Final

Site Investigation Report
Cleared Area with Mound, Choccolocco Corridor, Parcel 237(7)

Fort McClellan
Calhoun County, Alabama

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Executive Summary

In accordance with Contract Number DACA21-96-D-0018, Task Order CK05, IT Corporation completed a site investigation (SI) at the Cleared Area with Mound, Choccolocco Corridor, Parcel 237(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 Parcel 237(7) consisted of the sampling and analysis of six surface soil samples and six subsurface soil samples.

Chemical analyses of samples collected at the Cleared Area with Mound, Choccolocco Corridor, Parcel 237(7), indicate that metals, volatile organic compounds (VOC), semivolatile organic compounds (SVOC), and chlorinated pesticides were detected in the environmental media sampled. Polychlorinated biphenyls, chlorinated herbicides, organophosphorus pesticides, and nitroexplosives were not detected in any of the samples collected at the site. To evaluate whether the detected constituents pose an unacceptable risk to human health or the environment, the analytical results were compared to the human health site-specific screening levels (SSSL), ecological screening values (ESV), and background screening values for Fort McClellan.

The potential threat to human receptors is expected to be low. Although the site is located within a wildlife management area, the analytical data were screened against residential human health SSSLs to evaluate the site for possible unrestricted future land use. With the exception of aluminum in one subsurface soil sample, the metals concentrations that exceeded SSSLs were below their respective background concentrations. However, the aluminum concentration was within the range of background values and does not pose an unacceptable risk to human health. VOC, SVOC, and pesticide concentrations in site media were below SSSLs.

The potential impact to ecological receptors is also expected to be minimal. Selenium concentrations exceeded the ESV and the background concentration in each of the surface soil samples collected at the site. However, the selenium results were within the range of background values. In addition, the pesticide 4,4-DDE was detected at a concentration (0.0041 milligrams per kilogram) marginally exceeding the ESV (0.0025 milligrams per kilogram) at one surface soil sample location. VOC and SVOC concentrations in site media were below ESVs.

Based on the results of the SI, past operations at the Cleared Area with Mound, Choccolocco Corridor, Parcel 237(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 the Cleared Area with Mound, Choccolocco Corridor, Parcel 237(7).

1.0 Introduction

The U.S. Army has selected Fort McClellan (FTMC) located in Calhoun County, Alabama, for closure by the Base Realignment and Closure (BRAC) Commission under Public Laws 100-526 and 101-510. The 1990 Base Closure Act, Public Law 101-510, established the process by which U.S. Department of Defense (DOD) installations would be closed or realigned. The BRAC Environmental Restoration Program requires investigation and cleanup of federal properties prior to transfer to the public domain. The U.S. Army is conducting environmental studies of the impact of suspected contaminants at parcels at FTMC under the management of the U.S. Army Corps of Engineers (USACE), Mobile District. The USACE contracted with IT Corporation (IT) to perform the site investigation (SI) at the Cleared Area with Mound, Choccolocco Corridor, Parcel 237(7), under Contract Number DACA21-96-D-0018, Task Order CK05.

This SI report presents specific information and results compiled from the SI, including field sampling and analysis, conducted at the Cleared Area with Mound, Choccolocco Corridor, Parcel 237(7).

1.1 Project Description

The Cleared Area with Mound, Choccolocco Corridor, Parcel 237(7), 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 additional evaluation.

A site-specific field sampling plan (SFSP) attachment (IT, 1998a) and a site-specific safety and health plan (SSHP) attachment were finalized in December 1998. The SFSP and SSHP were prepared to provide technical guidance for sample collection and analysis at the Cleared Area with Mound, Choccolocco Corridor, Parcel 237(7). The SFSP was used in conjunction with the SSHP as attachments to the installation-wide work plan (IT, 1998b) and the installation-wide sampling and analysis plan (SAP) (IT, 2000a). The SAP includes the installation-wide safety and health plan and quality assurance plan.

The SI included fieldwork to collect six surface soil samples and six subsurface soil samples. Data from the field investigation were used to determine whether potential site-specific chemicals are present at the Cleared Area with Mound, Choccolocco Corridor, Parcel 237(7).

1.2 Purpose and Objectives

The SI program was designed to collect data from site media and provide a level of defensible data and information in sufficient detail to determine whether chemical constituents are present at the Cleared Area with Mound, Choccolocco Corridor, Parcel 237(7), 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), ecological screening values (ESV), and background screening values for FTMC. The SSSLs and ESVs were developed by IT as part of the human health and ecological risk evaluations associated with SIs being performed under the BRAC Environmental Restoration Program at FTMC. The SSSLs and ESVs are presented in the *Final Human Health and Ecological Screening Values and PAH Background Summary Report* (IT, 2000b). Background metals screening values are presented in the *Final Background Metals Survey Report, Fort McClellan, Alabama* (Science Applications International Corporation [SAIC], 1998).

1.3 Site Description and History

The Cleared Area with Mound, Choccolocco Corridor, Parcel 237(7), is located on the lower eastern slope of the Choccolocco Mountains in the center of the Choccolocco Corridor (Figure 1-1). The site is approximately one-half mile southwest of the junction of Bains Gap Road and Alabama State Route 9 and approximately four miles north of Choccolocco, Alabama. The formerly wooded site contains dense undergrowth and is located immediately south of a dirt road (Figure 1-2). An apparent mound within a cleared area, or ground scar, was identified by the Environmental Photographic Interpretation Center on aerial photographs from January 1972 and March 1982 (U.S. Environmental Protection Agency [EPA], 1990). However, no mound was observed by IT during SI field activities in 1998. Presently this site and the surrounding area are located within a wildlife management area managed by the Alabama Game and Fish Division. There is no documentation available regarding any activities at this location (ESE, 1998).

The site, which covers approximately two acres, gently slopes to the southeast. Site elevation is approximately 745 feet above mean sea level. Runoff from the site follows topography and flows to the southeast.

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 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, the Alabama Department of Environmental Management (ADEM), 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.

There are no previous investigations at this site identified in the EBS (ESE, 1998). The Cleared Area with Mound, Choccolocco Corridor, Parcel 237(7), was identified as a CERFA Category 7 site. The site comprises an apparent mound within an observed ground scar or cleared area that may have been the site of military operations. Potential site-specific chemicals may have been released onto the site or to the environment as materials were disposed of on site property. The Cleared Area with Mound, Choccolocco Corridor, Parcel 237(7), 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 the Cleared Area with Mound, Choccolocco Corridor, Parcel 237(7), including environmental sampling and analysis.

3.1 Environmental Sampling

The environmental sampling performed during the SI at the Cleared Area with Mound, Choccolocco Corridor, Parcel 237(7), included the collection of surface soil samples and subsurface soil samples for chemical analysis. The sample locations were determined by observing site physical characteristics during a site visit 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. Surface and subsurface soil samples were recollected at all sample locations and submitted for organophosphorus pesticides analysis because analytical laboratory quality assurance/quality control (QA/QC) criteria were out of limits.

3.1.1 Surface Soil Sampling

Surface soil samples were collected from six locations at the Cleared Area with Mound, Choccolocco Corridor, Parcel 237(7). Soil sampling locations and rationale are presented in Table 3-1. Sampling locations are shown on Figure 3-1. Sample designations and QA/QC samples are listed in Table 3-2. Soil sampling locations were determined in the field by the on-site geologist based on the sampling rationale, the presence of surface structures, and the site topography.

Sample Collection. Surface soil samples were collected from the upper 1 foot of soil with a 3-inch diameter stainless-steel hand auger using the methodology specified in Section 4.9.1.1 of the SAP (IT, 2000a). Surface soil samples were collected by first removing surface debris, such as rocks and vegetation, from the immediate sample area. The soil was collected with the sampling device and screened with a photoionization detector (PID) in accordance with Section 4.7.1.1 of the SAP (IT, 2000a). Samples for volatile organic compound (VOC) 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 six soil borings at the Cleared Area with Mound, Choccolocco Corridor, Parcel 237(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, the presence of surface structures, and site topography. 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 below ground surface (bgs) in the unsaturated zone. The soil borings were advanced and samples collected using the direct-push sampling procedures specified in Section 4.9.1.1 of the SAP (IT, 2000a). Sample collection logs are included in Appendix A. The samples were analyzed for the parameters listed in Table 3-2 using methods outlined in Section 3.3.

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

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 C.

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 EPA, ADEM, FTMC, and USACE requirements. Samples collected at the Cleared Area with Mound, Choccolocco Corridor, Parcel 237(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
- Chlorinated pesticides - EPA Method 8081A
- Chlorinated herbicides - EPA Method 8151A
- Organophosphorus pesticides - EPA Method 8141A
- Polychlorinated biphenyls (PCB) - EPA Method 8082
- Nitroexplosives - EPA Method 8330.

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 analytical data is included in Appendix D. The data validation summary report is included as Appendix E.

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 forms 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 the 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 the Cleared Area with Mound, Choccolocco Corridor, Parcel 237(7), was segregated as follows:

- Soil boring cuttings
- Decontamination fluids
- 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, soil boring cuttings and personal protective equipment generated during the SI at the Cleared Area with Mound, Choccolocco Corridor, Parcel 237(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

There were not any variances or nonconformances to the SFSP recorded during completion of the SI at the Cleared Area with Mound, Choccolocco Corridor, Parcel 237(7).

3.7 Data Quality

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

Data Validation. A complete (100 percent) Level III data validation effort was performed on the reported analytical data. Appendix E 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. These qualified parameters are highlighted in the report. The validation-assigned qualifiers were added to the FTMC IT Environmental Management System™ database for tracking and reporting. The qualified data were used in comparisons to the SSSLs and ESVs developed by IT. Rejected data (assigned an "R" qualifier) were not used in comparisons to the SSSLs and ESVs. The data presented in this report, except where qualified, meet the principle data quality objective for this SI.

4.0 Site Characterization

Subsurface investigations performed at the Cleared Area with Mound, Choccolocco Corridor, Parcel 237(7), provided soil data used to characterize the geology 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 southwest of the Main Post as mapped by Warman and Causey (1962) and 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

The soil mapped at Parcel 237(7) is the Jefferson gravelly sandy loam, friable soil derived from old local alluvium. This soil is generally found on the foot slopes at the base of steep hills and ridges underlain by sandstone and shale. The surface soil is generally dark grayish brown, and the subsurface soil is generally yellowish brown in color (U.S. Department of Agriculture, 1961).

The bedrock at Parcel 237(7) is mapped as the Cambrian Chilhowee Group, which consists of various sandstones, conglomerates, and mudstones (Osborne et al., 1989). A detailed lithologic and stratigraphic discussion of the Chilhowee Group is presented in the previous section.

The direct-push boring data revealed that the soils at the site consist of three distinct units. The first unit encountered was a reddish silty sand to a clayey silt, which extends from the ground surface to 3 to 6 feet bgs. This unit was underlain by a 3- to 9-foot-thick reddish to light-brown gravelly, silty clay. Beneath the gravelly, silty clay was a reddish to light-brown gravel to clayey gravel, which began at 3 to 9 feet bgs and continued to the end of the direct-push borings. Bedrock was not encountered during the direct-push boring activities.

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 (U.S. Department of Commerce, National Oceanic and Atmospheric Administration, 1998). The major surface water

feature in the Choccolocco Corridor is Choccolocco Creek, which flows south through the Choccolocco Corridor.

The Cleared Area with Mound, Choccolocco Corridor, Parcel 237(7), covers approximately two acres. The site gently slopes to the southeast, and site elevation is approximately 745 feet above mean sea level. Runoff from the site follows topography and flows to the southeast.

4.2.2 Hydrogeology

Groundwater was not encountered during direct-push activities at Parcel 237(7). Shallow groundwater at Parcel 237(7) most likely follows topography and flows to the southeast.

5.0 Summary of Analytical Results

The results of the chemical analysis of samples collected at the Cleared Area with Mound, Choccolocco Corridor, Parcel 237(7), indicate that metals, VOCs, SVOCs, and chlorinated pesticides were detected in the various site media. PCBs, chlorinated herbicides, organophosphorus pesticides, and nitroexplosives were not detected in any of the samples collected. To evaluate whether the detected constituents present an unacceptable risk to human health and the environment, the analytical results were compared to the human health SSSLs and ESVs for FTMC. The SSSLs and ESVs were developed by IT for human health and ecological risk evaluations as part of the ongoing SIs being performed under the BRAC Environmental Restoration Program at FTMC.

Metal concentrations exceeding the SSSLs and ESVs were subsequently compared to background screening values to determine if the metals concentrations are within natural background concentrations (SAIC, 1998). Summary statistics for background metals samples collected at FTMC are included in Appendix F.

Six compounds were quantified by both SW-846 Method 8260B (as VOC) and Method 8270C (as SVOC), namely, 1,2,4-trichlorobenzene, 1,4-dichlorobenzene, 1,3-dichlorobenzene, 1,2-dichlorobenzene, hexachlorobutadiene, and naphthalene. Method 8260B yields a reporting limit (RL) of 0.005 milligram per kilogram (mg/kg), while Method 8270C has a RL of 0.330 mg/kg, which is typical for a soil matrix sample. Because of the direct nature of the Method 8260B analysis and its resulting lower RL, this method should be considered superior to Method 8270C when quantifying low levels (0.005 to 0.330 mg/kg) of these compounds. Method 8270C and its associated methylene chloride extraction step is superior, however when dealing with samples that contain higher concentrations (greater than 0.330 mg/kg) of these compounds. Therefore, all data were considered, and none were categorically excluded. Data validation qualifiers were helpful in evaluating the usability of data, especially if calibration, blank contamination, precision, or accuracy indicator anomalies were encountered. The validation qualifiers and concentrations reported (e.g., whether concentrations were less than or greater than 0.330 mg/kg) were used to determine which analytical method was likely to return the more nearly accurate result.

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

5.1 Surface Soil Analytical Results

Six surface soil samples were collected for chemical analysis at the Cleared Area with Mound, Choccolocco Corridor, Parcel 237(7). Surface soil samples were collected from the upper 1 foot of soil at the locations shown on Figure 3-1. Analytical results were compared to residential human health SSSLs, ESVs, and metals background values, as presented in Table 5-1.

Metals. Nineteen metals were detected in each of the surface soil samples collected at Parcel 237(7). The sodium results and five of the mercury results were flagged with a "B" data qualifier, signifying that these metals were also detected in an associated laboratory or field blank. The concentrations of five metals (aluminum, arsenic, chromium, iron, and manganese) exceeded SSSLs but were below their respective background concentration.

The concentrations of six metals (aluminum, chromium, iron, manganese, selenium, and vanadium) exceeded ESVs. With the exception of selenium in each of the samples, the metals concentrations were below their respective background concentrations. However, the selenium results (0.86 to 1.2 mg/kg) were within the background range (SAIC, 1998) (Appendix F).

Volatile Organic Compounds. Four VOCs (2-butanone, acetone, methylene chloride, and p-cymene) were detected in surface soil samples collected at the site. The methylene chloride results and four of the six acetone results were flagged with a "B" data qualifier, signifying that these compounds were also detected in an associated laboratory or field blank sample. The remaining results were flagged with a "J" data qualifier, indicating that the results were greater than the method detection limit (MDL) but less than the RL. Acetone and methylene chloride, which are common laboratory contaminants, were the only detected VOCs at four sample locations.

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

Semivolatile Organic Compounds. Two SVOCs (di-n-butyl phthalate and bis[2-ethylhexyl]phthalate) were detected in each of the surface soil samples collected at the site. The analytical results were flagged with a "B" data qualifier, signifying that these compounds were also detected in an associated laboratory or field blank sample. Di-n-butyl phthalate and bis(2-ethylhexyl)phthalate are common laboratory contaminants.

The SVOC concentrations in surface soils were below SSSLs and ESVs.

Pesticides. Three pesticides (4,4'-DDE, aldrin, and endosulfan sulfate) were detected in surface soil samples collected at the site. The analytical results were flagged with a "J" data qualifier, indicating that the results were greater than the MDL but less than the RL. The pesticide concentrations in surface soils were below SSSLs. The concentration of 4,4'-DDE (0.0041 mg/kg) exceeded the ESV (0.0025 mg/kg) at sample location PPMP-237-GP06.

5.2 Subsurface Soil Analytical Results

Six subsurface soil samples were collected for chemical analysis at the Cleared Area with Mound, Choccolocco Corridor, Parcel 237(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 values, as presented in Table 5-2.

Metals. Nineteen metals were detected in each of the subsurface soil samples collected at Parcel 237(7). The concentrations of five metals (aluminum, arsenic, chromium, iron, and manganese) exceeded SSSLs. With the exception of aluminum in one sample (PPMP-237-GP04), the concentrations of these metals were below their respective background concentrations. However, the aluminum result was within the background range (Appendix F).

Volatile Organic Compounds. Four VOCs (2-butanone, acetone, methylene chloride, and p-cymene) were detected in subsurface soil samples collected at Parcel 237(7). The methylene chloride results and two of the acetone results were flagged with a "B" data qualifier, signifying that these compounds were also detected in an associated laboratory or field blank sample. The remaining results were flagged with a "J" data qualifier, indicating that the results were greater than the MDL but less than the RL. Acetone and methylene chloride, which are common laboratory contaminants, were the only detected VOCs at four sample locations.

The VOC concentrations in subsurface soils were below SSSLs.

Semivolatile Organic Compounds. Two SVOCs (di-n-butyl phthalate and bis[2-ethylhexyl]phthalate) were detected in each of the subsurface soil samples collected at Parcel 237(7). The analytical results were flagged with a "B" data qualifier, signifying that these compounds were also detected in an associated laboratory or field blank sample. Di-n-butyl phthalate and bis(2-ethylhexyl)phthalate are common laboratory contaminants.

The SVOC concentrations in subsurface soils were below SSSLs.

Pesticides. The pesticide delta-betahexachlorocyclohexane (BHC) was detected in the subsurface soil sample collected at PPMP-237-GP05. The delta-BHC result was flagged with a "J" data qualifier, indicating that the result was greater than the MDL but less than the RL. The delta-BHC concentration was below the SSSL.

6.0 Summary and Conclusions and Recommendations

IT, under contract to USACE, completed an SI at the Cleared Area with Mound, Choccolocco Corridor, Parcel 237(7), at FTMC in Calhoun County, Alabama. The SI was conducted to determine whether chemical constituents are present at the site, and, if present, whether the concentrations present an unacceptable risk to human health or the environment. The SI at the Cleared Area with Mound, Choccolocco Corridor, Parcel 237(7), consisted of the sampling and analysis of six surface soil samples and six subsurface soil samples.

Chemical analyses of samples collected at the Cleared Area with Mound, Choccolocco Corridor, Parcel 237(7), indicate that metals, VOCs, SVOCs, and chlorinated pesticides were detected in the environmental media sampled. PCBs, chlorinated herbicides, organophosphorus pesticides, and nitroexplosives were not detected in any of the samples collected. Analytical results were compared to the SSSLs and ESVs for FTMC. The SSSLs and ESVs were developed by IT for human health and ecological risk evaluations as part of the ongoing SIs being performed under the BRAC Environmental Restoration Program at FTMC. Additionally, metal concentrations exceeding SSSLs and ESVs 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 located within a wildlife management area, the analytical data were screened against residential human health SSSLs to evaluate the site for possible unrestricted future land use. With the exception of aluminum in one subsurface soil sample, the metals concentrations that exceeded SSSLs were below their respective background concentrations. However, the aluminum concentration was within the background range (SAIC, 1998) and does not pose an unacceptable risk to human health. VOC, SVOC, and pesticide concentrations in site media were below SSSLs.

The potential impact to ecological receptors is also expected to be minimal. Selenium concentrations (0.86 to 1.2 mg/kg) exceeded the ESV and the background concentration in each of the surface soil samples collected at the site. However, the selenium results were within the background range. In addition, the pesticide 4,4-DDE was detected at a concentration (0.0041 mg/kg) marginally exceeding the ESV (0.0025 mg/kg) at one surface soil sample location. VOC and SVOC concentrations in site media were below ESVs.

Based on the results of the SI, past operations at the Cleared Area with Mound, Choccolocco Corridor, Parcel 237(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 the Cleared Area with Mound, Choccolocco Corridor, Parcel 237(7).

7.0 References

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ATTACHMENT 1

LIST OF ABBREVIATIONS AND ACRONYMS

APPENDIX A

SAMPLE COLLECTION LOGS AND ANALYSIS REQUEST/CHAIN-OF-CUSTODY RECORDS

SAMPLE COLLECTION LOGS

CHAIN-OF-CUSTODY RECORDS

APPENDIX B

BORING LOGS

APPENDIX C

SURVEY DATA

APPENDIX D

SUMMARY OF VALIDATED ANALYTICAL DATA

APPENDIX E

DATA VALIDATION SUMMARY REPORT

APPENDIX F

SUMMARY STATISTICS FOR BACKGROUND MEDIA, FORT McCLELLAN, ALABAMA