

**Final  
Site Investigation  
Site-Specific Field Sampling Plan,  
Site-Specific Safety and Health Plan,  
and Site-Specific Unexploded Ordnance Safety Plan  
Attachments for Chemical Warfare Material Site  
Training Area T-31, Parcels 184(7) and 185(7)**

**Fort McClellan  
Calhoun County, Alabama**

**Delivery Order CK10  
Contract No. DACA21-96-D-0018  
IT Project No. 796887**

**September 2000**

**Revision 1**

**Final  
Site Investigation  
Site-Specific Field Sampling Plan for  
Chemical Warfare Material Site  
Training Area T-31, Parcels 184(7) and 185(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**

**Delivery Order CK10  
Contract No. DACA21-96-D-0018  
IT Project No. 796887**

**September 2000**

**Revision 1**

# Table of Contents

---

	<b>Page</b>
List of Tables .....	iii
List of Figures .....	iv
List of Acronyms .....	v
Executive Summary .....	ES-1
1.0 Project Description.....	1-1
1.1 Introduction .....	1-1
1.2 Site Description .....	1-1
1.3 Scope of Work.....	1-3
2.0 Summary of Existing Environmental Studies .....	2-1
3.0 Site-Specific Data Quality Objectives .....	3-1
3.1 Overview .....	3-1
3.2 Data Users and Available Data.....	3-1
3.3 Conceptual Site Exposure Model.....	3-2
3.4 Decision-Making Process, Data Uses, and Needs.....	3-3
3.4.1 Risk Evaluation .....	3-3
3.4.2 Data Types and Quality .....	3-4
3.4.3 Precision, Accuracy, and Completeness.....	3-4
4.0 Field Activities .....	4-1
4.1 UXO and Chemical Warfare Agent Survey Requirements .....	4-1
4.1.1 Surface UXO Survey.....	4-1
4.1.2 Downhole UXO Survey .....	4-1
4.2 Utility Clearances .....	4-2
4.3 Environmental Sampling .....	4-2
4.3.1 Surface Soil Sampling .....	4-2
4.3.1.1 Sample Locations and Rationale .....	4-2
4.3.1.2 Sample Collection .....	4-2
4.3.2 Subsurface Soil Sampling .....	4-3
4.3.2.1 Sample Locations and Rationale .....	4-3
4.3.2.2 Sample Collection .....	4-3
4.3.3 Permanent Residuum Monitoring Wells .....	4-4

## **Table of Contents** (Continued)

---

	<b>Page</b>
4.3.4 Groundwater Sampling.....	4-4
4.3.4.1 Sample Locations and Rationale .....	4-5
4.3.4.2 Sample Collection .....	4-5
4.3.5 Surface Water Sampling.....	4-5
4.3.5.1 Sample Locations and Rationale .....	4-5
4.3.5.2 Sample Collection .....	4-5
4.3.6 Sediment Sampling.....	4-6
4.3.6.1 Sample Locations and Rationale .....	4-6
4.3.6.2 Sample Collection .....	4-6
4.4 Decontamination Requirements .....	4-6
4.5 Surveying of Sample Locations.....	4-6
4.6 Analytical Program.....	4-7
4.7 Sample Preservation, Packaging, and Shipping .....	4-8
4.8 Investigation-Derived Waste Management .....	4-8
4.9 Site-Specific Safety and Health.....	4-8
5.0 Project Schedule.....	5-1
6.0 References .....	6-1
Attachment 1 - List of Abbreviations and Acronyms	
Appendix A - MINICAMS Screening Procedure	

## **List of Tables**

---

<b>Number</b>	<b>Title</b>	<b>Follows Page</b>
2-1	USATEU Results for MINICAMS Screening, Training Area T-31, Parcel 184(7)	2-2
2-2	SI Soil Sample Results Summary, Training Area T-31, Parcel 184(7)	2-2
2-3	SI Surface Water Sample Results, Training Area T-31, Parcel 184(7)	2-2
2-4	SI Sediment Sample Results, Training Area T-31, Parcel 184(7)	2-2
3-1	Summary of Data Quality Objectives	3-1
4-1	Sampling Locations and Rationale	4-2
4-2	Surface Soil and Subsurface Soil Sample Designations and QA/QC Sample Quantities, Training Area T-31, Parcels 184(7) and 185(7)	4-2
4-3	Groundwater Sample Designations and QA/QC Sample Quantities, Training Area T-31, Parcels 184(7) and 185(7)	4-5
4-4	Surface Water and Sediment Sample Designations and QA/QC Sample Quantities, Training Area T-31, Parcels 184(7) and 185(7)	4-5
4-5	Analytical Samples	4-7

## **List of Figures**

---

<b>Number</b>	<b>Title</b>	<b>Follows Page</b>
1-1	Site Location Map, Training Area T-31, Parcels 184(7) and 185(7)	1-1
1-2	Site Map, Training Area T-31, Parcels 184(7) and 185(7)	1-1
2-1	SI Sample Locations, Training Area T-31, Parcel 185(7)	2-2
3-1	Human Health Conceptual Site Exposure Model	3-3
4-1	Proposed Sample Locations, Training Area T-31, Parcels 184(7) and 185(7)	4-2

## ***List of Acronyms***

---

See Attachment 1, List of Abbreviations and Acronyms.

## ***Executive Summary***

---

In accordance with Contract Number DACA21-96-D-0018, Delivery Order CK10, IT Corporation (IT) will conduct sampling and analysis activities at the Chemical Warfare Material (CWM) Site, Training Area T-31, Parcels 184(7) and 185(7) at Fort McClellan (FTMC), Calhoun County, Alabama to determine the presence or absence of potential site-specific chemicals at this site. The purpose of this site-specific field sampling plan (SFSP) is to provide technical guidance for sampling activities at Training Area T-31.

The Training Area T-31, Parcels 184(7) and 185(7) is located in the north-central area of the Main Post. Training Area T-31 is located north of the Fill Area North of the Ammunition Supply Point (ASP), Parcel 230(7), and occupies approximately 12 acres. The site is in a valley bordered by Cemetery Hill to the west. This training area partly overlaps with historic firing ranges for 37 millimeter, small arms and machine guns. The site was used from 1957 to 1969 as a Technical Escort Reaction Area and currently has unrestricted access.

Training of Technical Escort personnel was reportedly conducted here using sarin (GB) and distilled mustard (HD) in quantities of 20 to 40 milliliters. Also, storage of unspecified CWM may also have occurred. The decontaminants superhypochlorite bleach (STB) and decontamination solution No. 2 (DS2) may also have been used here. Based on observations of piles of white powder during a visit by U.S. Army Environmental Hygiene Agency in December 1973, it was surmised STB was used as a decontaminant for HD. When the chemical warfare training was deactivated in 1973, items used at the site were reportedly moved to Area T-38.

Two locations have been reported for Training Area T-31. Previous reports identify one area located at Parcel 184(7) and cite storage of CWM in Igloo 14 or in Igloo 13. The igloos are neither evident on the ground today, nor on aerial photos reviewed by the environmental baseline survey team. However, igloos are present at the ASP, located a short distance to the southeast. Long-time FTMC personnel report that CWM was stored in and dispensed from an igloo at the ASP, and from nearby Area T-38. Binary CWM components were stored in Building 4416 (also known as Igloo No.14, at the ASP).

Retired FTMC personnel also report conducting CWM exercises at a second site close to the previously reported location of Training Area T-31. This site is identified as Parcel 185(7). One report indicated that the training occurred in a previously unidentified area measuring approximately 70 feet by 72 feet, but was not confirmed. The EBS team believed that details of

the facility layout, location, and operations conducted at Training Area T-31 are in doubt and that activities associated with CWM training may have occurred at three areas. Two of the suspected areas are Parcels 184(7) and 185(7) at Training Area T-31 and the third is the ASP.

The site investigation (SI), conducted from 1991 through 1993 by Science Applications International Corporation, included a magnetometer survey over the site identified in historical records and site photography; however, no surface evidence of the former training area was visible. During the SI, the site was reported to be overgrown, but several pads and concrete structures were evident. The geophysical survey indicated metallic debris scattered within and beyond the site boundaries. This data suggests burial of some items at this location. The SI also included collection of soil, sediment, and surface water samples and field screening for CWM (HD and GB) and laboratory analysis for their breakdown products. Neither field screening for CWM and breakdown products, nor laboratory analysis detected any HD, GB, or degradation products in the shallow soil, sediment, or surface water samples.

The purpose of this SFSP is to provide technical guidance for sampling and analysis activities at Training Area T-31, Parcels 184(7) and 185(7). Specifically, IT will collect seven surface soil samples, seven subsurface soil samples, seven groundwater samples, four surface water samples, and four sediment samples at Training Area T-31, Parcels 184(7) and 185(7). Chemical analyses of the samples collected during the field program will include volatile organic compounds, semivolatile organic compounds, metals, and CWM breakdown products. In addition, sediment samples will be analyzed for total organic carbon and grain size. Results from these analyses will be compared to site-specific screening levels and ecological screening values presented in the IT July 1999 *Final Human Health and Ecological Screening Values and PAH Background Summary Report* and regulatory agency guidelines.

The field activities described in this SFSP will not be conducted until after U.S. Army Corps of Engineers (USACE)-Huntsville has completed the investigation of the CWM sites. If USACE-Huntsville determines there are other potential sources at the site, IT will collect additional samples to address these sources.

A USACE-Huntsville requirement for conducting work at CWM sites at FTMC is to use unexploded ordnance (UXO) anomaly avoidance techniques; therefore, UXO surface sweeps and downhole surveys of soil borings will be required to support field activities at Training Area T-31, Parcels 184(7) and 185(7). The surface sweeps and downhole surveys will be conducted to identify anomalies for the purpose of UXO avoidance.

This SFSP attachment to the installation-wide sampling and analysis plan (SAP) for Training Area T-31, Parcels 184(7) and 185(7), will be used in conjunction with the site-specific safety and health plan, the site-specific UXO safety plan, the installation-wide work plan, and the SAP. The SAP includes the installation-wide safety and health plan, waste management plan, ordnance and explosives management plan, and quality assurance plan. Site-specific hazard analyses are included in the site-specific safety and health plan and the site-specific UXO safety plan.

## **1.0 Project Description**

---

### **1.1 Introduction**

The U.S. Army is conducting studies of the environmental impact of suspected contaminants at Fort McClellan (FTMC) in Calhoun County, Alabama, under the management of the U.S. Army Corps of Engineers (USACE)-Mobile District. The USACE has contracted IT Corporation (IT) to provide environmental services for the site investigation (SI) of the chemical warfare material (CWM) site, Training Area T-31, Parcels 184(7) and 185(7), under Delivery Order CK10, Contract Number DACA21-96-D-0018.

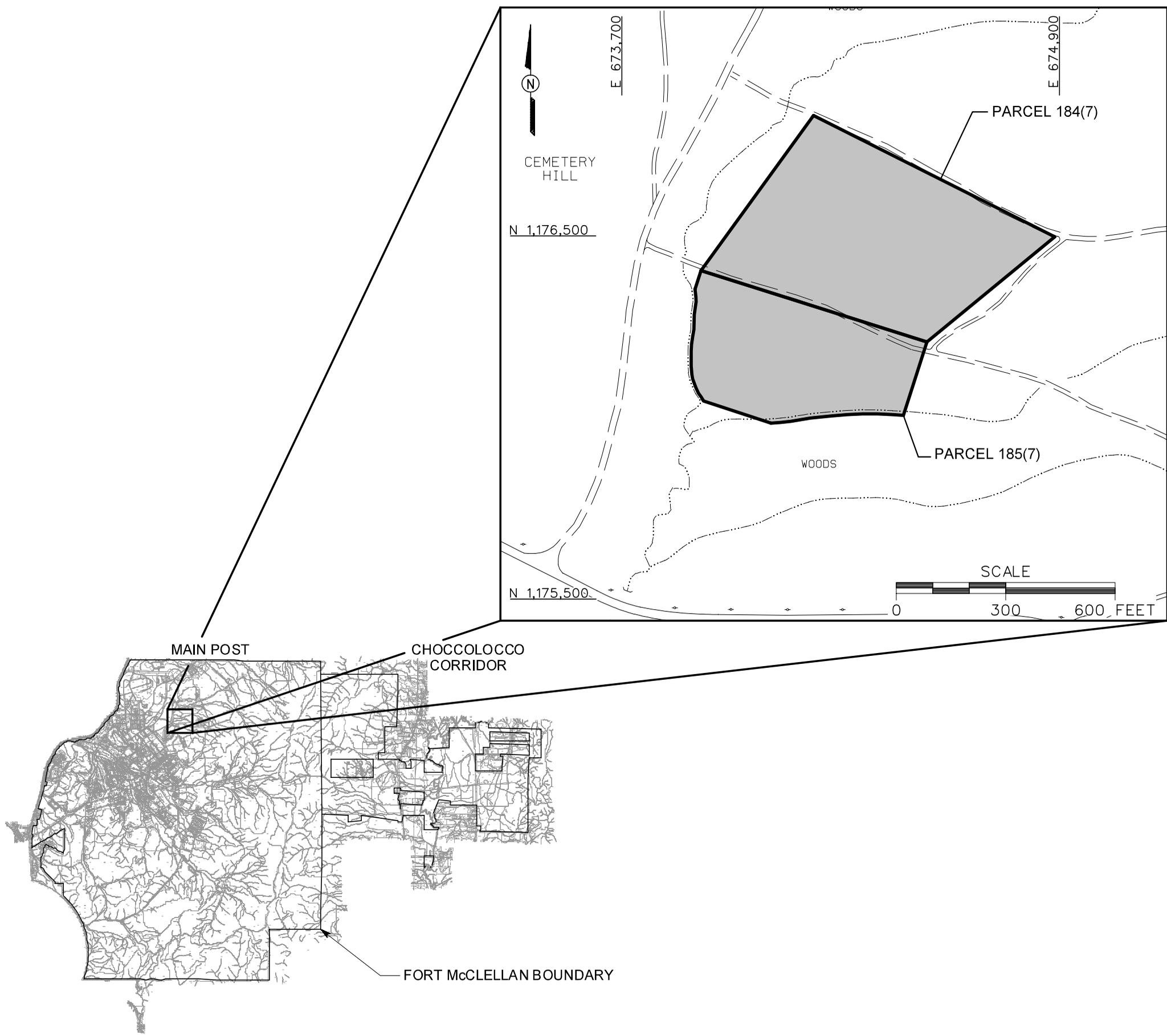
This site-specific field sampling plan (SFSP) attachment to the installation-wide sampling and analysis plan (SAP) (IT, 2000a) for FTMC has been prepared to provide technical guidance for sample collection and analysis at the Training Area T-31. This SFSP will be used in conjunction with the site-specific safety and health plan (SSHP) and site-specific unexploded ordnance (UXO) safety plan developed for Training Area T-31 and the installation-wide work plan (WP) (IT, 1998) and SAP. The SAP includes the installation-wide safety and health plan (SHP), waste management plan, ordnance and explosives management plan, and quality assurance plan (QAP). Site-specific hazard analyses are included in the SSHP and the site-specific UXO plan.

### **1.2 Site Description**

Training Area T-31, Parcels 184(7) and 185(7) is located in the north-central area of the Main Post (Figures 1-1 and 1-2). Training Area T-31 is located north of the Fill Area North of the ASP, Parcel 230(7), and occupies approximately 12 acres (Figure 1-2). The site is in a valley bordered by Cemetery Hill to the west. This training area partly overlaps with historic firing ranges for 37 millimeter, small arms and machine guns. The site was used from 1957 to 1969 as a Technical Escort Reaction Area and currently has unrestricted access.

Training of Technical Escort personnel was reportedly conducted at Training Area T-31 using sarin (GB) and distilled mustard (HD) in quantities of 20 to 40 milliliters (Roy F. Weston, Inc. [Weston], 1990). Also, storage of unspecified CWM may also have occurred. The decontaminants supertropical bleach (STB) and decontamination solution No. 2 (DS2) may also have been used at Training Area T-31. Based on observations of piles of white powder during a visit by U.S. Army Environmental Hygiene Agency in December 1973, it was surmised STB was used as a decontaminant for HD (Parson Engineering Science, Inc. [Parsons], 1999). When the chemical warfare training was deactivated in 1973, items used at the site were reportedly moved to Area T-38 (Parsons, 1999).

DWG. NO.: ... \796887es.032  
 PROJ. NO.: 796887  
 INITIATOR: J. RAGSDALE  
 PROJ. MGR.: J. YACOUB  
 DRAFT. CHCK. BY:  
 ENGR. CHCK. BY: J. RAGSDALE  
 DATE LAST REV.:  
 DRAWN BY:  
 STARTING DATE: 02/23/00  
 DRAWN BY: D. BILLINGSLEY  
 09/26/00  
 01:54:29  
 DBILLING  
 c:\cadd\design\796887es.032



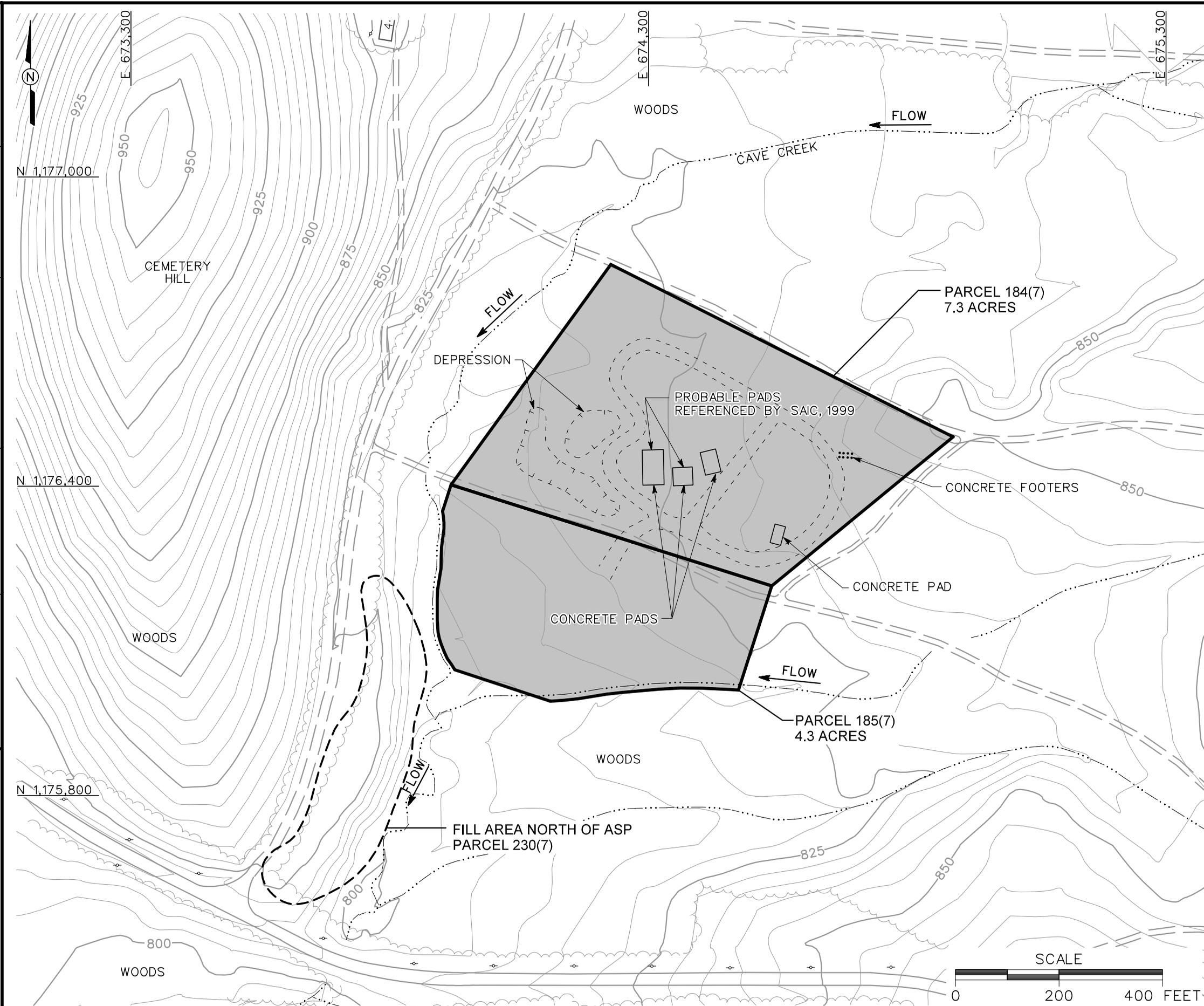
**LEGEND**

- UNIMPROVED ROADS AND PARKING
- PAVED ROADS AND PARKING
- BUILDING
- TREES / TREELINE
- PARCEL BOUNDARY
- SURFACE DRAINAGE / CREEK
- UTILITY POLE

**FIGURE 1-1**  
**SITE LOCATION MAP**  
**TRAINING AREA T-31**  
**PARCELS 184(7) AND 185(7)**

U. S. ARMY CORPS OF ENGINEERS  
 MOBILE DISTRICT  
 FORT McCLELLAN  
 CALHOUN COUNTY, ALABAMA  
 Contract No. DACA21-96-D-0018

DWG. NO.: ... \796887es.033  
 PROJ. NO.: 796887  
 INITIATOR: J. RAGSDALE  
 PROJ. MGR.: J. YACOUB  
 DRAFT. CHK. BY:  
 ENGR. CHK. BY: J. RAGSDALE  
 STARTING DATE: 02/21/00  
 DATE LAST REV.:  
 DRAWN BY: D. BILLINGSLEY  
 09/25/00  
 04:30:38  
 DBILLING  
 c:\cadd\design\796887es.033



- ### LEGEND
- UNIMPROVED ROADS AND PARKING
  - PAVED ROADS AND PARKING
  - BUILDING
  - TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 5 FOOT)
  - TREES / TREELINE
  - PARCEL BOUNDARY
  - BRIDGE
  - CULVERT WITH HEADWALL
  - SURFACE DRAINAGE / CREEK
  - UTILITY POLE
  - HISTORICAL FEATURES
  - DEPRESSION

**FIGURE 1-2**  
**SITE MAP**  
**TRAINING AREA T-31**  
**PARCELS 184(7) AND 185(7)**

U. S. ARMY CORPS OF ENGINEERS  
 MOBILE DISTRICT  
 FORT McCLELLAN  
 CALHOUN COUNTY, ALABAMA  
 Contract No. DACA21-96-D-0018



The historical aerial photography review revealed that there was activity in the area reportedly used for training. However, the review identified mostly trails or paths with one exception. One location, a cleared area with depressions, was identified as being a possible burial site based on its location with respect to the rest of the activity at the site. This cleared area also appeared during the time when this site was reportedly used for chemical training.

A site visit was conducted by Parsons in February 1999 (Parsons, 1999). Two concrete pads were located in approximately the same position as is shown on Figure 1-2. In addition, the remains of a structure located in the eastern portion of the site were found and may be related to the permanent tents that were reportedly used at the site. Several holes, as well as a disturbed area, were observed at the site, but their purpose is not known (Parsons, 1999).

Two locations have been reported for Training Area T-31 (Environmental Science and Engineering, Inc. [ESE], 1998). Previous reports identify one area located at Parcel 184(7) and cite storage of CWM in Igloo 14 or in Igloo 13 (ESE, 1998). The igloos are neither evident on the ground today (Science Applications International Corporation [SAIC], 1993), nor on aerial photos reviewed by the environmental baseline survey (EBS) team (ESE, 1998). However, igloos are present at the Ammunition Supply Point (ASP), located a short distance to the southeast. Long-time FTMC personnel report that CWM was stored in and dispensed from an igloo at the ASP, and from nearby Area T-38 (ESE, 1998). Binary CWM components were stored in Building 4416 (also known as Igloo 14, at the ASP) (ESE, 1998).

Retired FTMC personnel also report conducting CWM exercises at a second site close to the previously reported location of Training Area T-31. This site is identified as Parcel 185(7). One report indicated that the training occurred in a previously unidentified area measuring approximately 70 feet by 72 feet, but was not confirmed (ESE, 1998). The EBS team believes that details of the facility layout, location, and operations conducted at Training Area T-31 are in doubt and that activities associated with CWM training may have occurred at three areas. Two of the suspected areas are Parcels 184(7) and 185(7) at the Training Area T-31, as previously identified, and the third is the ASP (ESE, 1998).

The SI, conducted from 1991 through 1993 by SAIC, included a magnetometer survey over the site identified in historical records and photography (SAIC, 1993); however, no surface evidence of the former training area was visible. However, during the SI that started in 1991, the site was reported to be overgrown, but several pads and concrete structures were evident (SAIC, 1993).

The geophysical survey indicated metallic debris scattered within and beyond the site boundaries. This data suggests burial of some items at this location (SAIC, 1993). The SI also included collection of soil, sediment, and surface water samples and field screening for CWM (HD and GB) and laboratory analysis for their breakdown products. Neither field screening for CWM and breakdown products, nor laboratory analysis detected any HD, GB, or degradation products in the shallow soil, sediment, or surface water samples.

The soils at Training Area T-31, Parcels 184(7) and 185(7) fall into the Jefferson gravelly fine sandy loam, 2 to 6 percent slopes, eroded (JeB2) (U.S. Department of Agriculture, 1961). The soils at this site are of the Jefferson series and typically consist of 1.5 feet to 4 feet of well-drained, strongly acid soils that occur in small areas on fans and on foot slopes in the Choccolocco, Colvin and Coldwater Mountains (U.S. Department of Agriculture, 1961). These soils have developed from old local alluviums that washed or sloughed from ridges of sandstone, shale, and Weisner quartzite. Shallow groundwater direction at the site is probably controlled by topography. The depth to bedrock typically ranges from 2 feet to greater than 4 feet. The depth to the water table for this series is usually greater than 20 feet.

This mapping unit is friable soil developed from old local alluvium on foot slopes and fans along ridges and mountains. The surface soil is dark-grayish-brown fine sandy loam, and the subsoil is yellowish-brown, light fine sandy clay. Fragments as large as 8 inches in diameter are on the surface and throughout the soil.

### **1.3 Scope of Work**

The scope of work for activities associated with the SI at the Training Area T-31, Parcels 184(7) and 185(7), as specified by the statement of work (USACE, 1999), includes the following tasks:

- Develop the SFSP attachment.
- Develop the SSHP attachment.
- Develop the site-specific UXO safety plan.
- Conduct a surface and near-surface UXO survey over all areas to be included in the supplemental sampling effort for the purpose of UXO avoidance.
- Provide downhole UXO survey support for all intrusive drilling to determine buried downhole hazards for the purposes of UXO avoidance.

- Collect seven surface soil samples, seven subsurface soil samples, seven groundwater samples, four surface water samples, and four sediment samples to determine the absence or presence of hazardous, toxic, and radioactive waste contamination at Training Area T-31, Parcels 184(7) and 185(7) to provide data useful for supporting any future planned corrective measures and closure activities.
- Samples will be analyzed for the parameters listed in Section 4.6.

A USACE-Huntsville requirement for conducting work at CWM sites at FTMC is to use UXO anomaly avoidance techniques; therefore, UXO surface sweeps and downhole surveys of soil borings will be required to support field activities at Training Area T-31. The surface sweeps and downhole surveys will be conducted to identify anomalies for the purposes of UXO avoidance.

The site-specific UXO safety plan will be used to support investigation and construction activities at Training Area T-31 should indicate ordnance, explosives, and UXO be encountered and require avoidance or disposal.

At completion of the field activities and sample analyses, draft and final site investigation summary reports will be prepared to evaluate the absence or presence of potential site-specific chemicals (PSSC) at this site. SI sampling reports will be prepared in accordance with current U.S. Environmental (EPA), Region IV and Alabama Department of Environmental Management (ADEM) guidelines.

## ***2.0 Summary of Existing Environmental Studies***

---

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 (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 (including migration) has occurred
2. Areas where only release or disposal of petroleum products has occurred
3. Areas of contamination below action levels
4. Areas where all necessary remedial actions have been taken
5. Areas of known contamination with removal and/or remedial action underway
6. Areas of known contamination where required response actions have not been taken
7. Areas that are not evaluated or require further evaluation.

The EBS was conducted in accordance with the Community Environmental Response Facilitation Act (CERFA) (CERFA-Public Law 102-426) protocols and DOD policy regarding contamination assessment. Record searches and reviews were performed on all reasonably available documents from FTMC, ADEM, 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 Comprehensive Environmental Response, Compensation, and Liability 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.

Training Area T-31, Parcels 184(7) and 185(7), was identified as a Category 7 CERFA site. CERFA sites are parcels where site-specific chemicals were stored, and possibly released onto the site or to the environment, and/or were disposed of on site property. Category 7 CERFA sites are areas that lack adequate documentation and, therefore, require additional evaluation to determine the environmental condition of the parcel.

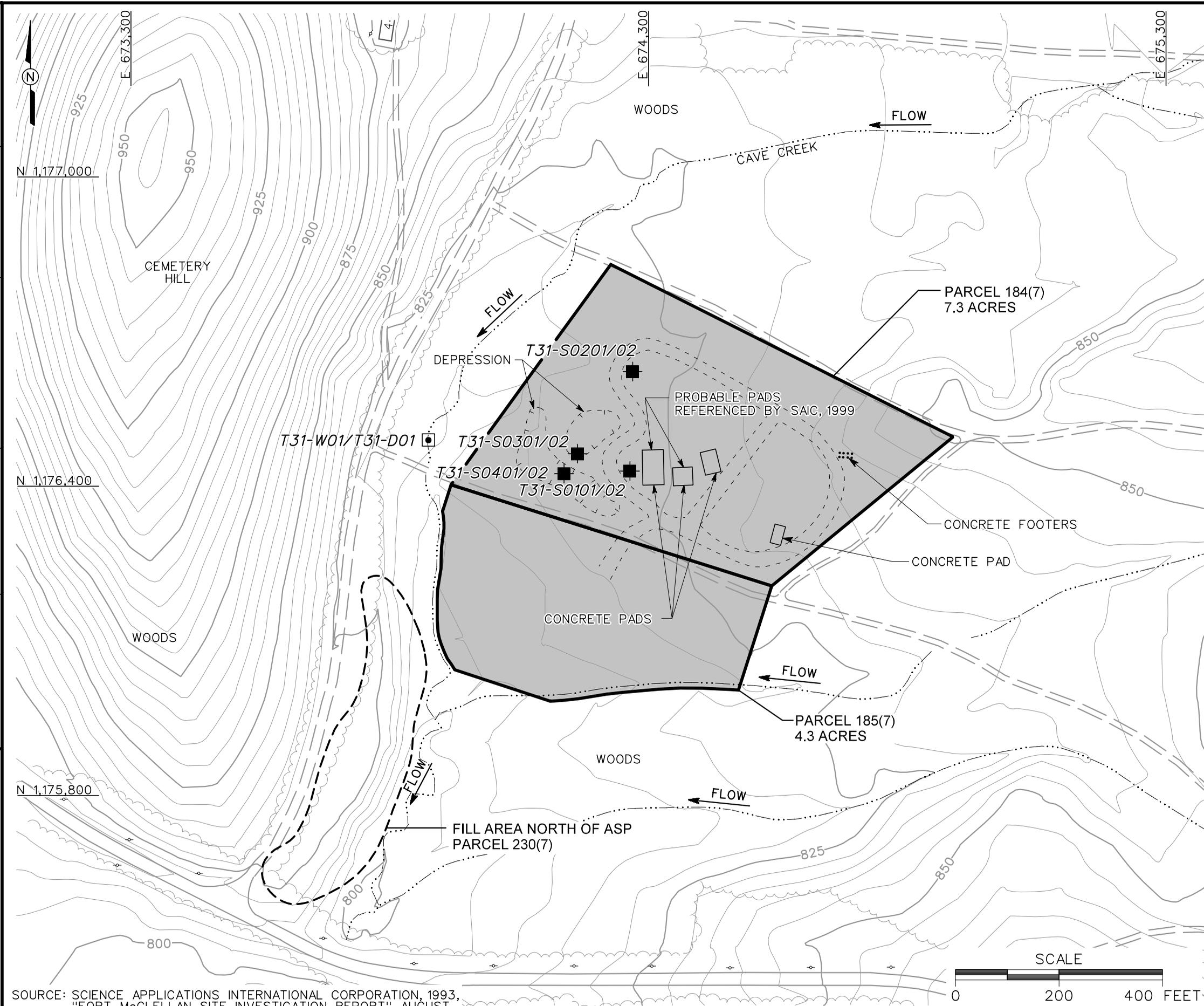
Investigations and additional site studies have been conducted at Training Area T-31. Training Area T-31 is a former toxic training area used between 1957 and 1969 for training with small quantities of GB and HD and storage of unknown types of chemical agent. The available site map for this site is of marginal quality and the location of structures based on the map is qualitative (SAIC, 1993). The site was heavily overgrown during two site visits. The site was investigated by collecting and analyzing shallow soil samples from identified high probability areas and analysis of surface water and sediment samples downstream from the site (Figure 2-1).

Eight shallow soil samples were collected from four locations identified near existing decontamination structures and drainage features at Training Area T-31 by the U.S. Army Technical Escort Unit (SAIC, 1993) (Figure 2-1). The soil samples were screened onsite by U.S. Army Technical Escort Unit using a Miniature Continuous Air Monitoring System analyzer. The results of the sample screening are provided in Table 2-1. The field screening did not detect the presence of HD or GB chemical agent in concentrations above background in the collected samples. The values ranged between 0.0 and 0.04 time weighted average (TWA) and were below the 0.8 TWA threshold for the agents. The Miniature Continuous Air Monitoring System screening procedure and definition of the TWA concentration is included as Appendix A. Laboratory analysis of the screened soil samples did not detect the presence of HD or GB degradation products (SAIC, 1993). The results of the laboratory analyses are provided in Table 2-2.

Surface water and sediment samples were collected from a tributary of Cave Creek downstream from Training Area T-31 (Figure 2-1). Laboratory analysis of the samples for chemical agent breakdown products did not indicate the presence of these compounds at the sampled location (SAIC, 1993). The results of the laboratory analyses are provided in Tables 2-3 and 2-4.

Chemical analysis of soil, surface water, and sediment samples from high-probability locations at Training Area T-31 did not detect the presence of chemical agent or agent breakdown products at the site (SAIC, 1993).

DWG. NO.: ...796887es.034  
 PROJ. NO.: 796887  
 INITIATOR: J. RAGSDALE  
 PROJ. MGR.: J. YACOB  
 DRAFT. CHK. BY:  
 ENGR. CHK. BY: J. RAGSDALE  
 STARTING DATE: 03/09/00  
 DATE LAST REV.:  
 DRAWN BY: D. BILLINGSLEY  
 09/25/00  
 04:29:52  
 DBILLING  
 c:\cadd\design\796887es.034



- ### LEGEND
- UNIMPROVED ROADS AND PARKING
  - PAVED ROADS AND PARKING
  - BUILDING
  - TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 5 FOOT)
  - TREES / TREELINE
  - PARCEL BOUNDARY
  - BRIDGE
  - CULVERT WITH HEADWALL
  - SURFACE DRAINAGE / CREEK
  - UTILITY POLE
  - HISTORICAL FEATURES
  - SAIC SI SUBSURFACE SOIL SAMPLE LOCATION
  - SAIC SI SURFACE WATER/SEDIMENT SAMPLE LOCATION
  - DEPRESSION

**FIGURE 2-1**  
 SI SAMPLE LOCATIONS  
 TRAINING AREA T-31  
 PARCELS 184(7) AND 185(7)

U. S. ARMY CORPS OF ENGINEERS  
 MOBILE DISTRICT  
 FORT McCLELLAN  
 CALHOUN COUNTY, ALABAMA  
 Contract No. DACA21-96-D-0018



SOURCE: SCIENCE APPLICATIONS INTERNATIONAL CORPORATION, 1993,  
 "FORT McCLELLAN SITE INVESTIGATION REPORT", AUGUST.

**Table 2-1**

**USATEU Results of MINICAMS Screening  
Training Area T-31, Parcel 184(7)<sup>a</sup>  
Fort McClellan, Calhoun County, Alabama**

<b>Sample Number</b>	<b>Sample Depth (inches)</b>	<b>HD(TWA)<sup>b</sup></b>	<b>GB(TWA)<sup>b</sup></b>
T31-S0101	11 - 14	0.04	0.0
T31-S0102	60 -63	0.0	0.0
T31-S0201	9 - 12	0.0	0.01
T31-S0202	57 -60	0.0	0.01
T31-S0301	10 - 13	0.0	0.0
T31-S0302	67 -70	0.0	0.0
T31-S0401	12 - 18	0.03	0.0
T31-S0402	67 -70	0.0	0.0

<sup>a</sup>Science Applications International Corporation, 1993, *Fort McClellan Site Investigation Report*, August.

<sup>b</sup>Reported values are below the 0.8 time-weighted average (TWA) for the Miniature Continuous Air Monitoring System and are not indicative of detected chemical warfare agent (U.S. Army Technical Escort Unit, 6/92). See Appendix A for MINICAMS procedure and TWA definition.

HD - Distilled mustard.

GB - Sarin.

USATEU - U.S. Army Technical Escort Unit

MINICAMS - Miniature Continuous Air Monitoring System

Table 2-2

**SI Soil Sample Results Summary<sup>a</sup>**  
**Training Area T-31, Parcel 184(7)**  
**Fort McClellan, Calhoun County, Alabama**

SAIC ID Number: T31-S01				T31-S01 D	T31-S01	T31-S02	T31-S02
Depth BLS: (1.0)				(1.0)	(5.0)	(1.0)	(5.0)
Collection Date: 4/22/1992				4/29/1992	4/22/1992	4/20/1992	4/20/1992
Associated Field QC Sample: FAS001				FAS001	FAS001	FAS001	FAS001
FMP002				FMP002	FMP002	FMP002	FMP002
RB-004				RB-004	RB-004	RB-004	RB-004
Parameter	Units	CRL	UCR				
<b>Method AAA9 (IMPA and MPA in Soil)</b>							
Isopropylmethyl phosphonic acid	µg/g	2.10	40	2.10 LT	2.10 LT D	2.10 LT	2.10 LT
Methyl phosphonic acid	µg/g	2.00	40	2.00 LT	2.00 LT D	2.00 LT	2.00 LT
<b>Method LL03 (Organosulfur Compounds in Soil)</b>							
1,4 Oxathiane	µg/g	0.856	17.1	0.856 LT	0.856 LT D	0.856 LT	0.856 LT
1,4-Dithiane	µg/g	1.47	11.3	1.47 LT	1.47 LT D	1.47 LT	1.47 LT
p-Chlorophenylmethylsulfoxide	µg/g	2.25	45.0	2.25 LT	2.25 LT D	2.25 LT	2.25 LT
p-Chlorophenylmethylsulfone	µg/g	2.37	47.4	2.37 LT	2.37 LT D	2.37 LT	2.37 LT
<b>Method LW18 (Thiodiglycol and Chloroacetic Acid in Soil)</b>							
Thiodiglycol	µg/g	3.94	102	3.94 LT I	3.94 LT D	3.94 LT	3.94 LT
<b>Method TT9 (DIMP and DMMP in Soil)</b>							
Di-isopropylmethylphosphonate	µg/g	0.114	4.57	0.114 LT	0.114 LT D	0.114 LT	0.114 LT
Dimethylmethylphosphonate	µg/g	0.133	4.18	0.133 LT	0.133 LT D	0.133 LT	0.133 LT

SAIC ID Number: T31-S03				T31-S03	T31-S04	T31-S04
Depth BLS: (1.0)				(5.0)	(1.0)	(5.0)
Collection Date: 4/22/1992				4/22/1992	4/22/1992	4/22/1992
Associated Field QC Sample: FAS001				FAS001	FAS001	FAS001
FMP002				FMP002	FMP002	FMP002
RB-004				RB-004	RB-004	RB-004
Parameter	Units	CRL	UCR			
<b>Method AAA9 (IMPA and MPA in Soil)</b>						
Isopropylmethyl phosphonic acid	µg/g	2.10	40	2.10 LT	2.10 LT	2.10 LT
Methyl phosphonic acid	µg/g	2.00	40	2.00 LT	2.00 LT	2.00 LT
<b>Method LL03 (Organosulfur Compounds in Soil)</b>						
1,4 Oxathiane	µg/g	0.856	17.1	0.856 LT	0.856 LT	0.856 LT
1,4-Dithiane	µg/g	1.47	11.3	1.47 LT	1.47 LT	1.47 LT
p-Chlorophenylmethylsulfoxide	µg/g	2.25	45.0	2.25 LT	2.25 LT	2.25 LT
p-Chlorophenylmethylsulfone	µg/g	2.37	47.4	2.37 LT	2.37 LT	2.37 LT
<b>Method LW18 (Thiodiglycol and Chloroacetic Acid in Soil)</b>						
Thiodiglycol	µg/g	3.94	102	3.94 LT	3.94 LT	3.94 LT
<b>Method TT9 (DIMP and DMMP in Soil)</b>						
Di-isopropylmethylphosphonate	µg/g	0.114	4.57	0.114 LT	0.114 LT	0.114 LT
Dimethylmethylphosphonate	µg/g	0.133	4.18	0.133 LT	0.133 LT	0.133 LT

<sup>a</sup>Science Applications International Corporation, 1993, *Fort McClellan Site Investigation Report*, August.

CRL - Certified reporting limit.

D - Duplicate sample.

LT - Less than the certified reporting limit.

µg/g - Micrograms per gram.

UCR - Upper certified range.

I - Out of control, data rejected due to low recovery.

BLS - Below land surface.

Table 2-3

**SI Surface Water Sample Results<sup>a</sup>**  
**Training Area T-31, Parcel 184(7)**  
**Fort McClellan, Calhoun County, Alabama**

				SAIC ID Number:	T3-W01	T3-W01D	T3-W01D2
				Depth:	(1.0)	(1.0)	(1.0)
				Collection Date:	4/20/1992	4/20/1992	4/29/1992
				Associated Field QC Sample:	N/A	N/A	N/A
				FAS001	FAS001	FAS001	FAS001
				FMP002	FMP002	FMP002	FMP002
				RB-004	RB-004	RB-004	RB-007
Parameter	Units	CRL	UCR				
<b>Method UT02 (IMPA and MPA in Water)</b>							
Isopropylmethyl phosphonic acid	µg/L	100	9,000	100 LT	100 LT D	100 LT D	
Methyl phosphonic acid	µg/L	128	9,000	128 LT	128 LT D	128 LT D	
<b>Method UL04 (Organosulfur Compounds in Water)</b>							
1,4 Oxathiane	µg/L	1.98	39.5	1.98 LT	1.98 LT D	1.98 LT D	
1,4-Dithiane	µg/L	1.11	22.2	1.11 LT	1.11 LT D	1.11 LT D	
p-Chlorophenylmethylsulfoxide	µg/L	4.23	106	4.23 LT	4.23 LT D	4.23 LT D	
p-Chlorophenylmethylsulfone	µg/L	4.72	106	4.72 LT	4.72 LT D	4.72 LT D	
<b>Method UW22 (TDGCL and TDGCLA in Water)</b>							
Thiodiglycol	µg/L	48.8	4,880	48.8 LT	48.8 LT D	48.8 LT D	
<b>Method T8 (DIMP and DMMP in Water)</b>							
Di-isopropylmethylphosphonate	µg/L	10.5	209.6	10.5 LT	10.5 LT D	10.5 LT D	
Dimethylmethylphosphonate	µg/L	15.2	304.8	15.2 LT	15.2 LT D	15.2 LT D	

<sup>a</sup> Science Applications International Corporation, 1993, *Fort McClellan Site Investigation Report*, August.

D - Duplicate sample.

CRL - Certified reporting limit.

LT - Less than the certified reporting limit.

µg/L - Micrograms per liter.

UCR - Upper certified range.

**Table 2-4**

**SI Sediment Sample Results<sup>a</sup>  
Training Area T-31, Parcel 184(7)  
Fort McClellan, Calhoun County, Alabama**

				SAIC ID Number:	T-31-D01	T-31-D01D
				Depth BLS:	(1.0)	(1.0)
				Collection Date:	4/20/1992	4/20/1992
				Associated Field QC Sample:	N/A	N/A
					FAS001	FAS001
					FMP002	FMP002
					RB-004	RB-004
Parameter	Units	CRL	UCR			
<b>Method AAA9 (IMPA and MPA in Soil)</b>						
Isopropylmethyl phosphonic acid	µg/g	2.1	40	2.10 LT	2.10 LT D	
Methyl phosphonic acid	µg/g	2	40	2.00 LT	2.00 LT D	
<b>Method LL03 (Organosulfur Compounds in Soil)</b>						
1,4-Oxathiana	µg/g	0.856	17.1	0.856 LT	0.856 LT D	
1,4-Dithiane	µg/g	1.47	11.3	1.47 LT	1.47 LT D	
p-Chlorophenylmethylsulfoxide	µg/g	2.25	45.0	2.25 LT	2.25 LT D	
p-Chlorophenylmethylsulfone	µg/g	2.37	47.4	2.37 LT	2.37 LT D	
<b>Method LW18 (Thiodiglycol and Chloroacetic Acid in Soil)</b>						
Thiodiglycol	µg/g	3.94	102	3.94 LT	3.94 LT D	
<b>Method TT9 (DIMP and DMMP in Soil)</b>						
Di-isopropylmethylphosphonate	µg/g	0.114	4.57	0.114 LT	0.114 LT D	
Dimethylmethylphosphonate	µg/g	0.133	4.18	0.133 LT	0.133 LT D	

<sup>a</sup>Science Applications International Corporation, 1993, *Fort McClellan Site Investigation Report*, August.

BLS - Below land surface.

CRL - Certified reporting limit.

LT - Less than the certified reporting limit.

µg/g - Micrograms per gram.

UCR - Upper certified range.

D - Duplicate sample.

## **3.0 Site-Specific Data Quality Objectives**

---

### **3.1 Overview**

The data quality objective (DQO) process is followed to establish data requirements. This process ensures that the proper quantity and quality of data are generated to support the decision-making process associated with the action selection for the Training Area T-31, Parcels 184(7) and 185(7). This section incorporates the components of the DQO process described in the publication EPA 540-R-93-071 *Data Quality Objectives Process for Superfund* (EPA, 1993). The DQO process as applied to Training Area T-31, Parcels 184(7) and 185(7) is described in more detail in Section 4.3 of the WP. Table 3-1 provides a summary of the factors used to determine the appropriate quantity of samples, and the procedures necessary to meet the objectives of the SI and establish a basis for any future action at Training Area T-31.

The samples will be analyzed using EPA SW-846 methods, including Update III Methods where applicable, as presented in Chapter 4.0 in this SFSP and Table 6-1 in the QAP. Data will be reported and evaluated in accordance with Corps of Engineers South Atlantic Savannah (CESAS) Level B criteria (USACE, 1994) and the stipulated requirements for the generation of definitive data (Section 3.1.2 of the QAP). Chemical data will be reported via hard copy data packages by the laboratory using Contract Laboratory Program (CLP)-like forms along with electronic copies. These packages will be validated in accordance with EPA National Functional Guidelines by Level III criteria.

### **3.2 Data Users and Available Data**

The available data, presented in Table 3-1, related to the SI at Training Area T-31, Parcels 184(7) and 185(7) have been used to formulate a site-specific conceptual model. This conceptual model was developed to support the development of this SFSP, which is necessary to meet the objectives of these activities and to establish a basis for future action at the site. The data users for the data and information generated during field activities are primarily EPA, USACE, ADEM, FTMC, and the USACE supporting contractors. This SFSP, along with the necessary companion documents, has been designed to provide the regulatory agencies with sufficient detail to reach a determination as to the adequacy of the scope of work. The program has also been designed to provide the level of defensible data and information required to confirm or rule out the existence of residual chemical contamination in site media.

### **3.3 Conceptual Site Exposure Model**

The CSEM provides the basis for identifying and evaluating the potential risks and hazards to human health in the risk assessment. The CSEM includes receptors and potential exposure

Table 3-1

**Summary of Data Quality Objectives  
Site Investigation  
Training Area T-31, Parcels 184(7) and 185(7)  
Fort McClellan, Calhoun County, Alabama**

Potential Data Users	Available Data	Conceptual Site Model	Media of Concern	Data Uses and Objectives	Data Types	Analytical Level	Data Quantity	
EPA, ADEM USACE, DOD FTMC, IT Corporation Other contractors, and possible future land users	Limited SI data from the SAIC Fort McClellan Site Investi- gation Report, August 1993	<u>Contaminant Source</u> Training Area T-31, Parcels 184(7) and 185(7)	<u>Surface soil</u>	SI to confirm the presence or absence of contamination in the site media	<u>Surface soil</u> TCL VOCs, TCL SVOCs, TAL Metals CWM Breakdown Products	Definitive data in CESAS Level B data packages	7 direct-push soil samples + QC	
			<u>Subsurface Soil</u>					
			<u>Groundwater</u>					
			<u>Surface Water</u>	Infiltration to subsurface soil, infiltration and leaching to groundwater, biotransfer to deer through browsing, dust emissions and volatilization to ambient air, and runoff and erosion to surface water and sediment	Definitive quality data for future decision- making	<u>Subsurface Soil</u> TCL VOCs, TCL SVOCs, TAL Metals CWM Breakdown Products	Definitive data in CESAS Level B data packages	7 direct-push soil samples + QC
			<u>Sediment</u>					
	<u>Potential Receptors</u> Recreational site user (current and future) construction workers (future), and residents (future)							
	<u>PSSC</u> Decontamination materials, volatiles, semivolatiles, and metals							
					<u>Groundwater</u> TCL VOCs, TCL SVOCs, TAL Metals CWM Breakdown Products	Definitive data in CESAS Level B data packages	7 groundwater samples + QC	
					<u>Surface Water</u> TCL VOCs, TCL SVOCs, TAL Metals CWM Breakdown Products	Definitive data in CESAS Level B data packages	4 surface water samples + QC	
					<u>Sediment</u> TCL VOCs, TCL SVOCs, TAL Metals, CWM Breakdown Products TOC, and Grain Size	Definitive data in CESAS Level B data packages	4 sediment samples + QC	

ADEM - Alabama Department of Environmental Management.  
CESAS - Corps of Engineers South Atlantic Savannah.  
CWM - Chemical warfare materials.  
DOD - U.S. Department of Defense.  
EPA - U.S. Environmental Protection Agency.  
FTMC - Fort McClellan.

PSSC - Potential site-specific chemical.  
QC - Quality control.  
SAIC - Science Applications International Corporation.  
SI - Site investigation.  
SVOC - Semivolatile organic compound.  
TAL - Target analyte list.

TCL - Target Compound list.  
TOC - Total organic carbon.  
USACE - U.S. Army Corps of Engineers.  
VOC - Volatile organic compound.

pathways appropriate to all plausible scenarios. The CSEM facilitates consistent and comprehensive evaluation of human health through graphically presenting all possible exposure pathways, including sources, release and transport pathways, and exposure routes. In addition, the CSEM helps to ensure that potential pathways are not overlooked. The elements of a complete exposure pathway and CSEM are:

- Source (i.e., contaminated environmental) media
- Contaminant release mechanisms
- Contaminant transport pathways
- Receptors
- Exposure pathways.

Contaminant release mechanisms and transport pathways are not relevant for direct receptor contact with a contaminated source medium.

Primary contaminant releases were probably limited to leaks and spills that entered surface soil. However, burial of wastes is suspected at the site. Potential contaminant transport pathways include infiltration and leaching to subsurface soil and groundwater, biotransfer to deer through browsing, and dust emissions and volatilization to ambient air from surface soil and run off and erosion to surface water and sediment.

Currently the site is not utilized, has an overgrowth of vegetation and it is not fenced. A large wooded area of many acres surrounds the site; therefore people may trespass at the site and may hunt for deer. The only plausible receptor for the site with the current land-use is a recreational site user who may also hunt. Other potential receptors considered, but not included under current land-use scenarios, are the:

- **Groundskeeper.** The site is not currently maintained by a groundskeeper.
- **Construction Worker.** The site is unused, and no development or construction is occurring or scheduled.
- **Resident.** The site is not currently used for residential purposes.

Future land use in this area is shown as Remediation Reserve (FTMC, 1997) and will likely be used for passive recreation and open space. The site may not be deemed safe for public access until remediation has been completed because of the potential for UXO (FTMC, 1997).

Plausible future land-use receptor scenarios addressed in the CSEM include:

- **Resident.** Although the site is expected to be used as open space and not be developed, the residential scenario is considered in order to provide information for the project manager and regulators.
- **Construction Worker.** Although the site is not expected to be developed in the near future, construction/demolition or maintenance of buried utilities may occur at some point in the future, thus this receptor is evaluated.
- **Recreational Site User.** The site may be planned for recreational use. Deer hunting is a potential exposure pathway for the recreational site user.

Human health receptor scenarios excluded from the CSEM include:

- **Groundskeeper.** The site is not likely to have areas that will need to be maintained in the future such as along roads and/or buildings.
- **Fish Consumption.** Fish consumption is not considered for the recreational site user receptor scenario because there is not sufficient surface water on the site to support fishing consumption.

A summary of relevant contaminant release and transport mechanisms, source and exposure media, and receptors and exposure pathways for this site is provided in Table 3-1 and Figure 3-1.

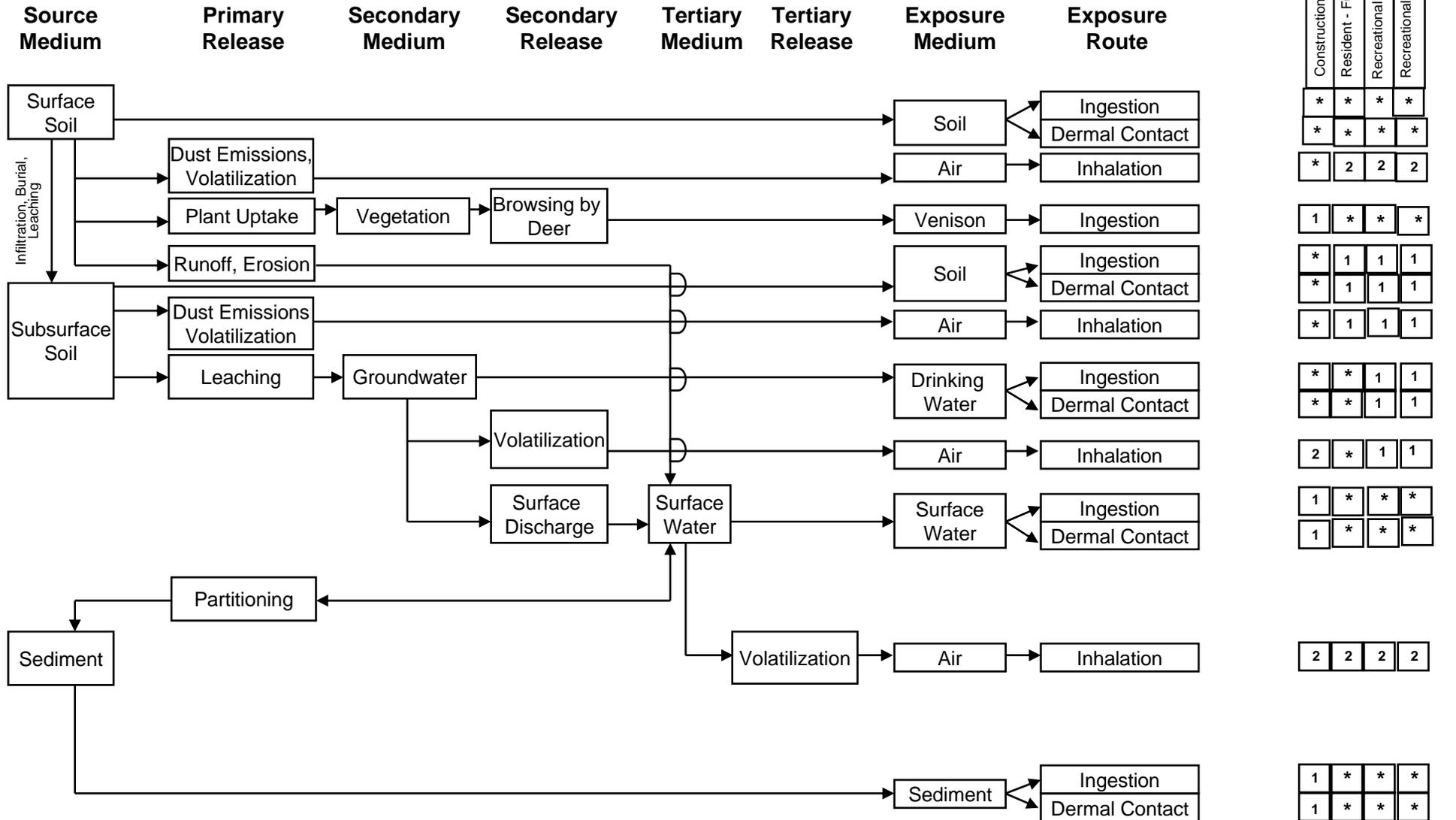
### **3.4 Decision-Making Process, Data Uses, and Needs**

The decision-making process consists of a seven-step process that is presented in detail in Section 4.3 of the WP and will be followed during the SI at the Training Area T-31, Parcels 184(7) and 185(7). Data uses and needs are summarized in Table 3-1.

#### **3.4.1 Risk Evaluation**

Confirmation of contamination at the Training Area T-31, Parcels 184(7) and 185(7), will be based on using EPA definitive data with CESAS Level B data packages to determine whether or not PSSCs are detected in site media. Detected site chemical concentrations will be compared to site-specific screening levels developed in the *Final Human Health and Ecological Screening Values and PAH Background Summary Report* (IT, 2000b). Definitive data will be adequate for confirming the presence of site contamination and for supporting a feasibility study and risk assessment.

**Figure 3-1**  
**Human Health Conceptual Site Exposure Model**  
**Training Area T-31, Parcels 184(7) and 185(7)**  
**Fort McClellan, Calhoun County, Alabama**



\* = Complete exposure pathway evaluated in the streamlined risk assessment.  
 1 = Incomplete exposure pathway.  
 2 = Although theoretically complete, this pathway is judged to be insignificant and is not evaluated in the streamlined risk assessment.

Assessment of potential ecological risk associated with sites or parcels (e.g., surface water and sediment sampling, specific ecological assessment methods, etc.) will be addressed in accordance with the procedures in the WP.

### ***3.4.2 Data Types and Quality***

Surface soil, subsurface soil, groundwater, surface water, and sediment will be sampled and analyzed to meet the objectives of the SI at Training Area T-31, Parcels 184(7) and 185(7). Quality assurance/quality control (QA/QC) samples will be collected for all sample types as described in Chapter 4.0 of this SFSP. Samples will be analyzed by EPA-approved SW-846 Methods Update III, where available; comply with EPA definitive data requirements; and be reported using hard copy data packages with electronic copies. In addition to meeting the quality needs of this SI, data analyzed at this level of quality are appropriate for all phases of the SI, feasibility study, and risk assessment.

### ***3.4.3 Precision, Accuracy, and Completeness***

Laboratory requirements of precision, accuracy, and completeness for this SI are provided in Section 9.0 of the QAP.

## **4.0 Field Activities**

---

### **4.1 UXO and Chemical Warfare Agent Survey Requirements**

A USACE-Huntsville requirement for conducting work at CWM sites at FTMC is to use UXO anomaly avoidance techniques; therefore, UXO surface sweeps and downhole surveys of soil borings will be required to support field activities at Training Area T-31, Parcels 184(7) and 185(7). The surface sweeps and downhole surveys will be conducted to identify anomalies for the purposes of UXO avoidance. The site-specific UXO safety plan provides technical guidance for ordnance and explosives avoidance and construction activities for sample collection activities at Training Area T-31, Parcels 184(7) and 185(7). The site-specific UXO safety attachment has been written in conjunction with Appendix E of the SAP (IT, 2000a).

CWM sites are being investigated for chemical agents in soil by the USACE-Huntsville and Parsons (Parsons, 1999). When the USACE investigate these sites, they will use real-time analysis methods to screen the soil for the presence of chemical agents. If agents are not present, no additional air monitoring surveys will be required in these areas when IT collects the planned soil samples and installs the monitoring wells. The field activities described in this SFSP will not be conducted until after USACE-Huntsville has completed the investigation of the CWM sites. If USACE-Huntsville determines there are other potential sources at the site, IT will collect additional samples to address these sources.

#### **4.1.1 Surface UXO Survey**

A UXO sweep will be conducted over areas that will be included in the sampling and surveying activities to identify UXO on or near the surface that may present a hazard to on-site workers during field activities for the purposes of UXO avoidance. Low-sensitivity magnetometers will be used to locate surface and shallow-buried metal objects. UXO located on the surface will be identified and conspicuously marked for easy avoidance. Subsurface metallic anomalies will not be disturbed, and will also be marked for easy avoidance. UXO personnel requirements, procedures, and detailed descriptions of the geophysical equipment to be used are provided in Chapter 4.0 and Appendix E of the approved SAP (IT, 2000a).

#### **4.1.2 Downhole UXO Survey**

During the soil boring and downhole sampling, downhole UXO surveys will be performed to determine if buried metallic objects are present for the purposes of UXO avoidance. UXO monitoring, as described in Chapter 4.0 of the SAP (IT, 2000a), will continue until undisturbed

soils are encountered or the borehole has been advanced to 12 feet below ground surface, whichever is reached first.

## **4.2 Utility Clearances**

After the UXO surface survey has cleared the area to be sampled and prior to performing any intrusive sampling, a utility clearance will be performed at locations where soil and groundwater samples will be collected, using the procedure outlined in Section 4.2.6 of the SAP (IT, 2000a). The site manager will mark the proposed locations with stakes, coordinate with the appropriate utility companies to clear the proposed locations for utilities, and obtain digging permits. Once the locations are approved (for both UXO and utility avoidance) for intrusive sampling, the stakes will be labeled as cleared.

## **4.3 Environmental Sampling**

The environmental sampling program at the Training Area T-31, Parcels 184(7) and 185(7) includes the collection of surface soil, subsurface soil, groundwater, surface water, and sediment samples for chemical analyses. These samples will be collected and analyzed to provide data for characterizing the site to determine the environmental condition of the site and any further action to be conducted at the site. Additionally, samples will be collected from environmental media in locations that will assist in the assessment of potential ecological impacts resulting from activities at the site.

### **4.3.1 Surface Soil Sampling**

Surface soil samples will be collected from seven soil locations at Training Area T-31, Parcels 184(7) and 185(7).

#### **4.3.1.1 Sample Locations and Rationale**

The surface soil sampling rationale are listed in Table 4-1. Proposed sampling locations are shown in Figure 4-1. Surface soil sample designations and required QA/QC sample requirements are summarized in Table 4-2. The final soil boring sampling locations will be determined in the field by the on-site geologist, based on actual field conditions.

#### **4.3.1.2 Sample Collection**

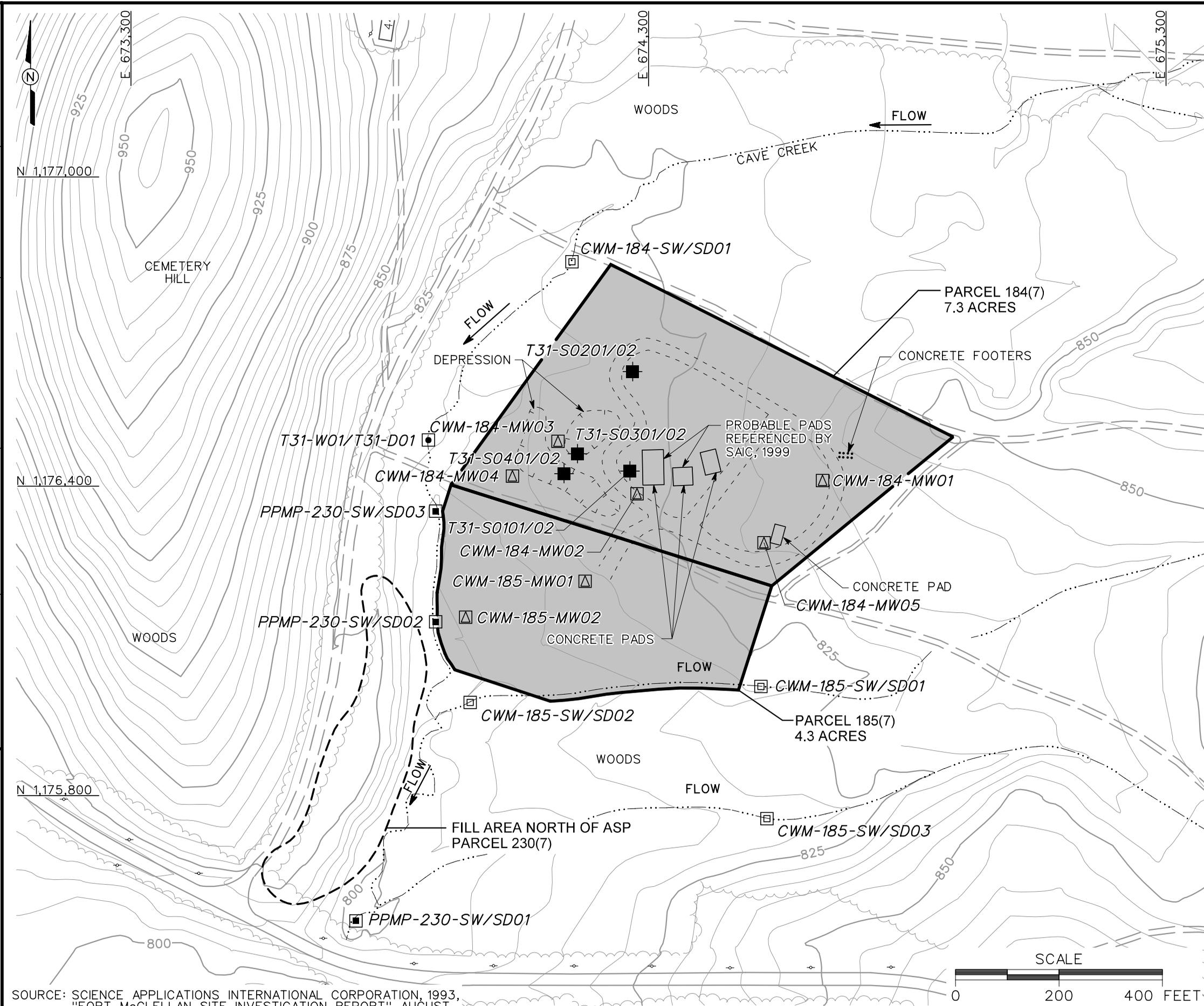
Surface soil samples will be collected from the upper 1 foot of soil by direct-push methodology as specified in Section 4.7.1.1 of the SAP (IT, 2000a). Collected soil samples will be screened using a photoionization detector (PID) in accordance with Section 4.15 of the SAP. Surface soil samples will be screened for information purposes only, and not to select samples for analysis.

Table 4-1

**Sampling Locations And Rationale  
Training Area T-31, Parcels 184(7) and 185(7)  
Fort McClellan, Calhoun County, Alabama**

Sample Location	Sample Media	Sample Location Rationale
CWM-184-MW01	Surface soil, subsurface soil, and groundwater	Soil boring for surface soil, subsurface soil, and groundwater samples to be placed in the eastern area of Parcel 184 (7) and upgradient of most of the Training Area T-31. Sample data will indicate if contaminant releases into the environment have occurred upgradient of this area and if contaminated soil exists at this site. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes. The monitoring well location will be used to establish a local groundwater flow direction and site-specific geology, and provide information on groundwater quality in the residuum aquifer.
CWM-184-MW02	Surface soil, subsurface soil, and groundwater	Soil boring for surface soil, subsurface soil, and groundwater samples to be placed south and downgradient of the concrete pads near the center of Parcel 184(7). Sample data will indicate if contaminant releases into the environment have occurred in this area and if contaminated soil exists at this site. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes. The monitoring well location will be used to establish a local groundwater flow direction and site-specific geology, and provide information on groundwater quality in the residuum aquifer.
CWM-184-MW03	Surface soil, subsurface soil, and groundwater	Soil boring for surface soil, subsurface soil, and groundwater samples to be placed adjacent and south (downgradient) to the circular depression in the western section of Parcel 184(7). Sample data will indicate if contaminant releases into the environment have occurred in this area and if contaminated soil exists at this site. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes. The monitoring well location will be used to establish a local groundwater flow direction and site-specific geology, and provide information on groundwater quality in the residuum aquifer.
CWM-184-MW04	Surface soil, subsurface soil, and groundwater	Soil boring for surface soil, subsurface soil, and groundwater samples to be placed adjacent and southwest (downgradient) of the elongated depression in the western section of Parcel 184(7). Sample data will indicate if contaminant releases into the environment have occurred in this area and if contaminated soil exists at this site. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes. The monitoring well location will be used to establish a local groundwater flow direction and site-specific geology, and provide information on groundwater quality in the residuum aquifer.
CWM-184-MW05	Surface soil, subsurface soil, and groundwater	Soil boring for surface soil, subsurface soil, and groundwater samples to be placed adjacent and southwest (downgradient) of the concrete pad in the southeastern section of Parcel 184(7). Sample data will indicate if contaminant releases into the environment have occurred in this area and if contaminated soil exists at this site. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes. The monitoring well location will be used to establish a local groundwater flow direction and site-specific geology, and provide information on groundwater quality in the residuum aquifer.
CWM-185-MW01	Surface soil, subsurface soil, and groundwater	Soil boring for surface soil, subsurface soil, and groundwater samples to be placed near the center of Parcel 185(7) at the end of a dirt road into the center of the parcel and downgradient of the center area of the site. Sample data will indicate if contaminant releases into the environment have occurred in this area and if contaminated soil exists at this site. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes. The monitoring well location will be used to establish a local groundwater flow direction and site-specific geology, and provide information on groundwater quality in the residuum aquifer.
CWM-185-MW02	Surface soil, subsurface soil, and groundwater	Soil boring for surface soil, subsurface soil, and groundwater samples to be placed southwest downgradient of most of the Training Area T-31 in Parcel 185(7). Sample data will indicate if contaminant releases into the environment have occurred in this area and if contaminated soil exists at this site. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes. The monitoring well location will be used to establish a local groundwater flow direction and site-specific geology, and provide information on groundwater quality in the residuum aquifer.
CWM-184-SW/SD01	Surface water and sediment	Sample location is Cave Creek outside the north corner of Parcel 184(7). Sample data will indicate if contaminant releases have occurred from runoff upstream of the parcel. Sample data will also be used to assess potential impacts to aquatic biota in the stream and other ecological receptors that may utilize that stream for food and/or habitat purposes.
CWM-185-SW/SD01	Surface water and sediment	Sample location is in the intermittent stream that flows southwest along the southern boundary of Parcel 185(7), east of the southeast corner of Parcel 185(7). Sample data will indicate if contaminant releases have occurred from runoff from upstream of the parcel. Sample data will also be used to assess potential impacts to aquatic biota in the stream and other ecological receptors that may utilize that stream for food and/or habitat purposes.
CWM-185-SW/SD02	Surface water and sediment	Sample location is in the intermittent stream that flows southwest along the southern boundary of Parcel 185(7), southwest of the southwestern corner of Parcel 185(7). Sample data will indicate if contaminant releases have occurred from runoff from upstream within the parcel. Sample data will also be used to assess potential impacts to aquatic biota in the stream and other ecological receptors that may utilize that stream for food and/or habitat purposes.
CWM-185-SW/SD03	Surface water and sediment	Sample location is southeast of Parcel 185(7) on the intermittent stream that flows west to Cave Creek. Sample data will indicate if contaminant releases have occurred from runoff from upstream of Parcel 185(7). Sample data will also be used to assess potential impacts to aquatic biota in the stream and other ecological receptors that may utilize that stream for food and/or habitat purposes.
PPMP-230-SW/SD01	Surface water and sediment	Surface water and sediment sample location collected as part of the SI for Parcel 230(7). Samples will be evaluated with samples collected for the Training Area T-31.
PPMP-230-SW/SD02	Surface water and sediment	Surface water and sediment sample location collected as part of the SI for Parcel 230(7). Samples will be evaluated with samples collected for the Training Area T-31.
PPMP-230-SW/SD03	Surface water and sediment	Surface water and sediment sample location collected as part of the SI for Parcel 230(7). Samples will be evaluated with samples collected for the Training Area T-31.

DWG. NO.: ...796887es.035  
 PROJ. NO.: 796887  
 INITIATOR: J. RAGSDALE  
 PROJ. MGR.: J. YACOB  
 DRAFT. CHK. BY:  
 ENGR. CHK. BY: J. RAGSDALE  
 DATE LAST REV.:  
 DRAWN BY:  
 STARTING DATE: 02/21/00  
 D. BILLINGSLEY  
 09/25/00  
 04:38:02  
 SOURCE: SCIENCE APPLICATIONS INTERNATIONAL CORPORATION, 1993,  
 "FORT McCLELLAN SITE INVESTIGATION REPORT", AUGUST.  
 c:\cadd\design\796887es.035



- ### LEGEND
- UNIMPROVED ROADS AND PARKING
  - PAVED ROADS AND PARKING
  - BUILDING
  - TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 5 FOOT)
  - TREES / TREELINE
  - PARCEL BOUNDARY
  - BRIDGE
  - CULVERT WITH HEADWALL
  - SURFACE DRAINAGE / CREEK
  - UTILITY POLE
  - HISTORICAL FEATURES
  - SAIC SI SURFACE SOIL SAMPLE LOCATION
  - SAIC SI SURFACE WATER/SEDIMENT SAMPLE LOCATION
  - EXISTING SURFACE WATER/SEDIMENT SAMPLE LOCATION
  - PROPOSED SURFACE WATER/SEDIMENT SAMPLE LOCATION
  - PROPOSED GROUNDWATER, SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION
  - DEPRESSION

**FIGURE 4-1**  
**PROPOSED SAMPLE LOCATIONS**  
**TRAINING AREA T-31**  
**PARCELS 184(7) AND 185(7)**

U. S. ARMY CORPS OF ENGINEERS  
 MOBILE DISTRICT  
 FORT McCLELLAN  
 CALHOUN COUNTY, ALABAMA  
 Contract No. DACA21-96-D-0018

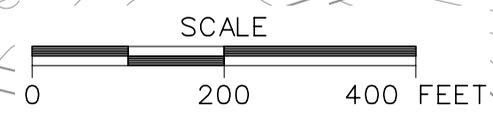


Table 4-2

**Surface Soil and Subsurface Soil Sample Designations and QA/QC Sample Quantities  
Training Area T-31, Parcels 184(7) and 185(7)  
Fort McClellan, Calhoun County, Alabama**

Sample Location	Sample Designation	Sample Depth (ft)	QA/QC Samples			Analytical Suite
			Field Duplicates	Field Splits	MS/MSD	
CWM-184-MW01	CWM-184-MW01-SS-TL0001-REG	0-1				TCL VOCs, TCL SVOCs, TAL Metals CWM Breakdown Products
	CWM-184-MW01-DS-TL0002-REG	a			CWM-184-MW01-DS-TL0002-MS/MSD	
CWM-184-MW02	CWM-184-MW02-SS-TL0003-REG	0-1				TCL VOCs, TCL SVOCs, TAL Metals CWM Breakdown Products
	CWM-184-MW02-DS-TL0004-REG	a				
CWM-184-MW03	CWM-184-MW03-SS-TL0005-REG	0-1				TCL VOCs, TCL SVOCs, TAL Metals CWM Breakdown Products
	CWM-184-MW03-DS-TL0006-REG	a				
CWM-184-MW04	CWM-184-MW04-SS-TL0007-REG	0-1				TCL VOCs, TCL SVOCs, TAL Metals CWM Breakdown Products
	CWM-184-MW04-DS-TL0008-REG	a				
CWM-184-MW05	CWM-184-MW05-SS-TL0009-REG	0-1				TCL VOCs, TCL SVOCs, TAL Metals CWM Breakdown Products
	CWM-184-MW05-DS-TL0010-REG	a				
CWM-185-MW01	CWM-185-MW01-SS-TF0001-REG	0-1				TCL VOCs, TCL SVOCs, TAL Metals CWM Breakdown Products
	CWM-185-MW01-DS-TF0002-REG	a				
CWM-185-MW02	CWM-185-MW02-SS-TF0003-REG	0-1				TCL VOCs, TCL SVOCs, TAL Metals CWM Breakdown Products
	CWM-185-MW02-DS-TF0004-REG	a	CWM-185-MW02-DS-TF0005-FD	CWM-185-MW02-DS-TF0006-FS		

<sup>a</sup>Actual sample depth selected for analysis will be at the discretion of the site geologist and will be based on field observation.

CWM - Chemical warfare material.  
 FD - Field duplicate.  
 FS - Field split.  
 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.

Sample containers, sample volumes, preservatives, and holding times for the analyses required in this SFSP are listed in Section 5.0, Table 5-1, of the QAP. Sample documentation and chain-of-custodies (COC) will be recorded as specified in Section 4.13 of the SAP. The samples will be analyzed for the parameters listed in Section 4.6 of this SFSP.

### **4.3.2 Subsurface Soil Sampling**

Subsurface soil samples will be collected from the seven soil borings installed at Training Area T-31, Parcels 184(7) and 185(7).

#### **4.3.2.1 Sample Locations and Rationale**

Subsurface soil samples will be collected from the soil borings proposed on Figure 4-1. The subsurface soil sampling rationale is listed in Table 4-1. Subsurface soil samples to be collected are listed in Table 4-2. The final soil boring sampling locations will be determined in the field by the on-site geologist, based on actual field observations and utility clearance results.

#### **4.3.2.2 Sample Collection**

Subsurface soil samples will be collected from soil borings at a depth greater than 1 foot below ground surface in the unsaturated zone. The soil borings will be advanced and soil samples collected using the direct-push sampling procedures specified in Section 4.7.1.1 of the SAP (IT, 2000a).

Soil samples will be collected continuously for the first 12 feet or until either groundwater or refusal is reached. A detailed lithological log will be recorded by the on-site geologist for each borehole. At least one subsurface sample from each borehole will be selected for analyses. The collected subsurface soil samples will be field-screened using a PID in accordance with Section 4.15 of the SAP to measure samples exhibiting elevated readings exceeding background (readings in ambient air). Typically, the subsurface soil sample showing the highest reading (above background) will be selected and sent to the laboratory for analysis. If none of the samples indicate readings exceeding background using the PID, the deepest interval from the soil boring will be sampled and submitted to the laboratory for analyses. Subsurface soil samples will be selected for analyses from any depth interval if the on-site geologist suspects PSSCs at the interval. Site conditions such as lithology may also determine the actual sample depth interval submitted for analyses. More than one subsurface soil sample will be collected if field measurements and observations indicate a possible layer of PSSCs and/or additional sample data would provide insight to the existence of any PSSCs.

Sample documentation and COC will be recorded as specified in Section 4.13 of the SAP. Sample containers, sample volumes, preservatives, and holding times for the analyses required in this SFSP are listed in Section 5.0, Table 5-1 of the QAP. The samples will be analyzed for the parameters listed in Section 4.6 of this SFSP.

### **4.3.3 Permanent Residuum Monitoring Wells**

Seven permanent residuum-monitoring wells will be installed at Training Area T-31, Parcels 184(7) and 185(7). The permanent residuum monitoring well locations are shown on Figure 4-1. The rationale for the monitoring well locations are presented in Table 4-1. The monitoring well boreholes will be drilled a minimum of 5 feet into the water bearing zone or to the top of bedrock whichever is first using a truck-mounted hollow-stem auger drill rig. The monitoring well casing will consist of new 2-inch inside-diameter, Schedule 40, threaded, flush-joint, polyvinyl chloride pipe. Attached to the bottom of the well casing will be a section of new threaded, flush-joint, 0.010-inch continuous wrap polyvinyl chloride well screen, approximately 10 to 20 feet long. The well will be installed so the well screen straddles the water table.

Soil samples for lithology will be collected every 5 feet to the total depth of the hole during hollow-stem auger drilling to provide a detailed lithologic log. The samples will be collected for lithology using a 24-inch-long, 2-inch-or-larger-diameter, split-spoon sampler. The soil borings will be logged in accordance with American Standard for Testing and Materials Method D 2488 using the Unified Soil Classification System. The soil samples will be screened in the field using a PID. The monitoring wells will be drilled, installed, and developed as specified in Section 4.8 and Appendix C of the SAP (IT, 2000a). The exact monitoring well locations will be determined in the field by the on-site geologist, based on actual field conditions.

### **4.3.4 Groundwater Sampling**

Groundwater samples will be collected from the seven monitoring wells completed at Training Area T-31, Parcels 184(7) and 185(7) presented in Section 4.3.3.

#### **4.3.4.1 Sample Locations and Rationale**

Groundwater samples will be collected from the monitoring well locations shown on Figure 4-1. The groundwater sampling rationale is listed in Table 4-1. The groundwater sample designations, depths, and required QA/QC sample quantities are listed in Table 4-3.

#### **4.3.4.2 Sample Collection**

Prior to sampling monitoring wells, static water levels will be measured from each of the seven monitoring wells installed at the site to define the groundwater flow in the residuum aquifer. Water level measurements will be performed as outlined in Section 4.18 of the SAP (IT, 2000a). Groundwater samples will be collected in accordance with the procedures outlined in Section 4.9.1.4 of the SAP.

Sample documentation and COC will be recorded as specified in Section 4.13 of the SAP. Sample containers, sample volumes, preservatives, and holding times for the analyses required in this SFSP are listed in Section 5.0, Table 5-1 of the QAP (IT, 2000a). The samples will be analyzed for the parameters listed in Section 4.6 of this SFSP.

#### **4.3.5 Surface Water Sampling**

Four surface water samples will be collected from Training Area T-31, Parcels 184(7) and 185(7). Also, the collection of surface water samples was included in the SI for Parcel 230(7) that is southwest of the Training Area T-31. The samples for Parcel 230(7), shown on Figure 4-1, will be evaluated with the surface water samples proposed for the Training Area T-31.

##### **4.3.5.1 Sample Locations and Rationale**

The surface water sampling rationale are listed in Table 4-1. The surface water samples will be collected from the proposed locations on Figure 4-1. The surface water sample designations and required QA/QC sample requirements are listed in Table 4-4. The exact sampling locations will be determined in the field by the ecological sampler, based on drainage pathways and actual field observations.

##### **4.3.5.2 Sample Collection**

The surface water samples will be collected in accordance with the procedures specified in Section 4.9.1.3 of the SAP (IT, 2000a). Sample documentation and COC will be recorded as specified in Section 4.13 of the SAP. Sample containers, sample volumes, preservatives, and holding times for the analyses required in this SFSP are listed in Section 5.0, Table 5-1, of the QAP. The samples will be analyzed for the parameters listed in Section 4.6 of this SFSP.

**Table 4-3**

**Groundwater Sample Designations and QA/QC Sample Quantities  
Training Area T-31, Parcels 184(7) and 185(7)  
Fort McClellan, Calhoun County, Alabama**

Sample Location	Sample Designation	Sample Matrix	Sample Depth (ft)	QA/QC Samples			Analytical Suite
				Field Duplicates	Field Splits	MS/MSD	
CWM-184-MW01	CWM-184-MW01-GW-TL3001-REG	Groundwater	a			CWM-184-MW01-GW-TL3001-MS/MSD	TCL VOCs, TCL SVOCs, TAL Metals, CWM Breakdown Products
CWM-184-MW02	CWM-184-MW02-GW-TL3002-REG	Groundwater	a				TCL VOCs, TCL SVOCs, TAL Metals, CWM Breakdown Products
CWM-184-MW03	CWM-184-MW03-GW-TL3003-REG	Groundwater	a				TCL VOCs, TCL SVOCs, TAL Metals, CWM Breakdown Products
CWM-184-MW04	CWM-184-MW04-GW-TL3004-REG	Groundwater	a				TCL VOCs, TCL SVOCs, TAL Metals, CWM Breakdown Products
CWM-184-MW05	CWM-184-MW05-GW-TL3005-REG	Groundwater	a				TCL VOCs, TCL SVOCs, TAL Metals, CWM Breakdown Products
CWM-185-MW01	CWM-185-MW01-GW-TF3001-REG	Groundwater	a				TCL VOCs, TCL SVOCs, TAL Metals, CWM Breakdown Products
CWM-185-MW02	CWM-185-MW02-GW-TF3002-REG	Groundwater	a	CWM-185-MW02-GW-TF3003-FD	CWM-185-MW02-GW-TF3004-FS		TCL VOCs, TCL SVOCs, TAL Metals, CWM Breakdown Products

<sup>a</sup>Sample depth will depend on where sufficient first water is encountered to collect a water sample.

- CWM - Chemical warfare material.
- FD - Field duplicate.
- FS - Field split.
- 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.

**Table 4-4**

**Surface Water and Sediment Sample Designations and QA/QC Sample Quantities  
Training Area T-31, Parcels 184 (7) and 185(7)  
Fort McClellan, Calhoun County, Alabama**

Sample Location	Sample Designation	Sample Matrix	Sample Depth (ft)	QA/QC Samples			Analytical Suite
				Field Duplicates	Field Splits	MS/MSD	
CWM-184-SW/SD01	CWM-184-SW/SD01-SW-TL2001-REG	Surface Water	N/A				TCL VOCs, TCL SVOCs, TAL Metals, CWM Breakdown Products (Also, TOC, Grain Size for sediment only)
	CWM-184-SW/SD01-SD-TL1001-REG	Sediment	0-0.5				
CWM-185-SW/SD01	CWM-185-SW/SD01-SW-TF2001-REG	Surface Water	N/A				TCL VOCs, TCL SVOCs, TAL Metals, CWM Breakdown Products (Also, TOC, Grain Size for sediment only)
	CWM-185-SW/SD01-SD-TF1001-REG	Sediment	0-0.5				
CWM-185-SW/SD02	CWM-185-SW/SD02-SW-TF2002-REG	Surface Water	NA				TCL VOCs, TCL SVOCs, TAL Metals, CWM Breakdown Products (Also, TOC, Grain Size for sediment only)
	CWM-185-SW/SD02-SD-TF1002-REG	Sediment	0-0.5	CWM-185-SW/SD02-SD-TF1003-FD			
CWM-185-SW/SD03	CWM-185-SW/SD03-SW-TF2003-REG	Surface Water	NA				TCL VOCs, TCL SVOCs, TAL Metals, CWM Breakdown Products (Also, TOC, Grain Size for sediment only)
	CWM-185-SW/SD03-SD-TF1004-REG	Sediment	0-0.5				

MS/MSD - Matrix spike/matrix spike duplicate.  
 NA - Not applicable.  
 QA/QC - Quality assurance/quality control.  
 REG - Field sample.  
 SVOC - Semivolatile organic compound.  
 TAL - Target analyte list.  
 TCL - Target compound list.  
 TOC - Total organic carbon.  
 VOC - Volatile organic compound.

### **4.3.6 Sediment Sampling**

Four sediment samples will be collected from Training Area T-31, Parcels 184(7) and 185(7). These sediment samples will be collected at the same locations as the surface water samples described in Section 4.3.5. Also, the collection of sediment samples was included in the SI for Parcel 230(7) that is southwest of the Training Area T-31. The samples for Parcel 230(7), shown on Figure 4-1, will be evaluated with the sediment samples proposed for the Training Area T-31.

#### **4.3.6.1 Sample Locations and Rationale**

The proposed locations for the sediment samples are shown in Figure 4-1. Sediment sampling rationale is presented in Table 4-1. The sediment sample designation and required QA/QC sample requirements are listed in Table 4-4. The actual sediment sample points will be at the discretion of the ecological sampler, based on the drainage pathways and actual field observations.

#### **4.3.6.2 Sample Collection**

The sediment samples will be collected in accordance with the procedures specified in Section 4.9.1.2 of the SAP. Sediment samples for volatile organic analysis will be collected using EnCore sample collection devices. Sample documentation and COC will be recorded as specified in Section 4.13 of the SAP. The sediment samples will be analyzed for the parameters listed in Section 4.6 of this SFSP.

### **4.4 Decontamination Requirements**

Decontamination will be performed on sampling and nonsampling equipment to prevent cross-contamination between sampling locations. Decontamination of sampling equipment will be performed in accordance with the requirements presented in Section 4.10.1.1 of the SAP (IT, 2000a). Decontamination of nonsampling equipment will be performed in accordance with the requirements presented in Section 4.10.1.2 of the SAP.

### **4.5 Surveying of Sample Locations**

Sampling locations will be marked with pin flags, stakes, and/or flagging and will be surveyed using either global positioning system (GPS) or conventional civil survey techniques, as necessary to obtain the required level of accuracy. Horizontal coordinates will be referenced to the U.S. State Plane Coordinate System, Alabama East Zone, North American Datum, 1983. Elevations will be referenced to the National Geodetic Vertical Datum of 1929 or the North American Vertical Datum of 1988 (soon to be established on site).

Horizontal coordinates for soil, sediment, and surface water locations will be recorded using a GPS to provide accuracy within 1 meter. Because of the need to use permanent monitoring wells to determine water levels, a higher level of accuracy is required. Monitoring wells will be surveyed to an accuracy of 0.1 foot for horizontal coordinates and 0.01 foot for elevations, using survey-grade GPS techniques and/or conventional civil survey techniques, as required. Procedures to be used for GPS surveying are described in Section 4.3 of the SAP. Conventional land survey requirements are presented in Section 4.19 of the SAP. All areas at this site must be cleared for UXO avoidance before any surveying activities will commence.

#### **4.6 Analytical Program**

Samples collected at locations specified in this chapter of this SFSP will be analyzed for the specific suites of chemicals and elements based on the history of site usage, as well as EPA, ADEM, FTMC, and USACE requirements. Target analyses for samples collected from the Training Area T-31, Parcels 184(7) and 185(7), consist of the following list of analytical suites:

- ☐ Target Compound List Volatile Organic Compounds - Method 5035/8260B
- ☐ Target Compound List Semivolatile Organic Compounds - Method 8270C
- ☐ Target Analyte List Metals - Method 6010B/7000.
- ☐ Chemical Agent Breakdown Products- Methods 8270M/8321.

In addition, the sediment samples will be analyzed for the following list of parameters:

- ☐ Total Organic Carbon - Method 9060
- ☐ Grain Size - ASTM D-421/D-422.

The samples will be analyzed using EPA SW-846 methods, including Update III Methods where applicable, as presented in Table 4-5 in this SFSP and Table 6-1 in the QAP. Data will be reported and evaluated in accordance with CESAS Level B criteria (USACE, 1994) and the stipulated requirements for the generation of definitive data (Section 3.1.2 of the QAP). Chemical data will be reported via hard copy data packages by the laboratory using CLP-like forms. These packages will be validated in accordance with EPA National Functional Guidelines by Level III criteria.

#### **4.7 Sample Preservation, Packaging, and Shipping**

Sample preservation, packaging, and shipping will follow the procedures specified in Section 4.13.2 of the SAP (IT, 2000a). Completed analysis request/COC records will be secured and included with each shipment of coolers to:

**Table 4-5**

**Analytical Samples  
Training Area T-31, Parcels 184(7) and 185(7)  
Fort McClellan, Calhoun County, Alabama**

Parameters	Analysis Method	Sample Matrix	TAT Needed	Field Samples			QA/QC Samples <sup>(a)</sup>					Quanterra	QA Lab
				No. of Sample Points	No. of Events	No. of Field Samples	Field Dups (10%)	Splits w/ QA Lab (5%)	MS/MSD (5%)	Trip Blank (1/ship)	Eq. Rinse (1/wk/matrix)	Total No. Analysis	Total No. Analysis
<b>Training Area T-31: 11 water matrix samples</b> (7 groundwater samples and 4 surface water samples); <b>18 soil matrix samples</b> (7 surface soil samples, 7 subsurface soil samples, 4 sediment samples)													
TCL VOCs	8260B	water	normal	11	1	11	1	1	1	3	1	18	1
TCL SVOCs	8270C	water	normal	11	1	11	1	1	1		1	15	1
Tot TAL Metals	6010B/7000	water	normal	11	1	11	1	1	1		1	15	1
CWM BD Products <sup>(b)</sup>	8270/8321	water	normal	11	1	11	1	1	1		1	15	1
TCL VOCs	8260B	soil	normal	18	1	18	2	1	1	4	1	27	1
TCL SVOCs	8270C	soil	normal	18	1	18	2	1	1		1	23	1
TAL Metals	6010B/7000	soil	normal	18	1	18	2	1	1		1	23	1
CWM BD Products <sup>(b)</sup>	8270/8321	soil	normal	18	1	18	2	1	1		1	23	1
TOC	9060	sediment	normal	4	1	4						4	0
Grain Size	ASTM D-421/D-422	sediment	normal	4	1	4						4	0
<b>Training Area T-31:</b>				124	12	8	8	7	8	167	8		

<sup>a</sup>Field duplicate, QA split, and MS/MSD samples were calculated as a percentage of the field samples collected per site and were rounded to the nearest whole number  
Trip blank samples will be collected in association with water matrix samples for VOC analysis only. Assumed four field samples per day to estimate trip blanks. Equipment blanks will be collected once per event whenever sampling equipment is field decontaminated and re-used. They will be repeated weekly for sampling events that are anticipated to last more than 1 week. Assumed 20 field samples will be collected per week to estimate number of equipment blanks.

<sup>b</sup>Chemical Warfare Material Breakdown Products - include Method 8270 (Modified): 1,4-oxathiane, 1,4-dithiane, p-chlorophenylmethylsulfoxide, p-chlorophenylmethylsulfone  
Method 8321: thiodiglycol, IMPA, EMPA, MPA, DIMP, and DMMP.

Ship samples to:

EMAX Laboratories, Inc.  
630 Maple Avenue  
Torrance, California 90503  
Attn: Elizabeth McIntyre  
Tel: 310-618-8889  
Fax: 310-618-0818

USACE Laboratory split samples  
are shipped to:

U.S. Army Engineer District, Savannah  
Environmental & Materials District  
Attn: Sample Receiving  
200 North Cobb Parkway  
Building 400, Suite 404  
Marietta, Georgia 30062  
Tel: 678-354-0310

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.  
TOC - Total organic carbon.  
VOC - Volatile organic compound.

Attn: Elizabeth McIntyre  
EMAX Laboratories, Inc.  
630 Maple Avenue  
Torrance, California 90503  
Telephone: (310) 618-8889.

QA split samples collected for the USACE laboratory will be shipped to the following address:

U.S. Army Engineer District, Savannah  
Environmental & Materials Unit  
Attn: Sample Receiving  
200 North Cobb Parkway  
Building 400, Suite 404  
Marietta, Georgia 30062  
Telephone: (678) 354-0310.

#### ***4.8 Investigation-Derived Waste Management***

Management and disposal of the investigation-derived wastes (IDW) will follow procedures and requirements as described in Appendix D of the SAP (IT, 2000a). The IDW expected to be generated at Training Area T-31, Parcels 184(7) and 185(7) will include decontamination and well development fluids, drill cuttings, and disposable personal protective equipment. The IDW will be staged in the fenced area surrounding Buildings 335 and 336 while awaiting final disposal.

#### ***4.9 Site-Specific Safety and Health***

Health and safety requirements for this SI are provided in the SSHP attachment for the Training Area T-31, Parcels 184(7) and 185(7). The SSHP attachment will be used in conjunction with the installation-wide SHP.

## **5.0 Project Schedule**

---

The project schedule for the SI activities will be provided by the IT project manager to the Base Realignment and Closure Cleanup Team and will be in accordance with the WP.

## 6.0 References

---

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.

Fort McClellan (FTMC), 1997, *Fort McClellan Comprehensive Reuse Plan*, Fort McClellan Reuse and Redevelopment Authority of Alabama, prepared under contract to the Calhoun County Commission, November.

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*, July.

IT Corporation (IT), 1998, *Final Installation-Wide Work Plan, Fort McClellan, Calhoun County, Alabama*, August.

Parsons Engineering Science, Inc. (Parsons), 1999, *Draft-Final Work Plan/Site Safety Submission, Chemical Warfare Material Site EE/CA, Fort McClellan, Alabama*, March

Science Applications International Corporation (SAIC), 1993, *Fort McClellan Site Investigation Report*, August.

U.S. Army Corps of Engineers (USACE), 1999, *Statement of Work for Task Order CK10, Remedial Investigations(RIs) at the Chemical Warfare Material Sites, RIs at the Fuel/ Training Areas, RIs at the Print Plants/Motor Pools, RIs at the Ground Scars/Boiler Plants, RI at Range 24A, Site investigations (SIs) at the Historic Ranges, and a Groundwater Investigation at Rideout Field at Fort McClellan, Alabama*, June.

U.S. Army Corps of Engineers (USACE), 1994, *Requirements for the Preparation of Sampling and Analysis Plan*, Engineer Manual EM 200-1-3, September 1.

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

U.S. Environmental Protection Agency (EPA), 1993, *Data Quality Objectives Process for Superfund, Interim Final Guidance*, EPA 540-R-93-071, September.

Roy F. Weston, Inc. (Weston), 1990, *Final USATHAMA Task Order 11, Enhanced Preliminary Assessment, Fort McClellan, Anniston, Alabama*, prepared for U.S. Army Toxic and Hazardous Materials Agency, Aberdeen Proving Ground, Maryland, December.

**ATTACHMENT 1**  
**LIST OF ABBREVIATIONS AND ACRONYMS**

## List of Abbreviations and Acronyms

Abs	skin absorption	COE	Corps of Engineers	FMP 1300	Former Motor Pool 1300 Site
AC	hydrogen cyanide	Con	skin or eye contact	Frtn	fraction
AcB2	Anniston and Allen gravelly loams, 2 to 6 percent slopes, eroded	CRL	certified reporting limit	FS	field split
AcC2	Anniston and Allen gravelly loams, 6 to 10 percent slopes, eroded	CRZ	contamination reduction zone	ft	feet
AcD2	Anniston and Allen gravelly loams, 10 to 15 percent slopes, eroded	CS	ortho-chlorobenzylidene-malononitrile	ft/ft	feet per foot
AcE2	Anniston and Allen gravelly loams, 15 to 25 percent slopes, eroded	CSEM	conceptual site exposure model	FTA	fire training area
ACGIH	American Conference of Governmental Industrial Hygienists	ctr.	container	FTMC	Fort McClellan
ADEM	Alabama Department of Environmental Management	CWA	chemical warfare agent	g	gram
AEL	airborne exposure limit	CWM	chemical warfare materials, clear wide mouth	G-856	Geometrics, Inc. G-856 magnetometer
AL	Alabama	CX	dichloroformoxime	G-858G	Geometrics, Inc. G-858G magnetic gradiometer
amb.	Amber	D	duplicate	gal	gallon
ANAD	Anniston Army Depot	DANC	decontamination agent, non-corrosive	gal/min	gallons per minute
APT	armor piercing tracer	°C	degrees Celsius	GB	sarin
ASP	Ammunition Supply Point	°F	degrees Fahrenheit	gc	clay gravels; gravel-sand-clay mixtures
ASR	Archives Search Report, July 1999	DDT	dichlorodiphenyltrichloroethane	GC	gas chromatograph
AST	aboveground storage tank	DEP	depositional soil	GC/MS	gas chromatograph/mass spectrometer
ASTM	American Society for Testing and Materials	DI	deionized	GFAA	graphite furnace atomic absorption
B	analyte detected in laboratory or field blank at concentration greater than the reporting limit (and greater than zero)	DIMP	di-isopropylmethylphosphonate	gm	silty gravels; gravel-sand-silt mixtures
BCT	BRAC Cleanup Team	DMMP	dimethylmethylphosphonate	gp	poorly graded gravels; gravel-sand mixtures
BFB	bromofluorobenzene	DOD	U.S. Department of Defense	gpm	gallons per minute
bgs	below ground surface	DP	direct-push	GPR	ground-penetrating radar
bkg	background	DPDO	Defense Property Disposal Office	GPS	global positioning system
bls	below land surface	DQO	data quality objective	GSPB	Ground Scar Boiler Plant
BOD	biological oxygen demand	DRMO	Defense Reutilization and Marketing Office	GSSI	Geophysical Survey Systems, Inc.
BRAC	Base Realignment and Closure	DS	deep (subsurface) soil	GW	groundwater
Braun	Braun Intertec Corporation	DS2	Decontamination Solution Number 2	gw	well-graded gravels; gravel-sand mixtures
BTEX	benzene, toluene, ethylbenzene, and xylenes	E&E	Ecology and Environment, Inc.	HA	hand auger
BTOC	below top of casing	EBS	environmental baseline survey	HCl	hydrochloric acid
BZ	breathing zone	Elev.	elevation	HD	distilled mustard
C	ceiling limit value	EM	electromagnetic	HDPE	high-density polyethylene
Ca	carcinogen	EM31	Geonics Limited EM31 Terrain Conductivity Meter	Herb.	herbicides
CCAL	continuing calibration	EM61	Geonics Limited EM61 High-Resolution Metal Detector	HNO <sub>3</sub>	nitric acid
CCB	continuing calibration blank	EOD	explosive and ordnance disposal	hr	hour
CD	compact disc	EODT	explosive and ordnance disposal team	H&S	health and safety
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act	EPA	U.S. Environmental Protection Agency	HSA	hollow stem auger
CERFA	Community Environmental Response Facilitation Act	EPC	exposure point concentration	HTRW	hazardous, toxic, and radioactive waste
CESAS	Corps of Engineers South Atlantic Savannah	EPIC	Environmental Photographic Interpretation Center	I	out of control, data rejected due to low recovery
CFC	chlorofluorocarbon	ER	equipment rinsate	ICAL	initial calibration
CG	cyanogen chloride	ESE	Environmental Science and Engineering, Inc.	ICB	initial calibration blank
ch	inorganic clays of high plasticity	ESV	ecological screening value	ICP	inductively-coupled plasma
CK	carbonyl chloride	E-W	east to west	ICS	interference check sample
cl	inorganic clays of low to medium plasticity	EZ	exclusion zone	ID	inside diameter
Cl.	chlorinated	FB	field blank	IDL	instrument detection limit
CLP	Contract Laboratory Program	FD	field duplicate	IDLH	immediately dangerous to life or health
CN	chloroacetophenone	FedEx	Federal Express, Inc.	IDW	investigation-derived waste
CNB	chloroacetophenone, benzene, and carbon tetrachloride	FFE	field flame expedient	IMPA	isopropylmethyl phosphonic acid
CNS	chloroacetophenone, chloropicrin, and chloroform	Fil	filtered	in.	inch
COC	chain of custody	FIt	filtered	Ing	ingestion

## List of Abbreviations and Acronyms (Continued)

Inh	inhalation	ND	not detected	qty	quantity
IP	ionization potential	NE	no evidence	Qual	qualifier
IPS	International Pipe Standard	NFA	No Further Action	R	rejected
IRDMIS	Installation Restoration Data Management Information System	ng/L	nanograms per liter	RCRA	Resource Conservation and Recovery Act
IT	IT Corporation	NGVD	National Geodetic Vertical Datum	ReB3	Rarden silty clay loams
ITEMS	IT Environmental Management System <sup>TM</sup>	NIC	notice of intended change	REG	field sample
J	estimated concentration	NIOSH	National Institute for Occupational Safety and Health	REL	recommended exposure limit
JeB2	Jefferson gravelly fine sandy loam, 2 to 6 percent slopes, eroded	No.	number	RFA	request for analysis
JeC2	Jefferson gravelly fine sandy loam, 6 to 10 percent slopes, eroded	NOAA	National Oceanic and Atmospheric Administration	RI	remedial investigation
JfB	Jefferson stony fine sandy loam, 0 to 10 percent slopes have strong slopes	NR	not requested	RL	reporting limit
K	conductivity	ns	nanosecond	RPD	relative percent difference
L	lewisite; liter	N-S	north to south	RRF	relative response factor
LC <sub>50</sub>	lethal concentration for 50 percent of population tested	nT	nanotesla	RSD	relative standard deviation
LD <sub>50</sub>	lethal dose for 50 percent of population tested	NTU	nephelometric turbidity unit	RTK	real-time kinematic
l	liter	O&G	oil and grease	SAD	South Atlantic Division
LCS	laboratory control sample	OD	outside diameter	SAE	Society of Automotive Engineers
LEL	lower explosive limit	OE	ordnance and explosives	SAIC	Science Applications International Corporation
LT	less than the certified reporting limit	oh	organic clays of medium to high plasticity	SAP	installation-wide sampling and analysis plan
max	maximum	ol	organic silts and organic silty clays of low plasticity	sc	clayey sands; sand-clay mixtures
MDL	method detection limit	OP	organophosphorus	Sch.	schedule
mg/kg	milligrams per kilogram	OSHA	Occupational Safety and Health Administration	SD	sediment
mg/L	milligrams per liter	OWS	oil/water separator	SDG	sample delivery group
mg/m <sup>3</sup>	milligrams per cubic meter	oz	ounce	SDZ	safe distance zone
mh	inorganic silts, micaceous or diatomaceous fine, sandy or silt soils	PAH	polynuclear aromatic hydrocarbon	SEMS	Southern Environmental Management & Specialties
MHz	megahertz	Pb	lead	SFSP	site-specific field sampling plan
µg/g	micrograms per gram	PCB	polychlorinated biphenyl	SGF	standard grade fuels
µg/kg	micrograms per kilogram	PCE	perchloroethene	SHP	installation-wide safety and health plan
µg/L	micrograms per liter	PDS	Personnel Decontamination Station	SI	site investigation
µmhos/cm	micromhos per centimeter	PEL	permissible exposure limit	sm	silty sands; sand-silt mixtures
min	minimum	Pest.	pesticide	SOP	standard operating procedure
MINICAMS	miniature continuous air sampling system	PG	professional geologist	sp	poorly graded sands; gravelly sands
ml	inorganic silts and very fine sands	PID	photoionization detector	SP	sump pump
mL	milliliter	PkA	Philo and Stendal soils local alluvium, 0 to 2 percent slopes	Ss	stony rough land, sandstone series
mm	millimeter	POL	petroleum, oils, and lubricants	SS	surface soil
MOGAS	motor vehicle gasoline	PP	peristaltic pump	SSC	site-specific chemical
MPA	methyl phosphonic acid	ppb	parts per billion	SSHO	site safety and health officer
MR	molasses residue	PPE	personal protective equipment	SSHP	site-specific safety and health plan
MS	matrix spike	ppm	parts per million	SSSL	site-specific screening level
mS/cm	milliSiemens per centimeter	PPMP	Print Plant Motor Pool	STB	supertropical bleach
MSD	matrix spike duplicate	ppt	parts per thousand	STEL	short-term exposure limit
msl	mean sea level	PSSC	potential site-specific chemical	STOLS	Surface Towed Ordnance Locator System <sup>®</sup>
MtD3	Montevallo shaly, silty clay loam, 10 to 40 percent slopes, severely eroded	pt	peat or other highly organic silts	Std. units	standard units
mV	millivolts	PVC	polyvinyl chloride	SU	standard unit
MW	monitoring well	QA	quality assurance	SVOC	semivolatile organic compound
N/A	not applicable; not available	QA/QC	quality assurance/quality control	SW	surface water
NAD	North American Datum	QAP	installation-wide quality assurance plan	SW-846	U.S. EPA <i>Test Methods for Evaluating Solid Waste: Physical/Chemical Methods</i>
NAD83	North American Datum of 1983	QC	quality control	SZ	support zone
NAVD88	North American Vertical Datum of 1988	QST	QST Environmental Inc.	TAL	target analyte list

## List of Abbreviations and Acronyms (Continued)

---

TAT	turn around time
TB	trip blank
TCE	trichloroethene
TCL	target compound list
TCLP	toxicity characteristic leaching procedure
TDGCL	thiodiglycol
TDGCLA	thiodiglycol chloroacetic acid
TERC	Total Environmental Restoration Contract
TIC	tentatively identified compounds
TLV	threshold limit value
TN	Tennessee
TOC	top of casing, total organic carbon
TPH	total petroleum hydrocarbons
TRADOC	U.S. Army Training and Doctrine Command
TRPH	total recoverable petroleum hydrocarbons
TWA	time weighted average
UCL	upper confidence limit
UCR	upper certified range
UJ	not detected above reporting limit; result should be estimated
USACE	U.S. Army Corps of Engineers
USAEC	U.S. Army Environmental Center
USAEHA	U.S. Army Environmental Hygiene Agency
USAMCLS	U.S. Army Chemical School
USATEU	U.S. Army Technical Escort Unit
USATHAMA	U.S. Army Toxic and Hazardous Material Agency
USCS	Unified Soil Classification System
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
UST	underground storage tank
UXO	unexploded ordnance
VOA	volatile organic analyte
VOC	volatile organic compound
VOH	volatile organic hydrocarbon
VQlfr	validation qualifier
VQual	validated qualifier
VX	nerve agent (O-ethyl-S- [diisopropylaminoethyl]-methylphosphonothiolate)
Weston	Roy F. Weston, Inc.
WP	installation-wide work plan
WS	watershed
WSA	Watershed Screening Assessment
WWI	World War I
WWII	World War II
XRF	x-ray fluorescence
yd <sup>3</sup>	cubic yards

## **APPENDIX A**

### **MINICAMS SCREENING PROCEDURE (SAIC Remedial Investigation Report, Fort McClellan, Alabama, August, 1995)**

## MINICAMS Screening Procedure<sup>a</sup>

The Miniature Continuous Air Monitoring System (MINICAMS) units were operated by two U.S. Army Technical Escort Unit (USATEU) teams according to their Standard Operating Procedure (SOP). The MINICAMS units obtain a time weighted average (TWA) concentration by analyzing vapors produced by thermal desorption from a soil sample. The thermal desorption was effected by heating each sample to approximately 70 degrees Fahrenheit (°F) in a controlled environment. The relationship between the concentration of chemical warfare agent (CWA) detected in the desorbed vapor sample and the concentration of CWA contained in the soil is variable and depends on the lithology, moisture content, and pH of the soil sample. In general, more CWA vapor is recovered from coarse soils than from fine-grained soils at an optimum moisture content that varies with soil type (Sage and Howard, 1989). TWA concentrations for distilled mustard (HD), sarin (GB), and nerve agent (VX) are established by the Surgeon General of the United States and are shown below:

Agent	TWA* (mg/m <sup>3</sup> )	TWA* (ng/L)	MINICAMS Detection Limit* (relative units)
HD	.003	3	1
GB	.0001	0.1	.005
VX	.00001	0.01	.005

\*Data provided by CMS Research Corporation (1993, written communication SAIC, 1995).

The MINICAMS system is normally set up to report concentrations in relative units. For example, if a concentration of 0.003 milligrams per cubic meter (mg/m<sup>3</sup>) of HD is detected by the MINICAMS, it is reported as 1.00 TWA in relative units. If a concentration of 0.00001 mg/m<sup>3</sup> of VX is detected, it is reported as 1.00 TWA. Thus, the TWA reading has the same significance no matter which agent is being detected. The TWA reading reported for a given agent may be converted to mg/m<sup>3</sup> simply by multiplying the reported TWA reading by the definition given above. For example, a reading of 0.5 TWA for GB corresponds to 0.00005 mg/m<sup>3</sup>.

Ideally, the unit will report a concentration reading of 1.00 TWA each time the proper quantity of agent is injected into the MINICAMS after calibration. The alarm level for the MINICAMS is set to correspond to a 95 percent confidence level, which would sound an alarm if the instrument was challenged with the equivalent of 1.00 TWA of agent. Statistical studies have shown that an alarm level of 0.80 TWA is a suitable setpoint for the MINICAMS to achieve a 95

percent confidence level. A 1.00 TWA challenge of the MINICAMS will result in a concentration reading greater than or equal of 0.80, 95 percent of the time, resulting in an alarm.

The following procedure was used to analyze soil samples using a MINICAMS unit at Fort McClellan:

- Approximately 50 grams of soil were collected with a decontaminated stainless-steel spoon trowel, or hand auger; deposited into a stainless-steel bowl; homogenized; and placed into a glass jar. Upon retrieval of a split-spoon sample, the soil in the tip of the sampler was removed with a stainless-steel spoon and placed into a glass jar.
- The soil sample was placed into the heater box (uncapped) and heated to the required minimum temperature of 70°F. Evolved vapors were collected through Teflon™ tubing attached to the heater box and were introduced directly into the MINICAMS unit. Once the MINICAMS reported the sample clear of CWA, the soil sample was removed, disposed of onsite, and the results logged by USATEU. Each sample was equilibrated in the heater box at the same temperature, for the same duration, and with approximately equal volume in each soil sample container.
- USATEU also conducted continuous air monitoring with the MINICAMS units during intrusive activities (i.e., drilling and trenching). The heater lines were placed as close to the borehole or test pit as conditions allowed. The soil vapors released by the intrusive activity were purged through the heater lines, adsorbed onto the trap, and desorbed into the column of the MINICAMS. The results of each cycle were logged by USATEU.

G.W. Sage and P.H. Howard, 1989, *Environmental Fate Assessments of Chemical Agents HD and VX*, Chemical Research, Development, and Engineering Center, U.S. Army Armament Munitions Chemical Compound, CRDEC-CR-034, p. 33, June.

Science Applications International Corporation, 1995, *Draft Fort McClellan Remedial Investigation Report*, August.

**Final  
Site Investigation  
Site-Specific Safety and Health Plan Attachment  
Chemical Warfare Material Site  
Training Area T-31, Parcels 184(7) and 185(7)**

**Fort McClellan  
Calhoun County, Alabama  
EPA ID No. AL7 210 020 562**

**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**

**Delivery Order CK10  
Contract No. DACA21-96-D-0018  
IT Project No. 796887**

**September 2000**

**Revision 1**

This Site-Specific Safety and Health Plan must be used in conjunction with the Installation-Wide Safety and Health Plan, Fort McClellan, Alabama.

**Site-Specific Safety and Health Plan Attachment Approval  
Fort McClellan, Calhoun County, Alabama**

I have read and approve this site-specific safety and health plan attachment for the Chemical Warfare Material Site, Training Area T-31, at Fort McClellan, Alabama, with respect to project hazards, regulatory requirements, and IT Corporation procedures.

  
\_\_\_\_\_  
Jeanne Yacoub, PE  
Project Manager

9/27/00  
Date

  
\_\_\_\_\_  
Andrew Johnson, CIH  
Health & Safety Manager

22SEP00  
Date

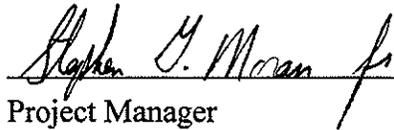
  
\_\_\_\_\_  
Jeff Tarr  
Site Coordinator

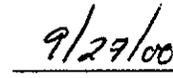
9/27/00  
Date

## **Acknowledgements**

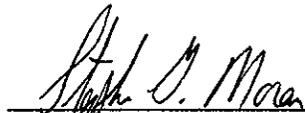
---

The final approved version of this site-specific safety and health plan (SSHP) attachment for the Chemical Warfare Material Site, Training Area T-31, at Fort McClellan, Alabama, has been provided to the site coordinator. I acknowledge my responsibility to provide the site coordinator with the equipment, materials, and qualified personnel to implement fully all safety requirements in this SSHP attachment. I will formally review this plan with the health and safety staff every 6 months until project completion.

  
Project Manager

  
Date

I acknowledge receipt of this SSHP attachment from the project manager, and that it is my responsibility to explain its contents to all site personnel and cause these requirements to be fully implemented. Any change in conditions, scope of work, or other change that might affect worker safety requires me to notify the project manager and the health and safety manager.

  
Site Coordinator

  
Date



# Fort McClellan Gate Hours

Baltzell Gate	Baltzell Road. Open 24 hours daily, 7 days a week.
---------------	---

# Fort McClellan Project Emergency Contacts

Fire Department (on post).....	911
Fire Department (off post) .....	(256) 237-3541
Ambulance (off post) .....	911
Regional Medical Center .....	(256) 235-5121
Military Police (SSG Busch) .....	(256) 848-5680, 848-4824
DOD Guard Force (Mr. Bolton) .....	(256) 848-5680, 848-4732
Anniston Police Department .....	(256) 238-1800
Chemical Agent Emergencies .....	(256) 895-1598
(Ken Barnett, CEHNC).....	cell phone (256) 310-0604
UXO Emergencies .....	(256) 895-1598
(Ken Barnett, CEHNC).....	cell phone (256) 310-0604
UXO Nonemergencies/Reporting Only (Ronald Levy) .....	(256) 848-3758
Baltzell Gate Guard Shack (Staffed 1600-0700 hours, Mon-Sun) .....	(256) 848-5693, 848-3821
National Response Center & Terrorist Hotline.....	(800) 424-8802
Poison Control Center.....	(800) 462-0800
EPA Region IV .....	(404) 562-8725
Ronald Levy, Chief, FTMC Environmental Management .....	(256) 848-3758
Ellis Pope, U.S. Army Corps of Engineers.....	(334) 690-3077
Jeanne Yacoub, IT Project Manager.....	(770) 663-1429
Bill Hetrick, IT H&S Manager .....	(865) 690-3211
Mike Moore, Fort McClellan Safety Officer .....	(256) 848-5433
Dr. Elaine Theriault, IT Occupational Physician.....	(800) 229-3674

# **Table of Contents**

---

	<b>Page</b>
List of Tables .....	ii
List of Figures .....	ii
List of Acronyms .....	iii
1.0 Site Work Plan Summary.....	1
2.0 Site Characterization and Analysis.....	2
2.1 Anticipated Hazards .....	2
2.2 General Site Information.....	2
3.0 Personal Protective Equipment.....	4
4.0 Site Monitoring .....	6
5.0 Activity Hazard Analysis.....	7

## **List of Tables**

---

<b>Number</b>	<b>Title</b>	<b>Follows Page</b>
2-1	Toxicological and Physical Properties of Chemicals	2
4-1	Action Levels	6
4-2	Air Monitoring Frequency and Location	6
5-1	Activity Hazard Analysis	7

## **List of Figures**

---

<b>Number</b>	<b>Title</b>	<b>Follows Page</b>
1-1	Organization Chart	1
5-1	Hospital Emergency Route	7

## ***List of Acronyms***

---

See Attachment 1, List of Abbreviations and Acronyms, of the Site-Specific Field Sampling Plan contained in this binder.

## **1.0 Site Work Plan Summary**

---

**Project Objective.** The objective of this site investigation at Fort McClellan (FTMC), Calhoun County, Alabama is to collect and analyze samples at the Training Area T-31, Parcels 184(7) and 185(7).

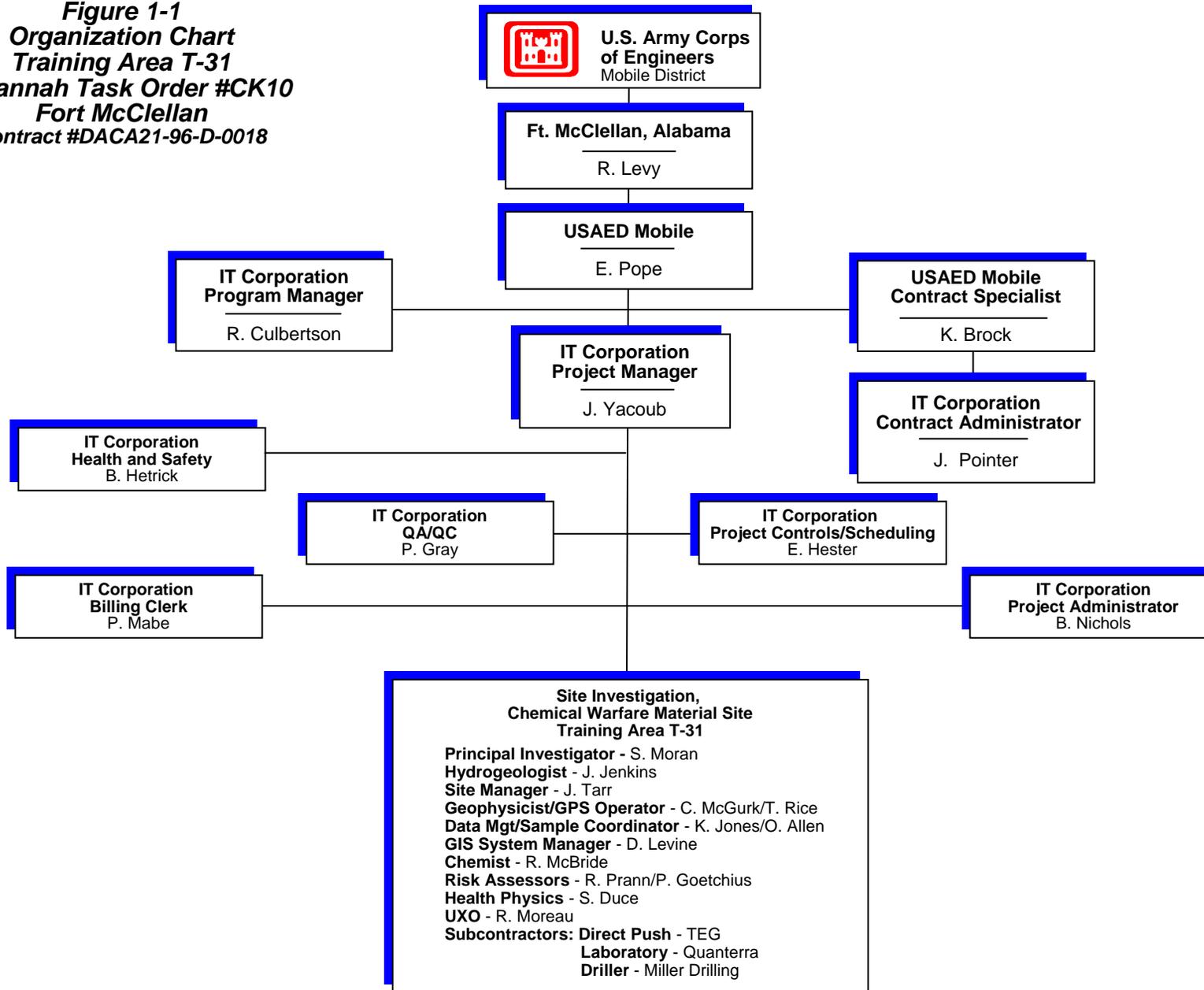
### **Project Tasks**

- Conduct a surface and near surface unexploded ordnance (UXO) survey over all areas to be included in the sampling effort for the purpose of UXO avoidance.
- Provide downhole UXO support for all intrusive drilling activity to determine buried downhole hazards for the purpose of UXO avoidance.
- Install seven groundwater monitoring wells.
- Collect seven surface soil samples, seven subsurface soil samples, seven groundwater samples, four surface water samples, and four sediment samples.

**Personnel Requirements.** Up to 15 employees. See Figure 1-1 for an organization chart.

Note: All personnel on this site shall have received training, informational programs, and medical surveillance as outlined in the installation-wide safety and health plan (SHP) for site investigations at FTMC, and be familiar with the requirements of this site-specific SHP. This site-specific health and safety plan must be used in conjunction with the SHP, FTMC, Alabama.

**Figure 1-1  
 Organization Chart  
 Training Area T-31  
 Savannah Task Order #CK10  
 Fort McClellan  
 Contract #DACA21-96-D-0018**



## **2.0 Site Characterization and Analysis**

---

### **2.1 Anticipated Hazards**

The activity hazard analysis in Chapter 5.0 contains project-specific practices utilized to reduce or eliminate anticipated site hazards. The activity hazard analysis indicates specific chemical and physical hazards that may be present and encountered during each task from on-site operations. Below each task is a list of hazards and specific actions that will be taken to control the respective hazards. These control measures may include work practice controls, engineering controls, and/or use of appropriate personal protective equipment (PPE).

The Chemical Warfare Material Site, Training Area T-31, Parcels 184(7) and 185(7) is located in the north-central area of the FTMC Main Post. Training Area T-31 is located near Range 31 and occupies approximately 12 acres. According to the 1999 *Draft-Final Work Plan/Site Safety Submission* by Parsons Engineering Science, the site is in a valley surrounded by Cemetery Hill to the west, Reservoir Ridge to the south, and Caffey Hill to the southwest. The training area partly overlaps with historic firing ranges for 37 millimeter, small arms and machine guns. The site was used from 1957 to 1969 as a Technical Escort Reaction Area and currently has unrestricted access. Training activities conducted here reportedly were using sarin (GB) and distilled mustard (HD). The decontaminants supertropical bleach (STB) and decontamination solution No. 2 (DS2) may also have been used here. When chemical warfare training was deactivated in 1973, training aids used at the site were reportedly moved to Area T-38.

Table 2-1 contains the toxicological and physiological properties of chemicals anticipated or to be used at the Training Area T-31. Contaminants of concern at the area include DS2, GB, HD, lead, and STB.

The possibility of UXO exists at the Training Area T-31; therefore, UXO surface sweeps and downhole surveys of soil borings will be required to support field activities at the Training Area T-31. The surface sweeps and downhole surveys will be conducted to identify anomalies for the purposes of UXO avoidance.

Table 2-1

**Toxicological and Physical Properties of Chemicals  
Training Area T-31  
Fort McClellan, Calhoun County, Alabama**

(Page 1 of 4)

Substance [CAS]	IP <sup>a</sup> (eV)	Odor Threshold (ppm)	Route <sup>b</sup>	Symptoms of Exposure	Treatment	TWA <sup>c</sup>	STEL <sup>d</sup>	Source <sup>e</sup>	IDLH (NIOSH) <sup>f</sup>
Acetone [67-64-1]	9.7	13-100	Inh Ing Con	Irritated eyes, nose, and throat; headache, dizziness; dermatitis.	Eye: Irrigate immediately Skin: Soap wash immediately Breath: Respiratory support Swallow: Immediate medical attention	750 ppm 750 ppm 250 ppm	1,000 ppm 1,000 ppm	PEL TLV REL	20,000 ppm
DS2	?	?	Inh Ing Con	Direct contact will corrode skin, cause corneal opacification, severe burns, and esophageal stricture; inhalation may cause CNS depression, liver damage, nausea, vomiting, and respiratory irritation. Repeated skin and respiratory exposure can cause skin sensitization and asthma.	Eye: Irrigate immediately Skin: Water flush immediately Breath: Respiratory support Swallow: Immediate medical attention. Give milk/water if conscious	1 ppm 1 ppm --	-- -- --	PEL TLV REL	
Fuel oil (diesel oil, medium)	?	?	Ing Inh Con	Ingestion causes nausea, vomiting, and cramps; depressed central nervous system, headache, coma, death; pulmonary irritation; kidney and liver damage; aspiration causes severe lung irritation, coughing, gagging, dyspnea, substernal stress, pulmonary edema; broncho-pneumonia; excited, then depressed, central nervous system.	Eye: Irrigate promptly Skin: Soap wash Breath: Respiratory support Swallow: Immediate medical attention Aspiration: Immediate medical attention			PEL TLV REL	

Table 2-1

Toxicological and Physical Properties of Chemicals  
 Training Area T-31  
 Fort McClellan, Calhoun County, Alabama

(Page 2 of 4)

Substance [CAS]	IP <sup>a</sup> (eV)	Odor Threshold (ppm)	Route <sup>b</sup>	Symptoms of Exposure	Treatment	TWA <sup>c</sup>	STEL <sup>d</sup>	Source <sup>e</sup>	IDLH (NIOSH) <sup>f</sup>
GB	?	?	Abs	Anticholinesterase agent producing cholinergic poisoning; tightness in chest, wheezing, increased bronchial secretion, cough, breathing difficulty, pulmonary edema, death; CNS depression; coma; convulsions; sweating; salivation, abdominal cramps, heartburn, belching, diarrhea, involuntary defecation.	Eye: Irrigate immediately (15 min). Transfer to medical facility Skin: Remove victim from area immediately. Flush skin and clothes with bleach within 1 minute. Cut and remove contaminated clothing, then wash skin again with soap and water. Transfer to medical facility. Breath: Remove from area immediately. Transfer to medical facility		C 0.0001 mg/m <sup>3</sup>	AEL	0.2 mg/m <sup>3</sup>
HD	?	0.0006 mg/m <sup>3</sup>	Abs Inh	Garlic-like odor. Eye and respiratory tract irritation; redness of skin and blisters develop 4 to 24 hours after exposure; hoarseness, sore throat, coughing, pulmonary edema.	Treat like a thermal burn. Do not break blisters. Eye: Irrigate immediately. Transfer to medical facility. Skin: Remove victim from area immediately. Flush skin and clothes with bleach within 1 minute. Cut and remove contaminated clothing, then wash skin again with soap and water. Transfer to medical facility. Breath: Remove from area immediately. Transfer to medical facility		C 0.003 mg/m <sup>3</sup>	AEL	0.5 mg/m <sup>3</sup>

Table 2-1

Toxicological and Physical Properties of Chemicals  
 Training Area T-31  
 Fort McClellan, Calhoun County, Alabama

(Page 3 of 4)

Substance [CAS]	IP <sup>a</sup> (eV)	Odor Threshold (ppm)	Route <sup>b</sup>	Symptoms of Exposure	Treatment	TWA <sup>c</sup>	STEL <sup>d</sup>	Source <sup>e</sup>	IDLH (NIOSH) <sup>f</sup>
Isopropyl alcohol (isopropanol) [67-63-0]	10.16	43-200	Inh Ing Con	Mild irritation of the eyes, nose, and throat; drowsiness, dizziness, headache; dry, cracked skin.	Eye: Irrigate immediately Skin: Water flush Breath: Respiratory support Swallow: Immediate medical attention	400 ppm 400 ppm 400 ppm	500 ppm 500 ppm 500 ppm	PEL TLV REL	12,000 ppm
Lead [7439-92-1]	NA	NA	Inh Ing Con	Weak, insomnia, facial pallor, constipated, abdominal pain, colic, anemia, irritated eyes, paralysis of wrists and ankles, encephalopathy.	Eye: Irrigate immediately Skin: Soap wash promptly Breath: Respiratory support Swallow: Immediate medical attention	0.05 mg/m <sup>3</sup> 0.05 mg/m <sup>3</sup> 0.1 mg/m <sup>3</sup>		PEL TLV REL	100 mg/m
Motor Oil [NA]	?	?	Inh Ing	Irritated eyes, skin, respiratory system; usually only a problem if misted or ingested.	Eye: Irrigate immediately (15 min) Skin: Soap wash immediately Swallow: Immediate medical attention		500 ppm 500 ppm 500 ppm	PEL TLV REL	
Nitric acid [7697-37-2]	11.95	0.3-1	Inh Ing Con	Irritated eyes, mucous membranes, and skin; delayed pulmonary edema, pneumonitis, bronchitis; dental erosion.	Eye: Irrigate immediately Skin: Water flush promptly Breath: Respiratory support Swallow: Immediate medical attention	2 ppm 2 ppm 2 ppm	4 ppm 4 ppm 4 ppm	PEL TLV REL	200 ppm

## Table 2-1

### Toxicological and Physical Properties of Chemicals Training Area T-31 Fort McClellan, Calhoun County, Alabama

(Page 4 of 4)

<sup>a</sup>IP = Ionization potential (electron volts).

<sup>b</sup>Route = Inh, Inhalation; Abs, Skin absorption; Ing, Ingestion; Con, Skin and/or eye contact.

<sup>c</sup>TWA = Time-weighted average. The TWA concentration for a normal work day (usually 8 or 10 hours) and a 40-hour work week, to which nearly all workers may be repeatedly exposed, day after day without adverse effect.

<sup>d</sup>STEL = Short-term exposure limit. A 15-minute TWA exposure that should not be exceeded at any time during a workday, even if the TWA is not exceeded.

<sup>e</sup>PEL = Occupational Safety and Health Administration (OSHA) permissible exposure limit (29 CFR 1910.1000, Table Z).

AEL = Airborne Exposure Limit.

TLV = American Conference of Governmental Industrial Hygiene (ACGIH) threshold limit value—TWA.

REL = National Institute for Occupational Safety and Health (NIOSH) recommended exposure limit.

<sup>f</sup>IDLH (NIOSH)—Immediately dangerous to life or health (NIOSH). Represents the maximum concentration from which, in the event of respirator failure, one could escape within 30 minutes without a respirator and without experiencing any escape-impairing or irreversible health effects.

NE = No evidence could be found for the existence of an IDLH (NIOSH Pocket Guide to Chemical Hazards, Pub. 1998).

C = Ceiling limit value which should not be exceeded at any time.

Ca = Carcinogen.

NA = Not applicable.

? = Unknown.

LEL = Lower explosive limits.

LC<sub>50</sub> = Lethal concentration for 50 percent of population tested.

LD<sub>50</sub> = Lethal dose for 50 percent of population tested.

NIC = Notice of intended change (ACGIH).

#### References:

American Conference of Governmental Industrial Hygienists Guide to Occupational Exposure Values, 1998, compiled by the American Conference of Governmental Industrial Hygienists.

Amoore, J. E. Hautula, "Odor as an Aid to Chemical Safety," Journal of Applied Toxicology, 1983.

Clayton, George D., Clayton, F. E., Patty's Industrial Hygiene and Toxicology, 3rd ed., John Wiley & Sons, New York.

Documentation of TLVs and BEIs, American Conference of Governmental Industrial Hygienists, 6th ed., 1998.

Fazzuluri, F. A., Compilation of Odor and Taste Threshold Values Data, American Society for Testing and Materials, 1978.

Gemet, L. J. Van, Compilation of Odor Threshold Values in Air and Water, CIVO, Netherlands, 1977.

Gemet, L. J. Van, Compilation of Odor Threshold Values in Air and Water, Supplement IV, CIVO, Netherlands, 1977.

Lewis, Richard J., Sr., 1992, Sax's Dangerous Properties of Industrial Materials, 8th ed., Van Nostrand Reinhold, New York.

Micromedex Tomes Plus (R) System, 1992, Micromedex, Inc.

National Institute for Occupational Safety and Health Pocket Guide to Chemicals, Pub. 1998, National Institute for Occupational Safety and Health.

Odor Threshold for Chemicals with Established Occupational Health Standards, American Industrial Hygiene Association, 1989.

Respirator Selection Guide, 3M Occupational Health and Safety Division, 1993.

Verschueren, K., Handbook of Environmental Data on Organic Chemicals, Van Nostrand and Reinhold, 1977.

Warning Properties of Industrial Chemicals—Occupational Health Resource Center, Oregon Lung Association.

Workplace Environmental Exposure Levels, American Industrial Hygiene Association, 1992.

## **2.2 General Site Information**

**Duration of Planned Employee Activity.** Employee activity duration is 1 month.

**Pathways for Hazardous Substance Dispersion.** Possible pathways for hazardous substances in the area are groundwater, surface water, sediment, and soils.

### 3.0 Personal Protective Equipment

---

The work activities will begin in the following levels of protection. Also, a completed description of Level D, Modified Level D, and Level C PPE is provided.

Task	Initial Level of PPE
Staging equipment	Level D
Collecting samples	Modified Level D*
Install monitoring wells	Modified Level D*

\*Initial level will be raised to Level C or higher if air monitoring results for volatile organic hydrocarbons in the worker's breathing zone are greater than action levels.

**Level D.** The minimal level of protection that will be required of IT Corporation personnel at the site will be Level D. The following equipment will be used for Level D protection:

- Coveralls or work clothing
- Leather work gloves (when necessary)
- Steel-toed safety boots
- Safety glasses
- Hard hat
- Hearing protection (when working near/adjacent to operating equipment).

Note: UXO personnel should not wear hard hats and steel-toed shoes when engaged in ordnance operations unless a significant overhead hazard exists. Where overhead hazards exist, a chin strap will be worn with hard hats to prevent accidental falling of hard hat.

**Modified Level D.** The following equipment will be used for Level D-Modified protection:

- Permeable Tyvek, Kleenguard, or its equivalent
- Latex boot covers
- Nitrile, heavy work, or latex gloves
- Steel-toed safety boots
- Safety glasses
- Hard hat
- Hearing protection (when working near/adjacent to operating equipment).

Note: In addition to modified Level D PPE, the operator of high-pressure water jetting equipment shall wear metatarsal guards for the legs and feet and a face shield.

Note: UXO personnel should not wear hard hats and steel-toed shoes when engaged in ordnance operations unless a significant overhead hazard exists. Where overhead hazards exist, a chin strap will be worn with hard hats to prevent accidental falling of hard hat.

**Level C.** Level C protection will not be used unless air-monitoring data indicate the need for upgrade; however, the equipment shall be readily available on site. The following equipment will be used for Level C protection:

- X National Institute of Occupational Safety and Health-approved full-face, air-purifying respirators equipped with organic vapor/acid gas/P100 cartridge
- X Hooded, polyethylene-coated Tyvek, taped at gloves, boots, and respirator
- X Nitrile gloves (outer)
- X Latex or lightweight nitrile gloves (inner)
- X Neoprene steel-toed boots or polyvinyl chloride overbooties/steel-toed safety boots
- X Hard hat
- X Hearing protection (when working near/adjacent to operating equipment)

Note: In addition to Level C PPE, the operator of high-pressure water jetting equipment shall wear metatarsal guards for the legs and feet and a face shield.

## 4.0 Site Monitoring

---

The environmental contaminants of concern resulting from Training Area T-31 operations are DS2, GB, HD, lead, and STB. Table 4-1 contains action levels for site monitoring at the sites.

**Chemical.** Monitoring will be performed by the site safety and health officer during the performance of ground intrusive operations. A calibrated flame ionization detector (i.e., OVA 128 or equivalent) organic vapor analyzer will be utilized to monitor the sampling locations and breathing zones to determine if any organic material may be present that would necessitate upgrading of protection level. A calibrated combustible gas/oxygen indicator will be utilized to monitor the work areas to determine if any combustible/flammable oxygen levels may be present that would necessitate evacuation of the work area. Table 4-2 contains the air monitoring frequency and location for site monitoring at the work sites.

**Unexploded Ordnance.** UXO safety will be achieved by employing UXO specialists to ensure that field personnel do not come into contact with UXO. In areas where UXO is suspected to exist, the UXO specialists will perform the following UXO avoidance operations.

- X **Area UXO Surveys Using Magnetometers.** During this operation UXO on the surface will be detected and marked for avoidance during field operations. Metal objects just below the surface (within 2 feet) will also be marked to indicate the potential hazard.
  
- X **Downhole UXO Surveys.** UXO specialists will perform downhole magnetometer surveys to detect metal objects in the path of the boring apparatus until undisturbed soils are reached. The boring location will be moved if subsurface metal objects are detected.

If UXO is encountered, personnel will contact the site manager and UXO specialist immediately. Personnel will evacuate the immediate area and secure it.

**Table 4-1**

**Action Levels  
Training Area T-31  
Fort McClellan, Calhoun County, Alabama**

(Page 1 of 2)

When in Level C PPE

Analyte	Action Level	Required Action <sup>a</sup>
Volatile Organic Hydrocarbons (VOH)	$\geq 10$ ppm above background in breathing zone (BZ)	Stop work, evacuate work area, upgrade to Level B.
Oxygen	$\geq 20\%$ , $\leq 23\%$ $< 20\%$ , $> 23\%$	Normal operations. Stop work, evacuate work area.
Flammable vapors	$\geq 10\%$ LEL $< 10\%$ LEL	Stop work, evacuate work area. Continue operations, monitor for VOCs.

When in Level D Modified/D PPE

Analyte	Action Level	Required Action <sup>b</sup>
VOHs	$\geq 5$ ppm above background in BZ	Stop activities, suspend work activities for 15 to 30 minutes, if readings are sustained then upgrade to Level C PPE.
Oxygen	$\geq 20\%$ , $\leq 23\%$ $< 20\%$ , $> 23\%$	Normal operations. Stop work, evacuate work area.
Flammable vapors	$\geq 10\%$ LEL $< 10\%$ LEL	Stop work, evacuate work area. Continue operations, monitor for VOCs.

**Table 4-1**

**Action Levels  
Training Area T-31  
Fort McClellan, Calhoun County, Alabama**

(Page 2 of 2)

When in Support Zone

Analyte	Action Level	Required Action
VOHs	$\geq 1$ ppm above background in BZ	Evacuate support zone and re-establish perimeter of exclusion zone.

<sup>a</sup> Four instantaneous peaks in any 15-minute period or a sustained reading for 5 minutes in excess of the action level will trigger a response.

<sup>b</sup> Contact with the H&S manager must be made prior to continuance of work. The H&S manager may then initiate perimeter/integrated air sampling along with additional engineering controls.

**No one is permitted to downgrade levels of PPE without authorization from the H&S manager.**

**Table 4-2**

**Air Monitoring Frequency and Location  
Training Area T-31  
Fort McClellan, Calhoun County, Alabama**

Work Activity	Instrument	Frequency	Location
Staging equipment	OV Monitor	Initially for area	Breathing zone (BZ) of employees
Land Survey	OV Monitor	Initially for area	BZ of employees
Sampling (water, sediment, and soil)	OV Monitor LEL/O <sub>2</sub> Monitor	Continuously Continuously	BZ of employees and/or work area
Installing monitoring wells	OV Monitor LEL/O <sub>2</sub> Monitor	Continuously Continuously	BZ of employees and/or work area

OV = Organic vapor.

LEL/O<sub>2</sub> = Lower explosive level/oxygen.

## ***5.0 Activity Hazard Analysis***

---

The attached activity hazard analysis (Table 5-1) is provided for the following activities:

- Setup of equipment and general field activities
- Land survey
- Soil, sediment, and water sampling
- Installation of monitoring wells.

All injuries and illnesses must be immediately reported to the site manager or the site safety and health officer, who will then notify off-site personnel and organizations as necessary.

If hospital care must be provided, the victim shall be treated at Northeast Regional Medical Center. Directions to the hospital are provided in Figure 5-1.

**Table 5-1**

**Activity Hazard Analysis  
Training Area T-31  
Fort McClellan, Calhoun County, Alabama**

(Page 1 of 16)

Activity	Potential Hazards	Recommended Controls
Staging equipment	Unexploded ordnance (UXO)	<ul style="list-style-type: none"> <li>• UXO specialists will perform UXO surface clearance and/or UXO downhole clearance for UXO avoidance. See site-specific safety and health plans (SSHP) to determine if required.</li> </ul>
	Slip, trip, and fall hazards	<ul style="list-style-type: none"> <li>• Determine best access route before transporting equipment.</li> <li>• Practice good housekeeping; keep work area picked up and clean as feasible.</li> <li>• Continually inspect the work area for slip, trip, and fall hazards.</li> <li>• Look before you step; ensure safe and secure footing.</li> </ul>
	Heavy lifting	<ul style="list-style-type: none"> <li>• Use proper lifting techniques. Lifts greater than 60 pounds require assistance or mechanical equipment.</li> </ul>
	Falling objects	<ul style="list-style-type: none"> <li>• Stay alert and clear of materials suspended overhead; wear hard hat and steel-toed boots.</li> </ul>
	Flying debris, dirt, dust, etc.	<ul style="list-style-type: none"> <li>• Wear safety glasses/goggles; ensure that eye wash is in proper working condition.</li> </ul>
	Pinch points	<ul style="list-style-type: none"> <li>• Keep hands, fingers, and feet clear of moving/suspended materials and equipment.</li> <li>• Beware of contact points.</li> <li>• Stay alert at all times!</li> </ul>
	Cuts/bruises	<ul style="list-style-type: none"> <li>• Use cotton or leather work gloves for material handling.</li> </ul>
	Bees, spiders, and snakes	<ul style="list-style-type: none"> <li>• Inspect work area carefully and avoid placing hands and feet into concealed areas.</li> </ul>
	Ticks	<ul style="list-style-type: none"> <li>• Wear light colored clothing (can see ticks better).</li> <li>• Mow vegetated and small brush areas.</li> <li>• Wear insect repellent.</li> <li>• Wear long sleeves and long pants.</li> <li>• Visually check oneself promptly and frequently after exiting the work area.</li> </ul>
	Fire	<ul style="list-style-type: none"> <li>• Fire extinguishers shall be suitably placed, distinctly marked, readily accessible, and maintained in a fully charged and operable condition.</li> </ul>

**Table 5-1**

**Activity Hazard Analysis  
Training Area T-31  
Fort McClellan, Calhoun County, Alabama**

(Page 2 of 16)

Activity	Potential Hazards	Recommended Controls
Staging equipment (continued)	Contact with moving equipment/vehicles	<ul style="list-style-type: none"> <li>• Work area will be barricaded/demarcated.</li> <li>• Equipment will be laid out in an area free of traffic flow.</li> </ul>
	Hazard communication	<ul style="list-style-type: none"> <li>• Label all containers as to contents and dispose of properly.</li> <li>• Ensure Material Safety Data Sheets (MSDS) are available for hazardous chemicals used on site.</li> </ul>
	Noise	<ul style="list-style-type: none"> <li>• Sound levels above 85 decibels (dBA) mandates hearing protection.</li> </ul>
	Lighting	<ul style="list-style-type: none"> <li>• Adequate lighting will be provided to ensure a safe working environment.</li> </ul>
	Cold stress	<ul style="list-style-type: none"> <li>• Workers should wear insulated clothing when temperatures drop below 40 degrees Fahrenheit (°F).</li> <li>• Drink warm beverages on breaks. Refrain from drinking caffeinated beverages.</li> <li>• Remove wet clothing promptly.</li> <li>• Take breaks in warm areas.</li> <li>• Reduce work periods as necessary.</li> <li>• Layer work clothing.</li> </ul>
	Poison ivy/oak/sumac	<ul style="list-style-type: none"> <li>• Avoid plant areas if possible.</li> <li>• Wear long sleeves and long pants.</li> <li>• Promptly wash clothing that has contacted poisonous plants.</li> <li>• Wash affected areas immediately with soap and water.</li> </ul>
	Heat rash	<ul style="list-style-type: none"> <li>• Keep the skin clean and dry.</li> <li>• Change perspiration-soaked clothing, as necessary.</li> <li>• Bathe at end of work shift or day.</li> <li>• Apply powder to affected area.</li> </ul>
	Heat cramps	<ul style="list-style-type: none"> <li>• Drink plenty of cool fluids even when not thirsty.</li> <li>• Provide cool fluid for work crews.</li> <li>• Move victim to shaded, cool area.</li> </ul>

**Table 5-1**

**Activity Hazard Analysis  
Training Area T-31  
Fort McClellan, Calhoun County, Alabama**

(Page 3 of 16)

Activity	Potential Hazards	Recommended Controls
Staging equipment (continued)	Heat exhaustion	<ul style="list-style-type: none"> <li>• Conduct physiological worker monitoring as needed (i.e., heart rate, oral temperature).</li> <li>• Set up work/rest periods.</li> <li>• Use the buddy system.</li> <li>• Allow workers time to acclimate.</li> <li>• Have ice packs available for use.</li> <li>• Take frequent breaks.</li> </ul>
	Heat stroke	<ul style="list-style-type: none"> <li>• Evaluate possibility of night work.</li> <li>• Perform physiological monitoring on workers during breaks.</li> <li>• Wear body cooling devices.</li> </ul>
	Contact with moving equipment/vehicles	<ul style="list-style-type: none"> <li>• Work area will be barricaded/demarcated.</li> <li>• Equipment will be laid out in an area free of traffic flow.</li> <li>• Barricades shall be used on or around work areas when it is necessary to prevent the inadvertent intrusion of pedestrian traffic.</li> <li>• Barriers shall be used to protect workers from vehicular traffic.</li> <li>• Barriers shall be used to guard excavations adjacent to streets or roadways.</li> <li>• Flagging shall be used for the short term (less than 24 hours) to identify hazards until proper barricades or barriers are provided.</li> <li>• Heavy equipment shall have backup alarms.</li> </ul>
	Forklift operations	<ul style="list-style-type: none"> <li>• Use qualified and trained forklift operators.</li> <li>• The operator shall not exceed the load capacity rating for the forklift.</li> <li>• The load capacity shall be clearly visible on the forklift.</li> <li>• Forklift operators shall inform their supervisor of any prescribed medication that they are taking that would impair their judgement.</li> </ul>
	Portable electric tools	<ul style="list-style-type: none"> <li>• Portable electric tools that are unsafe due to faulty plugs, damaged cords, or other reasons, shall be tagged (do not use) and removed from service.</li> <li>• Portable electric tools and all cord and plug connected equipment shall be protected by a ground fault circuit interrupter (GFCI) device.</li> <li>• Electrical tools shall be inspected daily prior to use.</li> </ul>

**Table 5-1**

**Activity Hazard Analysis  
Training Area T-31  
Fort McClellan, Calhoun County, Alabama**

(Page 4 of 16)

Activity	Potential Hazards	Recommended Controls
Staging equipment (continued)	Extension cords	<ul style="list-style-type: none"> <li>• Extension cords that have faulty plugs, damaged insulation, or are unsafe in any way shall be removed from service.</li> <li>• Cords shall be protected from damage from sharp edges, projections, pinch points (doorways), and vehicular traffic.</li> <li>• Cords shall be suspended with a nonconductive support (rope, plastic ties, etc.).</li> <li>• Cords shall be designed for hard duty.</li> <li>• Cords shall be inspected daily.</li> </ul>
	Lightning strikes	<ul style="list-style-type: none"> <li>• Whenever possible, halt activities and take cover.</li> <li>• If outdoors, stay low to the ground.</li> <li>• Limit the body surface area that is in contact with the ground (i.e., kneeling on one knee is better than laying on the ground).</li> <li>• Seek shelter in a building if possible.</li> <li>• Stay away from windows.</li> <li>• If available, crouch under a group of trees instead of one single tree.</li> <li>• Keep all body parts in contact with the ground as close as possible.</li> <li>• Remain 6 feet away from tree trunk if seeking shelter beneath tree(s).</li> <li>• If in a group, keep 6 feet of distance between people.</li> </ul>
	Thunderstorms, tornadoes	<ul style="list-style-type: none"> <li>• Listen to radio or TV announcements for pending weather information.</li> <li>• Cease field activities during thunderstorm or tornado warnings.</li> <li>• Seek shelter. Do not try to outrun a tornado.</li> </ul>
Surveying	Slip, trip, fall	<ul style="list-style-type: none"> <li>• Site workers will be required to wear hard hat, safety glasses with side shields, work gloves, and steel-toe boots when working in the field.</li> <li>• Provide adequate lighting in all work areas.</li> <li>• Whenever possible, avoid routing cords and hoses across walking pathways.</li> <li>• Flag or cover inconspicuous holes to protect against falls.</li> <li>• Work areas will be kept clean and orderly.</li> <li>• Garbage and trash will be disposed of daily in approved refuse containers.</li> <li>• Tools and accessories will be properly maintained and stored.</li> <li>• Work areas and floors will be kept free of dirt, grease, and slippery materials.</li> </ul>
	UXO	<ul style="list-style-type: none"> <li>• UXO specialists will perform UXO surface clearance for UXO avoidance.</li> </ul>

**Table 5-1**

**Activity Hazard Analysis  
Training Area T-31  
Fort McClellan, Calhoun County, Alabama**

(Page 5 of 16)

Activity	Potential Hazards	Recommended Controls
Surveying (continued)	Traffic accidents	<ul style="list-style-type: none"> <li>• Place physical barrier (i.e., barricades, fencing) around work areas regularly occupied by pedestrians.</li> <li>• If working adjacent to roadways, have workers wear fluorescent orange vests.</li> <li>• Use warning signs or lights to alert oncoming traffic.</li> <li>• Assign flag person(s) if necessary to direct local traffic.</li> <li>• Set up temporary parking locations outside the immediate work area.</li> <li>• Motor vehicle operators shall obey all posted traffic signs, signals, and speed limits.</li> <li>• Pedestrians have the right-of-way.</li> <li>• Wear seat belts when vehicles are in motion.</li> </ul>
	Wildlife hazards	<ul style="list-style-type: none"> <li>• Workers should be cautious when driving through the site in order to avoid encounters with passing animals.</li> </ul>
	Biological hazards	<ul style="list-style-type: none"> <li>• Walking through overgrown grass areas, watch for snakes (rattlesnakes, moccasins, copperheads).</li> </ul>
	Ticks	<ul style="list-style-type: none"> <li>• Wear light colored clothing (can see ticks better).</li> <li>• Mow vegetated and small brush areas.</li> <li>• Wear insect repellent.</li> <li>• Wear long sleeves and long pants.</li> <li>• Visually check oneself promptly and frequently after exiting the work area.</li> </ul>
	Poison ivy/oak/sumac	<ul style="list-style-type: none"> <li>• Avoid plant areas if possible.</li> <li>• Wear long sleeves and long pants.</li> <li>• Promptly wash clothing that has contacted poisonous plants.</li> <li>• Wash affected areas immediately with soap and water.</li> </ul>
Hydropunch sampling	Faulty or damaged equipment being utilized to perform work	<ul style="list-style-type: none"> <li>• All machinery or mechanized equipment will be inspected by a competent mechanic and be certified to be in safe operating condition.</li> <li>• Equipment will be inspected before being put to use and at the beginning of each shift.</li> <li>• Faulty/unsafe equipment will be tagged and if possible locked out.</li> <li>• Drill rigs shall be equipped with reverse signal alarm, backup warning lights, or the vehicle is backed up only when an observer signals it is safe to do so.</li> </ul>

**Table 5-1**

**Activity Hazard Analysis  
Training Area T-31  
Fort McClellan, Calhoun County, Alabama**

(Page 6 of 16)

Activity	Potential Hazards	Recommended Controls
Hydropunch sampling (continued)	Uneven terrain, poor ground support, inadequate clearances, contact with utilities	<ul style="list-style-type: none"> <li>• Inspections or determinations of road conditions and structures shall be made in advance to ensure that clearances and load capacities are safe for the passage or placing of any machinery or equipment.</li> <li>• All mobile equipment and areas in which they are operated shall be adequately illuminated.</li> <li>• Whenever the equipment is parked, the parking brake shall be set.</li> <li>• Equipment parked on inclines will have the wheels chocked.</li> <li>• Inspect brakes and tire pressure on drill rig before staging for work.</li> <li>• Obtain trenching/drilling permit prior to operation.</li> </ul>
	Inexperienced operator	<ul style="list-style-type: none"> <li>• Machinery and mechanized equipment shall be operated only by designated personnel.</li> <li>• Heavy equipment operators shall inform their supervisor(s) of any prescribed medication that they are taking that would impair their judgement.</li> </ul>
	Jacks/outriggers	<ul style="list-style-type: none"> <li>• Ensure proper footing and cribbing.</li> </ul>
	UXO	<ul style="list-style-type: none"> <li>• UXO specialists will perform UXO surface clearance and/or UXO downhole clearance for UXO avoidance.</li> </ul>
	Falling objects	<ul style="list-style-type: none"> <li>• Remove unsecured tools and materials before raising or lowering the derrick.</li> <li>• Stay alert and clear of materials suspended overhead.</li> </ul>
	Pinch points	<ul style="list-style-type: none"> <li>• Keep feet and hands clear of moving/suspended materials and equipment.</li> <li>• Stay alert at all times!</li> </ul>
	Fire	<ul style="list-style-type: none"> <li>• Mechanized equipment shall be shut down prior to and during fueling operations.</li> <li>• Have fire extinguishers inspected and readily available.</li> </ul>
	Fall hazards	<ul style="list-style-type: none"> <li>• Personnel are not allowed to work off of machinery or use them as ladders.</li> <li>• Use fall protection when working above 6 feet.</li> </ul>
	Noise	<ul style="list-style-type: none"> <li>• Hearing protection is mandatory above 85 dBA.</li> </ul>
	Contact with rotating or reciprocating machine part	<ul style="list-style-type: none"> <li>• Use machine guards; use long-handled shovels to remove auger cuttings.</li> <li>• Safe lockout procedures for maintenance work.</li> </ul>

**Table 5-1**

**Activity Hazard Analysis  
Training Area T-31  
Fort McClellan, Calhoun County, Alabama**

(Page 7 of 16)

Activity	Potential Hazards	Recommended Controls
Hydropunch sampling (continued)	Heavy lifting	<ul style="list-style-type: none"> <li>• Use proper lifting techniques. Lifts greater than 60 pounds require assistance or mechanical equipment; size-up the lift.</li> </ul>
	Slip, trip, and fall hazards	<ul style="list-style-type: none"> <li>• Practice good housekeeping; keep work area picked up and clean as feasible.</li> <li>• Continually inspect the work area for slip, trip, and fall hazards.</li> </ul>
	Contact with potentially contaminated materials	<ul style="list-style-type: none"> <li>• Real-time air monitoring will take place. If necessary, proper personal protective clothing and equipment will be utilized.</li> </ul>
Groundwater sampling	Cross-contamination and contact with potentially contaminated materials	<ul style="list-style-type: none"> <li>• Sampling technicians will wear proper protective clothing and equipment to safeguard against potential contamination.</li> <li>• Avoid skin contact with water.</li> <li>• Handle samples with care.</li> <li>• Only essential personnel will be in the work area.</li> <li>• Real-time air monitoring will take place before and during sampling activities.</li> <li>• All personnel will follow good hygiene practices.</li> <li>• Proper decontamination procedures will be followed.</li> <li>• All liquids and materials used for decontamination will be contained and disposed of in accordance with federal, state, and local regulations.</li> </ul>
	UXO	<ul style="list-style-type: none"> <li>• UXO specialists will perform UXO surface clearance and/or UXO downhole clearance for UXO avoidance.</li> </ul>
	Cut hazards	<ul style="list-style-type: none"> <li>• Use care when handling glassware.</li> <li>• Wear adequate hand protection.</li> </ul>
	Hazard communication	<ul style="list-style-type: none"> <li>• MSDSs shall be obtained for chemicals brought on site.</li> <li>• Label all containers as to contents.</li> </ul>
	Strains/sprains	<ul style="list-style-type: none"> <li>• Use the proper tool for the job being performed.</li> <li>• Get assistance if needed.</li> <li>• Avoid twisting/turning while pulling on tools, moving equipment, etc.</li> </ul>
	Drowning	<ul style="list-style-type: none"> <li>• Personal flotation devices will be worn when sampling on or adjacent to the water.</li> </ul>

**Table 5-1**  
**Activity Hazard Analysis**  
**Training Area T-31**  
**Fort McClellan, Calhoun County, Alabama**

(Page 8 of 16)

Activity	Potential Hazards	Recommended Controls
Groundwater sampling (continued)	Spills/residual materials	<ul style="list-style-type: none"> <li>• Absorbent material and containers will be kept available where leaks or spills may occur.</li> </ul>
	Lighting	<ul style="list-style-type: none"> <li>• Adequate lighting will be provided to ensure a safe working environment.</li> </ul>
	Unattended worker	<ul style="list-style-type: none"> <li>• Use "buddy system" - visual contact will be maintained with the sampling technician during sampling activities.</li> </ul>
Soil boring and surface/subsurface sampling	Cross-contamination and contact with potentially contaminated materials	<ul style="list-style-type: none"> <li>• Sampling technicians will wear proper protective clothing and equipment to safeguard against potential contamination.</li> <li>• Avoid skin contact with paint.</li> <li>• Handle samples with care.</li> <li>• Only essential personnel will be in the work area.</li> <li>• All personnel will follow good hygiene practices.</li> <li>• Proper decontamination procedures will be followed.</li> <li>• All liquids and materials used for decontamination will be contained and disposed of in accordance with federal, state, and local regulations.</li> </ul>
	Cut hazards	<ul style="list-style-type: none"> <li>• Use care when handling glassware.</li> <li>• Wear adequate hand protection.</li> </ul>
	Slip, trip, and fall hazards	<ul style="list-style-type: none"> <li>• Practice good housekeeping; keep work area picked up and clean as feasible.</li> <li>• Continually inspect the work area for slip, trip, and fall hazards.</li> </ul>
	UXO	<ul style="list-style-type: none"> <li>• UXO specialists will perform UXO surface clearance and/or UXO downhole clearance for UXO avoidance.</li> </ul>
	Bees, spiders, and snakes	<ul style="list-style-type: none"> <li>• Workers shall inspect the work area carefully and avoid placing hands and feet into concealed areas.</li> <li>• Evaluate need for sensitive workers to have prescribed antibiotic or medicine to combat onset of symptoms.</li> </ul>
	Poison ivy/oak/sumac	<ul style="list-style-type: none"> <li>• Avoid plant areas if possible.</li> <li>• Wear long sleeves and long pants.</li> <li>• Promptly wash clothing that has contacted poisonous plants.</li> <li>• Wash affected areas immediately with soap and water.</li> </ul>

**Table 5-1**

**Activity Hazard Analysis  
Training Area T-31  
Fort McClellan, Calhoun County, Alabama**

(Page 9 of 16)

Activity	Potential Hazards	Recommended Controls
Soil boring and surface/subsurface sampling (continued)	Cold stress	<ul style="list-style-type: none"> <li>• Workers should wear insulated clothing when temperatures drop below 40 degrees Fahrenheit (°F).</li> <li>• Drink warm beverages on breaks. Refrain from drinking caffeinated beverages.</li> <li>• Remove wet clothing promptly.</li> <li>• Take breaks in warm areas.</li> <li>• Reduce work periods as necessary.</li> <li>• Layer work clothing.</li> </ul>
	Access/egress hazards	<ul style="list-style-type: none"> <li>• Use qualified and trained bushhog operator.</li> <li>• Keep employees out of the bushhog work area.</li> <li>• Utilize good housekeeping practices.</li> <li>• Keep aisleways, pathways, and work areas free of obstruction.</li> <li>• Clean ice or snow off of walkways or work stations.</li> <li>• Use appropriate footwear for the task assigned.</li> </ul>
	Heat rash	<ul style="list-style-type: none"> <li>• Keep the skin clean and dry.</li> <li>• Change perspiration-soaked clothing, as necessary.</li> <li>• Bathe at end of work shift or day.</li> <li>• Apply powder to affected area.</li> </ul>
	Heat cramps	<ul style="list-style-type: none"> <li>• Drink plenty of cool fluids even when not thirsty.</li> <li>• Provide cool fluid for work crews.</li> <li>• Move victim to shaded, cool area.</li> </ul>
	Heat exhaustion	<ul style="list-style-type: none"> <li>• Conduct physiological worker monitoring as needed (i.e., heart rate, oral temperature).</li> <li>• Set up work/rest periods.</li> <li>• Use the buddy system.</li> <li>• Allow workers time to acclimate.</li> <li>• Have ice packs available for use.</li> <li>• Take frequent breaks.</li> </ul>
	Heat stroke	<ul style="list-style-type: none"> <li>• Evaluate possibility of night work.</li> <li>• Perform physiological monitoring on workers during breaks.</li> <li>• Wear body cooling devices.</li> </ul>

**Table 5-1**  
**Activity Hazard Analysis**  
**Training Area T-31**  
**Fort McClellan, Calhoun County, Alabama**

(Page 10 of 16)

Activity	Potential Hazards	Recommended Controls
Soil boring and surface/subsurface sampling (continued)	Lightning strikes	<ul style="list-style-type: none"> <li>• Whenever possible, halt activities and take cover.</li> <li>• If outdoors, stay low to the ground.</li> <li>• Limit the body surface area that is in contact with the ground (i.e., kneeling on one knee is better than laying on the ground).</li> <li>• Seek shelter in a building if possible.</li> <li>• Stay away from windows.</li> <li>• If available, crouch under a group of trees instead of one single tree.</li> <li>• Keep all body parts in contact with the ground as close as possible.</li> <li>• If in a group, keep 6 feet of distance between people.</li> </ul>
	Thunderstorms, tornadoes	<ul style="list-style-type: none"> <li>• Listen to radio or TV announcements for pending weather information.</li> <li>• Cease field activities during thunderstorms or tornado warnings.</li> <li>• Seek shelter. Do not try to outrun a tornado.</li> </ul>
Installation of Monitoring Wells	Overhead hazards	<ul style="list-style-type: none"> <li>• Make sure no obstacles are within radius of boom. Always stay a safe distance from power lines.</li> </ul>
	Faulty or damaged equipment being utilized to perform work	<ul style="list-style-type: none"> <li>• All machinery or mechanized equipment will be inspected by a competent mechanic and be certified to be in safe operating condition.</li> <li>• Equipment will be inspected before being put to use and at the beginning of each shift.</li> <li>• Faulty/unsafe equipment will be tagged and if possible locked out.</li> <li>• Drill rigs and geoprobes shall be equipped with reverse signal alarm, backup warning lights, or the vehicle is backed up only when an observer signals it is safe to do so.</li> </ul>
	Heat rash	<ul style="list-style-type: none"> <li>• Keep the skin clean and dry.</li> <li>• Change perspiration-soaked clothing, as necessary.</li> <li>• Comply with IT Procedure HS 400 (May 13, 1999).</li> <li>• Bathe at end of work shift or day.</li> <li>• Apply powder to affected area.</li> </ul>
	Heat cramps	<ul style="list-style-type: none"> <li>• Drink plenty of cool fluids even when not thirsty.</li> <li>• Provide cool fluid for work crews.</li> <li>• Comply with IT Procedure HS 400 (May 13, 1999).</li> <li>• Move victim to shaded, cool area.</li> </ul>

**Table 5-1**

**Activity Hazard Analysis  
Training Area T-31  
Fort McClellan, Calhoun County, Alabama**

(Page 11 of 16)

Activity	Potential Hazards	Recommended Controls
Installation of Monitoring Wells (continued)	Heat exhaustion	<ul style="list-style-type: none"> <li>• Conduct physiological worker monitoring as needed (i.e., heart rate, oral temperature).</li> <li>• Set up work/rest periods.</li> <li>• Use the "buddy system."</li> <li>• Comply with IT Procedure HS 400 (May 13, 1999).</li> <li>• Allow workers time to acclimate.</li> <li>• Have ice packs available for use.</li> <li>• Take frequent breaks.</li> </ul>
	Heat stroke	<ul style="list-style-type: none"> <li>• Evaluate possibility of night work.</li> <li>• Perform physiological monitoring on workers during breaks.</li> <li>• Wear body cooling devices.</li> <li>• Comply with IT Procedure HS 400 (May 13, 1999).</li> </ul>
	Uneven terrain, poor ground support, inadequate clearances, contact with utilities	<ul style="list-style-type: none"> <li>• Inspections or determinations of road conditions and structures shall be made in advance to ensure that clearances and load capacities are safe for the passage or placing of any machinery or equipment.</li> <li>• All mobile equipment and areas in which they are operated shall be adequately illuminated.</li> <li>• Aboveground and belowground utilities will be located prior to staging equipment.</li> <li>• Whenever the equipment is parked, the parking brake shall be set.</li> <li>• Equipment parked on inclines will have the wheels chocked.</li> <li>• Inspect brakes and tire pressure on drill rig before staging for work.</li> </ul>
	Inexperienced operator	<ul style="list-style-type: none"> <li>• Machinery and mechanized equipment shall be operated only by designated personnel.</li> <li>• Operators shall inform their supervisor(s) of any prescribed medication that they are taking that would impair their judgment.</li> </ul>
	Jacks/outriggers	<ul style="list-style-type: none"> <li>• Ensure proper footing and cribbing.</li> </ul>
	Falling objects	<ul style="list-style-type: none"> <li>• Remove unsecured tools and materials before raising or lowering the derrick.</li> <li>• Stay alert and clear of materials suspended overhead.</li> </ul>
	Pinch points	<ul style="list-style-type: none"> <li>• Keep feet and hands clear of moving/suspended materials and equipment.</li> <li>• Stay alert at all times!</li> </ul>
	Fire	<ul style="list-style-type: none"> <li>• Mechanized equipment shall be shut down prior to and during fueling operations.</li> <li>• Have fire extinguishers inspected and readily available.</li> <li>• Obtain a Hot Work Permit, per IT Procedure HS 314 (May 19, 1999) for any operation which could act as an ignition source.</li> </ul>
	Fall hazards	<ul style="list-style-type: none"> <li>• Personnel are not allowed to work off of machinery or use them as ladders.</li> <li>• Use fall protection when working above 6 feet.</li> </ul>

**Table 5-1**

**Activity Hazard Analysis  
Training Area T-31  
Fort McClellan, Calhoun County, Alabama**

(Page 12 of 16)

Activity	Potential Hazards	Recommended Controls
Installation of Monitoring Wells (continued)	Noise	<ul style="list-style-type: none"> <li>• Hearing protection is mandatory above 85 dBA.</li> </ul>
	Contact with rotating or reciprocating machine parts	<ul style="list-style-type: none"> <li>• Use machine guards; use long-handled shovels to remove auger cuttings.</li> <li>• Safe lockout procedures for maintenance work.</li> </ul>
	Heavy lifting	<ul style="list-style-type: none"> <li>• Use proper lifting techniques. Lifts greater than 60 pounds require assistance or mechanical equipment; size up the lift.</li> </ul>
	Slip, trip, and fall hazards	<ul style="list-style-type: none"> <li>• Practice good housekeeping, keep work area picked up and clean as feasible.</li> <li>• Continually inspect the work area for slip, trip, and fall hazards.</li> </ul>
	Contact with potentially contaminated materials	<ul style="list-style-type: none"> <li>• Real time air monitoring will take place. Proper personal protective clothing and equipment will be utilized.</li> <li>• Stop immediately at any sign of obstruction.</li> <li>• Do not breathe air surrounding boring any more than necessary.</li> <li>• Upgrade to respirator if necessary.</li> <li>• Avoid skin contact with soil cuttings. Wear gloves.</li> <li>• Stay clear of moving parts of drill rig and geoprobe.</li> </ul>
	Drum handling	<ul style="list-style-type: none"> <li>• Be careful not to breathe air from around open drum any more than necessary. Monitor with photoionization detector/flame ionization detector (PID/FID) equipment and upgrade to respirator if necessary.</li> <li>• When filling a drum (with either soil or water), be careful not to make contact with the contained waste. Wear appropriate gloves. Make sure lid or bung of drum is secure.</li> <li>• If moving a drum unassisted, be sure to leverage properly, use proper lifting techniques, and wear safety glasses and steel-toed boots.</li> <li>• When using a drum dolly, make sure straps and lid catch are securely attached. Leverage properly when tilting drum. Be sure toes stay away from drum.</li> </ul>
Moving and shipping collected samples	Heavy lifting	<ul style="list-style-type: none"> <li>• Use proper lifting techniques. Lifts greater than 60 pounds require assistance or mechanical equipment; size-up the lift.</li> </ul>
	Pinch points	<ul style="list-style-type: none"> <li>• Keep hands, fingers, and feet clear of moving/suspended materials and equipment.</li> <li>• Beware of contact points.</li> <li>• Stay alert at all times!</li> </ul>
	Cut hazards	<ul style="list-style-type: none"> <li>• Wear adequate hand protection. Use care when handling glassware.</li> </ul>

**Table 5-1**  
**Activity Hazard Analysis**  
**Training Area T-31**  
**Fort McClellan, Calhoun County, Alabama**

(Page 13 of 16)

Activity	Potential Hazards	Recommended Controls
Moving and shipping collected samples (continued)	Hazard communication	<ul style="list-style-type: none"> <li>• Label all containers as to contents and associated hazards.</li> </ul>
	Heavy lifting	<ul style="list-style-type: none"> <li>• Use proper lifting techniques. Lifts greater than 60 pounds require assistance or mechanical equipment; size-up the lift.</li> </ul>
Material storage	Flammable and combustible liquids	<ul style="list-style-type: none"> <li>• Store in NO SMOKING AREA.</li> <li>• Fire extinguisher readily available.</li> <li>• Transfer only when properly grounded and bonded.</li> </ul>
Surface Water/Sediment Sampling	Drowning	<ul style="list-style-type: none"> <li>• Personnel will wear personal flotation devices when working on, over, or adjacent to water.</li> </ul>
	Contact with contaminated materials	<ul style="list-style-type: none"> <li>• Wear proper PPE when conducting sampling activities.</li> </ul>
	Cross-contamination and contact with potentially contaminated materials	<ul style="list-style-type: none"> <li>• Stop immediately at any sign of obstruction.</li> <li>• Sampling technicians will wear proper protective clothing and equipment to safeguard against potential contamination.</li> <li>• Only essential personnel will be in the work area.</li> <li>• Real-time air monitoring will take place before and during sampling activities.</li> <li>• All personnel will follow good hygiene practices.</li> <li>• Proper decontamination procedures will be followed.</li> <li>• All liquids and materials used for decontamination will be contained and disposed of in accordance with federal, state, and local regulations.</li> </ul>
	Cut hazards	<ul style="list-style-type: none"> <li>• Use care when handling glassware.</li> <li>• Wear adequate hand protection.</li> </ul>
	Slip, trip, fall	<ul style="list-style-type: none"> <li>• Site workers will be required to wear hard hat, safety glasses with side shields, work gloves, and steel-toe/shank boots when working in the field.</li> <li>• Whenever possible, avoid routing cords and hoses across walking pathways.</li> <li>• Flag or cover inconspicuous holes to protect against falls.</li> </ul>

**Table 5-1**

**Activity Hazard Analysis  
Training Area T-31  
Fort McClellan, Calhoun County, Alabama**

(Page 14 of 16)

Activity	Potential Hazards	Recommended Controls
Surface Water/Sediment Samples (continued)	UXO	<ul style="list-style-type: none"> <li>• UXO specialists will perform UXO surface clearance and/or UXO downhole clearance for UXO avoidance.</li> </ul>
	Bees, spiders, and snakes	<ul style="list-style-type: none"> <li>• Workers shall inspect the work area carefully and avoid placing hands and feet into concealed areas.</li> <li>• Evaluate need for sensitive workers to have prescribed antibiotic or medicine to combat onset of symptoms.</li> </ul>
	Poison ivy/oak/sumac	<ul style="list-style-type: none"> <li>• Avoid plant areas if possible.</li> <li>• Wear long sleeves and long pants.</li> <li>• Promptly wash clothing that has contacted poisonous plants.</li> <li>• Wash affected areas immediately with soap and water.</li> </ul>
	Access/egress hazards	<ul style="list-style-type: none"> <li>• Use qualified and trained bushhog operator.</li> <li>• Keep employees out of the bushhog work area.</li> <li>• Utilize good housekeeping practices.</li> <li>• Keep aiseways, pathways, and work areas free of obstruction.</li> <li>• Clean ice or snow off of walkways or work stations.</li> <li>• Use appropriate footwear for the task assigned.</li> </ul>
Disposal of investigation-derived waste (IDW) (Forklift Operation)	Personnel injury, property damage, and/or equipment damage	<ul style="list-style-type: none"> <li>• Use qualified and trained forklift operators.</li> <li>• The operator shall not exceed the load capacity rating for the forklift.</li> <li>• The load capacity shall be clearly visible on the forklift.</li> <li>• Forklift operators shall inform their supervisor of any prescribed medication that they are taking that would impair their judgement.</li> </ul>
	Cross-contamination and contact with potentially contaminated materials	<ul style="list-style-type: none"> <li>• Stop immediately at any sign of obstruction.</li> <li>• Sampling technicians will wear proper protective clothing and equipment to safeguard against potential contamination.</li> <li>• Only essential personnel will be in the work area.</li> <li>• Real-time air monitoring will take place before and during sampling activities.</li> <li>• All personnel will follow good hygiene practices.</li> <li>• Proper decontamination procedures will be followed.</li> <li>• All liquids and materials used for decontamination will be contained and disposed of in accordance with federal, state, and local regulations.</li> </ul>

**Table 5-1**

**Activity Hazard Analysis  
Training Area T-31  
Fort McClellan, Calhoun County, Alabama**

(Page 15 of 16)

Activity	Potential Hazards	Recommended Controls
Disposal of investigation-derived waste (IDW) (Forklift Operation) (continued)	Cut hazards	<ul style="list-style-type: none"> <li>• Use care when handling glassware.</li> <li>• Wear adequate hand protection.</li> </ul>
High-pressure water jetting operations	Heavy lifting	<ul style="list-style-type: none"> <li>• Use proper lifting techniques.</li> <li>• Lifts greater than 60 pounds require assistance or mechanical equipment; size-up the lift.</li> </ul>
	Slip, trip, and fall hazards	<ul style="list-style-type: none"> <li>• Good housekeeping shall be implemented.</li> <li>• The work area shall be kept clean as feasible.</li> <li>• Inspect the work area for slip, trip, and fall hazards.</li> </ul>
	Fueling	<ul style="list-style-type: none"> <li>• Only approved safety cans shall be used to store fuel.</li> <li>• Do not refuel equipment while it is operating.</li> <li>• Fire extinguishers shall be suitably placed, distinctly marked, readily accessible, and maintained in a fully charged and operable condition.</li> </ul>
	Faulty or damaged equipment	<ul style="list-style-type: none"> <li>• Equipment shall be inspected before being placed into service and at the beginning of each shift.</li> <li>• Preventive maintenance procedures recommended by the manufacturer shall be followed.</li> <li>• A lockout/tagout procedure shall be used for equipment found to be faulty or undergoing maintenance.</li> </ul>
	High-pressure water	<ul style="list-style-type: none"> <li>• Jetting gun operator must wear appropriate PPE including hard hat, impact-resistant safety glasses with side shields, water-resistant clothing, metatarsal guards for feet and legs, and hearing protection (if appropriate).</li> <li>• One standby person shall be available within the vicinity of the pump during jetting operation.</li> <li>• The work area shall be isolated and adequate barriers will be used to warn other site personnel.</li> </ul>
	Unqualified operators	<ul style="list-style-type: none"> <li>• Only qualified and trained personnel are permitted to operate machinery and mechanized equipment associated with water jet cutting and cleaning.</li> </ul>
	Out of control equipment	<ul style="list-style-type: none"> <li>• No machinery or equipment is permitted to run unattended.</li> <li>• Machinery or equipment will not be operated in a manner that will endanger persons or property nor will the safe operating speeds or loads be exceeded.</li> </ul>

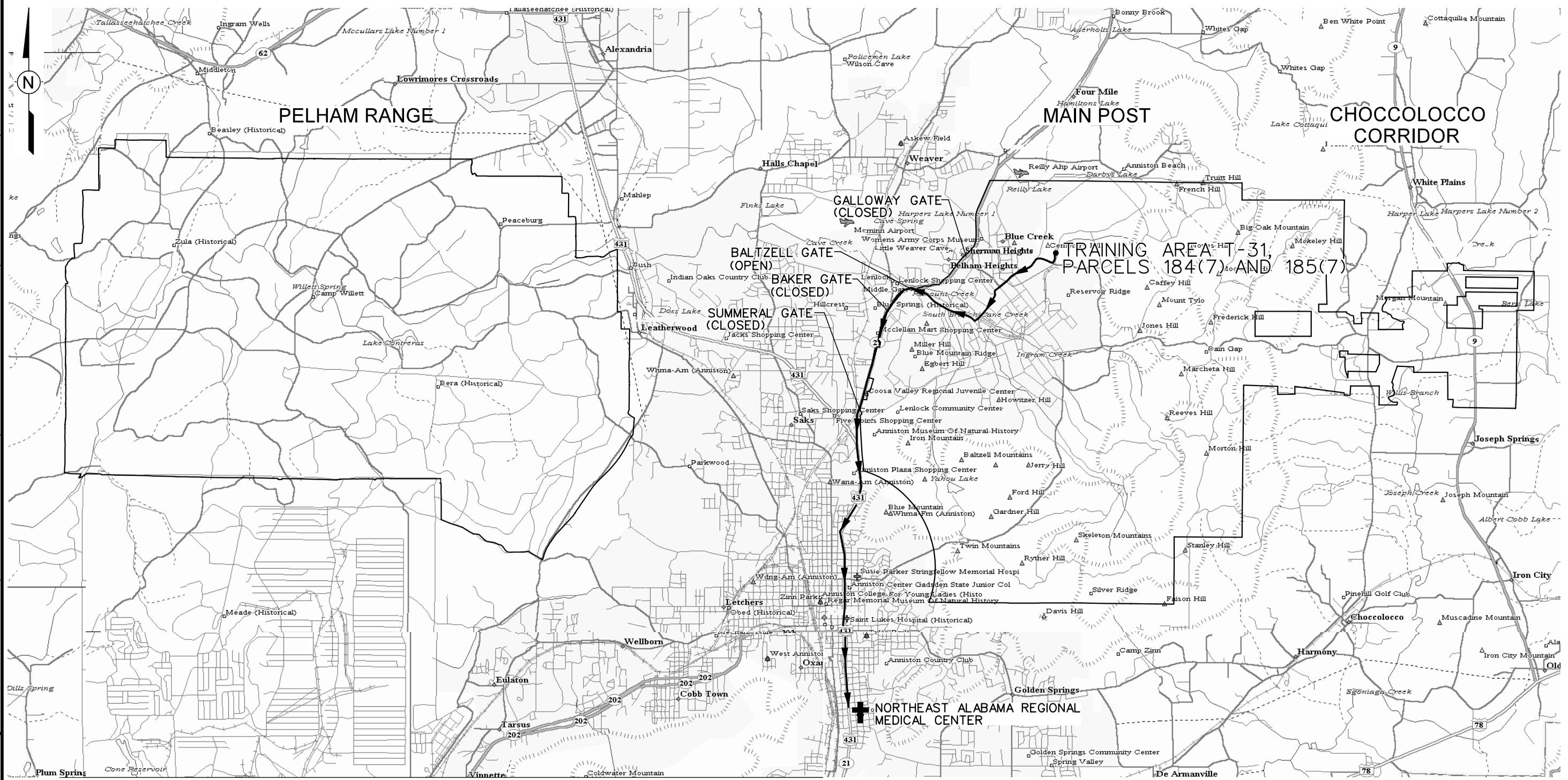
**Table 5-1**

**Activity Hazard Analysis  
Training Area T-31  
Fort McClellan, Calhoun County, Alabama**

(Page 16 of 16)

Activity	Potential Hazards	Recommended Controls
High-pressure water jetting operations (continued)	Noise	<ul style="list-style-type: none"> <li>• Sound levels above 85 dBA mandates hearing protection by nearby site personnel.</li> </ul>
	Activation during repairs	<ul style="list-style-type: none"> <li>• All machinery or equipment will be shut down and positive means taken to prevent its operation while repairs or manual lubrications are being done.</li> </ul>
	Pinch points	<ul style="list-style-type: none"> <li>• Keep feet and hands clear of moving/suspended materials and equipment.</li> <li>• Stay alert and clear of materials suspended.</li> </ul>
	Falling objects	<ul style="list-style-type: none"> <li>• Hard hats are required by site personnel.</li> <li>• Stay alert and clear of material suspended overhead.</li> </ul>
	Flying debris	<ul style="list-style-type: none"> <li>• Impact-resistant safety glasses with side shields are required.</li> </ul>
	Contact with potentially contaminated materials	<ul style="list-style-type: none"> <li>• All site personnel will wear the appropriate PPE.</li> </ul>

DWG. NO.: 796887es.071  
 PROJ. NO.: 796887  
 INITIATOR: J. RAGSDALE  
 DRAFT. CHK. BY: J. RAGSDALE  
 ENGR. CHK. BY: J. RAGSDALE  
 DATE LAST REV.:  
 STARTING DATE: 05/02/00  
 DRAWN BY: D. BILLINGSLEY  
 01:56:58  
 09/26/00  
 DBILLING  
 c:\cadd\design\796887es.071



**LEGEND:**

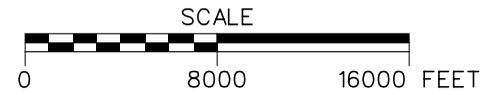
- ROUTE TO NORTHEAST ALABAMA REGIONAL MEDICAL CENTER
- U.S. HIGHWAY
- HOSPITALS
- INVESTIGATION SITES

**DRIVING DIRECTIONS FROM BALTZELL GATE ROAD TO THE NORTHEAST ALABAMA MEDICAL CENTER**

- LEAVING FORT MCCLELLAN ON BALTZELL GATE ROAD, TURN LEFT (SOUTH) ONTO AL HWY 21
- GO ~ 2.5 MILES WHERE AL HWY 21 MERGES WITH U.S. HWY 431 AND CONTINUE SOUTH
- CONTINUE SOUTH ON AL21/US431 FOR ~ 2.7 MILES
- TURN LEFT ONTO EAST 10th STREET
- GO ~ 0.2 MILE TO MEDICAL CENTER ON RIGHT
- PHONE NUMBER: (256)235-5121

**FIGURE 5-1  
HOSPITAL EMERGENCY ROUTE**

U. S. ARMY CORPS OF ENGINEERS  
 MOBILE DISTRICT  
 FORT McCLELLAN  
 CALHOUN COUNTY, ALABAMA  
 Contract No. DACA21-96-D-0018



**Final  
Site-Specific Unexploded Ordnance Safety Plan Attachment  
Site Investigation at Training Area T-31, Parcels 184(7) and  
185(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**

**Task Order CK10  
Contract No. DACA21-96-D-0018  
IT Project No. 796887**

**September 2000**

**Revision 0**

# **Table of Contents**

---

	<b>Page</b>
List of Acronyms .....	ii
1.0 Introduction .....	1
2.0 UXO Team Composition .....	3
3.0 Responsibilities .....	3
4.0 Authority .....	4
5.0 Anomaly Avoidance Procedures for Sampling Activities .....	4
6.0 UXO/OE Disposition .....	7
7.0 Safety .....	7
8.0 Quality .....	7
9.0 Reference .....	8

## ***List of Acronyms***

---

See Attachment 1, List of Abbreviations and Acronyms, of the Site-Specific Field Sampling Plan Attachment contained in this binder.

## **1.0 Introduction**

---

This document defines anomaly avoidance procedures for activities to be performed by IT Corporation (IT) in conjunction with the site investigation (SI) activities at the Training Area T-31, Parcels 184(7) and 185(7), at Fort McClellan (FTMC), Calhoun County, Alabama. IT will perform visual surveys and collect surface soil, subsurface soil, groundwater, surface water, and sediment samples for chemical analysis at Training Area T-31, Parcels 184(7) and 185(7). In performing these activities, IT will require unexploded ordnance (UXO) anomaly avoidance services to avoid any potential surface UXO or subsurface anomalies during sampling activities. Intrusive anomaly investigation is not authorized for this SI work.

The Training Area T-31, Parcels 184(7) and 185(7) is located in the northeastern area of the Main Post. Training Area T-31 is located near Range 31 and occupies approximately 3.4 acres (Roy F. Weston, Inc. [Weston], 1990). The site is in a valley surrounded by Cemetery Hill to the west, Reservoir Ridge to the south, and Caffey Hill to the southwest (Parsons Engineering Science, Inc. [Parsons], 1999). This training area partly overlaps with historic firing ranges for 37 millimeter, small arms and machine guns. The site was used from 1957 to 1969 as a Technical Escort Reaction Area and currently has unrestricted access.

Training of Technical Escort personnel was reportedly conducted here using sarin (GB) and distilled mustard (HD) in quantities of 20 to 40 milliliters (Weston, 1990). Also; storage of unspecified chemical warfare materials (CWM) may also have occurred. The decontaminants supertropical bleach (STB) and decontamination solution No. 2 (DS2) may also have been used here. Based on observations of piles of white powder during a visit by U.S. Army Environmental Hygiene Agency in December 1973, it was surmised STB was used as a decontaminant for HD (Parsons, 1999). When the chemical warfare training was deactivated in 1973, training aids used at the site were reported moved to Area T-38 (Parsons, 1999).

Two locations have been reported for Training Area T-31 (Environmental Science Engineering, Inc.[ESE], 1998). Previous reports identify one area located generally west of existing Range 31 at Parcel 184(7) and cite storage of CWM in Igloo 14 or in Igloo 13 (ESE, 1998). The igloos are neither evident on the ground today (Science Applications International Corporation [SAIC], 1993), nor on aerial photos reviewed by the environmental baseline survey team (ESE, 1998). However, igloos are present at the Ammunition Supply Point (ASP), located a short distance to

the southeast. Long-time FTMC personnel report that CWM was stored in and dispensed from an igloo at the ASP, and from nearby Area T-38 (ESE, 1998). Binary CWM components were stored in Building 4416 (also known as Igloo 14, at the ASP) (ESE, 1998).

Retired FTMC personnel also report conducting CWM exercises at a second site close to the previously reported location of Training Area T-31. This site is identified as Parcel 185(7). One report indicated that the training occurred in a previously unidentified area measured approximately 70 feet by 72 feet, but was not confirmed (ESE, 1998). The EBS team believes that details of the facility layout, location, and operations conducted at Training Area T-31 are in doubt and that activities associated with CWM training may have occurred at three areas. Two of the suspected areas are Parcels 184(7) and 185(7) at the Training Area T-31, as previously identified, and the third is the ASP (ESE, 1998).

Previous investigations report six separate training sites within this area. Several spills were reported at this area (Weston, 1990); however, there is not any information is available on the types or quantities of material spilled. Residual soil contamination is believed to have been treated with STB and DS2 in accordance with Army standard operating procedures.

The SI, conducted from 1991 through 1993, included a magnetometer survey over the site identified in historical records and site photography (SAIC, 1993); however, no surface evidence of the former training area was visible. During the SI that started in 1991, the site was reported to be overgrown, but several pads and concrete structures were evident (SAIC, 1993). The geophysical survey indicated metallic debris scattered within and beyond the site boundaries and this data suggests burial of some items at this location (SAIC, 1993). The SI also included collection of soil, sediment, and surface water samples and field screening for CWM (HD and GB) and laboratory analysis for their breakdown products. Neither field screening for CWM and breakdown products, or laboratory analysis detected any HD, GB, or degradation products in the shallow soil, sediment, or surface water samples.

The elevation at the site ranges from approximately 810 feet to approximately 850 feet above mean sea level. Shallow groundwater direction at the site is probably controlled by topography (northeast to southwest). The depth to bedrock typically ranges from 2 feet to greater than 4 feet. The depth to the water table for this series is usually greater than 20 feet.

## **2.0 UXO Team Composition**

---

A UXO team will be on site during all sampling activities for anomaly avoidance on a site with known or suspected ordnance and explosives (OE).

- a) The UXO team will be composed of two UXO qualified personnel, depending on the tasks to be performed. One UXO team member will be a UXO Technician III and the other will be, as a minimum, a UXO Technician II. Qualifications of these personnel are published in Engineering Pamphlet 1110-1-18 and stated in Section 2.0 of the installation-wide OE management plan (IT, 2000).
- b) For the work to be performed in accordance with this work plan, IT will use a Schonstedt GA-72 magnetometer to assist in surface and subsurface sweeps. The Schonstedt GA-230 magnetometer will be the instrument used for downhole anomaly avoidance.
  - (1) A geophysical proveout test grid will be established and each geophysical instrument will be checked for operational reliability and calibration against this known response prior to field use each day. If calibration checks indicate that the instrument is not functioning within an acceptable range, and field adjustments do not resolve the performance discrepancy, the instrument will be tagged and removed from service.
  - (2) Preventive maintenance will be performed on a regularly scheduled basis. If an equipment problem is encountered, maintenance will be performed as soon as possible; records of the unscheduled maintenance and corrective action will be collected and retained for future reference.

## **3.0 Responsibilities**

---

The UXO team member(s) will have the following responsibilities for anomaly avoidance procedures at the sites specified in this work plan.

- a) Provide the explosive ordnance recognition, location, and safety functions for IT employees and any subcontractors during sampling activities. Sampling activities include surface and subsurface soil sampling, drilling and sampling of monitoring wells, survey of sample points, and safe access and egress to the site.
- b) Conduct UXO safety briefings for all site personnel and visitors.

## **4.0 Authority**

---

For this investigation, the UXO team will not perform any disposal activities. If the team identifies an OE item, the item will be clearly marked, and operations will be directed to another location for safe execution of the investigation. The UXO team will not destroy the item. The UXO team will report the item to the IT site manager and the FTMC transition force at FTMC for disposition of the item.

## **5.0 Anomaly Avoidance Procedures for Sampling Activities**

When conducting sampling activities in the areas described in this work plan, consideration must be given for possible OE contamination. Since these areas may contain OE contamination, the UXO team must conduct a surface access survey and a subsurface survey of UXO before any type of activities commence, including foot and vehicular traffic.

### **a) Access Surveys.**

- (1) The UXO team will conduct access surveys of the footpaths and vehicular lanes approaching and leaving each of the investigation sites. If UXO is found during the access survey, the ordnance will be conspicuously marked and avoided. No personnel will be allowed outside of the surveyed areas.
- (2) The UXO team will locate an access route to and from the proposed investigation site that is free of surface and near-surface UXO using an appropriate geophysical detection instrument as required. The access route should be as wide as the minimum number of feet of the widest vehicle.
- (3) Geophysical instrumentation should be used to locate potential UXO just below the surface that may be encountered through erosion from rain, continual vehicular traffic, or subsurface sampling and drilling activities. If surface UXO or subsurface UXO-related anomalies are encountered, the access route must be diverted to avoid contact.
- (4) The boundary of each access route and investigation site should be marked using white survey flagging and pin flags. Non-UXO qualified personnel will not be allowed outside designated access areas without proper UXO escort. Near-surface anomaly locations will be prominently identified

with yellow survey flagging or pin flags. Red flagging will be placed adjacent to any discovered UXO for subsequent visual reference.

- (5) At the actual investigation site, the UXO team must also complete an access survey of an area sufficient to support mechanical excavation equipment maneuverability, parking of support vehicles, and establishment of decontamination stations, as appropriate for site activities. As a minimum, the surveyed area should have a dimension in all directions equal to twice the length of the largest vehicle or piece of equipment to be brought on site. Intrusive activities will not proceed if an anomaly is detected that cannot be positively identified as inert material. In this event, the sampling personnel must select an alternate investigation area or configuration.
- b) **Surface/Near Surface-Sampling.** Surface soil samples are normally collected at depths of 0 to 12 inches below ground surface. The UXO team will visually survey the surface of the selected surface soil sampling sites for any indication of UXO or UXO-related contamination. In addition, the UXO team will utilize a magnetometer over the site before sampling begins. Any anomalies detected will be prominently marked with a yellow survey flag or pin flag for avoidance during sampling activities. If too many anomalies are found within an area of interest, the sampling personnel will select an alternate sampling location for collection of surface/near surface samples.
  - c) **Subsurface Soil Sampling and Monitoring Well Installations.** Subsurface soil sampling is considered to be the collection of samples below a nominal depth of approximately 12 inches from a split-spoon, Shelby tube, or bucket auger soil sampler using drilling techniques. Drilling techniques are also used to install groundwater-monitoring wells for investigative sampling.
    - (1) The UXO team must conduct an access survey to locate an access route to the proposed sampling or drilling location as well as an access survey at the proposed drilling site that is large enough to support drill rig maneuverability, parking of support vehicles, and establishment of decontamination stations. As a minimum, the surveyed area should have a minimum dimension in all directions equal to twice the length of the largest vehicle or piece of equipment to be brought on site. The UXO team will clearly mark the boundaries of the cleared soil sampling or well site. Personnel will not go outside the cleared area. If a preselected area indicates magnetic anomalies, a new sampling/drilling site will be chosen.
    - (2) The UXO team must complete a subsurface geophysical survey of the proposed drill hole location(s). If the subsurface sampling depth is greater than the geophysical instrumentation detection capabilities below existing

ground surface, then the UXO team must incrementally complete the geophysical survey as outlined below.

- (a) **Underground Utilities.** Utility clearance and/or excavation permits are not required for the areas covered by this document. In the event subsurface utilities are suspected in an excavation area, the UXO team must attempt to verify their location using geophysical instrumentation. Note that only utilities with a ferrous content are detectable with a geophysical instrument. All located utilities should be marked with a series of pin flags to visually delineate their approximate subsurface routing.
- (b) **Pilot Hole.** An incremental geophysical survey of the drill hole location(s) will be initially accomplished using a hand auger to install a pilot hole. An access survey of the immediate vicinity of the pilot hole location will precede its installation. The UXO team using a manual or mechanical portable auger will install the pilot hole. The augured hole will be inspected for anomalies with a geophysical instrument (configured for downhole utilization) at 2-foot increments as the hole is advanced below ground surface. The pilot hole will also be inspected with the geophysical instrument upon reaching the final depth of the hand auger providing a total clearance depth equal to pilot hole depth plus 2 feet. If the proposed site is still free of magnetic anomalies, the drilling equipment may be brought on site and utilized. Hand augering of a hole will not proceed if an anomaly is detected that cannot be positively identified as inert material. If OE is encountered or an anomaly cannot be positively identified as inert material, the sampling personnel must select a new drill hole location.
- (c) **Monitoring of Drilling by Others.** Once a drilling site has been surface cleared and a pilot hole installed as described above, the drilling contractor will be notified that the site is available for subsurface sampling or monitoring well installation. The drilling contractor's actual drill hole must be located within a 2-foot radius of the pilot hole installed by the UXO team. The UXO team will continue to complete a subsurface inspection for anomalies with a geophysical instrument configured for down hole utilization at 2-foot increments as the drilling is advanced from the clearance depth of the pilot hole until achievement of one of the following indicators: the drilling activity is completed; the drilling is extended to depths greater than 30 feet below ground surface; or a qualified geologist determines that virgin soil is found.
- (d) **Drilling equipment and/or metallic support materials (e.g., drill rig, augers, drill rods, casings, etc.)** may create an interference affecting the operation of the geophysical survey instrumentation during the incremental depth inspection process. In such event, the item(s) creating the interference

must be relocated outside the interference range of the geophysical instrument during each incremental depth inspection of the drill hole for the presence of anomalies. Drilling of a hole will not proceed if OE is encountered or if an anomaly is detected that cannot be positively identified as inert material. In this event, the sampling personnel must select a new drill hole location.

## **6.0 UXO/OE Disposition**

---

Since the purpose of UXO support during activities is anomaly avoidance, the UXO team is not tasked to perform UXO/OE disposal. The UXO team will notify the site manager and the FTMC transition force if UXO is encountered that cannot be avoided or if the item presents an imminent hazard requiring immediate action based on the items fuzing or current condition. The UXO/OE item will be marked and recorded and all project personnel will evacuate the area.

## **7.0 Safety**

---

In addition to the requirements of the site-specific safety and health plan prepared for this site, the UXO team will ensure the following:

- a) During the access and subsurface surveys conducted with a geophysical instrument, the UXO team members will not wear safety shoes or other footwear that would cause the instrument to present a false response.
- b) The UXO team will not be required to wear protective helmets unless a head threat is present.

## **8.0 Quality**

---

A UXO quality control specialist is not required for this work. However, quality control instructions and procedures listed in Section 9.0 of the installation-wide OE management plan (IT, 2000) will be followed as appropriate to this task.

## 9.0 References

---

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), 2000, *Final Installation-Wide Sampling and Analysis Plan, Fort McClellan, Calhoun County, Alabama*, March.

Parsons Engineering Science, Inc. (Parsons), 1999, *Draft-Final Work Plan/Site Safety Submission, Chemical Warfare Material Site EE/CA, Fort McClellan, Alabama*, March.

Roy F. Weston, Inc. (Weston), 1990, *Final USATHAMA Task Order 11, Enhanced Preliminary Assessment, Fort McClellan, Anniston, Alabama*, prepared for U.S. Army Toxic and Hazardous Materials Agency, Aberdeen Proving Ground, Maryland, December.

Science Applications International Corporation (SAIC), 1993, *Fort McClellan Site Investigation Report*, August.