elevation (ft msl)
PPMP-162-GP01	14-Mar-00	6.84	806.99	806.36	800.15
PPMP-162-GP02	14-Mar-00	9.39	806.44	804.27	797.05
PPMP-162-GP03	14-Mar-00	4.59	804.21	804.42	799.62
FTA-146-GP02	14-Mar-00	16.33	823.57	822.73	807.24
FTA-146-GP05	14-Mar-00	16.00	822.16	820.95	806.16
FTA-146-GP06	14-Mar-00	14.75	819.91	820.18	805.16
FTA-146-GP07	14-Mar-00	17.71	823.74	821.22	806.03
FTA-146-GP08	14-Mar-00	17.32	824.04	823.50	806.72
FTA-146-GP09	14-Mar-00	18.31	824.45	823.35	806.14
FTA-146-GP10	14-Mar-00	17.21	822.87	821.25	805.66

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 Samples
Printing Plant, Building 3183, Parcel 162(7)
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Designation	Sample Depth (ft btoc)	QA/QC Samples			Analytical Suite
			Field Duplicates	Field Splits	MS/MSD	
PPMP-162-GP01	PPMP-162-GP01-GW-KG3001-REG	11.63-14.38	PPMP-162-GP01-GW-KG3002-FD	PPMP-162-GP01-GW-KG3003-FS		TCL VOCs, TCL SVOCs, TAL Metals, Cyanide
PPMP-162-GP02	PPMP-162-GP02-GW-KG3004-REG	*				*TCL VOCs, TAL Metals
PPMP-162-GPO3	PPMP-162-GP03-GW-KG3005-REG	7.92-15.04			PPMP-162-GP03-GW-KG3005-MS PPMP-162-GP03-GW-KG3005-MSD	TCL VOCs, TCL SVOCs, TAL Metals, Cyanide

FD - Field duplicate.
FS - Field split.
ft btoc - Feet below top of casing.
MS/MSD - Matrix spike/matrix spike duplicate.
QA/QC - Quality assurance/quality control.
SVOC - Semivolatile organic compound.
TAL - Target analyte list.
TCL - Target compound list.
VOC - Volatile organic compound.
* - Limited quantity of groundwater recovered from bottom of well; bottom screen is at a depth of 15.92 ft btoc.

Table 3-6

Groundwater Field Parameters
Printing Plant, Building 3183, Parcel 162(7)
Fort McClellan, Calhoun County, Alabama

Sample Location	Date	Media	Specific Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Oxidation Reduction Potential (mV)	Temperature (^{o}C)	Turbidity (NTUs)	pH (SU)
PPMP-162-GP01	3-Feb-99	GW	0.4096	2.82	162	30.99	0.6	6.50
PPMP-162-GP02	29-Jan-99	GW	0.3277	5.44	156	22.63	0	6.62
PPMP-162-GP03	29-Jan-99	GW	0.5225	0.72	42	20.25	25.2	7.33

mS/cm - Millisiemens per centimeter.
mg/L - Milligrams per liter.
mV - Millivolts.
^{o}C - Degrees Celsius.
NTUs - Nephelometric turbidity units.
SU - Standard units.
GW - Groundwater.

attempts to collect adequate sample volume, aliquots were collected for VOC and metals analysis only.

3.2 Surveying of Sample Locations

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

3.3 Analytical Program

Samples collected during the SI were analyzed for various chemical properties. The specific suite of analyses performed is based on the potential site-specific chemicals historically at the site and EPA, ADEM, FTMC, and USACE requirements. Samples collected from the Former Printing Plant, Building 3183, Parcel 162(7) were analyzed for the following parameters:

- Target Compound List VOCs - Method 5035/8260B
- TCL SVOCs - Method 8270C
- Target Analyte List Metals - Method 6010B/7000
- Cyanide - Method 9010B.

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

3.4 Sample Preservation, Packaging, and Shipping

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

4.13 of the SAP (IT, 2000a).

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

3.5 Investigation-Derived Waste Management and Disposal

Investigation-derived waste (IDW) was managed and disposed as outlined in Appendix D of the SAP (IT, 2000a). The IDW generated from the field sampling at the Former Printing Plant, Building 3183, Parcel 162(7) was segregated as follows:

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

Solid IDW was stored inside the fenced area surrounding Buildings 335 and 336 in lined rolloff bins prior to characterization and final disposal. Solid IDW was characterized using toxicity characteristic leaching procedure analyses. Based on the results, drill cuttings and PPE generated during the SI at the Former Printing Plant, Building 3183, Parcel 162(7) were disposed as non-regulated waste at the Industrial Waste Landfill on the Main Post of FTMC.

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

3.6 Variances/Nonconformances

3.6.1 Variances

There were not any variances to the SFSP recorded during completion of the SI at the Former Printing Plant, Building 3183, Parcel 162(7).

3.6.2 Nonconformances

There was one nonconformance to the SFSP recorded during completion of the SI at the Former Printing Plant, Building 3183, Parcel 162(7) (Appendix G). Because of limited sample volume at the time of sample collection, the groundwater sample collected from PPMP-162-GP02 was not analyzed for SVOCs and cyanide.

3.7 Data Quality

The field sample results data are presented in tabular form in Appendix E. The field samples were collected, documented, handled, analyzed, and reported in a manner consistent with the SI work plan; the FTMC SAP and installation-wide quality assurance plan; and standard, accepted methods and procedures. Sample collection logs pertaining to the collection of the samples were reviewed and organized for this report and are included in Appendix A. As discussed in Section 3.6, there was one nonconformance identified in the field. However, this nonconformance has not impacted the usability of the data.

Data Validation. A complete (100 percent) Level III data validation effort was performed on the reported analytical data. Appendix F consists of a data validation summary report that was prepared to discuss the results of the validation. Selected results were rejected or otherwise qualified based on the implementation of accepted data validation procedures and practices during the validation effort. These qualified parameters are highlighted in the report. The validation-assigned qualifiers were added to the FTMC IT Environmental Management System™ database for tracking and reporting. The qualified data were used in the comparison to the SSSLs and ESVs developed by IT. Rejected data (assigned an "R" qualifier) were not used in the comparison to the SSSLs or 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 3183, Parcel 162(7) provided soil, geological, and groundwater data. These data were used to characterize the geology and hydrogeology of the site.

4.1 Regional and Site Geology

4.1.1 Regional Geology

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

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

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

The basal unit of the sedimentary sequence in Calhoun County is the Cambrian Chilhowee Group. The Chilhowee Group is comprised of the Cochran, Nichols, Wilson Ridge, and Weisner Formations (Osborne and Szabo, 1984), but in Calhoun County is either undifferentiated or divided into the Cochran and Nichols Formations and an upper undifferentiated Wilson Ridge and Weisner Formation. The Cochran is composed of poorly sorted arkosic sandstone and conglomerate with interbeds of greenish-gray siltstone and mudstone. Massive to laminated,

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

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

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

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

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

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

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

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

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

The Mississippian Fort Payne Chert and the Maury Formation overlie the Frog Mountain Sandstone and are composed of dark- to light-gray limestone with abundant chert nodules and greenish-gray to grayish-red phosphatic shale with increasing amounts of calcareous chert toward the upper portion of the formation (Osborne and Szabo, 1984). These units occur in the northwestern portion of Pelham Range. Overlying the Fort Payne Chert is the Floyd Shale, also of Mississippian age, which consists of thin-bedded, fissile brown to black shale with thin intercalated limestone layers and interbedded sandstone. Osborne and Szabo (1984) reassigned the Floyd Shale, which was mapped by Warman and Causey (1962) on the Main Post of FTMC, to the Ordovician Athens Shale based on fossil data.

The Jacksonville Thrust Fault is the most significant structural geologic feature 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 the Former Printing Plant, Building 3183, Parcel 162(7) are identified as Anniston and Allen gravelly loam, which is a friable, deep, strongly acid, well-drained soil that has developed in old local alluvium (U.S. Department of Agriculture, 1961). This soil is formed either by erosional forces, surface runoff, or naturally reworking processes. The surface horizon is usually a very dark brown loam or dark grayish-brown sandy loam, while the subsoil is a dark red sandy clay loam. Sandstone and quartzite gravel and cobbles, as much as 8 inches in diameter, are on the surface and throughout the soil.

Bedrock beneath the Former Printing Plant, Building 3183, Parcel 162(7), is mapped as the Ordovician/Mississippian Athens Shale, and Floyd Shale, undifferentiated and the Ordovician Little Oak and Newala Limestones. A contact between the shale and limestone units is mapped striking southwest to northeast through the center of the site. 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.

Four borings were installed at the Former Printing Plant, Building 3183, Parcel 162(7) to collect lithogic data and characterize the underlying geology. Total depth of the borings ranged from 12 to 15.5 feet bgs across the site. Based on this information, brownish-red to reddish-brown clay residuum is the primary soil type present from ground surface to 15.5 feet bgs. Underlying the clay, chert was detected in one of the borings at a depth of 15.5 feet bgs. Bedrock was not encountered during drilling activity.

4.2 Site Hydrology

4.2.1 Surface Hydrology

Precipitation in the form of rainfall averages about 54 inches annually in Anniston, Alabama, with infiltration rates annually exceeding evapotranspiration rates. The major surface water features at the Main Post of FTMC include Remount Creek, Cane Creek, and Cave Creek. These waterways flow in a general northwest to westerly direction towards the Coosa River on the western boundary of Calhoun County.

Surface runoff at the Former Printing Plant, Building 3183, Parcel 162(7) follows the site topography and generally flows to the north-northwest. Storm drainage lines are located on the northern and western sides of the Former Printing Plant, Building 3183.

4.2.2 Hydrogeology

During boring and well installation activities, groundwater was encountered in the clay soils. Static groundwater levels were measured on March 14, 2000 as summarized in Table 3-4. Static groundwater elevations from monitoring wells located at Parcel 146 were used in the construction of the groundwater elevation map for Parcel 162(7) to allow accurate representation of groundwater elevations and flow for Parcel 162(7). Groundwater elevations were calculated by measuring the depth to groundwater relative to the surveyed top-of-casing elevations. A groundwater elevation map constructed from data from March 14, 2000 is shown on Figure 4-1. Based on the March groundwater levels, horizontal groundwater flow is to the northwest, following the general slope of the surface topography, with a gradient of approximately 0.026 feet per foot. Static groundwater levels summarized in Table 3-4 are at shallower depths than depth to water data from the drilling logs (Appendix B). This is indicative of upward vertical hydraulic head.

5.0 Summary of Analytical Results

The results of the chemical analyses of samples collected at the Former Printing Plant, Building 3183, Parcel 162(7) indicate that metals, VOCs, and SVOCs, have been detected in the various site media. Cyanide was not detected in any of the samples collected. To evaluate whether the detected constituents present an unacceptable risk to human health and the environment, detected constituent concentrations were compared to the human health SSSLs and ESVs for FTMC. The SSSLs and ESVs were developed by IT for human health and ecological risk evaluations as part of the ongoing SIs being performed under the BRAC Environmental Restoration Program at FTMC.

Metal concentrations exceeding the SSSLs and ESVs were subsequently compared to background metals screening values (background concentrations) (SAIC, 1998) to determine if the metals concentrations are within natural background concentrations. Summary statistics for background metals samples collected at FTMC (SAIC, 1998) are included in Appendix H. Additionally, SVOC concentrations in surface 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 that were determined to represent anthropogenic activity at FTMC (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 the more conservative (i.e., lower) of the PAH background values and are the values used herein for comparison.

Six compounds were quantified by both SW-846 Method 8260B (as VOC) and Method 8270C (as SVOC), including 1,2,4-trichlorobenzene, 1,4-dichlorobenzene, 1,3-dichlorobenzene, 1,2-dichlorobenzene, hexachlorobutadiene, and naphthalene. Method 8260B yields a reporting limit (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. This evaluation was conducted for naphthalene for which results were reported from both methods.

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 3183, Parcel 162(7). Surface soil samples were collected from the upper 1 foot of soil at the locations shown on Figure 3-1. Analytical results were compared to residential human health SSSLs and ESVs and background concentrations, as presented in Table 5-1.

Metals. Twenty-two metals were detected in surface soil samples collected at the Former Printing Plant, Building 3183, Parcel 162(7).

The concentrations of aluminum (PPMP-162-GP01, PPMP-162-GP02 and PPMP-162-GP03), arsenic (all four locations), chromium (PPMP-162-GP02 and PPMP-162-GP03), iron (all four locations), manganese (PPMP-162-GP02), and thallium (PPMP-162-GP03) exceeded residential human health SSSLs. However, with the exception of arsenic (PPMP-162-GP02 and PPMP162-GP03) and iron (PPMP-162-GP02 and PPMP162-GP03), the concentrations of these metals were within background concentrations. The arsenic and iron concentrations were within the range of background values determined by SAIC (1998).

Aluminum (all four locations), arsenic (all four locations), chromium (all four locations), iron (all four locations), lead (PPMP-162-GP04), manganese (PPMP-171-GP02), nickel (PPMP-162-GP03), selenium (PPMP-162-GP01, PPMP-162-GP02 and PPMP-162-GP03), silver (PPMP-162-GP02 and PPMP-162-GP03), vanadium (all four locations), zinc (PPMP-162-GP02 and PPMP-162-GP03), and mercury (PPMP-162-GP03) exceeded ESVs. Arsenic (PPMP-162-GP02 and PPMP162-GP03), iron (PPMP-162-GP02 and PPMP162-GP03), lead (PPMP-162-GP04), nickel (PPMP-162-GP03), selenium (PPMP-162-GP01, PPMP-162-GP02 and PPMP-162-GP03), silver (PPMP-162-GP02 and PPMP-162-GP03), zinc (PPMP-162-GP02 and PPMP-162-GP03), and mercury (PPMP-162-GP03) concentrations also exceeded the background

Table 5-1

Surface Soil Analytical Results
Printing Plant, Building 3183, Parcel 162(7)
Fort McClellan, Calhoun County, Alabama

					Parcel	PPMP-162					PPMP-162					PPMP-162					PPMP-162			
					Sample Location	PPMP-162-GP01					PPMP-162-GP02					PPMP-162-GP03					PPMP-162-GP04			
					Sample Number	KG0001					KG0003					KG0005					KG0007			
					Sample Date	14-Jan-99					14-Jan-99					14-Jan-99					18-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
METALS																								
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	1.01E+04			YES	YES	1.36E+04			YES	YES	1.40E+04			YES	YES	3.96E+03			
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	1.03E+01			YES	YES	2.65E+01		YES	YES	YES	1.70E+01		YES	YES	YES	2.00E+00			YES
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	5.07E+01					4.19E+01					3.99E+01					1.90E+01	J		
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	8.00E-01		YES			7.00E-01					1.10E+00		YES		YES	1.40E-01	B		
Cadmium	mg/kg	2.90E-01	6.25E+00	1.60E+00	ND					ND					4.00E-01	J	YES			ND			
Calcium	mg/kg	1.72E+03	NA	NA	2.70E+03		YES			1.46E+03					4.12E+03		YES			9.08E+03		YES	
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	1.92E+01	J			YES	3.00E+01	J		YES	YES	3.29E+01	J		YES	YES	1.89E+01			
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	ND					ND					6.30E+00	J				3.60E+00	J		
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	2.24E+01		YES			2.30E+01		YES			3.28E+01		YES			6.30E+00			
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	2.93E+04			YES	YES	4.99E+04		YES	YES	YES	3.70E+04		YES	YES	YES	7.22E+03			YES
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	1.90E+01					2.63E+01					2.46E+01					1.08E+02	J	YES	
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	9.85E+02					8.55E+02					2.36E+03		YES			3.36E+03		YES	
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	1.72E+02	J			YES	5.60E+02	J		YES	YES	1.60E+02	J			YES	6.01E+01			
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	8.20E-02		YES			8.10E-02		YES			2.70E-01		YES		YES	5.40E-02			
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	1.32E+01		YES			1.47E+01		YES			3.99E+01	J	YES		YES	6.30E+00	J		
Potassium	mg/kg	8.00E+02	NA	NA	4.22E+02	J				4.88E+02	J				6.69E+02					2.15E+02	J		
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	1.30E+00		YES		YES	2.80E+00		YES		YES	1.20E+00		YES		YES	ND			
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00	1.60E+00		YES			3.10E+00		YES		YES	2.60E+00		YES		YES	ND			
Sodium	mg/kg	6.34E+02	NA	NA	5.57E+01	B				6.65E+01	B				8.59E+01	B				4.12E+01	B		
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00	ND					ND					9.40E-01	J		YES		ND			
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	1.54E+01				YES	2.30E+01				YES	2.21E+01				YES	1.10E+01			
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	4.76E+01	J	YES			5.13E+01	J	YES		YES	7.83E+01	J	YES		YES	2.99E+01			
SEMIVOLATILE ORGANIC COMPOUNDS																								
2-Methylnaphthalene	mg/kg	NA	1.55E+02	NA	ND					ND					6.80E-01					3.00E-01	J		
Acenaphthene	mg/kg	7.02E-01	4.63E+02	2.00E+01	ND					ND					3.60E-01	J				ND			
Acenaphthylene	mg/kg	8.91E-01	4.63E+02	6.82E+02	ND					ND					2.80E-01	J				ND			
Anthracene	mg/kg	9.35E-01	2.33E+03	1.00E-01	4.40E-02	J				4.10E-02	J				8.90E-01				YES	ND			
Benzo(a)anthracene	mg/kg	1.19E+00	8.51E-01	5.21E+00	1.10E-01	J				1.10E-01	J				7.00E-01					ND			
Benzo(a)pyrene	mg/kg	1.42E+00	8.51E-02	1.00E-01	8.40E-02	J				1.10E-01	J		YES	YES	5.00E-01			YES	YES	ND			
Benzo(b)fluoranthene	mg/kg	1.66E+00	8.51E-01	5.98E+01	1.00E-01	J				1.30E-01	J				4.00E-01	J				2.30E-01	J		
Benzo(ghi)perylene	mg/kg	9.55E-01	2.32E+02	1.19E+02	4.90E-02	J				5.90E-02	J				2.60E-01	J				ND			
Benzo(k)fluoranthene	mg/kg	1.45E+00	8.51E+00	1.48E+02	6.90E-02	J				9.60E-02	J				4.30E-01					ND			
Carbazole	mg/kg	NA	3.11E+01	NA	ND					4.10E-02	J				2.40E-01	J				ND			
Chrysene	mg/kg	1.40E+00	8.61E+01	4.73E+00	1.10E-01	J				1.20E-01	J				6.30E-01					1.90E-01	J		
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	2.00E+02	9.00E-02	B				8.30E-02	B				7.60E-02	B				ND			
Dibenz(a,h)anthracene	mg/kg	7.20E-01	8.61E-02	1.84E+01	ND					ND					1.30E-01	J		YES		ND			
Dibenzofuran	mg/kg	NA	3.09E+01	NA	ND					ND					4.60E-01					ND			
Fluoranthene	mg/kg	2.03E+00	3.09E+02	1.00E-01	2.60E-01	J			YES	2.80E-01	J			YES	1.80E+00				YES	3.60E-01	J		
Fluorene	mg/kg	6.67E-01	3.09E+02	1.22E+02	ND					ND					1.00E+00		YES			ND			
Indeno(1,2,3-cd)pyrene	mg/kg	9.37E-01	8.51E-01	1.09E+02	4.70E-02	J				5.80E-02	J				2.40E-01	J				ND			
Naphthalene	mg/kg	3.30E-02	1.55E+02	1.00E-01	ND					ND					2.70E-01	J	YES		YES	1.20E+00	J	YES	
Phenanthrene	mg/kg	1.08E+00	2.32E+03	1.00E-01	2.10E-01	J			YES	1.80E-01	J			YES	3.40E+00		YES		YES	ND			
Pyrene	mg/kg	1.63E+00	2.33E+02	1.00E-01	2.30E-01	J			YES	2.30E-01	J			YES	1.60E+00				YES	4.00E-01	J		
bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	9.30E-01	8.30E-02	B				6.70E-02	B				7.40E-02	B				ND			

Table 5-1

Surface Soil Analytical Results
Printing Plant, Building 3183, Parcel 162(7)
Fort McClellan, Calhoun County, Alabama

				Parcel	PPMP-162					PPMP-162					PPMP-162					PPMP-162			
				Sample Location	PPMP-162-GP01					PPMP-162-GP02					PPMP-162-GP03					PPMP-162-GP04			
				Sample Number	KG0001					KG0003					KG0005					KG0007			
				Sample Date	14-Jan-99					14-Jan-99					14-Jan-99					18-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
VOLATILE ORGANIC COMPOUNDS																							
1,2,4-Trimethylbenzene	mg/kg	NA	3.88E+02	1.00E-01	ND					ND					ND					1.40E-01	J		
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	ND					ND					ND					7.70E-03	J		
Acetone	mg/kg	NA	7.76E+02	2.50E+00	8.30E-03	B				1.90E-02	B				8.90E-03	B				6.40E-02	B		
Benzene	mg/kg	NA	2.17E+01	5.00E-02	ND					ND					ND					2.00E-02	J		
Bromomethane	mg/kg	NA	1.09E+01	NA	5.00E-03	B				3.80E-03	B				1.60E-03	B				2.10E-03	B		
Cumene	mg/kg	NA	7.77E+02	NA	ND					ND					ND					2.00E-02	J		
Ethylbenzene	mg/kg	NA	7.77E+02	5.00E-02	ND					ND					ND					3.20E-02	J		
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00	4.10E-03	B				3.40E-03	B				3.30E-03	B				4.80E-03	B		
Naphthalene	mg/kg	3.30E-02	1.55E+02	1.00E-01	ND					ND					1.90E-02	J				1.80E-01	J	YES	
Trichlorofluoromethane	mg/kg	NA	2.33E+03	1.00E-01	3.20E-03	J				ND					ND					ND			
m,p-Xylenes	mg/kg	NA	1.55E+04	5.00E-02	ND					ND					ND					4.70E-03	J		
n-Butylbenzene	mg/kg	NA	7.77E+01	NA	ND					ND					ND					3.20E-02	J		
n-Propylbenzene	mg/kg	NA	7.77E+01	NA	ND					ND					ND					4.60E-02	J		
p-Cymene	mg/kg	NA	1.55E+03	NA	ND					ND					ND					2.40E-02	J		
sec-Butylbenzene	mg/kg	NA	7.77E+01	NA	ND					ND					ND					3.50E-02	J		

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. For metals, the 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 McClella *Alabama,* July.

For SVOCs, value listed is the background screening criterion given in IT Corporation (2000b), *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 (SSSL) and ecological screening values (ESV) as given in IT Corporation (2000b), *Final Human Health and Ecological Screening Values and PAH Background Summary Report, Fort McClella 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 5-1

Surface Soil Analytical Results
Printing Plant, Building 3183, Parcel 162(7)
Fort McClellan, Calhoun County, Alabama

Parameter	Units	BKG[a]	SSSL[b]	ESV[b]	>ESV
Parcel / Sample Location / Sample Number / Sample Date / Sample Depth (Feet)					
METALS					
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	YES
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	
Cadmium	mg/kg	2.90E-01	6.25E+00	1.60E+00	
Calcium	mg/kg	1.72E+03	NA	NA	
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	YES
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	YES
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	
Potassium	mg/kg	8.00E+02	NA	NA	
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00	
Sodium	mg/kg	6.34E+02	NA	NA	
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00	
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	
SEMIVOLATILE ORGANIC COMPOUNDS					
2-Methylnaphthalene	mg/kg	NA	1.55E+02	NA	
Acenaphthene	mg/kg	7.02E-01	4.63E+02	2.00E+01	
Acenaphthylene	mg/kg	8.91E-01	4.63E+02	6.82E+02	
Anthracene	mg/kg	9.35E-01	2.33E+03	1.00E-01	
Benzo(a)anthracene	mg/kg	1.19E+00	8.51E-01	5.21E+00	
Benzo(a)pyrene	mg/kg	1.42E+00	8.51E-02	1.00E-01	
Benzo(b)fluoranthene	mg/kg	1.66E+00	8.51E-01	5.98E+01	
Benzo(ghi)perylene	mg/kg	9.55E-01	2.32E+02	1.19E+02	
Benzo(k)fluoranthene	mg/kg	1.45E+00	8.51E+00	1.48E+02	
Carbazole	mg/kg	NA	3.11E+01	NA	
Chrysene	mg/kg	1.40E+00	8.61E+01	4.73E+00	
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	2.00E+02	
Dibenz(a,h)anthracene	mg/kg	7.20E-01	8.61E-02	1.84E+01	
Dibenzofuran	mg/kg	NA	3.09E+01	NA	
Fluoranthene	mg/kg	2.03E+00	3.09E+02	1.00E-01	YES
Fluorene	mg/kg	6.67E-01	3.09E+02	1.22E+02	
Indeno(1,2,3-cd)pyrene	mg/kg	9.37E-01	8.51E-01	1.09E+02	
Naphthalene	mg/kg	3.30E-02	1.55E+02	1.00E-01	YES
Phenanthrene	mg/kg	1.08E+00	2.32E+03	1.00E-01	
Pyrene	mg/kg	1.63E+00	2.33E+02	1.00E-01	YES
bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	9.30E-01	

Table 5-1

Surface Soil Analytical Results
Printing Plant, Building 3183, Parcel 162(7)
Fort McClellan, Calhoun County, Alabama

Parameter	Units	BKG[a]	SSSL[b]	ESV[b]	>ESV
Parcel					
Sample Location					
Sample Number					
Sample Date					
Sample Depth (Feet)					
VOLATILE ORGANIC COMPOUNDS					
1,2,4-Trimethylbenzene	mg/kg	NA	3.88E+02	1.00E-01	YES
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	
Acetone	mg/kg	NA	7.76E+02	2.50E+00	
Benzene	mg/kg	NA	2.17E+01	5.00E-02	
Bromomethane	mg/kg	NA	1.09E+01	NA	
Cumene	mg/kg	NA	7.77E+02	NA	
Ethylbenzene	mg/kg	NA	7.77E+02	5.00E-02	
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00	
Naphthalene	mg/kg	3.30E-02	1.55E+02	1.00E-01	YES
Trichlorofluoromethane	mg/kg	NA	2.33E+03	1.00E-01	
m,p-Xylenes	mg/kg	NA	1.55E+04	5.00E-02	
n-Butylbenzene	mg/kg	NA	7.77E+01	NA	
n-Propylbenzene	mg/kg	NA	7.77E+01	NA	
p-Cymene	mg/kg	NA	1.55E+03	NA	
sec-Butylbenzene	mg/kg	NA	7.77E+01	NA	

Analyses performed by Quanterra Environmental Services using U.S. Envi

[a]Bkg - Background. For metals, the concentration listed is two times (2x) tln, *Alabama,* July.

For SVOCs, value listed is the background screening criterion given in IT (

[b]Residential human health site-specific screening levels (SSSL) and ecolo*n, Calhoun County, Alabama* , July.

B = Analyte detected in laboratory or field blank at concentration greater th

J = Result is greater than stated method detection limit but less than or equ

mg/kg = Milligrams per kilogram.

NA - Not available.

ND - Not detected.

Qual - Data validation qualifier.

Table 5-2

Subsurface Soil Analytical Results
Printing Plant, Building 3183, Parcel 162(7)
Fort McClellan, Calhoun County, Alabama

				Parcel	PPMP-162				PPMP-162				PPMP-162				PPMP-162			
				Sample Location	PPMP-162-GP01				PPMP-162-GP02				PPMP-162-GP03				PPMP-162-GP04			
				Sample Number	KG0002				KG0004				KG0006				KG0010			
				Sample Date	14-Jan-99				14-Jan-99				14-Jan-99				15-Jan-99			
				Sample Depth (Feet)	9-12				9-12				6-9				9-12			
Parameter	Units	BKG[a]	SSSL[b]	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL
METALS																			
Aluminum	mg/kg	1.36E+04	7.80E+03	9.68E+03			YES	1.90E+04		YES	YES	1.63E+04		YES	YES	1.28E+04			YES
Arsenic	mg/kg	1.83E+01	4.26E-01	1.00E+01			YES	3.65E+01		YES	YES	3.18E+01		YES	YES	3.10E+01		YES	YES
Barium	mg/kg	2.34E+02	5.47E+02	7.86E+01				6.05E+01				5.74E+01				8.90E+01			
Beryllium	mg/kg	8.60E-01	9.60E+00	1.20E+00		YES		2.30E+00		YES		2.40E+00		YES		6.50E+00		YES	
Cadmium	mg/kg	2.20E-01	6.25E+00	3.80E-01	J	YES		ND				ND				4.90E-01	J	YES	
Calcium	mg/kg	6.37E+02	NA	1.77E+03		YES		2.54E+03		YES		1.20E+03		YES		2.12E+03		YES	
Chromium	mg/kg	3.83E+01	2.32E+01	1.81E+01	J			4.27E+01	J	YES	YES	2.82E+01	J		YES	2.41E+01	J		YES
Cobalt	mg/kg	1.75E+01	4.68E+02	9.90E+00	J			ND				1.66E+01	J			ND			
Copper	mg/kg	1.94E+01	3.13E+02	2.16E+01		YES		7.32E+01		YES		4.85E+01		YES		4.31E+01		YES	
Iron	mg/kg	4.48E+04	2.34E+03	3.10E+04			YES	7.68E+04		YES	YES	5.67E+04		YES	YES	5.62E+04		YES	YES
Lead	mg/kg	3.85E+01	4.00E+02	2.77E+01				2.97E+01				3.06E+01				2.15E+01			
Magnesium	mg/kg	7.66E+02	NA	5.68E+02	J			9.90E+02		YES		1.49E+03		YES		1.18E+03		YES	
Manganese	mg/kg	1.36E+03	3.63E+02	5.86E+02	J		YES	1.22E+02	J			3.57E+02	J			3.41E+02	J		
Mercury	mg/kg	7.00E-02	2.33E+00	7.50E-02		YES		1.50E-01		YES		2.70E-01		YES		1.10E-01		YES	
Nickel	mg/kg	1.29E+01	1.54E+02	2.37E+01		YES		5.64E+01		YES		8.06E+01		YES		7.02E+01		YES	
Potassium	mg/kg	7.11E+02	NA	2.90E+02	J			4.64E+02	J			7.52E+02		YES		4.04E+02	J		
Selenium	mg/kg	4.70E-01	3.91E+01	1.50E+00		YES		2.10E+00		YES		1.60E+00		YES		1.40E+00		YES	
Silver	mg/kg	2.40E-01	3.91E+01	2.00E+00		YES		4.50E+00		YES		3.50E+00		YES		3.60E+00		YES	
Sodium	mg/kg	7.02E+02	NA	6.75E+01	B			8.64E+01	B			7.28E+01	B			6.86E+01	B		
Thallium	mg/kg	1.40E+00	5.08E-01	ND				ND				8.00E-01	J		YES	ND			
Vanadium	mg/kg	6.49E+01	5.31E+01	1.53E+01				2.53E+01				2.53E+01				3.09E+01			
Zinc	mg/kg	3.49E+01	2.34E+03	7.70E+01	J	YES		1.43E+02	J	YES		2.06E+02	J	YES		1.30E+02	J	YES	
SEMIVOLATILE ORGANIC COMPOUNDS																			
Benzo(a)anthracene	mg/kg	NA	8.51E-01	7.50E-02	J			ND				ND				ND			
Benzo(a)pyrene	mg/kg	NA	8.51E-02	8.60E-02	J		YES	ND				ND				ND			
Benzo(b)fluoranthene	mg/kg	NA	8.51E-01	9.90E-02	J			ND				ND				ND			
Benzo(ghi)perylene	mg/kg	NA	2.32E+02	6.10E-02	J			ND				ND				ND			
Benzo(k)fluoranthene	mg/kg	NA	8.51E+00	8.70E-02	J			ND				ND				ND			
Chrysene	mg/kg	NA	8.61E+01	9.10E-02	J			ND				ND				ND			
Di-n-butyl phthalate	mg/kg	NA	7.80E+02	1.00E-01	B			1.20E-01	B			1.10E-01	B			7.80E-02	B		
Fluoranthene	mg/kg	NA	3.09E+02	1.70E-01	J			ND				ND				ND			
Indeno(1,2,3-cd)pyrene	mg/kg	NA	8.51E-01	5.20E-02	J			ND				ND				ND			
Phenanthrene	mg/kg	NA	2.32E+03	7.90E-02	J			ND				ND				ND			
Pyrene	mg/kg	NA	2.33E+02	1.40E-01	J			ND				ND				ND			
bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	8.40E-02	B			1.00E-01	B			9.30E-02	B			7.60E-02	B		
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	ND				ND				6.90E-03	J			ND			
Acetone	mg/kg	NA	7.76E+02	8.20E-02	J			1.00E+01	J			3.00E-01	J			6.50E-03	B		
Bromomethane	mg/kg	NA	1.09E+01	4.10E-03	B			3.90E-03	B			3.20E-03	B			1.70E-03	B		
Carbon tetrachloride	mg/kg	NA	4.83E+00	ND				ND				ND				1.80E-02			
Chloroform	mg/kg	NA	1.03E+02	ND				ND				ND				2.30E-03	J		
Methylene chloride	mg/kg	NA	8.41E+01	3.40E-03	B			3.70E-03	B			3.70E-03	B			3.40E-03	B		
Naphthalene	mg/kg	NA	1.55E+02	ND				ND				8.20E-03	J			ND			
Tetrachloroethene	mg/kg	NA	1.21E+01	ND				ND				ND				6.60E-03			
Toluene	mg/kg	NA	1.55E+03	ND				3.90E-02				3.70E-03	J			ND			

Table 5-2

Subsurface Soil Analytical Results
Printing Plant, Building 3183, Parcel 162(7)
Fort McClellan, Calhoun County, Alabama

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

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

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

J - Result is greater than stated method detection limit but less than or equal to specified reporting limit.

mg/kg - Milligrams per kilogram.

NA - Not available.

ND - Not detected.

Qual - Data validation qualifier.

Table 5-3

Groundwater Analytical Results
Printing Plant, Building 3183, Parcel 162(7)
Fort McClellan, Calhoun County, Alabama

				Parcel	PPMP-162			PPMP-162				PPMP-162			
				Sample Location	PPMP-162-GP01			PPMP-162-GP02				PPMP-162-GP03			
				Sample Number	KG3001			KG3004				KG3005			
				Sample Date	3-Feb-99			29-Jan-99				29-Jan-99			
Parameter	Units	BKG[a]	SSSL[b]	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL
METALS															
Aluminum	mg/L	2.34E+00	1.56E+00	1.60E+00	J		YES	1.46E-01	B			5.20E-01	J		
Arsenic	mg/L	1.78E-02	4.00E-05	ND				ND				3.70E-03	J		YES
Barium	mg/L	1.27E-01	1.10E-01	1.37E-01	J	YES	YES	2.73E-02	J			6.63E-02	J		
Calcium	mg/L	5.65E+01	NA	5.05E+01	J			3.10E+01	J			6.75E+01	J	YES	
Iron	mg/L	7.04E+00	4.69E-01	1.96E+00	J		YES	1.06E-01				6.35E-01			YES
Magnesium	mg/L	2.13E+01	NA	9.09E+00	J			4.01E+00	J			2.16E+01	J	YES	
Manganese	mg/L	5.81E-01	7.35E-02	3.90E-01	J		YES	1.70E-03	J			8.69E-02			YES
Potassium	mg/L	7.20E+00	NA	1.75E+00	J			ND				ND			
Sodium	mg/L	1.48E+01	NA	8.58E+00	J			3.26E+01	J	YES		1.20E+01	J		
Thallium	mg/L	1.45E-03	1.00E-04	ND				ND				4.40E-03	B	YES	YES
Zinc	mg/L	2.20E-01	4.69E-01	1.04E-02	J			ND				ND			
SEMIVOLATILE ORGANIC COMPOUNDS															
Acenaphthene	mg/L	NA	6.58E-02	3.30E-03	J			[c]				ND			
Carbazole	mg/L	NA	2.76E-03	7.00E-03	J		YES	[c]				ND			
Fluorene	mg/L	NA	4.66E-02	1.20E-03	J			[c]				ND			
bis(2-Ethylhexyl)phthalate	mg/L	NA	4.30E-03	1.10E-03	J			[c]				ND			
VOLATILE ORGANIC COMPOUNDS															
Acetone	mg/L	NA	1.56E-01	3.60E-03	B			ND				ND			
Methylene chloride	mg/L	NA	7.85E-03	1.00E-03	B			1.00E-03	B			1.60E-03	B		
Naphthalene	mg/L	NA	3.00E-03	3.90E-04	J			ND				5.30E-04	J		
Tetrachloroethene	mg/L	NA	1.25E-03	ND				ND				2.20E-04	J		
cis-1,2-Dichloroethene	mg/L	NA	1.55E-02	1.40E-04	J			ND				ND			

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

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

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

[c]Not collected see text.

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/L - Milligrams per liter.

NA - Not available.

ND - Not detected.

concentrations.

Volatile Organic Compounds. Fifteen VOCs were detected in surface soil samples collected at the Former Printing Plant, Building 3183, Parcel 162(7). The acetone, 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. Ten of the VOCs were detected only in PPMP-162-GP04. None of the detected VOCs were present at a concentration exceeding residential human health SSSLs. Concentrations of naphthalene and 1,2,4-trimethylbenezene were detected at concentrations exceeding the ESVs in PPMP-162-GP04.

Semivolatile Organic Compounds. Twenty-one SVOCs were detected in surface soil samples collected at the Former Printing Plant, Building 3183, Parcel 162(7). The bis(2-ethylhexyl)phthalate and di-n-butylphthalate results were flagged with a "B" data qualifier, signifying that these compounds were also detected in an associated laboratory or field blank. The surface soil sample from PPMP-162-GP03 contained all of the detected SVOCs. PPMP-162-GP02 and PPMP-162-GP01 surface soil samples contained fourteen and thirteen of the detected SVOCs, respectively. PPMP-162-GP04 surface soil only contained six of the detected SVOCs. Most of the SVOC analytical results were flagged with a “J” data qualifier, signifying that the result is greater than the method detection limit but less than the specified RL.

The benzo(a)pyrene and dibenz(a,h)anthracene concentrations at sample location PPMP-162-GP03 exceeded residential human health SSSLs but were below PAH background screening values.

The concentrations of anthracene (PPMP-162-GP03), benzo(a)pyrene (PPMP-162-GP02), fluoranthene (all four locations), naphthalene (PPMP-162-GP03 and PPMP-162-GP04), phenanthrene (PPMP-162-GP01, PPMP-162-GP02 and PPMP-162-GP03), and pyrene (all four locations) exceeded ESVs. However, with the exception of naphthalene (PPMP-162-GP03 and PPMP-162-GP04) and phenanthrene (PPMP-162-GP03), the SVOC concentrations were below PAH background screening values.

5.2 Subsurface Soil Sample Results

Four subsurface soil samples were collected for chemical analyses at the Former Printing Plant, Building 3183, Parcel 162(7). Subsurface soil samples were collected at depths greater than 1

foot bgs at the locations shown on Figure 3-1. Analytical results were compared to residential human health SSSLs and background concentrations, as presented in Table 5-2.

Metals. Twenty-two metals were detected in subsurface soil samples collected at the Former Printing Plant, Building 3183, Parcel 162(7). With the exception of cadmium, cobalt, and thallium, the detected metals were present in each of the samples.

The concentrations of aluminum (all four locations), arsenic (all four locations), chromium (PPMP-162-GP02, PPMP-162-GP03, and PPMP-162-GP04), iron (all four locations), manganese (PPMP-162-GP01), and thallium (PPMP-162-GP03) exceeded residential human health SSSLs. However, with the exception of the iron results, these metals concentrations were within the range of background values determined by SAIC (1998).

Volatile Organic Compounds. Nine VOCs were detected in subsurface soil samples collected at the Former Printing Plant, Building 3183, Parcel 162(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. Sample locations PPMP-162-GP03 and PPMP-162-GP04 each contained six of the nine detected VOCs.

None of the detected VOCs were present at a concentration exceeding residential human health SSSLs.

Semivolatile Organic Compounds. Twelve SVOCs were detected in subsurface soil samples from location PPMP-162-GP01. Di-n-butyl phthalate and bis(2-ethylhexyl)phthalate were the only SVOCs detected in the remaining subsurface soil samples collected at the Former Printing Plant, Building 3183, Parcel 162(7). The di-n-butyl phthalate and bis(2-ethylhexyl)phthalate results were flagged with a "B" data qualifier, signifying that these compounds were also detected in an associated laboratory or field blank sample.

None of the detected SVOCs was present at a concentration exceeding residential human health SSSLs.

5.3 Groundwater Sample Results

Three monitoring wells were sampled at the Former Printing Plant, Building 3183, Parcel 162(7) at the sample locations shown on Figure 3-1. Analytical results were compared to residential

human health SSSLs and background concentrations, as presented in Table 5-3. Because of limited sample volume at the time of sample collection, the groundwater sample collected from PPMP-162-GP02 was not analyzed for SVOCs. However, based upon the SVOC results for groundwater samples from PPMP-162-GP01 and PPMP-162-GP03, SVOCs appear to have minimal impact on groundwater at the site.

Metals. Eleven metals, including aluminum, arsenic, barium, calcium, iron, magnesium, manganese, potassium, sodium, thallium, and zinc, were detected in groundwater samples collected at the Former Printing Plant, Building 3183, Parcel 162(7). The concentration of six metals (aluminum, arsenic, barium, iron, manganese, and thallium) exceeded residential human health SSSLs. However, these metals concentrations were within the range of background values determined by SAIC (1998).

Volatile Organic Compounds. Five VOCs were detected in groundwater samples collected at the Former Printing Plant, Building 3183, Parcel 162(7). The acetone 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. Sample location PPMP-162-GP01 contained four of the five detected VOCs.

The VOC concentrations were below residential human health SSSLs.

Semivolatile Organic Compounds. Four SVOCs (acenaphthene, carbazole, fluorene, and bis[2-ehylhexyl]phthalate) were detected in the groundwater sample collected from location PPMP-162-GP01. However, only the concentration of carbazole exceeded residential human health SSSLs. SVOCs were not detected in samples from the other two sampling locations.

6.0 Summary and Conclusions and Recommendations

IT, under contract with USACE, completed an SI at the Former Printing Plant, Building 3183, Parcel 162(7) at FTMC, Calhoun County, Alabama. The SI was conducted to determine whether chemical constituents are present at the Former Printing Plant, Building 3183, Parcel 162(7) and, if present, whether the concentrations would present an unacceptable risk to human health or the environment. The SI at the Former Printing Plant, Building 3183, Parcel 162(7) consisted of the sampling and analyses of four surface soil samples, four subsurface soil samples, and three groundwater samples. In addition, three monitoring wells were installed in the residuum groundwater zone to facilitate groundwater sample collection and to provide site-specific geological and hydrogeological characterization information.

Chemical analyses of samples collected at the Former Printing Plant, Building 3183, Parcel 162(7) indicate that metals, VOCs, and SVOCs were detected in the environmental media sampled. Cyanide was not detected in any of the samples collected. Analytical results were compared to the residential human health SSSLs, and, where available, ecological ESVs. The SSSLs and ESVs were developed by IT for human health and ecological risk evaluations as part of the ongoing SIs being performed under the BRAC Environmental Restoration Program at FTMC. Additionally, metals results exceeding the SSSLs and ESVs were compared to media-specific background concentrations (SAIC, 1998) and SVOC concentrations exceeding SSSLs and ESVs in surface soils were compared to PAH background screening values where available (IT, 2000b).

The potential impact to human receptors is expected to be minimal. With the exception of iron in subsurface soils the metals that exceeded residential human health SSSLs were within background concentrations or the range of background values and thus do not pose an unacceptable risk to future human receptors. The SVOC carbazole was detected in one groundwater sample at a concentration slightly exceeding the residential human health SSSL. Given the extremely limited impacted area, carbazole is not expected to pose an unacceptable risk to human health.

Several metals were detected in surface soils at concentrations exceeding ESVs and background concentrations. In addition, the concentrations of two VOCs and six SVOCs exceeded ESVs. However, the potential impact to ecological receptors is expected to be minimal based on the

existing viable habitat. The site is a well-developed area and is projected for continued industrial/business use. Consequently, viable ecological habitat is not expected to increase.

Based on the results of the SI, past operations at the Former Printing Plant, Building 3183, Parcel 162(7) do not appear to have adversely impacted the environment. Furthermore, the metals and organic compounds detected in site media do not pose an unacceptable risk to human health or the environment in either 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 3183, Parcel 162(7).

7.0 References

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ATTACHMENT 1

LIST OF ABBREVIATIONS AND ACRONYMS

APPENDIX A

SAMPLE COLLECTION LOGS

APPENDIX B

BORING LOGS AND WELL LOGS

APPENDIX C

WELL DEVELOPMENT LOGS

APPENDIX D

SURVEY DATA

APPENDIX E

SUMMARY OF VALIDATED ANALYTICAL DATA

APPENDIX G

NONCONFORMANCES

APPENDIX F

DATA VALIDATION SUMMARY REPORT

APPENDIX H

SUMMARY STATISTICS FOR BACKGROUND MEDIA, FORT MCCLELLAN, ALABAMA