

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

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

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

For non-Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) environmental or safety issues, the parcel label includes the following components: a unique non-CERCLA issue number, the letter "Q" designating the parcel as a Community Environmental Response Facilitation Act (CERFA) Category 1 Qualified Parcel, and the code for the specific non-CERCLA issue(s) present (ESE, 1998). The non-CERCLA issue codes used are:

- A = Asbestos (in buildings)
- L = Lead-based paint (in buildings)
- P = Polychlorinated biphenyls
- R = Radon (in buildings)

- RD = Radionuclides/radiological issues
- X = UXO
- CWM = Chemical warfare material.

The EBS was conducted in accordance with the 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 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 81mm Mortar Range, Parcel 137Q-X, was identified as a Category 1 CERFA site, qualified “X” for potential UXO. CERFA 1 category sites are parcels where no known or recorded storage, release, or disposal (including migration) has occurred on site property. Former 81mm Mortar Range, Parcel 137Q-X, requires additional evaluation to determine the environmental condition of the parcel.

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

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### **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 Former 81mm Mortar Range, Parcel 137Q-X. This section incorporates the components of the DQO process described in the publication EPA 600/R-96/005, *Guidance for the Data Quality Objectives Process* (EPA, 2000). The DQO process as applied to the Former 81mm Mortar Range, Parcel 137Q-X, 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 Chemistry Data Reporting Requirements and Data Package Deliverables, Update III Methods where applicable, as presented in Chapter 4.0 in this SFSP and Chapter 5.0 in the QAP. Data will be reported in accordance with definitive data requirements of Chapter 2, *Chemistry Data Reporting Requirements and Data Package Deliverables*, USACE Engineer 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 7.2.2 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 the Former 81mm Mortar Range, Parcel 137Q-X, 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  
Former 81mm Mortar Range, Parcel 137Q-X  
Site Investigation  
Fort McClellan, Calhoun County, Alabama**

(Page 1 of 2)

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 land users.	None	<p><u>Contaminant Source</u> Parcel 137Q-X (explosives and metals)</p> <p><u>Migration Pathways</u> Rain runoff and erosion to surface soil, infiltration and leaching to subsurface soil and groundwater, biotransfer to venison, dust</p> <p>emissions and volatilization to ambient air, groundwater discharge to surface water, and runoff and erosion to surface water and sediment.</p> <p><u>Potential Receptors</u> Resident (future) Recreational site user (current and future)</p> <p><u>PSSC</u> metals, nitroexplosives, VOCs, SVOCs, herbicides, and pesticides.</p>	<u>Surface soil</u>	SI to confirm the presence or absence of contamination in the site media	<u>Surface Soil</u> TAL Metals, Nitroaromatic and Nitramine Explosives; plus a select number of samples for TCL VOCs, TCL, SVOCs, CL Pesticides, OP Pesticides, and CL Herbicides.	Definitive data in data packages (as defined in USACE EM200-1-6)	15 surface soil samples + QC
			<u>Subsurface soil</u>		<u>Subsurface Soil</u> TAL Metals, Nitroaromatic and Nitramine Explosives; plus a select number of samples for TCL VOCs, TCL, SVOCs, CL Pesticides, OP Pesticides, and CL Herbicides.		
			<u>Groundwater</u>	Definitive quality data for future decision making	<u>Subsurface Soil</u> TAL Metals, Nitroaromatic and Nitramine Explosives; plus a select number of samples for TCL VOCs, TCL, SVOCs, CL Pesticides, OP Pesticides, and CL Herbicides.	Definitive data in data packages (as defined in USACE EM200-1-6)	4 groundwater samples + QC
			<u>Surface water</u>		<u>Groundwater</u> TAL Metals, Nitroaromatic and Nitramine Explosives; plus a select number of samples for TCL VOCs, TCL, SVOCs, CL Pesticides, OP Pesticides, and CL Herbicides.		
			<u>Sediment</u>		<u>Surface Water</u> TAL Metals, Nitroaromatic and Nitramine Explosives; plus a select number of samples for TCL VOCs, TCL, SVOCs, CL Pesticides, OP Pesticides, and CL Herbicides.		
					<u>Sediment</u> TAL Metals, Nitroaromatic and Nitramine Explosives; plus a select number of samples for TCL VOCs, TCL, SVOCs, CL Pesticides, OP Pesticides, and CL Herbicides.		

Table 3-1

**Summary of Data Quality Objectives  
Former 81mm Mortar Range, Parcel 137Q-X  
Site Investigation  
Fort McClellan, Calhoun County, Alabama**

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Potential Data Users	Available Data	Conceptual Site Model	Media of Concern	Data Uses and Objectives	Data Types	Analytical Level	Data Quantity
					<u>Depositional Soil</u> TAL Metals, Nitroaromatic and Nitramine Explosives; plus a select number of samples for TCL VOCs, TCL, SVOCs, CL Pesticides, OP Pesticides, and CL Herbicides.	Definitive data in data packages (as defined in USACE EM200-1-6)	1 depositional soil sample + QC

EM2001-1-6 - USACE Engineer Manual, Chemical Quality Assurance for HTRW Projects, October 10, 1992.

ADEM - Alabama Department of Environmental Management.  
 CL - Chlorinated.  
 DOD - U.S. Department of Defense.  
 EPA - U.S. Environmental Protection Agency.  
 FTMC - Fort McClellan.  
 OP - Prthophosphorus.

PSSC - Potential site-specific chemical.  
 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.

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

The conceptual site exposure model (CSEM) provides the basis for identifying and evaluating potential risks to human health in the risk assessment. The CSEM includes all receptors and potential exposure pathways appropriate to all plausible scenarios. The CSEM facilitates consistent and comprehensive evaluation of risk to human health through graphically presenting all possible exposure pathways, including all 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., discharging lead and ordnance to the ground) and possibly through leaks and spills. Potential contaminant transport pathways include rain runoff and erosion to surface soil, infiltration and leaching to subsurface soil and groundwater, dust emissions and volatilization to ambient air, groundwater discharge to surface water, surface water runoff and erosion to surface water and sediment, and biotransfer to deer through browsing.

Current conditions at the site and anticipated future land use dictate the selection of receptor scenarios used to estimate current and future risks and hazards to human health. Currently, the Former 81mm Mortar Range, Parcel 137Q-X, is not used. Although access to Fort McClellan is limited, it is possible that an individual could circumvent the perimeter fence and trespass into the area. Based on these conditions, a recreational site user who may hunt is the only receptor scenario evaluated under the current land use. Fish ingestion will not be evaluated for the recreational site user because there is not sufficient surface water at the site to sustain fish. Potential receptor scenarios considered, but not included under current land-use scenarios, are as follows:

- **Construction Worker.** The site is unused, and no development or construction is occurring.

- **Groundskeeper.** The range is not currently maintained and will not be in the future.
- **Resident.** The site is not currently used for residential purposes.

Future land use for the Former 81mm Mortar Range, Parcel 137Q-X, is shown as part of the remediation reserve to be used for passive recreation. Due to the potential for UXO, the site may not be deemed safe for public access until remediation has been completed (FTMC, 1997).

Potential receptor scenarios evaluated for the future include the following:

- **Recreational Site User.** Because the future site is planned for passive recreational use, and hunting is a viable option, the recreational site user is included. Fish ingestion will not be evaluated because the intermittent standing water is too infrequent to support fish for consumption.
- **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.

A summary of relevant contaminant release and transport mechanisms, source and exposure media, and 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-stage data quality objective decision-making process is presented in detail in Chapter 3.0 of the QAP and will be followed during the SI at the Former 81mm Mortar Range, Parcel 137Q-X. Data uses and needs are summarized in Table 3-1.

#### **3.4.1 Risk Evaluation**

Confirmation of contamination at the Former 81mm Mortar Range, Parcel 137Q-X, 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, ecological screening values, and background values to determine if PSSCs are present at the site at concentrations that pose an unacceptable risk to human health or the environment. Definitive data will be adequate for confirming the presence of site contamination and for supporting a feasibility study and 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 Section 5.3 of the WP (IT, 2002b).

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

Surface soil, subsurface soil, groundwater, surface water, sediment, and depositional soil will be sampled and analyzed to meet the objectives of the SI at the Former 81mm Mortar Range, Parcel 137Q-X. Quality assurance/quality control (QA/QC) samples will be collected for all sample media, 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 defined in Section 3.3 and presented in Chapter 5.0 of the QAP (IT, 2002a).

## **4.0 Field Activities**

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### **4.1 UXO Survey Requirements and Utility Clearances**

The Former 81mm Mortar Range, Parcel 137Q-X, falls within the “Possible Explosive Ordnance Impact Areas” shown on Plate 10 of the U.S. Army Corps of Engineers July 1999 *Archives Search Report, Maps, Fort McClellan, Anniston, Alabama*. Therefore, UXO surface sweeps and downhole surveys of soil borings will be required to support field activities at the Former 81mm Mortar Range, Parcel 137Q-X. 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 has been written in conjunction with Appendix E of the SAP (IT, 2002a).

#### **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 Appendix E of the SAP (IT, 2002a).

#### **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. UXO monitoring, as described in Appendix E of the SAP (IT, 2002a), will continue until undisturbed soil is encountered or the borehole has been advanced to 12 feet below ground surface (bgs), whichever is reached first.

#### **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 of the SAP (IT, 2002a). The site manager will mark the proposed locations with stakes, coordinate with the local 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.

## **4.2 Environmental Sampling**

The environmental sampling program at the Former 81mm Mortar Range, Parcel 137Q-X, includes the collection of surface soil, subsurface soil, groundwater, surface water, sediment, and depositional soil samples for chemical analysis. 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. 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 15 locations at the Former 81mm Mortar Range, Parcel 137Q-X.

#### **4.2.1.1 Sample Locations and Rationale**

The sampling rationale for each surface soil sample location is 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.

#### **4.2.1.2 Sample Collection**

Surface soil samples will be collected from the upper 1 foot of soil by direct-push methodology as specified in Sections 5.1.1.1 and 6.1.1.1 of the SAP (IT, 2002a). In areas where site access does not permit the use of a direct-push rig, the samples will be collected using a hand auger as specified in Sections 5.1.1.2 and 6.1.1.1 of the SAP (IT, 2002a). Collected soil samples will be screened using a photoionization detector (PID) in accordance with Section 6.8.3 of the SAP. Surface soil samples will be screened for information purposes only, not to aid in the selection of samples for analysis. Sample containers, sample volumes, preservatives, and holding times for the analyses required in this SFSP are discussed in Chapter 4.0, and listed in Table 4-1, of the QAP. Sample documentation and chain-of-custody (COC) will be recorded as specified in Chapter 6.0 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 15 borings installed at the Former 81mm Mortar Range, Parcel 137Q-X.

**Table 4-1**

**Sample Locations and Rationale  
Site Investigation, Former 81mm Mortar Range, Parcel 137Q-X  
Fort McClellan, Calhoun County, Alabama**

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Sample Location	Sample Media	Sample Location Rationale
HR-137Q-MW01	Surface soil, subsurface soil and groundwater	Soil boring for soil and groundwater samples to be placed in the south-central portion of the site, east (and down-slope) of the truck bed and possible STB drums (physical feature 3 on sample location map), and west of the stream channel. Soil boring will be drilled to a depth no greater than 100 feet bgs. If groundwater is not encountered before 100 feet bgs, the soil boring will be abandoned without installing a well. Sample data will indicate if contaminant releases have occurred from former activities at the 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. The monitoring well location will be used to establish local groundwater flow direction and site-specific geology, and provide information on groundwater quality in the residuum aquifer.
HR-137Q-MW02	Surface soil, subsurface soil and groundwater	Soil boring for soil and groundwater samples to be placed northeast (and down-slope) of the trench and STB drums (physical feature 2 on sample location map). Soil boring will be drilled to a depth no greater than 100 feet bgs. If groundwater is not encountered before 100 feet bgs, the soil boring will be abandoned without installing a well. Sample data will indicate if contaminant releases have occurred from former activities at the 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. The monitoring well location will be used to establish local groundwater flow direction and site-specific geology, and provide information on groundwater quality in the residuum aquifer.
HR-137Q-MW03	Surface soil, subsurface soil and groundwater	Soil boring for soil and groundwater samples to be placed in the central portion of the site investigation area, approximately 75 feet northwest (and down-slope) of the trench and pit (physical feature 11 on sample location map). Soil boring will be drilled to a depth no greater than 100 feet bgs. If groundwater is not encountered before 100 feet bgs, the soil boring will be abandoned without installing a well. Sample data will indicate if contaminant releases have occurred from former activities at the 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. The monitoring well location will be used to establish local groundwater flow direction and site-specific geology, and provide information on groundwater quality in the residuum aquifer.
HR-137Q-MW04	Surface soil, subsurface soil and groundwater	Soil boring for soil and groundwater samples to be placed approximately 75 feet southwest (and up-slope) of the trench and pit (physical feature 11 on sample location map). Soil boring will be drilled to a depth no greater than 100 feet bgs. If groundwater is not encountered before 100 feet bgs, the soil boring will be abandoned without installing a well. Sample data will indicate if contaminant releases have occurred from former activities at the 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. The monitoring well location will be used to establish local groundwater flow direction and site-specific geology, and provide information on groundwater quality in the residuum aquifer.
HR-137Q-GP01	Surface soil and subsurface soil	Soil boring for surface soil and subsurface soil samples to be placed west of the secondary road on the west side of the site, and approximately 15 feet north (and down-slope) from a disturbed area with a rusted truck bed (physical feature 10 on sample location map). 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.

**Table 4-1**

**Sample Locations and Rationale  
Site Investigation, Former 81mm Mortar Range, Parcel 137Q-X  
Fort McClellan, Calhoun County, Alabama**

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<b>Sample Location</b>	<b>Sample Media</b>	<b>Sample Location Rationale</b>
HR-137Q-GP02	Surface soil and subsurface soil	Soil boring for surface soil and subsurface soil samples to be placed approximately 15 feet west (and down-slope) of the disturbed area with possible STB drums (physical feature 8 on sample location map). 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.
HR-137Q-GP03	Surface soil and subsurface soil	Soil boring for surface soil and subsurface soil samples to be placed approximately 15 feet south (and up-slope) of the disturbed area with possible STB drums (physical features 8, 9, and 10 on sample location map). 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.
HR-137Q-GP04	Surface soil and subsurface soil	Soil boring for surface soil and subsurface soil samples to be placed in the trench, approximately 70 feet east of the intermittent stream channel and 20 feet southeast of two surface depressions (physical feature 4 on sample location map). 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.
HR-137Q-GP05	Surface soil and subsurface soil	Soil boring for surface soil and subsurface soil samples to be placed approximately 75 feet east of the stream channel, and 30 feet northwest (and down-slope) of a disturbed area (physical feature 6 on sample location map) in the eastern-central portion of the site. 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.
HR-137Q-GP06	Surface soil and subsurface soil	Soil boring for surface soil and subsurface soil samples to be placed in the southeast portion of the site, west of the secondary road, and southeast of a surface depression (physical feature 5 on sample location map). 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.
HR-137Q-GP07	Surface soil and subsurface soil	Soil boring for surface soil and subsurface soil samples to be placed in the trench, approximately 30 feet east (and down-slope) of the STB drums (physical feature 2 on sample location map), in the south-central portion of the site. 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.
HR-137Q-GP08	Surface soil and subsurface soil	Soil boring for surface and subsurface soil samples to be placed in the trench, between the western stream channel and the surface pit (physical feature 11 on sample location map). Sample data will indicate if contaminant releases into the environment have occurred from former activities at 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.

**Table 4-1**

**Sample Locations and Rationale  
Site Investigation, Former 81mm Mortar Range, Parcel 137Q-X  
Fort McClellan, Calhoun County, Alabama**

(Page 3 of 4)

Sample Location	Sample Media	Sample Location Rationale
HR-137Q-GP09	Surface soil and subsurface soil	Soil boring for surface and subsurface soil samples to be placed south (and up-slope) of the trench and scattered debris, in the south-central portion of the site. Sample data will indicate if contaminant releases into the environment have occurred from former activities at this 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.
HR-137Q-GP10	Surface soil and subsurface soil	Soil boring for surface soil and subsurface soil samples to be placed in the trench, between the western stream channel and the rusted truck body (physical feature 1 on sample location map). 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.
HR-137Q-GP11	Surface soil and subsurface soil	Soil boring for surface soil and subsurface soil samples to be placed in the pit, in the trench (physical feature 11 on sample location map). 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.
HR-137Q-SW/SD01	Surface water and sediment	Surface water and sediment samples to be placed in the eastern intermittent stream, south of the site investigation area, and up-slope of the trench and scattered debris. Sample data will indicate if contaminant releases have occurred from previous use of this area and if contaminated media exists at this location. Sample data will also be used to assess potential impacts to aquatic biota in the waterway and other ecological receptors that may utilize the waterway for food and/or habitat purposes.
HR-137Q-SW/SD02	Surface water and sediment	Surface water and sediment samples to be placed in the eastern intermittent stream, north (and down-slope) of the trench. Sample data will indicate if contaminant releases have occurred from previous use of this area and if contaminated media exists at this location. Sample data will also be used to assess potential impacts to aquatic biota in the waterway and other ecological receptors that may utilize the waterway for food and/or habitat purposes.
HR-137Q-SW/SD03	Surface water and sediment	Surface water and sediment samples to be placed in the western intermittent stream, south (and up-slope) of the trench. Sample data will indicate if contaminant releases have occurred from previous use of this area and if contaminated media exists at this location. Sample data will also be used to assess potential impacts to aquatic biota in the waterway and other ecological receptors that may utilize the waterway for food and/or habitat purposes.
HR-137Q-SW/SD04	Surface water and sediment	Surface water and sediment samples to be placed in the western intermittent stream, north (and down-slope) of the trench. Sample data will indicate if contaminant releases have occurred from previous use of this area and if contaminated media exists at this location. Sample data will also be used to assess potential impacts to aquatic biota in the waterway and other ecological receptors that may utilize the waterway for food and/or habitat purposes.
HR-137Q-SW/SD05	Surface water and sediment	Surface water and sediment samples to be placed in the northern portion of the site, after the convergence of the east and west intermittent stream channels. Sample data will indicate if contaminant releases have occurred from previous use of this area and if contaminated media exists at this location. Sample data will also be used to assess potential impacts to aquatic biota in the waterway and other ecological receptors that may utilize the waterway for food and/or habitat purposes.

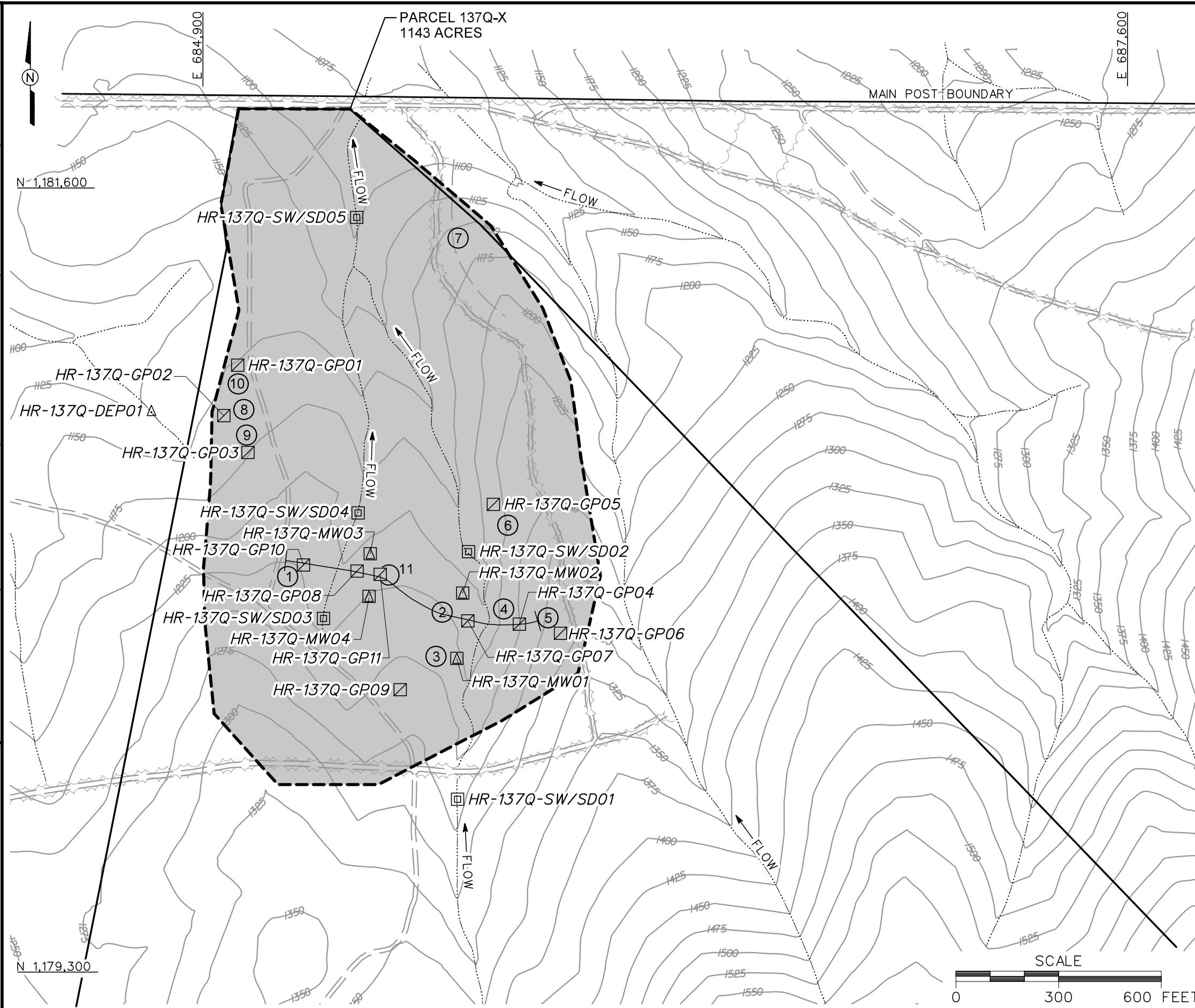
**Table 4-1**

**Sample Locations and Rationale  
Site Investigation, Former 81mm Mortar Range, Parcel 137Q-X  
Fort McClellan, Calhoun County, Alabama**

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<b>Sample Location</b>	<b>Sample Media</b>	<b>Sample Location Rationale</b>
HR-137Q-DEP01	Depositional soil	Depositional soil sample to be placed to the west of the site investigation area, in a dry streambed west of the disturbed area and possible STB drums (physical features 8,9, and 10 on sample location map). Sample data will indicate if contaminant releases into the environment have occurred from former activities at this 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.

DWG. NO.: ...796887es.306  
 PROJ. NO.: 796887  
 INITIATOR: L. OHARE  
 PROJ. MGR.: J. YACOB  
 DRAFT. CHK. BY:  
 ENGR. CHK. BY: S. MORAN  
 DATE LAST REV.:  
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 STARTING DATE: 01/15/02  
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**LEGEND**

- UNIMPROVED ROADS AND PARKING
- PAVED ROADS AND PARKING
- BUILDING
- TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 25 FOOT)
- TREES / TREELINE
- AREA OF INVESTIGATION
- SURFACE DRAINAGE / CREEK
- TRENCH WITH NUMEROUS SURFACE DEPRESSIONS THROUGHOUT
- PROPOSED SURFACE WATER/SEDIMENT SAMPLE LOCATION
- PROPOSED SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION
- PROPOSED GROUNDWATER, SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION
- PROPOSED DEPOSITIONAL SOIL SAMPLE LOCATION

**TRAINING AIDS/PHYSICAL FEATURES OBSERVED**

- ① OLD RUSTED TRUCK WITH BULLET HOLES
- ② TRENCH WITH EMPTY RUSTED STB DRUMS (3), POSSIBLE METAL SHOWER HEAD, AND ONE FOXHOLE
- ③ SEVERAL RUSTED 1-5 GALLON DRUMS (POSSIBLE GAS CANS AND STB DRUMS), SHOWER HEADS, AND THE BACK OF AN OLD TRUCK
- ④ 2 SURFACE DEPRESSIONS
- ⑤ SURFACE DEPRESSION WITH RUSTED METAL SHEET IN BOTTOM (APPEARS TO BE WALLS OF OLD TUB)
- ⑥ DISTURBED AREA
- ⑦ OLD ROAD RUNNING PARALLEL TO SECONDARY ROAD
- ⑧ 4 RUSTED DRUMS (SOME ARE CONSTRUCTED OF CORRUGATED STEEL) IN DIRT MOUND
- ⑨ RUSTED DRUM WEST OF DIRT MOUND
- ⑩ OLD RUSTED TRUCK BED AND DISTURBED AREA WITH MOUNDS AND DEPRESSIONS
- ⑪ PIT IN TRENCH WITH METAL IN BOTTOM

**FIGURE 4-1**  
**PROPOSED SAMPLE LOCATION MAP**  
**FORMER 81mm MORTAR RANGE**  
**PARCEL 137Q-X**

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

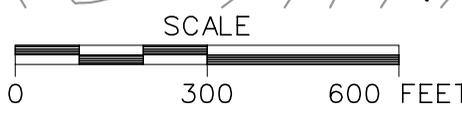


Table 4-2

**Soil Sample Designations and QA/QC Sample Quantities  
Site Investigation, Former 81mm Mortar Range, Parcel 137Q-X  
Fort McClellan, Calhoun County, Alabama**

(Page 1 of 2)

Sample Location	Sample Designation	Sample Depth (ft)	QA/QC Samples		Analytical Suite
			Field Duplicates	MS/MSD	
HR-137Q-GP01	HR-137Q-GP01-SS-RH0001-REG	0-1			TAL Metals and Explosives.
	HR-137Q-GP01-DS-RH0002-REG	2-4			
HR-137Q-GP02	HR-137Q-GP02-SS-RH0003-REG	0-1			TAL Metals and Explosives.
	HR-137Q-GP02-DS-RH0004-REG	2-4			
HR-137Q-GP03	HR-137Q-GP03-SS-RH0005-REG	0-1			TAL Metals and Explosives.
	HR-137Q-GP03-DS-RH0006-REG	2-4			
HR-137Q-GP04	HR-137Q-GP04-SS-RH0007-REG	0-1		HR-137Q-GP04-SS-RH0007-MS/MSD	TAL Metals, Explosives, TCL VOCs, TCL SVOCs, CL and OP Pesticides, and CL Herbicides.
	HR-137Q-GP04-DS-RH0008-REG	2-4			
HR-137Q-GP05	HR-137Q-GP05-SS-RH0009-REG	0-1			TAL Metals and Explosives.
	HR-137Q-GP05-DS-RH0010-REG	2-4			
HR-137Q-GP06	HR-137Q-GP06-SS-RH0011-REG	0-1			TAL Metals and Explosives.
	HR-137Q-GP06-DS-RH0012-REG	2-4			
HR-137Q-GP07	HR-137Q-GP07-SS-RH0013-REG	0-1			TAL Metals, Explosives, TCL VOCs, TCL SVOCs, CL and OP Pesticides, and CL Herbicides.
	HR-137Q-GP07-DS-RH0014-REG	2-4			
HR-137Q-GP08	HR-137Q-GP08-SS-RH0015-REG	0-1			TAL Metals, Explosives, TCL VOCs, TCL SVOCs, CL and OP Pesticides, and CL Herbicides.
	HR-137Q-GP08-DS-RH0016-REG	2-4			
HR-137Q-GP09	HR-137Q-GP09-SS-RH0017-REG	0-1			TAL Metals and Explosives.
	HR-137Q-GP09-DS-RH0018-REG	2-4			
HR-137Q-GP10	HR-137Q-GP10-SS-RH0019-REG	0-1			TAL Metals, Explosives, TCL VOCs, TCL SVOCs, CL and OP Pesticides, and CL Herbicides.
	HR-137Q-GP10-DS-RH0020-REG	2-4			
HR-137Q-GP11	HR-137Q-GP11-SS-RH0021-REG	0-1			TAL Metals, Explosives, TCL VOCs, TCL SVOCs, CL and OP Pesticides, and CL Herbicides.
	HR-137Q-GP11-DS-RH0022-REG	2-4			

Table 4-2

**Soil Sample Designations and QA/QC Sample Quantities  
Site Investigation, Former 81mm Mortar Range, Parcel 137Q-X  
Fort McClellan, Calhoun County, Alabama**

(Page 2 of 2)

Sample Location	Sample Designation	Sample Depth (ft)	QA/QC Samples		Analytical Suite
			Field Duplicates	MS/MSD	
HR-137Q-MW01	HR-137Q-MW01-SS-RH0023-REG	0-1	HR-137Q-MW01-SS-RH0024-FD		TAL Metals, Explosives, TCL VOCs, TCL SVOCs, CI and OP Pesticides, and CI Herbicides.
	HR-137Q-MW01-DS-RH0025-REG	2-4			
HR-137Q-MW02	HR-137Q-MW02-SS-RH0026-REG	0-1	HR-137Q-MW02-DS-RH0028FD		TAL Metals, Explosives, TCL VOCs, TCL SVOCs, CI and OP Pesticides, and CI Herbicides.
	HR-137Q-MW02-DS-RH0027-REG	2-4			
HR-137Q-MW03	HR-137Q-MW03-SS-RH0029-REG	0-1			TAL Metals, Explosives, TCL VOCs, TCL SVOCs, CI and OP Pesticides, and CI Herbicides.
	HR-137Q-MW03-DS-RH0030-REG	2-4			
HR-137Q-MW04	HR-137Q-MW04-SS-RH0031-REG	0-1			TAL Metals, Explosives, TCL VOCs, TCL SVOCs, CI and OP Pesticides, and CI Herbicides.
	HR-137Q-MW04-DS-RH0032-REG	2-4			
HR-137Q-DEP01	HR-137Q-DEP01-DEP-RH0033-REG	0-1	HR-137Q-DEP-RH0034-FD		TAL Metals, Explosives, TCL VOCs, TCL SVOCs, CI and OP Pesticides, and CI Herbicides.

<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.

CI - Chlorinated.

Explosives - Nitroaromatic and Nitramine.

FD - Field duplicate.

MS/MSD - Matrix spike/matrix spike duplicate.

OP - Organophosphorous.

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.

#### **4.2.2.1 Sample Locations and Rationale**

Subsurface soil samples will be collected from the proposed soil boring locations shown on Figure 4-1. The sampling rationale for each subsurface soil sample location is listed in Table 4-1. Subsurface soil sample designations and QA/QC sample requirements 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 Sections 5.1.1.1 and 6.1.1.1 of the SAP (IT, 2002a). In areas where site access does not permit the use of a direct-push rig, the samples will be collected using a hand auger as specified in Sections 5.1.1.2 and 6.1.1.1 of the SAP (IT, 2002a).

Soil samples will be collected continuously for the first four 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 analysis. The collected subsurface soil samples will be field-screened using a PID in accordance with Section 6.8.3 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. The depth of the boring may be extended beyond four feet bgs and more than one subsurface soil sample may 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 Chapter 6.0 of the SAP.

Sample containers, sample volumes, preservatives, and holding times for the analyses required in this SFSP are discussed in Chapter 4.0, and listed in Table 4-1 of the QAP. The samples will be analyzed for the parameters listed in Section 4.5 of this SFSP.

### **4.2.3 Permanent Monitoring Wells**

Four permanent monitoring wells will be installed at the Former 81mm Mortar Range, Parcel 137Q-X. The permanent monitoring well locations are shown on Figure 4-1. The rationale for each monitoring well location is presented in Table 4-1. Monitoring wells will be installed using a truck-mounted hollow-stem auger drill rig, or an air rotary drill rig if hollow-stem auger refusal is encountered before groundwater or competent bedrock. The monitoring well boreholes will be drilled to the top of bedrock, or until adequate groundwater is encountered to install a well with 10 to 20 feet of screen. The monitoring well boreholes will be drilled to a depth no greater than 100 feet bgs. If groundwater is not encountered before 100 feet bgs, the borehole will be abandoned without installing a monitoring well.

The monitoring well casing will consist of new 2-inch inside-diameter (ID), 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. At the discretion of the IT site manager, a sump (consisting of new, 2-inch ID, Schedule 40, threaded, flush-joint PVC) may be attached to the bottom of the well screen. After the casing and screen materials are lowered into the boring, a filter pack will be installed around the well screen. In wells installed to depths of 20 feet or less, the filter pack material will be gravity filled. In wells installed to depths greater than 20 feet, the filter pack will be tremied into place. The filter pack will be installed from the bottom of the well to approximately five feet above the top of the well screen. The filter pack will consist of 20/40 silica sand. A fine sand (30/70 silica sand), approximately five feet thick, may be placed above the filter pack. A bentonite seal, approximately five feet thick, will be placed above the filter pack (or fine sand, if used). The remaining annular space will be grouted with a bentonite-cement mixture, using approximately 7 to 8 gallons of water and approximately 5 pounds of bentonite per 94 pound bag of Type I or Type II Portland cement. The grout will be tremied into place from the top of the bentonite seal to ground surface.

Soil samples for lithology will be collected starting at five feet bgs, and at five-foot intervals thereafter, to the total depth of the borehole. Lithologic samples will be collected and described to provide a detailed lithologic log. The samples will be collected 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 for the presence of volatile

organic compound contamination using a PID. The monitoring wells will be drilled, installed, and developed as specified in Section 5.1 and Appendix C of the SAP (IT, 2002a). The exact monitoring well locations will be determined in the field by the on-site geologist, based on actual field conditions. Monitoring wells will be allowed to equilibrate for 14 days after well development prior to collecting groundwater samples.

#### **4.2.4 Groundwater Sampling**

Groundwater samples will be collected from the four monitoring wells completed at the Former 81mm Mortar Range, Parcel 137Q-X, as presented in Section 4.2.3.

##### **4.2.4.1 Sample Locations and Rationale**

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 required QA/QC sample quantities are listed in Table 4-3.

##### **4.2.4.2 Sample Collection**

Prior to sampling monitoring wells, static water level will be measured at each of the 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 5.5 of the SAP (IT, 2002a). Groundwater samples will be collected in accordance with the procedures outlined in Section 6.1.1.5 and Attachment 5 of the SAP. Low-flow groundwater sampling methodology outlined in Attachment 5, Procedure No. FTMC-GW-001 of the SAP (IT, 2002a) may be used as 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 Chapter 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.

#### **4.2.5 Surface Water Sampling**

Five surface water samples will be collected from the Former 81mm Mortar Range, Parcel 137Q-X. Surface water samples will be collected from the intermittent streams at the site, as shown on Figure 4-1.

**Table 4-3**

**Groundwater Sample Designations and QA/QC Sample Quantities  
Site Investigation, Former 81mm Mortar Range, Parcel 137Q-X  
Fort McClellan, Calhoun County, Alabama**

Sample Location	Sample Designation <sup>a</sup>	QA/QC Samples		Analytical Suite
		Field Duplicates	MS/MSD	
HR-137Q-MW01	HR-137Q-MW01-GW-RH3001-REG		HR-137Q-MW01-GW-RH3001-MS/MSD	TAL Metals, Explosives, TCL VOCs, TCL SVOCs, CI and OP Pesticides, and CI Herbicides
HR-137Q-MW02	HR-137Q-MW02-GW-RH3002-REG	HR-137Q-MW02-GW-RH3003-FD		TAL Metals, Explosives, TCL VOCs, TCL SVOCs, CI and OP Pesticides, and CI Herbicides
HR-137Q-MW03	HR-137Q-MW03-GW-RH3004-REG			TAL Metals, Explosives, TCL VOCs, TCL SVOCs, CI and OP Pesticides, and CI Herbicides
HR-137Q-MW04	HR-137Q-MW04-GW-RH3005-REG			TAL Metals, Explosives, TCL VOCs, TCL SVOCs, CI and OP Pesticides, and CI Herbicides

<sup>a</sup>Groundwater samples will be collected from the approximate top 5 to 10 feet of the water column per Attachment 5 of the Installation-Wide Sampling and Analysis Plan (IT, 2002a).

- CI - Chlorinated.
- Explosives - Nitroaromatic and Nitramine.
- FD - Field duplicate.
- MS/MSD - Matrix spike/matrix spike duplicate.
- OP - Organophosphorous.
- 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.

#### **4.2.5.1 Sample Locations and Rationale**

The surface water sampling rationales 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 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.

#### **4.2.5.2 Sample Collection**

The surface water samples will be collected in accordance with the procedures specified in Section 6.1.1.3 of the SAP (IT, 2002a). Sample documentation and COC will be recorded as specified in Chapter 6.0 of the SAP. Sample containers, sample volumes, preservatives, and holding times for the analyses required in this SFSP are discussed in Chapter 4.0 and listed in Table 4-1, of the QAP. The samples will be analyzed for the parameters listed in Section 4.5 of this SFSP.

#### **4.2.6 Sediment Sampling**

Five sediment samples will be collected from the site of the Former 81mm Mortar Range, Parcel 137Q-X. These sediment samples will be collected at the same locations as the surface water samples described in Section 4.2.5.

##### **4.2.6.1 Sample Locations and Rationale**

The proposed locations for the sediment samples are shown in Figure 4-1. Sediment sampling rationales are presented in Table 4-1. The sediment sample designations and 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 field observations.

##### **4.2.6.2 Sample Collection**

The sediment samples will be collected in accordance with the procedures specified in Section 6.1.1.2 of the SAP. Sample documentation and COC will be recorded as specified in Chapter 6.0 of the SAP. Sample containers, sample volumes, preservatives, and holding times for the analyses required in this SFSP are discussed in Chapter 4.0 and listed in Table 4-1 of the QAP. The sediment samples will be analyzed for the parameters listed in Section 4.5 of this SFSP.

#### **4.2.7 Depositional Soil Sampling**

One depositional soil sample will be collected at the Former 81mm Mortar Range, Parcel 137Q-X.

Table 4-4

**Surface Water and Sediment Sample Designations and QA/QC Sample Quantities,  
Site Investigation, Former 81mm Mortar Range, Parcel 137Q-X  
Fort McClellan, Calhoun County, Alabama**

Sample Location	Sample Designation	Sample Matrix	Sample Depth (ft)	QA/QC Samples		Analytical Suite
				Field Duplicates	MS/MSD	
HR-137Q-SW/SD01	HR-137Q-SW/SD01-SW-RH2001-REG	Surface water	N/A			TAL Metals and Explosives. TOC and Grain size (for sediment only).
	HR-137Q-SW/SD01-SD-RH1001-REG	Sediment	0-1	HR-137Q-SW/SD01-SD-RH1002-FD		
HR-137Q-SW/SD02	HR-137Q-SW/SD02-SW-RH2002-REG	Surface water	N/A			TAL Metals and Explosives. TOC and Grain size (for sediment only).
	HR-137Q-SW/SD02-SD-RH1003-REG	Sediment	0-1			
HR-137Q-SW/SD03	HR-137Q-SW/SD03-SW-RH2003-REG	Surface water	N/A			TAL Metals, Explosives, TCL VOCs, TCL SVOCs, CI and OP Pesticides, CI Herbicides, and TOC and Grain size (for sediment only).
	HR-137Q-SW/SD03-SD-RH1004-REG	Sediment	0-1		HR-137Q-SW/SD03-SD-RH1004-MS/MSD	
HR-137Q-SW/SD04	HR-137Q-SW/SD04-SW-RH2004-REG	Surface water	N/A			TAL Metals and Explosives. TOC and Grain size (for sediment only).
	HR-137Q-SW/SD04-SD-RH1005-REG	Sediment	0-1			
HR-137Q-SW/SD05	HR-137Q-SW/SD05-SW-RH2005-REG	Surface water	N/A			TAL Metals and Explosives. TOC and Grain size (for sediment only).
	HR-137Q-SW/SD05-SD-RH1006-REG	Sediment	0-1			

CI - Chlorinated.  
 FD - Field duplicate.  
 FS - Field split.  
 MS/MSD - Matrix spike/matrix spike duplicate.  
 N/A - Not applicable.  
 OP - Organophosphorous.  
 QA/QC - Quality assurance/quality control.  
 REG - Field sample.  
 SVOC - Semivolatile organic compound.  
 VOC - Volatile organic compound.

#### **4.2.7.1 Sample Location and Rationale**

The depositional soil sample will be collected in the dry intermittent streambed west of the site. The sampling rationale is listed in Table 4-1, and the proposed sampling location is shown on Figure 4-1. The depositional soil sample designation, depth, and required QA/QC sample quantities are listed in Table 4-2. The actual depositional soil sample location will be at the discretion of the ecological sampler, based on the physical characteristics of the drainage area and actual field observations.

#### **4.2.7.2 Sample Collection**

The depositional soil sample collection will be conducted in accordance with the procedures for surface soil sample collection specified in Section 6.1.1.1 of the SAP. Sample documentation and COC will be recorded as specified in Chapter 6.0 of the SAP. Sample containers, sample volumes, preservatives, and holding times for the analyses required in this SFSP are discussed in Chapter 4.0 and listed in, Table 4-1 of the QAP. 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 6.5.1.1 of the SAP (IT, 2002a). Decontamination of non-sampling equipment will be performed in accordance with the requirements presented in Section 6.5.1.2 of the SAP.

### **4.4 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 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 4.4.1.1 of the SAP. Conventional land survey requirements are presented in Section 4.4.1.2 of the SAP.

#### **4.5 Analytical Program**

Samples collected at locations specified in this SFSP will be analyzed for a specific suite 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 Former 81mm Mortar Range, Parcel 137Q-X, consist of the following list of analytical suites:

- Target analyte metals - Method 6010B/7000
- Nitroaromatic/nitramine explosives – Method 8330.

A select number of samples will be analyzed for a further suite that includes:

- Target compound list volatile organic compounds - Method 5035/8260B
- Target compound list semivolatile organic compounds - Method 8270C
- Chlorinated herbicides - Method 8151A
- Chlorinated pesticides - Method 8081A
- Organophosphorus pesticides - Method 8141A.

In addition, sediment samples will be collected for the analyses of:

- Total organic carbon (TOC) – 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 Chapter 5.0 of the QAP. Data will be reported in accordance with the definitive data requirements of Chapter 2 of the USACE Engineer 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 7.2.2 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.

Table 4-5

**Analytical Samples**  
 Site Investigation, Former 81mm Mortar Range, Parcel 137Q-X  
 Fort McClellan, Calhoun County, Alabama

Parameters	Analysis Method	Sample Matrix	TAT Needed	Field Samples			QA/QC Samples <sup>a</sup>				EMAX Total No. Analysis
				No. of Sample Points	No. of Events	No. of Field Samples	Field Dups (10%)	MS/MSD (5%)	Trip Blank (1/ship)	Eq. Rinse (1/wk/matrix)	
<b>Former 81mm Mortar Range: 9 water matrix samples (4 groundwater and 5 surface water); 36 soil matrix samples (15 surface soil, 15 subsurface soil, 5 sediment and 1 depositional soil)</b>											
Explosives	8330	water	normal	9	1	9	1	1	0	1	13
TAL Metals	6010B/7000	water	normal	9	1	9	1	1	0	1	13
TCL VOCs	8260B	water	normal	5	1	5	1	1	1	1	10
TCL SVOCs	8270C	water	normal	5	1	5	1	1	0	1	9
Chlorinated Pesticides	8081A	water	normal	5	1	5	1	1	0	1	9
Organophosphorus Pesticides	8141A	water	normal	5	1	5	1	1	0	1	9
Chlorinated Herbicides	8151A	water	normal	5	1	5	1	1	0	1	9
Explosives	8330	soil	normal	36	1	36	4	2	0	2	46
TAL Metals	6010B/7000	soil	normal	36	1	36	4	2	0	2	46
TCL VOCs	8260B	soil	normal	20	1	20	3	2	0	2	29
TCL SVOCs	8270C	soil	normal	20	1	20	3	2	0	1	28
Chlorinated Pesticides	8081A	soil	normal	20	1	20	3	2	0	1	28
Organophosphorus Pesticides	8141A	soil	normal	20	1	20	3	2	0	1	28
Chlorinated Herbicides	8151A	soil	normal	20	1	20	3	2	0	1	28
Total Organic Carbon	9060	soil	normal	5	1	5	0	0	0	0	5
Grain Size	ASTMD-421/D-422	soil	normal	5	1	5	0	0	0	0	5
<b>Parcel 137Q Subtotal:</b>				225	30	21	1	17	315		

<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 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 last more than 1 week. Assumed 20 field samples will be collected per week to estimate number of equipment blanks.

MS/MSD - Matrix spike/matrix spike duplicate.  
 Explosives - Nitroaromatic and Nitramine.  
 QA/QC - Quality assurance/quality control.  
 SVOCs - Semivolatile organic compounds.

TAL - Target analyte list.  
 TAT - Turn-around time.  
 TCL - Target compound list.  
 VOCs - Volatile organic compounds.

Ship samples to: EMAX Laboratories, Inc.  
 1835 205th Street  
 Torrance, CA 90501  
 Attn: Elizabeth McIntyre  
 Tel: 310-618-8889  
 Fax: 310-618-0818

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

Sample preservation, packaging, and shipping will follow the procedures specified in Section 6.1.3 through 6.1.7 of the SAP (IT, 2002a). Completed analysis request/COC records will be secured and included with each shipment of coolers to:

Attn: Sample Receiving/Elizabeth McIntyre  
EMAX Laboratories, Inc.  
1835 205th Street  
Torrance, California 90501  
Telephone: (310) 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, 2002a). The IDW expected to be generated at the Former 81mm Mortar Range, Parcel 137Q-X, will include decontamination fluids, drill cuttings, purge water, and disposable personal protective equipment. Sampling of IDW to obtain analytical results for characterizing the waste for disposal will follow the procedures specified in Section 6.1.1.8 of the SAP (IT, 2002a).

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

Health and safety requirements for this SI are provided in the SSHP attachment for the Former 81mm Mortar Range, Parcel 137Q-X. The SSHP attachment will be used in conjunction with the installation-wide safety and health plan, Appendix A of the SAP (IT, 2002a).

## **5.0 Project Schedule**

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

## 6.0 References

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**ATTACHMENT 1**

**LIST OF ABBREVIATIONS AND ACRONYMS**

## List of Abbreviations and Acronyms

2,4-D	2,4-dichlorophenoxyacetic acid	BCT	BRAC Cleanup Team	Cl.	chlorinated
2,4,5-T	2,4,5-trichlorophenoxyacetic acid	BERA	baseline ecological risk assessment	CLP	Contract Laboratory Program
2,4,5-TP	silvex	BEHP	bis(2-ethylhexyl)phthalate	cm	centimeter
3D	3D International Environmental Group	BFB	bromofluorobenzene	CN	chloroacetophenone
AB	ambient blank	BFE	base flood elevation	CNB	chloroacetophenone, benzene, and carbon tetrachloride
AbB3	Anniston gravelly clay loam, 2 to 6 percent slopes, severely eroded	BG	Bacillus globigii	CNS	chloroacetophenone, chloropicrin, and chloroform
AbC3	Anniston gravelly clay loam, 6 to 10 percent slopes, severely eroded	bgs	below ground surface	CO	carbon monoxide
AbD3	Anniston and Allen gravelly clay loams, 10 to 15 percent slopes, eroded	BHC	betahexachlorocyclohexane	Co-60	cobalt-60
Abs	skin absorption	BHHRA	baseline human health risk assessment	CoA	Code of Alabama
ABS	dermal absorption factor	BIRTC	Branch Immaterial Replacement Training Center	COC	chain of custody; contaminant of concern
AC	hydrogen cyanide	bkg	background	COE	Corps of Engineers
ACAD	AutoCadd	bls	below land surface	Con	skin or eye contact
AcB2	Anniston and Allen gravelly loams, 2 to 6 percent slopes, eroded	BOD	biological oxygen demand	COPC	chemical(s) of potential concern
AcC2	Anniston and Allen gravelly loams, 6 to 10 percent slopes, eroded	Bp	soil-to-plant biotransfer factors	COPEC	chemical(s) of potential ecological concern
AcD2	Anniston and Allen gravelly loams, 10 to 15 percent slopes, eroded	BRAC	Base Realignment and Closure	CPSS	chemicals present in site samples
AcE2	Anniston and Allen gravelly loams, 15 to 25 percent slopes, eroded	Braun	Braun Intertec Corporation	CQCSM	Contract Quality Control System Manager
ACGIH	American Conference of Governmental Industrial Hygienists	BSAF	biota-to-sediment accumulation factors	CRDL	contract-required detection limit
AdE	Anniston and Allen stony loam, 10 to 25 percent slope	BSC	background screening criterion	CRL	certified reporting limit
ADEM	Alabama Department of Environmental Management	BTAG	Biological Technical Assistance Group	CRQL	contract-required quantitation limit
ADPH	Alabama Department of Public Health	BTEX	benzene, toluene, ethyl benzene, and xylenes	CRZ	contamination reduction zone
AEC	U.S. Army Environmental Center	BTOC	below top of casing	Cs-137	cesium-137
AEL	airborne exposure limit	BTV	background threshold value	CS	ortho-chlorobenzylidene-malononitrile
AET	adverse effect threshold	BW	biological warfare; body weight	CSEM	conceptual site exposure model
AF	soil-to-skin adherence factor	BZ	breathing zone; 3-quinuclidinyl benzilate	CSM	conceptual site model
AHA	ammunition holding area	C	ceiling limit value	CT	central tendency
AL	Alabama	Ca	carcinogen	ctr.	container
ALAD	-aminolevulinic acid dehydratase	CAB	chemical warfare agent breakdown products	CWA	chemical warfare agent
amb.	Amber	CAMU	corrective action management unit	CWM	chemical warfare material; clear, wide mouth
amsl	above mean sea level	CBR	chemical, biological and radiological	CX	dichloroformoxime
ANAD	Anniston Army Depot	CCAL	continuing calibration	'D'	duplicate; dilution
AOC	area of concern	CCB	continuing calibration blank	D&I	detection and identification
APEC	areas of potential ecological concern	CCV	continuing calibration verification	DAF	dilution-attenuation factor
APT	armor-piercing tracer	CD	compact disc	DANC	decontamination agent, non-corrosive
AR	analysis request	CDTF	Chemical Defense Training Facility	°C	degrees Celsius
ARAR	applicable or relevant and appropriate requirement	CEHNC	U.S. Army Engineering and Support Center, Huntsville	°F	degrees Fahrenheit
AREE	area requiring environmental evaluation	CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act	DCE	dichloroethene
ASP	Ammunition Supply Point	CERFA	Community Environmental Response Facilitation Act	DDD	dichlorodiphenyldichloroethane
ASR	Archives Search Report	CESAS	Corps of Engineers South Atlantic Savannah	DDE	dichlorodiphenyldichloroethane
AST	aboveground storage tank	CF	conversion factor	DDT	dichlorodiphenyltrichloroethane
ASTM	American Society for Testing and Materials	CFC	chlorofluorocarbon	DEH	Directorate of Engineering and Housing
AT	averaging time	CFDP	Center for Domestic Preparedness	DEP	depositional soil
ATSDR	Agency for Toxic Substances and Disease Registry	CFR	Code of Federal Regulations	DFTPP	decafluorotriphenylphosphine
ATV	all-terrain vehicle	CG	carbonyl chloride (phosgene)	DI	deionized
AWARE	Associated Water and Air Resources Engineers, Inc.	CGI	combustible gas indicator	DID	data item description
AWWSB	Anniston Water Works and Sewer Board	ch	inorganic clays of high plasticity	DIMP	di-isopropylmethylphosphonate
'B'	Analyte detected in laboratory or field blank at concentration greater than the reporting limit (and greater than zero)	CHPPM	U.S. Army Center for Health Promotion and Preventive Medicine	DM	dry matter
BCF	blank correction factor; bioconcentration factor	CK	cyanogen chloride	DMBA	dimethylbenz(a)anthracene
		cl	inorganic clays of low to medium plasticity	DMMP	dimethylmethylphosphonate

## List of Abbreviations and Acronyms (Continued)

DOD	U.S. Department of Defense	FD	field duplicate	GW	groundwater
DOJ	U.S. Department of Justice	FDA	U.S. Food and Drug Administration	gw	well-graded gravels; gravel-sand mixtures
DOT	U.S. Department of Transportation	FedEx	Federal Express, Inc.	HA	hand auger
DP	direct-push	FEMA	Federal Emergency Management Agency	HCl	hydrochloric acid
DPDO	Defense Property Disposal Office	FFCA	Federal Facilities Compliance Act	HD	distilled mustard
DPT	direct-push technology	FFE	field flame expedient	HDPE	high-density polyethylene
DQO	data quality objective	FFS	focused feasibility study	HEAST	Health Effects Assessment Summary Tables
DRMO	Defense Reutilization and Marketing Office	FI	fraction of exposure	Herb.	herbicides
DRO	diesel range organics	Fil	filtered	HHRA	human health risk assessment
DS	deep (subsurface) soil	Flt	filtered	HI	hazard index
DS2	Decontamination Solution Number 2	FMDC	Fort McClellan Development Commission	HPLC	high performance liquid chromatography
DWEL	drinking water equivalent level	FML	flexible membrane liner	HNO <sub>3</sub>	nitric acid
E&E	Ecology and Environment, Inc.	FMP 1300	Former Motor Pool 1300	HQ	hazard quotient
EB	equipment blank	FOMRA	Former Ordnance Motor Repair Area	HQ <sub>screen</sub>	screening-level hazard quotient
EBS	environmental baseline survey	Foster Wheeler	Foster Wheeler Environmental Corporation	hr	hour
EC <sub>50</sub>	effects concentration for 50 percent of a population	Frtn	fraction	H&S	health and safety
ECBC	Edgewood Chemical/Biological Command	FS	field split; feasibility study	HSA	hollow-stem auger
ED	exposure duration	FSP	field sampling plan	HTRW	hazardous, toxic, and radioactive waste
EDD	electronic data deliverable	ft	feet	'I'	out of control, data rejected due to low recovery
EF	exposure frequency	ft/ft	feet per foot	IATA	International Air Transport Authority
EDQL	ecological data quality level	FTA	Fire Training Area	ICAL	initial calibration
EE/CA	engineering evaluation and cost analysis	FTMC	Fort McClellan	ICB	initial calibration blank
Elev.	elevation	FTRRA	FTMC Reuse & Redevelopment Authority	ICP	inductively-coupled plasma
EM	electromagnetic	g	gram	ICRP	International Commission on Radiological Protection
EMI	Environmental Management Inc.	g/m <sup>3</sup>	gram per cubic meter	ICS	interference check sample
EM31	Geonics Limited EM31 Terrain Conductivity Meter	G-856	Geometrics, Inc. G-856 magnetometer	ID	inside diameter
EM61	Geonics Limited EM61 High-Resolution Metal Detector	G-858G	Geometrics, Inc. G-858G magnetic gradiometer	IDL	instrument detection limit
EOD	explosive ordnance disposal	GAF	gastrointestinal absorption factor	IDLH	immediately dangerous to life or health
EODT	explosive ordnance disposal team	gal	gallon	IDM	investigative-derived media
EPA	U.S. Environmental Protection Agency	gal/min	gallons per minute	IDW	investigation-derived waste
EPC	exposure point concentration	GB	sarin	IEUBK	Integrated Exposure Uptake Biokinetic
EPIC	Environmental Photographic Interpretation Center	gc	clay gravels; gravel-sand-clay mixtures	IF	ingestion factor; inhalation factor
EPRI	Electrical Power Research Institute	GC	gas chromatograph	ILCR	incremental lifetime cancer risk
ER	equipment rinsate	GCL	geosynthetic clay liner	IMPA	isopropylmethyl phosphonic acid
ERA	ecological risk assessment	GC/MS	gas chromatograph/mass spectrometer	IMR	Iron Mountain Road
ER-L	effects range-low	GCR	geosynthetic clay liner	in.	inch
ER-M	effects range-medium	GFAA	graphite furnace atomic absorption	Ing	ingestion
ESE	Environmental Science and Engineering, Inc.	GIS	Geographic Information System	Inh	inhalation
ESMP	Endangered Species Management Plan	gm	silty gravels; gravel-sand-silt mixtures	IP	ionization potential
ESN	Environmental Services Network, Inc.	gp	poorly graded gravels; gravel-sand mixtures	IPS	International Pipe Standard
ESV	ecological screening value	gpm	gallons per minute	IR	ingestion rate
ET	exposure time	GPR	ground-penetrating radar	IRDMIS	Installation Restoration Data Management Information System
EU	exposure unit	GPS	global positioning system	IRIS	Integrated Risk Information Service
Exp.	explosives	GS	ground scar	IRP	Installation Restoration Program
E-W	east to west	GSA	General Services Administration; Geologic Survey of Alabama	IS	internal standard
EZ	exclusion zone	GSBP	Ground Scar Boiler Plant	ISCP	Installation Spill Contingency Plan
FAR	Federal Acquisition Regulations	GSSI	Geophysical Survey Systems, Inc.	IT	IT Corporation
FB	field blank	GST	ground stain	ITEMS	IT Environmental Management System™

## List of Abbreviations and Acronyms (Continued)

'J'	estimated concentration	MMBtu/hr	million Btu per hour	NRCC	National Research Council of Canada
JeB2	Jefferson gravelly fine sandy loam, 2 to 6 percent slopes, eroded	MOGAS	motor vehicle gasoline	NRHP	National Register of Historic Places
JeC2	Jefferson gravelly fine sandy loam, 6 to 10 percent slopes, eroded	MP	Military Police	ns	nanosecond
JfB	Jefferson stony fine sandy loam, 0 to 10 percent slopes have strong slopes	MPA	methyl phosphonic acid	N-S	north to south
JPA	Joint Powers Authority	MPM	most probable munition	NS	not surveyed
K	conductivity	MQL	method quantitation limit	NSA	New South Associates, Inc.
K <sub>ow</sub>	octonal-water partition coefficient	MR	molasses residue	nT	nanotesla
L	lewisite; liter	MRL	method reporting limit	nT/m	nanoteslas per meter
l	liter	MS	matrix spike	NTU	nephelometric turbidity unit
LBP	lead-based paint	mS/cm	millisiemens per centimeter	nv	not validated
LC	liquid chromatography	mS/m	millisiemens per meter	O <sub>2</sub>	oxygen
LCS	laboratory control sample	MSD	matrix spike duplicate	O&G	oil and grease
LC <sub>50</sub>	lethal concentration for 50 percent population tested	MTBE	methyl tertiary butyl ether	O&M	operation and maintenance
LD <sub>50</sub>	lethal dose for 50 percent population tested	msl	mean sea level	OB/OD	open burning/open detonation
LEL	lower explosive limit	MtD3	Montevallo shaly, silty clay loam, 10 to 40 percent slopes , severely eroded	OD	outside diameter
LOAEL	lowest-observed-advserse-effects-level	mV	millivolts	OE	ordnance and explosives
LT	less than the certified reporting limit	MW	monitoring well	oh	organic clays of medium to high plasticity
LUC	land-use control	MWI&P	Monitoring Well Installation and Management Plan	ol	organic silts and organic silty clays of low plasticity
LUCAP	land-use control assurance plan	Na	sodium	OP	organophosphorus
LUCIP	land-use control implementation plan	NA	not applicable; not available	ORP	oxidation-reduction potential
max	maximum	NAD	North American Datum	OSHA	Occupational Safety and Health Administration
MB	method blank	NAD83	North American Datum of 1983	OSWER	Office of Solid Waste and Emergency Response
MCL	maximum contaminant level	NAVD88	North American Vertical Datum of 1988	OVM-PID/FID	organic vapor meter-photoionization detector/flame ionization detector
MCLG	maximum contaminant level goal	NAS	National Academy of Sciences	OVS	oil/water separator
MCPA	4-chloro-2-methylphenoxyacetic acid	NCEA	National Center for Environmental Assessment	oz	ounce
MCS	media cleanup standard	NCP	National Contingency Plan	PA	preliminary assessment
MD	matrix duplicate	NCRP	National Council on Radiation Protection and Measurements	PAH	polynuclear aromatic hydrocarbon
MDC	maximum detected concentration	ND	not detected	PARCCS	precision, accuracy, representativeness, comparability, completeness, and sensitivity
MDCC	maximum detected constituent concentration	NE	no evidence; northeast	Parsons	Parsons Engineering Science, Inc.
MDL	method detection limit	ne	not evaluated	Pb	lead
mg	milligrams	NEW	net explosive weight	PBMS	performance-based measurement system
mg/kg	milligrams per kilogram	NFA	No Further Action	PC	permeability coefficient
mg/kg/day	milligram per kilogram per day	NG	National Guard	PCB	polychlorinated biphenyl
mg/kgbw/day	milligrams per kilogram of body weight per day	NGP	National Guardsperson	PCDD	polychlorinated dibenzo-p-dioxins
mg/L	milligrams per liter	ng/L	nanograms per liter	PCDF	polychlorinated dibenzofurans
mg/m <sup>3</sup>	milligrams per cubic meter	NGVD	National Geodetic Vertical Datum	PCE	perchloroethene
mh	inorganic silts, micaceous or diatomaceous fine, sandy or silt soils	Ni	nickel	PCP	pentachlorophenol
MHz	megahertz	NIC	notice of intended change	PDS	Personnel Decontamination Station
µg/g	micrograms per gram	NIOSH	National Institute for Occupational Safety and Health	PEF	particulate emission factor
µg/kg	micrograms per kilogram	NIST	National Institute of Standards and Technology	PEL	permissible exposure limit
µg/L	micrograms per liter	NLM	National Library of Medicine	PES	potential explosive site
µmhos/cm	micromhos per centimeter	NPDES	National Pollutant Discharge Elimination System	Pest.	pesticides
min	minimum	NPW	net present worth	PETN	pentarey thritol tetranitrate
MINICAMS	miniature continuous air monitoring system	No.	number	PFT	portable flamethrower
ml	inorganic silts and very fine sands	NOAA	National Oceanic and Atmospheric Administration	PG	professional geologist
mL	milliliter	NOAEL	no-observed-adverse-effects-level	PID	photoionization detector
mm	millimeter	NR	not requested; not recorded; no risk	PkA	Philo and Stendal soils local alluvium, 0 to 2 percent slopes
MM	mounded material	NRC	National Research Council		

## List of Abbreviations and Acronyms (Continued)

PM	project manager	RTK	real-time kinematic	STL	Severn-Trent Laboratories
POC	point of contact	SA	exposed skin surface area	STOLS	Surface Towed Ordnance Locator System®
POL	petroleum, oils, and lubricants	SAD	South Atlantic Division	Std. units	standard units
POW	prisoner of war	SAE	Society of Automotive Engineers	SU	standard unit
PP	peristaltic pump; Proposed Plan	SAIC	Science Applications International Corporation	SUXOS	senior UXO supervisor
ppb	parts per billion	SAP	installation-wide sampling and analysis plan	SVOC	semivolatile organic compound
PPE	personal protective equipment	sc	clayey sands; sand-clay mixtures	SW	surface water
ppm	parts per million	Sch.	Schedule	SW-846	U.S. EPA's <i>Test Methods for Evaluating Solid Waste: Physical/Chemical Methods</i>
PPMP	Print Plant Motor Pool	SCM	site conceptual model	SWMU	solid waste management unit
ppt	parts per thousand	SD	sediment	SWPP	storm water pollution prevention plan
PR	potential risk	SDG	sample delivery group	SZ	support zone
PRG	preliminary remediation goal	SDZ	safe distance zone; surface danger zone	TAL	target analyte list
PSSC	potential site-specific chemical	SEMS	Southern Environmental Management & Specialties, Inc.	TAT	turn around time
pt	peat or other highly organic silts	SF	cancer slope factor	TB	trip blank
PVC	polyvinyl chloride	SFSP	site-specific field sampling plan	TBC	to be considered
QA	quality assurance	SGF	standard grade fuels	TCA	trichloroethane
QA/QC	quality assurance/quality control	SHP	installation-wide safety and health plan	TCDD	2,3,7,8-tetrachlorodibenzo-p-dioxin
QAM	quality assurance manual	SI	site investigation	TCDF	tetrachlorodibenzofurans
QAO	quality assurance officer	SINA	Special Interest Natural Area	TCE	trichloroethene
QAP	installation-wide quality assurance plan	SL	standing liquid	TCL	target compound list
QC	quality control	SLERA	screening-level ecological risk assessment	TCLP	toxicity characteristic leaching procedure
QST	QST Environmental, Inc.	sm	silty sands; sand-silt mixtures	TDEC	Tennessee Department of Environment and Conservation
qty	quantity	SM	Serratia marcescens	TDGCL	thiodiglycol
Qual	qualifier	SMDP	Scientific Management Decision Point	TDGCLA	thiodiglycol chloroacetic acid
'R'	rejected data; resample	s/n	signal-to-noise ratio	TERC	Total Environmental Restoration Contract
R&A	relevant and appropriate	SOP	standard operating procedure	THI	target hazard index
RA	remedial action	SOPQAM	U.S. EPA's <i>Standard Operating Procedure/Quality Assurance Manual</i>	TIC	tentatively identified compound
RAO	removal action objective	sp	poorly graded sands; gravelly sands	TLV	threshold limit value
RBC	risk-based concentration	SP	submersible pump	TN	Tennessee
RCRA	Resource Conservation and Recovery Act	SPCC	system performance calibration compound	TNT	trinitrotoluene
RD	remedial design	SPCS	State Plane Coordinate System	TOC	top of casing; total organic carbon
RDX	cyclonite	SPM	sample planning module	TPH	total petroleum hydrocarbons
ReB3	Rarden silty clay loams	SQRT	screening quick reference tables	TR	target cancer risk
REG	regular field sample	Sr-90	strontium-90	TRADOC	U.S. Army Training and Doctrine Command
REL	recommended exposure limit	SRA	streamlined human health risk assessment	TRPH	total recoverable petroleum hydrocarbons
RFA	request for analysis	SRM	standard reference material	TSCA	Toxic Substances Control Act
RfC	reference concentration	Ss	stony rough land, sandstone series	TSDF	treatment, storage, and disposal facility
RfD	reference dose	SS	surface soil	TWA	time-weighted average
RGO	remedial goal option	SSC	site-specific chemical	UCL	upper confidence limit
RI	remedial investigation	SSHO	site safety and health officer	UCR	upper certified range
RL	reporting limit	SSHP	site-specific safety and health plan	'U'	not detected above reporting limit
RME	reasonable maximum exposure	SSL	soil screening level	UF	uncertainty factor
ROD	Record of Decision	SSSL	site-specific screening level	USACE	U.S. Army Corps of Engineers
RPD	relative percent difference	SSSSL	site-specific soil screening level	USACHPPM	U.S. Army Center for Health Promotion and Preventive Medicine
RRF	relative response factor	STB	supertropical bleach	USAEC	U.S. Army Environmental Center
RSD	relative standard deviation	STC	source-term concentration	USAEHA	U.S. Army Environmental Hygiene Agency
RTC	Recruiting Training Center	STD	standard deviation	USACMLS	U.S. Army Chemical School
RTECS	Registry of Toxic Effects of Chemical Substances	STEL	short-term exposure limit	USAMPS	U.S. Army Military Police School

## List of Abbreviations and Acronyms (Continued)

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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
USC	United States Code
USCS	Unified Soil Classification System
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UST	underground storage tank
UTL	upper tolerance level; upper tolerance limit
UXO	unexploded ordnance
UXOQCS	UXO Quality Control Supervisor
UXOSO	UXO safety officer
V	vanadium
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)
WAC	Women's Army Corps
Weston	Roy F. Weston, Inc.
WP	installation-wide work plan
WRS	Wilcoxon rank sum
WS	watershed
WSA	Watershed Screening Assessment
WWI	World War I
WWII	World War II
XRF	x-ray fluorescence
yd <sup>3</sup>	cubic yards

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

### 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)