

Final

**Site Investigation Report
Former Gas Mask Test Chambers,
Parcels 195(7), 196(7), and 198(7)**

**Fort McClellan
Calhoun County, Alabama**

Prepared for:

**U.S. Army Corps of Engineers, Mobile District
109 St. Joseph Street
Mobile, Alabama 36602**

Prepared by:

**IT Corporation
312 Directors Drive
Knoxville, Tennessee 37923**

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See Attachment 1 - List of Abbreviations and Acronyms.

Executive Summary

In accordance with Contract Number DACA21-96-D-0018, Task Order CK05, IT Corporation completed a site investigation (SI) at the Former Gas Mask Test Chambers, Parcels 195(7), 196(7), and 198(7), at Fort McClellan in Calhoun County, Alabama. The SI was conducted to determine whether chemical constituents are present at the Former Gas Mask Test Chambers, Parcels 195(7), 196(7), and 198(7) and, if present, whether the concentrations would present an unacceptable risk to human health or the environment. The SI at the Former Gas Mask Test Chambers, Parcels 195(7), 196(7), and 198(7), consisted of the sampling and analyses of four surface soil samples and four subsurface soil samples.

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.

The potential impact to human receptors is expected to be minimal. The metals that exceeded residential human health SSSLs were within background concentrations or the range of background values, and thus, do not pose an unacceptable risk to future human receptors. VOC and SVOC concentrations were below residential human health SSSLs. However, based on the physical reactions of the field personnel during sampling activities at Parcel 195(7), apparent tear gas compounds are present possibly in soils or building walls at the site. Because of the problems encountered by field personnel, a tentatively identified compound library search for chloroacetophenone/chloroacetophenone, chloropicrin, and chloroform compounds was performed on the soil samples. Chloroacetophenone/chloroacetophenone, chloropicrin, and chloroform compounds were not identified in the tentatively identified compound search.

The potential impact to ecological receptors is expected to be minimal. The metals that exceeded ESVs were within background concentrations or the range of background values. VOC and SVOC concentrations in surface soils were below ESVs. Consequently, the threat to potential ecological receptors is expected to be minimal.

The Former Gas Mask Test Chambers, Parcel 195(7) and a small segment of Parcel 198(7), are scheduled to be transferred to the Alabama National Guard for continued use as a gas mask training area. The Former Gas Mask Test Chambers, Parcel 196(7) and the remainder of Parcel 198(7), are scheduled to be transferred to the Joint Powers Authority. Provided that Parcel 195(7) and the small segment of Parcel 198(7) remain under the control of the Alabama National Guard, and are used in the manner historically used, IT Corporation recommends no further action at the Former Gas Mask Test Chambers, Parcels 195(7), 196(7), and 198(7). If the land-use scenario changes, the no further action recommendation at the Former Gas Mask Test Chambers, Parcels 195(7), 196(7), and 198(7), will need to be reevaluated.

1.0 Introduction

The U.S. Army has selected Fort McClellan (FTMC), located in Calhoun County, Alabama, for closure by the Base Realignment and Closure (BRAC) Commission under Public Laws 100-526 and 101-510. The 1990 Base Closure Act, Public Law 101-510, established the process by which U.S. Department of Defense (DOD) installations would be closed or realigned. The BRAC Environmental Restoration Program requires investigation and cleanup of federal properties prior to transfer to the public domain. The U.S. Army is conducting environmental studies of the impact of suspected contaminants at parcels at FTMC under the management of the U.S. Army Corps of Engineers (USACE)-Mobile District. The USACE contracted IT Corporation (IT) to provide environmental services for the site investigation (SI) of the Former Gas Mask Test Chambers, Parcels 195(7), 196(7), and 198(7), under Prime 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 activities, conducted at the Former Gas Mask Test Chambers, Parcels 195(7), 196(7), and 198(7).

1.1 Project Description

The Former Gas Mask Test Chambers site, Parcels 195(7), 196(7), and 198(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 further evaluation.

A site-specific field sampling plan (SFSP) attachment and a site-specific safety and health plan (SSHP) attachment were finalized in October 1998 (IT, 1998a). The SFSP and SSHP were prepared to provide technical guidance for sample collection and analysis at the Former Gas Mask Test Chambers, Parcels 195(7), 196(7), and 198(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 field work to collect four surface soil samples and four subsurface soil samples. Data from the field investigation were used to determine whether potential site-specific

chemicals are present at the Former Gas Mask Test Chambers, Parcels 195(7), 196(7), and 198(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 Former Gas Mask Test Chambers, Parcels 195(7), 196(7), and 198(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, Fort McClellan, Alabama* (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 this site or to conduct additional work at the site.

1.3 Site Description and History

The Former Gas Mask Test Chambers, Parcels 195(7), 196(7), and 198(7), are located in the northern section of the Main Post, south of Reilly Airfield, near 10th Street (Figure 1-1). This site is made up of three parcels: Parcel 195(7), which is northernmost; Parcel 198(7); and farther to the south-southwest, Parcel 196(7) (Figure 1-2). These parcels lie in a wooded area between Trench Hill on the west and Cemetery Hill on the east. A series of small drainage pathways enter the site from the east (near 10th Street), from the south, and from the southwest cutting across Parcel 198(7). These drainage ways converge into one drainage way, which flows northwest across the upper end of the site between Parcels 195(7) and 198(7). The site ranges in elevation from approximately 760 feet to about 810 feet above mean sea level and slopes mainly to the northwest. The building on Parcel 198(7) has been demolished. Building rubble was visible at the site during the April 21, 1998 walkover, but was not apparent during a June 2000 site visit.

Gas mask test chambers have been used at FTMC since the 1950s to instill confidence in trainees

that gas masks perform as required and to confirm proper fit before beginning training elsewhere with live chemical warfare agents. The agents used at the Gas Mask Test Chambers included chloroacetophenone (CN) and o-chlorobenzylidenemalononitrile (CS). CN “tear gas,” CS “tear gas,” and nonpersistent chlorine gas were reportedly used in the past. Live chemical warfare agents were not used at this site. Breakdown products of CN and CS compounds are hydroxyacetophenone (CN), and acetophenone (CN), and malononitrile (CS).

Specific procedures for operating the gas mask test chamber were followed: a capsule containing tear agent (CS) would be burned by an instructor in one chamber, and trainees would be required to don masks, check for proper fit, enter the chamber, remove masks, and exit upon signal. CN and chlorine gas would have been used in a similar manner. Small amounts of these irritating agents were used in these gas mask confidence training exercises. Releases have not been reported at any of these current or historical sites. Currently, Parcel 198(7) has unrestricted access. It is unknown what training occurred there. Chemicals used include CS. One active FTMC employee reported that powdered CS was spread on the ground at this location during training exercises; therefore, it is possible that soil contamination is present. No other information is available (ESE, 1998).

2.0 Previous Investigations

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

1. Areas where no storage, release, or disposal of hazardous substances or petroleum products has occurred (including no migration of these substances from adjacent areas)
2. Areas where only release or disposal of petroleum products has occurred
3. Areas where release, disposal, and/or migration of hazardous substances has occurred, but at concentrations that do not require a removal or remedial response
4. Areas where release, disposal, and/or migration of hazardous substances has occurred, and all removal or remedial actions to protect human health and the environment have been taken
5. Areas where release, disposal, and/or migration of hazardous substances has occurred, and removal or remedial actions are underway, but all required remedial actions have not yet been taken
6. Areas where release, disposal, and/or migration of hazardous substances has occurred, but required actions have not yet been implemented
7. Areas that are not evaluated or require additional evaluation.

The EBS was conducted in accordance with the Community Environmental Response Facilitation Act (CERFA) (CERFA-Public Law 102-426) protocols and DOD policy regarding contamination assessment. Records searches and reviews were performed on all reasonably available documents from FTMC, the Alabama Department of Environmental Management (ADEM), the U.S. Environmental Protection Agency (EPA) Region IV, and Calhoun County, as well as a database search of Comprehensive Environmental Response, Compensation, and Liability Act-regulated substances, petroleum products, and Resource Conservation and Recovery Act-regulated facilities. Available historic maps and aerial photographs were reviewed to document historic land uses. Personal and telephone interviews of past and present FTMC

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

The Former Gas Mask Test Chambers, Parcels 195(7), 196(7) and 198(7), were classified as Category 7 CERFA sites: areas that are not evaluated or that require further evaluation. Previous studies to document site environmental conditions have not been conducted at Parcels 195(7), 196(7), and 198(7).

3.0 Current Site Investigation Activities

This chapter summarizes SI activities conducted by IT at the Former Gas Mask Test Chambers, Parcels 195(7), 196(7), and 198(7), including environmental sampling and analysis.

3.1 Environmental Sampling

The environmental sampling performed during the SI at the Former Gas Mask Test Chambers, Parcels 195(7), 196(7), and 198(7), included the collection of surface soil and subsurface soil samples for chemical analysis. 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 the site-related parameters listed in Section 3.3.

3.1.1 Surface Soil Sampling

Surface soil samples were collected from four locations at the Former Gas Mask Test Chambers: Parcel 195(7) (two samples), Parcel 196(7) (one sample), and Parcel 198(7) (one sample). Soil sampling locations and rationale are presented in Table 3-1. Sampling locations are shown on Figure 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 the sampling rationale, presence of surface structures, site topography, and buried utilities.

Sample Collection. Soil samples were collected from the upper 1 foot of soil by either direct-push technology or with a 3-inch diameter stainless-steel hand auger using the methodology specified in Section 4.9 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 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 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.

Table 3-1

**Sampling Locations and Rationale
Former Gas Mask Test Chambers
Parcels 195(7), 196(7), and 198(7)
Fort McClellan, Calhoun County, Alabama**

Sample Location	Sample Media	Sample Location Rationale
FTA-195-GP01	Surface Soil Subsurface Soil	Soil samples were collected near the door of Building T-401.
FTA-195-GP02	Surface Soil Subsurface Soil	Soil samples were collected near the eastern boundary of Parcel 195(7).
FTA-195-GP03	Surface Soil Subsurface Soil	Soil samples were collected near the eastern boundary of Parcel 198(7).
FTA-195-GP04	Surface Soil Subsurface Soil	Soil samples were collected near the door of Building 439.

Table 3-2

**Surface and Subsurface Soil Sample Designations and QA/QC Samples
Former Gas Mask Test Chambers
Parcels 195(7), 196(7), and 198(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-195-GP01	FTA-195-GP01-SS-DT0001-REG	0-1.0	FTA-195-GP01-SS-DT0003-FD	FTA-195-GP01-SS-DT0004-FS	FTA-195-GP01-SS-DT0001-MS	TCL VOCs, TCL SVOCS, TAL Metals
	FTA-195-GP01-DS-DT0002-REG	4.0-8.0			FTA-195-GP01-SS-DT0001-MSD	
FTA-195-GP02	FTA-195-GP02-SS-DT0005-REG	0-1.0				TCL VOCs, TCL SVOCS, TAL Metals
	FTA-195-GP02-DS-DT0006-REG	2.0-4.0				
FTA-195-GP03	FTA-195-GP03-SS-DT0007-REG	0-1.0				TCL VOCs, TCL SVOCS, TAL Metals
	FTA-195-GP03-DS-DT0008-REG	2.0-3.0				
FTA-195-GP04	FTA-195-GP04-SS-DT0009-REG	0-1.0				TCL VOCs, TCL SVOCS, TAL Metals
	FTA-195-GP04-DS-DT0010-REG	3.0-5.0				

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.

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 Gas Mask Test Chambers, Parcels 195(7), 196(7), and 198(7). Subsurface soil sampling locations and rationale are presented in Table 3-1. Subsurface soil sample designations, depths, and quality assurance/quality control samples are listed in Table 3-2. Soil boring sampling locations were determined in the field by the on-site geologist based on the sampling rationale, presence of surface structures, site topography, and buried and overhead utilities. IT contracted TEG, Inc., a direct-push technology subcontractor, to assist in subsurface soil sample collection.

Sample Collection. Subsurface soil samples were collected from soil borings at depths of 2 to 8 feet below the 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.

Soil samples were collected continuously until direct-push sampler refusal was encountered. Subsurface soil samples were field screened using a PID in accordance with Section 4.7.1.1 of the SAP (IT, 2000a) to measure samples 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 analyses. Samples to be analyzed for VOCs were collected directly from the sampler with three EnCore[®] samplers. The remaining portion of the sample was transferred to a clean stainless-steel bowl, homogenized, and placed in the appropriate sample containers. Samples submitted for laboratory analyses are summarized in Table 3-2. The on-site geologist constructed a detailed lithological log 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 bentonite chips 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. 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 Former Gas Mask Test Chambers, Parcels 195(7), 196(7), and 198(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. Sample documentation and chain-of-custody forms were recorded as specified in Section 4.13 of the SAP.

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

3.5 Investigation-Derived Waste Management and Disposal

Investigation-derived waste (IDW) was managed and disposed as outlined in Appendix D of the SAP (IT, 2000a). The IDW generated from the field sampling at the Former Gas Mask Test Chambers, Parcels 195(7), 196(7), and 198(7), was segregated as follows:

- Drill 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 analyses. Based on the results, soil boring cuttings and personal protective equipment generated during the SI at the Former Gas Mask Test Chambers, Parcels 195(7), 196(7), and 198(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 Former Gas Mask Test Chambers, Parcels 195(7), 196(7), and 198(7).

3.7 Data Quality

The field sample results 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 procedures. Sample collection logs pertaining to the collection of these samples were reviewed and organized for this report, and are included in Appendix A. As discussed in Section 3.6, there

were not any variances or nonconformances identified either in the field or during the review of sample collection logs that may have impacted the usability of the data.

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 validation results. 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 the comparison to the SSSLs and ESVs. Rejected data (assigned an 'R' qualifier) were not used in the comparison to 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 Former Gas Mask Test Chambers, Parcels 195(7), 196(7), and 198(7), provided soil and geological data to characterize the site. There were not any wells installed at the parcel and a hydrogeological characterization of the Former Gas Mask Test Chambers 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 consists of sandy and micaceous shale and silty, micaceous mudstone, which are locally interbedded with the coarse clastic rocks. The abundance of orthoquartzitic sandstone and quartzite suggests that most of the Chilhowee Group bedrock in the vicinity of FTMC belongs to the Weisner Formation (Osborne and Szabo, 1984).

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

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

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

Two soil series are present at the Former Gas Mask Test Chambers, Parcels 195(7), 196(7), and 198(7). The northernmost portion of the site has the Philo Series. The southern portion of the site has Anniston Series soils.

The specific soil type of Philo Series soil at this site is Philo and Stendal soils, local alluvium, and 0 to 2 percent slopes (PkA). This mapping unit is on foot slopes, along and at the head of small drainageways or draws. It occurs in areas that are 1 to 10 acres in size. The soils are variable in color, texture, and consistency. Drainage ranges from poor to moderately good. Water stands on the surface for short periods, and there are a few seepage areas. Impaired drainage is the main hazard, and these areas are frequently flooded. Depth to top of bedrock is generally greater than 6 feet bgs.

The specific type of Anniston Series soil at this site is Anniston gravelly clay loam, 6 to 10 percent slopes, severely eroded (AbC3). These soils consist of areas that have lost nearly all of their original surface soil through erosion. The upper layer is now a reddish-brown, gravelly clay loam, 4 to 6 inches thick. It is underlain, in most places, by red or dark reddish-brown gravelly clay loam. It has many small, shallow gullies and a few deep ones. Infiltration is moderately

slow, and the capacity for available moisture is low. Depth to bedrock is generally between 2 and 10 feet (U.S. Department of Agriculture, 1961).

The Former Gas Mask Test Chambers site is situated on the northern portion of the Ordovician window in the uppermost thrust sheet. Bedrock beneath the site is mapped as Floyd Shale of Mississippian age (Warman and Causey, 1962). Osborne and Szabo (1983, 1984) later reassigned this unit to the Ordovician age Athens Shale.

Based on direct-push soil boring data collected during the SI, residuum beneath the Former Gas Mask Test Chambers, Parcels 195(7), 196(7), and 198(7) consists of predominantly sandy clay and silt with chert and rock fragments. Direct-push refusal was encountered at depths ranging from 3 to 8 feet bgs. Bedrock was not encountered in any of the borings installed.

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. The major surface water features at the Main Post of FTMC include Remount Creek, Cane Creek, and Cave Creek. These waterways flow in a general northwest to westerly direction towards the Coosa River on the western boundary of Calhoun County.

Surface runoff at the Former Gas Mask Test Chambers site flows into a series of small drainage pathways that enter the site from the east (near 10th Street), from the south, and from the southwest cutting across Parcel 198(7). These drainage ways converge into one drainage way that flows northwest across the upper end of the site between Parcels 195(7) and 198(7).

5.0 Summary of Analytical Results

The results of the chemical analyses of samples collected at the Former Gas Mask Test Chambers, Parcels 195(7), 196(7), and 198(7), indicate that metals, VOCs, and SVOCs have been detected in surface and subsurface soils. 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 background metals screening values (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 F.

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.

Table 5-1

**Surface Soil Analytical Results
Former Gas Mask Test Chambers, Parcels 195(7), 196(7), and 198(7)
Fort McClellan, Calhoun County, Alabama**

Parcel Sample Location Sample Number Sample Date Sample Depth (Feet)			FTA-195 FTA-195-GP01 DT0001 4-Nov-98 0- 1					FTA-195 FTA-195-GP02 DT0005 29-Oct-98 0- 1					FTA-195 FTA-195-GP03 DT0007 29-Oct-98 0- 1					FTA-195 FTA-195-GP04 DT0009 29-Oct-98 0- 1								
Parameter	Units	BKG ^a	SSSL ^b	ESV ^b	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV		
METALS																										
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	6.20E+03				YES	8.38E+03				YES	YES	1.39E+04			YES	YES	4.90E+03					YES
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	4.70E+00	J		YES		4.40E+00	J			YES		6.30E+00	J		YES		3.70E+00	J		YES		
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	3.77E+01					6.01E+01						8.50E+01					2.84E+01					
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	ND					ND						6.80E-01					ND					
Calcium	mg/kg	1.72E+03	NA	NA	7.18E+03	J	YES			1.78E+04	J	YES				ND					ND					
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	1.19E+01	J			YES	1.83E+01	J			YES		3.83E+01	J	YES	YES	YES	4.96E+01	J	YES	YES	YES	YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	ND					7.20E+00						9.90E+00	J				ND					
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	6.80E+00					6.60E+00						6.80E+00					5.80E+00					
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	9.48E+03				YES	YES	1.56E+04			YES	YES	2.41E+04			YES	YES	1.66E+04			YES	YES	
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	1.45E+01					2.92E+01						2.19E+01					9.20E+00					
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	3.91E+03	J	YES			8.82E+03	J	YES				ND					ND					
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	6.62E+02				YES	YES	6.21E+02			YES	YES	5.61E+02			YES	YES	1.17E+02					YES
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	ND					6.10E-02						7.80E-02					3.60E-02					
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	ND					4.90E+00						8.10E+00					ND					
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	ND					ND						ND					7.40E-01		YES			
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	1.20E+01				YES	2.01E+01				YES		2.74E+01				YES	1.65E+01					YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	4.14E+01		YES			4.14E+01		YES				1.92E+01	B				2.42E+01	B				
VOLATILE ORGANIC COMPOUNDS																										
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	8.00E-03	B				5.00E-03	J					5.70E-03	J				2.80E-03	J				
Acetone	mg/kg	NA	7.76E+02	2.50E+00	2.60E-01	J				9.20E-02	J					1.60E+00	J				1.60E-01	J				
Bromomethane	mg/kg	NA	1.09E+01	NA	4.60E-03	B				ND						2.30E-03	J				ND					
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00	4.50E-03	B				3.30E-03	B					3.80E-03	B				3.60E-03	B				
Toluene	mg/kg	NA	1.55E+03	5.00E-02	1.20E-02	J				3.70E-03	J					3.60E-02					ND					
m,p-Xylenes	mg/kg	NA	1.55E+04	5.00E-02	ND					ND						5.70E-03					ND					
p-Cymene	mg/kg	NA	1.55E+03	NA	1.10E-02	J				6.40E-03	J					5.80E-02					ND					
SEMIVOLATILE ORGANIC COMPOUNDS																										
bis(2-Chloroethyl)ether	mg/kg	NA	5.73E-01	2.37E+01	1.00E-01	J				ND						ND					ND					
bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	9.30E-01	7.30E-02	J				8.30E-02	J					ND					ND					

Analyses performed by Quanterra Environmental Services using U.S. Environmental Protection Agency (EPA) SW-846 analytical methods, including Update III methods where applicable.

^a 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*.

^b Residential human health site-specific screening level (SSSL) and ecological screening value (ESV) as given in IT Corporation (2000b), *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 stated method detection limit but less than or equal to specified 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 Gas Mask Test Chambers, Parcels 195(7), 196(7), and 198(7)
Fort McClellan, Calhoun County, Alabama**

Parcel Sample Location Sample Number Sample Date Sample Depth (Feet)		FTA-195 FTA-195-GP01 DT0002 4-Nov-98 4-8				FTA-195 FTA-195-GP02 DT0006 29-Oct-98 2-4				FTA-195 FTA-195-GP03 DT0008 29-Oct-98 2-3				FTA-195 FTA-195-GP04 DT0010 29-Oct-98 3-5					
Parameter	Units	BKG ^a	SSSL ^b	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL
METALS																			
Aluminum	mg/kg	1.36E+04	7.80E+03	1.26E+04			YES	7.10E+03				1.33E+04			YES	1.07E+04			YES
Arsenic	mg/kg	1.83E+01	4.26E-01	7.90E+00	J		YES	6.00E+00	J		YES	8.10E+00	J		YES	5.40E+00	J		YES
Barium	mg/kg	2.34E+02	5.47E+02	3.08E+01				ND				4.30E+01				ND			
Calcium	mg/kg	6.37E+02	NA	ND				1.40E+03	J	YES		ND				ND			
Chromium	mg/kg	3.83E+01	2.32E+01	5.19E+01	J	YES	YES	3.05E+01	J		YES	4.83E+01	J	YES	YES	2.32E+01	J		YES
Cobalt	mg/kg	1.75E+01	4.68E+02	7.50E+00	J			ND				6.00E+00	J			ND			
Copper	mg/kg	1.94E+01	3.13E+02	7.80E+00				7.30E+00				1.16E+01				9.10E+00			
Iron	mg/kg	4.48E+04	2.34E+03	3.11E+04			YES	2.72E+04			YES	3.57E+04			YES	2.85E+04			YES
Lead	mg/kg	3.85E+01	4.00E+02	1.48E+01				9.50E+00				1.23E+01				7.30E+00			
Magnesium	mg/kg	7.66E+02	NA	ND				8.23E+02	J	YES		ND				ND			
Manganese	mg/kg	1.36E+03	3.63E+02	5.37E+02			YES	1.04E+02				1.39E+02				2.30E+01			
Mercury	mg/kg	7.00E-02	2.33E+00	5.80E-02				6.30E-02				1.50E-01		YES		4.10E-02			
Nickel	mg/kg	1.29E+01	1.54E+02	7.00E+00				ND				6.40E+00				ND			
Selenium	mg/kg	4.70E-01	3.91E+01	ND				ND				ND				6.60E-01		YES	
Vanadium	mg/kg	6.49E+01	5.31E+01	3.49E+01				2.47E+01				3.82E+01				1.89E+01			
Zinc	mg/kg	3.49E+01	2.34E+03	1.73E+01				1.24E+01	B			1.84E+01	B			1.10E+01	B		
VOLATILE ORGANIC COMPOUNDS																			
Acetone	mg/kg	NA	7.76E+02	2.40E-02	B			1.10E-01	J			2.60E-01	J			1.10E-01	J		
Methylene chloride	mg/kg	NA	8.41E+01	5.40E-03	B			4.30E-03	B			9.40E-03	B			3.20E-03	B		
Trichlorofluoromethane	mg/kg	NA	2.33E+03	ND				ND				4.70E-03	J			ND			
p-Cymene	mg/kg	NA	1553.41	ND				ND				0.47	J			ND			
SEMIVOLATILE ORGANIC COMPOUNDS																			
bis(2-Chloroethyl)ether	mg/kg	NA	5.73E-01	1.10E-01	J			ND				ND				ND			
bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	7.70E-02	J			ND				ND				ND			

Analyses performed by Quanterra Environmental Services using U.S. Environmental Protection Agency (EPA) SW-846 analytical methods, including Update III methods where applicable.

^a 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.

^b Residential human health site-specific screening level (SSSL) as given in IT Corporation (2000b), *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 stated method detection limit but less than or equal to specified reporting limit.

mg/kg - Milligrams per kilogram

NA - Not available

ND - Not detected

Qual - Data validation qualifier

5.1 Surface Soil Analytical Results

Four surface soil samples were collected for chemical analyses at the Former Gas Mask Test Chambers, Parcels 195(7), 196(7), and 198(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 background screening values, as presented in Table 5-1.

Metals. Seventeen metals were detected in surface soil samples collected at the Former Gas Mask Test Chambers, Parcels 195(7), 196(7), and 198(7). Aluminum, arsenic, barium, chromium, copper, iron, lead, manganese, vanadium, and zinc were present in each of the samples.

The concentrations of aluminum (FTA-195-GP02 and FTA-195-GP03), arsenic (four locations), chromium (FTA-195-GP03 and FTA-195-GP04), iron (four locations), and manganese (FTA-195-GP01, FTA-195-GP02, and FTA-195-GP03) exceeded residential human health SSSLs. With the exception of chromium (two locations), these metals concentrations were within background concentrations. The chromium results were within the range of background values (Appendix F).

The concentrations of five metals (aluminum, chromium, iron, manganese, and vanadium) exceeded ESVs but were within background concentrations or the range of background values.

Volatile Organic Compounds. Seven VOCs, including 2-butanone, acetone, bromomethane, methylene chloride, toluene, m,p-xylenes, and p-cymene were detected in surface soil samples collected at the Former Gas Mask Test Chambers, Parcels 195(7), 196(7), and 198(7). The methylene chloride results, one of the 2-butanone results, and one of the bromomethane results were flagged with a 'B' data qualifier, signifying that these compounds were also detected in an associated laboratory or field blank sample. Sample location FTA-195-GP03 contained each of the detected VOCs, and sample location FTA-195-GP01 contained six of the seven detected VOCs. However, none of the detected VOCs were present at a concentration exceeding residential human health SSSLs or ESVs.

Semivolatile Organic Compounds. The SVOCs bis(2-chloroethyl)ether and bis(2-ethylhexyl)phthalate were detected in surface soil samples collected at the Former Gas Mask Test Chambers, Parcels 195(7), 196(7), and 198(7). SVOCs were not detected in the surface soils collected from sample locations FTA-195-GP03 and FTA-195-GP04. Sample location FTA-195-GP01 contained both of the detected SVOCs, and sample location FTA-195-GP02 contained one of the detected SVOCs. The SVOC analytical results were flagged with a 'J' data qualifier, signifying that the results were greater than the method detection limit but less than the specified RL. However, none of the detected SVOCs was present at a concentration exceeding SSSLs or ESVs.

5.2 Subsurface Soil Analytical Results

Four subsurface soil samples were collected for chemical analyses at the Former Gas Mask Test Chambers, Parcels 195(7), 196(7), and 198(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 background screening values, as presented in Table 5-2.

Metals. Sixteen metals were detected in subsurface soil samples collected at the Former Gas Mask Test Chambers, Parcels 195(7), 196(7), and 198(7). The concentrations of five metals (aluminum, arsenic, chromium, iron, and manganese) exceeded residential human health SSSLs. However, with the exception of chromium at two locations (FTA-195-GP01 and FTA-195-GP03) the concentrations of these metals were within background concentrations. The chromium results were within the range of background values determined by SAIC (1998) (Appendix F).

Volatile Organic Compounds. Acetone, methylene chloride, trichlorofluoromethane, and p-cymene were detected in subsurface soil samples collected at the Former Gas Mask Test Chambers, Parcels 195(7), 196(7), and 198(7). The methylene chloride results and one of the acetone results were flagged with a 'B' data qualifier, signifying this compound was also detected in an associated laboratory or field blank sample. None of the detected VOCs were present at a concentration exceeding residential human health SSSLs.

Semivolatile Organic Compounds. Bis(2-chloroethyl)ether and bis(2-ethylhexyl)phthalate were detected in one of the subsurface soil samples collected at the Former Gas Mask Test Chambers, Parcels 195(7), 196(7), and 198(7). Sample location FTA-195-GP01 contained both of the detected SVOCs. SVOCs were not detected in the other three samples. The bis(2-

chloroethyl)ether and bis(2-ethylhexyl)phthalate concentrations were below residential human health SSSLs.

During direct-push subsurface soil sample collection activities at Building T-401 (Parcel 195[7]), IT personnel experienced irritation of the eyes and upper respiratory tract, consistent with symptoms of exposure to tear gas agents. The field crew evacuated the area, but returned a few days later in Level “C” PPE (including full-face respirator) to complete subsurface soil sample collection. Because of the apparent CN/CS compounds encountered during field activities, IT requested that the analytical laboratory (Quanterra) perform a tentatively identified compound (TIC) library search on the soil samples previously submitted for analysis. Quanterra produced an analytical report for Lot Number H9K170163 that summarized the results of TIC library searches on each of the soil samples collected at the Former Gas Mask Test Chambers site. The searches were performed to check for the presence of CN or CS and CS/CN breakdown products in samples originally analyzed for TCL SVOCs. The individual CN and CS compounds that were processed during the search included:

- Chloroacetophenone (CN)
- o-Chlorobenzylidenemelanonitrile (CS)
- Malonitrile (CS)
- Hydroxyacetophenone (CN)
- Acetophenone (CN).

However, none of these compounds were identified during the TIC searches performed on the samples.

6.0 Summary and Conclusions and Recommendations

IT, under contract with USACE, completed an SI at the Former Gas Mask Test Chambers, Parcels 195(7), 196(7), and 198(7), at FTMC in Calhoun County, Alabama. The SI was conducted to determine whether chemical constituents are present at the Former Gas Mask Test Chambers, Parcels 195(7), 196(7), and 198(7) and, if present, whether the concentrations would present an unacceptable risk to human health or the environment. The SI at the Former Gas Mask Test Chambers, Parcels 195(7), 196(7), and 198(7), consisted of the sampling and analyses of four surface soil samples and four subsurface soil samples.

The analytical results indicate that metals, VOCs, and SVOCs were detected in the environmental media sampled. Analytical results were compared to the residential human health SSSLs and ESVs. 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, metals results exceeding the SSSLs and ESVs were compared to media-specific background concentrations (SAIC, 1998).

The potential impact to human receptors is expected to be minimal. The metals that exceeded residential human health SSSLs were within background concentrations or the range of background values, and thus, do not pose an unacceptable risk to future human receptors. VOC and SVOC concentrations were below residential human health SSSLs. However, based on the physical reactions of the field personnel during sampling activities at Parcel 195(7), apparent tear gas compounds are present possibly in soils or building walls at the site. Because of the problems encountered by field personnel, a TIC library search for CS/CN compounds was performed on the soil samples. CS/CN compounds were not identified in the TIC search.

The potential impact to ecological receptors is expected to be minimal. The metals that exceeded ESVs were within background concentrations or the range of background values. VOC and SVOC concentrations in surface soils were below ESVs. Consequently, the threat to potential ecological receptors is expected to be minimal.

The Former Gas Mask Test Chambers, Parcel 195(7) and a small segment of Parcel 198(7), are scheduled to be transferred to the Alabama National Guard for continued use as a gas mask training area. The Former Gas Mask Test Chambers, Parcel 196(7) and the remainder of Parcel 198(7), are scheduled to be transferred to the Joint Powers Authority. Provided that Parcel

195(7) and the small segment of Parcel 198(7) remains under the control of the Alabama National Guard and is used in the manner historically used, IT recommends no further action at the Former Gas Mask Test Chambers, Parcels 195(7), 196(7), and 198(7). If the land-use scenario changes, the no further action recommendation at the Former Gas Mask Test Chambers, Parcels 195(7), 196(7), and 198(7), will need to be reevaluated.

7.0 References

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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
SUMMARY STATISTICS FOR BACKGROUND MEDIA
FORT MCCLELLAN, ALABAMA

ATTACHMENT 1

LIST OF ABBREVIATIONS AND ACRONYMS