Final

Site Investigation Report
Autocraft Shop/Former DPDO and
Former Motor Pool Area 2100 North of DPDO
Parcels 100(7), 20(7), 47(7), 152(7), and 241(7)

Fort McClellan
Calhoun County, Alabama

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Executive Summary

IT Corporation (IT), under contract with the U.S. Army Corps of Engineers, completed a site investigation (SI) at the Autocraft Shop/Former Defense Property Disposal Office (DPDO) and Former Motor Pool Area 2100 North of the DPDO, Parcels 100(7), 20(7), 47(7), 152(7), and 241(7) at Fort McClellan (FTMC) in Calhoun County, Alabama. The SI was conducted to determine whether chemical constituents are present at the site and, if present, whether the concentrations present an unacceptable risk to human health or the environment. The SI at the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of the DPDO consisted of the sampling and analysis of 18 surface soil samples, 3 depositional soil samples, 8 subsurface soil samples, 20 groundwater samples, and 6 surface water and sediment samples. In addition, 16 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. Data previously collected by QST Environmental Inc. at the Former DPDO, Parcel 152(7) were incorporated into this SI report.

Chemical analyses of samples collected at the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of the DPDO indicate that metals, volatile organic compounds (VOC), semivolatile organic compounds (SVOC), pesticides, and nitroaromatic compounds were detected in the various site media. Polychlorinated biphenyls and herbicides were not detected in samples collected at the site. To evaluate whether the detected constituents pose an unacceptable risk to human health or the environment, analytical results were compared to human health site-specific screening levels (SSSL), ecological screening values (ESV), and background screening values for FTMC.

The potential threat to human receptors is expected to be minimal. Although the site is projected for passive recreational use, the soils and groundwater data were screened against residential human health SSSLs to evaluate the site for possible unrestricted land reuse. Concentrations of detected metals in soils were below their respective SSSLs or background screening concentrations, or within the range of background values, with the exception of antimony (3.17 mg/kg), copper (356 mg/kg), and lead (573 mg/kg) in one surface soil sample each. The concentrations of antimony and copper, however, were sufficiently low so that adverse effects are very unlikely. Also, the average concentration of lead was below the SSSL. The average, rather than the maximum detected concentration, is the more appropriate value to compare with the SSSL. It is concluded that the metals in soil do not represent unacceptable human health risk effects.

The polynuclear aromatic hydrocarbon (PAH) compound benzo(a)pyrene was detected in surface and depositional soils at concentrations (0.086 to 0.59 mg/kg) slightly exceeding the SSSL (0.085 mg/kg) but below the PAH background value. Given the limited distribution and low concentrations of benzo(a)pyrene, this compound is not expected to pose a threat to human health.

Two VOCs (1,1,2,2-tetrachloroethane and naphthalene) were detected in groundwater from one well (GSBP-152-MW12) at levels exceeding SSSLs. Currently, there is no established EPA drinking water standard (maximum contaminant level [MCL]) for either compound. The concentration of naphthalene (0.0069 mg/L) is well below its EPA Lifetime Health Advisory (0.1 mg/L), and is not expected to induce adverse health effects. The concentration of 1,1,2,2-tetrachlorethane (0.00057 mg/L) does not exceed its noncancer SSSL, suggesting it is unlikely to induce adverse noncancer effects. The cancer risk associated with 1,1,2,2-tetrachloroethane estimated from the SSSL is near the low end of the EPA risk management range generally considered to be acceptable. It is concluded that exposure to the two VOCs in groundwater does not represent unacceptable risk of cancer or noncancer human health effects.

Two nitroaromatic compounds (2,6-dinitrotoluene and 2-amino-4,6-dinitrotoluene) were detected in groundwater from one well (GSBP-152-MW14) at concentrations exceeding their SSSLs. Currently there is no established EPA MCL for either of these compounds. However, the concentration of 2,6-dinitrotoluene (0.00025 mg/L) in groundwater does not exceed the EPA Lifetime Health Advisory, suggesting that adverse noncancer effects are unlikely. The cancer risk associated with 2,6-dinitrotoluene estimated from the SSSL is near the low end of the EPA risk management range generally considered to be acceptable. Health Advisory values do not exist for 2-amino-4,6-dinitrotoluene (detected at a concentration of 0.00028 mg/L). The hazard index estimated from the SSSL, however, is less than the threshold limit of 1, suggesting that adverse noncancer health effects are unlikely. It is concluded that exposure to the two nitroaromatic compounds in groundwater does not represent unacceptable risk of cancer or noncancer human health effects.

Concentrations of six pesticides (aldrin, heptachlor, heptachlor epoxide, alpha-BHC, beta-BHC, and gamma-BHC) in groundwater from one or more of three wells (GSBP-152-MW03, GSBP-152-MW12, and GSBP-152-MW13) exceeded their SSSLs. The concentrations of heptachlor, heptachlor epoxide, and gamma-BHC, however, did not exceed their respective EPA MCLs for drinking water. MCLs and Lifetime Health Advisories do not exist for aldrin, alpha-BHC, and

beta-BHC. Cancer risks estimated from the respective SSSLs for these pesticides, however, are all within the EPA risk management range that is generally considered to be acceptable. It is concluded that exposure to the six pesticides in groundwater does not represent unacceptable risk of cancer or noncancer human health effects.

Metals, SVOCs, and pesticides were detected in site media at concentrations exceeding ESVs. The site is located within the developed area of the Main Post and consists of buildings, concrete and asphalt pavement, and limited wooded and grassy areas. The site (particularly Parcels 152[7] and 241[7]) may support limited ecological habitat in the proposed passive recreation land reuse scenario. However, given the low levels and the sporadic distribution of chemical constituents, the potential threat to ecological receptors is expected to be minimal.

Based on the results of the SI, past operations at the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO do not appear to have adversely impacted the environment. The metals and chemical compounds detected in site media do not pose an unacceptable risk to human health or the environment. Therefore, IT recommends "No Further Action" and unrestricted land reuse at the Autocraft Shop/Former DPDP and Former Motor Pool Area 2100 North of DPDO, Parcels 100(7), 20(7), 47(7), 152(7), and 241(7).

1.0 Introduction

The U.S. Army has selected Fort McClellan (FTMC), located in Calhoun County, Alabama, for closure by the Base Realignment and Closure (BRAC) Commission under Public Laws 100-526 and 101-510. The 1990 Base Closure Act, Public Law 101-510, established the process by which U.S. Department of Defense (DOD) installations would be closed or realigned. The BRAC Environmental Restoration Program requires investigation and cleanup of federal properties prior to transfer to the public domain. The U.S. Army is conducting environmental studies of the impact of suspected contaminants at parcels at FTMC under the management of the U.S. Army Corps of Engineers (USACE)-Mobile District. The USACE contracted IT Corporation (IT) to provide environmental services for completion of the site investigation (SI) of the Autocraft Shop/Former Defense Property Disposal Office (DPDO) and Former Motor Pool Area 2100 North of DPDO, Parcels 100(7), 20(7), 47(7), 152(7), and 241(7), under Contract No. DACA21-96-D-0018, Task Orders CK05 and CK08.

The U.S. Army Environmental Center (AEC) originally contracted with QST Environmental, Inc., to conduct the SI at the Former DPDO, Parcel 152(7). QST prepared an SI work plan for the Former DPDO, Parcel 152(7), (QST, 1998) and conducted field work in May 1998. However, QST was unable to collect all of the data required because of difficulty installing temporary monitoring wells using direct-push technology (DPT). Therefore, IT was tasked to complete the SI at the Former DPDO, Parcel 152(7), and to conduct additional sampling and field activities at Parcels 100(7), 20(7), 47(7), and 241(7) described in the IT work plan (IT, 1998a). IT has incorporated the results from the samples collected by QST into this SI report.

This SI report presents specific information and results compiled from both the IT and QST SIs, including field sampling and analysis and monitoring well installation activities, conducted at the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO, Parcels 100(7), 20(7), 47(7), 152(7), and 241(7).

1.1 Project Description

The Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO were identified as areas to be investigated prior to property transfer. The Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO were identified as Category 7 sites 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.

Two site-specific field-sampling plans (SFSP) were prepared to investigate these sites. QST initially prepared a plan to investigate the Former DPDO, Parcel 152(7) (QST, 1998), and IT prepared a SFSP attachment and a site-specific safety and health plan (SSHP) attachment that were finalized in September 1998. The SFSP and SSHP prepared by IT provided technical guidance for sample collection and analysis at the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO. 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 (SHP) and quality assurance plan (QAP).

QST was unable to collect the majority of the groundwater samples proposed in its work plan for the Former DPDO, Parcel 152(7). The QST work plan proposed the use of direct-push technology to collect groundwater samples; however, direct-push rigs could not penetrate the shallow bedrock at the Former DPDO, Parcel 152(7). Therefore, IT installed monitoring wells using hollow-stem auger drill rigs at the locations that QST had proposed for direct-push groundwater samples.

The SI included field work to collect 18 surface soil samples (2 by IT and 16 by QST), 3 depositional soil samples (IT), 8 subsurface soil samples (5 by IT and 3 by QST), 6 surface water and sediment samples (5 by IT and 1 by QST), and 20 groundwater samples (IT) to determine if potential site-specific chemicals are present at the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO.

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 Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO at concentrations that present an unacceptable risk to human health or the environment. The conclusions of the SI in Chapter 6.0 are based on comparisons 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 site investigations 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. Metals background values are presented in the *Final Background Metals Survey, Fort McClellan, Alabama* (Science Applications International Corporation [SAIC], 1998).

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

1.3 Site Description and History

The following paragraphs provide site description and historical information for the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO.

Autocraft Shop - Parcels 100(7), 20(7), and 47(7). The Autocraft Shop, Building 1800, Parcels 100(7), 20(7), and 47(7), is located on 23rd Street on the Main Post of FTMC (Figures 1-1 and 1-2). The Autocraft Shop was built in 1976 and was used by FTMC personnel to repair and rebuild privately owned vehicles. Records indicate that these activities were not conducted on post prior to 1976 (ESE, 1998).

The facility, which was closed in September 1999, has several bays, some with in-floor hydraulic lifts or mobile electric lifts for maintenance and repair of motor vehicles. The building also housed a muffler shop area, tire changing area, tool room, machine shop, body work area, and spray paint booth. Pressurized spray car wash booths are attached to the north end of the building. An oil/water separator was installed at the facility and appeared to be operating normally prior to base closure. The facility also had an oil filter crusher with an indoor waste oil recovery tank, an antifreeze recycling unit, a chlorofluorocarbon recovery unit for air-conditioning system service, a tire and battery return to the Defense Reutilization and Marketing Office (DRMO), and a Safety Kleen parts washer with nonhazardous mineral spirits. The DRMO was formerly known as the DPDO. According to site utility maps, floor drains are connected to the sanitary sewer system. Evidence of releases or other environmental problems were not noted during the visual site inspection (ESE, 1998).

Building 1800 is one of four areas at FTMC known to have been used for storage of polychlorinated biphenyls (PCB). According to 1981 U.S. Army Training and Doctrine Command guidance for return of PCB items to DPDO, "nonleaking" transformers, capacitors, and any accessories were to be wiped clean with a rag, and the contents were to be analyzed and turned in (Roy F. Weston [Weston], 1990). Leaking items were packed in spill containers and

handled by personnel of the Pesticide Branch. According to records, the DPDO was formerly located at the Autocraft Shop area, Building 1800, and just north of the building. FTMC facility real estate records indicate that the Autocraft Shop was built in 1976, thus any DPDO activity at this location would have been prior to this time. The most recent DRMO building was built in 1970 and was located on 18th Street, east of Building T-350. Based on this information, it is assumed that DRMO/DPDO stored PCB transformers at their facilities in Building 1800 on BG D.H. Stem Avenue (formerly 23rd Avenue) before 1976.

Two underground storage tanks (UST) are located at the Autocraft Shop/Former DPDO: a 2,000-gallon waste oil UST (Parcel 20[7]) and a 2,000-gallon heating oil UST (Parcel 47[7]). Oil-stained soils on the surface around the waste oil UST were documented in 1990 (Weston, 1990). The waste oil UST was removed and replaced in April 1994 by Braun Intertec Corporation (Braun). Soil contamination was documented in the closure report, which presents the analytical results. A limited amount of petroleum-contaminated soil was excavated and sent to the landfill; however, the extent of soil contamination was not determined (Braun, 1995).

The 2,000-gallon heating oil UST (Parcel 47[7]) was removed from the southwest end of Building 1800 on October 9, 1996 (Southern Environmental Management & Specialties, 1997). The UST was replaced with a 2,500-gallon, double-wall fiberglass tank equipped with interstitial monitoring on October 29, 1997. The closure report indicates that the tank was removed according to Alabama Department of Environmental Management (ADEM) guidelines; however, the report does not indicate that any samples were collected. Groundwater was not encountered in the excavation, which was extended to 5 feet below the bottom of the tank. No soil was removed for disposal.

Oil stains were observed in the parts laydown area in the back of Building 1800 (Weston, 1990). Overflow oil from this area may have drained to an intermittent stream behind the building. Oil-stained sediment was also observed near the discharge point from the floor drain of the parts laydown area (Weston, 1990).

Former DPDO, Parcel 152(7). According to records, the Former DPDO was located just north of the area where the Autocraft Shop building is located (Figure 1-2). During the visual site inspection in 1996, empty lead-acid battery casings were observed embedded in a low concrete wall along the west bank of a creek, immediately west of the current Autocraft Shop. Evidence of spills or other indications of past DPDO operations at the Building 1800 area were not discovered during the visual site inspection (ESE, 1998).

The Former DPDO, Parcel 152(7), is located north of Building 1800 along the east side of Justice Avenue (formerly 11th Avenue) (Figure 1-2). The southern two-thirds of the site has been engineered by terracing. The ground surface is essentially flat within the site, with scarps at the eastern and western site boundaries. A tributary to South Branch of Cane Creek cuts diagonally across the site then flows through culverts in approximately three sections. *The Master Plan, Fort McClellan, General Utilities Map, Electrical* (Office of the Post Engineer, December 1946) identifies a "Salvage Yard." The location of this site is east of Justice Avenue, west of South Branch of Cane Creek, north of BG D.H. Stem Avenue, and south of Building T-2116. This area was later named the DPDO. Historical information suggests that PCB transformers and other potentially hazardous substances (e.g., drums and lead-acid batteries) were stored at this location prior to 1976. Aerial photographs taken in 1964 indicate that this area has been maintained, although salvaged material is not evident in the photographs. The EBS identified scrap metal and debris in this area. In addition, the former fence line was discovered. A washrack was identified at the Former DPDO on the 1946 FTMC Master Plan map on the east side of the parcel, next to the creek (ESE, 1998). However, only concrete blocks were identified at this location during the EBS visual site inspection (ESE, 1998). Additional information regarding the washracks was not available. Very little scrap metal remains at this site (railroad ties and rails, galvanized pipe, loose plastic sheeting, one 3.5-inch practice rocket, plates, and glassware). Neither denuded areas nor stressed vegetation were observed (QST, 1998). A 1982 aerial photograph shows three buildings present on the site: Buildings T-2114, T-2115, and T-2116. A 1994 aerial photograph shows that Building T-2114 had been demolished; in addition, Building T-2115 had been enlarged.

It is assumed that the same types of material were processed through the Former DPDO and DRMO. These items include old appliances; furniture; clothes; empty and cleaned drums and containers; waste petroleum, oil, and lubricant; batteries and battery casings; transformers; waste solvents; brass shell casings; old tires; ammunition boxes; scrap metal, plastic, or lumber; surplus vehicles; and other surplus machinery and equipment.

Former Motor Pool Area 2100 North of the DPDO, Parcel 241(7). According to aerial photographs taken in December 1982, the Former Motor Pool Area 2100 (Parcel 241[7]) was located at the southeastern corner of Exchange Avenue (formerly 21st Street) and Justice Avenue immediately north of the Former DPDO (Parcel 152[7]) (Figure 1-2). Aerial photographs taken in December 1982 show Motor Pool Area 2100 in this location; however, aerial photographs taken in 1994 show that the Motor Pool Area 2100 had been demolished. Historical operations

at this site are believed to have been primarily vehicle storage (ESE, 1998). Additional information concerning dates or details of operations at this motor pool was not available (ESE, 1998).

2.0 Previous Investigations

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

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

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

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

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

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

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

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

The EBS was conducted in accordance with the Community Environmental Response Facilitation Act (CERFA) (CERFA-Public Law 102-426) protocols and DOD policy regarding contamination assessment. Record searches and reviews were performed on all reasonably available documents from FTMC, 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 (RCRA)-regulated facilities. Available historical maps and aerial photographs were reviewed to document historical land uses. Personal and telephone interviews of past and present FTMC employees and military personnel were conducted. In addition, visual site inspections were conducted to verify conditions of specific property parcels.

Previous investigations have been conducted at the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO as described in the following paragraphs.

A 600-gallon, steel waste oil UST located at the rear of Building 1800 (northeast corner) was removed on April 27, 1994 and replaced with a 2,000-gallon UST (Parcel 20[7]) (Braun, 1995). During normal operation, the tank was filled by pouring used oil into a sink in Building 1800 and allowing the oil to feed by gravity through an underground polyvinyl chloride (PVC) pipe to the UST. It was noted in the closure report that at least one leak had occurred at an unsealed joint in the PVC (Braun, 1995). The base of the tank was approximately 8 feet below ground surface (bgs), and groundwater was not encountered at that depth. After removal of the tank, water was encountered at bedrock as the excavation was extended to approximately 10 feet deep. Although holes were not noted in the tank, stained soils were observed on the east side of the excavation from the top of the excavation to the bottom. Surface spills were noted before the UST was removed (Weston, 1990). The pipe trench was excavated to approximately 2 feet bgs to remove and replace approximately 14 feet of the piping leading to the UST. Approximately 6 cubic yards of soil were removed from the excavation and transported to the Base landfill for disposal. The excavation was backfilled with pea gravel.

Soil samples were collected from the sidewalls and the bottom of the excavation after the tank was removed. These sample results are listed in Table 2-1. Sample locations are shown on Figure 2-1. Samples labeled as "A" were collected at the surface of each location (walls and floor) and samples labeled as "B" were collected 2 feet further into the undisturbed soil. Where "A" sample results exceeded 100 parts per million (ppm) for total petroleum hydrocarbons (TPH) (EPA Method 418.1), the "B" samples were analyzed. Elevated concentrations of TPH were detected in all of the samples, except the sample collected from the north side of the excavation.

Four monitoring wells were installed near the waste oil UST (Parcel 20[7]) excavation to collect groundwater samples for analyses in accordance with the ADEM UST requirements. The locations of the four wells are shown on Figure 2-1. Each monitoring well was constructed of 4-inch-diameter PVC pipe with a 10-foot-long PVC screen. Three of the wells were installed to 15 feet bgs, and one well was installed to 14.5 feet bgs. One groundwater sample was collected from each of the wells (MW01, MW02, MW03, and MW04) on October 13, 1994. Samples were analyzed for volatile organic compounds (VOC), PAHs, and total lead. VOCs and PAHs were not detected above the reporting limit in the groundwater samples, with the exception of

Table 2-1

Historical Sample Data for the Removal of 600-Gallon Waste Oil UST
Autocraft Shop/Former DPDO Building 1800
Fort McClellan, Calhoun County, Alabama

Sampling Task	Sample Number	Sample Location	Sample Date	Sample Depth (ft bgs)	Analytical Parameters	
					Total Lead (mg/kg)	TPH (mg/kg)
Samples collected after UST and piping removal	94-0431-21	North side wall "A"	4/27/94	4	3.9	< 5
	94-0431-26	North side wall "B"	4/27/94	4	NA	NA
	94-0431-22	South side wall "A"	4/27/94	4	17	5000
	94-0431-27	South side wall "B"	4/27/94	4	7.9	680
	94-0431-23	East side wall "A"	4/27/94	4	16	41,000
	94-0431-28	East side wall "B"	4/27/94	4	8.5	45
	94-0431-24	West side wall "A"	4/27/94	4	58	26,000
	94-0431-29	West side wall "B"	4/27/94	4	7.4	425
	94-0431-25	Base "A"	4/27/94	6	15	1200
	94-0431-30	Base "B"	4/27/94	8	14	12,000
	94-0431-31	Pipe trench "A"	4/27/94	1.5	95	71,000
	94-0431-32	Pipe trench "B"	4/27/94	3.5	12	340
	94-0452-11	Stock pile	5/10/94	NL	31	6,700

Source: Braun Intertec Corporation (Braun) 1995, *UST Closure Report, Site Assessment Report, Fort McClellan Building 1800, Calhoun County, Fort McClellan, Alabama,* January.

ft bgs - Feet below ground surface.
mg/kg - Milligrams per kilogram.
NA - Not analyzed.
NL - Not listed.
TPH - Total petroleum hydrocarbons.
UST - Underground storage tank.

fluorene in MW01 and MW03 at 0.3 micrograms per liter (µg/L) and 0.12 µg/L, respectively. Lead was detected above the reporting limit in MW04 at 3 µg/L, but below the EPA action level of 15 µg/L (EPA, 2000).

The closure report stated that the extent of the petroleum-contaminated soils was not determined during the excavation. Groundwater was encountered within 5 feet of the bottom of the tank during final excavation (Braun, 1995).

The 2,000-gallon heating oil tank (Parcel 47[7]) was removed from the southwest end of Building 1800 in October 1996 (Southern Environmental Management & Specialties, 1997) and replaced with a 2,500-gallon, double-wall, fiberglass tank. The closure report does not indicate that any soil samples were collected.

The FTMC EBS identified the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO as Category 7 CERFA sites: areas that are not evaluated or require additional evaluation (ESE, 1998). The Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO lacked adequate documentation and therefore required additional evaluation to determine the environmental condition of the parcels.

3.0 Current Site Investigation Activities

This chapter summarizes SI activities conducted by IT and QST at the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO, including environmental sampling and analysis and monitoring well installation activities.

3.1 Environmental Sampling

The environmental sampling performed during the SI at the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO included the collection of surface soil samples, depositional soil samples, subsurface soil samples, surface water samples, sediment samples, and groundwater samples for chemical analysis. The sample locations were determined by observing site physical characteristics during a site walkover and by reviewing historical documents pertaining to activities conducted at the site. The sample locations, media, and rationales are summarized in Table 3-1. Samples collected by QST are designated with the prefix "SI06." Samples were submitted for laboratory analyses of site-related parameters listed in Section 3.3.

3.1.1 Surface and Depositional Soil Sampling

A total of 18 surface soil samples and 3 depositional soil samples were collected during the SI at the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO. IT collected 2 surface soil samples and 3 depositional soil samples at the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO. Additionally, QST collected 16 surface soil samples at the Former DPDO, Parcel 152(7) (QST, 1998). Soil sampling locations and rationales 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 utilities.

IT Sample Collection. Surface and depositional soil samples for Parcels 100(7), 20(7), and 47(7) were collected from the upper 1 foot of soil by either DPT or with a 3-inch diameter stainless-steel hand auger using the methodology specified in Section 4.9.1.1 of the SAP (IT, 2000a). Surface and depositional 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 VOC analysis 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.

QST Sample Collection. QST collected 16 surface soil samples at Parcel 152(7). The samples were collected from 0 to 1 foot bgs either DPT or a hand auger in accordance with the QST work plan. Where possible, surface soil aliquots for semivolatile organic compound (SVOC) and metal analyses were collected from the 0 to 6-inch interval, and aliqouts for VOCs from the 9- to 12-inch interval (QST, 1998). Sample collection logs are included in Appendix A. The samples were analyzed for parameters listed in Table 3-2 using methods outlined in Section 3.3.

3.1.2 Subsurface Soil Sampling

A total of eight subsurface soil samples were collected at the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO. IT collected subsurface soil samples from five soil borings, and QST collected samples from three soil borings. The subsurface soil sample locations are shown on Figure 3-1, and the subsurface sampling locations and rationales 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 Sample Collection. IT contracted TEG Inc., a DPT subcontractor, to assist in subsurface soil sample collection. Subsurface soil samples were collected by IT from soil borings at depths 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 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 analysis. 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 lithological log at each borehole. The lithological logs are included in Appendix B.

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

QST Sample Collection. QST contracted Graves Service Company Inc. to complete the soil borings and monitoring well installations. QST collected three subsurface samples at Parcel 152(7). Each sample was collected with a surface soil sample. The subsurface soil samples were collected at an interval from 3 to 4 feet bgs using a direct-push sampling system, in accordance with the procedures outlined in the QST work plan (QST, 1998).

3.1.3 Well Installation

QST originally installed five groundwater monitoring wells using DPT in May 1998 at the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO. IT subsequently installed two temporary and fourteen permanent wells with a hollow-stem auger rig in September 1999. Permanent wells installed by IT were located immediately adjacent to the five QST direct-push monitoring wells. Because the IT-installed hollow-stem auger permanent wells were located immediately adjacent to the QST direct-push temporary wells, and because the data provided by the IT wells are more recent, the QST well installation procedures and groundwater analytical data are not included in this SI report.

IT installed two temporary wells (FTA-100-GP02 and FTA-100-GP04) and fourteen permanent monitoring wells in the residuum groundwater zone at the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO to collect groundwater samples for laboratory analysis. The well/groundwater sample locations are shown on Figure 3-1. Table 3-3 summarizes construction details of the wells installed at the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO. The well construction logs are included in Appendix B.

IT contracted Miller Drilling Inc. to install two temporary wells at Parcel 100(7) with a hollow-stem auger rig in January 1999 at the locations shown on Figure 3-1. In September 1999, Miller Drilling Inc. installed 14 permanent monitoring wells with a hollow-stem auger rig at Parcels 152(7) and 241(7). The temporary and permanent 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 split-spoon refusal occurred, the auger was advanced until the first water-bearing zone was encountered. The on-site geologist logging the auger boreholes continued the lithological log for each borehole from the depth of split-spoon sampler refusal to the bottom of the auger borehole by logging the auger drill cuttings. The drill cuttings were logged to determine lithologic changes and the approximate depth of groundwater encountered during drilling. This information was used to determine the optimal placement of the monitoring well screen interval and to provide site-specific geologic and hydrogeologic information. The lithological log for each borehole is included in Appendix B.

Upon reaching the target depth at each borehole, a 5- to 20-foot length of 2-inch ID, 0.010-inch factory slotted, continuously wrapped, Schedule 40 PVC screen with a PVC end cap was placed through the auger to the bottom of the borehole. For both the temporary and permanent monitoring wells, the screen and end cap were attached to a 2-inch ID, flush-threaded Schedule 40 PVC riser. A sand pack consisting of number 1 filter sand (environmentally safe, clean fine sand, sieve size 20 to 40) was tremied around the well screen to approximately 2 feet above the top of the well screen as the augers were removed. The wells were surged using a PVC surge block for 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 sand pack and hydrated with potable water. The bentonite seal placement and hydration followed procedures in Appendix C of the SAP (IT, 2000a). 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. A locking well cap was placed on the PVC well casing.

At permanent well locations, the wells were grouted to ground surface with a bentonite-cement grout and a concrete pad was installed flush to ground surface. An 8-inch-diameter, traffic-bearing steel vault was placed around the well casing flush to the concrete surface pad. A locking well cap was placed on the PVC well casing.

The wells were developed by surging and pumping with a 2-inch submersible pump in accordance with methodology outlined in Section 4.8 and Appendix C of the SAP (IT, 2000a). The submersible pump used for well development was moved in an up-and-down fashion to encourage any residual well installation materials to enter the well. These materials were then pumped out of the well in order to re-establish the natural hydraulic flow conditions. Development continued until the water turbidity was equal to or less than 20 nephelometric turbidity units or for a maximum of 4 hours for the temporary wells and a maximum of 8 hours for the permanent wells. The IT well development logs are included in Appendix C.

3.1.4 Water Level Measurements

The depth to groundwater was measured in temporary and permanent wells installed by IT during the SI and in four existing monitoring wells at the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO 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. The meter probe and cable were cleaned before use at each well, following decontamination methodology presented in Section 4.10 of the SAP (IT, 2000a). Measurements were referenced to the top of the PVC well casing. A summary of groundwater level measurements is presented in Table 3-4.

3.1.5 Groundwater Sampling

IT collected groundwater samples from 20 temporary, permanent, and existing monitoring wells at the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO. QST collected groundwater samples from four temporary wells installed with DPT. However, IT subsequently installed permanent wells immediately adjacent to the QST temporary well locations; because the IT data are more recent, the QST groundwater data are not included in this SI report. For the purpose of the SI, existing monitoring wells MW01, MW02, MW03, and MW04 were redesignated FTA-100-MW01, FTA-100-MW02, FTA-100-MW03, and FTA-100-MW04, respectively.

The well/groundwater sampling locations are shown on Figure 3-1. The groundwater sampling locations and rationales 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 following procedures outlined in Section 4.9.1.4 of the SAP (IT, 2000a) for the IT wells.

Groundwater samples were collected by IT after purging a minimum of three well volumes and after field parameters, including temperature, pH, specific conductivity, oxidation-reduction potential, and turbidity, stabilized. Purging and sampling were performed with either a submersible pump or a peristaltic pump equipped with Teflon tubing (except for VOCs). Groundwater samples for VOC analysis were collected by filling the Teflon tubing via suction applied by the peristaltic pump head, removing the tubing from the well and the pump head, and draining the water into the sample vials. The procedure was repeated until all vials were filled. Field parameters were measured using a calibrated water quality meter. Field parameter readings are summarized in Table 3-6. Sample collection logs are included in Appendix A. The samples were analyzed for the parameters listed in Table 3-5 using methods outlined in Section 3.3.

3.1.6 Surface Water Sampling

IT collected five surface water samples and QST collected one surface water sample at the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO, from the locations shown on Figure 3-1. The surface water sampling locations and rationales are listed in Table 3-1. The surface water sample designations and QA/QC samples are listed in Table 3-7. Surface water samples with a "WS" prefix were collected as part of the watershed screening assessment conducted at FTMC to characterize the general quality of FTMC surface water bodies and to determine whether they meet state-designated use criteria (IT, 1998c). The sampling locations were determined in the field, based on drainage pathways and field observations.

IT Sample Collection. IT surface water sample collection was conducted in accordance with the procedures specified in Section 4.9.1.3 of the SAP (IT, 2000a). The surface water samples were collected by dipping a clean stainless-steel pitcher in the water and pouring the water in the appropriate sample containers. Surface water samples were collected after field parameters had been measured using a calibrated water quality meter.

QST Sample Collection. QST surface water sample collection was conducted in accordance with the procedures specified in the QST work plan (QST, 1998). QST collected samples by dipping a clean sample jar into the surface water body until it was filled and then transferring the water to the appropriate container.

Surface water field parameters are listed in Table 3-6, and sample collection logs are included in Appendix A. The samples were analyzed for the parameters listed in Table 3-7 using methods outlined in Section 3.3.

3.1.7 Sediment Sampling

A total of six sediment samples were collected during the SI at the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO. IT collected five sediment samples and QST collected one sediment sample. The sediment samples were collected at the same locations as the surface water samples presented in Section 3.1.6. The locations of the sediment samples collected are shown on Figure 3-1. Sediment sampling locations and rationales are presented in Table 3-1. The sediment sample designations and QA/QC samples are listed in Table 3-7. Sediment samples with a "WS" prefix were collected as part of the watershed screening assessment conducted at FTMC to characterize the general quality of FTMC surface water bodies and to determine whether they meet state-designated use criteria (IT, 1998c). The actual sediment sampling locations were determined in the field, based on drainage pathways and actual field observations.

IT Sample Collection. IT sediment sample collection was conducted in accordance with the procedures specified in Section 4.9.1.2 of the SAP (IT, 2000a). Sediments were collected with a stainless-steel spoon and placed in a clean stainless-steel bowl. Samples for VOC analysis were then immediately collected from the stainless-steel bowl with three EnCore samplers. The remaining portion of the sample was homogenized and placed in the appropriate sample containers.

QST Sample Collection. QST sediment sample collection was conducted in accordance with the procedures outlined in the QST work plan (QST, 1998). The sediment samples were collected by dipping a jar that was attached to a pole into the water and dragging it along the bottom to scoop up the sediment. The sediment was emptied onto a piece of heavy-duty aluminum foil. Once enough sediment had been collected to conduct the required analyses, the material for VOC analysis was immediately containerized. Following VOC sample collection, the remaining sediment was thoroughly mixed and then placed into the appropriate sample containers using a stainless-steel spoon.

IT and QST sample collection logs are included in Appendix A. The sediment samples were analyzed for the parameters listed in Table 3-7 using methods outlined in Section 3.3.

3.2 Surveying of Sample Locations

IT surveyed sample locations using global positioning system (GPS) 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 of 1983. Elevations were referenced to the North American Vertical Datum of 1988. Horizontal coordinates and elevations are included in Appendix D.

QST surveyed sample locations using GPS survey techniques or traditional surveying techniques described in the SI work plan (QST, 1998). Map coordinates for each sample location were determined using a Transverse Mercator (UTM) or State Planar grid to within ± 3 feet (± 1 meter). If necessary, the elevation of the natural ground surface for each monitor well and the highest point on the top of each monitor well casing was surveyed within ± 0.01 feet (± 0.3 centimeter) using the National Geodetic Vertical Datum of 1929.

3.3 Analytical Program

IT and QST samples collected during the SI were analyzed for various physical and chemical parameters. The specific suite of analyses performed was based on the potential site-specific chemical (PSSC) historically at the site and EPA, ADEM, FTMC, and USACE requirements. Target analyses for samples collected at the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO included the following parameters:

- Target Compound List (TCL) VOCs - Method 5035/8260B
- TCL SVOC - Method 8270C
- Target Analyte List Metals - Method 6010B/7000
- Chlorinated Pesticides -- Method 8081A
- Organophosphorous Pesticides – Method 8141A
- Chlorinated Herbicides – Method 8151A
- Pesticides/Polychlorinated Biphenyls (PCB) – Method 8080 (QST data only)
- Nitroexplosives – Method 8330
- Total Organic Carbon – Method 9060

- Grain size – American Society for Testing and Materials D421/D422 (sediment only)

- Biological oxygen demand - Method 4051.

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).

3.4 Sample Preservation, Packaging, and Shipping

IT 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-custody 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.

QST sample preservation, packaging, and shipping followed the guidelines specified in the QST work plan (QST, 1998).

3.5 Investigation-Derived Waste Management and Disposal

IT Investigation Derived Waste. IT investigation-derived waste (IDW) was managed and disposed as outlined in Appendix D of the SAP (IT, 2000a). The IDW generated during the SI at the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO was segregated as follows:

- Drill cuttings

- Purge water from well development and sampling activities, and decontamination fluids

- Spent well materials, and personal protective equipment.

Solid IDW was stored inside the fenced area surrounding Buildings 335 and 336 in lined roll-off bins prior to characterization and final disposal. Solid IDW was characterized using toxicity characteristic leaching procedure (TCLP) analyses. Based on the results, drill cuttings, spent

well materials, and personal protective equipment generated during the SI at the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO 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 washrack. Liquid IDW was characterized by VOC, SVOC, and metals analyses. Based on the analyses, liquid IDW was discharged as nonregulated waste to the FTMC wastewater treatment plant on the Main Post.

QST Investigation-Derived Waste. QST-generated IDW was managed and disposed as outlined in the QST work plan (QST, 1998). Borehole cuttings were collected as they were generated and screened with a PID. If the PID indicated greater than 50 ppm VOCs in air, then the soil was containerized in 55-gallon drums. All drilling fluid, purge water, and decontamination fluids were containerized in drums or other appropriate containers. All IDW was characterized as hazardous or nonhazardous using TCLP analyses. If the IDW exceeded TCLP regulatory criteria, then it was disposed as hazardous waste in an approved hazardous waste facility.

3.6 Variances/Nonconformances

The following sections describe variances and nonconformances to the IT and QST work plans that occurred during the completion of the SI at the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO.

3.6.1 Variances

One variance to the IT SFSP was recorded during completion of the SI at the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO. The variance did not alter the intent of the investigation or the sampling rationale presented in Table 4-2 of the SFSP (IT, 1998a). The IT variance to the SFSP is summarized in Table 3-8 and included in Appendix G.

QST did not document any variances to the QST work plan.

3.6.2 Nonconformances

IT recorded one nonconformance to the SFSP during completion of the SI at the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO. Borehole FTA-100-GP01 was not completed because of its proximity to underground utilities. The nonconformance

did not alter the intent of the investigation or the sampling rationale presented in Table 4-2 of the SFSP (IT, 1998a). The nonconformance to the SFSP is summarized in Table 3-9 and included in Appendix G. QST did not document any nonconformances to the QST work plan.

3.7 Data Quality

IT Data. Samples collected by IT were collected, documented, handled, analyzed, and reported in a manner consistent with the SI 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. The field sample analytical data are presented in tabular form in Appendix E. The variances and nonconformances discussed in Section 3.6 did not impact the usability of the data.

Data were reported and evaluated in accordance with Corps of Engineers South Atlantic Savannah Level B criteria (USACE, 1994) and the stipulated requirements for the generation of definitive data (Section 3.1.2 of Appendix B of the SAP [IT, 2000a]). Chemical data were reported via hard-copy data packages by the laboratory using Contract Laboratory Program-like forms. A summary of validated data is included in Appendix E. A complete (100 percent) Level III data validation effort was performed on the reported analytical data. Appendix F includes a data validation summary report that discusses IT data 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 ITEMS™ database for tracking and reporting.

QST Data. QST data were submitted to the IRDMIS database at the conclusion of QST field activities. Hard-copy data packages were sent to the AEC in Edgewood, Maryland for storage. IT retrieved the electronic data via IRDMIS and the original data packages from the AEC for evaluation. From the IRDMIS data, IT identifed key fields of information (analytical records, well construction and geotechnical information, sample location information, and water level readings) and translated the data into the ITEMS database.

QST hard-copy analytical data packages were validated during a complete (i.e., 100 percent) Level III data validation effort. Appendix F includes a copy of the data validation summary report that discusses the QST data validation. Selected results were rejected or qualified based

on the implementation of accepted data validation procedures and practices. These qualified parameters are highlighted in the data validation report. In addition, during the validation the electronic results were compared to the hard-copy results. Concentrations in the database were corrected where necessary and validation qualifiers added to the QST data using ITEMS to reflect the findings summarized in the QST data validation report.

After the QST data validation was complete and the results updated, the QST data and the IT data were merged using ITEMS for inclusion in this SI report. The combined validated analytical data are presented in tabular form in Appendix E. The qualified data were used in the comparisons to the SSSLs and ESVs developed by IT in Chapter 5.0. Rejected data (assigned an "R" data qualifier) were not used in the comparisons to SSSLs and ESVs. The IT and QST data presented in this report, except where qualified, meet the principle data quality objective for this SI.

4.0 Site Characterization

Subsurface investigations performed at the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO provided soil, bedrock, and groundwater data used to characterize the geology and hydrogeology of the site.

4.1 Regional and Site Geology

4.1.1 Regional Geology

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

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

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

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

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

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

Overlying the Conasauga Formation is the Knox Group, which is composed of the Copper Ridge and Chepultepec dolomites of Cambro-Ordovician age. The Knox Group is undifferentiated in Calhoun County and consists of light medium gray, fine to medium crystalline, variably bedded

to laminated, siliceous dolomite and dolomitic limestone that weather to a chert residuum (Osborne and Szabo, 1984). The Knox Group underlies a large portion of Pelham Range.

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 that makes up the Eden thrust sheet is exposed at FTMC through an eroded "window," or "fenster," in the overlying thrust sheet. Rocks within the window display complex folding with the folds being overturned and tight to isoclinal. The carbonates and shales locally exhibit well-developed cleavage (Osborne and Szabo, 1984). The FTMC window is framed on the northwest by the Rome Formation, north by the Conasauga Formation, northeast, east, and southwest by the Shady Dolomite, and southeast and southwest by the Chilhowee Group (Osborne et al., 1997).

4.1.2 Site Geology

The soils at the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO are the Philo and Stendal fine sandy loams, which are developed in general alluvium on nearly level bottoms subject to flooding. The surface soil ranges from dark grayish-brown to dark brown. The subsoil ranges from dark brown to yellowish brown. A few areas are weakly cemented at depths of 30 to 38 inches. Runoff is slow, and flooding commonly occurs during heavy rain of short duration. Infiltration is medium and permeability is moderate. The capacity for moisture is high. General soil depth in these series is approximately 2 to 5.5 feet of moderately well drained to somewhat poorly drained fine sandy loam or fine sandy clay loam. These series are developed from alluvium that washed from sandstone and shale soils that frequently flooded (U.S. Department of Agriculture, 1961).

Bedrock beneath the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO is mapped as Ordovician limestone and shale formations, including the Little Oak/Newala Limestone and Floyd/Athens Undifferentiated Shale. 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. A geologic map of the area is shown on Figure 4-1.

A geologic cross section was constructed from direct-push and hollow-stem auger boring data collected during the SI, as shown on Figure 4-2. The geologic cross section location is shown on Figure 3-1. Based on the cross section, residuum beneath the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO consists of predominantly silt and clay overlying dark-gray to black weathered shale and light to dark-gray limestone. The weathered shale was

encountered at about 10 to 12 feet bgs at the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO. The weathered shale at Parcel 152(7) was encountered between 1 foot bgs (GSBP-152-MW08) and 7 feet bgs (GSBP-152-MW11). Bedrock (auger refusal) ranged from 8 feet bgs (GSBP-152-MW03) to 24 feet bgs (GSBP-152-MW10), on black hard shale. Limestone was encountered at 7 feet bgs at GSBP-152-MW14. This suggests a shale/limestone contact approximately 20 feet north of the former Building T-2114 and perpendicular to South Branch of Cane Creek. An outcrop observed in South Branch of Cane Creek adjacent to the site further supports existence of a shale/limestone contact.

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 exceeding evapotranspiration rates. The major surface water features at the Main Post of FTMC include Remount Creek, Cane Creek, South Branch of 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 Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO follows site topography and generally flows to the northeast towards South Branch of Cane Creek. South Branch of Cane Creek flows to the northwest and eventually discharges into Cane Creek.

4.2.2 Hydrogeology

Static groundwater levels were measured in 20 monitoring wells at the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO on March 14, 2000. Table 3-4 summarizes the measured groundwater elevations. A groundwater elevation contour map was constructed from the March 2000 data, as shown on Figure 4-3.

Static groundwater levels measured on March 14, 2000 are above the depth to water encountered during well installation activities. This indicates that the groundwater has an upward hydraulic gradient and is under semi-confined conditions.

Groundwater at the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO has a general direction of flow to the north-northeast towards South Branch of Cane Creek, as shown on Figure 4-3. This suggests that the area is hydraulically connected to the

creek. The average hydraulic gradient at the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO is approximately 0.035 feet per foot.

5.0 Summary of Analytical Results

The results of the chemical analysis of samples collected at the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO indicate that metals, VOCs, SVOCs, pesticides, and nitroaromatic compounds have been detected in the various site media. PCBs and chlorinated herbicides were not detected in any of the samples collected. To evaluate whether the detected constituents present an unacceptable risk to human health and the environment, the analytical results were compared to the human health SSSLs and ESVs for FTMC. The SSSLs and ESVs were developed by IT for human health and ecological risk evaluations as part of the ongoing SIs being performed under the BRAC Environmental Restoration Program at FTMC.

Metal concentrations exceeding the SSSLs and ESVs were subsequently compared to metals background screening values (background concentrations) 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, PAH concentrations in surface and depositional soils that exceeded the SSSLs and ESVs were compared to PAH background screening values. 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 two 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 of 0.005 milligrams per kilogram (mg/kg), while Method 8270C has a reporting limit of 0.330 mg/kg, which is typical for a soil matrix sample. Because of the direct nature of the Method 8260B analysis and its resulting lower reporting limit, this method should be considered superior to Method 8270C when quantifying low levels (0.005 to 0.330 mg/kg) of these compounds. Method 8270C and its associated methylene chloride extraction step is superior, however, when dealing with samples that contain higher concentrations (greater than 0.330 mg/kg) of these compounds. Therefore, all data were considered, and none were categorically excluded. Data validation qualifiers were helpful in evaluating the usability of data, especially if calibration, blank contamination, precision, or accuracy indicator anomalies were encountered. The validation qualifiers and concentrations reported (e.g., whether concentrations were less than or

greater than 0.330 mg/kg) were used to determine which analytical method was likely to return the more accurate result.

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

5.1 Surface and Depositional Soil Analytical Results

Eighteen surface soil samples and three depositional soil samples were collected for chemical analysis at the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO. Surface and depositional soil samples were collected from the upper 1 foot of soil at the sample locations shown on Figure 3-1. Analytical results were compared to residential human health SSSLs, ESVs, and background screening values (metals and PAHs), as presented in Table 5-1.

Metals. Twenty-three metals were detected in surface and depositional soil samples collected at the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO. Twenty-two of the 23 detected metals were present in sample SI06-SS09.

Eight metals (aluminum, antimony, arsenic, chromium, copper, iron, lead, and manganese) were detected at concentrations exceeding residential human health SSSLs. Of these metals, concentrations of antimony (at SI06-SS15), lead (SI06-SS09), and copper (SI06-SS09) also exceeded their respective background concentrations.

The following metals were detected at concentrations exceeding ESVs and background concentrations: cadmium (SI06-SS10 and SI06-SS11), cobalt (SI06-SS08), copper (three locations), lead (seven locations), mercury (three locations), selenium (two locations), and zinc (fourteen locations).

Volatile Organic Compounds. Thirteen VOCs, including 4-methyl-2-pentanone, benzene, cumene, ethylbenzene, naphthalene, toluene, xylene (total), and p-cymene, were detected in surface and depositional soil samples collected. Seven of the detected VOCs were present in each of the samples collected at SI06-SS10 and SI06-SS16. Six of the thirteen detected VOCs were present in each of the samples collected at FTA-100-DEP02, SI06-GWS09, SI06-SS09, SI06-SS15. However, all VOC concentrations detected in surface and depositional soils were below SSSLs and ESVs.

Semivolatile Organic Compounds. Twenty-three SVOCs, including sixteen PAH compounds, were detected in surface and depositional soil samples collected at the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO. Twenty of the 23 detected SVOCs were present in the sample collected at FTA-100-DEP01. Three or more SVOCs were present in the samples collected at FTA-100-DEP02, SI06-SS09, and SI06-SS16. The concentrations of benzo(a)pyrene (0.086 to 0.59 mg/kg) exceeded the SSSL (0.085 mg/kg) at seven locations but were below the PAH background value.

Seven SVOCs, including six PAH compounds (anthracene, benzo[a]pyrene, fluoranthene, naphthalene, phenanthrene, and pyrene) and one non-PAH compound (phenol) were detected at concentrations exceeding ESVs. With the exception of naphthalene at two sample locations (FTA-100-DEP01 and SI06-GWS06), the concentrations of the PAHs were below PAH background values. The naphthalene concentrations at FTA-100-DEP01 and SI06-GWS06 were 0.1 mg/kg and 0.309 mg/kg, respectively. The phenol concentration (0.055 mg/kg) marginally exceeded the ESV (0.05 mg/kg) at one location (FTA-100-DEP01).

Pesticides. Eight pesticides, namely 4,4'-dichlorodiphenyldichlorethane (DDD), 4,4'-dichlorodiphenyldichloroethene (DDE), 4,4'-dichlorodiphenyltrichloroethane (DDT), chlordane, heptachlor epoxide, methoxychlor, alpha-chlordane, and gamma-chlordane, were detected in surface and depositional soil samples collected at the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO.

Pesticide concentrations in surface and depositional soils were below SSSLs. Four of the eight pesticides were detected at concentrations exceeding ESVs, namely 4,4'-DDD (two locations), 4,4'-DDE (six locations), 4,4'-DDT (five locations), and chlordane (one location).

Total Organic Carbon. Six surface soil samples collected by QST were analyzed for total organic carbon (TOC) content. TOC concentrations ranged from 2,190 to 21,400 mg/kg, as summarized in Appendix E.

5.2 Subsurface Soil Analytical Results

Eight subsurface soil samples were collected for chemical analyses at the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO. Subsurface soil samples were collected at depths greater than 1 foot bgs at the sample locations shown on Figure 3-1.

Analytical results were compared to residential human health SSSLs and metals background screening values, as presented in Table 5-2.

Metals. Twenty-one metals were detected in subsurface soil samples collected at the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO. Aluminum, arsenic, barium, beryllium, chromium, cobalt, copper, iron, lead, magnesium, manganese, nickel, potassium, and zinc were detected in each of the subsurface soil samples. Sample locations SI06-GWS09 and SI06-SS01 each contained 20 of the 21 detected metals.

The concentrations of five metals (aluminum, arsenic, chromium, iron, and manganese) exceeded SSSLs in subsurface soils. With the exception of aluminum (six locations), the concentrations of these metals were below their respective background concentrations. The aluminum results were within the range of background values determined by SAIC (1998) (Appendix H).

Volatile Organic Compounds. Twelve VOCs, including benzene, ethylbenzene, naphthalene, toluene, and xylene, were detected in subsurface soil samples collected. However, the VOC concentrations were below their respective SSSLs.

Semivolatile Organic Compounds. The SVOC bis(2-ethylhexyl)phthalate was detected in one subsurface soil sample (FTA-100-GP02) collected at the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO. The bis(2-ethylhexyl)phthalate concentration was below the SSSL. Benzoic acid was detected in SI06-GWS09 at an estimated concentration of 0.16 mg/kg (an SSSL does not exist for benzoic acid).

Pesticides. Four pesticides, namely 4,4'-DDT, chlordane, alpha-chlordane, and gamma-chlordane, were detected in the subsurface soil sample collected at SI06-GWS09. Pesticides were not detected in any of the other subsurface soil samples. However, the pesticide concentrations soils were below SSSLs.

5.3 Groundwater Analytical Results

Twenty temporary and permanent monitoring wells were sampled at the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO at the locations shown on Figure 3-1. Analytical results were compared to residential human health SSSLs and metals background screening values, as presented in Table 5-3.

Metals. Twenty-one metals were detected in groundwater samples collected at the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO. The concentrations of five metals (aluminum, iron, manganese, thallium, and vanadium) exceeded SSSLs and their respective background concentrations. The aluminum, thallium, and vanadium results also exceeded the background range.

Volatile Organic Compounds. Seventeen VOCs were detected in groundwater samples collected at the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO. VOCs were not detected at 12 of the 20 sample locations. Twelve of the 17 VOCs detected were present in the sample from GSBP-152-MW12.

The concentrations of 1,1,2,2-tetrachloroethane (0.00057 milligrams per liter [mg/L]) and naphthalene (0.0069 mg/L) exceeded SSSLs at sample location GSBP-152-MW12. The SSSLs for 1,1,2,2-tetrachloroethane and naphthalene are 0.0002 mg/L and 0.003 mg/L, respectively. These compounds were not detected in any of the other groundwater samples collected.

Semivolatile Organic Compounds. Four SVOCs, including naphthalene and phenol, were detected in the groundwater samples collected at the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO. SVOCs were not detected at 15 sample locations, and phenol was the only detected SVOC at three locations. The phenol results were flagged with a "B" data qualifier, signifying that phenol was also detected in an associated laboratory or field blank. The SVOCs concentrations in groundwater were below SSSLs.

Nitroaromatics. Fourteen of the 20 groundwater samples were analyzed for nitroaromatic compounds. Three nitroaromatics compounds, namely 2,6-dinitrotoluene, 2-amino-4,6-dinitrotoluene, and 2-nitrotoluene, were detected in two of the groundwater samples collected at the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO. 2-nitrotoluene (GSBP-152-MW03), 2-amino-4,6-dinitrotoluene (GSBP-152-MW14), and 2,6-dinitrotoluene (GSBP-152-MW14) were each detected in only one sample. The 2,6-dinitrotoluene result was flagged with a "B" data qualifier, signifying that compound was also detected in an associated laboratory or field blank. The concentrations of 2,6-dinitrotoluene and 2-amino-4,6-dinitrotoluene exceeded SSSLs at sample location GSBP-152-MW14; the concentrations were 0.00025 mg/L and 0.00028 mg/L, respectively.

Pesticides. Eleven pesticides were detected in groundwater samples collected at the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO. These pesticides were

detected at only three sample locations (GSBP-152-MW03, GSBP-152-MW12, and GSBP-152-MW13). Sample location GSBP-152-MW03 contained ten of the eleven detected pesticides.

The concentrations of aldrin, heptachlor, heptachlor epoxide, alpha-BHC, beta-BHC, and gamma-BHC exceeded SSSLs in one or more of the three samples (GSBP-152-MW03, GSBP-152-MW12, and GSBP-152-MW13). The concentrations of the 11 detected pesticides ranged from 0.000019 to 0.00027 mg/L.

5.4 Surface Water Analytical Results

Six surface water samples were collected at the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO at the locations shown on Figure 3-1. Analytical results were compared to recreational site user human health SSSLs, ESVs, and metals background screening values, as presented in Table 5-4.

Metals. Fifteen metals were detected in surface water samples collected at the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO. None of the detected metals was present at a concentration exceeding its SSSL. The concentrations of four metals (aluminum, barium, iron, and mercury) exceeded ESVs. Surface water sample WS100-SW/SD01 contained each of these metals at a concentration greater than the ESV. With the exception of mercury, the concentrations of these metals were below their respective background concentrations. A background value for mercury is not available.

Volatile Organic Compounds. Five VOCs, including 1,2,4-trimethybenzene, toluene, and trichloroethene, were detected in surface water samples collected at the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO. Four of the five detected VOCs were present in the sample from location WS-100-SW/SD01. Trichloroethene was detected in four of the surface water samples. The VOC concentrations in surface water were below SSSLs and ESVs.

Semivolatile Organic Compounds. The SVOC bis(2-ethylhexyl)phthalate was detected in three of the surface water samples collected at the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO. Two of the bis(2-ethylhexyl)phthalate results were flagged with a "B" data qualifier, indicating that the compound was also detected in an associated laboratory or field blank sample. Bis (2-ethylhexyl)phthalate is a common laboratory contaminant.

The bis(2-ethylhexyl)phthalate concentrations were below the SSSL but exceeded the ESV at each location.

Pesticides. Pesticides were not detected in the surface water samples collected at the site.

Biological Oxygen Demand. Biological oxygen demand was determined for one surface water sample collected by QST. The biological oxygen demand for sample SI06-SW01 was 1.8 mg/L, as summarized in Appendix E.

5.5 Sediment Analytical Results

Six sediment samples were collected at the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO. Samples were collected from the upper 0.5 foot of sediment at the sample locations shown on Figure 3-1. Analytical results were compared to recreational site user human health SSSLs, ESVs, and metals background screening values, as presented in Table 5-5.

Metals. Twenty-two metals were detected in sediment samples collected at the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO. Each of the detected metals was present in the sample collected at FTA-100-SW/SD02 and 21 of the 22 detected metals were present in the sample collected at FTA-100-SW/SD03. The concentrations of the detected metals were below SSSLs. The concentrations of cadmium (two locations) and copper (one location) exceeded ESVs and their respective background concentrations. The cadmium concentration (3.66 mg/kg) also exceeded the background range (2.4 mg/kg) at SI06-SED01.

Volatile Organic Compounds. Eleven VOCs, including 1,1,1-trichloroethane, benzene, ethylbenzene, tetrachloroethene, toluene, trichloroethene, and xylene, were detected in sediment samples collected at the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO. Ten of the eleven detected VOCs were present in the sample collected from S106-SED01. The VOC concentrations in sediments were below SSSLs and ESVs.

Semivolatile Organic Compounds. Twelve SVOCs, including eleven PAH compounds, were detected in sediment samples collected at the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO. SVOC concentrations in sediments were below SSSLs. The concentrations of four PAHs (benzo[a]anthracene, chrysene, fluoranthene, and pyrene) exceeded ESVs at FTA-100-SW/SD03. In addition, the concentration of fluoranthene exceeded the ESV at SI06-SED01.

Pesticides. Five of the six sediment samples were analyzed for pesticides. Six pesticides, namely 4,4'-DDE, 4,4'-DDT, delta-BHC, chlordane, gamma chlordane, and alpha chlordane, were detected in sediment samples collected at the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO. Pesticides were not detected at three of the five sample locations. Sample location SI06-SED01 contained four of the six detected pesticides. With the exception of chlordane in one sample, the pesticide concentrations in sediments were below SSSLs and ESVs. The chlordane concentration at SI06-SED01 exceeded the ESV but was below the SSSL.

Total Organic Carbon. Five sediment samples collected by IT were analyzed for TOC content. TOC concentrations ranged from 1,560 to 17,600 mg/kg, as summarized in Appendix E.

Grain Size. Grain size distribution was determined in five sediment samples collected by IT. Grain size results are included in Appendix E.

6.0 Summary, Conclusions, and Recommendations

IT, under contract with the USACE, completed an SI at the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of the DPDO, Parcels 100(7), 20(7), 47(7), 152(7), and 241(7) at FTMC in Calhoun County, Alabama. The SI was conducted to determine whether chemical constituents are present at the site and, if present, whether the concentrations present an unacceptable risk to human health or the environment. The SI at the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of the DPDO consisted of the sampling and analysis of 18 surface soil samples, 3 depositional soil samples, 8 subsurface soil samples, 20 groundwater samples, and 6 surface water and sediment samples. In addition, 16 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. Data previously collected by QST at the Former DPDO, Parcel 152(7) were incorporated into this SI report.

Chemical analyses of samples collected at the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of the DPDO indicate that metals, VOC, SVOC, pesticides, and nitroaromatic compounds have been detected in the various site media. PCBs and herbicides were not detected in any of the samples collected. To evaluate whether detected constituents pose an unacceptable risk to human health or the environment, analytical results were compared to human health SSSL, ESV, and background screening values.

The potential threat to human receptors is expected to be minimal. Although the site is projected for passive recreational use, the soils and groundwater data were screened against residential human health SSSLs to evaluate the site for possible unrestricted land reuse. Concentrations of detected metals in soils were below their respective SSSLs or background screening concentrations, or within the range of background values, with the exception of antimony (3.17 mg/kg), copper (356 mg/kg), and lead (573 mg/kg) in one surface soil sample each. The concentrations of antimony and copper, however, were sufficiently low so that adverse effects are very unlikely. Also, the average concentration of lead was below the SSSL. The average, rather than the maximum detected concentration, is the more appropriate value to compare with the SSSL (EPA, 1994). It is concluded that the metals in soil do not represent unacceptable human health risk effects.

The PAH compound benzo(a)pyrene was detected in surface and depositional soils at concentrations (0.086 to 0.59 mg/kg) slightly exceeding the SSSL (0.085 mg/kg) but below the

PAH background value. Given the limited distribution and low concentrations of benzo(a)pyrene, this compound is not expected to pose a threat to human health.

Two VOCs (1,1,2,2-tetrachloroethane and naphthalene) were detected in groundwater from one well (GSBP-152-MW12) at levels exceeding SSSLs. Currently, there is no established EPA drinking water standard (maximum contaminant level [MCL]) for either compound. The concentration of naphthalene (0.0069 mg/L) is well below its EPA Lifetime Health Advisory (0.1 mg/L), and is not expected to induce adverse health effects. The concentration of 1,1,2,2-tetrachlorethane (0.00057 mg/L) does not exceed its noncancer SSSL, suggesting it is unlikely to induce adverse noncancer effects. The cancer risk associated with 1,1,2,2-tetrachloroethane estimated from the SSSL is near the low end of the EPA risk management range generally considered to be acceptable. It is concluded that exposure to the two VOCs in groundwater does not represent unacceptable risk of cancer or noncancer human health effects.

Two nitroaromatic compounds (2,6-dinitrotoluene and 2-amino-4,6-dinitrotoluene) were detected in groundwater from one well (GSBP-152-MW14) at concentrations exceeding their SSSLs. Currently there is no established EPA MCL for either of these compounds. However, the concentration of 2,6-dinitrotoluene (0.00025 mg/L) in groundwater does not exceed the EPA Lifetime Health Advisory, suggesting that adverse noncancer effects are unlikely. The cancer risk associated with 2,6-dinitrotoluene estimated from the SSSL is near the low end of the EPA risk management range generally considered to be acceptable. Health Advisory values do not exist for 2-amino-4,6-dinitrotoluene (detected at a concentration of 0.00028 mg/L). The hazard index estimated from the SSSL, however, is less than the threshold limit of 1, suggesting that adverse noncancer health effects are unlikely. It is concluded that exposure to the two nitroaromatic compounds in groundwater does not represent unacceptable risk of cancer or noncancer human health effects.

Concentrations of six pesticides (aldrin, heptachlor, heptachlor epoxide, alpha-BHC, beta-BHC, and gamma-BHC) in groundwater from one or more of three wells (GSBP-152-MW03, GSBP-152-MW12, and GSBP-152-MW13) exceeded their SSSLs. The concentrations of heptachlor, heptachlor epoxide, and gamma-BHC, however, did not exceed their respective EPA MCLs for drinking water. MCLs and Lifetime Health Advisories do not exist for aldrin, alpha-BHC, and beta-BHC. Cancer risks estimated from the respective SSSLs for these pesticides, however, are all within the EPA risk management range that is generally considered to be acceptable. It is concluded that exposure to the six pesticides in groundwater does not represent unacceptable risk of cancer or noncancer human health effects.

Metals, SVOCs, and pesticides were detected in site media at concentrations exceeding ESVs. The site is located within the developed area of the Main Post and consists of buildings, concrete and asphalt pavement, and limited wooded and grassy areas. The site (particularly Parcels 152[7] and 241[7]) may support limited ecological habitat in the proposed passive recreation land reuse scenario. However, given the low levels and the sporadic distribution of chemical constituents, the potential threat to ecological receptors is expected to be minimal.

Based on the results of the SI, past operations at the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO do not appear to have adversely impacted the environment. The metals and chemical compounds detected in site media do not pose an unacceptable risk to human health or the environment. Therefore, IT recommends "No Further Action" and unrestricted land reuse at the Autocraft Shop/Former DPDO and Former Motor Pool Area 2100 North of DPDO, Parcels 100(7), 20(7), 47(7), 152(7), and 241(7).

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