Final

Site Investigation Report
Boiler Plant No. 3, Building 1076
Parcels 14(7) and 235(7)

Fort McClellan
Calhoun County, Alabama

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Executive Summary

In accordance with Contract Number DACA21-96-D-0018, Task Order CK08, IT Corporation (IT) and QST Environmental, Inc. (QST) completed a site investigation (SI) at Boiler Plant No. 3, Building 1076, Parcels 14(7) and 235(7), at Fort McClellan 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 Boiler Plant No. 3 consisted of the sampling and analysis of seven subsurface soil samples and four groundwater samples by QST. In addition, QST installed two temporary groundwater monitoring wells in the residuum groundwater zone to facilitate groundwater sample collection and to provide site-specific geological and hydrogeological characterization information.

The analytical results indicate that metals, volatile organic compounds (VOC), and semivolatile organic compounds (SVOC) were detected in the environmental media sampled. To evaluate whether the detected constituents present an unacceptable risk to human health or the environment, the analytical results were compared to human health site-specific screening levels (SSSL) and to background metals values for Fort McClellan.

The potential threat to human receptors is expected to be low. Although the site is projected for reuse by the Alabama Army National Guard, the analytical data were screened against residential human health SSSLs to evaluate the site for unrestricted land reuse. In soils, with the exception of iron in one sample, the metals concentrations that exceeded SSSLs were below their respective background concentrations or within the range of background values and thus do not pose an unacceptable risk to human health. VOC and SVOC concentrations in soils were below SSSLs.

In groundwater, several metals were detected in two samples at concentrations exceeding SSSLs and background concentrations. However, the samples with the elevated metals results were collected from small diameter (1-inch) direct-push temporary wells. It is likely that the samples had high turbidity, which caused the elevated metals results. Chloroform (two samples) and naphthalene (one sample) were detected in groundwater at concentrations exceeding SSSLs. However, the chloroform and naphthalene concentrations were below U.S. Environmental

Protection Agency drinking water standards and health advisory values and are not expected to pose a threat to human health.

Based on the results of the SI, past operations at Boiler Plant No. 3 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. Furthermore, the underground storage tanks associated with the boiler plant have been removed from the site in accordance with State of Alabama regulations. Therefore, IT recommends "No Further Action" and unrestricted land reuse at Boiler Plant No. 3, Building 1076, Parcels 14(7) and 235(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 provide environmental services for completion of the site investigation (SI) at Boiler Plant No. 3, Building 1076, Parcels 14(7) and 235(7), under Contract Number DACA21-96-D-0018, Task Order CK08.

The U.S. Army Environmental Center (AEC) originally contracted with QST Environmental, Inc. (QST) to perform the SI at Boiler Plant No. 3, Building 1076, Parcels 14(7) and 235(7). QST prepared an SI work plan (QST, 1998) and conducted field activities in 1998. This SI report summarizes field activities, including field sampling and analysis and monitoring well installation activities, and data compiled by QST for the SI conducted at Boiler Plant No. 3, Building 1076, Parcels 14(7) and 235(7). The site is hereinafter referred to as Boiler Plant No. 3 and includes all associated parcels unless otherwise specified.

1.1 Project Description

Boiler Plant No. 3 was identified as an area to be investigated prior to property transfer. The site was classified as a Category 7 site in the environmental baseline survey (EBS) (Environmental Science and Engineering, Inc. [ESE], 1998). Category 7 sites are areas that are not evaluated and/or that require further evaluation.

The SI consisted of the collection of seven subsurface soil samples and four groundwater samples by QST to determine if potential site-specific chemicals are present at Boiler Plant No. 3.

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 Boiler Plant No. 3 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 the comparison of the analytical results to human health site-specific screening levels (SSSL) and metals background screening values for FTMC. The SSSLs were developed by IT as part of the human health risk evaluations associated with SIs being performed under the BRAC Environmental Restoration Program at FTMC. The SSSLs are presented in the *Final Human Health and Ecological Screening Values and PAH Background Summary Report* (IT, 2000a). 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 BRAC Cleanup Team 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

Boiler Plant No. 3, Building 1076 (Parcel 235[7]) is located off Fremont Road in the northwestern portion of the FTMC Main Post (Figure 1-1). Boiler Plant No. 3 was built in 1954 and was decommissioned in 1999 (Jaye, 2001). At the time of decommissioning, the plant was maintained and operated by Johnson Controls, Inc. and was fired by natural gas. However, the plant could also operate using heating oil, which was used as a backup fuel source. Heating oil was used in the past as the primary fuel source (ESE, 1998).

Two 15,000-gallon steel underground storage tanks (UST) were installed at the site in 1953 and were used to store No. 4 heating oil. The two steel USTs were removed in 1991 and replaced with two 15,000-gallon fiberglass USTs (Jaye, 2001). A closure report for the removal of the two 15,000-gallon steel USTs was not available (ESE, 1998). The replacement USTs were located just east of the old USTs (Figure 1-2).

The two 15,000-gallon fiberglass USTs (Parcel 14[7]) installed in 1991 were located under a concrete pad south of Building 1076 (Figure 1-2). The USTs were used to store heating oil, which was used as a backup fuel source for the boiler plant. These USTs were removed by Karst Environmental, Inc. in September 2000 in accordance with Alabama Department of Environmental Management (ADEM) regulations. The ADEM UST Closure Site Assessment Report for the removed USTs is included in Appendix A.

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 historic maps and aerial photographs were reviewed to document historic land uses. Personal and telephone interviews of past and present FTMC employees and military personnel were conducted. In addition, visual

site inspections were conducted to verify conditions of specific property parcels. Previous UST investigations have been conducted at the site, as described in the following paragraph.

Two 15,000-gallon steel USTs used to store heating oil were removed from the site in 1991 and replaced with two 15,000-gallon fiberglass USTs (Jaye, 2001). A closure report for the removal of the two 15,000-gallon steel USTs was not available (ESE, 1998). The two 15,000-gallon fiberglass USTs were removed by Karst Environmental, Inc. in September 2000 in accordance with ADEM regulations. At the time of closure, the USTs were noted to be in excellent condition and without holes observed in the tanks. The ADEM UST Closure Site Assessment Report for the removed USTs is included in Appendix A.

Other investigations to document site environmental conditions have not been conducted at Boiler Plant No. 3. Therefore, the site was classified as a Category 7 CERFA site: areas that are not evaluated or require further evaluation.

3.0 Current Site Investigation Activities

This chapter summarizes SI activities conducted by QST at Boiler Plant No. 3, including environmental sampling and analysis and groundwater monitoring well installation activities.

3.1 Environmental Sampling

The environmental sampling performed during the SI at Boiler Plant No. 3 included the collection of subsurface soil 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 rationale are summarized in Table 3-1. Sampling locations are shown on Figure 3-1. Samples were submitted for laboratory analysis of site-related parameters listed in Section 3.3.

3.1.1 Subsurface Soil Sampling

Seven subsurface soil samples were collected from four soil borings at Boiler Plant No. 3, as shown on Figure 3-1. Subsurface soil sampling locations and rationale are presented in Table 3-1. Subsurface soil sample designations, depths, and quality assurance/quality control (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.

Sample Collection. QST contracted Graves Service Company, Inc. to complete the soil borings. Subsurface soil samples were collected from the soil borings at depths greater than 8 feet below ground surface (bgs) using a direct-push sampling system, in accordance with the procedures outlined in the QST work plan (QST, 1998). Two samples were collected from each of three borings and one sample was collected from the fourth boring. 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 B.

3.1.2 Well Installation

Two temporary groundwater monitoring wells were installed during the SI at Boiler Plant No. 3. The well locations are shown on Figure 3-1. Table 3-3 summarizes construction details of the temporary wells installed at the site. The well construction logs are included in Appendix C.

The temporary wells were installed in accordance with procedures outlined in the QST work plan (QST, 1998). QST contracted Graves Service Company, Inc. to install the temporary wells using direct-push technology (DPT). The temporary wells were installed, purged, sampled, and removed within 24 hours. Initially, a 2-inch diameter borehole for each temporary well was installed using direct-push technology. The 2-inch borehole was advanced up to 5 feet into the uppermost water-bearing zone. Soil descriptions were prepared by the QST geologist and are presented in Appendix C of this report. Upon reaching the target depth at each borehole, a 15-foot-length of 1-inch (nominal) diameter Schedule 40 polyvinyl chloride (PVC) slotted screen (0.010-inch) was lowered into the borehole. A sand pack consisting of 20/40 silica sand was placed into the annular space to the ground surface.

3.1.3 Groundwater Sampling

Groundwater samples were collected from the two temporary wells installed during the SI and from two existing UST compliance wells at Boiler Plant No. 3. The well locations are shown on Figure 3-1. The groundwater sampling locations and rationale are listed in Table 3-1. The groundwater sample designations and analytical parameters are listed in Table 3-4.

Groundwater samples were collected immediately following completion of well purging using a peristaltic pump and a vacuum jar. Groundwater sample parameters were recorded for pH, conductivity, and temperature (turbidity, dissolved oxygen, and oxidation-reduction potential were not monitored). Field parameter readings are summarized in Table 3-5. Sample collection logs are included in Appendix B. The samples were analyzed for the parameters listed in Table 3-4 using methods outlined in Section 3.3.

3.2 Surveying of Sample Locations

Sample locations were surveyed using global positioning system survey techniques or traditional surveying techniques described in the QST work plan (QST, 1998). Map coordinates for each sample location were determined using a Transverse Mercator (UTM) or State Planar grid to within $\pm$ 3 feet ($\pm$ 1 meter). Horizontal coordinates are included in Appendix D. Elevations were not recorded for the wells at Boiler Plant No. 3.

3.3 Analytical Program

Samples collected during the SI were analyzed for various chemical parameters. The specific suite of analyses performed was based on the potential site-specific chemicals historically at the site and on EPA, ADEM, FTMC, and USACE requirements. The samples collected at Boiler Plant No. 3 were analyzed for the following parameters:

- Volatile organic compounds (VOC) – EPA Method 8260
- Semivolatile organic compounds (SVOC) – EPA Method 8270
- Target analyte list metals – EPA Method 6010/7000
- Total organic carbon (TOC) – EPA Method 9060 (two soil samples only).

The samples were analyzed using EPA SW-846 analytical methods, including Update III methods where applicable.

3.4 Sample Preservation, Packaging, and Shipping

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

3.5 Investigation-Derived Waste Management and Disposal

Investigation-derived waste (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 photoionization detector. If the photoionization detector indicated greater than 50 parts per million VOCs in the air, then the soil was containerized in 55-gallon drums. All drilling fluids, well purge water, and decontamination fluids were containerized in drums or other appropriate containers. All IDW was characterized as hazardous or nonhazardous using TCLP analysis. If the IDW exceeded the toxicity characteristic leaching procedure (TCLP) regulatory criteria, then it was disposed as hazardous waste in an approved hazardous waste facility.

3.6 Variances/Nonconformances

QST did not document any variances or nonconformances to the work plan (QST, 1998).

3.7 Data Quality

QST data were submitted to the Installation Restoration Data Management Information System (IRDMIS) database at the conclusion of SI 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 was able to identify the key fields of information (analytical records, well construction and geotechnical information, sample location information, and water level readings) and translate the data into the IT Environmental Management System™ (ITEMS™) database.

QST hard-copy analytical data packages were validated during a complete (100 percent) Level III data validation effort. The validated analytical data are presented in tabular form in Appendix

E. Appendix F consists 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. The qualified data were used in the comparison to the SSSLs and background screening values in Chapter 5.0. The QST analytical 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 Boiler Plant No. 3 provided soil, geologic, 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 is comprised of the Cochran, Nichols, Wilson Ridge, and Weisner Formations (Osborne and Szabo, 1984), but in Calhoun County is either undifferentiated or divided into the Cochran and Nichols Formations and an upper undifferentiated Wilson Ridge and Weisner Formation. The Cochran is composed of poorly sorted arkosic sandstone and conglomerate with interbeds of greenish-gray siltstone and mudstone. Massive to laminated, greenish-gray and black mudstone makes up the Nichols Formation with thin interbeds of

siltstone and very fine-grained sandstone (Szabo et al., 1988). These two formations are mapped only in the eastern part of the county.

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

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

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

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

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

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

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

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

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

The Jacksonville Thrust Fault is the most significant structural geologic feature in the vicinity of FTMC, both for its role in determining the stratigraphic relationships in the area and for its contribution to regional water supplies. The trace of the fault extends northeastward for approximately 39 miles between Bynum, Alabama and Piedmont, Alabama. The fault is interpreted as a major splay of the Pell City Fault (Osborne and Szabo, 1984). The Ordovician sequence comprising the Eden thrust sheet is exposed at FTMC through an eroded "window" or "fenster" in the overlying thrust sheet. Rocks within the window display complex folding with the folds being overturned and tight to isoclinal. The carbonates and shales locally exhibit well-developed cleavage (Osborne and Szabo, 1984). The FTMC window is framed on the northwest by the Rome Formation, on the north by the Conasauga Formation, on the northeast, east, and southwest by the Shady Dolomite, and on the southeast and southwest by the Chilhowee Group (Osborne et al., 1997).

4.1.2 Site Geology

The soils mapped at Boiler Plant No.3 consist of Montevallo shaly silty clay loam (MtD3). The Montevallo series consists of shallow, well-drained, strongly acidic soils that formed from the residuum of interbedded shale and fine-grained sandstone or limestone. The Montevallo Series of soils occur extensively in the northern part of Calhoun County, but are found in other parts as well. Fragments of shale (less than 2 inches square) are commonly found within the soil (U.S. Department of Agriculture, 1961).

The bedrock at the site is mapped as the undifferentiated Mississippian/Ordovician Floyd and Athens Shale (Osborne et al., 1997). The Floyd and Athens Shale consists of brown, dark-gray to black shale with localized interbedded limestone and sandstone (Osborne et al., 1997). QST installed two direct-push soil borings to depths of approximately 15 feet bgs at Boiler Plant No. 3. Lithologic logs from the soil borings indicate that the soil at the site is predominately clayey sand. Bedrock was not encountered during direct push boring installation by QST.

4.2 Site Hydrology

4.2.1 Surface Hydrology

Precipitation in the form of rainfall averages about 54 inches annually in Anniston, Alabama, with infiltration rates annually exceeding evapotranspiration rates. The major surface water features at the Main Post of FTMC include Remount Creek, Cane Creek, and Cave Creek. These

waterways flow in a general northwest to westerly direction towards the Coosa River on the western boundary of Calhoun County.

Site elevation at Boiler Plant No. 3 is approximately 790 feet above mean sea level. Surface water runoff follows site topography and generally flows to the east. There are no natural surface water features in the immediate vicinity of the site.

4.2.2 Hydrogeology

Based on groundwater elevation data from monitoring wells installed by IT in the vicinity of Boiler Plant No. 3, groundwater flow at the site is anticipated to be toward to the northeast.

5.0 Summary of Analytical Results

The results of the chemical analysis of samples collected at Boiler Plant No. 3 indicate that metals, VOCs, and SVOCs were detected in the various site media. To evaluate whether the detected constituents present an unacceptable risk to human health and the environment, analytical results were compared to the human health SSSLs for FTMC. The SSSLs were developed by IT for human health risk evaluations as part of the ongoing SIs being performed under the BRAC Environmental Restoration Program at FTMC. Metals concentrations exceeding the SSSLs 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 G.

The following sections and Tables 5-1 and 5-2 summarize the results of the comparison of detected constituents to the SSSLs and background screening values. Complete analytical results are presented in Appendix E.

5.1 Subsurface Soil Analytical Results

Seven subsurface soil samples were collected for chemical analysis at Boiler Plant No. 3. Subsurface soil samples were collected from four soil borings at depths greater than 8 feet 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. Twenty-two metals were detected in subsurface soil samples collected at Boiler Plant No. 3. The concentrations of five metals (aluminum, arsenic, iron, manganese, and thallium) exceeded SSSLs. Of these metals, the concentrations of iron, manganese, and thallium also exceeded their respective background concentrations in one sample each. The manganese and thallium results were within the range of background values (Appendix G). The iron concentration (51,000 milligrams per kilogram [mg/kg]) at sample location SI03-SS03B exceeded the range of background iron values (4,840 to 48,000 mg/kg).

Volatile Organic Compounds. Fifteen VOCs were detected in subsurface soil samples collected at Boiler Plant No. 3. VOC concentrations in the subsurface soil samples ranged from 0.00054 to 0.6 mg/kg, and the cumulative concentration was 2.35 mg/kg. The VOC concentrations in subsurface soils were below SSSLs.

Semivolatile Organic Compounds. Three SVOCs were detected in subsurface soil samples collected at Boiler Plant No. 3. SVOCs were not detected in four of the samples and bis(2-ethylhexyl)phthalate was the only detected SVOC in two samples. 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. The SVOC concentrations in subsurface soils were below SSSLs.

Total Organic Carbon. Two of the subsurface soil samples (SI03-SS02A and SI03-SS02B) were analyzed for TOC content. TOC concentrations in the samples were 4,330 and 3,380 mg/kg, as summarized in Appendix E.

5.2 Groundwater Analytical Results

Four groundwater samples were collected for chemical analysis at Boiler Plant No. 3 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. Sixteen metals were detected in groundwater samples collected at Boiler Plant No. 3. Several metals were detected in two of the samples (SI03-GWS01 and SI03-GWS02) at concentrations exceeding SSSLs and background concentrations. The samples with the elevated metals concentrations were from the small diameter (1-inch) DPT wells. DPT well construction involves the use of a very limited volume of filter pack sand in the annular space of the well. The limited filter sand does not provide adequate filtration in soils with fine-grained silt and clay particles. Therefore, the metals results from these samples are suspect because it is likely that the samples had high turbidity, causing the elevated metals results. The effect of high turbidity on metals concentrations in groundwater has been previously demonstrated in a groundwater resampling study conducted by IT at FTMC (IT, 2000b) (Appendix H).

Evaluation of the samples collected from the existing wells indicates that only two metals (aluminum and manganese) were detected at concentrations exceeding SSSLs and their

respective background concentrations. However, the aluminum and manganese results were within the range of background values determined by SAIC (1998) (Appendix G).

Volatile Organic Compounds. Three VOCs (1,1,1-trichloroethane, 1-methyl naphthalene, and chloroform) were detected in groundwater samples collected at Boiler Plant No. 3. VOC concentrations in the groundwater samples ranged from 0.0018 milligrams per liter (mg/L) to 0.02 mg/L, and the cumulative concentration was 0.028 mg/L.

Chloroform concentrations (0.0022 and 0.0018 mg/L) exceeded the SSSL (0.00115 mg/L) in two of the samples (SI03-GW01 and SI03-GW02).

Semivolatile Organic Compounds. Six SVOCs (2-methylnapthalene, acenaphthene, fluorene, naphthalene, phenanthrene, and bis[2-ethylhexyl]phthalate) were detected in groundwater samples collected at Boiler Plant No. 3. 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. In addition, bis(2-ethylhexyl)phthalate was the only detected SVOC in three of the four samples. Bis(2-ethylhexyl)phthalate is a common laboratory contaminant. Each of the detected SVOCs was present in the sample collected at SI03-GWS02.

With the exception of naphthalene and bis(2-ethylhexyl)phthalate in one sample each, the SVOC concentrations in groundwater were below SSSLs. The concentration of naphthalene (0.0035 mg/L) marginally exceeded the SSSL (0.003 mg/L) at sample location SI03-GWS02. The bis(2-ethylhexyl)phthalate concentration (0.0056 mg/L) marginally exceeded the SSSL (0.0043 mg/L) at sample location SI03-GW02.

6.0 Summary, Conclusions, and Recommendations

IT and QST completed an SI at Boiler Plant No. 3 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 Boiler Plant No. 3 consisted of the sampling and analysis of seven subsurface soil samples and four groundwater samples by QST. In addition, QST installed two temporary groundwater monitoring wells in the residuum groundwater zone to facilitate groundwater sample collection and to provide site-specific geological and hydrogeological characterization information.

Chemical analysis of samples collected at Boiler Plant No. 3 indicates that metals, VOCs, and SVOCs were detected in the various site media. Analytical results were compared to human health SSSLs for FTMC. The SSSLs were developed by IT for human health risk evaluations as part of the ongoing SIs being performed under the BRAC Environmental Restoration Program at FTMC. Additionally, metals concentrations exceeding SSSLs were compared to media-specific background screening values (SAIC, 1998).

The potential threat to human receptors is expected to be low. Although the site is projected for reuse by the Alabama Army National Guard, the analytical data were screened against residential human health SSSLs to evaluate the site for unrestricted land reuse. In soils, with the exception of iron in one sample, the metals concentrations that exceeded SSSLs were below their respective background concentration or within the range of background values and thus do not pose an unacceptable risk to human health. VOC and SVOC concentrations in soils were below SSSLs.

In groundwater, several metals were detected in two samples at concentrations exceeding SSSLs and background concentrations. However, the samples with the elevated metals results were collected from small diameter (1-inch) DPT wells. It is likely that the samples had high turbidity, which caused the elevated metals results. Chloroform (0.0022 and 0.0018 mg/L) and naphthalene (0.0035 mg/L) were detected at concentrations marginally exceeding SSSLs (0.00115 and 0.003 mg/L, respectively). However, the chloroform and naphthalene concentrations were below EPA drinking water standards and health advisory values (EPA, 2000) and are not expected to pose a threat to human health.

Based on the results of the SI, past operations at Boiler Plant No. 3 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. Furthermore, the USTs associated with the boiler plant have been removed from the site in accordance with State of Alabama regulations. Therefore, IT recommends "No Further Action" and unrestricted land reuse at Boiler Plant No. 3, Building 1076, Parcels 14(7) and 235(7).

7.0 References

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ATTACHMENT 1

LIST OF ABBREVIATIONS AND ACRONYMS