

**Final**

**Site Investigation Report**  
**Former Smoke Area, South Slope of Morgan Mountain,**  
**Parcel 159(7)**

**Fort McClellan**  
**Calhoun County, Alabama**

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# Table of Contents

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	<b>Page</b>
List of Appendices.....	iii
List of Tables.....	iv
List of Figures .....	iv
List of Acronyms.....	v
Executive Summary .....	ES-1
1.0 Introduction .....	1-1
1.1 Project Description .....	1-1
1.2 Purpose and Objectives.....	1-2
1.3 Site Description and History.....	1-2
2.0 Previous Investigations.....	2-1
3.0 Current Site Investigation Activities .....	3-1
3.1 Environmental Sampling .....	3-1
3.1.1 Surface and Depositional Soil Sampling .....	3-1
3.1.2 Subsurface Soil Sampling.....	3-2
3.2 Surveying of Sample Locations .....	3-2
3.3 Analytical Program .....	3-3
3.4 Sample Preservation, Packaging, and Shipping.....	3-3
3.5 Investigation-Derived Waste Management and Disposal.....	3-4
3.6 Variances/Nonconformances .....	3-4
3.7 Data Quality.....	3-4
4.0 Site Characterization .....	4-1
4.1 Regional and Site Geology .....	4-1
4.1.1 Regional Geology .....	4-1
4.1.2 Site Geology .....	4-4
4.2 Site Hydrology .....	4-5
5.0 Summary of Analytical Results.....	5-1
5.1 Surface and Depositional Soil Analytical Results .....	5-2
5.2 Subsurface Soil Analytical Results.....	5-3
6.0 Summary and Conclusions and Recommendations.....	6-1

**Table of Contents (Continued)**

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**Page**

7.0 References ..... 7-1

Attachment 1 – List of Abbreviations and Acronyms

## ***List of Appendices***

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Appendix A – Sample Collection Logs and Analysis Request/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 – Variances/Nonconformances

Appendix G – Summary Statistics for Background Media, Fort McClellan, Alabama

## **List of Tables**

---

<b>Table</b>	<b>Title</b>	<b>Follows Page</b>
3-1	Sampling Locations and Rationale	3-1
3-2	Surface Soil, Subsurface Soil, and Depositional Soil Sample Designations and QA/QC Samples	3-1
3-3	Variance to the Site-Specific Field Sampling Plan	3-4
5-1	Surface and Depositional Soil Analytical Results	5-1
5-2	Subsurface Soil Analytical Results	5-1
5-3	Comparison of Selected Metals Concentrations, Field Samples vs. Background Samples	5-2

## **List of Figures**

---

<b>Figure</b>	<b>Title</b>	<b>Follows Page</b>
1-1	Site Location Map	1-2
1-2	Site Map	1-2
3-1	Sample Location Map	3-1
4-1	Site Geologic Map	4-4

## ***List of Acronyms***

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See Attachment 1 – List of Abbreviations and Acronyms.

## ***Executive Summary***

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In accordance with Contract Number DACA21-96-D-0018, Task Order CK05, IT Corporation completed a site investigation (SI) at the Former Smoke Area, South Slope of Morgan Mountain, Parcel 159(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 would present an unacceptable risk to human health or the environment. The SI at the Former Smoke Area, South Slope of Morgan Mountain, Parcel 159(7), consisted of the sampling and analyses of four surface soil samples, four subsurface soil samples, and one depositional soil sample.

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), ecological screening values (ESV), and background screening values for Fort McClellan.

The potential impact to human receptors is expected to be minimal. Although the site is located within an undeveloped area of the Choccolocco Corridor owned by the State of Alabama, analytical data were screened against residential human health SSSLs to evaluate the site for possible unrestricted future use. The metals that exceeded residential human health SSSLs, with a few limited exceptions related to site-specific geological conditions, were below the respective background concentration or within the range of background values, and thus, do not pose an unacceptable risk to future human receptors. VOC and SVOC concentrations in site media were below SSSLs.

In surface and depositional soils, the concentrations of iron (one location), copper (one location), and selenium (three locations) exceeded ESVs and the range of background values. In addition, the concentrations of the VOCs acetone (two surface soil samples) and trichloroethene (one depositional soil sample) exceeded ESVs. Acetone is a common laboratory contaminant and the trichloroethene result was flagged with a "B" data qualifier, signifying that it is probably a laboratory artifact as well. The parcel is located in a wooded area in the Choccolocco Corridor and is expected to support viable ecological habitat. However, the low levels of the metals and VOCs detected are not expected to pose a substantial threat to ecological receptors.

Based on the results of the SI, past operations at the Former Smoke Area, South Slope of Morgan Mountain, Parcel 159(7), do not appear to have adversely impacted the environment. The metals and organic compounds detected in site media do not pose an unacceptable risk to human health or the environment. Therefore, IT Corporation recommends “No Further Action” and unrestricted land reuse at the Former Smoke Area, South Slope of Morgan Mountain, Parcel 159(7).

## **1.0 Introduction**

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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 installations would be closed or realigned. The BRAC Environmental Restoration Program requires investigation and cleanup of federal properties prior to transfer to the public domain. The U.S. Army is conducting environmental studies of the impact of suspected contaminants at parcels at FTMC under the management of the U.S. Army Corps of Engineers (USACE), Mobile District. The USACE contracted with IT Corporation (IT) to perform the site investigation (SI) at the Former Smoke Area, South Slope of Morgan Mountain, Parcel 159(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 Former Smoke Area, South Slope of Morgan Mountain, Parcel 159(7).

### **1.1 Project Description**

The Former Smoke Area, South Slope of Morgan Mountain 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.

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 Smoke Area, South Slope of Morgan Mountain, Parcel 159(7). The SFSP was used in conjunction with the SSHP as attachments to the installation-wide work plan (IT, 1998b) and the installation-wide sampling and analysis plan (SAP) (IT, 2000a). The SAP includes the installation-wide safety and health plan and quality assurance plan.

The SI included fieldwork to collect four surface soil samples, one depositional soil sample, and four subsurface soil samples to determine whether potential site-specific chemicals are present at the site and to provide data useful for supporting any future corrective measures and closure activities.

## **1.2 Purpose and Objectives**

The SI program was designed to collect data from site media and provide a level of defensible data and information in sufficient detail to determine whether chemical constituents are present at the Former Smoke Area, South Slope of Morgan Mountain, Parcel 159(7), at concentrations that would 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).

Based on the conclusions presented in this SI report, the BRAC Cleanup Team will decide to propose “No Further Action” at the site or to conduct additional work at the site.

## **1.3 Site Description and History**

The Former Smoke Area, South Slope of Morgan Mountain, Parcel 159(7), is located in the eastern portion of the Choccolocco Corridor at the south toe of Morgan Mountain (Figure 1-1). The site, which covers approximately 5 acres, is located at the toe of a steep south-facing slope, and is approximately 300 feet wide (east to west) and 600 feet in length (north to south).

Training activities conducted at the site involved the use of smoke generators. The dates of use could not be determined and other information regarding operations at the site was not available.

The site and surrounding area are mostly undeveloped or wooded. Site elevation is approximately 700 to 730 feet above mean sea level. There is one small stream (Willis Branch) approximately 0.3 mile due south of the site that drains west into Choccolocco Creek. Figure 1-2 is a site map that shows topographic features and the site boundaries.

## **2.0 Previous Investigations**

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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 U.S. Department of Defense 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, the Alabama Department of Environmental Management, the U.S. Environmental Protection Agency (EPA) Region IV, and Calhoun County, as well as a database search of Comprehensive Environmental Response, Compensation, and Liability Act-regulated substances, petroleum products, and Resource Conservation and Recovery Act-regulated facilities. Available historic maps and aerial photographs were reviewed to document historic land uses. Personal and telephone interviews of past and present FTMC employees and

military personnel were conducted. In addition, visual site inspections were conducted to verify conditions of specific property parcels.

The Former Smoke Area, South Slope of Morgan Mountain, was identified as a Category 7 CERFA site: areas that are not evaluated or require further evaluation. The site lacked adequate documentation and therefore required evaluation to determine the environmental condition of the parcel. There were not any other investigations identified for the Former Smoke Area, South Slope of Morgan Mountain, Parcel 159(7).

## **3.0 Current Site Investigation Activities**

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This chapter summarizes SI activities conducted by IT at the Former Smoke Area, South Slope of Morgan Mountain, Parcel 159(7), including environmental sampling and analysis activities.

### **3.1 Environmental Sampling**

The environmental sampling performed during the SI at the Former Smoke Area, South Slope of Morgan Mountain, Parcel 159(7), included the collection of surface, depositional, and subsurface soil samples for chemical analyses. The sample locations were determined by observing site physical characteristics noted 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 analyses of site-related parameters listed in Section 3.3.

#### **3.1.1 Surface and Depositional Soil Sampling**

Surface soil samples were collected from four locations and a depositional soil sample was collected from one location at the Former Smoke Area, South Slope of Morgan Mountain, Parcel 159(7), as shown on Figure 3-1. Soil sampling locations and rationale are presented in Table 3-1. Sample designations and quality assurance/quality control samples are listed in Table 3-2. Soil sampling locations were determined in the field by the on-site geologist based on sampling rationale, presence of surface structures, site topography, and buried 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 or vegetation, from the immediate sample area. The soil was then collected with the sampling device and screened with a photoionization detector (PID) in accordance with Section 4.7.1.1 of the SAP (IT, 2000a). Samples for volatile organic compound (VOC) analyses were collected directly from the sampler using three EnCore<sup>®</sup> samplers. The remaining portion of the sample was transferred to a clean stainless-steel bowl, homogenized, and placed in the appropriate sample containers. The samples were analyzed for the parameters listed in Table 3-2 using methods outlined in Section 3.3. Sample collection logs are included in Appendix A.

**Table 3-1**

**Sampling Locations and Rationale  
Former Smoke Area, South Slope of Morgan Mountain, Parcel 159(7)  
Fort McClellan, Calhoun County, Alabama**

<b>Sample Location</b>	<b>Media Sampled</b>	<b>Sample Location Rationale</b>
FTA-159-GP01	Surface Soil Subsurface Soil	Surface and subsurface soil samples were collected near the northwest corner of the Former Smoke Area, South Slope of Morgan Mountain. Sampling location represents a likely point for the entry, collection, and infiltration of runoff at this site.
FTA-159-GP02	Surface Soil Subsurface Soil	Surface and subsurface soil samples were collected near the northeast corner of the Former Smoke Area, South Slope of Morgan Mountain. Sampling location represents the highest elevation within the study parcel.
FTA-159-GP03	Surface Soil Subsurface Soil	Surface and subsurface soil samples were collected near the western boundary of the Former Smoke Area, South Slope of Morgan Mountain.
FTA-159-GP04	Surface Soil Subsurface Soil	Surface and subsurface soil samples were collected near the eastern boundary of the Former Smoke Area, South Slope of Morgan Mountain.
FTA-159-DEP01	Depositional Soil	A depositional soil sample was collected from a low-lying area within the parcel. The sample location represents a potential depositional sink for potential site-specific chemicals.

**Table 3-2**

**Surface Soil, Subsurface Soil, and Depositional Soil Sample Designations and QA/QC Samples  
Former Smoke Area, South Slope of Morgan Mountain, Parcel 159(7)  
Fort McClellan, Calhoun County, Alabama**

Sample Location	Sample Designation	Sample Depth (ft. bgs)	QA/QC Samples			Analytical Suite
			Field Duplicates	Field Splits	MS/MSD	
FTA-159-GP01	FTA-159-GP01-SS-FA0001-REG	0-1				TCL VOCs, TCL SVOCs, TAL Metals
	FTA-159-GP01-DS-FA0002-REG	1-3				
FTA-159-GP02	FTA-159-GP02-SS-FA0003-REG	0-1			FTA-159-GP02-SS-FA0003-MS	TCL VOCs, TCL SVOCs, TAL Metals
	FTA-159-GP02-DS-FA0004-REG	2-4			FTA-159-GP02-SS-FA0003-MSD	
FTA-159-GP03	FTA-159-GP03-SS-FA0005-REG	0-1	FTA-159-GP03-SS-FA0006-FD	FTA-159-GP03-SS-FA0007-FS		TCL VOCs, TCL SVOCs, TAL Metals
	FTA-159-GP03-DS-FA0008-REG	1-4				
FTA-159-GP04	FTA-159-GP04-SS-FA0009-REG	0-1				TCL VOCs, TCL SVOCs, TAL Metals
	FTA-159-GP04-DS-FA0010-REG	4-6				
FTA-159-DEP01	FTA-159-DEP01-DEP-FA0011-REG	0-1				TCL VOCs, TCL SVOCs, TAL Metals

FD - Field duplicate.

FS - Field split.

ft. bgs - feet below ground surface.

MS/MSD - Matrix spike/matrix spike duplicate.

QA/QC - Quality assurance/quality control.

REG - Field sample.

SVOC - Semivolatile organic compound.

TAL - Target analyte list.

TCL - Target compound list.

VOC - Volatile organic compound.

### **3.1.2 Subsurface Soil Sampling**

Subsurface soil samples were collected from four soil borings at the Former Smoke Area, South Slope of Morgan Mountain, Parcel 159(7), as shown on Figure 3-1. Subsurface soil sampling locations and rationale are presented in Table 3-1. Subsurface soil sample designations and depths are listed in Table 3-2. Soil boring sampling locations were determined in the field by the on-site geologist based on 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 below ground surface (bgs) in the unsaturated zone. The soil borings were advanced and soil samples collected using the direct-push sampling procedures specified in Section 4.9.1.1 of the SAP (IT, 2000a). 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.

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 volatile organic vapors. The soil 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 soil sample interval above the saturated zone was submitted for analyses. Samples to be analyzed for VOCs were collected directly from the sampler using three EnCore<sup>®</sup> samplers. The remaining portion of the sample was transferred to a clean stainless-steel bowl, homogenized, and placed in the appropriate sample containers. Samples submitted for laboratory analyses are summarized in Table 3-2. The on-site geologist constructed a detailed boring log for each soil boring. The lithological log for each borehole is included in Appendix B.

At the completion of soil sampling, boreholes were abandoned with hydrated bentonite pellets 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, Alabama Department of Environmental Management, FTMC, and USACE requirements. The samples collected at the Former Smoke Area, South Slope of Morgan Mountain, Parcel 159(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.

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 Section 5.0, Table 5-1, of Appendix B of the SAP (IT, 2000a). Sample documentation and chain-of-custodies were recorded as specified in Section 4.13 of the SAP (IT, 2000a).

Completed analysis request and chain-of-custody records (Appendix A) were secured and included with each shipment of sample coolers to Quanterra Environmental Services in Knoxville, Tennessee. Split samples were shipped to 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 Former Smoke Area, South Slope of Morgan Mountain, Parcel 159(7) was segregated as follows:

- Soil boring cuttings
- Personal protective equipment
- Decontamination fluids.

Solid IDW was stored inside the fenced area surrounding Buildings 335 and 336 in lined rolloff bins prior to characterization and final disposal. Solid IDW was characterized using toxicity characteristic leaching procedure analyses. Based on the results, soil boring cuttings and personal protective equipment generated during the SI 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**

One variance to the SFSP was recorded during completion of the SI at the Former Smoke Area, South Slope of Morgan Mountain, Parcel 159(7). The variance did not alter the intent of the SI or the sampling rationale presented in Table 4-2 of the SFSP (IT, 1998a). The variance to the SFSP is summarized in Table 3-3 and included in Appendix F. There were not any nonconformances to the SFSP recorded during completion of the SI.

### **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 quality assurance plan; and standard, accepted methods and

**Table 3-3**

**Variance to the Site-Specific Field Sampling Plan  
Former Smoke Area, South Slope of Morgan Mountain, Parcel 159(7)  
Fort McClellan, Calhoun County, Alabama**

<b>Variance to the SFSP</b>	<b>Justification for Variance</b>	<b>Impact to Site Investigation</b>
Depositional soil sample location FTA-159-DEP01 was relocated approximately 450 feet north of the proposed location.	Proposed sample location was not in a low-lying area where depositional soils would accumulate.	None. Relocation of the depositional soil sample point allowed successful sample collection for laboratory analysis.

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<sup>TM</sup> database for tracking and reporting. The qualified data were used in the comparison to the SSSLs and ESVs. Rejected data (assigned an “R” qualifier) were not used in the comparison 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**

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Subsurface investigations performed at the Former Smoke Area, South Slope of Morgan Mountain, Parcel 159(7), provided soil data used to characterize the geology of the site. Because there were not any wells installed at Parcel 159(7), a hydrogeological characterization was not performed.

### **4.1 Regional and Site Geology**

#### **4.1.1 Regional Geology**

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

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

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

The basal unit of the sedimentary sequence in Calhoun County is the Cambrian Chilhowee Group. The Chilhowee Group is comprised of the Cochran, Nichols, Wilson Ridge, and Weisner Formations (Osborne and Szabo, 1984), but in Calhoun County is either undifferentiated or divided into the Cochran and Nichols Formations and an upper undifferentiated Wilson Ridge and Weisner Formation. The Cochran is composed of poorly sorted arkosic sandstone and

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

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

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

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

Overlying the Conasauga Formation is the Knox Group, which is composed of the Copper Ridge

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

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

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

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

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

the Floyd Shale, which was mapped by Warman and Causey (1962) on the Main Post of FTMC, to the Ordovician Athens Shale 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, 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**

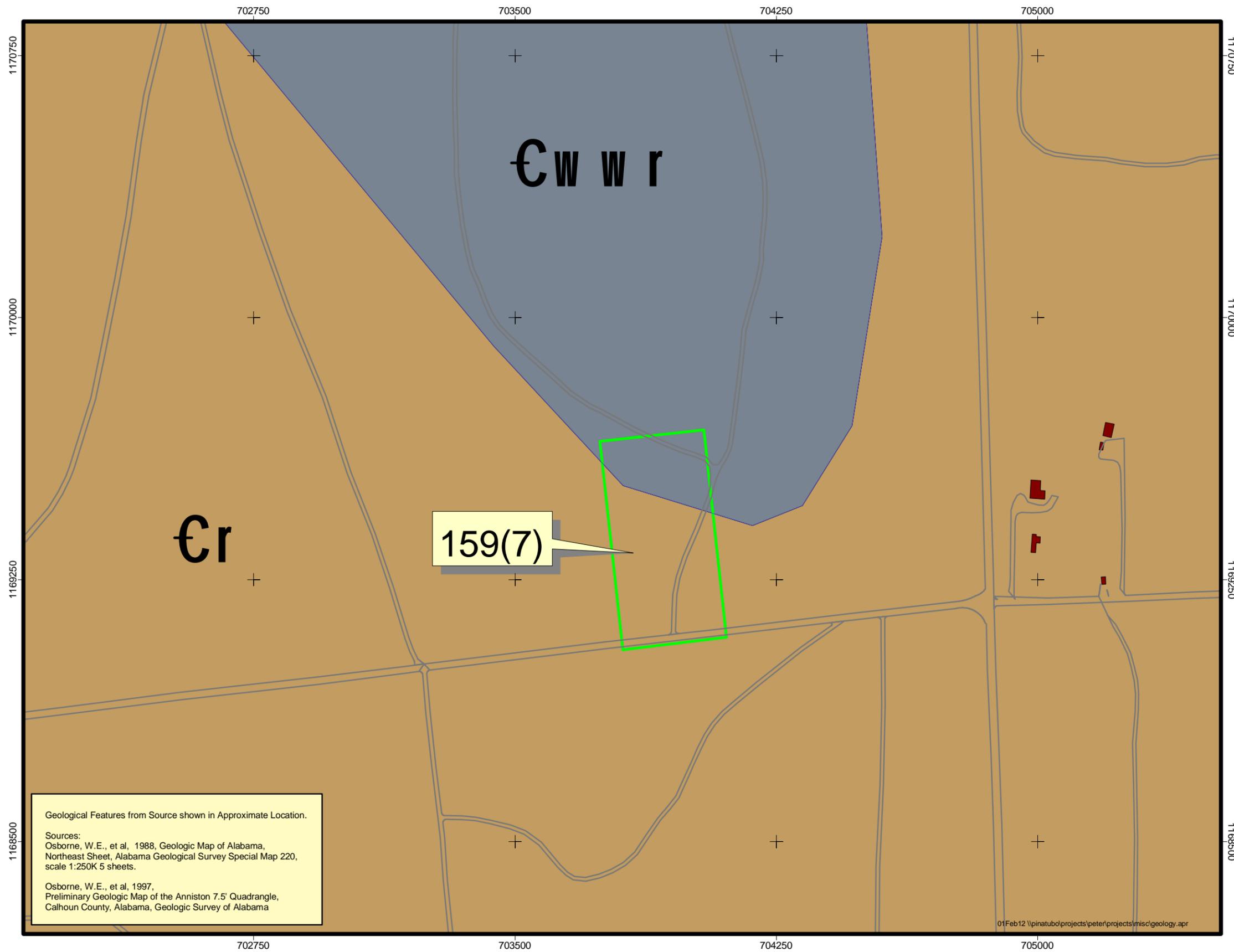
The soil type at the Former Smoke Area, South Slope of Morgan Mountain is the Dewey Series, which consists of strongly acid residuum of limestone or old valley-fill material. The soils at this site are formed by erosional forces and surface runoff, and are typically dark red or reddish-brown. The depth to bedrock or groundwater is highly variable and depends on the locale, slope, or presence of fractures. Although the permeability is moderate, the capacity for available moisture is high, and the root zone is thick, runoff and erosion is still a hazard (U.S. Department of Agriculture, 1961).

Bedrock at Parcel 159(7) is mapped as the Weisner and Wilson Ridge Formations, undifferentiated, of the Cambrian Chilhowee Group and the Cambrian Rome Formation. The Weisner and Wilson Ridge Formation rocks occur within a klippe (Figure 4-1).

Based on direct-push boring data collected during the SI, residuum beneath the site consists predominantly of clay and silt. Direct-push refusal was encountered at depths ranging from 3 to 8 feet bgs. Competent bedrock was not encountered during direct-push sampling.

#### **4.2 Site 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



# Figure 4-1

## Site Geologic Map

Former Smoke Area,  
 South Slope of Morgan Mountain,  
 Parcel 159(7)

### Legend

-  CERFA Parcel 159(7) Boundary
-  Buildings
-  Roads
-  Thrust Fault

### Geology

-  Cr Cambrian - Rome Formation
-  Crwr Cambrian - Weisner and Wilson Ridge Formations undifferentiated



January 2001



U.S. Army Corps of Engineers  
 Mobile District  
 Fort McClellan  
 Calhoun County, Alabama  
 Contract No. DACA21-96-D-0018



Commerce, National Oceanic and Atmospheric Administration, 1998). The major surface water feature in the Choccolocco Corridor is Choccolocco Creek, which flows south through the corridor.

Surface runoff at the Former Smoke Area, South Slope of Morgan Mountain, Parcel 159(7), follows the general topography and flows to the south/southwest toward Choccolocco Creek.

## **5.0 Summary of Analytical Results**

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The results of the chemical analyses of samples collected at the Former Smoke Area, South Slope of Morgan Mountain, Parcel 159(7), 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 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 G.

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

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 and Depositional Soil Analytical Results**

Table 5-1

**Surface and Depositional Soil Analytical Results**  
**Former Smoke Area, South Slope of Morgan Mountain, Parcel 159(7)**  
**Fort McClellan, Calhoun County, Alabama**

(Page 1 of 2)

Parcel Sample Location Sample Number Sample Date Sample Depth (Feet)					FTA-159 FTA-159-DEP01 FA0011 13-Nov-98 0-1					FTA-159 FTA-159-GP01 FA0001 28-Oct-98 0-1					FTA-159 FTA-159-GP02 FA0003 28-Oct-98 0-1				
Parameter	Units	BKG <sup>a</sup>	SSSL <sup>b</sup>	ESV <sup>b</sup>	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV
<b>METALS</b>																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	1.22E+04			YES	YES	1.83E+04		YES	YES	YES	1.32E+04			YES	YES
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	1.09E+01			YES	YES	1.63E+01		YES	YES	YES	9.00E+00			YES	
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	7.07E+01					4.81E+01					7.12E+01				
Calcium	mg/kg	1.72E+03	NA	NA	9.09E+02					ND					ND				
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	4.16E+01		YES	YES	YES	5.55E+01		YES	YES	YES	5.88E+01		YES	YES	YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	1.29E+01					ND					8.80E+00				
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	1.94E+01		YES			1.56E+01		YES			9.90E+00				
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	3.89E+04		YES	YES	YES	5.84E+04		YES	YES	YES	2.95E+04			YES	YES
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	2.32E+01					1.95E+01					2.32E+01				
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	8.14E+02			YES	YES	4.25E+02			YES	YES	8.06E+02			YES	YES
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	1.60E-01		YES		YES	2.20E-01		YES		YES	1.30E-01		YES		YES
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	6.00E+00					5.90E+00					7.80E+00				
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	1.70E+00		YES		YES	1.50E+00		YES		YES	8.60E-01		YES		YES
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	3.97E+01				YES	5.50E+01	J		YES	YES	2.32E+01	J			YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	5.94E+01		YES		YES	2.59E+01	B				2.30E+01	B			
<b>VOLATILE ORGANIC COMPOUNDS</b>																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	1.30E-02	B				ND					4.90E-03	J			
Acetone	mg/kg	NA	7.76E+02	2.50E+00	4.10E-01	J				4.90E+00	J			YES	1.20E-01	J			
Bromomethane	mg/kg	NA	1.09E+01	NA	ND					ND					3.80E-03	B			
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00	3.50E-03	B				3.30E-03	B				2.80E-03	B			
Toluene	mg/kg	NA	1.55E+03	5.00E-02	2.40E-03	B				ND					ND				
Trichloroethene	mg/kg	NA	5.72E+01	1.00E-03	1.10E-02	B			YES	ND					ND				
p-Cymene	mg/kg	NA	1.55E+03	NA	4.80E-03	J				ND					ND				
<b>SEMIVOLATILE ORGANIC COMPOUNDS</b>																			
bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	9.30E-01	ND					6.50E-02	J				7.30E-02	J			

Table 5-1

**Surface and Depositional Soil Analytical Results**  
**Former Smoke Area, South Slope of Morgan Mountain, Parcel 159(7)**  
**Fort McClellan, Calhoun County, Alabama**

(Page 2 of 2)

Parcel Sample Location Sample Number Sample Date Sample Depth (Feet)					FTA-159 FTA-159-GP03 FA0005 28-Oct-98 0- 1					FTA-159 FTA-159-GP04 FA0009 28-Oct-98 0- 1				
Parameter	Units	BKG <sup>a</sup>	SSSL <sup>b</sup>	ESV <sup>b</sup>	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV
<b>METALS</b>														
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	1.95E+04		YES	YES	YES	8.02E+03			YES	YES
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	1.52E+01		YES	YES	YES	8.00E+00			YES	
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	5.81E+01					4.04E+01				
Calcium	mg/kg	1.72E+03	NA	NA	7.28E+02					7.57E+02				
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	7.51E+01		YES	YES	YES	2.94E+01			YES	YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	8.30E+00					8.70E+00				
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	1.36E+02		YES		YES	3.18E+01		YES		
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	5.25E+04		YES	YES	YES	2.29E+04			YES	YES
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	3.84E+01					1.44E+01				
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	4.67E+02			YES	YES	5.07E+02			YES	YES
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	1.90E-01		YES		YES	6.80E-02				
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	9.70E+00					6.30E+00				
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	1.80E+00		YES		YES	7.20E-01		YES		
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	5.25E+01	J				1.26E+01	J			YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	1.72E+02		YES		YES	3.53E+01				
<b>VOLATILE ORGANIC COMPOUNDS</b>														
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	8.50E-03	J				6.00E-03	J			
Acetone	mg/kg	NA	7.76E+02	2.50E+00	2.90E-01	J				5.00E+00	J			YES
Bromomethane	mg/kg	NA	1.09E+01	NA	ND					3.20E-03	J			
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00	4.00E-03	B				4.20E-03	B			
Toluene	mg/kg	NA	1.55E+03	5.00E-02	ND					ND				
Trichloroethene	mg/kg	NA	5.72E+01	1.00E-03	ND					ND				
p-Cymene	mg/kg	NA	1.55E+03	NA	ND					ND				
<b>SEMIVOLATILE ORGANIC COMPOUNDS</b>														
bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	9.30E-01	9.90E-02	J				8.90E-02	J			

Analyses performed by Quanterra Environmental Services using EPA-SW-846 analytical methods including Update III methods where applicable.

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

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

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

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

mg/kg - Milligrams per kilogram.

NA - Not available.

ND - Not detected.

Qual - Data validation qualifier.

Table 5-2

**Subsurface Soil Analytical Results**  
**Former Smoke Area, South Slope of Morgan Mountain, Parcel 159(7)**  
**Fort McClellan, Calhoun County, Alabama**

Parcel Sample Location Sample Number Sample Date Sample Depth (Feet)				FTA-159 FTA-159-GP01 FA0002 28-Oct-98 1-3				FTA-159 FTA-159-GP02 FA0004 28-Oct-98 2-4				FTA-159 FTA-159-GP03 FA0008 28-Oct-98 1-4				FTA-159 FTA-159-GP04 FA0010 28-Oct-98 4-6			
Parameter	Units	BKG <sup>a</sup>	SSSL <sup>b</sup>	Result	Qual	>BKG	>SSSL												
<b>METALS</b>																			
Aluminum	mg/kg	1.36E+04	7.80E+03	1.60E+04		YES	YES	1.91E+04		YES	YES	1.54E+04		YES	YES	1.50E+04		YES	YES
Arsenic	mg/kg	1.83E+01	4.26E-01	1.85E+01		YES	YES	1.11E+01		YES	YES	2.36E+01		YES	YES	1.68E+01			YES
Barium	mg/kg	2.34E+02	5.47E+02	ND				3.62E+01				2.80E+01				ND			
Cadmium	mg/kg	2.20E-01	6.25E+00	ND				ND				ND				7.40E-01		YES	
Chromium	mg/kg	3.83E+01	2.32E+01	5.33E+01		YES	YES	4.59E+01		YES	YES	8.96E+01		YES	YES	6.75E+01		YES	YES
Cobalt	mg/kg	1.75E+01	4.68E+02	ND				6.00E+00				8.60E+00				7.60E+00			
Copper	mg/kg	1.94E+01	3.13E+02	1.62E+01				1.29E+01				2.49E+01		YES		1.39E+01			
Iron	mg/kg	4.48E+04	2.34E+03	7.00E+04		YES	YES	4.32E+04			YES	7.85E+04		YES	YES	5.90E+04		YES	YES
Lead	mg/kg	3.85E+01	4.00E+02	1.62E+01				1.87E+01				2.18E+01				1.64E+01			
Manganese	mg/kg	1.36E+03	3.63E+02	1.46E+02				2.22E+02				2.09E+02				1.75E+02			
Mercury	mg/kg	7.00E-02	2.33E+00	2.40E-01		YES		1.50E-01		YES		2.10E-01		YES		1.90E-01		YES	
Nickel	mg/kg	1.29E+01	1.54E+02	ND				9.30E+00				8.20E+00				7.10E+00			
Selenium	mg/kg	4.70E-01	3.91E+01	1.80E+00		YES		1.00E+00		YES		1.40E+00		YES		1.60E+00		YES	
Vanadium	mg/kg	6.49E+01	5.31E+01	5.94E+01	J		YES	3.91E+01	J			6.29E+01	J		YES	4.68E+01	J		
Zinc	mg/kg	3.49E+01	2.34E+03	1.95E+01	B			2.61E+01	B			4.88E+01		YES		2.64E+01	B		
<b>VOLATILE ORGANIC COMPOUNDS</b>																			
Acetone	mg/kg	NA	7.76E+02	4.80E-01	J			1.50E-01	J			8.30E-01	J			2.80E-01	J		
Bromomethane	mg/kg	NA	1.09E+01	1.60E-03	B			ND				ND				ND			
Methylene chloride	mg/kg	NA	8.41E+01	4.60E-03	B			3.70E-03	B			4.40E-03	B			5.00E-03	B		
<b>SEMIVOLATILE ORGANIC COMPOUNDS</b>																			
bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	9.30E-02	J			7.60E-02	J			4.90E-02	J			8.70E-02	J		

Analysis performed by Quanterra Environmental Services using EPA SW-846 analytical methods, including Update III methods where applicable.

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

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

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

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

mg/kg - Milligrams per kilogram.

NA - Not available.

ND - Not detected.

Qual - Data validation qualifier.

Four surface soil samples and one depositional soil sample were collected for chemical analyses at the Former Smoke Area, South Slope of Morgan Mountain, Parcel 159(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 metals background concentrations, as presented in Table 5-1.

**Metals.** Fifteen metals were detected in surface and depositional soil samples collected at the Former Smoke Area, South Slope of Morgan Mountain, Parcel 159(7). Sample locations FTA-159-DEP01, FTA-159-GP03, and FTA-159-GP04 each contained all fifteen of the detected metals. Two of the zinc results were flagged with a "B" data qualifier, signifying that this metal was also detected in an associated laboratory or field blank.

The concentrations of aluminum (five locations), arsenic (five locations), chromium (five locations), iron (five locations), manganese (five locations), and vanadium (FTA-159-GP01) exceeded SSSLs. However, with the exception of iron at one location (FTA-159-GP01), the concentrations of these metals were below the respective background concentration or within the range of background values determined by SAIC (1998) (Appendix G). Because elevated chromium concentrations were detected in surface and subsurface soils at the site, IT collected site-specific background soil samples (surface and subsurface soil) from six locations adjacent to but outside of Parcel 159(7) (Figure 3-1). The site-specific background samples were analyzed for aluminum, chromium, and iron to determine if these metals were present because of site activities or because of the local geology. As shown in Table 5-3, the aluminum, chromium, and iron concentrations in the background samples were comparable to the concentrations in the field samples suggesting that the elevated concentrations of these metals are related to site-specific geology.

Aluminum (five locations), arsenic (three locations), chromium (five locations), copper (FTA-159-GP03), iron (five locations), manganese (five locations), mercury (four locations), selenium (four locations), vanadium (five locations), and zinc (FTA-159-DEP01 and FTA-159-GP03) concentrations exceeded ESVs. With the exceptions of copper (FTA-159-GP03), iron (FTA-159-GP01), and selenium (three locations), the concentrations of these metals were below the respective background concentration or within the range of background values.

**Volatile Organic Compounds.** Seven VOCs were detected in surface and depositional soil samples collected at the Former Smoke Area, South Slope of Morgan Mountain, Parcel 159(7).

**Table 5-3**

**Comparison of Selected Metals Concentrations  
Field Samples vs. Background Samples  
Former Smoke Area, South Slope of Morgan Mountain, Parcel 159(7)  
Fort McClellan, Calhoun County, Alabama**

**Field Samples**

Sample ID	Al Conc.	Cr Conc.	Fe Conc.
FTA-159-GP01-SS	18300	55.5	58400
FTA-159-GP01-DS	16000	53.3	70000
FTA-159-GP02-SS	13200	58.8	29500
FTA-159-GP02-DS	19100	45.9	43200
FTA-159-GP03-SS	19500	75.1	29400
FTA-159-GP03-DS	15400	89.6	78500
FTA-159-GP04-SS	8020	29.4	22900
FTA-159-GP04-DS	15000	67.5	59000
Average	15565	59.4	48863
Minimum	8020	29.4	22900
Maximum	19500	89.6	78500

**Background Samples**

Sample ID	Al Conc.	Cr Conc.	Fe Conc.
FTA-159-GP05-SS	36000	32.8	29000
FTA-159-GP05-DS	31800	52.8	72000
FTA-159-GP06-SS	16800	97.6	28200
FTA-159-GP06-DS	29700	45.1	38800
FTA-159-GP08-SS	37600	25.5	28500
FTA-159-GP08-DS	32800	39.4	46000
FTA-159-GP09-SS	27400	25.6	23200
FTA-159-GP09-DS	18200	53.6	64200
FTA-159-GP10-SS	35800	32.8	39900
FTA-159-GP10-DS	22600	54.5	38700
FTA-159-GP11-SS	29800	32.7	23900
FTA-159-GP11-DS	35100	44.5	70200
Average	29467	44.7	41883
Minimum	16800	25.5	23200
Maximum	37600	97.6	72000

All results given in milligrams per kilogram (mg/kg).

Al - Aluminum

Conc. - Concentration

Cr - Chromium

Fe - Iron

The methylene chloride results, one 2-butanone result, one bromomethane result, one toluene result, and one trichloroethene result were flagged with a "B" data qualifier, signifying that these compounds were also detected in an associated laboratory or field blank. Sample location FTA-159-DEP01 contained six of the seven detected VOCs.

VOC concentrations in surface and depositional soils were below SSSLs.

Acetone (FTA-159-GP01 and FTA-159-GP04) and trichloroethene (FTA-159-DEP01) concentrations exceeded ESVs.

**Semivolatile Organic Compounds.** One SVOC (bis[2-ethylhexyl]phthalate) was detected in four of the five surface and depositional soil samples collected at the Former Smoke Area, South Slope of Morgan Mountain, Parcel 159(7). The bis(2-ethylhexyl)phthalate concentrations were below the SSSL and ESV.

## **5.2 Subsurface Soil Analytical Results**

Four subsurface soil samples were collected for chemical analyses at the Former Smoke Area, South Slope of Morgan Mountain, Parcel 159(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 concentrations, as presented in Table 5-2.

**Metals.** Fifteen metals were detected in subsurface soil samples collected at the Former Smoke Area, South Slope of Morgan Mountain, Parcel 159(7). Sample locations FTA-159-GP02, FTA-159-GP03, and FTA-159-GP04 each contained fourteen of the fifteen detected metals. Three of the zinc results were flagged with a "B" data qualifier, signifying that this metal was also detected in an associated laboratory or field blank.

The concentrations of aluminum (four locations), arsenic (four locations), chromium (four locations), iron (four locations), and vanadium (two locations) exceeded SSSLs. With the exception of chromium (two locations) and iron (three locations), these metals concentrations were below the respective background concentration or within the range of background values determined by SAIC (1998) (Appendix G). As discussed in Section 5.1, the elevated chromium and iron concentrations in subsurface soils are believed to be related to the site-specific geology.

**Volatile Organic Compounds.** Three VOCs (acetone, bromomethane, and methylene chloride) were detected in subsurface soil samples collected at the Former Smoke Area, South Slope of Morgan Mountain, Parcel 159(7). The methylene chloride and bromomethane results were flagged with a "B" data qualifier, signifying that these compounds were also detected in an associated laboratory or field blank.

The VOC concentrations in subsurface soils were below SSSLs.

**Semivolatile Organic Compounds.** One SVOC (bis[2-ethylhexyl]phthalate) was detected in each of the subsurface soil samples collected at the Former Smoke Area, South Slope of Morgan Mountain, Parcel 159(7). The bis(2-ethylhexyl)phthalate concentrations were below the SSSL.

## **6.0 Summary and Conclusions and Recommendations**

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IT, under contract with USACE, completed an SI at the Former Smoke Area, South Slope of Morgan Mountain, Parcel 159(7), at FTMC in Calhoun County, Alabama. The SI was conducted to determine whether chemical constituents are present at the site at concentrations that would present an unacceptable risk to human health or the environment. The SI at the Former Smoke Area, South Slope of Morgan Mountain, Parcel 159(7) consisted of the sampling and analyses of four surface soil samples, one depositional soil sample, and four subsurface soil samples.

Chemical analyses of samples collected at the Former Smoke Area, South Slope of Morgan Mountain, Parcel 159(7), indicate that metals, VOCs, and SVOCs were detected in the various site media. 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).

The potential impact to human receptors is expected to be minimal. Although the site is located within an undeveloped area of the Choccolocco Corridor owned by the State of Alabama, analytical data were screened against residential human health SSSLs to evaluate the site for possible unrestricted future use. The metals that exceeded residential human health SSSLs, with a few limited exceptions related to site-specific geological conditions, were below the respective background concentrations or within the range of background values, and thus, do not pose an unacceptable risk to future human receptors. VOC and SVOC concentrations in site media were below SSSLs.

In surface and depositional soils, the concentrations of iron (one location), copper (one location), and selenium (three locations) exceeded ESVs and the range of background values. In addition, the concentrations of the VOCs acetone (two surface soil samples) and trichloroethene (one depositional soil sample) exceeded ESVs. Acetone is a common laboratory contaminant and the trichloroethene result was flagged with a "B" data qualifier, signifying that it is probably a laboratory artifact as well. The parcel is located in a wooded area in the Choccolocco Corridor and is expected to support viable ecological habitat. However, the low levels of the metals and VOCs detected are not expected to pose a substantial threat to ecological receptors.

Based on the results of the SI, past operations at the Former Smoke Area, South Slope of Morgan Mountain, Parcel 159(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 Former Smoke Area, South Slope of Morgan Mountain, Parcel 159(7).

## 7.0 References

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- Cloud, P. E., Jr., 1966, *Bauxite Deposits of the Anniston, Fort Payne, and Ashville Areas, Northeast Alabama*, U. S. Geological Survey Bulletin 1199-O, 35p.
- Environmental Science and Engineering, Inc. (ESE), 1998, *Final Environmental Baseline Survey, Fort McClellan, Alabama*, prepared for U.S. Army Environmental Center, Aberdeen Proving Ground, Maryland, January.
- IT Corporation (IT), 2000a, *Final Installation-Wide Sampling and Analysis Plan, Fort McClellan, Calhoun County, Alabama*, March.
- IT Corporation (IT), 2000b, *Final Human Health and Ecological Screening Values and PAH Background Summary Report, Fort McClellan, Calhoun County, Alabama*, July.
- IT Corporation (IT), 1998a, *Final Site-Specific Field Sampling Plan Attachment for Former Smoke Area South Slope of Morgan Mountain, Parcel 159(7), Fort McClellan, Calhoun County, Alabama*, October.
- IT Corporation (IT), 1998b, *Final Installation-Wide Work Plan, Fort McClellan, Calhoun County, Alabama*, October.
- Moser, P. H., and DeJarnette, S. S., 1992, *Ground-water Availability in Calhoun County, Alabama*, Geological Survey of Alabama Special Map 228.
- Osborne, W. E., 1999, Personal Communication with John Hofer, IT Corporation..
- Osborne, W. E., and Szabo, M. W., 1984, *Stratigraphy and Structure of the Jacksonville Fault, Calhoun County, Alabama*, Alabama Geological Survey Circular 117.
- Osborne, W. E., Irving, G. D., and Ward, W. E., 1997, *Geologic Map of the Anniston 7.5' Quadrangle, Calhoun County, Alabama*, Alabama Geologic Survey Preliminary Map, 1 sheet.
- Osborne, W. E., Szabo, M. W., Copeland, C. W. Jr., and Neathery, T. L., 1989, *Geologic Map of Alabama*, Alabama Geologic Survey Special Map 221, scale 1:500,000, 1 sheet.
- Science Applications International Corporation (SAIC), 1998, *Final Background Metals Survey Report, Fort McClellan, Alabama*, July.
- Szabo, M. W., Osborne, W. E., Copeland, C. W., Jr., and Neathery, T. L., compilers, 1988, *Geologic Map of Alabama*, Alabama Geological Survey Special Map 220, scale 1:250,000, 5 sheets.
- U.S. Army Corps of Engineers (USACE), 1994, *Requirements for the Preparation of Sampling*

*and Analysis Plans*, Engineer Manual EM 200-1-3, September 1.

U.S. Department of Agriculture, 1961, *Soil Survey, Calhoun County, Alabama*, Soil Conservation Service, Series 1958, No. 9, September.

U.S. Department of Commerce, National Oceanic and Atmospheric Administration, 1998, Unedited Local Climatological Data, Anniston, Alabama, January 1998 - December 1998.

Warman, J. C, and Causey, L. V., 1962, *Geology and Ground-water Resources of Calhoun County, Alabama*, Alabama Geological Survey County Report 7, 77 p.

**ATTACHMENT 1**

**LIST OF ABBREVIATIONS AND ACRONYMS**

## **APPENDIX A**

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

## **SAMPLE COLLECTION LOGS**

## **ANALYSIS REQUEST/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 G**

### **SUMMARY STATISTICS FOR BACKGROUND MEDIA, FORT McCLELLAN, ALABAMA**

**APPENDIX F**

**VARIANCES/NONCONFORMANCES**