Final
Site-Specific Field Sampling Plan, Site-Specific Safety and Health Plan, and Site-Specific Unexploded Ordnance Safety Plan Attachments, Station No. 6, Subsection of Former Toxic Gas Area – Pelham Range, Parcel 211(7)

Fort McClellan
Calhoun County, Alabama

Task Order CK05
Contract No. DACA21-96-D-0018
IT Project No. 774645

December 2001

Final
Site-Specific Field Sampling Plan Attachment
Station No. 6, Subsection of Former Toxic Gas Area – Pelham Range, Parcel 211(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 CK05
Contract No. DACA21-96-D-0018
IT Project No. 774645

December 2001

Revision 0

Table of Contents

Page

List of Tables iii
List of Figures iii
List of Acronyms iv
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 1-5
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 Screening Requirements and Utility Clearances 4-1
4.1.1 Surface UXO Survey 4-1
4.1.2 Downhole UXO and Chemical Warfare Agent Screening 4-1
4.1.3 Utility Clearances 4-2
4.2 Environmental Sampling 4-2
4.2.1 Surface Soil Sampling 4-2
4.2.1.1 Sample Locations and Rationales 4-2
4.2.1.2 Sample Collection 4-2
4.2.2 Subsurface Soil Sampling 4-3
4.2.2.1 Sample Locations and Rationales 4-3
4.2.2.2 Sample Collection 4-3

Table of Contents *(Continued)*

Page

4.2.3 Depositional Sampling 4-4
4.2.3.1 Sample Locations and Rationales 4-4
4.2.3.2 Sample Collection 4-4
4.2.4 Permanent Residuum Monitoring Wells 4-4
4.2.5 Groundwater Sampling 4-5
4.2.5.1 Sample Locations and Rationales 4-5
4.2.5.2 Sample Collection 4-5
4.3 Decontamination Requirements 4-5
4.4 Surveying of Sample Locations 4-6
4.5 Analytical Program 4-6
4.5.1 Chemical Agent Screening 4-6
4.5.2 HTRW Analytical Program 4-8
4.6 Sample Preservation, Packaging, and Shipping 4-8
4.7 Investigation-Derived Waste Management 4-9
4.8 Site-Specific Safety and Health 4-9
5.0 Project Schedule 5-1
6.0 References 6-1
Attachment 1 – List of Abbreviations and Acronyms

List of Tables

Number	Title	Follows Page
3-1	Summary of Data Quality Objectives	3-1
4-1	Sampling Locations and Rationales	4-2
4-2	Surface Soil, Subsurface Soil, and Depositional Soil Sample Designations and QA/QC Sample Quantities	4-2
4-3	Groundwater Sample Designations and QA/QC Sample Quantities	4-5
4-4	Analytical Samples	4-8

List of Figures

Number	Title	Follows Page
1-1	Site Location Map, Station No. 6, Subsection of Former Toxic Gas Area	1-1
1-2	Chemical Obstacle Course	1-1
1-3	Site Map, Station No. 6, Subsection of Former Toxic Gas Area	1-2
3-1	Human Health Conceptual Site Exposure Model	3-3
4-1	Sample Location Map, Station No. 6, Subsection of Former Toxic Gas Area	4-2
4-2	Chemical Agent Screening Program	4-7

List of Acronyms

See Attachment 1, List of Abbreviations and Acronyms

Executive Summary

In accordance with Contract Number DACA21-96-D-0018, Task Order CK05, IT Corporation (IT) will conduct site investigation activities at Station No. 6, Subsection of Former Toxic Gas Area at Pelham Range, Parcel 211(7), at Fort McClellan, Calhoun County, Alabama, to determine the presence or absence of potential site-specific chemicals (PSSC) at this site. The purpose of this site-specific field sampling plan (SFSP) is to provide technical guidance for sampling activities at Station No. 6.

Station No. 6 is a subsection of the Former Toxic Gas Area, Parcel 211(7), at Pelham Range. Station No. 6 was one of seven training stations in the Chemical Obstacle Course. The Chemical Obstacle Course is documented as being located in the northwest portion of Training Area 10B at Pelham Range, falling within the parcel boundary of Former Toxic Gas Area, Parcel 211(7). A 1955 Chemical Corps School Lesson Plan contains a description and a figure of the Chemical Obstacle Course. The Chemical Obstacle Course was used from approximately 1955 to 1963. Range K and Range L (Lima Pond) are also located within the Former Toxic Gas Area.

Station No. 6 is described in the Chemical Corps School Lesson Plan as a training area for mines containing molasses residue to simulate the encounter of mines containing chemical warfare agents. Other chemical warfare agent contamination scenarios included simulating surface soil contamination by placing chemical agent (mustard) on the ground to present a hazard for trainees to detect. The Chemical Corps School Lesson Plan also describes a shufflebox or pit containing dry mix located at the far edge of the area for the decontamination of shoes. There is not any information available to show the location of the training exercises and the shufflebox.

Specifically, IT will collect five surface soil samples, five subsurface soil samples, five groundwater samples, and two depositional soil samples at this site. Potential contaminant sources at Station No. 6, Subsection of Former Toxic Gas Area, are primarily mustard degradation products and chemicals commonly associated with the CWM decontamination activities. Chemical analyses of the samples collected during the field program will include volatile organic compounds, semivolatile organic compounds, nitroaromatic/nitramine explosives, chemical warfare materiel breakdown products, and metals. Results from these analyses will be compared with site-specific screening levels developed in the *Final Human Health and Ecological Screening Values and PAH Background Summary Report* (IT, 2000b), and regulatory agency guidelines.

The presence of unexploded ordnance (UXO) is possible at Station No. 6, Subsection of Former Toxic Gas Area, Parcel 211(7) because it is located within Pelham Range, which is an active range. Therefore, IT will conduct UXO avoidance activities as outlined in Appendix E of the installation-wide sampling and analysis plan (SAP) and the attached site-specific UXO safety plan prior to initiating field activities at Station No. 6. The surface sweeps and downhole surveys will be conducted to identify anomalies for the purpose of UXO avoidance. Additionally, the presence of mustard is a possibility. Therefore, the work area will be surveyed for the presence of mustard during the intrusive activities described in this sampling plan.

This SFSP attachment to the SAP for Station No. 6, Subsection of Former Toxic Gas Area, 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.

1.0 Project Description

1.1 Introduction

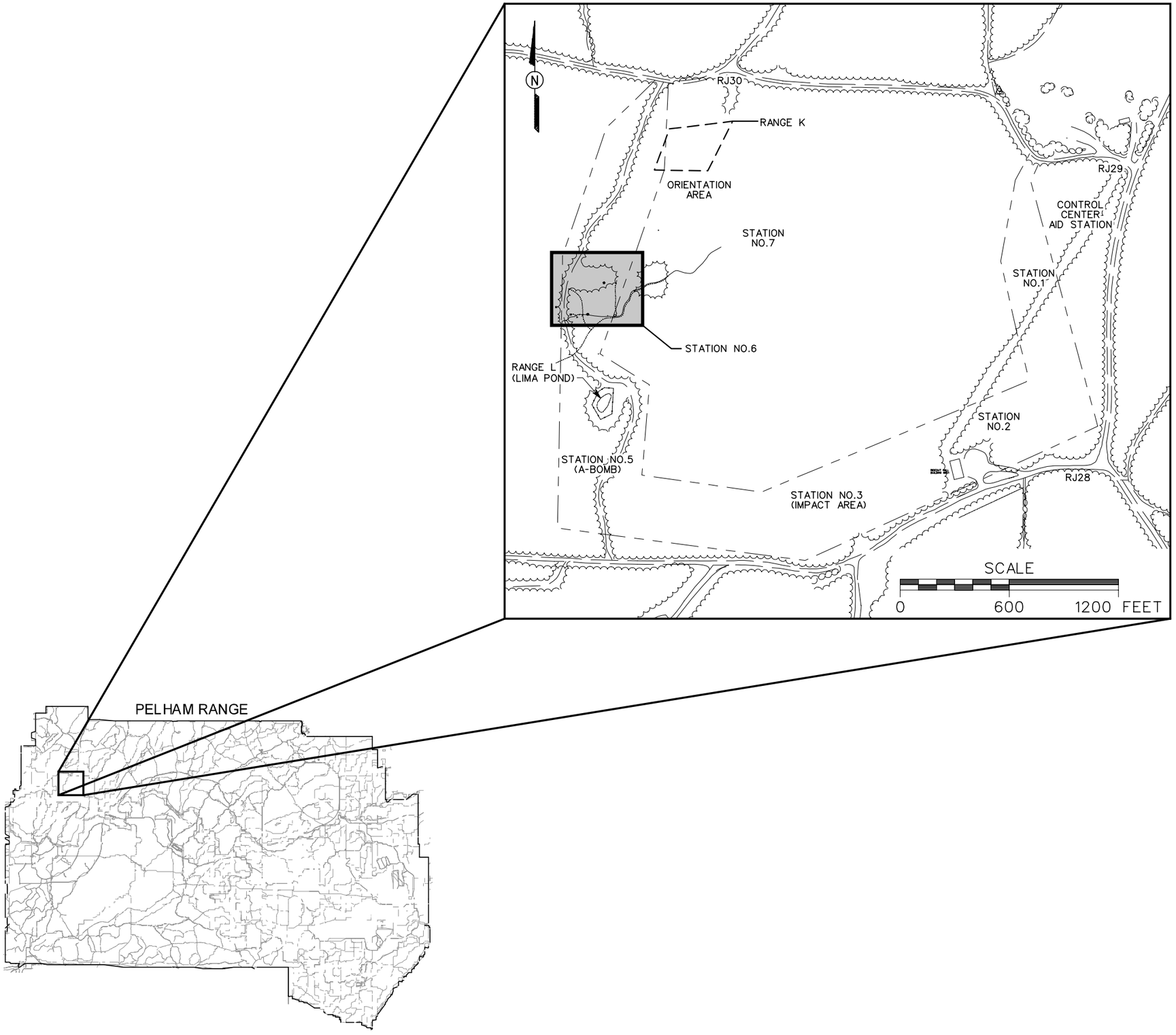
The U.S. Army is conducting studies of the environmental impact of suspected contaminants at Fort McClellan (FTMC) in Calhoun County, Alabama, under the management of the U.S. Army Corps of Engineers (USACE)-Mobile District. The USACE has contracted IT Corporation (IT) to provide environmental services for the site investigation (SI) at Station No. 6, Subsection of Former Toxic Gas Area, Parcel 211 (7), under Task Order CK05, Contract Number DACA21-96-D-0018.

This site-specific field sampling plan (SFSP) is an attachment to the installation-wide sampling and analysis plan (SAP) for FTMC (IT, 2000a) and has been prepared to provide technical guidance for sample collection and analysis at Station No. 6, Subsection of Former Toxic Gas Area. 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 Station No. 6, Subsection of Former Toxic Gas Area, and the installation-wide work plan (WP) (IT, 1998) and SAP. The SAP includes the installation-wide safety and health plan, waste management plan, ordnance and explosives management plan, and quality assurance plan (QAP). Site-specific hazard analyses are included in the SSHP.

1.2 Site Description

Station No. 6, a subsection of the Former Toxic Gas Area, Parcel 211(7), is located at Pelham Range (Figure 1-1). Station No. 6 was one of seven training stations in a former training area, the Chemical Obstacle Course. The Chemical Obstacle Course is documented as being located in the northwest portion of Training Area 10B at Pelham Range, falling within the parcel boundary of Former Toxic Gas Area, Parcel 211(7) (Figure 1-2). A 1955 Chemical Corps School Lesson Plan contains a description and a figure of the Chemical Obstacle Course. The Chemical Obstacle Course was used from approximately 1955-1963 (U.S. Army Center for Health Promotion and Preventive Medicine [CHPPM], 1999). Range K and Range L (Lima Pond) are also located within the Former Toxic Gas Area.

Station No. 6 is described in the Chemical Corps School Lesson Plan as a training area for mines containing molasses residue to simulate the encounter of mines containing chemical warfare agents. Other chemical warfare agent contamination scenarios included simulating surface soil



LEGEND

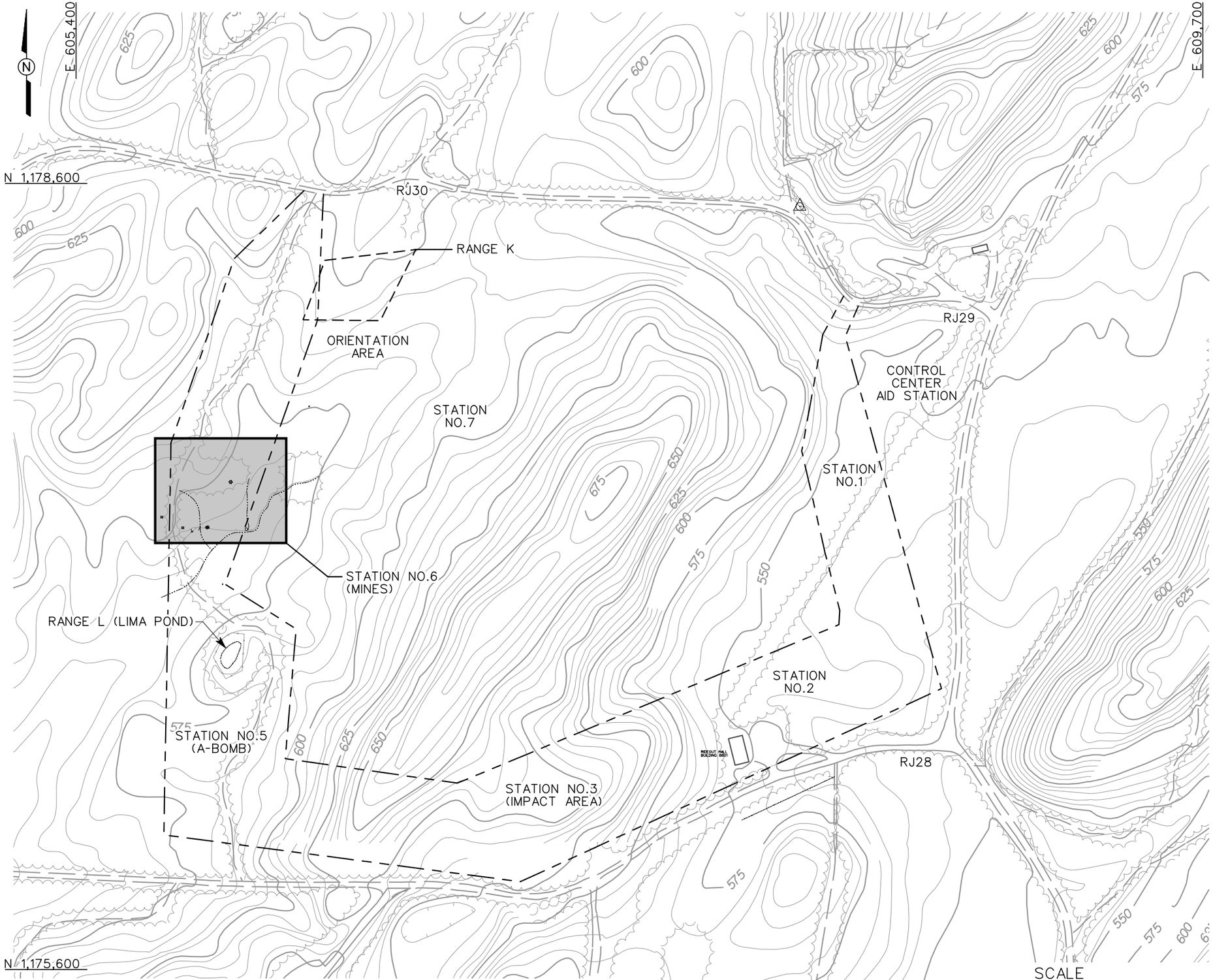
- UNIMPROVED ROADS
- PAVED ROADS
- BUILDING
- TREES / TREELINE
- SURFACE DRAINAGE
- DEPRESSION
- FORMER OBSTACLE COURSE BOUNDARY

FIGURE 1-1
SITE LOCATION MAP
STATION NO. 6, SUBSECTION OF
FORMER TOXIC GAS AREA
PARCEL 211(7)

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

IT CORPORATION
A Member of The IT Group

DWG. NO.: ...\774645es.791 | PROJ. NO.: 774645
INITIATOR: J. BROWN | PROJ. MGR.: J. YACOUB
DRAFT. CHCK. BY: | ENGR. CHCK. BY: S. MORAN
DATE LAST REV.: | DRAWN BY:
STARTING DATE: 09/04/01 | DRAWN BY: D. BOMAR
10/17/01 09:57:10 AM
DBILLING c:\cadd\design\774645es.791



SOURCE: U.S. ARMY CENTER FOR HEALTH PROMOTION AND PREVENTATIVE MEDICINE, "PRELIMINARY ASSESSMENT NO. 38-EH-1775-99, FORT McCLELLAN ARMY NATIONAL GUARD TRAINING CENTER, FORT McCLELLAN, ALABAMA MAY 28 - JUNE 17, 1999."

LEGEND

- UNIMPROVED ROADS AND PARKING
- PAVED ROADS AND PARKING
- BUILDING
- TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 5 FOOT)
- TREES / TREELINE
- FENCE
- FORMER OBSTACLE COURSE BOUNDARY

FIGURE 1-2
SITE MAP
FORMER CHEMICAL OBSTACLE COURSE AT PELHAN RANGE

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

IT CORPORATION
A Member of The IT Group

DWG. NO.: ...\774645es.803 | PROJ. NO.: 774645
INITIATOR: J. BROWN | PROJ. MGR.: J. YACOUB
DRAFT. CHCK. BY: | ENGR. CHCK. BY: S. MORAN
DATE LAST REV.: | DRAWN BY:
STARTING DATE: 10/03/01 | DRAWN BY: D. BOMAR
11/19/01 09:05:30 AM DBILLING c:\cadd\design\774645es.803

contamination by placing chemical agent (mustard) on the ground to present a hazard for trainees to detect (CHPPM, 1999). The Chemical Corps School Lesson Plan also describes a shufflebox or pit containing dry mix located at the far edge of the area for the decontamination of shoes (CHPPM, 1999). There is not any information available to show the location of the training exercises and the shufflebox. Station No. 6, Subsection of Former Toxic Gas Area, Parcel 211(7), is currently not in use.

A survey conducted by the U.S. Army Chemical School in 1967 declared the Chemical Obstacle Course area free of contamination. All empty rounds, containers, and miscellaneous items were policed and disposed of in accordance with standard operating procedures (not specified). The area was bulldozed and decontaminated. Based on existing information, the report concluded there appeared to be no significant risk for surface activity (CHPPM, 1999).

During a site walkover on September 10, 2001, IT employees noted numerous 0.30-caliber rifle casings in a low-lying area and several small depressions (Figure 1-3).

The location of Station No. 6 and the Chemical Obstacle Course was unknown when the 1967 Army survey was performed and the area was declared free of contamination. It is believed that the shufflebox or pit containing an unknown decontaminant was bulldozed (CHPPM, 1999).

The chemical agent mustard was reportedly used at Station No. 6, as well as decontaminants. Below is a list of the decontaminants that were probably used at Station No. 6, with a description of each:

- Decontamination agent (non-corrosive) (DANC)
- Decontamination Solution Number 2 (DS2)
- Supertropical bleach (STB).

DANC. A well-known and often-used decontaminating agent prior to World War II, DANC may have been used or disposed of at the site in conjunction with other types of decontaminants, such as DS2 or STB. DANC is a 6.25-percent solution of RH-195 (1,3-dichloro-5,5-dimethylhydantion) in 1,1,2,2-tetrachloroethane (acetylene tetrachloride) and was adopted as a satisfactory decontaminant for mustard in small-scale operations. It is an effective decontaminant for arsenicals, if sufficient time is allowed to react (U.S. Department of the Army and Air Force, 1963).

LEGEND

- UNIMPROVED ROADS AND PARKING
- TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 5 FOOT)
- TREES / TREELINE
- PARCEL BOUNDARY
- DEPRESSION
- SURFACE DRAINAGE

NOTE:

1. DEPRESSIONS GENERALLY VOID OF VEGETATION WITH IRREGULAR SHAPE AND 9-12 INCHES DEEP.

FIGURE 1-3
SITE MAP
STATION NO. 6, SUBSECTION OF FORMER TOXIC GAS AREA
PARCEL 211(7)

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

IT CORPORATION
A Member of The IT Group

DWG. NO.: ...\774645es.792 | PROJ. NO.: 774645
INITIATOR: J. BROWN | PROJ. MGR.: J. YACOUB
DRAFT. CHCK. BY: | ENGR. CHCK. BY: S. MORAN
DATE LAST REV.: | DRAWN BY:
STARTING DATE: 09/04/01 | DRAWN BY: D. BOMAR
11/19/01 09:07:28 AM
DBILLING
c:\cadd\design\774645es.792

DS2. DS2 is a clear solution of general-purpose decontaminant consisting of 70 percent diethylenetriamine, 28 percent solvent (ethylene glycol monomethylether), and 2 percent active agent booster (sodium hydroxide). DS2 reacts with Sarin and mustard to effectively reduce their hazard within 5 minutes of application. It is effective for most toxic chemical agents. DS2 was applied manually or by using a portable decontaminating apparatus such as the M11 (U.S. Department of the Army and Air Force, 1963).

STB. STB is referred to as bleach, bleaching powder, supertropical bleach, bleaching material, or chlorinated lime. STB is a white powder containing about 30 percent available chlorine (U.S. Department of the Army and Air Force, 1963).

Station No. 6, Subsection of Former Toxic Gas Area, is approximately 500 feet wide (east to west) by 400 feet long (north to south) and covers 4.6 acres. The site has three well-defined surface drainage features (Figure 1-3). The largest and longest of the features runs the length of the site from east of the site to the southwest corner. This feature is 1.5 to 2 feet deep. However, it becomes shallower in several areas, forming a washout, or a shallow wide depression. Two other drainage features at the site run north to south, depositing into the larger drainage feature. Water was not observed during site visits conducted by IT during late August, early September, and early November 2001.

There were two "U-shaped" depressions found on the southwestern portion of the site. It is speculated that these depressions may have been machine gun entrenchments used for training. Several shallow depressions were also found (9 to 12 inches deep). Remnants of a barbed wire fence extended across the southern portion of the site from east to west. A shallow depression with numerous .30 caliber casings is located near the confluence of the two easternmost drainage swales.

Station No. 6 is positioned in a low-lying area approximately 570 feet in elevation. The highest elevation at the site is 590 feet. The areas to the south, east, and west of the site are densely wooded. An unnamed and unused road runs through the site north to south along the western-side of the site (Figure 1-3). This road is currently covered in vegetation. Vehicular access to Station No. 6 is not easily obtained. Access to Pelham Range is controlled by the Alabama National Guard. Lima Pond is approximately 400 feet directly south of Station No. 6, and Range K is approximately 600 feet northeast.

There are not any historical photographs available when Station No. 6 was active. An aerial photograph taken of Station No. 6 and the surrounding area in 1964 reveals no physical structures nor evidence of training areas. This 1964 photograph of Station No. 6 and the surrounding area illustrates only dense vegetation.

Surface water at the site appears to drain southeast into the large surface drainage feature that flows to the southwest corner of the site. Local shallow groundwater direction at the site is probably controlled by topography; therefore, groundwater direction in the residuum is likely to the southwest.

Soils at Station No. 6 fall into the Rarden gravelly loam with 6 to10 percent slopes (RaC2) and the Tyler silt loam with 0 to 2 percent slopes (TyA) (U.S. Department of Agriculture, 1961). The Rarden series of soils consists of strongly acidic to very strongly acidic, well-drained soils that have developed from the residuum of shale and fine-grained, platy sandstone or cherty limestone. Rarden soils are associated with the Montevallo, Lehew, Conasauga, and Enders soils. In eroded areas, the surface soil is brown silt loam. The subsoil is yellowish-red clay or silty clay mottled with strong brown. The Rarden mapping unit has fair tilth and a low capacity for available moisture. The typical soil description is 0.7 to 2.5 feet of moderately well-drained silt loam to silty clay or shale, platy sandstone and limestone. The surface soil of some areas has platy sandstone gravel up to 3 inches in diameter. The depth to bedrock is typically greater than 1.5 feet with the depth to water greater than 20 feet.

The Tyler series of soils consists of strongly acidic, somewhat poorly drained soils found on low stream terraces. These soils have developed in old general alluvium that washed from soils derived primarily from sandstone and shale and, to a lesser extent, from limestone and other material. In most places, Tyler soils are associated with the Nolichucky, Holston, Monongahela, and Purdy soils and in a few places with the Altavista and Masada soils. The surface soil is a grayish-brown silt loam. The subsoil is a light yellowish-brown, mottled fine sandy clay loam. The soils in the Tyler mapping unit have good tilth and a low capacity for available moisture. The typical soil description is 1 to 2 feet of somewhat poorly drained silt loam to fine sandy clay loam over a compact layer of light silty clay loam developed from old alluvium that washed from soils underlain by sandstone and shale. The depth to bedrock is typically from 1 foot or greater with depth to water ranging from 1 to 3 feet.

1.3 Scope of Work

The scope of work for activities associated with the SI at Station No. 6, Subsection of Former Toxic Gas Area, as specified by the statement of work (USACE, 2000), includes the following tasks:

- Develop the SFSP attachment.
- Develop the SSHP attachment.
- Develop the UXO safety plan attachment
- Conduct a surface and near-surface UXO survey over all areas to be included in the sampling effort.
- Provide downhole UXO support for all intrusive drilling to determine buried downhole hazards.
- Provide Miniature Continuous Air Monitoring System (MINICAMS) support for intrusive drilling to determine downhole chemical agent hazards.
- Collect five surface soil samples, five subsurface soil samples, five groundwater samples, and two depositional soil samples to determine whether potential site-specific chemicals (PSSC) are present at Station No. 6 and to provide data useful for supporting any future planned corrective measures and closure activities.
- Analyze samples for the parameters listed in Section 4.5.

Pelham Range is an active range maintained by the Alabama National Guard. Therefore, UXO surface sweeps and downhole surveys of soil borings will be required to support field activities at this site. The surface sweeps and downhole surveys will be conducted to identify anomalies for the purposes of UXO avoidance. The site-specific UXO safety plan attachment addresses the manner in which the avoidance will be conducted.

At completion of the field activities and sample analyses (as listed in Section 4.5), an SI summary report will be prepared evaluating the absence or presence of PSSCs at this site and to recommend further actions, if appropriate. The SI report will be prepared in accordance with current U.S. Environmental Protection Agency (EPA), Region IV, and Alabama Department of Environmental Management (ADEM) guidelines.

2.0 Summary of Existing Environmental Studies

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

1. Areas where no storage, release, or disposal of hazardous substance or petroleum products has occurred (including no migration of these substances from adjacent areas)

2. Areas where only release or disposal of petroleum products has occurred

3. Areas where release, disposal, and/or migration of hazardous substance has occurred, but at concentrations that do not require a removal or remedial response

4. Areas where release, disposal, and/or migration of hazardous substance has occurred, and all removal or remedial actions to protect human health and the environment have been taken

5. Areas where release, disposal, and/or migration of hazardous substance has occurred, and removal or remedial actions are underway, but all required remedial actions have not yet been taken

6. Areas where release, disposal, and/or migration of hazardous substance has occurred, but required actions have not yet been implemented

7. Areas that are not evaluated or require further evaluation.

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

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

The Former Toxic Gas Area, containing Station No. 6, was identified as a Category 7 CERFA site. This CERFA site is a parcel that has not been evaluated and requires further evaluation to determine its environmental condition.

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 Station No. 6, Subsection of Former Toxic Gas Area. 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 Station No. 6 is described in more detail in Section 3.4 of this SFSP. 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 future action at this site.

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 in accordance with definitive data requirements of Chapter 2 of the USACE Engineering Manual 200-1-6, *Chemical Quality Assurance For Hazardous, Toxic And Radioactive Waste (HTRW) Projects* (USACE, 1997) and evaluated by the stipulated requirements for the generation of definitive data (Section 3.1.2 of the QAP). Chemical data will be reported by the laboratory via hard-copy data packages using Contract Laboratory Program-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 related to the SI at Station No. 6, Subsection of Former Toxic Gas Area, presented in Table 3-1, 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 other 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.

Table 3-1

Summary of Data Quality Objectives
Station No. 6, Subsection Former Toxic Gas Area, Parcel 211(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	None	Contaminant Source Station 6, Subsection Former Toxic Gas Area, Parcel 211(7) Migration Pathways Leaks and spills to surface soil, rain runoff and erosion to surface soil, infiltration to subsurface soil, infiltration and leaching to groundwater, biotransfer to deer, and dust emissions and volatilization to ambient air. Potential Receptors Recreational site user (current & future), on-site resident (future). National Guardsperson (to be developed). PSSC Chemical agent breakdown products, metals, VOCs (specifically carbon tetra-chloride and 1,1,2,2-tetrachlorethane).	Surface soil Subsurface Soil Groundwater Depositional soil	SI to confirm the presence or absence of contamination in the site media Definitive quality data for future decision-making	Surface soil TCL VOCs, TCL SVOCs, Nitroaromatic/nitramine explosives, CWM Breakdown Products and TAL Metals	Definitive data with definitive data package deliverables as required by USACE EM 200-1-6.	5 direct-push soil samples + QC
					Subsurface Soil TCL VOCs, TCL SVOCs, Nitroaromatic/nitramine explosives, CWM Breakdown Products and TAL Metals	Definitive data with definitive data package deliverables as required by USACE EM 200-1-6.	5 direct-push soil samples + QC
					Groundwater TCL VOCs, TCL SVOCs, Nitroaromatic/nitramine explosives, CWM Breakdown Products and TAL Metals	Definitive data with definitive data package deliverables as required by USACE EM 200-1-6.	5 groundwater samples + QC
					Depositional soil TCL VOCs, TCL SVOCs, Nitroaromatic/nitramine explosives, CWM Breakdown Products and TAL Metals	Definitive data with definitive data package deliverables as required by USACE EM 200-1-6.	2 depositional soil samples + QC

ADEM - Alabama Department of Environmental Management.
CESAS - Corps of Engineers South Atlantic Savannah.
CWM - Chemical Warfare Materiel
DOD - U.S. Department of Defense.
EPA - U.S. Environmental Protection Agency.
FTMC - Fort McClellan.
PSSC - Potential site-specific chemical.
QC - Quality control.
SI - Site inspection.
SVOC - Semivolatile organic compound.
TAL - Target analyte list.
TCL - Target compound list.
USACE - U.S. Army Corps of Engineers.
VOC - Volatile organic compound.

3.3 Conceptual Site Exposure Model

The conceptual site exposure model (CSEM) provides the basis for identifying and evaluating potential risks and hazards to human health in the risk assessment. The CSEM includes receptors and potential exposure pathways appropriate to all plausible scenarios. The CSEM facilitates a 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 release mechanisms were associated with training exercises (e.g., placing contaminants on the soil surface), and through leaks and spills. Potential contaminant transport pathways include rain runoff and erosion to surface soil, infiltration and leaching to subsurface soil and groundwater, biotransfer to deer through browsing, and dust emissions and volatilization to ambient air. Neither sediment nor surface water is located at the site, because the surface water drainage features are seasonal and probably limited to rain events.

The site is not currently being actively used. However, because the site is not fenced and is wooded, it is accessible to potential trespassers who may hunt. Therefore, the most likely current receptor scenario for the site is a recreational site user who hunts. Also, a risk-based scenario for exposure to National Guard troops (National Guardsperson) on Pelham Range will be developed. Analytical data collected to complete this SI will be compared to the SSSLs developed for this new scenario to determine risk to current site users. Because the site does not have surface water year round, there are no surface water that contain fish for consumption. Potential receptor scenarios 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.

- ***Resident***. The site is not currently used for residential purposes.

Future land use at Station No. 6 and the surrounding area will be for military training. Potential receptor scenarios evaluated for the future include the following:

- ***Resident***. Although the site is not expected to be utilized for residential purposes, the resident is considered in order to provide information for the project manager and regulators.

- ***Recreational Site User***. Although the site will most likely be used for military training, it is surrounded with many acres of forests, providing a good area for recreational purposes.

- ***National Guardsperson***. A risk-based scenario for exposure to National Guard troops on Pelham Range will be developed. Analytical data collected to complete this SI will be compared to the SSSLs developed for this new scenario to determine risk to future site users.

A summary of relevant contaminant release and transport mechanisms, source and exposure media, receptor scenarios 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

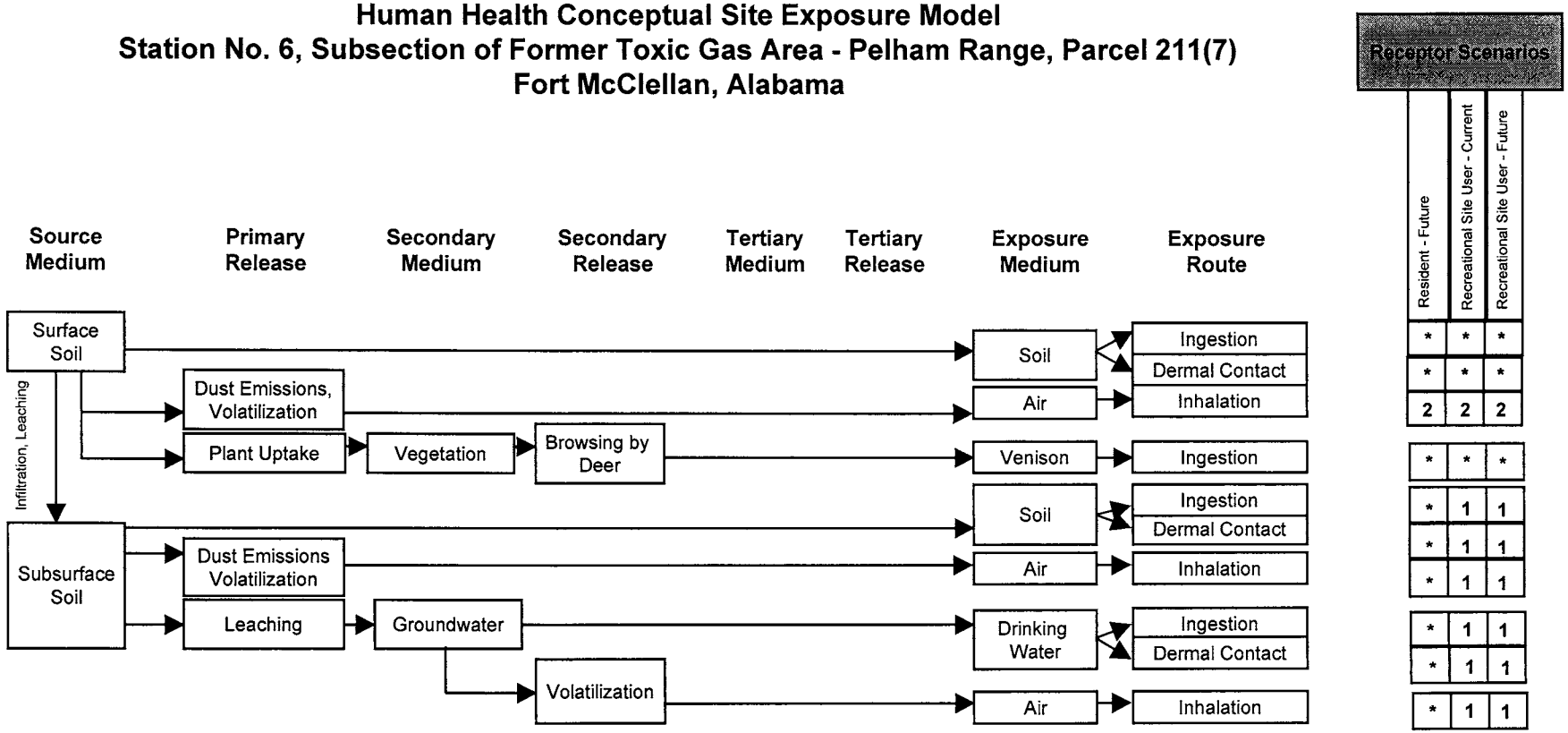
The seven-step decision-making is presented in detail in Section 4.3 of the WP and will be followed during the SI at Station No. 6. Data uses and needs are summarized in Table 3-1.

3.4.1 Risk Evaluation

Confirmation of contamination at Station No. 6 will be based on using EPA definitive data 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
Station No. 6, Subsection of Former Toxic Gas Area - Pelham Range, Parcel 211(7)
Fort McClellan, 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.

KN\4040\P211\Fig3-1rev.ppt\11/15/01 8:32 AM

3.4.2 Data Types and Quality

Surface soil, subsurface soil, depositional soil, and groundwater will be sampled and analyzed to meet the objectives of the SI at Station No. 6. 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. In addition to meeting the quality needs of this SI, data analyzed at this level of quality are appropriate for all phases of site characterization, remedial investigation, 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 (IT, 2000a).

4.0 Field Activities

4.1 UXO and Chemical Warfare Agent Screening Requirements and Utility Clearances

Pelham Range is an active range used by both the Alabama National Guard and the Anniston Army Depot for training and weapons testing. The possibility of the presence of chemical warfare agents and UXO exists at Station No. 6, Subsection of Former Toxic Gas Area. Additionally, it is reported that mustard (H) has been used at Station No. 6 during the late 1950s to the early 1960s. Therefore, IT and the Army will conduct UXO avoidance and chemical warfare agent surveillance activities. These activities include UXO surface sweeps and downhole surveys of soil borings and chemical warfare agent surveillance using MINICAMS support and on-site matrix analyses. Utility clearances will be obtained before installing soil borings and conducting any intrusive work.

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. 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 but 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 and Chemical Warfare Agent Screening

During the soil boring and downhole sampling, downhole UXO surveys will be performed to determine if buried metallic objects are present. 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 (bgs), whichever occurs first. Additionally, the boreholes will be screened continuously with a MINICAMS for chemical agents. MINICAMS support and on-site matrix analyses will be provided by the U.S. Army Engineering and Support Center, Huntsville, Alabama.

4.1.3 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 National Guard and local utility companies to clear the proposed locations for utilities, and obtain digging permits. Once the locations are approved for intrusive sampling (for both UXO and utility avoidance), the stakes will be labeled as cleared.

4.2 Environmental Sampling

The environmental sampling program at Station No. 6, Subsection of Former Toxic Gas Area, includes the collection of surface soil, subsurface soil, depositional soil, and groundwater samples for chemical analysis. These samples will be collected and analyzed to provide data for characterizing the site to determine its environmental condition 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.

4.2.1 Surface Soil Sampling

Surface soil samples will be collected from 5 locations at Station No. 6, Subsection of Former Toxic Gas Area.

4.2.1.1 Sample Locations and Rationales

The surface soil sampling rationales are listed in Table 4-1. Proposed sampling locations are shown in Figure 4-1. Surface soil sample designations and 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.

4.2.1.2 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 which samples for analysis. 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

Table 4-1

Sampling Locations and Rationale
Station No. 6, Subsection of Former Toxic Gas Area - Pelham Range, Parcel 211(7)
Fort McClellan, Alabama

Sample Location	Sample Media	Sample Location Rationale
PR-211-MW01	Surface soil subsurface soil and groundwater	Soil boring for surface soil, subsurface soil, and groundwater samples to be placed in the north central, upslope section of this parcel. Sample data will indicate if contaminant releases into the environment have occurred from former activities at this area of the site and if contaminated soil exists at this location. 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.
PR-211-MW02	Surface soil subsurface soil and groundwater	Soil boring for surface soil, subsurface soil, and groundwater samples to be placed near the southwestern corner of Station 6 parcel boundary, downslope from the U-shaped depression in this location west of the road. Sample data will indicate if contaminant releases into the environment have occurred from former activities at this area of the site and if contaminated soil exists at this location. 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.
PR-211-MW03	Surface soil subsurface soil and groundwater	Soil boring for surface soil, subsurface soil, and groundwater samples to be placed in the center of Station 6 parcel, downslope of several round depressions. Sample data will indicate if contaminant releases into the environment have occurred from former activities at this area of the site and if contaminated soil exists at this location. 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.
PR-211-MW04	Surface soil subsurface soil and groundwater	Soil boring for surface soil, subsurface soil, and groundwater samples to be placed near the southwestern corner of Station 6 parcel boundary, downslope from the U-shaped depression in this location, east of the road. Sample data will indicate if contaminant releases into the environment have occurred from former activities at this area of the site and if contaminated soil exists at this location. 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.
PR-211-MW05	Surface soil subsurface soil and groundwater	Soil boring for surface soil, subsurface soil, and groundwater samples to be placed in the south-central section of Station 6 parcel downslope of noted depressions. Sample data will indicate if contaminant releases into the environment have occurred from former activities at this area of the site and if contaminated soil exists at this location. 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.
PR-211-DEP01	Depositional soil	Depositional soil sample to be placed in the southwestern section of Station 6 parcel in intermittent stream, downslope of noted depressions. Sample data will indicate if contaminant releases into the environment have occurred from former activities at this area of the site and if contaminated soil exists at this location. 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.
PR-211-DEP02	Depositional soil	Depositional soil sample to be placed in the drainage feature that transects the southeastern section of Station 6 parcel. Sample data will indicate if contaminant releases into the environment have occurred from former activities at this area of the site and if contaminated soil exists at this location. 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.

LEGEND

- UNIMPROVED ROADS AND PARKING
- TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 5 FOOT)
- TREES / TREELINE
- PARCEL BOUNDARY
- DEPRESSION
- SURFACE DRAINAGE
- PROPOSED GROUNDWATER, SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION
- PROPOSED DEPOSITIONAL SOIL SAMPLE LOCATION

NOTE:

1. DEPRESSIONS GENERALLY VOID OF VEGETATION WITH IRREGULAR SHAPE AND 9-12 INCHES DEEP.

FIGURE 4-1
SAMPLE LOCATION MAP
STATION NO. 6, SUBSECTION OF
FORMER TOXIC GAS AREA
PARCEL 211(7)

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

IT CORPORATION
A Member of The IT Group

DWG. NO.: ...\774645es.793
PROJ. NO.: 774645
INITIATOR: J. BROWN
PROJ. MGR.: J. YACOUB
DRAFT. CHCK. BY:
ENGR. CHCK. BY: S. MORAN
DATE LAST REV.:
DRAWN BY:
STARTING DATE: 09/04/01
DRAWN BY: D. BOMAR
11/19/01 09:02:29 AM
DBILLING
c:\cadd\design\774645es.793

Table 4-2

Surface Soil, Subsurface Soil and Depositional Soil Sample Designations and QA/QC Sample Quantities
Station No. 6, Subsection of Former Toxic Gas Area - Pelham Range, Parcel 211(7)
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Designation	Sample Depth (ft)	QA/QC Samples			Analytical Suite
			Field Duplicates	Field Splits	MS/MSD	
PR-211-MW01	PR-211-MW01-SS-NQ0001-REG	0-1			PR-211-MW01-SS-NQ0001-MS/MSD	TCL VOCs, TCL SVOCs, TAL Metals, Nitroaromatic/nitramine explosives, CWA Breakdown Products
	PR-211-MW01-DS-NQ0002-REG	a				
PR-211-MW02	PR-211-MW02-SS-NQ0003-REG	0-1				TCL VOCs, TCL SVOCs, TAL Metals, Nitroaromatic/nitramine explosives, CWA Breakdown Products
	PR-211-MW02-DS-NQ0004-REG	a				
PR-211-MW03	PR-211-MW03-SS-NQ0005-REG	0-1				TCL VOCs, TCL SVOCs, TAL Metals, Nitroaromatic/nitramine explosives, CWA Breakdown Products
	PR-211-MW03-DS-NQ0006-REG	a				
PR-211-MW04	PR-211-MW04-SS-NQ0007-REG	0-1	PR-211-MW04-DS-NQ0008-FD			TCL VOCs, TCL SVOCs, TAL Metals, Nitroaromatic/nitramine explosives, CWA Breakdown Products
	PR-211-MW04-DS-NQ0009-REG	a				
PR-211-MW05	PR-211-MW05-SS-NQ0010-REG	0-1				TCL VOCs, TCL SVOCs, TAL Metals, Nitroaromatic/nitramine explosives, CWA Breakdown Products
	PR-211-MW05-DS-NQ0011-REG	a				
PR-211-DEP01	PR-211-DEP01-SS-NQ0012-REG	0-0.5				TCL VOCs, TCL SVOCs, TAL Metals, Nitroaromatic/nitramine explosives, CWA Breakdown Products
PR-211-DEP02	PR-211-DEP02-SS-NQ0013-REG	0-0.5				TCL VOCs, TCL SVOCs, TAL Metals, Nitroaromatic/nitramine explosives, CWA Breakdown Products

[a] Actual sample depth selected for analysis will be at the discretion of the site geologist and will be based on field observation.

CWA - Chemical warfare agents.
DEP - Depositional sample.
FD - Field duplicate.
MS/MSD - Matrix spike/matrix spike duplicate.
QA/QC - Quality assurance/quality control.
REG - Field sample.
SVOCs - Semivolatile organic compounds.
TAL - Target analyte list.
TCL - Target compound list.
VOCs - Volatile organic compounds.

and chain-of-custody (COC) will be recorded as specified in Section 4.13 of the SAP. The samples will be analyzed for the parameters listed in Section 4.5 of this SFSP.

4.2.2 Subsurface Soil Sampling

Subsurface soil samples will be collected from 5 borings installed at Station No. 6, Subsection of Former Toxic Gas Area.

4.2.2.1 Sample Locations and Rationales

Subsurface soil samples will be collected from the soil borings proposed on Figure 4-1. The subsurface soil sampling rationales are 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.

4.2.2.2 Sample Collection

Subsurface soil samples will be collected from soil borings at a depth greater than 1 foot bgs 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 lithogical log will be recorded by the on-site geologist for each borehole. At least one subsurface sample from each borehole will be selected for analysis. 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 indicates a reading exceeding background using the PID, the deepest interval from the soil boring will be sampled and submitted to the laboratory for analysis. Subsurface soil samples may be selected for analysis 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 analysis. More than one subsurface soil sample will be collected if field measurements and observations indicate a possible layer of PSSCs and/or if additional sample data would provide insight to the existence of any PSSCs.

Sample documentation and COCs 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 4.5 of this SFSP.

4.2.3 Depositional Soil Sampling

Two depositional samples will be collected from drainage features at Station No. 6, Subsection of Former Toxic Gas Area, Parcel 211(7).

4.2.3.1 Sample Locations and Rationales

The proposed locations for the depositional samples are shown in Figure 4-1. Depositional sampling rationale are presented in Table 4-1. The depositional sample designations are listed in Table 4-2. The actual depositional soil sample points will be at the discretion of the sampler and based on the drainage pathways and actual field observations.

4.2.3.2 Sample Collection

The depositional soil samples will be collected in accordance with the procedures for sediment sampling specified in Section 4.9.1.2 of the SAP. Sample documentation and COC will be recorded as specified in Section 4.13 of the SAP. The depositional soil samples will be analyzed for the parameters listed in Section 4.5 of this SFSP.

4.2.4 Permanent Residuum Monitoring Wells

Five permanent residuum monitoring wells will be installed in the study area at Station No. 6. The permanent residuum monitoring well locations are shown on Figure 4-1. The rationales for the monitoring well locations are presented in Table 4-1. The monitoring well boreholes will be drilled to the top of bedrock, or until adequate groundwater is encountered to install a well with a 10- to 20-foot screen. Monitoring wells will be installed 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 (PVC) pipe. Attached to the bottom of the well casing will be a section of new threaded, flush-joint, 0.010-inch continuous wrap PVC well screen, approximately 10 to 20 feet long.

Soil samples for lithology will be collected continuously 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.

4.2.5 Groundwater Sampling

Groundwater samples will be collected from the 5 monitoring wells completed at Station No. 6, Subsection of Former Toxic Gas Area, as described in Section 4.2.4.

4.2.5.1 Sample Locations and Rationales

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

4.2.5.2 Sample Collection

Prior to sampling each monitoring well, the static water level will be measured 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. The low-flow groundwater sampling method outlined in the August 2000 letter report to USACE (IT, 2000c) will be used if deemed necessary by the IT Site Manager.

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 4.5 of this SFSP.

4.3 Decontamination Requirements

Decontamination will be performed on sampling and non-sampling 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 non-sampling equipment will be performed in accordance with the requirements presented in Section 4.10.1.2 of the SAP.

Table 4-3

Groundwater Sample Designations and QA/QC Sample Quantities
Station No. 6, Subsection of Former Toxic Gas Area - Pelham Range, Parcel 211(7)
Fort McClellan, Alabama

Sample Location	Sample Designation	Sample Matrix [a]	QA/QC Samples			Analytical Suite
			Field Duplicates	Field Splits	MS/MSD	
PR-211-MW01	PR-211-MW01-GW-NQ3001-REG	Groundwater			PR-211-MW01-GW-NQ3001-MS/MSD	TCL VOCs, TCL SVOCs, TAL Metals, Nitroaromatic/nitramine explosives, CWA Breakdown Products
PR-211-MW02	PR-211-MW02-GW-NQ3002-REG	Groundwater				TCL VOCs, TCL SVOCs, TAL Metals, Nitroaromatic/nitramine explosives, CWA Breakdown Products
PR-211-MW03	PR-211-MW03-GW-NQ3003-REG	Groundwater				TCL VOCs, TCL SVOCs, TAL Metals, Nitroaromatic/nitramine explosives, CWA Breakdown Products
PR-211-MW04	PR-211-MW04-GW-NQ3004-REG	Groundwater	PR-211-MW04-GW-NQ3005-FD			TCL VOCs, TCL SVOCs, TAL Metals, Nitroaromatic/nitramine explosives, CWA Breakdown Products
PR-211-MW05	PR-211-MW05-GW-NQ3006-REG	Groundwater				TCL VOCs, TCL SVOCs, TAL Metals, Nitroaromatic/nitramine explosives, CWA Breakdown Products

[a] Groundwater samples will be collected from the top 5 to 10 feet of water column.

CWA - Chemical warfare agents.
FD - Field duplicate.
MS/MSD - Matrix spike/matrix spike duplicate.
QA/QC - Quality assurance/quality control.
REG - Field sample.
SVOCs - Semivolatile organic compounds.
TAL - Target analyte list.
TCL - Target compound list.
VOCs - Volatile organic compounds.

4.4 Surveying of Sample Locations

All areas at this site must be cleared for UXO avoidance before any surveying activities will commence. 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 of 1983. Elevations will be referenced to the North American Vertical Datum of 1988.

Horizontal coordinates for soil sample 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.

4.5 Analytical Program

Samples collected at the locations specified in this chapter will be analyzed for various chemical constituents, including chemical warfare agent breakdown products. These constituents will be referred to as the hazardous, toxic, and radioactive waste (HTRW) program. The HTRW analytical program will be implemented by EMAX Laboratories, Inc. of Torrance, California (EMAX). In addition to this program, a chemical warfare agent screening program is also required because Station No. 6 has been identified as a potential chemical agent site, where agents were reportedly used for training. For the HTRW and chemical warfare agent screening, the on-site sample coordinator will provide sampling containers and preservatives and coordinate sampling procedures with the field sampling crews in accordance with Table 5-1 of the QAP (IT, 2000a).

4.5.1 Chemical Agent Screening

Station No. 6, Subsection of Former Toxic Gas Area, Parcel 211(7), has been identified as a site where chemical warfare agents and decontaminants were used; therefore, special precautions will be required when collecting, screening, and analyzing soil and water samples collected from this area. The purpose of implementing a chemical agent screening program is to verify that both the area sampled and the collected samples themselves do not pose an exposure risk to the sampling technicians, sample shipment personnel, or laboratory analysis personnel. To perform this

verification, chemical agent screening will be performed in field laboratory facilities. Field screening and laboratory analytical services for chemical agents will be provided by Edgewood Chemical/Biological Command (ECBC). If at any point in the agent screening and analysis process the chemical agent concentration(s) exceed safety levels, all work will stop, the USACE will be notified, and no additional work will be performed until further instructions are given. The generalized screening and analysis program for chemical warfare agents and their breakdown products is summarized on Figure 4-2.

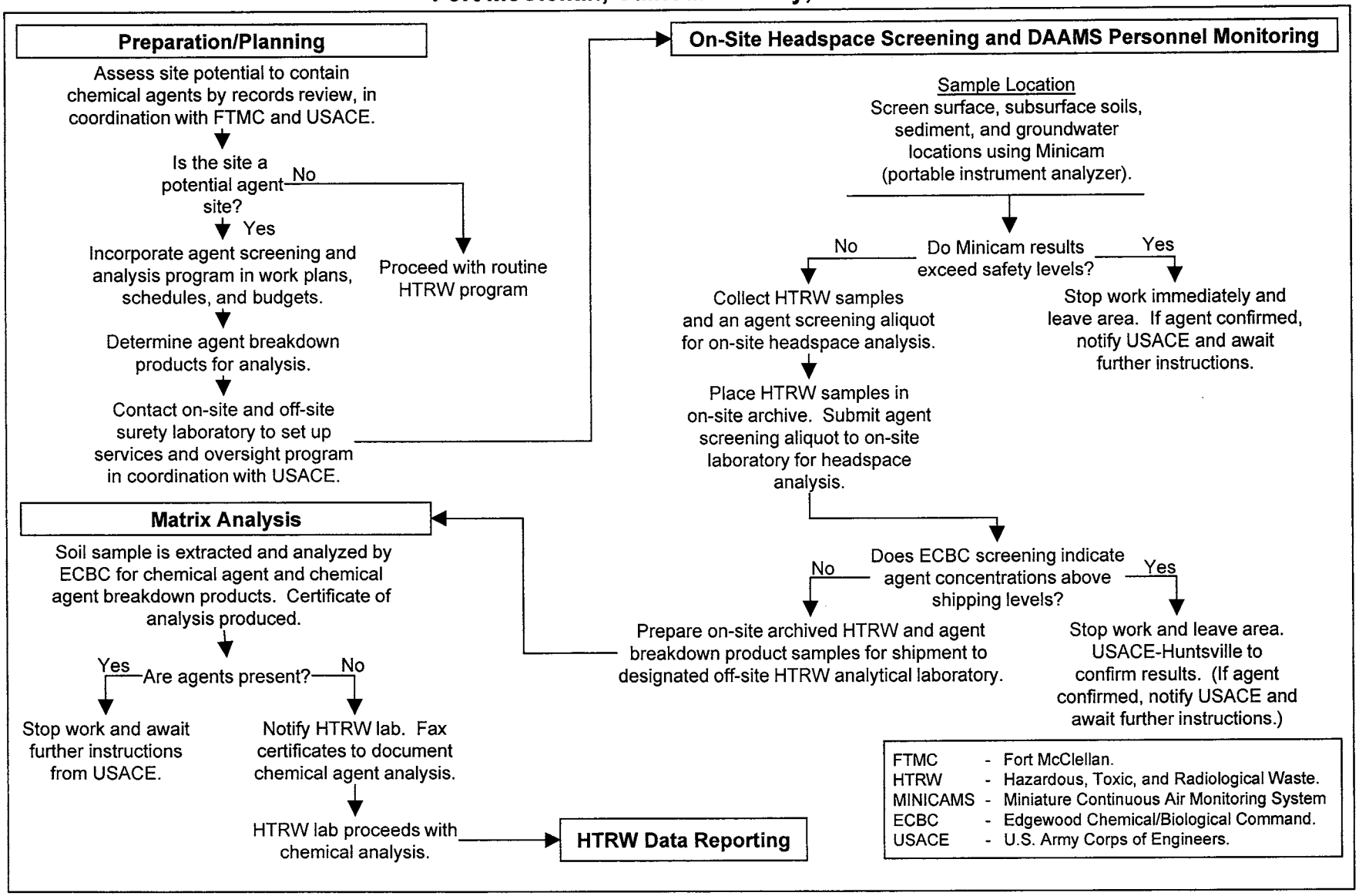
Real-Time Screening. The initial level of screening is conducted at the site of sample collection using MINICAMS instruments. The MINICAMS is a real-time portable air analyzer that measures the concentration of agents in the vapor phase. If the MINICAMS results indicate the area is safe to sample, then sample aliquots will be collected from the prescribed matrices to complete the HTRW program designated in Section 4.5.2 of this SFSP. These HTRW samples will be stored on site under custody and preserved at 4 degrees Celsius (°C) until approval from ECBC has been received to send them to EMAX pending laboratory results of headspace screening.

Headspace Analysis. Along with the HTRW samples, a separate aliquot will be collected and submitted for agent headspace screening at the laboratory located on site. Once the on-site laboratory results are evaluated and the area sampled has been verified to be free of chemical agents based on headspace analysis, the HTRW samples that have been stored on site will be released for shipment to EMAX for HTRW chemical analysis and agent breakdown product analysis as listed in Section 4.5.2. EMAX will be notified by the IT Sample Coordinator at FTMC to receive these samples, but not to open the coolers or log them into the laboratory system until chemical agent matrix analysis has been performed.

Matrix Analysis. Once the headspace screening of the collected soil samples by the onsite ECBC laboratory is complete, an additional aliquot of the soil sample matrix will be shipped to the ECBC laboratory in Edgewood, Maryland to be further prepared and analyzed for chemical agent breakdown products. This step will involve the extraction and analysis of the actual soil matrix itself. This matrix analysis will result in the production of a signed certificate of analysis provided by the ECBC personnel which then will be used by IT as final documentation that the samples are considered to be free of chemical agents and safe to handle. IT will relay the certificates to EMAX and notify them to proceed with the sample log in and HTRW analyses to meet sample holding times.

Figure 4-2

Chemical Agent Screening Program
Station No. 6, Subsection of Former Toxic Gas Area - Pelham Range, Parcel 211(7)
Fort McClellan, Calhoun County, Alabama



KN\4040\P211\Fig 4-2.ppt\12/10/01 6:33 PM

4.5.2 HTRW Analytical Program

Samples collected at locations specified in this chapter will be analyzed for 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 Station No. 6 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 metals - Method 6010B/7000
- Chemical warfare agent breakdown products – Method 8321 Modified/8270 Modified
- Nitroaromatic/nitramine explosives – Method 8330.

The samples will be analyzed using EPA SW-846 methods, including Update III Methods where applicable, as presented in Table 4-4 in this SFSP and Table 6-1 in the QAP. Data will be reported in accordance with definitive data requirements of Chapter 2 of the USACE Engineering Manual 200-1-6, *Chemical Quality Assurance For Hazardous, Toxic And Radioactive Waste (HTRW) Projects* (USACE, 1997), and evaluated by the stipulated requirements for the generation of definitive data (Section 3.1.2 of the QAP). Chemical data will be reported by the laboratory via hard-copy data packages using Contract Laboratory Program-like forms, along with electronic copies. These packages will be validated in accordance with EPA National Functional Guidelines by Level III criteria.

4.6 Sample Preservation, Packaging, and Shipping

For sample preservation and handling, separate protocols will be applied to chemical agent aliquots and samples for HTRW analyses. HTRW samples must be archived on site under conditions (temperature and pH) that meet the specifications found in the QAP. Chemical agent headspace analysis data provided by ECBC on-site laboratory will determine when the HTRW soil samples can be removed from on-site storage and shipped to EMAX. Matrix analysis will begin after a portion of each soil sample is received in the ECBC Maryland laboratory and the results used to certify the samples are free of chemical agent and safe to handle. Any delays in receiving ECBC matrix analysis data may result in the HTRW samples exceeding their recommended holding times. If this situation occurs, the USACE will be contacted for guidance.

HTRW Analyses. Sample preservation, packaging, and shipping for HTRW analyses will follow the procedures specified in Section 4.13.2 of the SAP. This includes secure, on-site refrigerated storage within a temperature range of 4 °C ± 2°C while waiting for chemical agent

Table 4-4

Analytical Samples
Site Investigation
Station No. 6, Subsection of Former Toxic Gas Area - Pelham Range, Parcel 211(7)
Fort McClellan, Alabama

Parameters	Analysis Method	Sample Matrix	TAT Needed	Field Samples: No. of Sample Points	Field Samples: No. of Events	Field Samples: No. of Field Samples	QA/QC Samples[a]: Field Dups (10%)	QA/QC Samples[a]: Splits w/ QA Lab (0%)	QA/QC Samples[a]: MS/MSD (5%)	QA/QC Samples[a]: Trip Blank (1/ship)	QA/QC Samples[a]: Eq. Rinse (1/wk/matrix)	EMAX Total No. Analysis	ECBC Lab Total No. Analysis
Station 6: 5 water matrix samples (5 groundwater samples); 12 soil matrix samples (5 surface soil samples, 5 subsurface soil samples, and 2 depositional soil samples)													
TCL VOCs	8260B	water	normal	5	1	5	1		1	2	1	11	0
TCL SVOCs	8270C	water	normal	5	1	5	1		1		1	9	0
CWA Breakdown Products	8321MOD/8270MOD	water	normal	5	1	5	1		1		1	9	0
TAL Metals	6010B/7000	water	normal	5	1	5	1		1		1	9	0
Nitroaromatic/nitramine explosives	8330	water	normal	5	1	5	1		1		1	9	0
TCL VOCs	8260B	soil	normal	12	1	12	1		1		1	16	0
TCL SVOCs	8270C	soil	normal	12	1	12	1		1		1	16	0
CWA Breakdown Products[b]	8321MOD/8270MOD	soil	normal	12	1	12	1		1		1	0	16
TAL Metals	6010B/7000	soil	normal	12	1	12	1		1		1	16	0
Nitroaromatic/nitramine explosives	8330	soil	normal	12	1	12	1		1		1	16	0
					Station 6 Subtotal:	85	10	0	10	2	10	111	16

[a]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.
[b]CWA breakdown product analysis for soil samples only will be performed by the ECBC Maryland laboratory as part of the soil matrix analysis to determine that the soil samples are free of chemical agent.

Ship samples to: EMAX Laboratories, Inc.
1835 205th Street
Torrance, CA 90501
Attn: Elizabeth McIntyre
Tel: 424-618-8889
Fax: 424-618-0818

CWA - Chemical warfare agents.
ECBC - Edgewood Biological/Chemical Command, Edgewopod, Maryland Laboratory.
FD - Field duplicate.
FS - Field split.
MS/MSD - Matrix spike/matrix spike duplicate.
QA/QC - Quality assurance/quality control.
REG - Field sample.
SVOCs - Semivolatile organic compounds.
TAL - Target analyte list.
TCL - Target compound list.
VOCs - Volatile organic compounds.

headspace screening results. Verification of the storage temperature will be performed using temperature blanks and will be recorded twice per day on a temperature monitoring log.

Completed analysis request/COC records will be secured and included with each shipment of coolers to EMAX. Chemical agent breakdown product analysis for soil samples will be performed by ECBC in their Maryland laboratory. The on-site ECBC laboratory will ship the additional aliquot of each soil sample after the headspace analysis has been completed. The remaining HTRW analyses, including groundwater samples for chemical agent breakdown products, will be conducted at EMAX. Sample preservation, packaging, and shipping will follow the procedures specified in Section 4.13.2 of the SAP (IT, 2000a). EMAX shipments will be sent to:

Attn: Elizabeth McIntyre
EMAX Laboratories, Inc.
1835 205th Street
Torrance, California 90501
Telephone: (424) 618-8889.

4.7 Investigation-Derived Waste Management

Management and disposal of the investigation-derived wastes (IDW) will follow procedures and requirements described in Appendix D of the SAP (IT, 2000a). The IDW expected to be generated at Station No. 6 will include decontamination fluids, drill cuttings, purge water, and disposable personal protective equipment.

4.8 Site-Specific Safety and Health

Health and safety requirements for this SI are provided in the SSHP attachment for Station No. 6, Subsection of Former Toxic Gas Area. 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.

IT Corporation (IT), 2000a, ***Final Installation-Wide Sampling and Analysis Plan, Fort McClellan, Calhoun County, Alabama***, August.

IT Corporation (IT), 2000b, ***Final Human Health and Ecological Screening Values and PAH Background Summary Report***, July.

IT Corporation (IT), 2000c, Letter to Ellis Pope (USACE) from Jeanne Yacoub (IT), "Groundwater Resampling Results," August 7.

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

U.S. Army Center for Health Promotion and Prevention Medicine (CHPPM), 1999, ***Draft Preliminary Assessment No. 38-EIH-1775-99, Fort McClellan Army National Guard Training Center, Fort McClellan, Alabama***, June.

U.S. Army Corps of Engineers (USACE), 2001, ***Requirements for the Preparation of Sampling and Analysis Plans***, Engineer Manual EM 200-1-3, February 1.

U.S. Army Corps of Engineers (USACE), 2000, ***Statement of Work for Task Order CK05, Modification No. 10, National Guard Memorandum of Agreement Sites, Fuel/Training Areas SI, Waste Chemical Storage Area SI, Fire Training Pit SI, Industrial Landfill Remedial Design, UST Review, Range J RI, and Partnering Facilities at Fort McClellan, Alabama***, September.

U.S. Army Corps of Engineers (USACE), 1997, ***Chemical Quality Assurance For Hazardous, Toxic and Radioactive Waste (HTRW) Projects***.

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

U.S. Department of the Army and Air Force, 1963, ***Military Chemistry and Chemical Agents,*** U.S. Department of Commerce, National Technical Information Service, December.

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

ATTACHMENT 1

LIST OF ABBREVIATIONS AND ACRONYMS

List of Abbreviations and Acronyms

2,4-D	2,4-dichlorophenoxyacetic acid
2,4,5-T	2,4,5-trichlorophenoxyacetic acid
2,4,5-TP	silvex
3D	3D International Environmental Group
Abs	skin absorption
Amsl	above mean sea level
AC	hydrogen cyanide
AcB2	Anniston and Allen gravelly loams, 2 to 6 percent slopes, eroded
AcC2	Anniston and Allen gravelly loams, 6 to 10 percent slopes, eroded
AcD2	Anniston and Allen gravelly loams, 10 to 15 percent slopes, eroded
AcE2	Anniston and Allen gravelly loams, 15 to 25 percent slopes, eroded
ACGIH	American Conference of Governmental Industrial Hygienists
ADEM	Alabama Department of Environmental Management
ADPH	Alabama Department of Public Health
AEC	U.S. Army Environmental Center
AEL	airborne exposure limit
AHA	ammunition holding area
AL	Alabama
amb.	amber
ANAD	Anniston Army Depot
AOC	area of concern
APT	armor-piercing tracer
ARAR	applicable or relevant and appropriate requirement
AREE	area requiring environmental evaluation
ASP	Ammunition Supply Point
ASR	Archives Search Report
AST	aboveground storage tank
ASTM	American Society for Testing and Materials
ATV	all-terrain vehicle
AWWSB	Anniston Water Works and Sewer Board
'B'	Analyte detected in laboratory or field blank at concentration greater than the reporting limit (and greater than zero)
BCF	blank correction factor
BCT	BRAC Cleanup Team
BEHP	bis(2-ethylhexyl)phthalate
BFB	bromofluorobenzene
BFE	base flood elevation
BG	Bacillus globigii
bgs	below ground surface
BHC	betahexachlorocyclohexane
bkg	background
bls	below land surface
BOD	biological oxygen demand
BRAC	Base Realignment and Closure
Braun	Braun Intertec Corporation
BSC	background screening criterion
BTAG	Biological Technical Assistance Group
BTEX	benzene, toluene, ethyl benzene, and xylenes
BTOC	below top of casing
BTV	background threshold value
BW	biological warfare
BZ	breathing zone; 3-quinuclidinyl benzilate
C	ceiling limit value
Ca	carcinogen
CAB	chemical warfare agent breakdown products
CAMU	corrective action management unit
CCAL	continuing calibration
CCB	continuing calibration blank
CD	compact disc
CEHNC	U.S. Army Engineering and Support Center, Huntsville
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERFA	Community Environmental Response Facilitation Act
CESAS	Corps of Engineers South Atlantic Savannah
CG	carbonyl chloride (phosgene)
CFC	chlorofluorocarbon
ch	inorganic clays of high plasticity
CHPPM	U.S. Army Center for Health Promotion and Preventive Medicine
CK	cyanogen chloride
cl	inorganic clays of low to medium plasticity
Cl.	chlorinated
CLP	Contract Laboratory Program
CN	chloroacetophenone
CNB	chloroacetophenone, benzene, and carbon tetrachloride
CNS	chloroacetophenone, chloropicrin, and chloroform
Co-60	cobalt-60
COC	chain of custody; contaminant of concern
COE	Corps of Engineers
Con	skin or eye contact
COPC	contaminant of potential concern
COPEC	contaminant of potential environmental concern
CQCSM	Contract Quality Control System Manager
CRL	certified reporting limit
CRZ	contamination reduction zone
Cs-137	cesium-137
CS	ortho-chlorobenzylidene-malononitrile
CSEM	conceptual site exposure model
ctr.	container
CWA	chemical warfare agent
CWM	chemical warfare material; clear, wide mouth
CX	dichloroformoxime
'D'	duplicate; dilution
DAF	dilution-attenuation factor
DANC	decontamination agent, non-corrosive
ºC	degrees Celsius
ºF	degrees Fahrenheit
DCE	dichloroethene
DDD	dichlorodiphenyldichloroethane
DDE	dichlorodiphenyldichloroethene
DDT	dichlorodiphenyltrichloroethane
DEH	Directorate of Engineering and Housing
DEP	depositional soil
DI	deionized
DID	data item description
DIMP	di-isopropylmethylphosphonate
DMMP	dimethylmethylphosphonate
DOD	U.S. Department of Defense
DOJ	U.S. Department of Justice
DOT	U.S. Department of Transportation
DP	direct-push
DPDO	Defense Property Disposal Office
DPT	direct-push technology
DQO	data quality objective
DRMO	Defense Reutilization and Marketing Office
DRO	diesel range organics
DS	deep (subsurface) soil
DS2	Decontamination Solution Number 2
DWEL	drinking water equivalent level
E&E	Ecology and Environment, Inc.
EBS	environmental baseline survey
EE/CA	engineering evaluation and cost analysis
Elev.	elevation
EM	electromagnetic
EMI	Environmental Management Inc.
EM31	Geonics Limited EM31 Terrain Conductivity Meter
EM61	Geonics Limited EM61 High-Resolution Metal Detector
EOD	explosive ordnance disposal
EODT	explosive ordnance disposal team
EPA	U.S. Environmental Protection Agency
EPC	exposure point concentration
EPIC	Environmental Photographic Interpretation Center
ER	equipment rinsate
ESE	Environmental Science and Engineering, Inc.
ESN	Environmental Services Network, Inc.
ESV	ecological screening value
Exp.	explosives
E-W	east to west
EZ	exclusion zone
FAR	Federal Acquisition Regulations
FB	field blank
FD	field duplicate
FedEx	Federal Express, Inc.
FEMA	Federal Emergency Management Agency
FFE	field flame expedient
Fil	filtered

Flt	filtered
FML	flexible membrane liner
FMP 1300	Former Motor Pool 1300
FOMRA	Former Ordnance Motor Repair Area
Foster Wheeler	Foster Wheeler Environmental Corporation
Frtn	fraction
FS	field split; feasibility study
FSP	field sampling plan
ft	feet
ft/ft	feet per foot
FTA	Fire Training Area
FTMC	Fort McClellan
FTRRA	FTMC Reuse & Redevelopment Authority
g	gram
G-856	Geometrics, Inc. G-856 magnetometer
G-858G	Geometrics, Inc. G-858G magnetic gradiometer
gal	gallon
gal/min	gallons per minute
GB	sarin
gc	clay gravels; gravel-sand-clay mixtures
GC	gas chromatograph
GC/MS	gas chromatograph/mass spectrometer
GCR	geosynthetic clay liner
GFAA	graphite furnace atomic absorption
GIS	Geographic Information System
gm	silty gravels; gravel-sand-silt mixtures
gp	poorly graded gravels; gravel-sand mixtures
gpm	gallons per minute
GPR	ground-penetrating radar
GPS	global positioning system
GS	ground scar
GSA	General Services Administration; Geologic Survey of Alabama
GSBP	Ground Scar Boiler Plant
GSSI	Geophysical Survey Systems, Inc.
GST	ground stain
GW	groundwater
gw	well-graded gravels; gravel-sand mixtures
HA	hand auger
HCl	hydrochloric acid
HD	distilled mustard
HDPE	high-density polyethylene
Herb.	herbicides
HNO_3	nitric acid
hr	hour
H&S	health and safety
HSA	hollow-stem auger
HTRW	hazardous, toxic, and radioactive waste
'I'	out of control, data rejected due to low recovery
ICAL	initial calibration
ICB	initial calibration blank
ICP	inductively-coupled plasma
ICRP	International Commission on Radiological Protection
ICS	interference check sample
ID	inside diameter
IDL	instrument detection limit
IDLH	immediately dangerous to life or health
IDM	investigative-derived media
IDW	investigation-derived waste
ILCR	incremental lifetime cancer risk
IMPA	isopropylmethyl phosphonic acid
IMR	Iron Mountain Road
in.	inch
Ing	ingestion
Inh	inhalation
IP	ionization potential
IPS	International Pipe Standard
IRDMIS	Installation Restoration Data Management Information System
IRP	Installation Restoration Program
ISCP	Installation Spill Contingency Plan
IT	IT Corporation
ITEMS	IT Environmental Management System ™
'J'	estimated concentration
JeB2	Jefferson gravelly fine sandy loam, 2 to 6 percent slopes, eroded
JeC2	Jefferson gravelly fine sandy loam, 6 to 10 percent slopes, eroded
JfB	Jefferson stony fine sandy loam, 0 to 10 percent slopes have strong slopes
JPA	Joint Powers Authority
K	conductivity
L	lewisite; liter
LC_{50}	lethal concentration for 50 percent of population tested
LD_{50}	lethal dose for 50 percent of population tested
l	liter
LBP	lead-based paint
LCS	laboratory control sample
LEL	lower explosive limit
LOAEL	lowest-observed-advserse-effects-level
LT	less than the certified reporting limit
LUC	land-use control
LUCAP	land-use control assurance plan
LUCIP	land-use control implementation plan
max	maximum
MCL	maximum contaminant level
MCPA	4-chloro-2-methylphenoxyacetic acid
MDC	maximum detected concentration
MDL	method detection limit
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
mg/m^3	milligrams per cubic meter
mh	inorganic silts, micaceous or diatomaceous fine, sandy or silt soils
MHz	megahertz
µg/g	micrograms per gram
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
µmhos/cm	micromhos per centimeter
min	minimum
MINICAMS	miniature continuous air monitoring system
ml	inorganic silts and very fine sands
mL	milliliter
mm	millimeter
MM	mounded material
MMBtu/hr	million Btu per hour
MOGAS	motor vehicle gasoline
MPA	methyl phosphonic acid
MPM	most probable munition
MR	molasses residue
MS	matrix spike
mS/cm	millisiemens per centimeter
MSD	matrix spike duplicate
MTBE	methyl tertiary butyl ether
msl	mean sea level
MtD3	Montevallo shaly, silty clay loam, 10 to 40 percent slopes , severely eroded
mV	millivolts
MW	monitoring well
NA	not applicable; not available
NAD	North American Datum
NAD83	North American Datum of 1983
NAVD88	North American Vertical Datum of 1988
NCP	National Contingency Plan
ND	not detected
NE	no evidence; northeast
ne	not evaluated
NEW	net explosive weight
NFA	No Further Action
ng/L	nanograms per liter
NGVD	National Geodetic Vertical Datum
NIC	notice of intended change
NIOSH	National Institute for Occupational Safety and Health
NPDES	National Pollutant Discharge Elimination System
No.	number
NOAA	National Oceanic and Atmospheric Administration
NOAEL	no-observed-adverse-effects-level
NR	not requested; not recorded
ns	nanosecond
N-S	north to south
NS	not surveyed

nT	nanotesla
NTU	nephelometric turbidity unit
nv	not validated
O&G	oil and grease
O&M	operating and maintenance
OB/OD	open burning/open detonation
OD	outside diameter
OE	ordnance and explosives
oh	organic clays of medium to high plasticity
ol	organic silts and organic silty clays of low plasticity
OP	organophosphorus
ORP	oxidation-reduction potential
OSHA	Occupational Safety and Health Administration
OWS	oil/water separator
oz	ounce
PA	preliminary assessment
PAH	polynuclear aromatic hydrocarbon
Parsons	Parsons Engineering Science, Inc.
Pb	lead
PCB	polychlorinated biphenyl
PCE	perchloroethene
PCP	pentachlorophenol
PDS	Personnel Decontamination Station
PEL	permissible exposure limit
PES	potential explosive site
Pest.	pesticides
PETN	pentarey thritol tetranitrate
PFT	portable flamethrower
PG	professional geologist
PID	photoionization detector
PkA	Philo and Stendal soils local alluvium, 0 to 2 percent slopes
POL	petroleum, oils, and lubricants
PP	peristaltic pump
ppb	parts per billion
PPE	personal protective equipment
ppm	parts per million
PPMP	Print Plant Motor Pool
ppt	parts per thousand
PRG	preliminary remediation goal
PSSC	potential site-specific chemical
pt	peat or other highly organic silts
PVC	polyvinyl chloride
QA	quality assurance
QA/QC	quality assurance/quality control
QAP	installation-wide quality assurance plan
QC	quality control
QST	QST Environmental, Inc.
qty	quantity
Qual	qualifier
‘R’	rejected data; resample
RAO	removal action objective
RBC	risk-based concentration
RCRA	Resource Conservation and Recovery Act
RD	remedial design
RDX	cyclonite
RfD	reference dose
ReB3	Rarden silty clay loams
REG	regular field sample
REL	recommended exposure limit
RFA	request for analysis
RGO	remedial goal option
RI	remedial investigation
RL	reporting limit
RPD	relative percent difference
RRF	relative response factor
RSD	relative standard deviation
RTK	real-time kinematic
SAD	South Atlantic Division
SAE	Society of Automotive Engineers
SAIC	Science Applications International Corporation
SAP	installation-wide sampling and analysis plan
sc	clayey sands; sand-clay mixtures
Sch.	schedule
SD	sediment
SDG	sample delivery group
SDZ	safe distance zone; surface danger zone
SEMS	Southern Environmental Management & Specialties, Inc.
SFSP	site-specific field sampling plan
SGF	standard grade fuels
SHP	installation-wide safety and health plan
SI	site investigation
SL	standing liquid
SLERA	screening-level ecological risk assessment
sm	silty sands; sand-silt mixtures
SM	Serratia marcescens
SOP	standard operating procedure
sp	poorly graded sands; gravelly sands
SP	submersible pump
Sr-90	strontium-90
SRA	streamlined human health risk assessment
Ss	stony rough land, sandstone series
SS	surface soil
SSC	site-specific chemical
SSHO	site safety and health officer
SSHP	site-specific safety and health plan
SSL	soil screening level
SSSL	site-specific screening level
SSSSL	site-specific soil screening level
STB	supertropical bleach
STC	source term concentrations
STEL	short-term exposure limit
STOLS	Surface Towed Ordnance Locator System®
Std. units	standard units
SU	standard unit
SUXOS	senior UXO supervisor
SVOC	semivolatile organic compound
SW	surface water
SW-846	U.S. EPA’s *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods*
SWPP	storm water pollution prevention plan
SZ	support zone
TAL	target analyte list
TAT	turn around time
TB	trip blank
TCA	trichloroethane
TCDD	2,3,7,8-tetrachlorodibenzo-p-dioxin
TCDF	tetrachlorodibenzofurans
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 compound
TLV	threshold limit value
TN	Tennessee
TNT	trinitrotoluene
TOC	top of casing; total organic carbon
TPH	total petroleum hydrocarbons
TRADOC	U.S. Army Training and Doctrine Command
TRPH	total recoverable petroleum hydrocarbons
TSCA	Toxic Substances Control Act
TWA	time-weighted average
UCL	upper confidence limit
UCR	upper certified range
‘U’	not detected above reporting limit
USACE	U.S. Army Corps of Engineers
USACHPPM	U.S. Army Center for Health Promotion and Preventive Medicine
USAEC	U.S. Army Environmental Center
USAEHA	U.S. Army Environmental Hygiene Agency
USACMLS	U.S. Army Chemical School
USAMPS	U.S. Army Military Police School
USATCES	U.S. Army Technical Center for Explosive Safety
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
USGS	U.S. Geological Survey
UST	underground storage tank
UTL	upper tolerance level
UXO	unexploded ordnance
UXOQCS	UXO Quality Control Supervisor
UXOSO	UXO safety officer
VOA	volatile organic analyte
VOC	volatile organic compound
VOH	volatile organic hydrocarbon
VQlfr	validation qualifier
VQual	validation 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^3	cubic yards

SAIC – Data Qualifiers, Codes and Footnotes, 1995 Remedial Investigation

N/A – Not analyzed

ND – Not detected

Boolean Codes

- LT – Less than the certified reporting limit

Flagging Codes

- 9 – Non-demonstrated/validated method performed for USAEC
- B – Analyte found in the method blank or QC blank
- C – Analysis was confirmed
- D – Duplicate analysis
- I – Interfaces in sample make quantitation and/or identification to be suspicious
- J – Value is estimated
- K – Reported results are affected by interfaces or high background
- N – Tentatively identified compound (match greater than 70%)
- Q – Sample interference obscured peak of interest
- R – Non-target compound analyzed for but not detected (GC/MS methods)
- S – Non-target compound analyzed for and detected (GC/MS methods)
- T – Non-target compound analyzed for but not detected (non GC/MS methods)
- U – Analysis in unconfirmed
- Z – Non-target compound analyzed for and detected (non-GC/MS methods)

Qualifiers

- J – The low-spike recovery is low
- N – The high-spike recovery is low
- R – Data is rejected