

## ***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. 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.

For non-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 (CERFA-Public Law 102-426) protocols 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 BBGR ranges were identified as Category 1 CERFA sites. These CERFA sites are parcels where no known or recorded storage, release, or disposal (including migration) has occurred on site property, but are qualified because the sites were active ranges. Therefore Parcels 74Q, 76Q-X, 79Q, 83Q, 84Q-X, 118Q-X, and 223Q, will require additional evaluation to determine their environmental condition.

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

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### **3.1 Overview**

The data quality objective process described in the publication EPA 540-R-93-071, *Data Quality Objectives Process for Superfund* (EPA, 1993) is followed to establish data requirements.

Following this process helps to ensure that the proper quantity and quality of data are generated to support the decision-making process associated with the action selection for Parcels 74Q, 76Q-X, 79Q, 83Q, 84Q-X, 118Q-X, and 223Q. The data quality objective process as applied to the BBGR ranges is described in more detail in Section 4.3 of the WP. Table 3-1 provides a summary of the factors used to determine the appropriate quantity of samples and the procedures necessary to meet the objectives of the SI and establish a basis for 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 and evaluated in accordance with the USACE requirements presented in the *Engineering Manual 200-1-6, Chemical Quality Assurance for Hazardous, Toxic, and Radiological Waste Projects* (USACE, 1997) and the stipulated requirements for the generation of definitive data (Section 3.1.2 of the QAP). Chemical data will be reported via hard-copy data packages by the laboratory using Contract Laboratory Program-like forms along with electronic copies. These packages will be validated in accordance with EPA National Functional Guidelines by Level III criteria.

XRF analysis will be performed in the field using standard operating procedures and the results will be documented and reported using standard reporting forms. Ten percent of the samples analyzed using XRF will be sent for definitive analysis at the fixed-based laboratory for confirmation.

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

The available data, presented in Table 3-1, related to the EE/CA investigation at Parcels 74Q, 76Q-X, 79Q, 83Q, 84Q-X, 118Q-X, and 223Q, 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 users of the data and information generated during field activities are primarily EPA, USACE, ADEM, FTMC, and the USACE supporting contractors. This SFSP, along with the necessary companion documents, has been designed to provide the regulatory agencies with sufficient detail to reach a determination as to the adequacy of the scope

Table 3-1

**Summary of Data Quality Objectives  
EE/CA at the Baby Bains Gap Road Ranges  
Fort McClellan, Calhoun County, Alabama**

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	<u>Contaminant Source</u> Range 18, Range 20, Range 23, Range 26, Former Range 25 East, Range 25, and Impact Area Parcel 118Q-X (explosives and metals)  <u>Migration Pathways</u> Infiltration to subsurface soil, infiltration and leaching to groundwater, biotransfer to venison, dust emissions and volatilization to ambient air, groundwater discharge to surface water, and runoff and erosion to surface water and sediment  <u>Potential Receptors</u> Residents (future), Recreational site user (current and future)  <u>PSSC</u> metals, nitroaromatic explosives, VOCs, SVOCs, herbicides, pesticides, PCBs	<u>Surface soil</u>	EE/CA investigation to confirm the presence or absence of contamination in the site media  Definitive quality data for future decision-making  XRF screening to characterize the site for supplemental sampling and analysis	<u>Surface soil</u> - Primarily lead, select samples for TAL metals, nitroaromatic explosives, TCL VOCs, TCL SVOCs, chlorinated herbicides, chlorinated and organophosphorus pesticides, and PCBs	Definitive data in data packages (as defined in USACE EM200-1-6)	252 surface soil samples + QC
			<u>Subsurface Soil</u>		<u>Subsurface soil</u> - Primarily lead, select samples for TAL metals, nitroaromatic explosives, TCL VOCs, TCL SVOCs, chlorinated herbicides, chlorinated and organophosphorus pesticides, and PCBs		
			<u>Groundwater</u>		<u>Groundwater</u> - TAL metals and nitroaromatic explosives; select samples for TCL VOCs, TCL SVOCs, chlorinated herbicides, chlorinated and organophosphorus pesticides, and PCBs		
			<u>Surface Water</u>		<u>Depositional soil</u> - Primarily lead, select samples for TAL metals, nitroaromatic explosives, TCL VOCs, TCL SVOCs, chlorinated herbicides, chlorinated and organophosphorus pesticides, and PCBs		
			<u>Sediment</u>		<u>Surface water and sediment</u> - Primarily lead, select samples for TAL metals, nitroaromatic explosives, TCL VOCs, TCL SVOCs, chlorinated herbicides, chlorinated and organophosphorus pesticides, and PCBs. All samples - TOC, grain size.		
					<u>Surface soil in range safety fan</u> - Lead (via XRF survey).		

ADEM - Alabama Department of Environmental Management.  
 DOD - U.S. Department of Defense.  
 EPA - U.S. Environmental Protection Agency.  
 FTMC - Fort McClellan.  
 USACE - U.S. Army Corps of Engineers.  
 PCBs - polychlorinated biphenyl compounds.  
 EE/CA - engineering evaluation and cost assessment.  
 XRF - X-ray fluorescence.

TAL - Target analyte list.  
 TCL - Target compound list.  
 VOCs - volatile organic compounds.  
 SVOCs - semivolatile organic compounds.  
 TOC - Total organic carbon.  
 PSSC - Potential site-specific chemical.  
 EM200-1-6 - USACE Engineering Manual, *Chemical Quality Assurance for HTRW Projects*, October 10, 1997.  
 QC - Quality control.

of work. The program has also been designed to provide the level of defensible data and information required to confirm or rule out the existence of residual chemical contamination in site media.

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

The 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 risk to 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 scenarios with a contaminated source medium.

Primary contaminant releases were probably limited to training activities. Potential contaminant transport pathways include infiltration and leaching to subsurface soil and groundwater, biotransfer to deer through browsing, dust emissions and volatilization to ambient air, groundwater discharge to surface water, surface water runoff, and erosion to surface water and sediment.

Any data collected previously from parcels that overlap Parcels 74, 76, 83, 84, 118, and 223 will be incorporated into the site investigation and screened against receptor-specific SSSLs.

Currently the ranges are not utilized and are not maintained. Trees cover most of the study area. The ranges are not fenced; therefore, people may trespass at the sites for hunting. There is not sufficient surface water to support fish habitat for fish consumption. The only plausible receptor under the current land-use scenario is a recreational site user who may hunt. Other potential receptors considered, but not included under the current land-use scenario, are the:

- **Groundskeeper.** The ranges are not currently maintained and will not be in the future.
- **Construction Worker.** The site is unused, and no development or construction is occurring or scheduled.
- **Resident.** The site is not currently used for residential purposes.

Future land use in this area is shown as mixed business for Range 18, Down Feedback (Known Distance) Range, Parcel 74Q, only. All remaining study areas are designated as passive recreation (FTMC, 1997). The sites may not be deemed safe for public access until remediation has been completed because of the potential for UXO (FTMC, 1997). Plausible future land-use receptor scenarios addressed in the CSEM include:

- **Resident.** Although the study areas are not planned for residential use, the residential scenario is considered in order to provide information for the project manager and regulators.
- **Recreational Site User.** Because many study areas have passive recreational use as their future land use, and hunting is a viable option, the recreational site user is included. Fish ingestion will not be evaluated because the streams are too small to support fish for consumption.
- **Groundskeeper.** Once Range 18 is developed for mixed business, it will require maintenance. Also, this receptor scenario represents the most highly exposed site worker for a business scenario.
- **Construction Worker.** Range 18 may be development for mixed business purposes in the future.

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

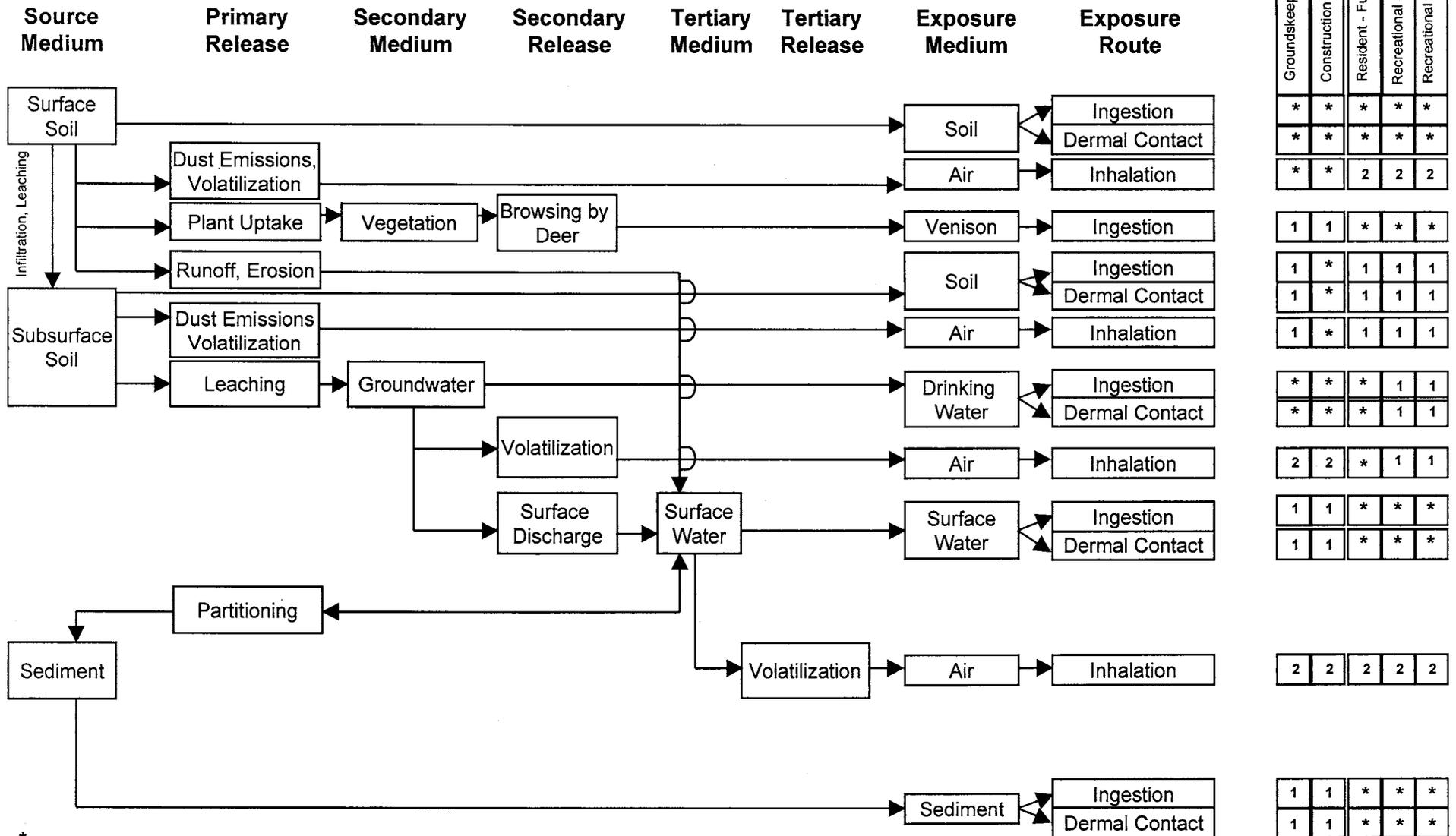
### **3.4 Decision-Making Process, Data Uses, and Needs**

The decision-making process consists of a seven-step process that is presented in detail in Section 4.3 of the WP and will be followed during the investigation at Parcels 74Q, 76Q-X, 79Q, 83Q, 84Q-X, 118Q-X, and 223Q. Data uses and needs are summarized in Table 3-1.

#### **3.4.1 Risk Evaluation**

Results from these analyses will be compared with site-specific screening levels, ecological screening values, and background values to determine if potential site-specific chemicals are

**Figure 3-1**  
**Human Health Conceptual Site Exposure Model**  
**EE/CA at the Baby Bains Gap Road Ranges**  
**Fort McClellan, Calhoun County, Alabama**



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

present at the site at constructions that pose an unacceptable risk to human health or the environment. EPA definitive data with data packages that meet the USACE requirements of the *Engineering Manual 200-1-6* (USACE, 1997) will be used to determine whether or not PSSCs are detected in site media. Definitive data will be adequate for confirming the presence of site contamination and for supporting a feasibility study and risk assessment. XRF analytical data will not be used to quantify risk, but instead be used to determine if further investigation is warranted.

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 approved procedures found in the FTMC installation-wide WP.

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

Surface soil, subsurface soil, groundwater, surface water, and sediment will be sampled and analyzed to meet the objectives of the EE/CA investigation at Parcels 74Q, 76Q-X, 79Q, 83Q, 84Q-X, 118Q-X, and 223Q. 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 hardcopy data packages. In addition to meeting the quality needs of this investigation, data analyzed at this level of quality are appropriate for all phases of site characterization, remedial investigation, and risk assessment. In addition to fixed-base laboratory analysis, soil samples will also be analyzed in the field using XRF technology. The XRF data will be used to screen large areas of the ranges to determine if additional characterization of these areas is necessary.

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

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

## **4.0 Field Activities**

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

The BBGR ranges fall within the “Possible Artillery Impact Area” shown on Plate 10 of the ASR. Therefore, IT will conduct UXO avoidance activities, including surface sweeps and downhole surveys of soil borings. The site-specific UXO safety work plan provides technical guidance for ordnance and explosives avoidance for sample collection activities at Parcels 74Q, 76Q-X, 79Q, 83Q, 84Q-X, 118Q-X, and 223Q. The site-specific UXO safety work plan attachment has been written in conjunction with Appendix E of the SAP (IT, 2000a).

#### **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 Appendices D and E of the approved SAP (IT, 2000a).

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

During the soil boring and downhole sampling, downhole UXO surveys will be performed to determine if buried metallic objects are present. 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 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 subsurface 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 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 Parcels 74Q, 76Q-X, 79Q, 83Q, 84Q-X, 118Q-X, and 223Q, includes the collection of surface soil, subsurface soil, groundwater, surface water, and sediment samples for chemical analyses. These samples will be collected and analyzed to provide data for characterizing the site to determine the environmental condition of the site and any further action to be conducted at the site. Additionally, samples will be collected from environmental media in locations that will assist in the assessment of potential ecological impacts resulting from activities at the site. Sections 4.2.1 through 4.2.6 describe these types of samples.

In addition to the samples collected for chemical analysis at a fixed base laboratory, soil samples will also be collected and analyzed onsite using XRF technology. XRF data will be used to determine if additional characterization is necessary over large parts of the range and to assist in evaluation of safety fan areas. Section 4.2.7 discusses this type of sampling in more detail.

### **4.2.1 Surface Soil Sampling**

Surface soil samples only will be collected from 135 locations at Range 18, Range 20, Range 23, Range 26 and former Range 25 East. Target mounds at Range 23 and pop-up target locations at Range 26 have been selected for characterization which will include the collection of 75 additional surface soil samples. Surface soil samples will also be collected at 30 soil boring locations and 12 monitoring well locations on the ranges. A total of 252 surface soil samples are planned for all BBGR ranges. Surface soil samples will be collected in the 0- to 1-foot bgs interval.

#### **4.2.1.1 Sample Locations and Rationales**

The surface soil sampling rationales are listed in Table 4-1. Proposed sampling locations for the various ranges are shown on the following figures:

- Range 18, Parcel 74Q - Figure 4-1
- Range 20, Parcel 76Q-X - Figure 4-2
- Range 23, Parcel 79Q - Figure 4-3
- Range 26, Parcel 84Q-X - Figure 4-4
- Former Range 25 East, Parcel 223Q - Figure 4-5

Range 23 mound samples and Range 26 pop up target sample designations and QA/QC sample requirements are summarized in Table 4-2. Surface soil sample designations and QA/QC sample requirements are summarized in Table 4-3. Figure 4-6 shows the typical mound sampling

Table 4-1

**Sampling Locations and Rationale  
EE/CA at the Baby Bains Gap Road Ranges  
Fort McClellan, Calhoun County, Alabama**

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Parcel Number	Sample Location	Type	Analysis	Sample Location Rationale
74Q (Range 18)	HR-74Q-GP01	SB	PB	Soil boring for surface soil and subsurface soil sample collection. Located in an historically used area (Sept 1940 aerial photo) northwest of the existing Range 18 firing line. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-74Q-GP02	SB	FULL	Soil boring for surface soil and subsurface soil sample collection. Located adjacent to the existing Range 18 firing line near historical foxhole firing points. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-74Q-GP03	SB	PB	Soil boring for surface soil and subsurface soil sample collection. Located in an historically used area (Sept 1940 aerial photo) northwest of the existing Range 18 firing line. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-74Q-GP04	SB	PB	Soil boring for surface soil and subsurface soil sample collection. Located south (and adjacent to) existing Range 18 firing line near gravel lane. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-74Q-GP05	SS	PB	Surface soil sample location on the east end of 25 meter target line. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-74Q-GP06	SS	PB	Surface soil sample location east of the Range 18 study area boundary and aligned with the 25 meter target line. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-74Q-GP07	SS	PB	Surface soil sample location on the west side of Range 18 south of the 25 meter target line and north of the 75 meter target line. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-74Q-GP08	SS	PB	Surface soil sample location south of the 25 meter target line and north of the 75 meter target line. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-74Q-GP09	SS	PB	Surface soil sample location on the west side of Range 18, south of the 75 meter target line and north of the former 500 foot target line. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-74Q-GP10	SS	TAL	Surface soil sample location in the central portion of Range 18 in the bullet channels of the 75 meter target line. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-74Q-GP11	SS	PB	Surface soil sample location on the east side of Range 18, south of 75 meter target line and north of former 500 foot target line. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-74Q-GP12	SS	PB	Surface soil sample location to the west of the former 500 foot target line in an historically used area (March 1973 aerial photo). Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-74Q-GP13	SS	PB	Surface soil sample location east of the study area boundary between the 175 meter target line and the former 500 foot target line. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-74Q-GP14	SS	PB	Surface soil sample location on the west side of Range 18 near the concrete target pads of the west end of the 175 meter target line. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. 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

**Sampling Locations and Rationale  
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Parcel Number	Sample Location	Type	Analysis	Sample Location Rationale
74Q (cont)	HR-74Q-GP15	SB	PB	Soil boring for surface soil and subsurface soil sample collection. Located in the central portion of the range, north (and adjacent to) 175 meter target line just south of old 500 foot target line. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-74Q-GP16	SS	PB	Surface soil sample location on the east side of Range 18 near the concrete target pads south of the 175 meter target line. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-74Q-GP17	SS	PB	Surface soil sample location in central portion of Range 18 between the 250 meter and the 175 meter target lines. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-74Q-GP18	SB	PB	Soil boring for surface soil and subsurface soil sample collection. Located west of 250 meter target line in an historically used area (March 1973 aerial photo). Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-74Q-GP19	SB	TAL	Soil boring for surface soil and subsurface soil sample collection. Located is east side of Range 18 near the bullet channels north of 250 meter target line. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-74Q-GP20	SS	PB	Surface soil sample location in the central portion of Range 18, south of 250 meter target line. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-74Q-GP21	SS	TAL	Surface soil sample location on the west side of Range 18 in the bullet channels of the 300 meter target line soil berm. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-74Q-GP22	SB_H	FULL	Horizontal soil boring for surface soil and subsurface soil sample collection. Located in central portion of Range 18 in the bullet channels of the 300 meter target line soil berm. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-74Q-GP23	SS	PB	Surface soil sample location east of the study area boundary and aligned with the 300 meter target line soil berm. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-74Q-GP24	SS	PB	Surface soil sample location east of 300 meter target line in the depressed area where runoff water collects from the concrete drainage ditch immediately south of the concrete wall. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-74Q-GP25	SS	PB	Surface soil sample location west of the unimproved road on the west side of the Range 18 study area. Location is on the possible west hillside impact zone (elevated between 65 and 75 feet above the target line area), downrange of historically used area (March 1973 aerial photo). Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-74Q-GP26	SS	PB	Surface soil sample location west of the unimproved road west of the Range 18 study area. Location is on the possible west hillside impact zone (elevated between 40 and 50 feet above the target line area) downrange of historically used area (March 1973 aerial photo). Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-74Q-GP27	SS	TAL	Surface soil sample location in the central portion of Range 18 in the bullet channels of the hillside impact zone. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. 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

**Sampling Locations and Rationale  
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Parcel Number	Sample Location	Type	Analysis	Sample Location Rationale
74Q (cont)	HR-74Q-GP28	SS	PB	Surface soil sample location on the east side of study area boundary, east of the central hillside impact zone. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-74Q-GP29	SS	PB	Surface soil sample location west of the central hillside impact zone, in a topographically flat area. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-74Q-GP30	SB_H	FULL	Horizontal soil boring for surface soil and subsurface soil sample collection. Located on the forward face of the central hillside impact zone, at an elevation approximately 20 to 25 feet above the base of the hill. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-74Q-GP31	SB_H	PB	Horizontal soil boring for surface soil and subsurface soil sample collection. Located on forward face of central hillside impact zone area at an elevation approximately 15 feet above the base of the hill and east of location GP30. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-74Q-GP32	SS	PB	Surface soil sample location near the top of the central hillside impact zone, at an elevation approximately 55 to 60 feet above the base of the hill and just southeast of location GP30. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-74Q-GP33	SS	PB	Surface soil sample location on the east side of the Range 18 study boundary, east of the central hillside impact zone and near a 10 foot deep, dry sinkhole (west of unimproved road). Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-74Q-GP34	SS	PB	Surface soil sample location west of the unimproved road in the topographically flat possible impact zone west of the central hillside impact zone. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-74Q-GP35	SB_H	PB	Horizontal soil boring for surface soil and subsurface soil sample collection. Located on the west edge of the central hillside impact zone, at an elevation approximately 30 to 35 feet above the base of the hill, and just west of location GP32. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-74Q-GP36	SS	PB	Surface soil sample location near the flat (850 ft msl) top of the central hillside impact zone, southeast of location GP32. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-74Q-GP37	SS	PB	Surface soil sample location east of the central hillside impact zone near the base of the hill and west of the creek. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-74Q-GP38	SS	PB	Surface soil sample location west of the central hillside impact zone, in the topographically flat possible impact zone just east of the unimproved road near the tree line. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-74Q-GP39	SS	PB	Surface soil sample location south of the Range 18 study area and west of the central hillside impact zone. Located at the base of the hillside downrange of the topographically flat possible impact area, southeast of location GP38. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-74Q-GP40	SS	PB	Surface soil sample location south in the Range 18 study area and west of the central hillside impact zone. Located at an elevation approximately 20 to 30 feet above the base of the hillside and just east of location GP39. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.

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Parcel Number	Sample Location	Type	Analysis	Sample Location Rationale	
74Q (cont)	HR-74Q-GP41	SS	PB	Surface soil sample location south of the Range 18 study area in the central hillside impact zone, at an elevation approximately 50 feet above the base of the hill and south of location GP36. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.	
	HR-74Q-GP42	SS	FULL	Surface soil sample location in the bullet channels on the forward face of the central hillside impact zone at an elevation approximately 10 to 15 feet above the base of the hill. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.	
	HR-74Q-GP43	SS	PB	Surface soil sample location in the central portion of Range 18 in the bullet channels of the 250 meter target line. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.	
	HR-74Q-GP44	SS	FULL	Surface soil sample location in the central portion of Range 18 in the bullet channels of the former 500 foot target line. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.	
	HR-74Q-GP45	SS	FULL	Surface soil sample in the central portion of Range 18 in the bullet channels of the 25 meter target line. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.	
	HR-74Q-GP46	SB	FULL	Soil boring for surface soil and subsurface soil sample collection. Located north of the existing Range 18 firing line in area historically used for range support (possible gun cleaning activities). Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.	
Summary for 74Q Soils:		SS	34	7	FULL
		SB	8	35	PB
		SB_H	4	4	TAL
		TOTAL	46	46	TOTAL
	HR-74Q-MW01	Shallow	PB (Soil)/ TAL & NE (GW)	Soil boring and shallow monitoring well for surface soil, subsurface soil, and groundwater sample collection. Located in the north-central portion of Range 18, north of 25m target line and south of the gravel firing line. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. 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.	
	HR-74Q-MW02	Shallow	TAL (Soil)/ TAL & NE (GW)	Soil boring and shallow monitoring well for surface soil, subsurface soil, and groundwater sample collection. Located in the central portion of Range 18, near the bullet channels north of the former 500 ft target line. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. 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.	
	HR-74Q-MW03	Shallow	FULL (Soil and GW)	Soil boring and shallow monitoring well for surface soil, subsurface soil, and groundwater sample collection. Located in the central portion of Range 18, near the bullet channels north of the 300m soil berm. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. 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.	

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Parcel Number	Sample Location	Type	Analysis	Sample Location Rationale
74Q (cont)	HR-74Q-MW04	Deep	PB (Soil)/ TAL & NE (GW)	Soil boring and deep monitoring well for surface soil, subsurface soil, and groundwater sample collection. Located in the central portion of Range 18, near the bullet channels east of location MW03 and north of the 300m soil berm. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. 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 bedrock aquifer.
	HR-74Q-SW/SD01	SW/SED	FULL	Surface water/sediment sample located downstream of Range 18 in a tributary of the South Branch of Cane Creek, northeast of firing line area. Sample data will indicate if contaminated sediment and surface water exists and if releases have occurred in the Range 18 runoff during former activities in this area. 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-74Q-DEP01	DEP	FULL	Depositional soil sample located in intermittent stream/surface drainage ditch of the South Branch of Cane Creek in the central portion of Range 18, just south of the 75 meter target line. If surface water is present, surface water/sediment samples will be collected instead of a depositional soil. Sample data will indicate if contaminated soil (or sediment and surface water) exists and if releases have occurred in the Range 18 runoff during former activities in this area. 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-74Q-DEP02	DEP	PB	Depositional soil sample located in intermittent stream/surface drainage ditch that flows east from the possible west hillside impact zone area (just south of location GP19) in the historically used impact zone area (March 1973 aerial photo). If surface water is present, surface water/sediment samples will be collected instead of a depositional soil. Sample data will indicate if contaminated soil (or sediment and surface water) exists and if releases have occurred in the Range 18 runoff during former activities in this area. 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-74Q-DEP03	DEP	FULL	Depositional soil sample located in intermittent stream/surface drainage ditch south of the unimproved road and south of the 300 meter target line. If surface water is present, surface water/sediment samples will be collected instead of a depositional soil. Sample data will indicate if contaminated soil (or sediment and surface water) exists and if releases have occurred in the Range 18 runoff during former activities in this area. 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-74Q-DEP04	DEP	FULL	Depositional soil sample located in intermittent stream/surface drainage ditch that drains runoff water from the central hillside impact zone (just east of the location GP27). If surface water is present, surface water/sediment samples will be collected instead of a depositional soil. Sample data will indicate if contaminated soil (or sediment and surface water) exists and if releases have occurred in the Range 18 runoff during former activities in this area. 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-74Q-DEP05	DEP	PB	Depositional soil sample located in intermittent stream/surface drainage ditch west of the central hillside impact zone. If surface water is present, surface water/sediment samples will be collected instead of a depositional soil. Sample data will indicate if contaminated soil (or sediment and surface water) exists and if releases have occurred in the Range 18 runoff during former activities in this area. 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.

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Parcel Number	Sample Location	Type	Analysis	Sample Location Rationale
76Q (Range 20)	HR-76Q-GP01	SS	PB	Surface soil sample location south of the infiltration training area and north of hillside M-60 machine gun impact zone. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-76Q-GP02	SB	PB	Soil boring for surface soil and subsurface soil sample collection. Located south of location GP01, north and downgradient of the hillside M-60 machine gun impact zone. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-76Q-GP03	SS	PB	Surface soil sample location northwest and downgradient of the hillside M-60 machine gun impact zone. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-76Q-GP04	SS	TAL	Surface soil sample location on the northwest side of the hillside M-60 machine gun impact zone in bullet channels. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-76Q-GP05	SS	FULL	Surface soil sample location in the bullet channels of the central area of the hillside M-60 machine gun impact zone. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-76Q-GP06	SB_H	FULL	Horizontal soil boring for surface soil and subsurface soil sample collection. Located in the bullet channels of the central area of the hillside M-60 machine gun impact zone, just south of location GP05 and at a higher elevation. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-76Q-GP07	SS	PB	Surface soil sample location on the east side of the hillside M-60 machine gun impact zone (east of location GP06). Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-76Q-GP08	SB_H	PB	Horizontal soil boring for surface soil and subsurface soil sample collection. Located in the bullet channels of the central area hillside M-60 machine gun impact zone, south of location GP06. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-76Q-GP09	SS	PB	Surface soil sample location southeast and upgradient of the hillside M-60 machine gun impact zone (east of location GP08). Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-76Q-GP10	SS	PB	Surface soil sample location west and sidegradient of the hillside M-60 machine gun impact zone (west of location GP08) east of the intermittent stream/surface drainage ditch. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-76Q-GP11	SS	PB	Surface soil sample location south and upgradient of the hillside M-60 machine gun impact zone (southeast of location GP08). Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.

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Parcel Number	Sample Location	Type	Analysis	Sample Location Rationale
76Q (Cont)	HR-76Q-GP12	SS	PB	Surface soil sample location southeast and upgradient of the hillside M-60 machine gun impact zone. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-76Q-GP13	SS	PB	Surface soil sample location southwest and upgradient of the hillside M-60 machine gun impact zone. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
Summary for 76Q Soils:	SS	10	2	FULL
	SB	1	10	PB
	SB_H	2	1	TAL
	TOTAL	13	13	TOTAL
	HR-76Q-DEP01	DEP	FULL	Depositional soil sample location in an intermittent stream/surface drainage ditch southwest of the infiltration training area, after the conjunction of the intermittent stream/surface drainage ditch that flows from the infiltration training area and the intermittent stream/drainage ditch that is downgradient of the M-60 machine gun impact zone. If the location contains surface water, surface water/sediment samples will be collected instead of a depositional soil. Sample data will indicate if contaminated soil (or sediment and surface water) exists and if releases have occurred in the Range 20 runoff during former activities in this area. 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-76Q-DEP02	DEP	PB	Depositional soil sample location in an intermittent stream/surface drainage ditch in the infiltration training area. If the location contains surface water, surface water/sediment samples will be collected instead of a depositional soil. Sample data will indicate if contaminated soil (or sediment and surface water) exists and if releases have occurred in the Range 20 runoff during former activities in this area. 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-76Q-DEP03	DEP	PB	Depositional soil sample location in an intermittent stream/surface drainage ditch in the infiltration training area. If the location contains surface water, surface water/sediment samples will be collected instead of a depositional soil. Sample data will indicate if contaminated soil (or sediment and surface water) exists and if releases have occurred in the Range 20 runoff during former activities in this area. 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-76Q-DEP04	DEP	FULL	Depositional soil sample location in an intermittent stream/surface drainage ditch, south of the infiltration area and downgradient of the M-60 machine gun impact zone. If the location contains surface water, surface water/sediment samples will be collected instead of a depositional soil. Sample data will indicate if contaminated soil (or sediment and surface water) exists and if releases have occurred in the Range 20 runoff during former activities in this area. 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-76Q-DEP05	DEP	FULL	Depositional soil sample location in an intermittent stream/surface drainage ditch, west and downgradient of the M-60 machine gun impact zone. If the location contains surface water, surface water/sediment samples will be collected instead of a depositional soil. Sample data will indicate if contaminated soil (or sediment and surface water) exists and if releases have occurred in the Range 20 runoff during former activities in this area. 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.

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Parcel Number	Sample Location	Type	Analysis	Sample Location Rationale
79Q (Range 23)	HR-79Q Mound Soil Samples	SS and SB	PB and FULL	Ten mounds (50m, 100m, 150m, 200m, 250m and 300m) from ten firing lanes (FL1, FL3, FL5, FL7, FL9, FL11, FL13, FL14, FL15, and FL16) will be sampled (See Table 4-2). Four surface soil sample locations (sides of the mound) and one soil boring location (top center of firing point side) per mound (see Figure 4-6). Surface soil samples will be collected 0-1 ft bgs. Soil boring will be advanced horizontally into mound face and two samples collected, surface soil (0-1 ft bgs) and subsurface soil (2-4 ft bgs). Two soil boring locations will be analyzed for full suite, remaining samples are lead only (per Table 4-2). Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-79Q-GP01	SS	PB	Surface soil sample location west of the firing point area on the north side of Range 23, near firing lane FL4. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-79Q-GP02	SS	PB	Surface soil sample location west of the firing point area on the south side of Range 23, near firing lane FL12. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-79Q-GP03	SS	PB	Surface soil sample location in the firing point area on the north side of Range 23, near firing lane FL2. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-79Q-GP04	SB	FULL	Soil boring for surface soil and subsurface soil sample collection. Located in the central portion of Range 23 firing point area, near firing lane FL9. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-79Q-GP05	SS	FULL	Surface soil sample location in the firing point area on the south side of Range 23, near firing lane FL13. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-79Q-GP06	SS	PB	Surface soil sample location in target mound area northeast of firing lane FL6, and adjacent to 50m mound. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-79Q-GP07	SS	PB	Surface soil sample location south of the Range 23 study area (south of firing lane FL16) aligned with the 100m mounds. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-79Q-GP08	SS	PB	Surface soil sample location north of the Range 23 study area (north of firing lane FL1) between the 50m and 100m mounds. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-79Q-GP09	SS	FULL	Surface soil sample location in the center of the target mound area in firing lane FL10, east of 150m mound. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-79Q-GP10	SS	PB	Surface soil sample location south of the Range 23 study area (south of firing lane FL16) aligned with the 200m mounds. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
HR-79Q-GP11	SS	PB	Surface soil sample location north of the Range 23 study area (north of firing lane FL1) between the 200m and 250m mounds. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.	

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Parcel Number	Sample Location	Type	Analysis	Sample Location Rationale
79Q (Cont)	HR-79Q-GP12	SB	PB	Soil boring for surface soil and subsurface soil sample collection. Located in the target mound area in firing lane FL3 east of the 200m mound. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-79Q-GP13	SS	PB	Surface soil sample location in the target mound area in firing lane FL14, southeast of the 250m mound. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-79Q-GP14	SS	PB	Surface soil sample location south of the Range 23 study area (south of firing lane FL16) aligned with the 300m mounds. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-79Q-GP15	SS	PB	Surface soil sample location north of the Range 23 study area (north of FL1) aligned with the 300m mounds. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-79Q-GP16	SS	TAL	Surface soil sample location northwest of the possible impact zone in the bullet channels east of the 300m mounds and downrange of firing lanes FL3 and FL4. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-79Q-GP17	SS	FULL	Surface soil sample location northwest of the possible impact zone, east of the 300m mounds and downrange of firing lane FL8. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-79Q-GP18	SB	TAL	Soil boring for surface soil and subsurface soil sample collection. Located northwest of the possible impact zone east of the 300m mounds and downrange of firing lane FL15. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-79Q-GP19	SS	PB	Surface soil sample location, north of the Range 23 study area/possible impact zone and northeast of Range 23 back road (in the Range 26 impact zone). Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-79Q-GP20	SB	FULL	Soil boring for surface soil and subsurface soil sample collection. Located in possible impact zone, east of Range 23 back road and downrange of firing lane FL3. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-79Q-GP21	SS	PB	Surface soil sample location in the possible impact zone, east of the Range 23 back road and downrange of firing lane FL7. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-79Q-GP22	SS	PB	Surface soil sample location in the possible impact zone, east of the Range 23 back road and downrange of firing lane FL11. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-79Q-GP23	SS	PB	Surface soil sample location in the possible impact zone, east of Range 23 back road and downrange of firing lane FL16. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-79Q-GP24	SS	PB	Surface soil sample location in the possible impact zone, east of Range 23 back road and northeast of firing lane FL1. Location is elevated approximately 40 feet above the target mound area. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.

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Parcel Number	Sample Location	Type	Analysis	Sample Location Rationale
79Q (Cont)	HR-79Q-GP25	SS	PB	Surface soil sample location in the possible impact zone, east of Range 23 back road and downrange of firing lanes FL9 and FL10. Location is elevated approximately 25 feet above the target mound area. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-79Q-GP26	SS	PB	Surface soil sample location in the possible impact zone, east of Range 23 back road and downrange of firing lane FL16. Location is elevated approximately 20 feet above the target mound area. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-79Q-GP27	SS	PB	Surface soil sample location in the possible impact zone, east of Range 23 back road and downrange of firing lane FL1. Location is elevated approximately 35 feet above the target mound area. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-79Q-GP28	SB_H	TAL	Horizontal soil boring for surface soil and subsurface soil sample collection. Located in the possible impact zone, east of Range 23 back road and downrange of firing lanes FL3 and FL4. Location is elevated approximately 25 feet above target mound area. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-79Q-GP29	SS	PB	Surface soil sample location in the possible impact zone, east of Range 23 back road and downrange of firing lanes FL15 and FL16. Location is elevated approximately 70 feet above the target mound area in the hillside of the old quarry. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-79Q-GP30	SS	PB	Surface soil sample location in the possible impact zone, east of Range 23 back road and downrange of firing lanes FL1 and FL2. Location is elevated approximately 75 feet above the target mound area. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-79Q-GP31	SS	PB	Surface soil sample location east of the possible impact zone and downrange of firing lanes FL4 and FL5. Location is elevated approximately 60 feet above the target mound area. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-79Q-GP32	SS	PB	Surface soil sample location on the southern boundary of the possible impact zone, downrange of firing lane FL9. Location is elevated approximately 60 feet above the target mound area. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-79Q-GP33	SS	PB	Surface soil sample location east of the possible impact zone and downrange of firing lanes FL2 and FL3. Location is elevated approximately 100 feet above the target mound area. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.

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**Sampling Locations and Rationale  
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Parcel Number	Sample Location	Type	Analysis	Sample Location Rationale	
79Q (Cont)  Summary for 79Q Soils:	HR-79Q-GP34	SS	PB	Surface soil sample location east of the possible impact zone and downrange of firing lanes FL12 and FL13. Location is elevated approximately 50 feet above the target mound area. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.	
		SS	29	5	FULL
		SB	4	26	PB
		SB_H	1	3	TAL
		TOTAL	34	34	TOTAL
	HR-79Q-MW01	Shallow	FULL (Soil and GW)	Soil boring and shallow monitoring well for surface soil, subsurface soil, and groundwater sample collection. Located in the target mound area in firing lane FL13 just west of the 100m target mound. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. 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.	
	HR-79Q-MW02	Shallow	PB (Soil)/ TAL & NE (GW)	Soil boring and shallow monitoring well for surface soil, subsurface soil, and groundwater sample collection. Located in the target mound area in firing lane FL8 between the 150m and 200m target mounds. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. 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.	
	HR-79Q-MW03	Deep	PB (Soil)/ TAL & NE (GW)	Soil boring and deep monitoring well for surface soil, subsurface soil, and groundwater sample collection. Located in the target mound area in firing lane FL8 between the 150m and 200m target mounds, adjacent to location MW02. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. 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 bedrock aquifer.	
HR-79Q-MW04	Shallow	TAL (Soil)/ TAL & NE (GW)	Soil boring and shallow monitoring well for surface soil, subsurface soil, and groundwater sample collection. Located in the target mound area in firing lane FL3 between the 250m and 300m target mounds. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. 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.		
HR-79Q-DEP01	DEP	FULL	Depositional soil sample location is in an intermittent stream/surface drainage ditch west of Snap Lane and west of the former Range 23 firing line. Location is downstream of the conjunction of the two intermittent streams/surface drainage ditches that flow from the hillside impact zone area of Range 23 through the target mound area and another intermittent stream/surface drainage ditch that flows in from the southeast part of the range. If surface water is present, surface water and sediment samples will be collected instead of depositional soil. Sample data will indicate if contaminated soil (or sediment and surface water) exists and if releases have occurred in the Range 23 runoff during former activities in this area. 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-79Q-DEP02	DEP	FULL	Depositional soil sample location is in an intermittent stream/surface drainage ditch in the firing lane FL12, east of the 100m mound. Location is downstream of the conjunction of the two intermittent streams/surface drainage ditches that flow from the possible impact zone. If surface water is present, surface water and sediment samples will be collected instead of depositional soil. Sample data will indicate if contaminated soil (or sediment and surface water) exists and if releases have occurred in the Range 23 runoff during former activities in this area. 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.		

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Parcel Number	Sample Location	Type	Analysis	Sample Location Rationale
79Q (Cont)	HR-79Q-DEP03	DEP	FULL	Depositional soil sample location is in an intermittent stream/surface drainage ditch in the firing lane FL16, between the 100m mound and the 150m mound. If surface water is present, surface water and sediment samples will be collected instead of depositional soil. Sample data will indicate if contaminated soil (or sediment and surface water) exists and if releases have occurred in the Range 20 runoff during former activities in this area. 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-79Q-DEP04	DEP	FULL	Depositional soil sample location is in an intermittent stream/surface drainage ditch in the possible impact zone area, east of the Range 23 back road and downrange of firing lanes FL7 and FL8. If surface water is present, surface water and sediment samples will be collected instead of depositional soil. Sample data will indicate if contaminated soil (or sediment and surface water) exists and if releases have occurred in the Range 20 runoff during former activities in this area. 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-79Q-DEP05	DEP	FULL	Depositional soil sample location is in an intermittent stream/surface drainage ditch in the possible impact zone, east of the Range 23 back road and downrange of firing lanes FL12 and FL13. If surface water is present, surface water and sediment samples will be collected instead of depositional soil. Sample data will indicate if contaminated soil (or sediment and surface water) exists and if releases have occurred in the Range 20 runoff during former activities in this area. 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-79Q-DEP06	DEP	PB	Depositional soil sample location is in an intermittent stream/surface drainage ditch in the southern part of the possible impact zone, east of the Range 23 back road and downrange of firing lane FL16. If surface water is present, surface water and sediment samples will be collected instead of depositional soil. Sample data will indicate if contaminated soil (or sediment and surface water) exists and if releases have occurred in the Range 20 runoff during former activities in this area. 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-79Q-DEP07	DEP	FULL	Depositional soil sample location is in an intermittent stream/surface drainage ditch near the observed bullet channels in the possible impact zone, east of the Range 23 back road and downrange of firing lane FL3. If surface water is present, surface water and sediment samples will be collected instead of depositional soil. Sample data will indicate if contaminated soil (or sediment and surface water) exists and if releases have occurred in the Range 20 runoff during former activities in this area. 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-79Q-DEP08	DEP	PB	Depositional soil sample location is in an intermittent stream/surface drainage ditch in the possible impact zone, east of the Range 23 back road and downrange of firing lanes FL4 and FL5. If surface water is present, surface water and sediment samples will be collected instead of depositional soil. Sample data will indicate if contaminated soil (or sediment and surface water) exists and if releases have occurred in the Range 20 runoff during former activities in this area. 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-79Q-DEP09	DEP	PB	Depositional soil sample location is in an intermittent stream/surface drainage ditch in the possible impact zone, east of the Range 23 back road and is downrange of firing lanes FL11 and FL12. If surface water is present, surface water and sediment samples will be collected instead of depositional soil. Sample data will indicate if contaminated soil (or sediment and surface water) exists and if releases have occurred in the Range 20 runoff during former activities in this area. 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.

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Parcel Number	Sample Location	Type	Analysis	Sample Location Rationale
84Q (Range 26)	HR-84Q Popul Target Locations	SS and SB	PB and FULL	Five popup target locations will be sampled (See Table 4-2). Four surface soil sample locations (sides of popup targets) and one soil boring (top center of firing lane side) per popup target location. Surface soil will be collected from 0-1 foot bgs. Soil boring will consist of one surface soil (0-1 foot bgs) and one subsurface soil (2-4 feet bgs). Three samples will be analyzed for full suite and remaining samples will be analyzed for lead (per Table 4-2). Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-84Q-GP01	SS	PB	Surface soil sample location in the firing lane area on the north side of Range 26. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-84Q-GP02	SS	PB	Surface soil sample location north of the firing lane area and west of the unimproved road. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-84Q-GP03	SS	PB	Surface soil sample location in the firing lane area on the south side of Range 26. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-84Q-GP04	SS	PB	Surface soil sample location north of the firing lane area and northeast of the unimproved road. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-84Q-GP05	SS	PB	Surface soil sample location in the central firing lane area near the eastern end of the firing lane. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-84Q-GP06	SS	FULL	Surface soil sample location between the firing lane area and west of the 2nd group of popup target locations (north-central). Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-84Q-GP07	SB	TAL	Soil boring for surface soil and subsurface soil sample collection. Located in the north group of popup target locations. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-84Q-GP08	SB	PB	Soil boring for surface soil and subsurface soil sample collection. Located in the possible impact zone, east of the 2nd group of popup target locations (north-central). Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-84Q-GP09	SS	FULL	Surface soil sample location in the possible impact zone, east of the 3rd group of popup target locations (south-central). Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-84Q-GP10	SS	PB	Surface soil sample location south of the firing lane area and west of the unimproved road. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-84Q-GP11	SS	PB	Surface soil sample location on the hillside north of Range 26, north of the unimproved road. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
HR-84Q-GP12	SS	PB	Surface soil sample location on the south side of Range 26, east of the unimproved road. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.	

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Parcel Number	Sample Location	Type	Analysis	Sample Location Rationale
84Q (Cont)	HR-84Q-GP13	SS	PB	Surface soil sample location in the possible impact zone on the north side of Range 26 and downrange of north group of popup targets. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-84Q-GP14	SB	TAL	Soil boring for surface soil and subsurface soil sample collection. Located downgradient of the observed bullet channels in the central possible impact zone near the parked vehicles. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-84Q-GP15	SB	FULL	Soil boring for surface soil and subsurface soil sample collection. Located in the observed bullet channels in the central possible impact zone near the parked vehicles. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-84Q-GP16	SS	PB	Surface soil sample near the parked vehicles and observed bullet channels in the central possible impact zone. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-84Q-GP17	SS	PB	Surface soil sample near the parked vehicles and observed bullet channels in the central possible impact zone, south of unimproved road. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-84Q-GP18	SS	TAL	Surface soil sample near the parked vehicles and in the observed bullet channels in central possible impact zone. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-84Q-GP19	SS	PB	Surface soil sample east of the parked vehicles and the observed bullet channels in central possible impact zone, south of unimproved road. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-84Q-GP20	SS	PB	Surface soil sample on the hillside in the central portion of the possible impact zone. Location is elevated approximately 55 feet above the popup target locations. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-84Q-GP21	SS	PB	Surface soil sample on the southern hillside of the possible impact zone. Location is elevated approximately 45 feet above the popup target locations. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-84Q-GP22	SS	PB	Surface soil sample on the northern hillside of the possible impact zone. Location is elevated approximately 45 feet above the popup target locations. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-84Q-GP23	SS	PB	Surface soil sample on the central hillside of the possible impact zone. Location is elevated approximately 70 feet above the popup target locations. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-84Q-GP24	SS	PB	Surface soil sample in the central hillside of the possible impact zone. Location is elevated approximately 90 feet above the popup target locations. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-84Q-GP25	SS	PB	Surface soil sample location north of the Range 26 possible impact zone, near the Range 20 infiltration area. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
HR-84Q-GP26	SS	PB	Surface soil sample location north of the Range 26 possible impact zone, near the Range 20 infiltration area north of the intermittent stream/surface drainage. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.	

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Parcel Number	Sample Location	Type	Analysis	Sample Location Rationale
84Q (Cont)	HR-84Q-GP27	SS	PB	Surface soil sample location north of the Range 26 possible impact zone, near the Range 20 infiltration area north of the intermittent stream/surface drainage. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-84Q-GP28	SS	PB	Surface soil sample location on north side of Range 26, north of intermittent stream/surface drainage and downrange of the north group of popup targets. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-84Q-GP29	SS	PB	Surface soil sample location in the firing lane area near the eastern end of the firing lane. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-84Q-GP30	SS	TAL	Surface soil sample location in the possible impact zone, east of north group of popup targets. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-84Q-GP31	SS	PB	Surface soil sample location in the central firing lane area. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-84Q-GP32	SB	PB	Soil boring for surface soil and subsurface soil sample collection. Located on the maneuver/firing lane boundary. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-84Q-GP33	SS	PB	Surface soil sample location east of the firing lane area and on the southeast hillside area of Range 26. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
Summary for 84Q Soils:	SS	28	3	FULL
	SB	5	26	PB
	SB_H	0	4	TAL
	TOTAL	33	33	TOTAL
HR-84Q-MW01	Shallow	PB (Soil)/ TAL & NE (GW)	Soil boring and shallow monitoring well for surface soil, subsurface soil, and groundwater sample collection. Located in the northeast part of firing lane area, between the 1st and 2nd group of popup targets. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. 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.	
HR-84Q-MW02	Shallow	FULL (Soil and GW)	Soil boring and shallow monitoring well for surface soil, subsurface soil, and groundwater sample collection. Located in the central part of the possible impact zone, and downrange of the 2nd and 3rd group of popup targets. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. 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.	
HR-84Q-MW03	Deep	TAL (Soil)/ TAL & NE (GW)	Soil boring and deep monitoring well for surface soil, subsurface soil, and groundwater sample collection. Located in the central part of the possible impact zone (northeast of MW02). Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. 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 bedrock aquifer.	

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Parcel Number	Sample Location	Type	Analysis	Sample Location Rationale
84Q (Cont)	HR-84Q-MW04	Shallow	PB (Soil)/ TAL & NE (GW)	Soil boring and shallow monitoring well for surface soil, subsurface soil, and groundwater sample collection. Located near the treeline in the eastern part of the possible impact zone, and downrange of the 1st and 2nd group of popup targets. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. 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.
	HR-84Q-DEP01	DEP	FULL	Depositional soil sample location in an intermittent stream/surface drainage on the north side of the Range 26 firing lane area and downstream of Range 20. If surface water is present, surface water and sediment samples will be collected instead of the depositional soil. Sample data will indicate if contaminated soil (or sediment and surface water) exists and if releases have occurred in the Range 20 and Range 26 runoff during former activities in these areas. 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-84Q-DEP02	DEP	FULL	Depositional soil sample location in an intermittent stream/surface drainage on the south side of the Range 26 firing lane area. If surface water is present, surface water and sediment samples will be collected instead of the depositional soil. Sample data will indicate if contaminated soil (or sediment and surface water) exists and if releases have occurred in the Range 26 runoff during former activities in this area. 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-84Q-DEP03	DEP	FULL	Depositional soil sample location in an intermittent stream/surface drainage at the base of the hillside southwest of the 3rd set of popup targets (south-central). If surface water is present, surface water and sediment samples will be collected instead of the depositional soil. Sample data will indicate if contaminated soil (or sediment and surface water) exists and if releases have occurred in the Range 26 runoff during former activities in this area. 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-84Q-DEP04	DEP	FULL	Depositional soil sample location in an intermittent stream/surface drainage north of the Range 26 possible impact zone and south of Range 20. If surface water is present, surface water and sediment samples will be collected instead of the depositional soil. Sample data will indicate if contaminated soil (or sediment and surface water) exists and if releases have occurred in the Range 20 runoff during former activities in this area. 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-84Q-DEP05	DEP	PB	Depositional soil sample location in an intermittent stream/surface drainage southwest of the Range 26 possible impact zone. If surface water is present, surface water and sediment samples will be collected instead of the depositional soil. Sample data will indicate if contaminated soil (or sediment and surface water) exists and if releases have occurred in the Range 20 runoff during former activities in this area. 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.

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Parcel Number	Sample Location	Type	Analysis	Sample Location Rationale
223Q (Fmr Range 25 East)	HR-223Q-GP01	SB	FULL	Soil boring for surface soil and subsurface soil sample collection. Located in the potential firing line area for former Range 25E and the Range 26 range support zone (possible gun cleaning area). Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-223Q-GP02	SS	PB	Surface soil sample location in the potential firing line area/support zone for the former Range 25E and the south side of Range 26 maneuver area/north side of Range 23 target mound area. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-223Q-GP03	SB	FULL	Soil boring for surface soil and subsurface soil sample collection. Location in potential firing line area for former Range 25E and Range 26 range support zone (gun cleaning). Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-223Q-GP04	SS	PB	Surface soil sample location in the potential firing line area/support zone for former Range 25E and in the south side of Range 26 firing lane area/north side of Range 23 target mound area. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-223Q-GP05	SS	PB	Surface soil sample location in the potential impact zone for former Range 25E and in the firing lane area of Range 26. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-223Q-GP06	SB_H	FULL	Horizontal soil boring for surface soil and subsurface soil sample collection. Located in the potential hillside impact zone, north of Bains Gap Road. Location is elevated approximately 50 to 55 feet above base of hill. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-223Q-GP07	SS	PB	Surface soil sample location in the potential hillside impact zone, east of Bains Gap Road and north of unimproved road. Location is elevated approximately 45 feet above base of hill. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-223Q-GP08	SB	TAL	Soil boring for surface soil and subsurface soil sample collection. Located in the potential hillside impact zone, east of Bains Gap Road and north of the unimproved road. Location is elevated approximately 70 feet above base of hill. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-223Q-GP09	SS	PB	Surface soil sample location east of the former Range 25E potential hillside impact zone and in the Range 20 infiltration training area. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-223Q-GP10	SS	PB	Surface soil sample location on the east side of the former Range 25E potential hillside impact zone and southwest of the Range 20 M-60 machine gun firing points. Location is elevated approximately 90 feet above the base of the hill. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-223Q-GP11	SS	PB	Surface soil sample location on the west side of the former Range 25E potential hillside impact zone, west of Bains Gap Road. Location is elevated approximately 75 feet above the base of the hill. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.

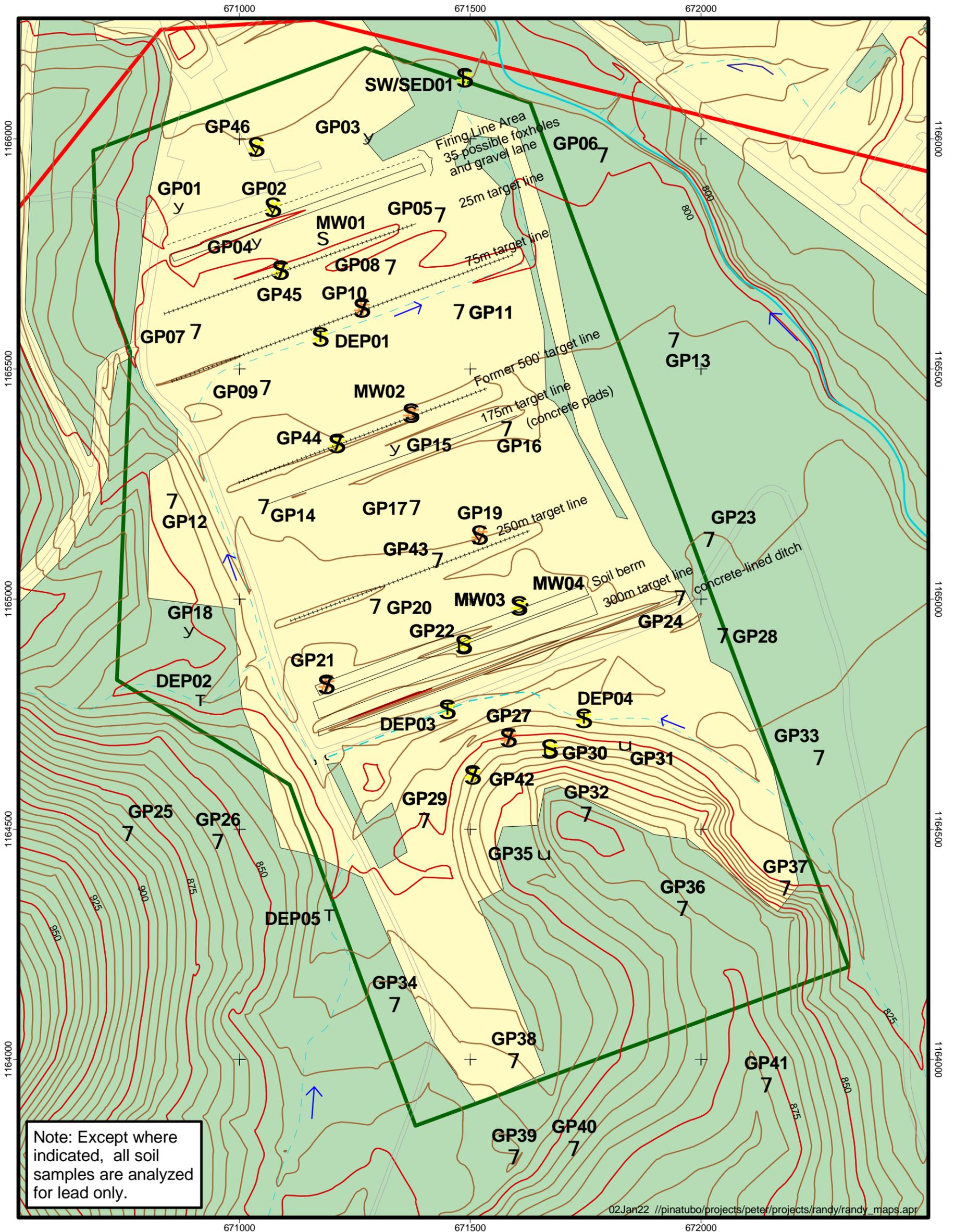
Table 4-1

**Sampling Locations and Rationale  
EE/CA at the Baby Bains Gap Road Ranges  
Fort McClellan, Calhoun County, Alabama**

(Page 18 of 18)

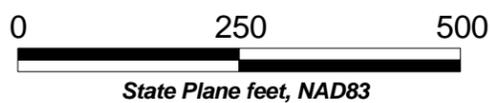
Parcel Number	Sample Location	Type	Analysis	Sample Location Rationale	
223Q (Cont)	HR-223Q-GP12	SB_H	PB	Horizontal soil boring for surface soil and subsurface soil sample collection. Located on the north side of the former Range 25E potential hillside impact zone, east of Bains Gap Road. Location is elevated approximately 125 feet above the base of the hill (near it's highest elevation). Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.	
	HR-223Q-GP13	SS	PB	Surface soil sample location north of the former Range 25E potential hillside impact zone, east of Bains Gap Road. Sample data will indicate if contaminated soil exists and if releases into the environment have occurred from former site activity. Data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.	
		SS	8	3	FULL
		SB	3	9	PB
		SB_H	2	1	TAL
		TOTAL	13	13	TOTAL
	Summary for 223Q Soils:				
	HR-223Q-DEP01	DEP	FULL	Depositional soil sample location is in an intermittent stream/surface drainage east of Snap Lane and southwest of the former Range 25E firing line area. The location is downstream of Range 26 and northwest of the Range 23 firing points. If surface water is present, surface water and sediment samples will be collected instead of depositional soil. Sample data will indicate if contaminated soil (or sediment and surface water) exists and if releases have occurred in the range runoff during former activities in this area. 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-223Q-DEP02	DEP	FULL	Depositional soil sample location is in an intermittent stream/surface drainage south of Bains Gap Road and west of Snap Lane near the Range 26 parking lot. The location is west of the former Range 25E potential firing line/target line area and is downstream of Range 26 and Range 20. If surface water is present, surface water and sediment samples will be collected instead of depositional soil. Sample data will indicate if contaminated soil (or sediment and surface water) exists and if releases have occurred in the range runoff during former activities in this area. 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.	

SB - soil boring (see Section 4.2.2).  
 SS - surface soil.  
 SB\_H - horizontal soil boring (see Section 4.2.2).  
 Shallow - Shallow monitoring well.  
 Deep - Deep (bedrock) monitoring well.  
 SW/SED - surface water/sediment.  
 DEP - depositional soil.  
 FULL - full analytical suite (see Section 4.5).  
 PB - lead only.  
 TAL - TAL metals only.  
 NE - nitroaromatic explosive compounds.  
 GW - groundwater.



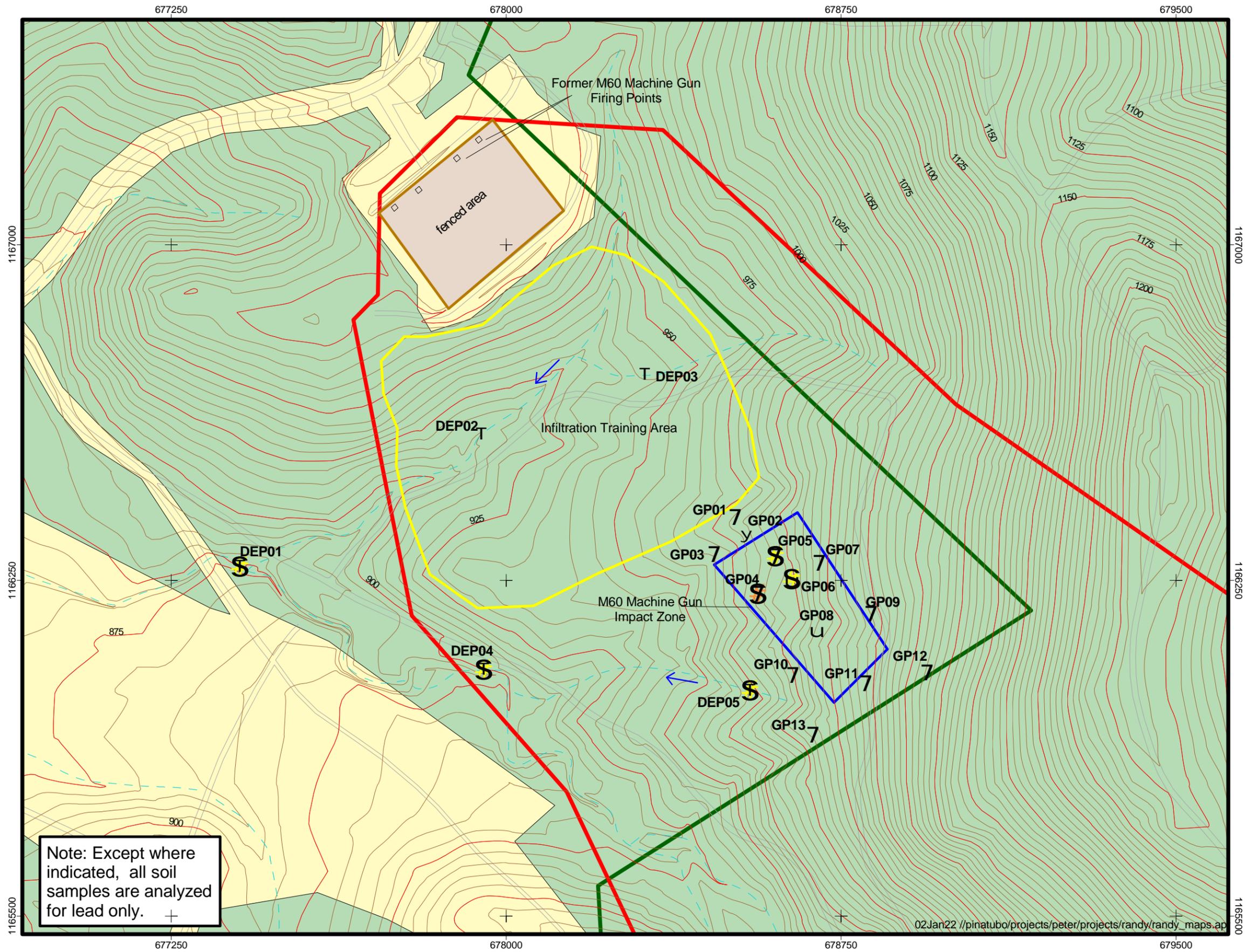
**Figure 4-1**  
**Sample Locations**  
**Range 18, Parcel 74Q**

T	Depositional Soil	—	5' Contour	Ⓢ	Full Analytical Suite (see Section 4.5)
•	Deep Monitoring Well	—	25' Contour	Ⓢ	TAL Metals Analysis
S	Shallow Monitoring Well	—	Roads	□	Safety Fan
7	Surface Soil	←	Flow Direction	▭	Study Area
y	Vertical Soil Boring (see Section 4.2.2)	—	Creeks	■	Woods
u	Horizontal Soil Boring (see Section 4.2.2)	—	Intermittent/Surface Drainage	■	Not Wooded
[	Surface Water/Sediment	—	Bullet Channels		



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 Calhoun County  
 Contract No. DACA21-96-D-0018





Note: Except where indicated, all soil samples are analyzed for lead only.

### Figure 4-2

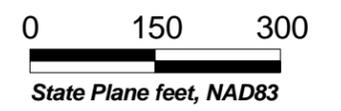
#### Sample Locations

#### Range 20

#### Parcel 76Q-X

Proposed Sample Location Types

- 7** Surface Soil
- y** Vertical Soil Boring (see Section 4.2.2)
- U** Horizontal Soil Boring (see Section 4.2.2)
- T** Depositional Soil
- S** Full Analytical Suite (see Section 4.5)
- S** TAL Metals Analysis
- Flow Direction
- Intermittent/Surface Drainage
- 25' Contour
- 5' Contour
- Roads
- Infiltration Area
- Range 20 Fenced Area
- Safety Fan
- Study Area
- M60 Machine Gun Impact Zone
- Woods
- Not Wooded

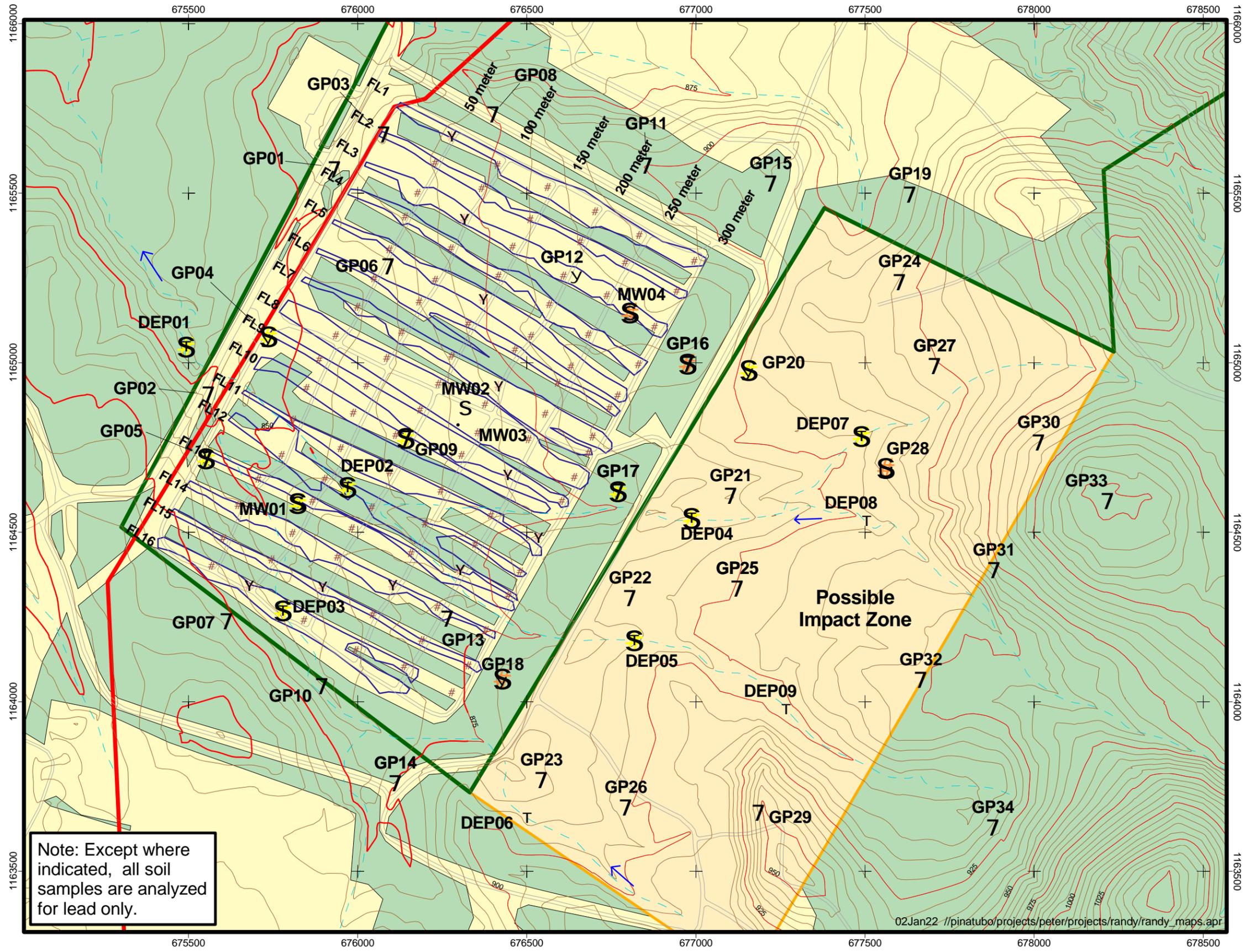


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# Figure 4-3

## Sample Locations Range 23 Parcel 79Q



Proposed Sampling Location Types

.	Deep Monitoring Well
S	Shallow Monitoring Well
7	Surface Soil
Y	Vertical Soil Boring (See Section 4.2.2)
U	Horizontal Soil Boring (See Section 4.2.2)
T	Depositional Soil
#	Mounds
Y	Mound Samples (See Table 4-2)
S	Full Analytical Suite (see Section 4.5)
S	TAL Metals Analysis
(Red line)	25' Contour
(Grey line)	5' Contour
(Grey line)	Roads
(Blue arrow)	Flow Direction
(Dashed blue line)	Intermittent/Surface Drainage
(Blue outline)	Firing Lanes
(Red outline)	Safety Fan
(Green outline)	Study Area
(Yellow outline)	Possible Impact Zone
(Green fill)	Woods
(Yellow fill)	Not Wooded

Note: Except where indicated, all soil samples are analyzed for lead only.

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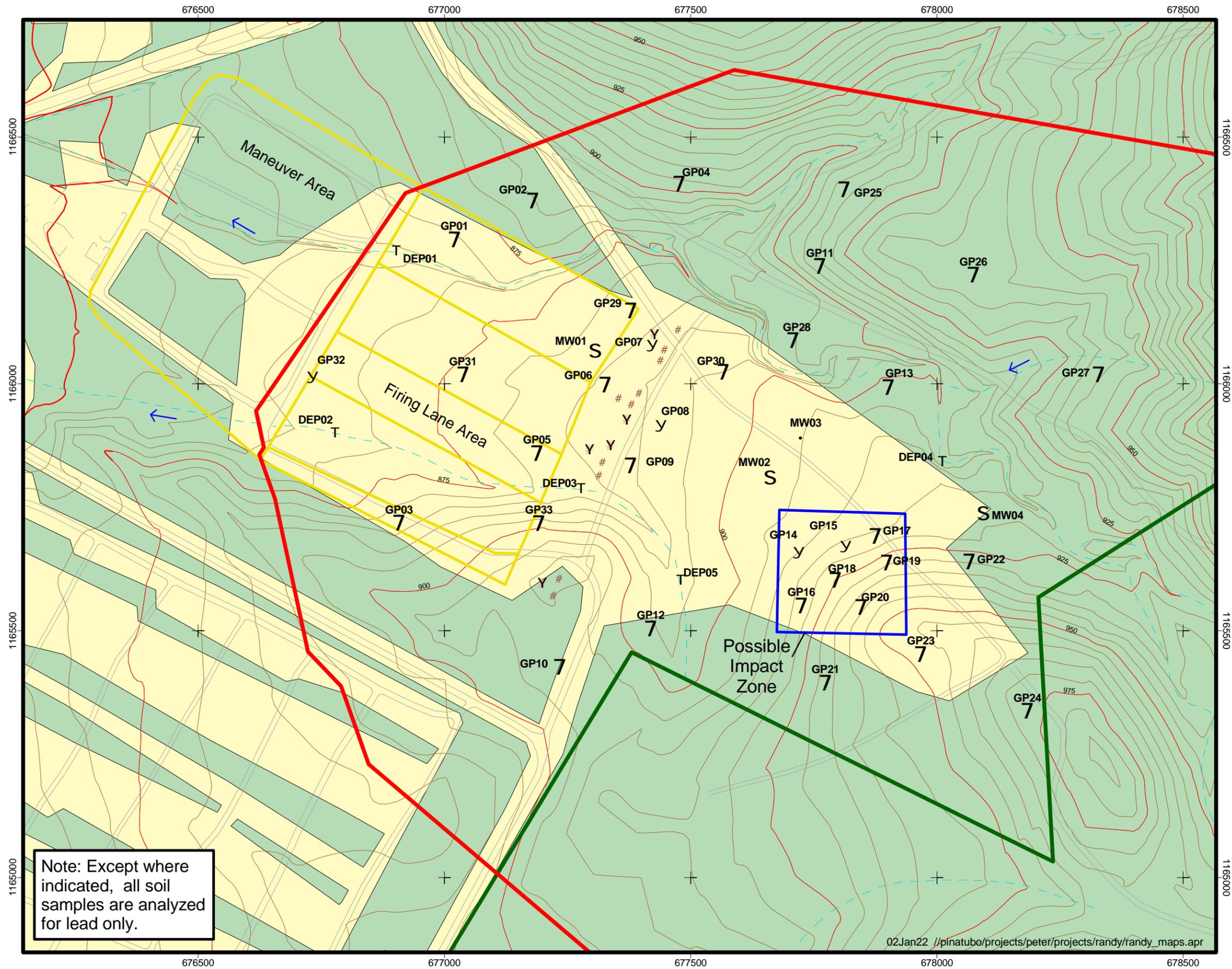
0 200 400  
State Plane feet, NAD83

N

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Calhoun County  
Contract No. DACA21-96-D-0018

# Figure 4-4

## Sample Locations Range 26 Parcel 84Q-X



**Proposed Sample Location Types**

- Deep Monitoring Well
- S Shallow Monitoring Well
- 7 Surface Soil
- y Vertical Soil Boring (See Section 4.2.2)
- T Depositional Soil
- # Popup Target Locations
- Y Popup Target Location Samples (See Table 4-2)
- S Full Analytical Suite (see Section 4.5)
- S TAL Metals Analysis

**Map Features:**

- Maneuver Area
- Roads
- Flow Direction
- Intermittent/Surface Drainage
- 25' Contours
- 5' Contours
- Safety Fan
- Study Area
- Woods
- Not Wooded

Note: Except where indicated, all soil samples are analyzed for lead only.

02Jan22 //pinatubo/projects/peter/projects/andy/andy\_maps.apr

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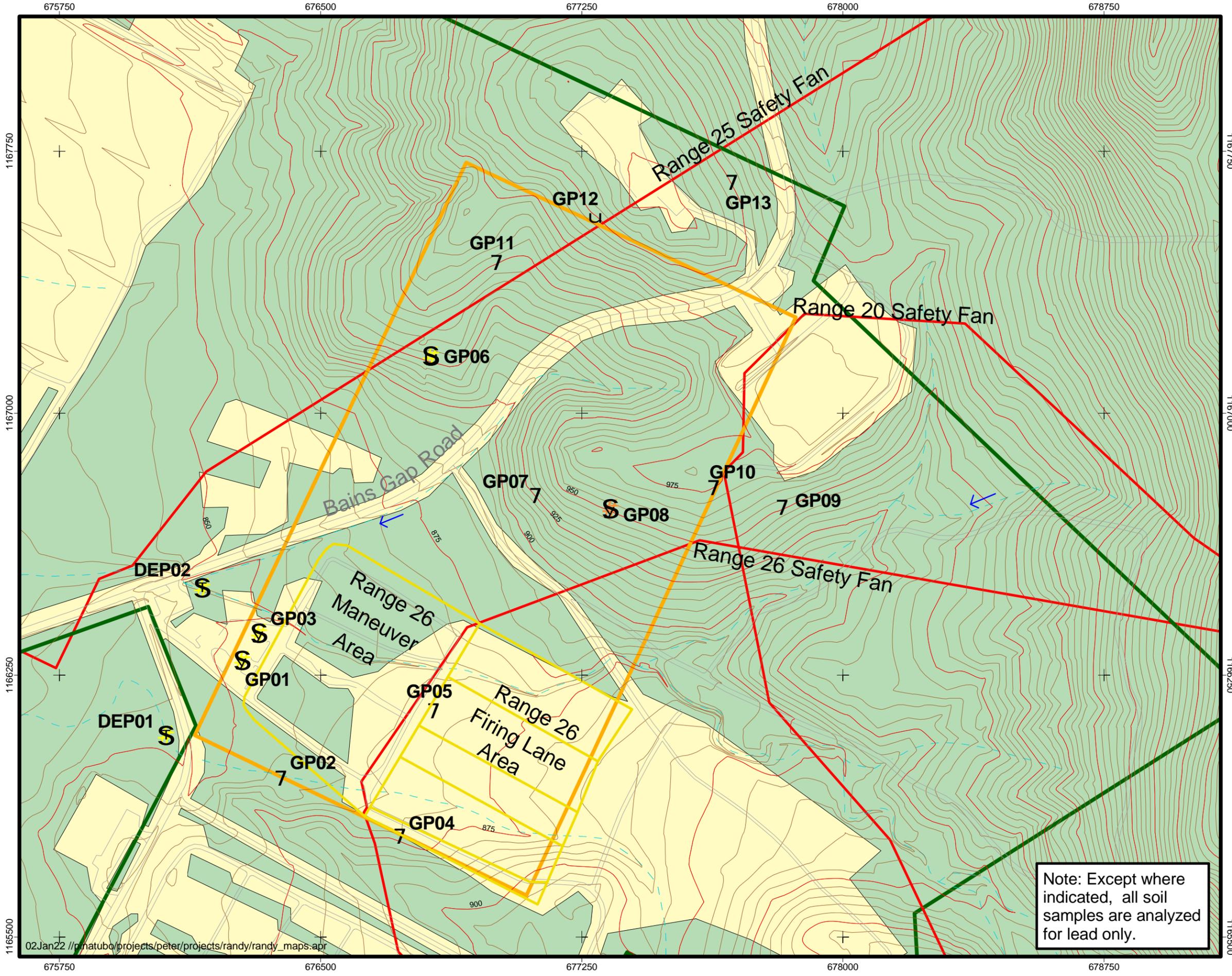
0 150 300  
State Plane feet, NAD83

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Contract No. DACA21-96-D-0018

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# Figure 4-5

## Sample Locations For Former Range 25 E Parcel 223Q



**Proposed Sample Location Types**

- 7** Surface Soil
- y** Vertical Soil Boring (See Section 4.2.2)
- U** Horizontal Soil Boring (See Section 4.2.2)
- T** Depositional Soil
- S** Full Analytical Suite (See Section 4.5)
- S** TAL Metals Analysis

- Range 26 Training Areas
- Roads
- 25' Contours
- 5' Contours
- ← Flow Direction
- Intermittent/Surface Drainage
- Former Range 25 East Study Area
- Safety Fan
- BBGR Range EE/CA Study Area
- Woods
- Not Wooded

Note: Except where indicated, all soil samples are analyzed for lead only.

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Table 4-2

**Field Sample and QA/QC Designations for Range 23 Target Mound Area  
and Range 26 Popup Target Location Soil Samples  
EE/CA at the Baby Bains Gap Road Ranges  
Fort McClellan, Calhoun County, Alabama**

(Page 1 of 4)

Firing Lane No. <sup>a</sup>	Mound ID <sup>b</sup>	Sampl Type <sup>c</sup>	Sample Location Description	Depth (ft bgs)	QA/QC Samples			Analytical Suite <sup>d</sup>
					Field Duplicates	Field Split	MS/MSD	
<b>Range 23 Target Mound Sampling</b>								
FL1	50	SB01	HR-79Q-SB01-SS-PL0001-R	0-1				TAL Metals
		SB01	HR-79Q-SB01-DS-PL0002-R	2-4				Lead
		SS01	HR-79Q-SS01-SS-PL0003-R	0-1			HR-79Q-SS01-SS-PL0003-MS/	Lead
		SS02	HR-79Q-SS02-SS-PL0004-R	0-1				Lead
		SS03	HR-79Q-SS03-SS-PL0005-R	0-1				Lead
		SS04	HR-79Q-SS04-SS-PL0006-R	0-1				Lead
FL3	100	SB02	HR-79Q-SB02-SS-PL0007-R	0-1	HR-79Q-SB02-SS-PL0008-FD			Full Suite
		SB02	HR-79Q-SB02-DS-PL0009-R	2-4				Full Suite
		SS05	HR-79Q-SS05-SS-PL0010-R	0-1				Lead
		SS06	HR-79Q-SS06-SS-PL0011-R	0-1				Lead
		SS07	HR-79Q-SS07-SS-PL0012-R	0-1				Lead
		SS08	HR-79Q-SS08-SS-PL0013-R	0-1				Lead
FL5	150	SB03	HR-79Q-SB03-SS-PL0014-R	0-1	HR-79Q-SB03-SS-PL0015-FD			Full Suite
		SB03	HR-79Q-SB03-DS-PL0016-R	2-4				TAL Metals
		SS09	HR-79Q-SS09-SS-PL0017-R	0-1				Lead
		SS10	HR-79Q-SS10-SS-PL0018-R	0-1				Lead
		SS11	HR-79Q-SS11-SS-PL0019-R	0-1				Lead
		SS12	HR-79Q-SS12-SS-PL0020-R	0-1				Lead
FL7	200	SB04	HR-79Q-SB04-SS-PL0021-R	0-1				Lead
		SB04	HR-79Q-SB04-DS-PL0022-R	2-4				Lead
		SS13	HR-79Q-SS13-SS-PL0023-R	0-1				TAL Metals
		SS14	HR-79Q-SS14-SS-PL0024-R	0-1				Lead
		SS15	HR-79Q-SS15-SS-PL0025-R	0-1				Lead
		SS16	HR-79Q-SS16-SS-PL0026-R	0-1				Lead
FL9	250	SB05	HR-79Q-SB05-SS-PL0027-R	0-1				TAL Metals
		SB05	HR-79Q-SB05-DS-PL0028-R	2-4	HR-79Q-SB05-DS-PL0029-FD			Lead
		SS17	HR-79Q-SS17-SS-PL0030-R	0-1			HR-79Q-SS17-SS-PL0030-MS/	Lead
		SS18	HR-79Q-SS18-SS-PL0031-R	0-1				Lead
		SS19	HR-79Q-SS19-SS-PL0032-R	0-1				Lead
		SS20	HR-79Q-SS20-SS-PL0033-R	0-1				Lead

Table 4-2

Field Sample and QA/QC Designations for Range 23 Target Mound Area  
and Range 26 Popup Target Location Soil Samples  
EE/CA at the Baby Bains Gap Road Ranges  
Fort McClellan, Calhoun County, Alabama

(Page 2 of 4)

Firing Lane No. <sup>a</sup>	Mound ID <sup>b</sup>	Sampl Type <sup>c</sup>	Sample Location Description	Depth (ft bgs)	QA/QC Samples			Analytical Suite <sup>d</sup>
					Field Duplicates	Field Split	MS/MSD	
FL11	300	SB06	HR-79Q-SB06-SS-PL0034-R	0-1				Full Suite
		SB06	HR-79Q-SB06-DS-PL0035-R	2-4				Lead
		SS21	HR-79Q-SS21-SS-PL0036-R	0-1				Lead
		SS22	HR-79Q-SS22-SS-PL0037-R	0-1				Lead
		SS23	HR-79Q-SS23-SS-PL0038-R	0-1				Lead
		SS24	HR-79Q-SS24-SS-PL0039-R	0-1				Lead
FL13	250	SB07	HR-79Q-SB07-SS-PL0040-R	0-1				TAL Metals
		SB07	HR-79Q-SB07-DS-PL0041-R	2-4				Lead
		SS25	HR-79Q-SS25-SS-PL0042-R	0-1	HR-79Q-SS25-SS-PL0043-FD			Lead
		SS26	HR-79Q-SS26-SS-PL0044-R	0-1				Lead
		SS27	HR-79Q-SS27-SS-PL0045-R	0-1				Lead
		SS28	HR-79Q-SS28-SS-PL0046-R	0-1				Lead
FL14	200	SB08	HR-79Q-SB08-SS-PL0047-R	0-1				Full Suite
		SB08	HR-79Q-SB08-DS-PL0048-R	2-4				Lead
		SS29	HR-79Q-SS29-SS-PL0049-R	0-1				Lead
		SS30	HR-79Q-SS30-SS-PL0050-R	0-1			HR-79Q-SS30-SS-PL0050-MS/	Lead
		SS31	HR-79Q-SS31-SS-PL0051-R	0-1				Lead
		SS32	HR-79Q-SS32-SS-PL0052-R	0-1				Lead
FL15	150	SB09	HR-79Q-SB09-SS-PL0053-R	0-1				TAL Metals
		SB09	HR-79Q-SB09-DS-PL0054-R	2-4				Lead
		SS33	HR-79Q-SS33-SS-PL0055-R	0-1				Lead
		SS34	HR-79Q-SS34-SS-PL0056-R	0-1	HR-79Q-SS34-SS-PL0057-FD			Lead
		SS35	HR-79Q-SS35-SS-PL0058-R	0-1				Lead
		SS36	HR-79Q-SS36-SS-PL0059-R	0-1				Lead
FL16	100	SB10	HR-79Q-SB10-SS-PL0060-R	0-1				Full Suite
		SB10	HR-79Q-SB10-DS-PL0061-R	2-4				Lead
		SS37	HR-79Q-SS37-SS-PL0062-R	0-1				Lead
		SS38	HR-79Q-SS38-SS-PL0063-R	0-1				Lead
		SS39	HR-79Q-SS39-SS-PL0064-R	0-1	HR-79Q-SS39-SS-PL0065-FD			Lead
		SS40	HR-79Q-SS40-SS-PL0066-R	0-1				Lead

Table 4-2

Field Sample and QA/QC Designations for Range 23 Target Mound Area  
and Range 26 Popup Target Location Soil Samples  
EE/CA at the Baby Bains Gap Road Ranges  
Fort McClellan, Calhoun County, Alabama

(Page 3 of 4)

Firing Lane No. <sup>a</sup>	Mound ID <sup>b</sup>	Sampl Type <sup>c</sup>	Sample Location Description	Depth (ft bgs)	QA/QC Samples			Analytical Suite <sup>d</sup>
					Field Duplicates	Field Split	MS/MSD	
<b>Range 26 Popup Target Location Sampling</b>								
LOC1		SB01	HR-84Q-SB01-SS-PM0001-	0-1				TAL Metals
		SB01	HR-84Q-SB01-DS-PM0002-	2-4				Lead
		SS01	HR-84Q-SS01-SS-PM0003-	0-1				Lead
		SS02	HR-84Q-SS02-SS-PM0004-	0-1			HR-84Q-SS02-SS-PM0004-MS/	Lead
		SS03	HR-84Q-SS03-SS-PM0005-	0-1				Lead
		SS04	HR-84Q-SS04-SS-PM0006-	0-1				Lead
LOC2		SB02	HR-84Q-SB02-SS-PM0007-	0-1	HR-84Q-SB02-SS-PM0008-FD			Full Suite
		SB02	HR-84Q-SB02-DS-PM0009-	2-4				Full Suite
		SS05	HR-84Q-SS05-SS-PM0010-	0-1				Lead
		SS06	HR-84Q-SS06-SS-PM0011-	0-1				Lead
		SS07	HR-84Q-SS07-SS-PM0012-	0-1				Lead
		SS08	HR-84Q-SS08-SS-PM0013-	0-1				Lead
LOC3		SB03	HR-84Q-SB03-SS-PM0014-	0-1				TAL Metals
		SB03	HR-84Q-SB03-DS-PM0015-	2-4	HR-84Q-SB03-DS-PM0016-FD			Lead
		SS09	HR-84Q-SS09-SS-PM0017-	0-1				Lead
		SS10	HR-84Q-SS10-SS-PM0018-	0-1				Lead
		SS11	HR-84Q-SS11-SS-PM0019-	0-1				Lead
		SS12	HR-84Q-SS12-SS-PM0020-	0-1				Lead
LOC4		SB04	HR-84Q-SB04-SS-PM0021-	0-1				Full Suite
		SB04	HR-84Q-SB04-DS-PM0022-	2-4				TAL Metals
		SS13	HR-84Q-SS13-SS-PM0023-	0-1				Lead
		SS14	HR-84Q-SS14-SS-PM0024-	0-1				Lead
		SS15	HR-84Q-SS15-SS-PM0025-	0-1			HR-84Q-SS15-SS-PM0025-MS/	Lead
		SS16	HR-84Q-SS16-SS-PM0026-	0-1				Lead
LOC5		SB05	HR-84Q-SB05-SS-PM0027-	0-1				Full Suite
		SB05	HR-84Q-SB05-DS-PM0028-	2-4				Lead
		SS17	HR-84Q-SS17-SS-PM0029-	0-1				TAL Metals
		SS18	HR-84Q-SS18-SS-PM0030-	0-1	HR-84Q-SS18-SS-PM0031-FD			Lead
		SS19	HR-84Q-SS19-SS-PM0032-	0-1				Lead
		SS20	HR-84Q-SS20-SS-PM0033-	0-1				Lead

**Table 4-2**

**Field Sample and QA/QC Designations for Range 23 Target Mound Area  
and Range 26 Popup Target Location Soil Samples  
EE/CA at the Baby Bains Gap Road Ranges  
Fort McClellan, Calhoun County, Alabama**

(Page 4 of 4)

<sup>a</sup> Firing lane number corresponds to Range 23 location shown on Figure 4-3.

<sup>b</sup> Mound ID is expressed as the distance away from the firing point in meters as shown on Figure 4-3.

<sup>c</sup> See sampling scheme on Figure 4-6.

<sup>d</sup> Analytical suite: Full Suite - target compound list (TCL) volatile organic compounds, TCL semivolatile organic compounds, target analyte list (TAL) metals, organophosphorus pesticides, polychlorinated biphenyls, chlorinated herbicides, and nitroaromatic explosive compounds. TAL metals - target analyte list  
Lead - lead only.

FD - Field duplicate.

QA/QC - Quality assurance/quality control.

FL - firing lane.

REG - Field sample.

ft bgs - feet below ground surface.

SB - soil boring (horizontal).

LOC - Location.

SS - surface soil sample.

MS/MSD - Matrix spike/matrix spike duplicate.

Table 4-3

Surface Soil and Subsurface Soil Sample Designations and QA/QC Sample Quantities  
 EE/CA at the Baby Bains Gap Road Ranges  
 Fort McClellan, Calhoun County, Alabama

(Page 1 of 7)

Sample Location	Sample Designation	Sample Depth <sup>a</sup> (ft bgs)	QA/QC Samples			Analytical Suite <sup>b</sup>
			Field Duplicates	Field Splits	MS/MSD	
<b>Parcel 74Q Range 18</b>						
HR-74Q-GP01	HR-74Q-GP01-SS-PJ0001-REG	0-1				Lead
	HR-74Q-GP01-DS-PJ0002-REG	2-4				Lead
HR-74Q-GP02	HR-74Q-GP02-SS-PJ0003-REG	0-1				Full Suite
	HR-74Q-GP02-DS-PJ0004-REG	2-4	HR-224Q-GP02-DS-PJ0005-FD			Full Suite
HR-74Q-GP03	HR-74Q-GP03-SS-PJ0006-REG	0-1				Lead
	HR-74Q-GP03-DS-PJ0007-REG	2-4				Lead
HR-74Q-GP04	HR-74Q-GP04-SS-PJ0008-REG	0-1				Lead
	HR-74Q-GP04-DS-PJ0009-REG	2-4			HR-74Q-GP04-DS-PJ0009-MS/MSD	Lead
HR-74Q-GP05	HR-74Q-GP05-SS-PJ0010-REG	0-1				Lead
HR-74Q-GP06	HR-74Q-GP06-SS-PJ0011-REG	0-1				Lead
HR-74Q-GP07	HR-74Q-GP07-SS-PJ0012-REG	0-1				Lead
HR-74Q-GP08	HR-74Q-GP08-SS-PJ0013-REG	0-1				Lead
HR-74Q-GP09	HR-74Q-GP09-SS-PJ0014-REG	0-1				Lead
HR-74Q-GP10	HR-74Q-GP10-SS-PJ0015-REG	0-1	HR-74Q-GP10-SS-PJ0016-FD			TAL Metals
HR-74Q-GP11	HR-74Q-GP11-SS-PJ0017-REG	0-1				Lead
HR-74Q-GP12	HR-74Q-GP12-SS-PJ0018-REG	0-1				Lead
HR-74Q-GP13	HR-74Q-GP13-SS-PJ0019-REG	0-1				Lead
HR-74Q-GP14	HR-74Q-GP14-SS-PJ0020-REG	0-1				Lead
HR-74Q-GP15	HR-74Q-GP15-SS-PJ0021-REG	0-1				Lead
	HR-74Q-GP15-DS-PJ0022-REG	2-4				Lead
HR-74Q-GP16	HR-74Q-GP16-SS-PJ0023-REG	0-1				Lead
HR-74Q-GP17	HR-74Q-GP17-SS-PJ0024-REG	0-1				Lead
HR-74Q-GP18	HR-74Q-GP18-SS-PJ0025-REG	0-1				Lead
	HR-74Q-GP18-DS-PJ0026-REG	2-4				Lead
HR-74Q-GP19	HR-74Q-GP19-SS-PJ0027-REG	0-1				TAL Metals
	HR-74Q-GP19-DS-PJ0028-REG	2-4				TAL Metals
HR-74Q-GP20	HR-74Q-GP20-SS-PJ0029-REG	0-1	HR-74Q-GP20-SS-PJ0030-FD			Lead
HR-74Q-GP21	HR-74Q-GP21-SS-PJ0031-REG	0-1				TAL Metals
HR-74Q-GP22	HR-74Q-GP22-SS-PJ0032-REG	0-1			HR-74Q-GP22-SS-PJ0032-MS/MSD	Full Suite
	HR-74Q-GP22-DS-PJ0033-REG	2-4				Full Suite
HR-74Q-GP23	HR-74Q-GP23-SS-PJ0034-REG	0-1				Lead

Table 4-3

**Surface Soil and Subsurface Soil Sample Designations and QA/QC Sample Quantities  
EE/CA at the Baby Bains Gap Road Ranges  
Fort McClellan, Calhoun County, Alabama**

(Page 2 of 7)

Sample Location	Sample Designation	Sample Depth <sup>a</sup> (ft bgs)	QA/QC Samples			Analytical Suite <sup>b</sup>
			Field Duplicates	Field Splits	MS/MSD	
HR-74Q-GP24	HR-74Q-GP24-SS-PJ0035-REG	0-1				Lead
HR-74Q-GP25	HR-74Q-GP25-SS-PJ0036-REG	0-1				Lead
HR-74Q-GP26	HR-74Q-GP26-SS-PJ0037-REG	0-1				Lead
HR-74Q-GP27	HR-74Q-GP27-SS-PJ0038-REG	0-1				TAL Metals
HR-74Q-GP28	HR-74Q-GP28-SS-PJ0039-REG	0-1				Lead
HR-74Q-GP29	HR-74Q-GP29-SS-PJ0040-REG	0-1	HR-74Q-GP29-SS-PJ0041-FD			Lead
HR-74Q-GP30	HR-74Q-GP30-SS-PJ0042-REG	0-1				Full Suite
	HR-74Q-GP30-DS-PJ0043-REG	2-4				Full Suite
HR-74Q-GP31	HR-74Q-GP31-SS-PJ0044-REG	0-1				Lead
	HR-74Q-GP31-DS-PJ0045-REG	2-4				Lead
HR-74Q-GP32	HR-74Q-GP32-SS-PJ0046-REG	0-1				Lead
HR-74Q-GP33	HR-74Q-GP33-SS-PJ0047-REG	0-1				Lead
HR-74Q-GP34	HR-74Q-GP34-SS-PJ0048-REG	0-1			HR-74Q-GP34-SS-PJ0048-MS/MSD	Lead
HR-74Q-GP35	HR-74Q-GP35-SS-PJ0049-REG	0-1				Lead
	HR-74Q-GP35-DS-PJ0050-REG	2-4				Lead
HR-74Q-GP36	HR-74Q-GP36-SS-PJ0051-REG	0-1				Lead
HR-74Q-GP37	HR-74Q-GP37-SS-PJ0052-REG	0-1				Lead
HR-74Q-GP38	HR-74Q-GP38-SS-PJ0053-REG	0-1	HR-74Q-GP38-SS-PJ0054-FD			Lead
HR-74Q-GP39	HR-74Q-GP39-SS-PJ0055-REG	0-1				Lead
HR-74Q-GP40	HR-74Q-GP40-SS-PJ0056-REG	0-1				Lead
HR-74Q-GP41	HR-74Q-GP41-SS-PJ0057-REG	0-1				Lead
HR-74Q-GP42	HR-74Q-GP42-SS-PJ0058-REG	0-1				Full Suite
HR-74Q-GP43	HR-74Q-GP43-SS-PJ0059-REG	0-1				Lead
HR-74Q-GP44	HR-74Q-GP44-SS-PJ0060-REG	0-1				Full Suite
HR-74Q-GP45	HR-74Q-GP45-SS-PJ0061-REG	0-1				Full Suite
HR-74Q-GP46	HR-74Q-GP46-SS-PJ0062-REG	0-1				Full Suite
	HR-74Q-GP46-DS-PJ0063-REG	2-4				Full Suite
HR-74Q-MW01	HR-74Q-MW01-SS-PJ0064-REG	0-1			HR-74Q-MW01-SS-PJ0064-MS/MSD	Lead
	HR-74Q-MW01-DS-PJ0065-REG	2-4				Lead
HR-74Q-MW02	HR-74Q-MW02-SS-PJ0066-REG	0-1				TAL Metals
	HR-74Q-MW02-DS-PJ0067-REG	2-4				TAL Metals

Table 4-3

**Surface Soil and Subsurface Soil Sample Designations and QA/QC Sample Quantities  
EE/CA at the Baby Bains Gap Road Ranges  
Fort McClellan, Calhoun County, Alabama**

(Page 3 of 7)

Sample Location	Sample Designation	Sample Depth <sup>a</sup> (ft bgs)	QA/QC Samples			Analytical Suite <sup>b</sup>
			Field Duplicates	Field Splits	MS/MSD	
HR-74Q-MW03	HR-74Q-MW03-SS-PJ0068-REG	0-1				Full Suite
	HR-74Q-MW03-DS-PJ0069-REG	2-4	HR-74Q-MW03-DS-PJ0070-FD			Full Suite
HR-74Q-MW04	HR-74Q-MW04-SS-PJ0071-REG	0-1				Lead
	HR-74Q-MW04-DS-PJ0072-REG	2-4				Lead
<b>Parcel 76Q Range 20</b>						
HR-76Q-GP01	HR-76Q-GP01-SS-PK0001-REG	0-1				Lead
HR-76Q-GP02	HR-76Q-GP02-SS-PK0002-REG	0-1				Lead
	HR-76Q-GP02-DS-PK0003-REG	2-4				Lead
HR-76Q-GP03	HR-76Q-GP03-SS-PK0004-REG	0-1				Lead
HR-76Q-GP04	HR-76Q-GP04-SS-PK0005-REG	0-1				TAL Metals
HR-76Q-GP05	HR-76Q-GP05-SS-PK0006-REG	0-1				Full Suite
HR-76Q-GP06	HR-76Q-GP06-SS-PK0007-REG	0-1	HR-76Q-GP06-SS-PK0008-FD			Full Suite
	HR-76Q-GP06-DS-PK0009-REG	2-4				Full Suite
HR-76Q-GP07	HR-76Q-GP07-SS-PK0010-REG	0-1				Lead
HR-76Q-GP08	HR-76Q-GP08-SS-PK0011-REG	0-1				Lead
	HR-76Q-GP08-DS-PK0012-REG	2-4				Lead
HR-76Q-GP09	HR-76Q-GP09-SS-PK0013-REG	0-1			HR-76Q-GP09-SS-PK0013-MS/MSD	Lead
HR-76Q-GP10	HR-76Q-GP10-SS-PK0014-REG	0-1				Lead
HR-76Q-GP11	HR-76Q-GP11-SS-PK0015-REG	0-1				Lead
HR-76Q-GP12	HR-76Q-GP12-SS-PK0016-REG	0-1				Lead
HR-76Q-GP13	HR-76Q-GP13-SS-PK0017-REG	0-1				Lead
<b>Parcel 79Q Range 23</b>						
HR-79Q Mound Samples (PL0001 - PL0066) - see Table 4-2.						
HR-79Q-GP01	HR-79Q-GP01-SS-PL0067-REG	0-1				Lead
HR-79Q-GP02	HR-79Q-GP02-SS-PL0068-REG	0-1				Lead
HR-79Q-GP03	HR-79Q-GP03-SS-PL0069-REG	0-1	HR-79Q-GP03-SS-PL0070-FD			Lead

Table 4-3

Surface Soil and Subsurface Soil Sample Designations and QA/QC Sample Quantities  
 EE/CA at the Baby Bains Gap Road Ranges  
 Fort McClellan, Calhoun County, Alabama

(Page 4 of 7)

Sample Location	Sample Designation	Sample Depth <sup>a</sup> (ft bgs)	QA/QC Samples			Analytical Suite <sup>b</sup>
			Field Duplicates	Field Splits	MS/MSD	
HR-79Q-GP04	HR-79Q-GP04-SS-PL0071-REG	0-1				Full Suite
	HR-79Q-GP04-DS-PL0072-REG	2-4			HR-79Q-GP04-DS-PL0072-MS/MSD	Full Suite
HR-79Q-GP05	HR-79Q-GP05-SS-PL0073-REG	0-1				Full Suite
HR-79Q-GP06	HR-79Q-GP06-SS-PL0074-REG	0-1				Lead
HR-79Q-GP07	HR-79Q-GP07-SS-PL0075-REG	0-1				Lead
HR-79Q-GP08	HR-79Q-GP08-SS-PL0076-REG	0-1				Lead
HR-79Q-GP09	HR-79Q-GP09-SS-PL0077-REG	0-1				Full Suite
HR-79Q-GP10	HR-79Q-GP10-SS-PL0078-REG	0-1				Lead
HR-79Q-GP11	HR-79Q-GP11-SS-PL0079-REG	0-1				Lead
HR-79Q-GP12	HR-79Q-GP12-SS-PL0080-REG	0-1				Lead
	HR-79Q-GP12-DS-PL0081-REG	2-4				Lead
HR-79Q-GP13	HR-79Q-GP13-SS-PL0082-REG	0-1				Lead
HR-79Q-GP14	HR-79Q-GP14-SS-PL0083-REG	0-1				Lead
HR-79Q-GP15	HR-79Q-GP15-SS-PL0084-REG	0-1				Lead
HR-79Q-GP16	HR-79Q-GP16-SS-PL0085-REG	0-1				TAL Metals
HR-79Q-GP17	HR-79Q-GP17-SS-PL0086-REG	0-1	HR-79Q-GP17-SS-PL0087-FD			Full Suite
HR-79Q-GP18	HR-79Q-GP18-SS-PL0088-REG	0-1				TAL Metals
	HR-79Q-GP18-DS-PL0089-REG	2-4				TAL Metals
HR-79Q-GP19	HR-79Q-GP19-SS-PL0090-REG	0-1				Lead
HR-79Q-GP20	HR-79Q-GP20-SS-PL0091-REG	0-1				Full Suite
	HR-79Q-GP20-DS-PL0092-REG	2-4				Full Suite
HR-79Q-GP21	HR-79Q-GP21-SS-PL0093-REG	0-1				Lead
HR-79Q-GP22	HR-79Q-GP22-SS-PL0094-REG	0-1				Lead
HR-79Q-GP23	HR-79Q-GP23-SS-PL0095-REG	0-1				Lead
HR-79Q-GP24	HR-79Q-GP24-SS-PL0096-REG	0-1				Lead
HR-79Q-GP25	HR-79Q-GP25-SS-PL0097-REG	0-1				Lead
HR-79Q-GP26	HR-79Q-GP26-SS-PL0098-REG	0-1				Lead
HR-79Q-GP27	HR-79Q-GP27-SS-PL0099-REG	0-1				Lead
HR-79Q-GP28	HR-79Q-GP28-SS-PL0100-REG	0-1				TAL Metals
	HR-79Q-GP28-DS-PL0101-REG	2-4	HR-79Q-GP28-DS-PL0102-FD			TAL Metals
HR-79Q-GP29	HR-79Q-GP29-SS-PL0103-REG	0-1				Lead
HR-79Q-GP30	HR-79Q-GP30-SS-PL0104-REG	0-1			HR-79Q-GP30-SS-PL0104-MS/MSD	Lead

Table 4-3

Surface Soil and Subsurface Soil Sample Designations and QA/QC Sample Quantities  
 EE/CA at the Baby Bains Gap Road Ranges  
 Fort McClellan, Calhoun County, Alabama

(Page 5 of 7)

Sample Location	Sample Designation	Sample Depth <sup>a</sup> (ft bgs)	QA/QC Samples			Analytical Suite <sup>b</sup>
			Field Duplicates	Field Splits	MS/MSD	
HR-79Q-GP31	HR-79Q-GP31-SS-PL0105-REG	0-1				Lead
HR-79Q-GP32	HR-79Q-GP32-SS-PL0106-REG	0-1				Lead
HR-79Q-GP33	HR-79Q-GP33-SS-PL0107-REG	0-1				Lead
HR-79Q-GP34	HR-79Q-GP34-SS-PL0108-REG	0-1				Lead
HR-79Q-MW01	HR-79Q-MW01-SS-PL0109-REG	0-1			HR-79Q-MW01-SS-PL0109-MS/MSD	Full Suite
	HR-79Q-MW01-DS-PL0110-REG	2-4	HR-79Q-MW01-DS-PL0111-FD			Full Suite
HR-79Q-MW02	HR-79Q-MW02-SS-PL0112-REG	0-1				Lead
	HR-79Q-MW02-DS-PL0113-REG	2-4				Lead
HR-79Q-MW03	HR-79Q-MW03-SS-PL0114-REG	0-1				Lead
	HR-79Q-MW03-DS-PL0115-REG	2-4				Lead
HR-79Q-MW04	HR-79Q-MW04-SS-PL0116-REG	0-1	HR-79Q-MW04-SS-PL0117-FD			TAL Metals
	HR-79Q-MW04-DS-PL0118-REG	2-4				TAL Metals
<b>Parcel 84Q Range 26</b>						
HR-84Q Pop up Target Location Samples (PM0001 - PM0033) - see Table 4-2.						
HR-84Q-GP01	HR-84Q-GP01-SS-PM0034-REG	0-1				Lead
HR-84Q-GP02	HR-84Q-GP02-SS-PM0035-REG	0-1	HR-84Q-GP02-SS-PM0036-FD			Lead
HR-84Q-GP03	HR-84Q-GP03-SS-PM0037-REG	0-1				Lead
HR-84Q-GP04	HR-84Q-GP04-SS-PM0038-REG	0-1				Lead
HR-84Q-GP05	HR-84Q-GP05-SS-PM0039-REG	0-1				Lead
HR-84Q-GP06	HR-84Q-GP06-SS-PM0040-REG	0-1				Full Suite
HR-84Q-GP07	HR-84Q-GP07-SS-PM0041-REG	0-1			HR-84Q-GP07-SS-PM0041-MS/MSD	TAL Metals
	HR-84Q-GP07-DS-PM0042-REG	2-4				TAL Metals
HR-84Q-GP08	HR-84Q-GP08-SS-PM0043-REG	0-1				Lead
	HR-84Q-GP08-DS-PM0044-REG	2-4				Lead
HR-84Q-GP09	HR-84Q-GP09-SS-PM0045-REG	0-1				Full Suite
HR-84Q-GP10	HR-84Q-GP10-SS-PM0046-REG	0-1				Lead
HR-84Q-GP11	HR-84Q-GP11-SS-PM0047-REG	0-1				Lead
HR-84Q-GP12	HR-84Q-GP12-SS-PM0048-REG	0-1				Lead
HR-84Q-GP13	HR-84Q-GP13-SS-PM0049-REG	0-1				Lead
HR-84Q-GP14	HR-84Q-GP14-SS-PM0050-REG	0-1				TAL Metals
	HR-84Q-GP14-DS-PM0051-REG	2-4				TAL Metals

Table 4-3

Surface Soil and Subsurface Soil Sample Designations and QA/QC Sample Quantities  
 EE/CA at the Baby Bains Gap Road Ranges  
 Fort McClellan, Calhoun County, Alabama

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Sample Location	Sample Designation	Sample Depth <sup>a</sup> (ft bgs)	QA/QC Samples			Analytical Suite <sup>b</sup>
			Field Duplicates	Field Splits	MS/MSD	
HR-84Q-GP15	HR-84Q-GP15-SS-PM0052-REG	0-1				Full Suite
	HR-84Q-GP15-DS-PM0053-REG	2-4	HR-84Q-GP15-DS-PM0054-FD			Full Suite
HR-84Q-GP16	HR-84Q-GP16-SS-PM0055-REG	0-1				Lead
HR-84Q-GP17	HR-84Q-GP17-SS-PM0056-REG	0-1				Lead
HR-84Q-GP18	HR-84Q-GP18-SS-PM0057-REG	0-1				TAL Metals
HR-84Q-GP19	HR-84Q-GP19-SS-PM0058-REG	0-1				Lead
HR-84Q-GP20	HR-84Q-GP20-SS-PM0059-REG	0-1				Lead
HR-84Q-GP21	HR-84Q-GP21-SS-PM0060-REG	0-1			HR-84Q-GP21-SS-PM0060-MS/MSD	Lead
HR-84Q-GP22	HR-84Q-GP22-SS-PM0061-REG	0-1				Lead
HR-84Q-GP23	HR-84Q-GP23-SS-PM0062-REG	0-1				Lead
HR-84Q-GP24	HR-84Q-GP24-SS-PM0063-REG	0-1				Lead
HR-84Q-GP25	HR-84Q-GP25-SS-PM0064-REG	0-1				Lead
HR-84Q-GP26	HR-84Q-GP26-SS-PM0065-REG	0-1				Lead
HR-84Q-GP27	HR-84Q-GP27-SS-PM0066-REG	0-1				Lead
HR-84Q-GP28	HR-84Q-GP28-SS-PM0067-REG	0-1	HR-84Q-GP28-SS-PM0068-FD			Lead
HR-84Q-GP29	HR-84Q-GP29-SS-PM0069-REG	0-1				Lead
HR-84Q-GP30	HR-84Q-GP30-SS-PM0070-REG	0-1				TAL Metals
HR-84Q-GP31	HR-84Q-GP31-SS-PM0071-REG	0-1				Lead
HR-84Q-GP32	HR-84Q-GP32-SS-PM0072-REG	0-1				Lead
	HR-84Q-GP32-DS-PM0073-REG	2-4				Lead
HR-84Q-GP33	HR-84Q-GP33-SS-PM0074-REG	0-1				Lead
HR-84Q-MW01	HR-84Q-MW01-SS-PM0075-REG	0-1			HR-84Q-MW01-SS-PM0075-MS/MSD	Lead
	HR-84Q-MW01-DS-PM0076-REG	2-4				Lead
HR-84Q-MW02	HR-84Q-MW02-SS-PM0077-REG	0-1				Full Suite
	HR-84Q-MW02-DS-PM0078-REG	2-4				Full Suite
HR-84Q-MW03	HR-84Q-MW03-SS-PM0079-REG	0-1				TAL Metals
	HR-84Q-MW03-DS-PM0080-REG	2-4	HR-84Q-MW03-DS-PM0081-FD			TAL Metals
HR-84Q-MW04	HR-84Q-MW04-SS-PM0082-REG	0-1				Lead
	HR-84Q-MW04-DS-PM0083-REG	2-4				Lead

Table 4-3

Surface Soil and Subsurface Soil Sample Designations and QA/QC Sample Quantities  
 EE/CA at the Baby Bains Gap Road Ranges  
 Fort McClellan, Calhoun County, Alabama

(Page 7 of 7)

Sample Location	Sample Designation	Sample Depth <sup>a</sup> (ft bgs)	QA/QC Samples			Analytical Suite <sup>b</sup>
			Field Duplicates	Field Splits	MS/MSD	
<b>Parcel 223Q Former Range 25 East</b>						
HR-223Q-GP01	HR-223Q-GP01-SS-PN0001-REG	0-1				Full Suite
	HR-223Q-GP01-DS-PN0002-REG	2-4	HR-223Q-GP01-DS-PN0003-FD			Full Suite
HR-223Q-GP02	HR-223Q-GP02-SS-PN0004-REG	0-1				Lead
HR-223Q-GP03	HR-223Q-GP03-SS-PN0005-REG	0-1				Full Suite
	HR-223Q-GP03-DS-PN0006-REG	2-4				Full Suite
HR-223Q-GP04	HR-223Q-GP04-SS-PN0007-REG	0-1				Lead
HR-223Q-GP05	HR-223Q-GP05-SS-PN0008-REG	0-1				Lead
HR-223Q-GP06	HR-223Q-GP06-SS-PN0009-REG	0-1				Full Suite
	HR-223Q-GP06-DS-PN0010-REG	2-4				Full Suite
HR-223Q-GP07	HR-223Q-GP07-SS-PN0011-REG	0-1				Lead
HR-223Q-GP08	HR-223Q-GP08-SS-PN0012-REG	0-1			HR-223Q-GP08-SS-PN0012-MS/MSD	TAL Metals
	HR-223Q-GP08-DS-PN0013-REG	2-4				TAL Metals
HR-223Q-GP09	HR-223Q-GP09-SS-PN0014-REG	0-1	HR-223Q-GP09-SS-PN0015-FD			Lead
HR-223Q-GP10	HR-223Q-GP10-SS-PN0016-REG	0-1				Lead
HR-223Q-GP11	HR-223Q-GP11-SS-PN0017-REG	0-1				Lead
HR-223Q-GP12	HR-223Q-GP12-SS-PN0018-REG	0-1				Lead
	HR-223Q-GP12-DS-PN0019-REG	2-4				Lead
HR-223Q-GP13	HR-223Q-GP13-SS-PN0020-REG	0-1				Lead

<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.

<sup>b</sup> Analytical suite: full suite - target compound list (TCL) volatile organic compounds, TCL semivolatile organic compounds, target analyte list (TAL) metals, chlorinated organophosphorus pesticides, polychlorinated biphenyls, chlorinated herbicides, and nitroaromatic explosive compounds.

FD - Field duplicate.

FS - Field split.

MS/MSD - Matrix spike/matrix spike duplicate.

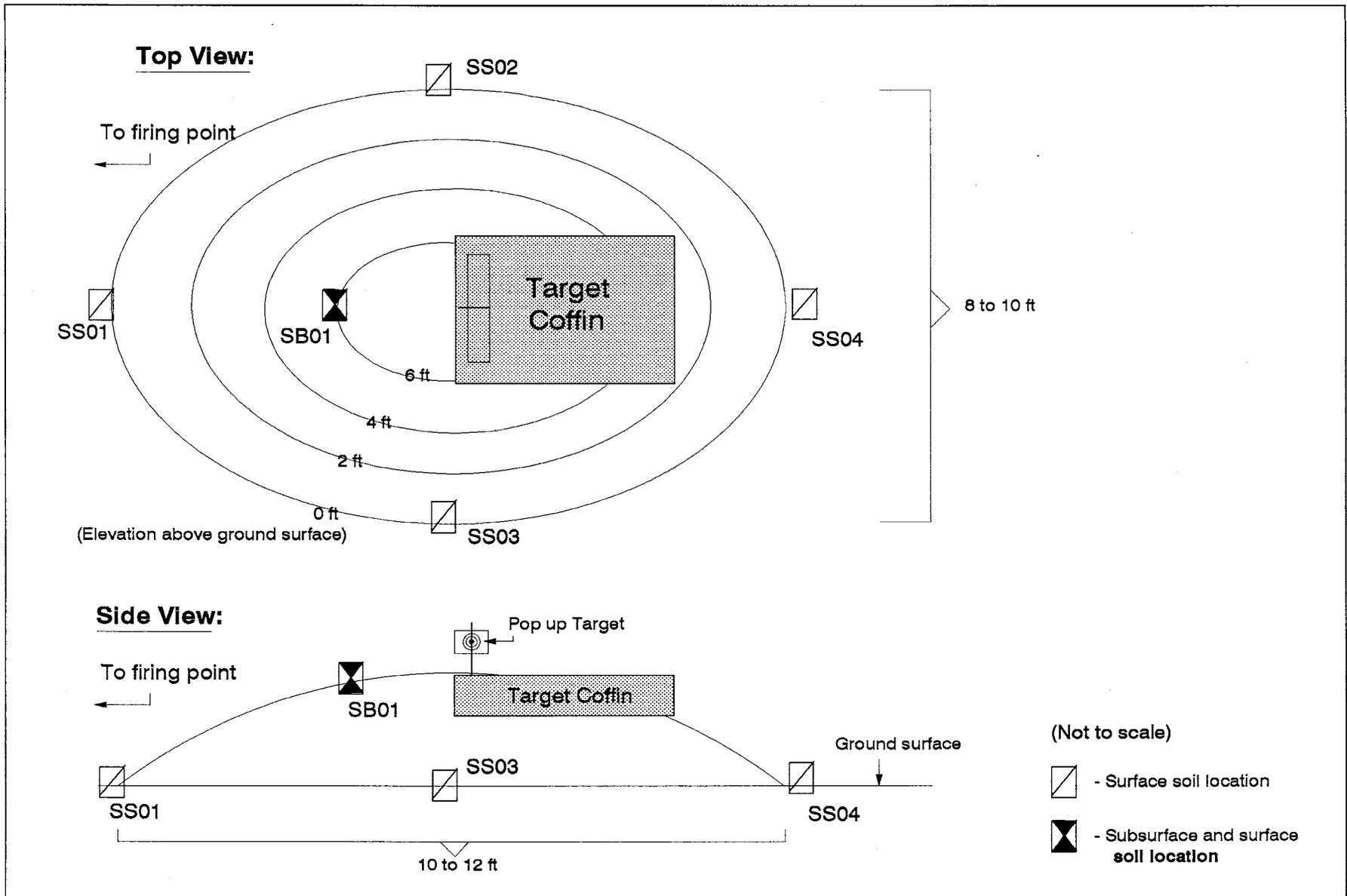
ft bgs - feet below ground surface.

QA/QC - Quality assurance/quality control.

REG - Field sample.

TAL - Target analyte list.

**Figure 4-6**  
**Range 23 Typical Mound Sampling Scheme**  
**EE/CA at the Baby Bains Gap Road Ranges**  
**Fort McClellan, Calhoun County, Alabama**



scheme for Range 23. The final 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 either by direct-push methodology as specified in Section 4.7.1.1 of the SAP (IT, 2000a) or by manual techniques (hand auger, e.g.). Collected soil samples will be screened for volatile organic compound (VOC) contamination using an organic vapor meter with a photoionization detector (PID) and possibly for lead contamination using an XRF instrument in accordance with the SAP. Surface soil samples will be screened for information purposes only, and not to select 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 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 30 borings installed at Range 18, Range 20, Range 23, Range 26 and former Range 25 East. In the target mounds at Range 23 and the pop-up target locations at Range 26, 15 additional subsurface soil samples will be collected.

Subsurface soil samples will also be collected before installing the 12 monitoring wells. A total of 57 subsurface soil samples are planned at the BBGR ranges. Subsurface soil samples will be collected from depths greater than 1 foot bgs in the unsaturated zone.

##### **4.2.2.1 Sample Locations and Rationales**

Subsurface soil samples will be collected from the soil borings proposed on Figure 4-1 through Figure 4-5. The subsurface soil sampling rationales are listed in Table 4-1. Subsurface soil samples and QA/QC to be collected are listed in Table 4-2. Subsurface soil samples and QA/QC associated with the mounds at Range 23 and the pop up target locations at Range 26 are listed on Table 4-3. Figure 4-6 shows the typical mound sampling scheme at Range 23. 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**

Two types of borings will be performed in association with the BBGR EE/CA investigation, typical vertical borings and horizontal borings. Vertical borings will be performed in topographically flat areas such as firing lines and target lines and will be advanced by direct push

(specified in Section 4.7.1.1 of the SAP) or manual techniques such as hand auger. In sloped areas such as forward-facing hillside impact zones and in bermed soil, horizontal borings will be performed to characterize the depth of bullet penetration (and subsequent lead contamination). These horizontal borings will be manually advanced using a slam bar and driven tube sampling system. At soil boring locations planned in this SFSP, a surface soil sample will be collected from the initial 0- to 1-foot bgs interval using direct push or manual sampling techniques. Subsurface soil samples will be collected from soil borings at a depth greater than 1 foot bgs in the unsaturated zone, typically 2 to 4 or 4 to 6 feet bgs.

For vertical soil borings, samples will be collected continuously for the first 12 feet or until either groundwater or refusal is reached. The on-site geologist will prepare a detailed lithological log 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 the SAP to measure samples exhibiting elevated readings exceeding background. Ambient air is considered to be representative of background. Typically, the subsurface soil sample showing the highest reading (above background) will be selected and sent to the laboratory for analysis. If none of the samples indicate readings exceeding background using the PID, the deepest interval from the soil boring will be sampled and submitted to the laboratory for analysis (typically 2 to 4 or 4 to 6 feet bgs). 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 additional sample data would provide insight to the existence of any PSSCs.

Horizontal borings will be advanced using a driven tube sampler in 0.5-foot increments. Samples will be collected continuously until refusal is reached, typically 4 to 6 feet bgs. The sampling personnel will inspect each 6-inch sampled interval by visually checking the soil for bullet fragments and recording their observations on the sample collection log. The deepest sampled interval that contains bullet fragments will be collected for laboratory analysis. If no intervals contain bullet fragments, then the deepest interval before refusal will be collected for laboratory analysis. More than one sampled interval may be selected for analysis if the additional intervals will provide data that will help characterize the location.

Sample documentation and COC will be recorded as specified in Section 4.13 of the SAP. Sample containers, sample volumes, preservatives, and holding times for the analyses required in

this SFSP are listed in Section 5.0, Table 5-1 of the QAP. The samples will be analyzed for the parameters listed in Section 4.5 of this SFSP.

#### **4.2.3 Monitoring Well Locations and Installation**

Nine permanent residuum monitoring wells and three permanent bedrock wells are planned for the study areas of Range 18, Range 23, and Range 26 and are shown on Figure 4-1, Figure 4-3, and Figure 4-4, respectively. The rationales for the monitoring well locations are presented in Table 4-1. Final locations will be determined in the field by the onsite geologist, based on actual field observations and utility and UXO clearance results.

**Residuum Monitoring Wells.** The residuum 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 or all-terrain-vehicle-mounted hollow-stem auger drill rig. 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. The well will be installed so the well screen intersects the water table.

Soil samples for laboratory analysis will be collected at surface and subsurface depths at residuum monitoring well locations before drilling. The surface soil will be collected from the 0- to 1-foot bgs interval using direct push or manual techniques. The subsurface soil sample will be collected using a direct push rig in an interval typically between 2 to 4 or 4 to 6 feet bgs.

Samples for lithology will be collected continuously to 12 feet bgs and at 5-foot intervals thereafter during hollow-stem auger drilling. Lithologic samples will be collected and described to provide a detailed lithological log. These 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 (ASTM) Method D 2488 using the Unified Soil Classification System. The soil samples will be screened in the field for VOC contamination using a PID. These samples will not be collected for chemical analysis. The monitoring wells will be drilled, installed, and developed as specified in Section 4.8 and Appendix C of the SAP (IT, 2000a). Groundwater samples will not be collected from residuum wells for a period of at least 14 days after well development.

**Bedrock Monitoring Wells.** The bedrock monitoring wells will be drilled using a combination of hollow-stem auger wireline coring and air rotary drilling techniques. It is estimated that the bedrock monitoring wells will be installed to an approximate depth of 100 feet bgs; however, actual depths may vary, based on ground elevation and lithology observed from the borehole.

Soil samples for laboratory analysis will be collected at surface and subsurface depths at bedrock monitoring well locations before drilling. The surface soil will be collected from the 0- to 1-foot bgs interval using direct push or manual techniques. The subsurface soil sample will be collected using a direct push rig in an interval typically between 2 to 4 or 4 to 6 feet bgs.

Boreholes will be first advanced using hollow-stem auger drilling and split spoon sampling. Subsurface soil samples will be collected using hollow-stem auger drilling equipment and a 2-inch diameter split spoon sampler (in accordance with ASTM Method D 1586) as specified in Section 4.7.1.2 of the SAP.

Soil samples for lithology will be collected starting at 5 feet bgs, and at 5-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 ASTM Method D 2488 using the Unified Soil Classification System. The soil samples will be screened in the field for the presence of VOC contamination using a PID. These soil samples will not be collected for chemical analysis.

Upon reaching auger refusal, continuous bedrock coring will be performed in accordance with ASTM Method D 2113, Standard Practice for Diamond Core Drilling for Site Investigation (1993). Bedrock coring will be performed with a PQ size wireline, triple-tube core barrel with a 10-foot longitudinally split inner tube to collect core samples continuously from split spoon refusal to 5 feet below auger refusal.

Bedrock cores will be described to provide a detailed lithologic log in accordance with methods outlined in the USACE, South Atlantic Division, Manual DM 1110-1-1 (July, 1983). Structural features such as folding, fracturing, and brecciation (which may indicate the presence of faulting) will be noted.

After auger refusal, an air rotary rig with a 12-inch percussion bit or rotary bit will be used to ream the borehole from ground surface to the depth of auger refusal. Nominal 8-inch ID, carbon steel, International Pipe Standard outer casing will then be installed into the borehole from ground surface to the bottom of the borehole. A minimum 2-inch annular space between the outer casing and the borehole wall will be required. The 8-inch carbon steel outer casing will be grouted in-place using a tremie pipe suspended in the annulus outside of the outer casing. Bentonite-cement grout will be mixed using approximately 6.5 to 7 gallons of water, and 5 pounds of bentonite per 94-pound bag of Type I Portland cement. After the grout has cured a minimum of 48 hours, a PQ wireline core barrel will be used to collect continuous bedrock core and to advance the borehole to the target depth. The depth into competent bedrock will be increased if groundwater is not encountered. After completion of core sample collection, a 7-7/8-inch air percussion bit will be used to ream the hole from the bottom of the surface casing to the borehole target depth. The compressor on the drill rig will be equipped with an air filter between the compressor and the drill bit.

At the completion of each boring, four-inch diameter monitoring wells will be installed inside the outer casing at each proposed bedrock well location. The well casing will consist of new, 4-inch ID, Schedule 80, threaded, flush-joint, 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 feet long. At the discretion of the IT Site Manager, an approximately 3- to 5-foot long sump, composed of new, 4-inch ID, Schedule 80, threaded, flush-joint PVC pipe 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. The filter pack will be tremied into place from the bottom of the sump to approximately 5 feet above the top of the screen. The filter pack will consist of 20/40 silica sand. A fine sand seal (30/65 silica sand), approximately 5 feet thick, will be placed above the filter pack. A bentonite seal will be placed above the filter pack and will extend from the top of the fine sand seal to approximately 5 feet above the bottom of the outer casing. The remaining annular space will be grouted with a bentonite-cement mixture (described above) and tremied in place with a side discharge tremie from the top of the bentonite seal to ground surface. The monitoring wells will be drilled, installed, and developed as specified in Section 4.8 and Appendix C of the SAP (IT, 2000a). Groundwater samples will not be collected from bedrock wells for a period of at least 14 days after well development.

#### **4.2.4 Groundwater Sampling**

Groundwater samples will be collected from the 12 monitoring wells completed on Range 18, Range 23, and Range 26 as presented in Section 4.2.3.

##### **4.2.4.1 Sample Locations and Rationales**

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

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

Prior to sampling each monitoring well, static water level will be measured to define the groundwater flow in the residuum and bedrock aquifers. Water level measurements will be performed as outlined in Section 4.18 of the SAP (IT, 2000a). Groundwater samples will be collected in accordance with the procedures outlined in Section 4.9.1.4 of the SAP.

Sample documentation and COC will be recorded as specified in Section 4.13 of the SAP. Sample containers, sample volumes, preservatives, and holding times for the analyses required in this SFSP are listed in Section 5.0, Table 5-1 of the QAP (IT, 2000a). The samples will be analyzed for the parameters listed in Section 4.5 of this SFSP.

#### **4.2.5 Depositional Soil, Surface Water, and Sediment Sampling**

The surface water bodies present at the BBGR ranges consist mostly of intermittent streams and surface drainage features; therefore, depositional soil samples are planned. If surface water is present at a location during sampling, a surface water and sediment sample will be collected instead of the depositional soil. As shown on Figure 4-1 through 4-5, 26 depositional soil samples are proposed on Range 18, Range 20, Range 23, Range 26, and Former Range 25 East. One surface water/sediment sample (near South Branch) is proposed at Range 18 (Figure 4-1).

##### **4.2.5.1 Sample Locations and Rationales**

The depositional soil, surface water, and sediment sampling rationales are listed in Table 4-1. The depositional soil samples will be collected from the proposed locations shown on Figure 4-1 through Figure 4-5. The surface water/sediment sample location is shown on Figure 4-1. The sample designations and QA/QC sample requirements are listed in Table 4-5. The exact sampling locations and type will be determined in the field by the ecological sampler, based on drainage pathways and actual field observations.

Table 4-4

**Groundwater Sample Designations and QA/QC Sample Quantities  
EE/CA at the Baby Bains Gap Road Ranges  
Fort McClellan, Calhoun County, Alabama**

Sample Location	Sample Designation	Sample Matrix <sup>a</sup>	QA/QC Samples			Analytical Suite <sup>b</sup>
			Field Duplicates	Field Splits	MS/MSD	
<b>Parcel 74Q Range 18</b>						
HR-74Q-MW01	HR-74Q-MW01-GW-PJ3001-REG	Shallow GW				TAL Metals and Nitroexplosives
HR-74Q-MW02	HR-74Q-MW02-GW-PJ3002-REG	Shallow GW			HR-74Q-MW02-GW-PJ3002-MS/MSD	TAL Metals and Nitroexplosives
HR-74Q-MW03	HR-74Q-MW03-GW-PJ3003-REG	Shallow GW	HR-74Q-MW03-GW-PJ3004-FD			Full Suite
HR-74Q-MW04	HR-74Q-MW04-GW-PJ3005-REG	Deep GW				TAL Metals and Nitroexplosives
<b>Parcel 79Q Range 23</b>						
HR-79Q-MW01	HR-79Q-MW01-GW-PL3001-REG	Shallow GW	HR-79Q-MW01-GW-PL3002-FD			Full Suite
HR-79Q-MW02	HR-79Q-MW02-GW-PL3003-REG	Shallow GW				TAL Metals and Nitroexplosives
HR-79Q-MW03	HR-79Q-MW03-GW-PL3004-REG	Deep GW			HR-79Q-MW03-GW-PL3004-MS/MSD	TAL Metals and Nitroexplosives
HR-79Q-MW04	HR-79Q-MW04-GW-PL3005-REG	Shallow GW				TAL Metals and Nitroexplosives
<b>Parcel 84Q Range 26</b>						
HR-84Q-MW01	HR-84Q-MW01-GW-PM3001-REG	Shallow GW				TAL Metals and Nitroexplosives
HR-84Q-MW02	HR-84Q-MW02-GW-PM3002-REG	Shallow GW	HR-84Q-MW02-GW-PM3003-FD			Full Suite
HR-84Q-MW03	HR-84Q-MW03-GW-PM3004-REG	Deep GW				TAL Metals and Nitroexplosives
HR-84Q-MW04	HR-84Q-MW04-GW-PM3005-REG	Shallow GW			HR-84Q-MW04-GW-PM3005-MS/MSD	TAL Metals and Nitroexplosives

<sup>a</sup> Groundwater samples will be collected from the approximate midpoint of the saturated screened interval of the monitoring well. Shallow GW - well is installed in the residuum aquifer. Deep GW - well installed in the bedrock aquifer.

<sup>b</sup> Analytical suite: full suite - target compound list (TCL) volatile organic compounds, TCL semivolatile organic compounds, target analyte list (TAL) metals, chlorinated pesticides, organophosphorus pesticides, polychlorinated biphenyls, chlorinated herbicides, and nitroaromatic explosive compounds. TAL metals and nitroexplosives - target analyte list metals and nitroaromatic explosive compounds only.

QA/QC - Quality Assurance/Quality Control.

REG - Field sample.

FD - Field duplicate.

TAL - Target analyte list.

MS/MSD - Matrix spike/matrix spike duplicate.

Table 4-5

**Depositional Soil, Surface Water, and Sediment<sup>a</sup> Sample Designations and QA/QC Sample Quantities  
EE/CA at the Baby Bains Gap Road Ranges  
Fort McClellan, Calhoun County, Alabama**

(Page 1 of 2)

Sample Location	Sample Designation	Sample Matrix	Sample Depth (ft)	QA/QC Samples			Analytical Suite <sup>b</sup>
				Field Duplicates	Field Splits	MS/MSD	
<b>Parcel 74Q Range 18</b>							
HR-74Q-SW/SD01	HR-74Q-SW/SD01-SW-PJ2001-REG	Surface water	c				Full Suite
	HR-224Q-SW/SD01-SD-PJ1001-REG	Sediment	0-0.5				
HR-74Q-DEP01	HR-74Q-DEP01-DEP-PJ0073-REG	Dep Soil	0-0.5				Full Suite
HR-74Q-DEP02	HR-74Q-DEP02-DEP-PJ0074-REG	Dep Soil	0-0.5	HR-74Q-DEP-DEP-PJ0075-FD			Lead
HR-74Q-DEP03	HR-74Q-DEP03-DEP-PJ0076-REG	Dep Soil	0-0.5				Full Suite
HR-74Q-DEP04	HR-74Q-DEP04-DEP-PJ0077-REG	Dep Soil	0-0.5			HR-74Q-DEP04-DEP-PJ0077-MS/MSD	Full Suite
HR-74Q-DEP05	HR-74Q-DEP05-DEP-PJ0078-REG	Dep Soil	0-0.5				Lead
<b>Parcel 76Q Range 20</b>							
HR-76Q-DEP01	HR-76Q-DEP01-DEP-PK0018-REG	Dep Soil	0-0.5				Full Suite
HR-76Q-DEP02	HR-76Q-DEP02-DEP-PK0019-REG	Dep Soil	0-0.5				Lead
HR-76Q-DEP03	HR-76Q-DEP03-DEP-PK0020-REG	Dep Soil	0-0.5				Lead
HR-76Q-DEP04	HR-76Q-DEP04-DEP-PK0021-REG	Dep Soil	0-0.5	HR-76Q-DEP04-DEP-PK0022-FD			Full Suite
HR-76Q-DEP05	HR-76Q-DEP05-DEP-PK0023-REG	Dep Soil	0-0.5				Full Suite
<b>Parcel 79Q Range 23</b>							
HR-79Q-DEP01	HR-79Q-DEP01-DEP-PL0119-REG	Dep Soil	0-0.5				Full Suite
HR-79Q-DEP02	HR-79Q-DEP02-DEP-PL0120-REG	Dep Soil	0-0.5				Full Suite
HR-79Q-DEP03	HR-79Q-DEP03-DEP-PL0121-REG	Dep Soil	0-0.5	HR-79Q-DEP03-DEP-PL0122-FD			Full suite
HR-79Q-DEP04	HR-79Q-DEP04-DEP-PL0123-REG	Dep Soil	0-0.5				Full suite
HR-79Q-DEP05	HR-79Q-DEP05-DEP-PL0124-REG	Dep Soil	0-0.5				Full suite
HR-79Q-DEP06	HR-79Q-DEP06-DEP-PL0125-REG	Dep Soil	0-0.5				Lead
HR-79Q-DEP07	HR-79Q-DEP07-DEP-PL0126-REG	Dep Soil	0-0.5			HR-79Q-DEP07-DEP-PL0126-MS/MSD	Full suite
HR-79Q-DEP08	HR-79Q-DEP08-DEP-PL0127-REG	Dep Soil	0-0.5				Lead
HR-79Q-DEP09	HR-79Q-DEP09-DEP-PL0128-REG	Dep Soil	0-0.5				Lead

Table 4-5

**Depositional Soil, Surface Water, and Sediment<sup>a</sup> Sample Designations and QA/QC Sample Quantities  
EE/CA at the Baby Bains Gap Road Ranges  
Fort McClellan, Calhoun County, Alabama**

(Page 2 of 2)

Sample Location	Sample Designation	Sample Matrix	Sample Depth (ft)	QA/QC Samples			Analytical Suite <sup>b</sup>
				Field Duplicates	Field Splits	MS/MSD	
<b>Parcel 84Q Range 26</b>							
HR-84Q-DEP01	HR-84Q-DEP01-DEP-PM0084-REG	Dep Soil	0-0.5				Full Suite
HR-84Q-DEP02	HR-84Q-DEP02-DEP-PM0085-REG	Dep Soil	0-0.5	HR-84Q-DEP02-DEP-PM0086-FD			Full Suite
HR-84Q-DEP03	HR-84Q-DEP03-DEP-PM0087-REG	Dep Soil	0-0.5				Full Suite
HR-84Q-DEP04	HR-84Q-DEP04-DEP-PM0088-REG	Dep Soil	0-0.5			HR-84Q-DEP04-DEP-PM0088-MS/MSD	Full Suite
HR-84Q-DEP05	HR-84Q-DEP05-DEP-PM0089-REG	Dep Soil	0-0.5				Lead
<b>Parcel 223Q Former Range 25 East</b>							
HR-223Q-DEP01	HR-223Q-DEP01-DEP-PN0021-REG	Dep Soil	0-0.5			HR-223Q-DEP01-DEP-PN0021-MS/MSD	Full Suite
HR-223Q-DEP02	HR-223Q-DEP02-DEP-PN0022-REG	Dep Soil	0-0.5	HR-223Q-DEP02-DEP-PN0023-FD			Full Suite

<sup>a</sup> These are preplanned samples only. If surface water is present at a location, then surface water and sediment samples will be collected instead of a depositional soil sample.

<sup>b</sup> Analytical suite: full suite - target compound list (TCL) volatile organic compounds, TCL semivolatile organic compounds, target analyte list (TAL) metals, chlorinated pesticides, organophosphorus pesticides, polychlorinated biphenyls, chlorinated herbicides, and nitroaromatic explosive compounds. Total organic carbon (TOC) and grain size will be performed on sediment samples.

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

FD - Field duplicate.

FS - Field split.

MS/MSD - Matrix spike/matrix spike duplicate.

Dep Soil - depositional soil.

REG - Field sample.

TAL - Target analyte list.

#### **4.2.5.2 Sample Collection**

The depositional soil, surface water, and sediment samples will be collected in accordance with the procedures specified in the SAP (IT, 2000a). Sample documentation and COC will be recorded as specified in Section 4.13 of the SAP. Sample containers, sample volumes, preservatives, and holding times for the analyses required in this SFSP are listed in Section 5.0, Table 5-1, of the QAP. The samples will be analyzed for the parameters listed in Section 4.5 of this SFSP.

#### **4.2.6 Soil Sampling for XRF Analysis**

To perform the Range 18 safety fan survey, the Range 20 infiltration area survey, and the Former Range 25 East potential impact zone survey, metals analysis will be completed onsite using an energy-dispersive, portable XRF instrument. Site soils will be prepared and analyzed with as little preparation as possible. Although the XRF instrument will measure and record a number of metals present in the sample, lead has been selected as the primary indicator of soil contamination from range use.

XRF measurements will involve exposing the sample to a series of x-rays generated by radioactive sources stored within the instrument. Qualitative and quantitative data are generated by measuring the wavelength and frequency of the fluorescence of metallic elements present in the sample. The fluorescence is a function of the x-ray strength and length of exposure during analysis. The instrument's detector captures the fluorescence wavelength and frequency and the signal data interpreted using the onboard data processor. The analyst manually records the concentration and standard deviation (in units of milligrams per kilogram) that are reported via the XRF liquid crystal display screen. The manufacturer's directions for instrument calibration, operation, and maintenance shall be followed explicitly. Select samples will be measured in duplicate to assess analytical precision.

The following sections describe the general sampling and analytical approach used for range surface soil locations. If the XRF is used to screen other sample types (soil boring, e.g.), this procedure will be modified to meet the needs of the application.

**Sample Collection.** At the designated sampling location, the technician will prepare the surface by removing any leaves, roots, or rocks using hand trowel and/or gardening tool. Soil from immediately below the root layer (1 to 3 inches below the surface) will be transferred into a small aluminum pan using a decontaminated steel trowel. The aluminum pan will be labeled with the sample location information (written in indelible ink on the side of the pan).

**Sample Preparation, and XRF Measurement.** Before any sample analysis, the XRF analyst will perform the initial daily calibration check. Once this check is complete, analysis can begin on prepared soil samples. Sample preparation will consist of:

- A visual assessment to ensure the soil is not wet. XRF will be typically performed in dry periods with no rain; however, if the location is wet, the sample will be dried, preferably in an oven, prior to analysis.
- Small rocks, vegetative material, and any extraneous material (including bullet fragments) in the sample pan will be removed by the analyst
- The sample will be thoroughly mixed in the pan using a steel scoop or spoon to homogenize the soil sample as much as possible
- The XRF instrument test guard shield (to protect the XRF from the soil) will be centered on a representative location within the pan and the instrument placed over the guard and the analysis initiated.
- If the sample is wet or contains soil that is difficult to homogenize, it may be further prepared in a onsite laboratory by oven drying (120 degrees Celsius for 4 hours), crushing with a porcelain pestle and sieving (through a standard #10, 2-millimeter pore size sieve). If additional sample preparation is performed, it will be documented on the XRF laboratory sample results form.

To screen the sample for lead, the instrument's cadmium-109 source will be used. The analyst will monitor the source exposure duration (instrument "count time"). Generally, 120 seconds of exposure will yield an instrument detection limit of 20 to 30 parts per million for lead; however, this may be adjusted in the field by the XRF analyst to meet the objectives of the task. When the measurement count time is complete, the analyst will stop the analysis and record the results manually on the XRF laboratory sample results form. The XRF instrument data logger will also record the analysis result in its internal memory for later review.

Remaining soil will be stored in archive. Three sample locations (of the 25 planned locations in the Range 18 safety fan survey) have been selected for confirmation analysis off site.

**Quality Assurance.** For the XRF calibration, the analyst will complete the internal instrument calibration specified by the instrument manufacturer. This internal calibration consists of an instrument energy check, clock check, and other automated checks. Following a successful internal calibration, the analyst will next perform measurements on a blank matrix

(silica sand) and on standard reference materials (SRM) purchased from the National Institute of Standards and Technology such as SRM 2586 that has certified concentration of 432 mg/kg lead and SRM 2711 that has a certified lead concentration of 1,162 mg/kg. Successful calibration of the instrument will be based on a non-detected value for lead on the blank matrix sample while achieving a relative percent difference of less than 25 percent for the measured concentrations of the SRMs compared to their certified values for lead. Calibrations will be performed at the beginning and end of each day's analysis. Continuing calibration checks consisting of internal calibrations will be performed during instrument usage (generally at mid-day or at least after every 4 hours of XRF usage).

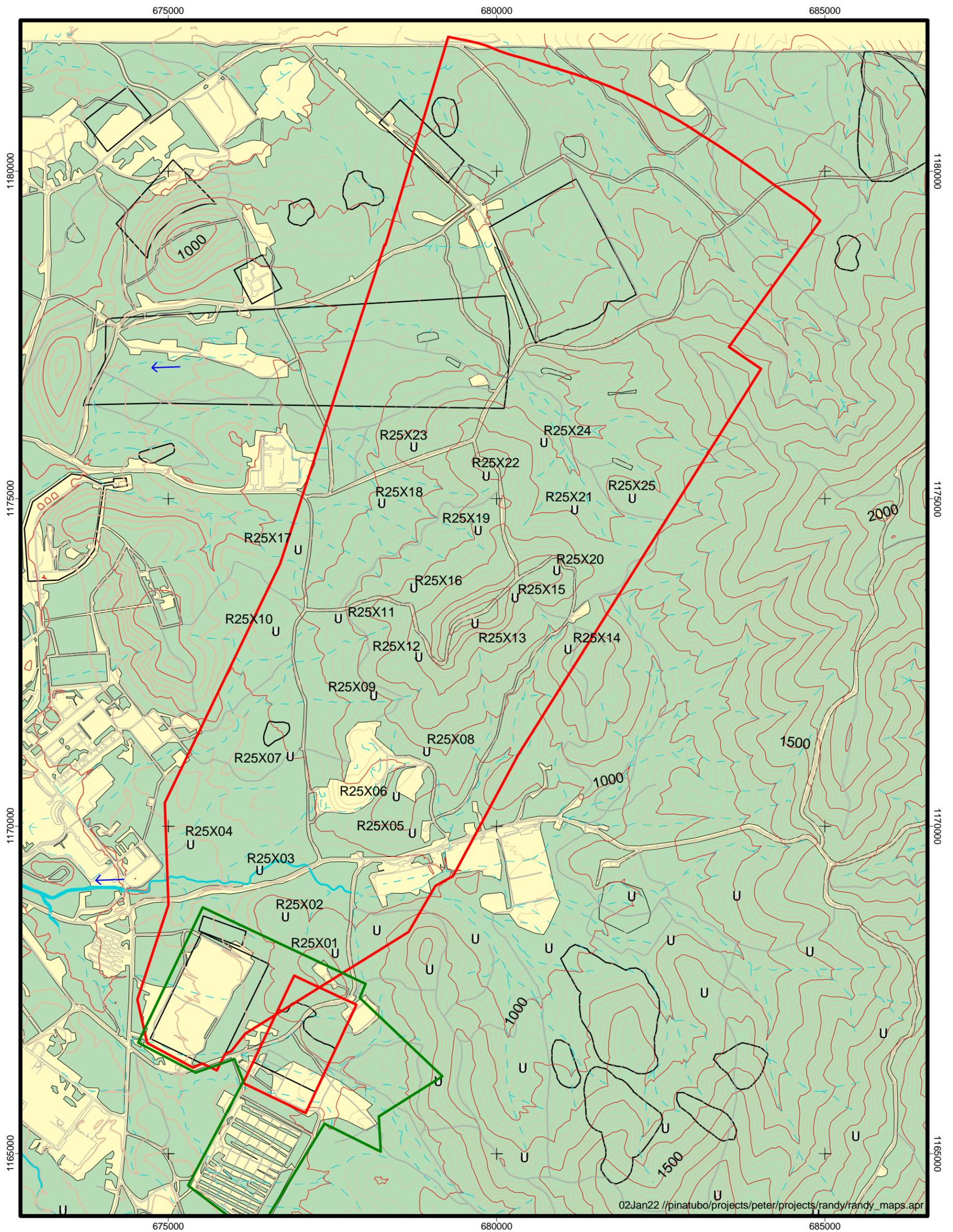
In addition to the accuracy checks of the calibration, the XRF instrument will be used to periodically measure the same location in duplicate to assess analytical precision. This check will be performed once for every 20 field measurements (a 5 percent frequency) at the discretion of the XRF analyst.

#### ***4.2.6.1 Sample Locations and Rationales***

The areas of the BBGR ranges where XRF analysis is proposed include the infiltration training area of Range 20, the possible hillside impact zone for former Range 25 East, and the safety fan of Range 25. Figure 4-2, Figure 4-5, and Figure 4-7 show these locations respectively. Table 4-6 summarizes the Range 25 safety fan sample locations and their geographical coordinates. These areas have been selected for XRF analysis because lead contamination is possible in these areas; however, additional site characterization is necessary before samples for laboratory analysis are collected.

The XRF surveys conducted in the Range 20 and Former Range 25 East will be conducted in connection with visual surveys to determine if impact zones exist in these areas. As such, the number and type of sample locations for XRF analysis are subjective and will be conducted at the discretion of the XRF analyst based on actual field conditions documented during the visual survey. The 25 XRF locations in the Range 25 safety fan (Figure 4-7, Table 4-6) have been preselected based on direction of fire, distance to the Range 25 main study area, and the area topography. Table 4-7 summarizes the Range 25 safety fan confirmation sample designations.

In addition to these planned locations and areas, the XRF may be used on other BBGR to supplement the visual surveys conducted to further define the impact zone(s) and select samples for laboratory analysis. For the XRF, the established FTMC lead background concentrations will be used to guide the selection of samples for laboratory analysis:



**Figure 4-7**

**Planned XRF Locations  
in the Range 25  
Safety Fan, Parcel 83Q**

N	Planned XRF Location	—	Roads		Study Area
U	Former XRF Location	←	Flow Direction		Safety Fan
	25' Contour		Creeks		Impact Area
	100' Contour		Intermittent/ Surface Drainage		Woods



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



**Table 4-6**

**Geographical Coordinates for XRF Sample  
Locations in Range 25 Safety Fan  
EE/CA for the Baby Bains Gap Road Ranges  
Fort McClellan, Calhoun County, Alabama**

Location	X-Coordinate	Y-Coordinate
R25X01	677541.0500	1168050.6056
R25X02	676782.8016	1168613.1771
R25X03	676391.4476	1169322.5063
R25X04	675339.6836	1169713.8603
R25X05	678715.1122	1169885.0777
R25X06	678470.5159	1170447.6491
R25X07	676856.1805	1171059.1398
R25X08	678935.2488	1171132.5187
R25X09	678128.0811	1171988.6056
R25X10	676636.0438	1172966.9907
R25X11	677589.9693	1173162.6678
R25X12	678812.9507	1172575.6367
R25X13	679669.0376	1173089.2889
R25X14	681087.6960	1172697.9348
R25X15	680280.5283	1173480.6429
R25X16	678739.5718	1173627.4007
R25X17	676978.4786	1174214.4317
R25X18	678250.3792	1174923.7609
R25X19	679717.9569	1174507.9473
R25X20	680916.4786	1173896.4566
R25X21	681185.5345	1174825.9224
R25X22	679840.2550	1175339.5746
R25X23	678739.5718	1175779.8479
R25X24	680720.8016	1175853.2268
R25X25	682066.0811	1174997.1398

Table 4-7

XRF Confirmation Sample Designations  
 EE/CA at the Baby Bains Gap Road Ranges  
 Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Designation	Sample Matrix	Sample Depth (ft)	QA/QC Samples			Analytical Suite
				Field Duplicates	Field Splits	MS/MSD	
<b>Parcel 83Q Range 25 Safety Fan</b>							
HR-83Q-R25X01	R-83Q-R25X01-SS-NN0096-RE	Soil	0-0.5				Lead
HR-83Q-R25X10	R-83Q-R25X10-SS-NN0097-RE	Soil	0-0.5				Lead
HR-83Q-R25X25	R-83Q-R25X25-SS-NN0098-RE	Soil	0-0.5				Lead

REG - Field sample.

- Surface Soil: 40.1 mg/kg, max. range of background values - 83 mg/kg
- Subsurface Soil: 38.5 mg/kg, max. range of background values - 500 mg/kg.

#### **4.2.6.2 Sample Collection**

The XRF locations will be sampled and analyzed as specified in Section 4.2.7 of this SFSP. The concentration of lead will be recorded in each analyzed sample as an indicator of contamination from firing activities. XRF data will not be used to perform in risk assessment; however, the results of XRF and visual surveys will be used to determine when and where additional laboratory samples may be needed.

#### **4.3 Decontamination Requirements**

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

#### **4.4 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, 1983. Elevations will be referenced to the North American Vertical Datum of 1988.

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

#### **4.5 Analytical Program**

Samples collected at locations specified in this chapter of this SFSP will be analyzed for the specific suites of chemicals and elements based on the history of site usage, as well as EPA, ADEM, FTMC, and USACE requirements. In addition to offsite analysis performed by a fixed base laboratory, select samples will also be analyzed onsite using XRF technology. Target fixed

base laboratory analyses for samples collected from Parcels 74Q, 76Q-X, 79Q, 83Q, 84Q-X, 118Q-X, and 223Q, consist of the following list of analytical suites:

- Target compound list VOCs - Method 8260B
- Target compound list (SVOC) - Method 8270C
- Target analyte list metals - Method 6010B/7000
- Chlorinated pesticide compounds - Method 8081A
- Organophosphorous pesticide compounds - Method 8141A
- Chlorinated herbicide compounds - Method 8151A
- PCBs - Method 8082
- Nitroaromatic and nitramine explosive compounds - Method 8330
- Lead - Method 6010B.

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

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

The samples will be analyzed using EPA SW-846 methods, including Update III Methods where applicable, as presented in Table 4-5 in this SFSP and Table 6-1 in the QAP. Data will be reported and evaluated in accordance with Chapter 2 of the USACE *Engineering Manual 200-1-6* (USACE, 1997) and the stipulated requirements for the generation of definitive data (Section 3.1.2 of the QAP). Chemical data will be reported via hard-copy data packages by the laboratory using Contract Laboratory Program-like forms and electronic copies. These packages will be validated in accordance with EPA National Functional Guidelines by Level III criteria.

XRF analysis will be performed in the field using standard operating procedures and the results will be documented and reported using standard reporting forms. Ten percent of the samples analyzed using XRF will be sent for definitive analysis at the fixed-based laboratory for confirmation (Table 4-7).

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

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

Attn: 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 as described in Appendix D of the SAP (IT, 2000a). The IDW generated at Parcels 74Q, 76Q-X, 79Q, 83Q, 84Q-X, 118Q-X, and 223Q, are expected to include solid waste (soil from drilling and sampling activities); groundwater from well installation, development, and purging; decontamination fluids; and disposable personal protective equipment. The IDW will be staged in the fenced area surrounding Buildings 335 and 336 while awaiting final disposal.

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

Health and safety requirements for this investigation are provided in the SSHP attachment for Parcels 74Q, 76Q-X, 79Q, 83Q, 84Q-X, 118Q-X, and 223Q. The SSHP attachment will be used in conjunction with the installation-wide SHP.

## **5.0 Project Schedule**

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The project schedule for the investigation activities at the BBGR ranges 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

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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.

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U.S. Army Corps of Engineers (USACE), 1999b, *Statement of Work for Task Order CK11, Small Arms Ranges Remediation at Fort McClellan, Alabama*, September.

U.S. Army Corps of Engineers (USACE), 1997, *Chemical Quality Assurance for HTRW Projects*, Engineer Manual EM 200-1-6, October 10.

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

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

**ATTACHMENT 1**

**LIST OF ABBREVIATIONS AND ACRONYMS**

## List of Abbreviations and Acronyms

2,4-D	2,4-dichlorophenoxyacetic acid	BOD	biological oxygen demand	CWA	chemical warfare agent
2,4,5-T	2,4,5-trichlorophenoxyacetic acid	BRAC	Base Realignment and Closure	CWM	chemical warfare material; clear, wide mouth
2,4,5-TP	silvex	Braun	Braun Intertec Corporation	CX	dichloroformoxime
3D	3D International Environmental Group	BSC	background screening criterion	'D'	duplicate; dilution
AbD3	Anniston and Allen gravelly clay loams, 10 to 15 percent slopes, eroded	BTAG	Biological Technical Assistance Group	DAF	dilution-attenuation factor
Abs	skin absorption	BTEX	benzene, toluene, ethyl benzene, and xylenes	DANC	decontamination agent, non-corrosive
AC	hydrogen cyanide	BTOC	below top of casing	°C	degrees Celsius
AcB2	Anniston and Allen gravelly loams, 2 to 6 percent slopes, eroded	BTV	background threshold value	°F	degrees Fahrenheit
AcC2	Anniston and Allen gravelly loams, 6 to 10 percent slopes, eroded	BW	biological warfare	DCE	dichloroethene
AcD2	Anniston and Allen gravelly loams, 10 to 15 percent slopes, eroded	BZ	breathing zone; 3-quinuclidinyl benzilate	DDD	dichlorodiphenyldichloroethane
AcE2	Anniston and Allen gravelly loams, 15 to 25 percent slopes, eroded	C	ceiling limit value	DDE	dichlorodiphenyldichloroethene
ACGIH	American Conference of Governmental Industrial Hygienists	Ca	carcinogen	DDT	dichlorodiphenyltrichloroethane
ADEM	Alabama Department of Environmental Management	CAB	chemical warfare agent breakdown products	DEH	Directorate of Engineering and Housing
ADPH	Alabama Department of Public Health	CAMU	corrective action management unit	DEP	depositional soil
AEC	U.S. Army Environmental Center	CCAL	continuing calibration	DI	deionized
AEL	airborne exposure limit	CCB	continuing calibration blank	DID	data item description
AET	adverse effect threshold	CD	compact disc	DIMP	di-isopropylmethylphosphonate
AHA	ammunition holding area	CDTF	Chemical Defense Training Facility	DMBA	dimethylbenz(a)anthracene
AL	Alabama	CEHNC	U.S. Army Engineering and Support Center, Huntsville	DMMP	dimethylmethylphosphonate
ALAD	-aminolevulinic acid dehydratase	CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act	DOD	U.S. Department of Defense
amb.	Amber	CERFA	Community Environmental Response Facilitation Act	DOJ	U.S. Department of Justice
amsl	above mean sea level	CESAS	Corps of Engineers South Atlantic Savannah	DOT	U.S. Department of Transportation
ANAD	Anniston Army Depot	CG	carbonyl chloride (phosgene)	DP	direct-push
AOC	area of concern	CFC	chlorofluorocarbon	DPDO	Defense Property Disposal Office
APT	armor-piercing tracer	CFDP	Center for Domestic Preparedness	DPT	direct-push technology
ARAR	applicable or relevant and appropriate requirement	ch	inorganic clays of high plasticity	DQO	data quality objective
AREE	area requiring environmental evaluation	CHPPM	U.S. Army Center for Health Promotion and Preventive Medicine	DRMO	Defense Reutilization and Marketing Office
ASP	Ammunition Supply Point	CK	cyanogen chloride	DRO	diesel range organics
ASR	Archives Search Report	cl	inorganic clays of low to medium plasticity	DS	deep (subsurface) soil
AST	aboveground storage tank	Cl.	chlorinated	DS2	Decontamination Solution Number 2
ASTM	American Society for Testing and Materials	CLP	Contract Laboratory Program	DWEL	drinking water equivalent level
ATSDR	Agency for Toxic Substances and Disease Registry	CN	chloroacetophenone	E&E	Ecology and Environment, Inc.
ATV	all-terrain vehicle	CNB	chloroacetophenone, benzene, and carbon tetrachloride	EBS	environmental baseline survey
AWARE	Associated Water and Air Resources Engineers, Inc.	CNS	chloroacetophenone, chloropicrin, and chloroform	EC <sub>50</sub>	effects concentration for 50 percent of a population
AWWSB	Anniston Water Works and Sewer Board	Co-60	cobalt-60	ECBC	Edgewood Chemical/Biological Command
'B'	Analyte detected in laboratory or field blank at concentration greater than the reporting limit (and greater than zero)	CoA	Code of Alabama	EDQL	ecological data quality level
BCF	blank correction factor	COC	chain of custody; contaminant of concern	EE/CA	engineering evaluation and cost analysis
BCT	BRAC Cleanup Team	COE	Corps of Engineers	Elev.	elevation
BERA	baseline ecological risk assessment	Con	skin or eye contact	EM	electromagnetic
BEHP	bis(2-ethylhexyl)phthalate	COPC	chemical(s) of potential concern	EMI	Environmental Management Inc.
BFB	bromofluorobenzene	COPEC	chemical(s) of potential environmental concern	EM31	Geonics Limited EM31 Terrain Conductivity Meter
BFE	base flood elevation	CQCSM	Contract Quality Control System Manager	EM61	Geonics Limited EM61 High-Resolution Metal Detector
BG	Bacillus globigii	CRL	certified reporting limit	EOD	explosive ordnance disposal
bgs	below ground surface	CRZ	contamination reduction zone	EODT	explosive ordnance disposal team
BHC	betahexachlorocyclohexane	Cs-137	cesium-137	EPA	U.S. Environmental Protection Agency
bkg	background	CS	ortho-chlorobenzylidene-malononitrile	EPC	exposure point concentration
bls	below land surface	CSEM	conceptual site exposure model	EPIC	Environmental Photographic Interpretation Center
		ctr.	container	ER	equipment rinsate

## List of Abbreviations and Acronyms (Continued)

ER-L	effects range-low	GPS	global positioning system	ITEMS	IT Environmental Management System™
ER-M	effects range-medium	GS	ground scar	'J'	estimated concentration
ESE	Environmental Science and Engineering, Inc.	GSA	General Services Administration; Geologic Survey of Alabama	JeB2	Jefferson gravelly fine sandy loam, 2 to 6 percent slopes, eroded
ESN	Environmental Services Network, Inc.	GSBP	Ground Scar Boiler Plant	JeC2	Jefferson gravelly fine sandy loam, 6 to 10 percent slopes, eroded
ESV	ecological screening value	GSSI	Geophysical Survey Systems, Inc.	JfB	Jefferson stony fine sandy loam, 0 to 10 percent slopes have strong slopes
Exp.	explosives	GST	ground stain	JPA	Joint Powers Authority
E-W	east to west	GW	groundwater	K	conductivity
EZ	exclusion zone	gw	well-graded gravels; gravel-sand mixtures	K <sub>ow</sub>	octonal-water partition coefficient
FAR	Federal Acquisition Regulations	HA	hand auger	L	lewisite; liter
FB	field blank	HCl	hydrochloric acid	LC <sub>50</sub>	lethal concentration for 50 percent of population tested
FD	field duplicate	HD	distilled mustard	LD <sub>50</sub>	lethal dose for 50 percent of population tested
FDA	U.S. Food and Drug Administration	HDPE	high-density polyethylene	l	liter
FedEx	Federal Express, Inc.	HEAST	Health Effects Assessment Summary Tables	LBP	lead-based paint
FEMA	Federal Emergency Management Agency	Herb.	herbicides	LCS	laboratory control sample
FFE	field flame expedient	HHRA	human health risk assessment	LC <sub>50</sub>	lethal concentration for 50 percent population tested
Fil	filtered	HI	hazard index	LD <sub>50</sub>	lethal dose for 50 percent population tested
Flt	filtered	HNO <sub>3</sub>	nitric acid	LEL	lower explosive limit
FMDC	Fort McClellan Development Commission	HQ	hazard quotient	LOAEL	lowest-observed-adverse-effects-level
FML	flexible membrane liner	HQ <sub>screen</sub>	screening-level hazard quotient	LT	less than the certified reporting limit
FMP 1300	Former Motor Pool 1300	hr	hour	LUC	land-use control
FOMRA	Former Ordnance Motor Repair Area	H&S	health and safety	LUCAP	land-use control assurance plan
Foster Wheeler	Foster Wheeler Environmental Corporation	HSA	hollow-stem auger	LUCIP	land-use control implementation plan
Frtn	fraction	HTRW	hazardous, toxic, and radioactive waste	max	maximum
FS	field split; feasibility study	'I'	out of control, data rejected due to low recovery	MCL	maximum contaminant level
FSP	field sampling plan	ICAL	initial calibration	MCPA	4-chloro-2-methylphenoxyacetic acid
ft	feet	ICB	initial calibration blank	MDC	maximum detected concentration
ft/ft	feet per foot	ICP	inductively-coupled plasma	MDCC	maximum detected constituent concentration
FTA	Fire Training Area	ICRP	International Commission on Radiological Protection	MDL	method detection limit
FTMC	Fort McClellan	ICS	interference check sample	mg	milligrams
FTRRA	FTMC Reuse & Redevelopment Authority	ID	inside diameter	mg/kg	milligrams per kilogram
g	gram	IDL	instrument detection limit	mg/kg/day	milligram per kilogram per day
g/m <sup>3</sup>	gram per cubic meter	IDLH	immediately dangerous to life or health	mg/kgbw/day	milligrams per kilogram of body weight per day
G-856	Geometrics, Inc. G-856 magnetometer	IDM	investigative-derived media	mg/L	milligrams per liter
G-858G	Geometrics, Inc. G-858G magnetic gradiometer	IDW	investigation-derived waste	mg/m <sup>3</sup>	milligrams per cubic meter
gal	gallon	IEUBK	Integrated Exposure Uptake Biokinetic	mh	inorganic silts, micaceous or diatomaceous fine, sandy or silt soils
gal/min	gallons per minute	ILCR	incremental lifetime cancer risk	MHz	megahertz
GB	sarin	IMPA	isopropylmethyl phosphonic acid	µg/g	micrograms per gram
gc	clay gravels; gravel-sand-clay mixtures	IMR	Iron Mountain Road	µg/kg	micrograms per kilogram
GC	gas chromatograph	in.	inch	µg/L	micrograms per liter
GCL	geosynthetic clay liner	Ing	ingestion	µmhos/cm	micromhos per centimeter
GC/MS	gas chromatograph/mass spectrometer	Inh	inhalation	min	minimum
GCR	geosynthetic clay liner	IP	ionization potential	MINICAMS	miniature continuous air monitoring system
GFAA	graphite furnace atomic absorption	IPS	International Pipe Standard	ml	inorganic silts and very fine sands
GIS	Geographic Information System	IRDMIS	Installation Restoration Data Management Information System	mL	milliliter
gm	silty gravels; gravel-sand-silt mixtures	IRIS	Integrated Risk Information Service	mm	millimeter
gp	poorly graded gravels; gravel-sand mixtures	IRP	Installation Restoration Program	MM	mounded material
gpm	gallons per minute	ISCP	Installation Spill Contingency Plan	MMBtu/hr	million Btu per hour
GPR	ground-penetrating radar	IT	IT Corporation	MOGAS	motor vehicle gasoline

## List of Abbreviations and Acronyms (Continued)

MPA	methyl phosphonic acid	oh	organic clays of medium to high plasticity	RCRA	Resource Conservation and Recovery Act
MPM	most probable munition	ol	organic silts and organic silty clays of low plasticity	RD	remedial design
MR	molasses residue	OP	organophosphorus	RDX	cyclonite
MS	matrix spike	ORP	oxidation-reduction potential	RfD	reference dose
mS/cm	millisiemens per centimeter	OSHA	Occupational Safety and Health Administration	ReB3	Rarden silty clay loams
MSD	matrix spike duplicate	OSWER	Office of Solid Waste and Emergency Response	REG	regular field sample
MTBE	methyl tertiary butyl ether	OWS	oil/water separator	REL	recommended exposure limit
msl	mean sea level	oz	ounce	RFA	request for analysis
MtD3	Montevallo shaly, silty clay loam, 10 to 40 percent slopes , severely eroded	PA	preliminary assessment	RGO	remedial goal option
mV	millivolts	PAH	polynuclear aromatic hydrocarbon	RI	remedial investigation
MW	monitoring well	Parsons	Parsons Engineering Science, Inc.	RL	reporting limit
Na	sodium	Pb	lead	RPD	relative percent difference
NA	not applicable; not available	PCB	polychlorinated biphenyl	RRF	relative response factor
NAD	North American Datum	PCE	perchloroethene	RSD	relative standard deviation
NAD83	North American Datum of 1983	PCP	pentachlorophenol	RTECS	Registry of Toxic Effects of Chemical Substances
NAVD88	North American Vertical Datum of 1988	PDS	Personnel Decontamination Station	RTK	real-time kinematic
NAS	National Academy of Sciences	PEL	permissible exposure limit	SAD	South Atlantic Division
NCP	National Contingency Plan	PES	potential explosive site	SAE	Society of Automotive Engineers
ND	not detected	Pest.	pesticides	SAIC	Science Applications International Corporation
NE	no evidence; northeast	PETN	pentarey thritol tetranitrate	SAP	installation-wide sampling and analysis plan
ne	not evaluated	PFT	portable flamethrower	sc	clayey sands; sand-clay mixtures
NEW	net explosive weight	PG	professional geologist	Sch.	Schedule
NFA	No Further Action	PID	photoionization detector	SCM	site conceptual model
ng/L	nanograms per liter	PkA	Philo and Stendal soils local alluvium, 0 to 2 percent slopes	SD	sediment
NGVD	National Geodetic Vertical Datum	POL	petroleum, oils, and lubricants	SDG	sample delivery group
Ni	nickel	POW	prisoner of war	SDZ	safe distance zone; surface danger zone
NIC	notice of intended change	PP	peristaltic pump	SEMS	Southern Environmental Management & Specialties, Inc.
NIOSH	National Institute for Occupational Safety and Health	ppb	parts per billion	SFSP	site-specific field sampling plan
NLM	National Library of Medicine	PPE	personal protective equipment	SGF	standard grade fuels
NPDES	National Pollutant Discharge Elimination System	ppm	parts per million	SHP	installation-wide safety and health plan
NPW	net present worth	PPMP	Print Plant Motor Pool	SI	site investigation
No.	number	ppt	parts per thousand	SL	standing liquid
NOAA	National Oceanic and Atmospheric Administration	PR	potential risk	SLERA	screening-level ecological risk assessment
NOAEL	no-observed-adverse-effects-level	PRG	preliminary remediation goal	sm	silty sands; sand-silt mixtures
NR	not requested; not recorded; no risk	PSSC	potential site-specific chemical	SM	Serratia marcescens
NRC	National Research Council	pt	peat or other highly organic silts	SOP	standard operating procedure
NRCC	National Research Council of Canada	PVC	polyvinyl chloride	sp	poorly graded sands; gravelly sands
ns	nanosecond	QA	quality assurance	SP	submersible pump
N-S	north to south	QA/QC	quality assurance/quality control	SQRT	screening quick reference tables
NS	not surveyed	QAP	installation-wide quality assurance plan	Sr-90	strontium-90
nT	nanotesla	QC	quality control	SRA	streamlined human health risk assessment
NTU	nephelometric turbidity unit	QST	QST Environmental, Inc.	Ss	stony rough land, sandstone series
nv	not validated	qty	quantity	SS	surface soil
O&G	oil and grease	Qual	qualifier	SSC	site-specific chemical
O&M	operation and maintenance	'R'	rejected data; resample	SSHO	site safety and health officer
OB/OD	open burning/open detonation	R&A	relevant and appropriate	SSHP	site-specific safety and health plan
OD	outside diameter	RAO	removal action objective	SSL	soil screening level
OE	ordnance and explosives	RBC	risk-based concentration	SSSL	site-specific screening level

## List of Abbreviations and Acronyms (Continued)

SSSSL	site-specific soil screening level
STB	supertropical bleach
STC	source term concentration
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 <i>Test Methods for Evaluating Solid Waste: Physical/Chemical Methods</i>
SWPP	storm water pollution prevention plan
SZ	support zone
TAL	target analyte list
TAT	turn around time
TB	trip blank
TBC	to be considered
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
TSDF	treatment, storage, and disposal facility
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
USC	United States Code
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
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)
Weston	Roy F. Weston, Inc.
WP	installation-wide work plan
WS	watershed
WSA	Watershed Screening Assessment
WWI	World War I
WWII	World War II
XRF	x-ray fluorescence
yd <sup>3</sup>	cubic yards

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)

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