Final

Site Investigation Report
Former Motor Pool Area 800
Parcels 164(7), 11(7), 12(7), and 68(7)

Fort McClellan
Calhoun County, Alabama

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Executive Summary

In accordance with Contract Number DACA21-96-D-0018, Task Order CK05, IT Corporation completed a site investigation (SI) at Former Motor Pool Area 800, Parcels 164(7), 11(7), 12(7), and 68(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 Former Motor Pool Area 800, Parcels 164(7), 11(7), 12(7), and 68(7), consisted of the sampling and analysis of 15 surface soil samples, 1 depositional soil sample, 12 subsurface soil samples, 13 groundwater samples, 5 surface water samples, and 5 sediment samples. In addition, 9 groundwater monitoring wells were installed to facilitate groundwater sample collection and to provide site-specific geological and hydrogeological characterization information.

Chemical analysis of samples collected at Former Motor Pool Area 800, Parcels 164(7), 11(7), 12(7), and 68(7), indicates that metals, volatile organic compounds (VOC), and semivolatile organic compounds (SVOC) were detected in the environmental media sampled. To evaluate whether detected constituents pose an unacceptable risk to human health or the environment, analytical results were compared to human health site-specific screening levels (SSSL), ecological screening values (ESV), and background screening values for FTMC.

The potential impact to human receptors is expected to be minimal. Although the site is projected for industrial reuse, the soils and groundwater analytical data were screened against residential human health SSSLs to evaluate the site for possible unrestricted future use. In soils, with the exception of cadmium, lead, and iron in one sample each, the metals that exceeded residential human health SSSLs were below their respective background concentrations or within the range of background values. Six SVOCs (polynuclear aromatic hydrocarbon [PAH] compounds) were detected in one surface soil sample at concentrations exceeding SSSLs and PAH background screening values. However, these PAH compounds are believed to be related to anthropogenic activities (i.e., asphalt pavement) and not related to operations conducted at the site. VOC concentrations in soils were below SSSLs.

In groundwater, the concentrations of four metals exceeded SSSLs and the range of background values. However, the majority of these metals were detected in groundwater samples with high turbidity at the time of sample collection, which caused the elevated metals results. The SVOC bis(2-ethylhexyl)phthalate was detected in one groundwater sample at a concentration exceeding

the SSSL. Bis(2-ethylhexyl)phthalate is a common laboratory contaminant and is probably not a site-related contaminant. VOC concentrations in groundwater were below SSSLs.

Several metals were detected in surface/depositional soil, surface water, and sediment samples at concentrations exceeding ESVs and background concentrations. In addition, SVOCs (PAH compounds, bis[2-ethylhexyl]phthalate, and phenol) and VOCs (trichloroethene and trichlorofluoromethane) were detected in a limited number of samples at concentrations exceeding ESVs. However, the potential impact to ecological receptors is expected to be minimal based on the current and projected future land use of the parcel. The site is a well-developed area, consisting of buildings and paved roads/areas interspersed with limited grassy areas, and is projected for industrial reuse. Viable ecological habitat is presently limited and is not expected to increase in the future land use scenario.

Based on the results of the SI, past operations at Former Motor Pool Area 800, Parcels 164(7), 11(7), 12(7), and 68(7), do not appear to have adversely impacted the environment. The metals and chemical constituents detected in site media do not pose an unacceptable risk to human health and the environment. Therefore, IT Corporation recommends "No Further Action" and unrestricted land reuse at Former Motor Pool Area 800, Parcels 164(7), 11(7), 12(7), and 68(7).

1.0 Introduction

The U.S. Army has selected Fort McClellan (FTMC) located in Calhoun County, Alabama, for closure by the Base Realignment and Closure (BRAC) Commission under Public Laws 100-526 and 101-510. The 1990 Base Closure Act, Public Law 101-510, established the process by which U.S. Department of Defense (DOD) installations would be closed or realigned. The BRAC Environmental Restoration Program requires investigation and cleanup of federal properties prior to transfer to the public domain. The U.S. Army is conducting environmental studies of the impact of suspected contaminants at parcels at FTMC under the management of the U.S. Army Corps of Engineers (USACE), Mobile District. The USACE contracted with IT Corporation (IT) to perform the site investigation (SI) at Former Motor Pool Area 800, Parcels 164(7), 11(7), 12(7), and 68(7), under Contract Number DACA21-96-D-0018, Task Order CK05. The site is hereinafter referred to as Former Motor Pool Area 800, Parcel 164(7), and includes all associated parcels unless otherwise specified.

This SI report presents specific information and results compiled from the SI, including field sampling and analysis and monitoring well installation activities, conducted at Former Motor Pool Area 800, Parcel 164(7).

1.1 Project Description

Former Motor Pool Area 800 was identified as an area to be investigated prior to property transfer. Former Motor Pool Area 800, Parcel 164(7), was identified as a Category 7 site in the environmental baseline survey (EBS) (Environmental Science and Engineering [ESE], 1998). Category 7 sites are areas that are not evaluated and/or that require further evaluation.

A site-specific field sampling plan (SFSP) attachment (IT, 1998a) and a site-specific safety and health plan (SSHP) attachment were finalized in October 1998. The SFSP and SSHP were prepared to provide technical guidance for sample collection and analysis at the Former Motor Pool Area 800, Parcel 164(7). The SFSP was used in conjunction with the SSHP as attachments to the installation-wide work plan (IT, 1998b), and the installation-wide sampling and analysis plan (SAP) (IT, 2000a). The SAP includes the installation-wide safety and health plan and quality assurance plan (QAP).

The SI included field work to collect 15 surface soil samples, 1 depositional soil sample, 12 subsurface soil samples, 13 groundwater samples, 5 surface water samples, and 5 sediment

samples to determine whether potential site-specific chemicals are present at Former Motor Pool Area 800, Parcel 164(7).

1.2 Purpose and Objectives

The SI program was designed to collect data from site media and provide a level of defensible data and information in sufficient detail to determine whether chemical constituents are present at Former Motor Pool Area 800, Parcel 164(7), at concentrations that present an unacceptable risk to human health or the environment. The conclusions in Chapter 6.0 of this report are based on the comparison of the analytical results to human health site-specific screening levels (SSSL), ecological screening values (ESV), and background screening values for FTMC. The SSSLs and ESVs were developed by IT as part of the human health and ecological risk evaluations associated with 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. Background metals screening values are presented in the *Final Background Metals Survey Report, Fort McClellan, Alabama* (Science Applications International Corporation [SAIC], 1998).

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

1.3 Site Description and History

Former Motor Pool Area 800 (Parcel 164[7]) is located in the north-central portion of the FTMC Main Post (Figure 1-1). It is a rectangular plot oriented northeast-southwest on 3rd Avenue near 21st Street (Figure 1-2). A washrack, an oil/water separator (OWS), a grease rack, and an aboveground fuel storage facility are located within this parcel. Two underground storage tank (UST) locations were also identified at this parcel.

Parcel 11(7) is a former UST associated with Building T-888 within Parcel 164(7). According to the EBS, the basis for the SI at this site is potential soil contamination. The site was cleared in 1995 by the Alabama Department of Environmental Management (ADEM) for no further action, with the understanding that the land use and property owners would not change (ADEM, 1995). The UST location was adjacent to (south of) a former grease pit and has four existing monitoring

wells associated with it. A small drainpipe (approximately 6 inches in diameter) is located near the fence line directly south of the tank.

Parcel 12(7) consists of USTs associated with former Building 894 within Parcel 164(7). According to the EBS, two USTs (one for motor gasoline, one for diesel) were removed in 1991. However, a closure report is not on file. This site is one of the former 1941 gas stations constructed with a 9-foot by 21-foot concrete pad and corrugated steel walls. The tanks were reportedly located in front of the former building. Evidence of former Building 894 was not noted during a site walkover, and that location is now the site of two inactive aboveground fuel storage tanks. These tanks have a capacity of approximately 10,000 gallons each and formerly were used to store fuel oil.

Parcel 68(7) is a washrack (Building 866) that was built around 1941 and had a rotating skimmer-type OWS. This facility was rebuilt in 1991 with a settling basin attached to a coalescing plate OWS, which discharged to the sanitary sewer (ESE, 1998).

Site elevation at Former Motor Pool Area 800 is approximately 800 feet above mean sea level, and the land surface slopes to the west-southwest. A small stream is located southeast of the site and flows to the southwest. Man-made surface drainage features are located along the northwestern and southwestern parcel boundaries.

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-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 Former Motor Pool Area 800 USTs (Parcels 11[7] and 12[7]), as described in the following paragraphs.

UST, Parcel 11(7). Parcel 11(7) is a former 2,000-gallon waste oil UST associated with Building T-888. The tank and product lines were removed in April 1994, and the tank was not replaced. Soil samples were collected during UST removal activities and analyzed for total petroleum hydrocarbons (TPH) and total lead. Groundwater was encountered at approximately 5 feet below ground surface (bgs). Elevated concentrations of TPH (greater than 100 parts per million [ppm]) were detected in the soil samples collected. Soil samples collected from the side walls and the base of the excavation had TPH concentrations ranging from 750 ppm to 8,100 ppm. Lead concentrations ranged from 5.3 ppm to 24 ppm. Approximately 9 cubic yards of contaminated soil were removed and transported to the Base landfill for thin spreading. Four monitoring wells (MW-1 through MW-4) were installed adjacent to the UST location, and one round of groundwater sampling was completed. Neither volatile organic compounds (VOC) nor PAHs were detected in any of the wells. Lead was detected in MW-2. Based upon the groundwater flow direction, it was determined that MW-2 was hydraulically upgradient. The closure report concluded that a petroleum release had occurred and that the vertical and horizontal extent of the contamination in the soil had not been determined (Braun, 1995). According to the FTMC EBS, this site obtained a "No Further Action" from ADEM in December 1995 (ADEM, 1995).

USTs, Parcel 12(7). Parcel 12(7) consists of two 6,000-gallon USTs (one containing gasoline and the other diesel) associated with former Building 894. Both USTs were removed in February 1991 by IT. Six soil borings were drilled around the perimeter of the USTs prior to closure. During UST removal activities, soil samples were collected from the walls and bottom of the excavation. The depth to groundwater was not noted. TPH concentrations ranged from not detected to 5,300 ppm. Contaminated soils were excavated and transported for thermal treatment. The amount of soil that was removed for thermal treatment is unknown. Soil samples collected at 18 to 20 feet bgs contained significant TPH concentrations.

Former Motor Pool Area 800 was identified as a CERFA Category 7 Site: areas that are not evaluated or that require further evaluation. The site lacked adequate documentation and, therefore, required additional evaluation to determine the environmental condition of the parcel.

3.0 Current Site Investigation Activities

This chapter summarizes SI activities conducted by IT at Former Motor Pool Area 800, Parcel 164(7), including environmental sampling and analysis, and monitoring well installation activities.

3.1 Environmental Sampling

The environmental sampling performed during the SI at Former Motor Pool Area 800, Parcel 164(7), included the collection of surface and depositional soil samples, subsurface soil samples, groundwater samples, surface water samples, and sediment 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 rationale are summarized in Table 3-1. Samples were submitted for laboratory analysis of site-related parameters listed in Section 3.3.

3.1.1 Surface and Depositional Soil Sampling

Fifteen surface soil samples and one depositional soil sample were collected at Former Motor Pool Area 800, Parcel 164(7), at the locations shown on Figure 3-1. Sample designations and quality assurance/quality control (QA/QC) samples are listed in Table 3-2. Surface and depositional soil sampling locations were determined in the field by the on-site geologist based on the sampling rationale, presence of surface structures, site topography, and buried and overhead utilities.

Sample Collection. Surface and depositional soil samples were collected from the upper 1 foot of soil with a 3-inch diameter stainless-steel hand auger using the methodology specified in Section 4.9.1.1 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.

3.1.2 Subsurface Soil Sampling

Subsurface soil samples were collected from 12 soil borings at Former Motor Pool Area 800, Parcel 164(7), as shown on Figure 3-1. Subsurface soil sampling locations and rationale are presented in Table 3-1. Subsurface soil sample designations, depths, and QA/QC samples are listed in Table 3-2. Soil boring sampling locations were determined in the field by the on-site geologist based on the sampling rationale, presence of surface structures, site topography, and buried and overhead utilities. IT contracted TEG, Inc., a direct-push technology subcontractor, to assist in subsurface soil sample collection.

Sample Collection. Subsurface soil samples were collected from soil borings at 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.

Subsurface soil samples were collected continuously until direct-push sampler refusal was encountered. Samples were field screened using a PID in accordance with Section 4.7.1.1 of the SAP (IT, 2000a) to measure for volatile organic vapors. The sample showing the highest reading was selected and sent to the laboratory for analysis; however, at those locations where PID readings were not greater than background, the deepest sample interval above groundwater was submitted for 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 analysis 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 pellets hydrated with potable water, following borehole abandonment procedures summarized in Appendix B of the SAP (IT, 2000a).

3.1.3 Well Installation

Nine temporary wells were installed in the residuum groundwater zone at Former Motor Pool Area 800, Parcel 164(7), to collect groundwater samples for laboratory analysis. The well locations are shown on Figure 3-1. Table 3-3 summarizes construction details of the temporary wells installed at Former Motor Pool Area 800, Parcel 164(7). The well construction logs are included in Appendix B.

IT contracted Miller Drilling, Inc., to install the nine temporary wells with a hollow-stem auger rig at the locations shown on Figure 3-1. IT attempted to install the temporary wells at the direct-push soil boring locations. However, at locations where this was not possible due to rig access issues and overhead and underground utilities, the temporary well location was offset approximately 5 to 20 feet from the soil boring location. The soil sampling location was identified with "(SS)" and the associated temporary well location was identified with "(W)". The wells were installed following procedures outlined in Section 4.7 and Appendix C of the SAP (IT, 2000a). The boreholes at these locations were advanced with a 4.25-inch inside diameter (ID) hollow-stem auger from ground surface to the first water-bearing zone in residuum at the well location. The borehole was augered to the depth of direct-push sampler refusal, and samples were collected at the depth of direct-push refusal to the bottom of the borehole. A 2-foot-long, 2-inch ID carbon steel split-spoon sampler was driven at 5-foot intervals to collect residuum for observing and describing lithology. Where split-spoon refusal was encountered, 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 10- or 15-foot length of 2-inch ID, 0.010-inch factory-slotted Schedule 40 PVC screen with a 3-inch PVC end cap was placed through the auger to the bottom of the borehole. The screen and end cap were attached to 2-inch ID, flush-threaded Schedule 40 PVC riser. A sand pack consisting of number 1 filter sand (environmentally safe, clean fine sand, sieve size 20 to 40) was placed 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 solid PVC surge block for approximately 10 minutes, or until no more settling of the sand pack occurred inside the borehole. A bentonite seal, consisting of approximately 2 feet of bentonite pellets, was placed immediately on top of the sand pack and hydrated with potable water. If the bentonite seal was installed below the water table surface, the bentonite pellets were allowed to hydrate in the groundwater. Bentonite seal placement and hydration followed procedures in Appendix C of the SAP (IT, 2000a). A locking well cap was placed on the PVC well casing. The temporary well surface completion included attaching plastic sheeting around the PVC riser using duct tape. Additionally, sand bags were used to secure the sheeting to the ground surface around the temporary well.

The temporary wells were developed by surging and pumping with a submersible pump in accordance with methodology outlined in Section 4.8 and Appendix C of the SAP (IT, 2000a). 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 natural hydraulic flow conditions. Development continued until the water turbidity was equal to or less than 20 nephelometric turbidity units (NTU), or for a maximum of 4 hours. The well development logs are included in Appendix C.

3.1.4 Water Level Measurements

The depth to groundwater was measured in temporary and existing monitoring wells at Former Motor Pool Area 800, Parcel 164(7), on March 13, 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 casing. A summary of groundwater level measurements is presented in Table 3-4.

3.1.5 Groundwater Sampling

Groundwater samples were collected from the nine temporary wells installed during the SI and from four existing wells at Former Motor Pool Area 800, Parcel 164(7). The well/groundwater sample locations are shown on Figure 3-1. The groundwater sampling locations and rationale are listed in Table 3-1. The groundwater sample designations and QA/QC samples are listed in Table 3-5.

For the purpose of the SI, the existing monitoring wells (MW-1 through MW-4) were redesignated FTA-164-MW01 through FTA-164-MW04, respectively.

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

3.1.6 Surface Water Sampling

Five surface water samples were collected at Former Motor Pool Area 800, Parcel 164(7) at the locations shown on Figure 3-1. The surface water sampling locations and rationale are listed in Table 3-1. The surface water sample designations are listed in Table 3-7. The sampling locations were determined in the field, based on drainage pathways and actual field observations.

Sample Collection. Surface water samples were collected 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. Surface water field parameters are listed in Table 3-6. 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

Five sediment samples were collected at the same locations as the surface water samples presented in Section 3.1.6, as shown on Figure 3-1. Sediment sampling locations and rationale are presented in Table 3-1. The sediment sample designations are listed in Table 3-7. The actual sediment sampling locations were determined in the field, based on drainage pathways and actual field observations.

Sample Collection. Sediment samples were collected 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. 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

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

3.3 Analytical Program

Samples collected during the SI were analyzed for various chemical and physical parameters. The specific suite of analyses performed was based on the potential site-specific chemicals historically at the site and EPA, ADEM, FTMC, and USACE requirements. Samples collected at Former Motor Pool Area 800, Parcel 164(7), were analyzed for the following parameters:

- Target compound list VOCs – EPA Method 5035/8260B
- Target compound list semivolatile organic compounds (SVOC) – EPA Method 8270C
- Target analyte list metals – EPA Method 6010B/7000
- Total organic carbon (TOC) – EPA Method 9060 (sediment only)
- Grain size -American Society for Testing and Materials D-421/D-422 (sediment only).

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

3.4 Sample Preservation, Packaging, and Shipping

Sample preservation, packaging, and shipping followed requirements specified in Section 4.13.2 of the SAP (IT, 2000a). Sample containers, sample volumes, preservatives, and holding times for the analyses required in this SI are listed in Chapter 5.0, Table 5-1, of Appendix B of the SAP (IT, 2000a). Sample documentation and chain-of-custody records were recorded as specified in Section 4.13 of the SAP (IT, 2000a).

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

3.5 Investigation-Derived Waste Management and Disposal

Investigation-derived waste (IDW) was managed and disposed as outlined in Appendix D of the SAP (IT, 2000a). The IDW generated during the SI at Former Motor Pool Area 800, Parcel 164(7) was segregated as follows:

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

Solid IDW was stored inside the fenced area surrounding Buildings 335 and 336 in lined roll-off bins prior to characterization and final disposal. Solid IDW was characterized using toxicity characteristic leaching procedure analysis. Based on the results, drill cuttings, spent well materials, and personal protective equipment generated during the SI at Former Motor Pool Area 800, Parcel 164(7), were disposed as nonregulated waste at the Industrial Waste Landfill on the Main Post of FTMC.

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

3.6 Variances/Nonconformances

Four variances to the SFSP were recorded during completion of the SI at Former Motor Pool Area 800, Parcel 164(7). The variances did not alter the intent of the investigation or the sampling rationale presented in Table 4-2 of the SFSP (IT, 1998a). The variances to the SFSP are summarized in Table 3-8 and included in Appendix G.

There were not any nonconformances to the SFSP recorded during completion of the SI at Former Motor Pool Area 800, Parcel 164(7).

3.7 Data Quality

The field sample analytical data are presented in tabular form in Appendix E. The field samples were collected, documented, handled, analyzed, and reported in a manner consistent with the SI work plan; the FTMC SAP and QAP; and standard, accepted methods and procedures. Sample collection logs pertaining to the collection of these samples were reviewed and organized for this

report and are included in Appendix A. As discussed in Section 3.6, there were four variances to the SFSP. However, these variances did not impact the usability of the data.

Data Validation. A complete (100 percent) Level III data validation effort was performed on the reported analytical data. Appendix F consists of a data validation summary report that was prepared to discuss the results of the validation. Selected results were rejected or otherwise qualified based on the implementation of accepted data validation procedures and practices during the validation effort. These qualified parameters are highlighted in the report. The validation-assigned qualifiers were added to the FTMC ITEMS™ database for tracking and reporting. The qualified data were used in the comparison to the SSSLs and ESVs developed by IT. The data presented in this report, except where qualified, meet the principle data quality objective for this SI.

4.0 Site Characterization

Subsurface investigations performed at Former Motor Pool Area 800, Parcel 164(7), 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 the Pelham Range area.

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

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

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

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

The Jacksonville Thrust Fault is the most significant structural geologic feature in the vicinity of FTMC, both for its role in determining the stratigraphic relationships in the area and for its contribution to regional water supplies. The trace of the fault extends northeastward for approximately 39 miles between Bynum, Alabama and Piedmont, Alabama. The fault is interpreted as a major splay of the Pell City fault (Osborne and Szabo, 1984). The Ordovician sequence 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

Two soil series are present at Former Motor Pool Area 800, Parcel 164(7): the Montevallo Series and the Rarden Series. The Montevallo Series covers the majority of the site, with Rarden soils on the southwest corner of the site. The Montevallo Series consists of shallow, well-drained, strongly acid soils. These soils have developed in the residuum of interbedded shale and fine-grained sandstone or limestone. The specific soil unit for Former Motor Pool Area 800, Parcel 164(7), is Montevallo shaly, silty, clay loam, 10 to 40 percent slopes, severely eroded (MtD3) (U.S. Department of Agriculture, 1961). Erosion has removed all or nearly all of the original surface soil. The top layer is now a yellowish-brown shaly silty clay loam. The subsoil is yellowish-brown shaly silt loam. Fragments of shale, less than 2 square inches, are commonly on and in the soil. Runoff, internal drainage, and permeability are rapid. Infiltration is medium. The capacity for available moisture is low.

Rarden Series soils consist of moderately well drained, strongly acid to very strongly acid soils. They generally occur in large areas on wide shale ridges. They have developed from the residuum of shale and fine-grained, platy sandstone or limestone. In eroded areas, the surface soil is brown silt loam. The subsoil is yellowish-red clay or silty clay mottled with strong brown. Concretions and fragments of sandstone, up to 0.5-inch in diameter, are commonly on and in the soil. The specific category of this soil for Former Motor Pool Area 800, Parcel 164(7), is Rarden silty clay loam, shallow, 2 to 6 percent slopes, severely eroded (ReB3). This type of Rarden soil has mild slopes, high erosion, and high runoff. Erosion has removed all or nearly all of the original brown silt loam surface soil (depth from surface is 0 to 14 inches). The depth of the

subsoil ranges from 14 to 44 inches from the surface. Erosion is a serious hazard. Infiltration is medium, permeability is slow, and capacity for available moisture is low.

Bedrock beneath Former Motor Pool Area 800, Parcel 164(7), is mapped as Mississippian/ Ordovician Floyd and Athens Shale, undifferentiated (Osborne, et al., 1997). These units occur within the eroded "window" in the uppermost structural thrust sheet at FTMC and underlie much of the developed areas on the Main Post of FTMC.

A geologic cross-section was constructed using the direct-push and hollow-stem auger boring data collected during the SI and is presented on Figure 4-1. The geologic cross section location is shown on Figure 3-1. As shown on the cross-section, soils beneath Former Motor Pool Area 800, Parcel 164(7), consist of predominately clay and silt overlying grayish-brown to brown weathered shale. The weathered shale was encountered at approximately 4 to 8 feet bgs across the site.

4.2 Site Hydrology

4.2.1 Surface Hydrology

Precipitation in the form of rainfall averages about 54 inches annually in Anniston, Alabama, with infiltration rates annually exceeding evapotranspiration rates (National Oceanic and Atmospheric Administration, 1998). The major surface water features at the Main Post of FTMC include Remount Creek, Cane Creek, and Cave Creek. These waterways flow in a general northwest to westerly direction towards the Coosa River on the western boundary of Calhoun County.

Former Motor Pool Area 800, Parcel 164(7), is bordered by a natural surface drainage feature to the southeast and by man-made surface drainage features to the northwest and to the southwest (along 3rd Avenue). Surface runoff flows to the west toward the man-made surface drainage features. Surface water runoff collects in the man-made drainage feature along 3rd Avenue and flows to the south-southeast, eventually emptying into Cane Creek approximately 1,000 feet south of the site.

4.2.2 Hydrogeology

During soil boring and well installation activities, groundwater was encountered in the borings at depths ranging from 17 feet bgs in FTA-164-GP04 to 35 feet bgs in FTA-164-GP05 (Appendix B).

Static groundwater levels were measured in temporary and permanent monitoring wells at Former Motor Pool Area 800, Parcel 164(7), on March 13, 2000, as summarized in Table 3-4. Groundwater elevations were calculated by measuring the depth to groundwater relative to the surveyed top-of-casing elevations. A groundwater elevation contour map was constructed from the March 2000 data and is presented on Figure 4-2. The groundwater elevation from FTA-164-GP11(W) was not used in the construction of the groundwater elevation map because of its proximity to the former UST excavation at Parcel 12(7). It is suspected that the groundwater elevation at this location may be influenced by a mounding of groundwater in the former excavation due to the backfill material having a higher conductivity than the surrounding soils. Based on the groundwater elevation contour map, horizontal groundwater flows to the west with a hydraulic gradient of approximately 0.02 feet per foot across the site.

Static groundwater levels summarized in Table 3-4 are at shallower depths than the depth to groundwater encountered during drilling (Appendix B). This indicates that the groundwater has an upward vertical hydraulic head.

5.0 Summary of Analytical Results

The results of the chemical analysis of samples collected at Former Motor Pool Area 800, Parcel 164(7), indicate that metals, VOCs, and SVOCs have been detected in the various site media. To evaluate whether the detected constituents present an unacceptable risk to human health and the environment, 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) (SAIC, 1998) to determine if the metals concentrations are within natural background concentrations. Summary statistics for background metals samples collected at FTMC (SAIC, 1998) are included in Appendix H. Additionally, SVOC (PAH compounds) 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 nearly accurate result.

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

5.1 Surface and Depositional Soil Analytical Results

Fifteen surface soil samples and one depositional soil sample were collected for chemical analysis at Former Motor Pool Area 800, Parcel 164(7). Surface and depositional soil samples were collected from the upper 1 foot of soil at the locations shown on Figure 3-1. Analytical results were compared to residential human health SSSLs, ESVs, and background screening values (metals and PAHs), as presented in Table 5-1.

Metals. Nineteen metals (aluminum, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, vanadium, and zinc) were detected in surface and depositional soils at Former Motor Pool Area 800, Parcel 164(7).

The concentrations of aluminum (at five locations), arsenic (fifteen locations), cadmium (one location), chromium (six locations), iron (sixteen locations), lead (one location), and manganese (seven locations) exceeded SSSLs. Of these metals, the concentrations of aluminum (sample FTA-164-GP10), cadmium (FTA-164-DEP01), chromium (FTA-164-GP14), iron (at two locations), and lead (FTA-164-GP13) also exceeded their respective background concentrations. However, with the exception of the aforementioned cadmium (13 mg/kg) and lead (498 mg/kg) results, the concentrations of these metals were within the range of background values (SAIC, 1998) (Appendix H).

The following metals were detected at concentrations exceeding ESVs and their respective background concentration: aluminum (at one location), barium (one location), beryllium (three locations), cadmium (three locations), chromium (one location), copper (three locations), iron (two locations), lead (six locations), mercury (two locations), nickel (two locations), selenium (seven locations), and zinc (ten locations). However, the aluminum, barium, chromium, iron, and mercury results were within the range of background values established by SAIC (1998).

Volatile Organic Compounds. Eighteen VOCs were detected in surface and depositional soil samples collected at Former Motor Pool Area 800, Parcel 164(7). The methylene chloride results, trichlorofluoromethane results, six of the fifteen acetone results, and two of the four bromomethane results were flagged with a "B" data qualifier, signifying that these compounds were also detected in an associated laboratory or field blank sample. Ten of the eighteen detected VOCs were present in the sample collected at FTA-164-GP08.

With the exception of trichloroethene at one location, the VOC concentrations in surface and depositional soils were below SSSLs and ESVs. The trichloroethene concentration (0.0016 mg/kg) at sample location FTA-164-GP05 was below the SSSL but exceeded the ESV (0.001 mg/kg).

Semivolatile Organic Compounds. Twenty-two SVOCs, including sixteen PAH compounds, were detected in surface and depositional soil samples collected at Former Motor Pool Area 800, Parcel 164(7). SVOCs were not detected at sample locations FTA-164-GP08 and FTA-164-GP09. Sample location FTA-164-GP11 contained 21 of the 22 detected SVOCs; sample location FTA-164-GP05 contained 18 of the 22 detected SVOCs.

Six PAH compounds (benzo[a]pyrene, benzo[a]anthracene, benzo[b]fluoranthene, benzo[k]fluoranthene, dibenz[a,h]anthracene, and indeno[1,2,3-cd]pyrene) were detected at two sample locations (FTA-164-GP04 and FTA-164-GP11) at concentrations exceeding SSSLs and PAH background values for soils adjacent to asphalt. However, because the two sample locations were beneath asphalt, the PAH results at these locations were also compared to PAH background values for soil beneath asphalt. The results indicate that PAH concentrations at FTA-164-GP04 were below PAH background values for soil beneath asphalt. However, the PAH concentrations at FTA-164-GP11 exceeded PAH background values for soil beneath asphalt.

The following PAH compounds were detected at concentrations exceeding ESVs and PAH background screening values for soils adjacent to asphalt: anthracene (at three locations), benzo(a)anthracene (sample location FTA-164-GP11), benzo(a)pyrene (FTA-164-GP04 and FTA-164-GP11), chrysene (FTA-164-GP11), fluoranthene (FTA-164-GP11), naphthalene (FTA-164-GP05 and FTA-164-GP11), phenanthrene (FTA-164-GP11), and pyrene (FTA-164-GP11). In addition, phenol concentrations (0.084 mg/kg and 0.18 mg/kg) exceeded the ESV (0.05 mg/kg) at two sample locations (FTA-164-DEP01 and FTA-164-GP11).

5.2 Subsurface Soil Analytical Results

Twelve subsurface soil samples were collected for chemical analysis at Former Motor Pool Area 800, Parcel 164(7). Subsurface soil samples were collected at depths greater than 1 foot bgs at the locations shown on Figure 3-1. Analytical results were compared to residential human health SSSLs and metals background screening values, as presented in Table 5-2.

Metals. Nineteen metals (aluminum, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, vanadium, and zinc) were detected in subsurface soil samples. Eighteen of the nineteen detected metals were present in the sample collected at FTA-164-GP02.

The concentrations of five metals (aluminum, arsenic, chromium, iron, and manganese) exceeded SSSLs. Of these metals, concentrations of aluminum (at eleven locations) and iron (two locations) also exceeded their respective background concentrations. With the exception of iron in one sample (FTA-164-GP04), the results were within the range of background values established by SAIC (1998) (Appendix H).

Volatile Organic Compounds. Five VOCs (2-butanone, acetone, bromomethane, methylene chloride, and trichloroethene) were detected in subsurface soil samples collected at Former Motor Pool Area 800, Parcel 164(7). The acetone, bromomethane, and methylene chloride results were flagged with a "B" data qualifier, signifying that these compounds were also detected in an associated laboratory or field blank sample. Acetone and methylene chloride were the only detected VOCs in nine of the samples. Bromomethane (sample location FTA-164-GP08), 2-butanone (FTA-164-GP06), and trichloroethene (FTA-164-GP02) were each detected in only one of the samples.

The VOC concentrations in subsurface soils were below SSSLs.

Semivolatile Organic Compounds. Seven SVOCs (benzo[a]anthracene, benzo[a]pyrene, chrysene, fluoranthene, phenanthrene, pyrene, and bis[2-ethylhexyl]phthalate) were detected in one of the subsurface soil samples (FTA-164-GP11) collected at Former Motor Pool Area 800, Parcel 164(7). SVOCs were not detected at the remaining sample locations.

The SVOC concentrations in subsurface soils were below SSSLs.

5.3 Groundwater Analytical Results

Nine temporary monitoring wells and four existing monitoring wells were sampled at Former Motor Pool Area 800, Parcel 164(7). The well/groundwater sampling locations are 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. Nineteen metals (aluminum, arsenic, barium, beryllium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, sodium, thallium, vanadium, and zinc) were detected in groundwater samples collected at Former Motor Pool Area 800, Parcel 164(7). Sample location FTA-164-GP10 contained each of the detected metals, and sample location FTA-164-GP02 contained 18 of the detected metals.

The concentrations of the following seven metals exceeded SSSLs and their respective background concentrations: aluminum (at seven locations), barium (three locations), iron (four locations), lead (two locations), manganese (seven locations), thallium (five locations), and vanadium (five locations). The barium, lead, and manganese concentrations were within the range of background values established by SAIC (1998). Background concentrations for chromium and nickel were not available.

Six of the groundwater samples had high turbidity (greater than 100 NTUs) at the time of sample collection. To evaluate the effects of high turbidity on metals concentrations in groundwater at FTMC, IT has resampled a number of wells at other parcels that previously had high turbidity using a low-flow groundwater purging and sampling technique to reduce turbidity to less than 10 NTUs. The resampling effort demonstrated that the concentrations of most metals in the lower turbidity samples were significantly lower than in the higher turbidity samples (IT, 2000c) (Appendix I). Consequently, the elevated metals results in the groundwater samples collected at the Former Motor Pool Area 800, Parcel 164(7), are likely the result of high turbidity.

Volatile Organic Compounds. Ten VOCs were detected in groundwater samples collected at Former Motor Pool Area 800, Parcel 164(7). The bromomethane results, methylene chloride results, four of the five toluene results, and two of the four acetone results were flagged with a "B" data qualifier, signifying that these compounds were also detected in an associated laboratory or field blank sample. Five of the ten detected VOCs were present in the sample collected at FTA-164-GP05.

The VOC concentrations in groundwater were below SSSLs.

Semivolatile Organic Compounds. Three SVOCs (di-n-butyl phthalate, phenol, and bis[2-ethylhexyl]phthalate) were detected in groundwater samples collected at Former Motor Pool Area 800, Parcel 164(7). The phenol result was flagged with a "B" data qualifier, signifying that phenol was also detected in an associated laboratory or field blank sample. SVOCs were not detected at eight of the sample locations.

The bis(2-ethylhexyl)phthalate concentration (0.0092 mg/L) exceeded the SSSL (0.0043 mg/L) at sample location FTA-164-MW02.

5.4 Surface Water Analytical Results

Five surface water samples were collected at Former Motor Pool Area 800, Parcel 164(7) 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. Eleven metals were detected in unfiltered surface water samples collected at Former Motor Pool Area 800, Parcel 164(7). Two of the five manganese results, three of the four potassium results, two of the four sodium results, and the zinc results were flagged with a "B" data qualifier, signifying that these metals were also detected in an associated laboratory or field blank sample.

The lead concentration (0.0244 mg/L) exceeded the SSSL (0.015 mg/L) and its respective background concentration at sample location FTA-164-SW/SD03. However, the lead concentration was within the range of background values determined by SAIC (1998) (Appendix H).

The concentrations of aluminum (at five locations), barium (four locations), iron (one location), lead (one location), manganese (one location), mercury (three locations), and zinc (one location) exceeded ESVs. With the exception of the mercury results, for which a background value was not available, the concentrations of these metals were below their respective background concentrations or within the range of background values established by SAIC (1998**)** (Appendix H).

Volatile Organic Compounds. Seven VOCs (acetone, bromodichloromethane, chloroform, dibromochloromethane, methylene chloride, toluene, and trichloroethene) were detected in surface water samples collected at Former Motor Pool Area 800, Parcel 164(7). The methylene

chloride results and one of the two acetone results were flagged with a "B" data qualifier, signifying that these compounds were also detected in an associated laboratory or field blank sample. Five of the seven detected VOCs were present in the sample collected at FTA-164-SW/SD03.

The VOC concentrations in surface water were below SSSLs and ESVs.

Semivolatile Organic Compounds. The SVOCs bis(2-ethylhexyl)phthalate, di-n-butyl phthalate, and phenol were detected in surface water samples collected at Former Motor Pool Area 800, Parcel 164(7). Phenol was detected in only one of the surface water samples and the result was flagged with a "B" data qualifier, signifying that the compound was also detected in an associated laboratory or field blank sample. Bis(2-ethylhexyl)phthalate and di-n-butyl phthalate were both detected at sample location FTA-164-SW/SD05; however, the results were flagged with an "R" data qualifier, indicating that the results were rejected during the data validation process. The reasons for the rejections can be found in the Data Validation Summary Report in Appendix F.

The SVOC concentrations in sediments were below SSSLs. The concentrations of bis(2-ethylhexyl)phthalate (0.0012 mg/L and 0.006 mg/L) at sample locations FTA-164-SW/SD04 and FTA-164-SW/SD05 exceeded the ESV (0.0004 mg/L).

5.5 Sediment Analytical Results

Five sediment samples were collected at Former Motor Pool Area 800, Parcel 164(7), 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 5-5.

Metals. Twenty metals were detected in sediment samples collected at Former Motor Pool Area 800, Parcel 164(7). Sample locations FTA-164-SW/SD01, FTA-164-SW/SD02, FTA-164-SW/SD04, and FTA-164-SW/SD05 each contained all of the detected metals except cadmium.

The metals concentrations in sediments were below SSSLs. The concentrations of cadmium (sample FTA-164-SW/SD03), copper (FTA-164-SW/SD02 and FTA-164-SW/SD03), lead (FTA-164-SW/SD03), mercury (FTA-164-SW/SD03), nickel (FTA-164-SW/SD02), and zinc (FTA-164-SW/SD03) exceeded ESVs and background concentrations. With the exception of the cadmium, lead, and zinc results, these metals concentrations were within the range of background values determined by SAIC (1998) (Appendix H).

Volatile Organic Compounds. Seven VOCs (2-butanone, acetone, carbon disulfide, methylene chloride, toluene, trichloroethene, and trichlorofluoromethane) were detected in sediment samples collected at Former Motor Pool Area 800, Parcel 164(7). The methylene chloride results were flagged with a "B" data qualifier, signifying that the compound was also detected in an associated laboratory or field blank sample. Five of the seven detected VOCs were present in the sample collected at FTA-164-SW/SD03.

With the exception of trichlorofluoromethane in one sample, the VOC concentrations in sediments were below SSSLs and ESVs. The trichlorofluoromethane concentration (0.0049 mg/kg) at sample location FTA-164-SW/SD02 exceeded the ESV (0.0031 mg/kg).

Semivolatile Organic Compounds. Fourteen SVOCs, including thirteen PAH compounds, were detected in sediment samples collected at Former Motor Pool Area 800, Parcel 164(7). Sample locations FTA-164-SW/SD03 and FTA-164-SW/SD05 each contained 13 of the 14 detected SVOCs. SVOCs were not detected at the remaining sample locations.

With the exception of bis(2-ethylhexyl)phthalate in one sample, the SVOC concentrations in sediments were below SSSLs and ESVs. The bis(2-ethylhexyl)phthalate concentration (0.29 mg/kg) at sample location FTA-164-SW/SD03 was below the SSSL but exceeded the ESV (0.18 mg/kg).

Total Organic Carbon. The sediment samples were analyzed for TOC content. TOC concentrations in the sediment samples ranged from 1,520 mg/kg to 66,600 mg/kg, as summarized in Appendix E.

Grain Size. The results of grain size analysis for sediment samples are included in Appendix E.

6.0 Summary, Conclusions, and Recommendations

Under contract with USACE, IT completed an SI at Former Motor Pool Area 800, Parcels 164(7), 11(7), 12(7), and 68(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 Former Motor Pool Area 800 consisted of the sampling and analysis of 15 surface soil samples, 1 depositional soil sample, 12 subsurface soil samples, 13 groundwater samples, 5 surface water samples, and 5 sediment samples. In addition, 9 temporary monitoring wells were installed in the residuum groundwater zone to facilitate groundwater sample collection and provide site-specific geological and hydrogeological characterization information.

Chemical analysis of samples collected at Former Motor Pool Area 800, Parcel 164(7) indicates that metals, VOCs, and SVOCs were detected in the environmental media sampled. Analytical results were compared to the human health SSSLs and ESVs for FTMC. The SSSLs and ESVs were developed by IT for human health and ecological risk evaluations as part of the ongoing SIs being performed under the BRAC Environmental Restoration Program at FTMC. Additionally, metal concentrations exceeding SSSLs and ESVs were compared to media-specific background screening values (SAIC, 1998), and PAH compound concentrations exceeding SSSLs and ESVs in surface and depositional soils were compared to PAH background screening values.

The potential impact to human receptors is expected to be minimal. Although the site is projected for industrial reuse, the soils and groundwater analytical data were screened against residential human health SSSLs to evaluate the site for possible unrestricted future use. In soils, with the exception of cadmium, lead, and iron in one sample each, the metals that exceeded residential human health SSSLs were below their respective background concentrations or within the range of background values determined by SAIC (1998). Six PAH compounds (benzo[a]anthracene, benzo[a]pyrene, benzo[k]fluoranthene, benzo[b]fluoranthene, dibenz[a,h]anthracene, and indeno[1,2,3-cd]pyrene) were detected in one surface soil sample at concentrations exceeding SSSLs and PAH background screening values. However, these PAH compounds are believed to be related to anthropogenic activities (i.e., asphalt pavement) and not related to operations conducted at the site. VOC concentrations in soils were below SSSLs.

In groundwater, the concentrations of four metals (aluminum, iron, thallium, and vanadium) exceeded SSSLs and the range of background values. However, the majority of these metals were detected in groundwater samples with high turbidity at the time of sample collection, which

caused the elevated metals results. The SVOC bis(2-ethylhexyl)phthalate was detected in one groundwater sample at a concentration exceeding the SSSL. Bis(2-ethylhexyl)phthalate is a common laboratory contaminant and is probably not a site-related contaminant. VOC concentrations in groundwater were below SSSLs.

Several metals were detected in surface/depositional soil, surface water, and sediment samples at concentrations exceeding ESVs and background concentrations. In addition, SVOCs (PAH compounds, bis[2-ethylhexyl]phthalate, and phenol) and VOCs (trichloroethene and trichlorofluoromethane) were detected in a limited number of samples at concentrations exceeding ESVs. However, the potential impact to ecological receptors is expected to be minimal based on the current and projected future land use of the parcel. The site is a well-developed area, consisting of buildings and paved roads/areas interspersed with limited grassy areas, and is projected for industrial reuse. Viable ecological habitat is presently limited and is not expected to increase in the future land use scenario.

Based on the results of the SI, past operations at Former Motor Pool Area 800, Parcels 164(7), 11(7), 12(7), and 68(7), do not appear to have adversely impacted the environment. The metals and chemical constituents detected in site media do not pose an unacceptable risk to human health and the environment. Therefore, IT recommends "No Further Action" and unrestricted land reuse at Former Motor Pool Area 800, Parcels 164(7), 11(7), 12(7), and 68(7).

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ATTACHMENT 1

LIST OF ABBREVIATIONS AND ACRONYMS