STARTING DATE: 12/11/02 | DATE LAST REV.: | DRAFT. CHCK. BY: | INITIATOR: J. RAGSDALE | DWG. NO.: ...\796887es.639
DRAWN BY: D. BOMAR | DRAWN BY: | ENGR. CHCK. BY: S. MORAN | PROJ. MGR.: J. YACOUB | PROJ. NO.: 796887

E 673,400

E 675,400

N 1,176,400

N 1,174,900

PARCEL 149Q

PARCEL 230Q-X

FIRING LINE

WOODS

UNITED ROAD

FLOW

PPMP-230-SW/SD03
PPMP-230-GP03
PPMP-230-SEP03
PPMP-230-DEP03
PPMP-230-GP07
CWM-185-MW02
CWM-185-MW01
PPMP-230-SW/SD02
PPMP-230-GP02
PPMP-230-SEP02
HR-230Q-GP04
HR-230Q-GP05
PPMP-230-DEP02
CWM-185-DEP01
FA-230-SB01
HR-230Q-GP06
HR-230Q-GP03
HR-230Q-MW03
HR-230Q-MW03(SS)
PPMP-230-GP05
HR-230Q-MW01
HR-230Q-GP07
HR-230Q-SW/SD01
HR-230Q-MW02(SS)
HR-230Q-GP09
HR-230Q-GP10
HR-230Q-GP01
HR-230Q-MW02
PPMP-230-SEP01
CWM-185-DEP02
PPMP-230-GP04
PPMP-230-DEP01
HR-230Q-GP02
HR-230Q-SW/SD02
HR-230Q-GP08
PPMP-230-GP01
PPMP-230-SW/SD01
FA-230-SB02

N400 N300 N200 N100 0 S100 S200 S300
W400 W300 W200 W100 0 E100 E200 E300 E400 E500 E600

4410 4417 4411 4427

825 850 875 900 925

LEGEND:

- UNIMPROVED ROADS AND PARKING
- PAVED ROADS AND PARKING
- BUILDING
- TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 25 FOOT)
- TREES / TREELINE
- AREA OF INVESTIGATION WITH EXTENDED AREA
- FIRING LINES
- SURFACE DRAINAGE / CREEK
- MANMADE SURFACE DRAINAGE FEATURE
- FENCE
- UTILITY POLE
- BERM
- EXISTING SURFACE WATER/SEDIMENT SAMPLE LOCATION
- EXISTING SUBSURFACE SOIL SAMPLE LOCATION
- EXISTING SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION
- EXISTING GROUNDWATER SAMPLE LOCATION
- EXISTING GROUNDWATER, SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION
- EXISTING DEPOSITIONAL SOIL SAMPLE LOCATION
- EXISTING SEEP WATER SAMPLE LOCATION
- XRF SAMPLE LOCATION GRID (100 ft x 100 ft) LOCATION OF HR-230Q-MW02 EQUALS GRID NODE LOCATION 0,0. XRF SURFACE SOIL SAMPLE WILL BE COLLECTED AT EACH GRID NODE.

NOTE:

1. GRID NODES ARE LABELED BY DISTANCE AND DIRECTION FROM CENTER POINT OF GRID (e.g., N100, W100) AND WILL BE LOCATED BY ACTUAL COORDINATES OF THE U.S. STATE PLANE COORDINATE SYSTEM, ALABAMA EAST ZONE, NORTH AMERICAN DATUM OF 1983.

SCALE
0 150 300 FEET

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FIGURE4-1
XRF SAMPLE LOCATION MAP
FORMER 37mm ANTITANK RANGE
PARCEL 230Q-X
FORMER RIFLE RANGE
PARCEL 149Q

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

IT CORPORATION
A Member of The IT Group

STARTING DATE: 12/11/02 | DATE LAST REV.: | DRAFT. CHCK. BY: | INITIATOR: J. RAGSDALE | DWG. NO:: ..\796887es.640
DRAWN BY: D. BOMAR | DRAWN BY: | ENGR. CHCK. BY:S. MORAN | PROJ. MGR.:J. YACOUB | PROJ. NO.:796887

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E 673,400
E 675,400
N 1,176,400
N 1,174,900

PARCEL 149Q
PARCEL 230Q-X
FIRING LINE
WOODS
UNITED ROAD
IMPACT AREA AS-DEFINED BY EBS
FLOW

HR-230Q-SW/SD04
HR-230Q-SW/SD05
HR-230Q-SW/SD06
HR-230Q-SW/SD07
HR-230Q-SW/SD08
HR-230Q-SW/SD09
HR-230Q-SW/SD10
HR-230Q-SW/SD03
HR-230Q-MW01
HR-230Q-MW02
HR-230Q-MW02(SS)
HR-230Q-MW03
HR-230Q-MW03(SS)
HR-230Q-MW04
HR-230Q-MW05
HR-230Q-GP06
HR-230Q-GP07
HR-230Q-GP08
HR-230Q-GP11
HR-230Q-GP12
HR-230Q-GP13
HR-230Q-GP14

4410
4417
4411
4427

LEGEND:

- UNIMPROVED ROADS AND PARKING
- PAVED ROADS AND PARKING
- BUILDING
- TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 25 FOOT)
- TREES / TREELINE
- EXTENDED AREA OF INVESTIGATION
- FIRING LINES
- SURFACE DRAINAGE / CREEK
- MANMADE SURFACE DRAINAGE FEATURE
- FENCE
- UTILITY POLE
- BERM
- EXISTING RESIDUUM MONITORING WELL TO BE SAMPLED
- EXISTING SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION
- EXISTING GROUNDWATER, SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION
- PROPOSED SURFACE WATER/SEDIMENT SAMPLE LOCATION
- PROPOSED SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION
- PROPOSED MONITORING WELL / GROUNDWATER, SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION

PHYSICAL FEATURES OBSERVED

1. 5-GALLON PLASTIC LID
2. 35-GALLON DRUM
3. SHALLOW PITS
4. DEPRESSION
5. STEEL POLE WITH 3 PULLEYS
6. REMNANTS OF PLATFORM
7. 5-GALLON SMOKE POTS - FROM FILL AREA
8. TRENCH
9. POP-UP TARGET AREA

NOTE:

1. APPROXIMATELY 14 ADDITIONAL SOIL BORINGS AND 3 ADDITIONAL MONITORING WELLS (NOT SHOWN) WILL BE INSTALLED BASED ON XRF SOIL SCREENING RESULTS.

SCALE
0 150 300 FEET

FIGURE4-2
PROPOSED SAMPLE LOCATION MAP
FORMER 37mm ANTITANK RANGE
PARCEL 230Q-X
FORMER RIFLE RANGE
PARCEL 149Q

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

IT CORPORATION
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Five residuum monitoring wells are proposed at Parcels 230Q-X and 149Q to be installed to approximate depth of 30 feet. Two of the five monitoring well locations have been previously selected and are shown on Figure 4-2. The remaining three proposed residuum monitoring well locations will be determined based on XRF surface soil screening results.

Eight groundwater samples will be collected from the monitoring wells in the vicinity of Parcels 230Q-X and 149Q. Groundwater samples will be collected from the five proposed and three pre-existing monitoring wells. Groundwater sample data will provide information on flow direction and water quality in the residuum saturated zone.

Eight surface water and eight sediment samples will be collected from intermittent stream locations at Parcels 230Q-X and 149Q as shown on Figure 4-2.

The following sections describe the field activities required to conduct the remedial investigations at Parcels 230Q-X and 149Q.

4.1 UXO Survey Requirements and Utility Clearances

Because an impact area is located within the study area and the surrounding parcels have been used as impact areas, the potential exists for UXO at the Former 37mm Antitank Range and the Former Rifle Range. Therefore, UXO surface sweeps and downhole surveys of soil borings will be required to support field activities at this site. The surface sweeps and downhole surveys will be conducted to identify anomalies for the purpose of UXO avoidance. The site-specific UXO safety plan attachment addresses the manner in which the avoidance will be conducted. IT will conduct UXO avoidance activities as outlined in Appendix E of the SAP (IT, 2002a) and the attached site-specific UXO safety plan.

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. UXO personnel requirements, procedures, and detailed descriptions of the geophysical equipment to be used are provided in Chapter 4.0 and Appendix E of the SAP (IT, 2002a).

4.1.2 Downhole UXO Survey

During the soil boring and downhole sampling activities, a downhole UXO survey will be performed to determine if buried metallic objects are present. UXO monitoring as described in Appendix E of the SAP (IT, 2002a) will continue until undisturbed 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 all locations where soil and groundwater samples will be collected, using the procedure outlined in Section 4.2 of the SAP (IT, 2002a). The site manager will mark the proposed locations with stakes, coordinate with the appropriate utility companies to clear the proposed locations for utilities, and obtain digging permits. Once the locations are approved (for both UXO and utility avoidance) for intrusive sampling, the stakes will be labeled as cleared.

4.2 X-Ray Fluorescence Surface Soil Screening

XRF surface soil screening will be carried out in situ at approximately 80 locations within the area of investigation of the Parcel 230Q-X and Parcel 149Q, shown on Figure 4-1. The purpose of the XRF surface soil screening will be to analyze the surface soils in the area of sample locations HR-230Q-GP06, -GP07, -GP08, -MW02(SS), and -MW03(SS) to define the horizontal extent of the presence of lead. The 100- foot grid shown in Figure 4-1 presents the proposed XRF surface soil sample locations surrounding sample locations. Samples will be collected at the grid line intersections or "grid nodes." Surface soil samples will be screened by XRF starting at the grid nodes closest to sample locations and moving outward to subsequent grid nodes. Table 4-1 presents the coordinates for each grid node where surface soil will be collected for XRF screening. The limits of the grid were determined by reviewing the laboratory results of samples collected during the previous SI by IT that is presented in Chapter 2.0 of this SFSP. XRF surface soil screening results will be compared to the ESV for lead (50 mg/kg) to determine the actual limits of the grid boundaries. The XRF grid may be expanded if surface soil results at grid nodes along the perimeter of the grid indicate high levels of lead. After the initial XRF screening of surface soil at each grid node has been completed, additional sample locations between grid nodes may be selected for XRF screening to further define the extent of lead contamination. Results from the XRF surface soil screening will be used to aid in placing soil boring locations and surface soil sample locations and may be used to adjust the sample locations shown on Figure 4-2 and presented in Table 4-2.

Table 4-1

XRF Grid Node Coordinates
Former 37mm Antitank Range, Parcel 230Q-X and Former Rifle Range, Parcel 149Q
Fort McClellan, Calhoun County, Alabama

Grid Node	Northing	Easting
0, 0	1175805.26	674560.32
N100, 0	1175905.26	674560.32
N200, 0	1176005.26	674560.32
N300, 0	1176105.26	674560.32
N400, 0	1176205.26	674560.32
S100, 0	1175705.26	674560.32
S200, 0	1175605.26	674560.32
S300, 0	1175505.26	674560.32
0, E100	1175805.26	674660.32
N100, E100	1175905.26	674660.32
N200, E100	1176005.26	674660.32
N300, E100	1176105.26	674660.32
N400, E100	1176205.26	674660.32
S100, E100	1175705.26	674660.32
S200, E100	1175605.26	674660.32
S300, E100	1175505.26	674660.32
0, W100	1175805.26	674460.32
N100, W100	1175905.26	674460.32
N200, W100	1176005.26	674460.32
N300, W100	1176105.26	674460.32
N400, W100	1176205.26	674460.32
S100, W100	1175705.26	674460.32
S200, W100	1175605.26	674460.32
S300, W100	1175505.26	674460.32
0, E200	1175805.26	674760.32
N100, E200	1175905.26	674760.32
N200, E200	1176005.26	674760.32
N300, E200	1176105.26	674760.32
N400, E200	1176205.26	674760.32
S100, E200	1175705.26	674760.32
S200, E200	1175605.26	674760.32
S300, E200	1175505.26	674760.32
0, W200	1175805.26	674360.32
N100, W200	1175905.26	674360.32
N200, W200	1176005.26	674360.32
N300, W200	1176105.26	674360.32
N400, W200	1176205.26	674360.32
S100, W200	1175705.26	674360.32
S200, W200	1175605.26	674360.32
S300, W200	1175505.26	674360.32
0, E300	1175805.26	674860.32
N100, E300	1175905.26	674860.32
N200, E300	1176005.26	674860.32
N300, E300	1176105.26	674860.32
N400, E300	1176205.26	674860.32
S100, E300	1175705.26	674860.32

Table 4-1

XRF Grid Node Coordinates
Former 37mm Antitank Range, Parcel 230Q-X and Former Rifle Range, Parcel 149Q
Fort McClellan, Calhoun County, Alabama

Grid Node	Northing	Easting
S200, E300	1175605.26	674860.32
S300, E300	1175505.26	674860.32
0, W300	1175805.26	674260.32
N100, W300	1175905.26	674260.32
N200, W300	1176005.26	674260.32
N300, W300	1176105.26	674260.32
N400, W300	1176205.26	674260.32
S100, W300	1175705.26	674260.32
S200, W300	1175605.26	674260.32
S300, W300	1175505.26	674260.32
0, E400	1175805.26	674960.32
N100, E400	1175905.26	674960.32
N200, E400	1176005.26	674960.32
N300, E400	1176105.26	674960.32
N400, E400	1176205.26	674960.32
S100, E400	1175705.26	674960.32
S200, E400	1175605.26	674960.32
S300, E400	1175505.26	674960.32
0, W400	1175805.26	674160.32
N100, W400	1175905.26	674160.32
N200, W400	1176005.26	674160.32
N300, W400	1176105.26	674160.32
N400, W400	1176205.26	674160.32
S100, W400	1175705.26	674160.32
S200, W400	1175605.26	674160.32
S300, W400	1175505.26	674160.32
0, E500	1175805.26	675060.32
N100, E500	1175905.26	675060.32
N200, E500	1176005.26	675060.32
N300, E500	1176105.26	675060.32
N400, E500	1176205.26	675060.32
S100, E500	1175705.26	675060.32
S200, E500	1175605.26	675060.32
S300, E500	1175505.26	675060.32
0, E600	1175805.26	675160.32
N100, E600	1175905.26	675160.32
N200, E600	1176005.26	675160.32
N300, E600	1176105.26	675160.32
N400, E600	1176205.26	675160.32
S100, E600	1175705.26	675160.32
S200, E600	1175605.26	675160.32
S300, E600	1175505.26	675160.32

Table 4-2

Sampling Locations and Rationale
Remedial Investigation
Former 37mm Antitank Range, Parcel 230Q-X and Former Rifle Range, Parcel 149Q
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Media	Sample Location Rationale
HR-230Q-MW01	One groundwater	Resample pre-existing permanent residuum monitoring well. Groundwater sample will be collected from existing monitoring well to provide sample data to assist in characterizing the groundwater for potential contamination and to provide sample data to support RI.
HR-230Q-MW02	One groundwater	Resample pre-existing permanent residuum monitoring well. Groundwater sample will be collected from existing monitoring well to provide sample data to assist in characterizing the groundwater for potential contamination and to provide sample data to support RI.
HR-230Q-MW03	One groundwater	Resample pre-existing permanent residuum monitoring well. Groundwater sample will be collected from existing monitoring well to provide sample data to assist in characterizing the groundwater for potential contamination and to provide sample data to support RI.
HR-230Q-MW04	One surface soil, two subsurface soils, and one groundwater	Soil boring location for one surface soil and two subsurface soil samples and permanent residuum monitoring well to an approximate depth of 30 feet bgs for groundwater sample to be located immediately adjacent to location HR-230Q-GP07. Sample data will confirm contaminant results previously found in samples for location HR-230Q-GP07. First subsurface soil sample to be collected 4 to 6 feet below ground subsurface (bgs) to match subsurface depth at location HR-230Q-GP07. Second subsurface soil sample to be collected from the interval between first subsurface soil sample and 12 feet bgs showing the highest concentration determined by XRF screening. The monitoring well location will be used to establish a local groundwater flow direction, site-specific geology and provide information on groundwater quality in the residuum aquifer. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
HR-230Q-MW05	One surface soil, two subsurface soils, and one groundwater	Soil boring location for one surface soil and two subsurface soil samples and permanent residuum monitoring well to an approximate depth of 30 feet bgs for groundwater sample to be located adjacent to location HR-230Q-GP06. Sample data will confirm contaminant results previously found in samples for location HR-230Q-GP06. First subsurface soil sample to be collected 3 to 4 feet below ground subsurface (bgs) to match subsurface depth at HR-230Q-GP06. Second subsurface soil sample to be collected from the interval between first subsurface soil sample and 12 feet bgs showing the highest concentration determined by XRF screening. The monitoring well location will be used to establish a local groundwater flow direction, site-specific geology and provide information on groundwater quality in the residuum aquifer. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
HR-230Q-MW06	One surface soil, two subsurface soils, and one groundwater	Soil boring location to be determined based on XRF surface soil screening results for one surface soil and two subsurface soil samples and permanent residuum monitoring well to an approximate depth of 30 feet bgs for groundwater sample. Two discrete subsurface soil samples will be collected from 1 to 12 feet bgs based on XRF screening showing the highest lead or copper concentrations. The monitoring well location will be used to establish a local groundwater flow direction, site-specific geology and provide information on groundwater quality in the residuum aquifer. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.

Table 4-2

Sampling Locations and Rationale
Remedial Investigation
Former 37mm Antitank Range, Parcel 230Q-X and Former Rifle Range, Parcel 149Q
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Media	Sample Location Rationale
HR-230Q-MW07	One surface soil, two subsurface soils, and one groundwater	Soil boring location to be determined based on XRF surface soil screening results for one surface soil and two subsurface soil samples and permanent residuum monitoring well to an approximate depth of 30 feet bgs for groundwater sample. Two discrete subsurface soil samples will be collected from 1 to 12 feet bgs based on XRF screening showing the highest lead or copper concentrations. The monitoring well location will be used to establish a local groundwater flow direction, site-specific geology and provide information on groundwater quality in the residuum aquifer. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
HR-230Q-MW08	One surface soil, two subsurface soils, and one groundwater	Soil boring location for one surface soil and two subsurface soil samples and permanent residuum monitoring well for groundwater sample to be determined based on XRF surface soil screening results. Two discrete subsurface soil samples will be collected from 1 to 12 feet bgs based on XRF screening showing the highest lead or copper concentrations. The monitoring well location will be used to establish a local groundwater flow direction, site-specific geology and provide information on groundwater quality in the residuum aquifer. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
HR-230Q-GP11	One surface soil and two subsurface soils	Soil boring for one surface soil and two subsurface soil samples to be located adjacent to HR-230Q-MW02(SS). Sample data will indicate if contaminant releases into the environment have occurred from the use of this area and if contaminated media exists at this site. First subsurface soil sample to be collected 3 to 4 feet bgs. Second subsurface soil sample to be collected from the interval between first subsurface soil sample and 12 feet bgs showing the highest concentration determined by XRF screening. The monitoring well location will be used to establish a local groundwater flow direction, site-specific geology and provide information on groundwater quality in the residuum aquifer. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
HR-230Q-GP12	One surface soil and two subsurface soils	Soil boring for one surface soil and two subsurface soil samples to be located adjacent to HR-230Q-MW03(SS). Sample data will indicate if contaminant releases into the environment have occurred from the use of this area and if contaminated media exists at this site. First subsurface soil sample to be collected 3 to 4 feet bgs. Second subsurface soil sample to be collected from the interval between first subsurface soil sample and 12 feet bgs showing the highest concentration determined by XRF screening. The monitoring well location will be used to establish a local groundwater flow direction, site-specific geology and provide information on groundwater quality in the residuum aquifer. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
HR-230Q-GP13	One surface soil and two subsurface soils	Soil boring location for one surface soil and two subsurface soil samples to be located at the southern end of the berm and south of where location HR-230Q-GP08 is located. Sample data will indicate if contaminant releases into the environment have occurred from the use of this area and if contaminated media exists at this site. Two discrete subsurface soil samples will be collected from 1 to 12 feet bgs based on XRF screening showing the highest lead or copper concentrations. The monitoring well location will be used to establish a local groundwater flow direction, site-specific geology and provide information on groundwater quality in the residuum aquifer. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
HR-230Q-GP14	One surface soil and two subsurface soils	Soil boring location for one surface soil and two subsurface soil samples to be located approximately 100 feet southwest of location HR-230Q-MW03(SS) in the end of the berm. Sample data will indicate if contaminant releases into the environment have occurred from the use of this area and if contaminated media exists at this site. Two discrete subsurface soil samples will be collected from 1 to 12 feet bgs based on XRF screening showing the highest lead or copper concentrations. The monitoring well location will be used to establish a local groundwater flow direction, site-specific geology and provide information on groundwater quality in the residuum aquifer. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.

Table 4-2

Sampling Locations and Rationale
Remedial Investigation
Former 37mm Antitank Range, Parcel 230Q-X and Former Rifle Range, Parcel 149Q
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Media	Sample Location Rationale
HR-230Q-GP15	One surface soil and two subsurface soils	Soil boring location for one surface soil and two subsurface soil samples to be determined based on XRF surface soil screening results. Two discrete subsurface soil samples will be collected from 1 to 12 feet bgs based on XRF screening showing the highest lead or copper concentrations. Sample data will be used to determine vertical and horizontal extent of potential contamination at the parcel to support the RI. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
HR-230Q-GP16	One surface soil and two subsurface soils	Soil boring location for one surface soil and two subsurface soil samples to be determined based on XRF surface soil screening results. Two discrete subsurface soil samples will be collected from 1 to 12 feet bgs based on XRF screening showing the highest lead or copper concentrations. Sample data will be used to determine vertical and horizontal extent of potential contamination at the parcel to support the RI. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
HR-230Q-GP17	One surface soil and two subsurface soils	Soil boring location for one surface soil and two subsurface soil samples to be determined based on XRF surface soil screening results. Two discrete subsurface soil samples will be collected from 1 to 12 feet bgs based on XRF screening showing the highest lead or copper concentrations. Sample data will be used to determine vertical and horizontal extent of potential contamination at the parcel to support the RI. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
HR-230Q-GP18	One surface soil and two subsurface soils	Soil boring location for one surface soil and two subsurface soil samples to be determined based on XRF surface soil screening results. Two discrete subsurface soil samples will be collected from 1 to 12 feet bgs based on XRF screening showing the highest lead or copper concentrations. Sample data will be used to determine vertical and horizontal extent of potential contamination at the parcel to support the RI. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
HR-230Q-GP19	One surface soil and two subsurface soils	Soil boring location for one surface soil and two subsurface soil samples to be determined based on XRF surface soil screening results. Two discrete subsurface soil samples will be collected from 1 to 12 feet bgs based on XRF screening showing the highest lead or copper concentrations. Sample data will be used to determine vertical and horizontal extent of potential contamination at the parcel to support the RI. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
HR-230Q-GP20	One surface soil and two subsurface soils	Soil boring location for one surface soil and two subsurface soil samples to be determined based on XRF surface soil screening results. Two discrete subsurface soil samples will be collected from 1 to 12 feet bgs based on XRF screening showing the highest lead or copper concentrations. Sample data will be used to determine vertical and horizontal extent of potential contamination at the parcel to support the RI. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
HR-230Q-GP21	One surface soil and two subsurface soils	Soil boring location for one surface soil and two subsurface soil samples to be determined based on XRF surface soil screening results. Two discrete subsurface soil samples will be collected from 1 to 12 feet bgs based on XRF screening showing the highest lead or copper concentrations. Sample data will be used to determine vertical and horizontal extent of potential contamination at the parcel to support the RI. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
HR-230Q-GP22	One surface soil and two subsurface soils	Soil boring location for one surface soil and two subsurface soil samples to be determined based on XRF surface soil screening results. Two discrete subsurface soil samples will be collected from 1 to 12 feet bgs based on XRF screening showing the highest lead or copper concentrations. Sample data will be used to determine vertical and horizontal extent of potential contamination at the parcel to support the RI. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
HR-230Q-GP23	One surface soil and two subsurface soils	Soil boring location for one surface soil and two subsurface soil samples to be determined based on XRF surface soil screening results. Two discrete subsurface soil samples will be collected from 1 to 12 feet bgs based on XRF screening showing the highest lead or copper concentrations. Sample data will be used to determine vertical and horizontal extent of potential contamination at the parcel to support the RI. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.

Table 4-2

Sampling Locations and Rationale
Remedial Investigation
Former 37mm Antitank Range, Parcel 230Q-X and Former Rifle Range, Parcel 149Q
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Media	Sample Location Rationale
HR-230Q-GP24	One surface soil and two subsurface soils	Soil boring location for one surface soil and two subsurface soil samples to be determined based on XRF surface soil screening results. Two discrete subsurface soil samples will be collected from 1 to 12 feet bgs based on XRF screening showing the highest lead or copper concentrations. Sample data will be used to determine vertical and horizontal extent of potential contamination at the parcel to support the RI. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
HR-230Q-GP25	One surface soil and two subsurface soils	Soil boring location for one surface soil and two subsurface soil samples to be determined based on XRF surface soil screening results. Two discrete subsurface soil samples will be collected from 1 to 12 feet bgs based on XRF screening showing the highest lead or copper concentrations. Sample data will be used to determine vertical and horizontal extent of potential contamination at the parcel to support the RI. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
HR-230Q-SW/SD03	Surface water and sediment	The sample location is in the northern intermittent stream flowing northwest, just outside of the eastern boundary of the area of investigation for Parcel 230Q-X. Sample data will indicate if contaminant releases have occurred from runoff upstream of this area from 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-230Q-SW/SD04	Surface water and sediment	The sample location is in the intermittent stream flowing southwest, just north of the boundary of the area of investigation for Parcel 230Q-X. Sample data will indicate if contaminant releases have occurred from runoff upstream of this area from 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-230Q-SW/SD05	Surface water and sediment	The sample location is in the northern intermittent stream flowing west, in the north central portion of the area of investigation for Parcel 230Q-X. Sample data will indicate if contaminant releases have occurred from runoff in this area from 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-230Q-SW/SD06	Surface water and sediment	The sample location is in the northern intermittent stream flowing west, in the north central portion of the area of investigation for Parcel 230Q-X. Sample data will indicate if contaminant releases have occurred from runoff in this area from 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-230Q-SW/SD07	Surface water and sediment	The sample location is in the northern intermittent stream flowing west, in the north western portion of the area of investigation for Parcel 230Q X. Sample data will indicate if contaminant releases have occurred from runoff in this area from 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-230Q-SW/SD08	Surface water and sediment	The sample location is in the southern intermittent stream flowing west, in the central portion of the area of investigation for Parcel 230Q-X. Sample data will indicate if contaminant releases have occurred from runoff in this area from 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-230Q-SW/SD09	Surface water and sediment	The sample location is in the southern intermittent stream flowing west, in the southwestern portion of the area of investigation for Parcel 230Q X. Sample data will indicate if contaminant releases have occurred from runoff in this area from 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.

Table 4-2

Sampling Locations and Rationale
Remedial Investigation
Former 37mm Antitank Range, Parcel 230Q-X and Former Rifle Range, Parcel 149Q
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Media	Sample Location Rationale
HR-230Q-SW/SD10	Surface water and sediment	The sample location is in the intermittent stream flowing south, in the western portion of the area of investigation for Parcel 230Q-X. Sample data will indicate if contaminant releases have occurred from runoff in this area from 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.

The XRF surface soil screening will be carried out in accordance with the procedures specified in Section 6.9 of the SAP. Sample documentation and chain of custody (COC) will be recorded as specified in Chapter 6.0 of the SAP.

To perform this phase of the investigation, metals analysis will be completed on site using an energy-dispersive portable XRF instrument. Site surface soil areas will be prepared and analyzed in situ according to the methodology specified in this SFSP. Although the XRF instrument will measure and record a number of metals present at the screening location, lead has been selected as the primary indicator element of contamination from range use. XRF surface soil analysis provides screening-level data.

XRF surface soil screening measurements involve exposing the soil 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 the metallic elements present in the soil. The fluorescence is a function of the x-ray strength and length of exposure during analysis. These data are captured and interpreted using an onboard data processor, then reported via the display screen for manual recording in terms of concentration and standard deviation. 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.

Prior to the measurement, the analyst will perform the daily instrument calibration checks. In situ measurements will be conducted by the XRF analyst placing the instrument probe in direct contact with the soil. In situ measurements will be performed on areas where the soil has been prepared. This preparation will include the following steps:

- A visual assessment to ensure the soil is not wet (if the location is wet, an aliquot will be collected and prepared by oven drying in a mobile lab to remove moisture before analysis).
- Removal of rocks, vegetative material, and bullet fragments from the surface using a trowel or spoon.
- Thorough surficial mixing to break up the compacted soil.
- Hand tamping the soil into a small, compacted dome with a level surface for probe interface.

When a compacted, level surface is achieved, the probe is then placed onto the prepared surface and is checked for consistency of contact and the analysis initiated. When the measurement is

complete, the analyst will record the XRF surface soil sample result manually on the XRF surface soil sample collection log. The XRF instrument logger will also record the analytical result associated with the sample location identity in its internal memory. This process will be repeated to gather data for all identified locations.

During XRF calibration, the analyst will perform measurements on a blank matrix (Teflon® or quartz) and on two standard reference materials (SRM) purchased from the National Institute of Standards and Technology. SRM 2586 has a certified concentration of 432 mg/kg of lead, and SRM 2711 has a certified concentration of 1,162 mg/kg of copper. Successful calibration of the instrument will be based on a nondetect value for lead on the blank matrix sample while achieving a relative percent difference of less than 25 percent for the SRM-measured concentrations compared to their certified values for lead and copper. Calibrations will be performed at the beginning and end of each day's analysis.

In addition to the accuracy check of the calibration, the XRF instrument will be used to periodically measure the same location in duplicate to assess analytical precision. The check will be performed once every 20 field measurements at the discretion of the XRF analyst.

XRF QA/QC surface soil samples will be collected and submitted for laboratory analysis by EPA Method 6010B for lead and copper. If the XRF instrument indicates locations with a high concentration of lead and copper, the XRF QA/QC surface soil samples will be collected from these locations. The XRF QA/QC surface soil samples will be collected at a frequency of 10 percent. Therefore, of approximately 80 surface soil sample locations proposed, there will be eight laboratory XRF QA/QC surface soil samples collected. The number of actual XRF QA/QC surface soil samples will be determined on the actual number of surface soil samples screened by XRF. The XRF QA/QC samples, as listed in Table 4-3 of this SFSP, will be analyzed in the laboratory for lead and copper using the method presented in Section 4.6.

The XRF analyst will be responsible for manually recording the results of the instrument calibration and the results of each field measurement using the XRF calibration forms and the XRF surface soil sample collection form.

4.3 Environmental Sampling

The environmental sampling program during the RI for the Former 37mm Antitank Range, Parcel 230Q-X and Former Rifle Range, Parcel 149Q, includes the collection of surface and subsurface soil, groundwater, surface water, and sediment samples for chemical analyses. The proposed sampling is intended to provide sufficient data to complete the RI; however, if

Table 4-3

XRF QA/QC Soil Sample Designations and QA/QC Sample Quantities,
Former 37mm Antitank Range, Parcel 230Q-X, and Former Rifle Range, Parcel 149Q
Fort McClellan, Alabama

Sample Location	Sample Designation	Sample Depth (feet)	QA/QC Samples		Analytical Suite
			Field Duplicates	MS/MSD	
HR-230Q-####	HR-230Q-####-SS-QT$$$$-REG	0-1	HR-230Q-####-SS-QT$$$$-FD		Lead and Copper
HR-230Q-####	HR-230Q-####-SS-QT$$$$-REG	0-1			Lead and Copper
HR-230Q-####	HR-230Q-####-SS-QT$$$$-REG	0-1		HR-230Q-####-SS-QT$$$$-MS/MSD	Lead and Copper
HR-230Q-####	HR-230Q-####-SS-QT$$$$-REG	0-1			Lead and Copper
HR-230Q-####	HR-230Q-####-SS-QT$$$$-REG	0-1			Lead and Copper
HR-230Q-####	HR-230Q-####-SS-QT$$$$-REG	0-1			Lead and Copper
HR-230Q-####	HR-230Q-####-SS-QT$$$$-REG	0-1			Lead and Copper
HR-230Q-####	HR-230Q-####-SS-QT$$$$-REG	0-1			Lead and Copper

- Unigue location identifier
$$$$ - Unigue sample number
FD - Field duplicate.
MS/MSD - Matrix spike/matrix spike duplicate.
QA/QC - Quality assurance/quality control.
REG - Field sample.

additional contaminants are detected, additional phases of groundwater monitoring well installation and sampling may be required.

4.3.1 Surface Soil Sampling

Twenty surface soil samples will be collected at the 20 soil boring locations proposed at the Former 37mm Antitank Range, Parcel 230Q-X and Former Rifle Range, Parcel 149Q.

4.3.1.1 Sample Locations and Rationale

The sampling rationale for each surface soil sample is listed in Table 4-2. Six of the 20 soil boring locations where surface soil samples will be collected have been selected and are shown on Figure 4-2. The remaining 14 soil boring locations, where surface soil samples will be collected, will be determined based on results from XRF surface soil screening for lead. Surface soil sample designations and QA/QC sample requirements are summarized in Table 4-4. The final soil boring sampling locations will be determined in the field by the on-site geologist based on actual field conditions.

4.3.1.2 Sample Collection

Surface soil samples will be collected from the uppermost foot of soil by direct-push methodology as specified in Sections 5.1.1.1 and 6.1.1.1 of the SAP (IT, 2002a). In areas where site access does not permit the use of a direct-push rig, the samples will be collected using a stainless-steel hand auger as specified in Sections 5.1.1.2 and 6.1.1.1 of the SAP. Collected soil samples will be screened using a photoionization detector (PID) in accordance with Section 6.8.3 of the SAP. Surface soil samples will be screened for information purposes only, not to aid in the selection of samples for analysis. Sample containers, sample volumes, preservatives, and holding times for the analyses required in this RI SFSP are discussed in Section 4.0 and listed in Table 4-1 of the QAP. Sample documentation and COC will be recorded as specified in Chapter 6.0 of the SAP. The samples will be analyzed for the parameters listed in Section 4.6 of this RI SFSP. The six surface soil samples from the selected soil boring locations shown on Figure 4-2 will be analyzed for VOCs, SVOCs, metals, explosives, pesticides, herbicides, and PCBs. Additionally, four surface soil samples from the remaining 14 soil boring locations, to be determined based on XRF surface soil screening results, will be analyzed for VOCs, SVOCs, metals, explosives, pesticides, herbicides and polychlorinated biphenyls (PCB) (Table 4-4). The remaining ten surface soil samples will be analyzed for metals and explosives only.

4.3.2 Subsurface Soil Sampling

Forty subsurface soil samples will be collected at the 20 soil boring locations proposed the Former 37mm Antitank Range, Parcel 230Q-X and Former Rifle Range, Parcel 149Q. Two

Table 4-4

Surface Soil and Subsurface Soil Sample Designationa and QA/QC Sample Quantities
Former 37mm Antitank Range, Parcel 230Q-X, and Former Rifle Range, Parcel 149Q
Fort McClellan, Alabama

Sample Location	Sample Designation	Sample Depth (feet)	QA/QC Samples		Analytical Suite
			Field Duplicates	MS/MSD	
HR-230Q-MW04	HR-230Q-MW04-SS-QT0029-REG HR-230Q-MW04-DS-QT0030-REG HR-230Q-MW04-DS-QT0031-REG	0-1 3-4[a] 4-12[b]		HR-230Q-MW04-SS-QT0029-MS/MSD	TCL VOCs, TCL SVOCs, TAL Metals, and Nitroaromatic/Nitramine Explosives, Pesticides, Herbicides and PCB's
HR-230Q-MW05	HR-230Q-MW05-SS-QT0032-REG HR-230Q-MW05-DS-QT0033-REG HR-230Q-MW05-DS-QT0035-REG	0-1 3-4[a] 4-12[b]	HR-230Q-MW05-DS-QT0034-FD		TCL VOCs, TCL SVOCs, TAL Metals, and Nitroaromatic/Nitramine Explosives, Pesticides, Herbicides and PCB's
HR-230Q-MW06	HR-230Q-MW06-SS-QT0036-REG HR-230Q-MW06-DS-QT0037-REG HR-230Q-MW06-DS-QT0038-REG	0-1 1-12 1-12[b]			TCL VOCs, TCL SVOCs, TAL Metals, and Nitroaromatic/Nitramine Explosives, Pesticides, Herbicides and PCB's
HR-230Q-MW07	HR-230Q-MW07-SS-QT0039-REG HR-230Q-MW07-DS-QT0040-REG HR-230Q-MW07-DS-QT0041-REG	0-1 1-12 1-12[b]			TCL VOCs, TCL SVOCs, TAL Metals, and Nitroaromatic/Nitramine Explosives, Pesticides, Herbicides and PCB's
HR-230Q-MW08	HR-230Q-MW08-SS-QT0042-REG HR-230Q-MW08-DS-QT0043-REG HR-230Q-MW08-DS-QT0044-REG	0-1 1-12 1-12[b]			TCL VOCs, TCL SVOCs, TAL Metals, and Nitroaromatic/Nitramine Explosives, Pesticides, Herbicides and PCB's
HR-230Q-GP11	HR-230Q-GP11-SS-QT0045-REG HR-230Q-GP11-DS-QT0046-REG HR-230Q-GP11-DS-QT0047-REG	0-1 3-4[a] 4-12[b]			TCL VOCs, TCL SVOCs, TAL Metals, and Nitroaromatic/Nitramine Explosives, Pesticides, Herbicides and PCB's
HR-230Q-GP12	HR-230Q-GP12-SS-QT0048-REG HR-230Q-GP12-DS-QT0049-REG HR-230Q-GP12-DS-QT0050-REG	0-1 3-4[a] 4-12[b]			TCL VOCs, TCL SVOCs, TAL Metals, and Nitroaromatic/Nitramine Explosives, Pesticides, Herbicides and PCB's
HR-230Q-GP13	HR-230Q-GP13-SS-QT0051-REG HR-230Q-GP13-DS-QT0052-REG	0-1 1-12			TCL VOCs, TCL SVOCs, TAL Metals, and Nitroaromatic/Nitramine Explosives, Pesticides, Herbicides and PCB's
	HR-230Q-GP13-DS-QT0053-REG	1-12[b]	HR-230Q-GP13-DS-QT0054-FD		TAL Metals and Nitroaromatic/Nitramine Explosives

Table 4-4

Surface Soil and Subsurface Soil Sample Designationa and QA/QC Sample Quantities
Former 37mm Antitank Range, Parcel 230Q-X, and Former Rifle Range, Parcel 149Q
Fort McClellan, Alabama

Sample Location	Sample Designation	Sample Depth (feet)	QA/QC Samples		Analytical Suite
			Field Duplicates	MS/MSD	
HR-230Q-GP14	HR-230Q-GP14-SS-QT0055-REG	0-1			TCL VOCs, TCL SVOCs, TAL Metals, and Nitroaromatic/Nitramine Explosives, Pesticides, Herbicides and PCB's
	HR-230Q-GP14-DS-QT0056-REG	1-12			TAL Metals and Nitroaromatic/Nitramine Explosives
	HR-230Q-GP14-DS-QT0057-REG	1-12[b]			
HR-230Q-GP15	HR-230Q-GP15-SS-QT0058-REG	0-1[a]	HR-230Q-GP15-SS-QT059-FD		TCL VOCs, TCL SVOCs, TAL Metals, and Nitroaromatic/Nitramine Explosives, Pesticides, Herbicides and PCB's
	HR-230Q-GP15-DS-QT0060-REG	1-12			TAL Metals and Nitroaromatic/Nitramine Explosives
	HR-230Q-GP15-DS-QT0061-REG	1-12[b]			
HR-230Q-GP16	HR-230Q-GP16-SS-QT0062-REG	0-1[a]			TCL VOCs, TCL SVOCs, TAL Metals, and Nitroaromatic/Nitramine Explosives, Pesticides, Herbicides and PCB's
	HR-230Q-GP16-DS-QT0063-REG	1-12			TAL Metals and Nitroaromatic/Nitramine Explosives
	HR-230Q-GP16-DS-QT0064-REG	1-12[b]			
HR-230Q-GP17	HR-230Q-GP17-SS-QT0065-REG	0-1			TAL Metals and Nitroaromatic/Nitramine Explosives
	HR-230Q-GP17-DS-QT0066-REG	1-12		HR-230Q-GP17-DS-QT0066-MS/MSD	
	HR-230Q-GP17-DS-QT0067-REG	1-12[b]			
HR-230Q-GP18	HR-230Q-GP18-SS-QT0068-REG	0-1			TAL Metals and Nitroaromatic/Nitramine Explosives
	HR-230Q-GP18-DS-QT0069-REG	1-12			
	HR-230Q-GP18-DS-QT0070-REG	1-12[b]			
HR-230Q-GP19	HR-230Q-GP19-SS-QT0071-REG	0-1			TAL Metals and Nitroaromatic/Nitramine Explosives
	HR-230Q-GP19-DS-QT0072-REG	1-12			
	HR-230Q-GP19-DS-QT0073-REG	1-12[b]			
HR-230Q-GP20	HR-230Q-GP20-SS-QT0074-REG	0-1	HR-230Q-GP20-SS-QT0075-FD		TAL Metals and Nitroaromatic/Nitramine Explosives
	HR-230Q-GP20-DS-QT0076-REG	1-12			
	HR-230Q-GP20-DS-QT0077-REG	1-12[b]			

Table 4-4

Surface Soil and Subsurface Soil Sample Designationa and QA/QC Sample Quantities
Former 37mm Antitank Range, Parcel 230Q-X, and Former Rifle Range, Parcel 149Q
Fort McClellan, Alabama

Sample Location	Sample Designation	Sample Depth (feet)	QA/QC Samples		Analytical Suite
			Field Duplicates	MS/MSD	
HR-230Q-GP21	HR-230Q-GP21-SS-QT0078-REG	0-1			TAL Metals and Nitroaromatic/Nitramine Explosives
	HR-230Q-GP21-DS-QT0079-REG	1-12			
	HR-230Q-GP21-DS-QT0080-REG	1-12[b]			
HR-230Q-GP22	HR-230Q-GP22-SS-QT0081-REG	0-1			TAL Metals and Nitroaromatic/Nitramine Explosives
	HR-230Q-GP22-DS-QT0082-REG	1-12			
	HR-230Q-GP22-DS-QT0083-REG	1-12[b]			
HR-230Q-GP23	HR-230Q-GP23-SS-QT0084-REG	0-1			TAL Metals and Nitroaromatic/Nitramine Explosives
	HR-230Q-GP23-DS-QT0085-REG	1-12			
	HR-230Q-GP23-DS-QT0086-REG	1-12[b]			
HR-230Q-GP24	HR-230Q-GP24-SS-QT0087-REG	0-1			TAL Metals and Nitroaromatic/Nitramine Explosives
	HR-230Q-GP24-DS-QT0088-REG	1-12			
	HR-230Q-GP24-DS-QT0089-REG	1-12[b]			
HR-230Q-GP25	HR-230Q-GP25-SS-QT0090-REG	0-1			TAL Metals and Nitroaromatic/Nitramine Explosives
	HR-230Q-GP25-DS-QT0091-REG	1-12			
	HR-230Q-GP25-DS-QT0092-REG	1-12[b]	HR-230Q-GP25-DS-QT0093-FD		

a First subsurface soil sample in this boring to be collected to match subsurface sample depth at location collected during previous SI.
[b]Second subsurface soil sample to be collected from different depth interval than the first subsurface soil sample so as to collect 2 discrete subsurface soil samples.
a Only the surface soil sample from this soil boring will be analyzed for the full suite of analyses

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

discrete subsurface soil samples will be collected from each soil boring. Four of the upper subsurface samples will be collected at depths to match subsurface soil samples collected during the SI to confirm contamination levels (summarized in Table 2-3) as described in Table 4-2. The remaining upper subsurface soil samples will be collected at depth intervals based on XRF screening of the subsurface soil intervals. The second (lower) subsurface soil sample from each soil boring will be collected from an interval below the first subsurface soil sample based on the XRF screening, but not any deeper than 12 feet bgs. Section 4.3.2.2 describes the procedure for selecting the subsurface soil sample interval by XRF screening.

4.3.2.1 Sample Locations and Rationale

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

4.3.2.2 Sample Collection

Subsurface soil samples will be collected from soil borings at a depth greater than 1 foot bgs in the unsaturated zone. The soil borings will be advanced and soil samples collected using the direct-push sampling procedures specified in Sections 5.1.1.1 and 6.1.1.1 of the SAP (IT, 2002a). In areas where site access does not permit the use of a direct-push rig, the samples will be collected using a hand auger, as specified in Sections 5.1.1.2 and 6.1.1.1 of the SAP.

Soil samples will be collected continuously for the first 12 feet or until either groundwater or refusal is met. A detailed lithogical log will be recorded by the on-site geologist for each borehole. The soil borings will be logged in accordance with American Society for Testing and Materials (ASTM) Method D 2488 using the Unified Soil Classification System (ASTM, 1993). Two subsurface soil samples will be collected from each soil boring at Parcels 230Q-X and 149Q using either direct-push technology (DPT) or hand auger. XRF will be used in the field to screen the collected depth intervals to determine the subsurface soil samples with the highest lead concentrations, which will be sent to the laboratory for additional analysis. The following describes the sample handling procedure that will be used to screen the subsurface soil intervals.

Whether the boring is installed with DPT or hand auger, the site geologist will describe the soil interval for the boring log and take headspace readings for organic vapors as per the procedures specified in the SAP. The XRF technician will then composite the sample in a decontaminated stainless steel mixing bowl and transfer a representative aliquot for on-site analysis into a labeled disposable aluminum pan. Remaining soil will be transferred temporarily into a labeled Ziploc®

bag and stored in a cooler on ice until the boring is complete. The aliquot for on-site analysis will be visually assessed for moisture content and, if the content is too high, the soil will be further prepared by oven drying. If the technician judges the soil is dry enough, the aliquot will be further mixed and hand-tamped using a sampling spoon, the XRF cover plate will be placed over the soil in a way to ensure good contact with the film window. The XRF will be placed over the cover plate and the analysis initiated. The XRF technician will monitor the output from the XRF during sample screening, and after an adequate amount of time has passed to quantify the lead and copper soil concentrations (approximately 120 seconds), the screening will be stopped. The technician will then record the results presented on the XRF liquid crystal display screen onto the XRF analysis form. This process will be repeated until all collected intervals for a boring have been collected and DPT or auger refusal is encountered.

At that point, the XRF technician and the geologist will confer and review the available data. Intervals will then be selected for off-site analysis based on geological conditions, results of the headspace screening, and the XRF analysis. Selected depth interval samples will be removed from temporary storage in the cooler and aliquots will be collected to fulfill the analytical requirements specified in this SFSP. Site conditions such as lithology may also determine the actual sample depth interval submitted for analysis. The collected subsurface soil samples will be field-screened using a PID in accordance with Section 6.8.3 of the SAP to measure samples exhibiting elevated readings exceeding background (readings in ambient air). Subsurface soil samples will be PID-screened for information purposes only, not to aid in selection of samples for analysis.

Sample documentation and COC will be recorded as specified in Chapter 6.0 of the SAP. Sample containers, sample volumes, preservatives, and holding times for the analyses required in this RI SFSP are discussed in Section 4.0 and listed in Table 4-1 of the QAP. The samples will be analyzed for the parameters listed in Section 4.6 of this RI SFSP. The ten subsurface soil samples from the five selected borings shown on Figure 4-2 will be analyzed for VOCs, SVOCs, metals, explosives, pesticides, herbicides and PCBs. The remaining 20 subsurface soil samples collected from the 10 soil borings to be determined based on XRF screening will be analyzed for metals and explosives only.

4.3.3 Monitoring Well Installation

Five residuum monitoring wells are proposed at the Former 37mm Antitank Range, Parcel 230Q-X and Former Rifle Range, Parcel 149Q. The monitoring wells will be installed using a combination of hollow-stem auger and air-rotary drilling methods. The wells will be installed to

provide additional information on water quality and groundwater flow in the residuum saturated zone.

4.3.3.1 Monitoring Well Locations and Rationale

Five proposed residuum monitoring wells will be installed to further characterize the local groundwater flow and delineate the horizontal extent of contamination in the residuum saturated zone. The locations of the three existing monitoring wells and two of the five proposed monitoring wells are presented on Figure 4-2. The remaining three proposed monitoring well locations will be selected based on the results of XRF screening of the surface soil discussed in Section 4.2. Table 4-2 presents proposed monitoring well locations and sampling rationale. The exact location of each proposed monitoring well will be determined in the field by the on-site geologist, based on XRF surface soil screening results and actual field conditions.

4.3.3.2 Permanent Residuum Monitoring Wells

Five permanent residuum monitoring wells will be installed at Parcels 230Q-X and 149Q using 4-1/4-inch inside diameter (ID) hollow-stem augers. Residuum monitoring wells will be drilled to a minimum of 20 feet below the first groundwater-bearing zone or to the top of bedrock, whichever is encountered first. Estimated depth of the proposed residuum monitoring wells is approximately 70 feet bgs. Samples will be collected at 5-foot intervals from 5 feet bgs (or at direct-push sample refusal) to the total well depth by the on-site geologist (to record lithologic information). 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.

The well casing will consist of new 2-inch 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, 10 to 20 feet long. At the discretion of the IT site manager, a sump (composed of a new 2-inch ID, Schedule 40, 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. In wells installed to depths of 20 feet or less, the filter pack material will be gravity filled. In wells installed to depths of 20 feet or more, the filter pack will be tremied into place. The filter pack will be installed from the bottom of the well to approximately 5 feet above the top of the screen. The filter pack will consist of 20/40 silica sand. A fine sand (30/70 silica sand), approximately 5 feet thick, may be placed above the filter pack. A bentonite seal, approximately 5 feet thick, will be placed above the filter pack (or fine sand if used). The remaining annular

space will be grouted with a bentonite-cement mixture, using approximately 7 to 8 gallons of water and approximately 5 pounds of bentonite per 94-pound bag of Type I or Type II Portland cement. The grout will be tremied into place from the top of the bentonite seal to ground surface. Monitoring wells will be completed with stick-up or flush-mount construction as determined by the site geologist. Investigation-derived waste (IDW) will be containerized and staged in accordance with Section 4.7 of this RI SFSP.

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

4.3.4 Groundwater Sampling

Groundwater samples will be collected from the five proposed monitoring wells and three pre-existing monitoring wells at Former 37mm Antitank Range, Parcel 230Q-X and Former Rifle Range, Parcel 149Q. Field parameters made at the time of sample collection are detailed in Section 6.3 of the SAP.

4.3.4.1 Sample Locations and Rationale

The three existing and 2 of the five proposed groundwater monitoring wells are depicted in Figure 4-1. The groundwater sampling rationale is listed in Table 4-2. The well locations were chosen to delineate the horizontal and vertical boundaries of the contaminants found in groundwater at Parcels 230Q-X and 149Q. The groundwater sample designations, depths, and required QA/QC sample quantities are listed in Table 4-5.

4.3.4.2 Sample Collection

Prior to sampling monitoring wells, static water levels will be measured from the monitoring wells to be sampled as part of this RI. Groundwater elevations will be used to define the groundwater flow in the residuum and bedrock aquifers. Water levels will be measured as outlined in Section 5.5 of the SAP (IT, 2002a). Groundwater samples will be collected in accordance with the procedures outlined in Section 6.1.1.5 and Attachment 5 of the SAP. Low-flow groundwater sampling methodology outlined in Attachment 5 of the SAP may be used as deemed necessary by the IT site manager.

Sample documentation and COC will be recorded as specified in Chapter 6.0 of the SAP. Sample containers, sample volumes, preservatives, and holding times for the analyses required in

Table 4-5

Groundwater Sample Designations and QA/QC Sample Quantities
Former 37mm Antitank Range, Parcel 230Q-X, and Former Rifle Range, Parcel 149Q
Remedial Investigation
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Designation	Sample Matrix	QA/QC Samples		Analytical Suite
			Field Duplicates	MS/MSD	
HR-230Q-MW01	HR-230Q-MW01-GW-QT3005-REG	Groundwater	HR-230Q-MW01-GW-QT3006-FD		TCL VOCs, TCL SVOCs, TAL Metals, Nitroaromatic/Nitramine Explosives, Herbicides, Pesticides and PCB's
HR-230Q-MW02	HR-230Q-MW02-GW-QT3007-REG	Groundwater		HR-230Q-MW02-GW-QT3007-MS/MSD	TCL VOCs, TCL SVOCs, TAL Metals, Nitroaromatic/Nitramine Explosives, Herbicides, Pesticides and PCB's
HR-230Q-MW03	HR-230Q-MW03-GW-QT3008-REG	Groundwater			TCL VOCs, TCL SVOCs, TAL Metals, Nitroaromatic/Nitramine Explosives, Herbicides, Pesticides and PCB's
HR-230Q-MW04	HR-230Q-MW04-GW-QT3009-REG	Groundwater			TCL VOCs, TCL SVOCs, TAL Metals, Nitroaromatic/Nitramine Explosives, Herbicides, Pesticides and PCB's
HR-230Q-MW05	HR-230Q-MW05-GW-QT3010-REG	Groundwater			TCL VOCs, TCL SVOCs, TAL Metals, Nitroaromatic/Nitramine Explosives, Herbicides, Pesticides and PCB's
HR-230Q-MW06	HR-230Q-MW06-GW-QT3011-REG	Groundwater			TCL VOCs, TCL SVOCs, TAL Metals, Nitroaromatic/Nitramine Explosives, Herbicides, Pesticides and PCB's
HR-230Q-MW07	HR-230Q-MW07-GW-QT3012-REG	Groundwater			TCL VOCs, TCL SVOCs, TAL Metals, Nitroaromatic/Nitramine Explosives, Herbicides, Pesticides and PCB's
HR-230Q-MW08	HR-230Q-MW08-GW-QT3013-REG	Groundwater			TCL VOCs, TCL SVOCs, TAL Metals, Nitroaromatic/Nitramine Explosives, Herbicides, Pesticides and PCB's

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

this RI SFSP are discussed in Section 4.0, Table 4-1 of the QAP (IT, 2002a). The samples will be analyzed for the parameters listed in Section 4.6 of this RI SFSP and will be analyzed for VOCs SVOCs, metals, explosives, pesticides, herbicides, and PCBs.

4.3.5 Surface Water Sampling

Eight surface water samples will be collected from intermittent streams in the vicinity of the Former 37mm Antitank Range, Parcel 230Q-X and Former Rifle Range, Parcel 149Q.

4.3.5.1 Sample Locations and Rationale

The surface water sampling rationale for each location is listed in Table 4-2. The surface water samples will be collected from the proposed locations on Figure 4-1. The surface water sample designations and required QA/QC sample requirements are listed in Table 4-6. The exact sampling locations will be determined in the field by the ecological sampler, based on drainage pathways and actual field observations.

4.3.5.2 Sample Collection

The surface water samples will be collected in accordance with the procedures specified in Section 6.1.1.3 of the SAP (IT, 2002a). Sample documentation and COC will be recorded as specified in Chapter 6.0 of the SAP. Sample containers, sample volumes, preservatives, and holding times for the analyses required in this SFSP are discussed in Chapter 4.0 and listed in Table 4-1 of the QAP. The surface water samples will be analyzed for the parameters listed in Section 4.6 of this SFSP and will be analyzed for VOCs, SVOCs, metals, explosives, pesticides, herbicides, and PCBs.

4.3.6 Sediment Sampling

Eight sediment samples will be collected from the same locations as the surface water samples described in Section 4.2.6.

4.3.6.1 Sample Locations and Rationale

The proposed locations for the sediment samples are shown in Figure 4-1. Sediment sampling rationale for each location is presented in Table 4-1. The sediment sample designations and required QA/QC sample requirements are listed in Table 4-6. The actual sediment sample points will be at the discretion of the ecological sampler, based on the drainage pathways and actual field observations.

Table 4-6

Surface Water and Sediment Sample Designations and QA/QC Sample Quantities
Former 37mm Antitank Range, Parcel 230Q-X, and Former Rifle Range, Parcel 149Q
Remedial Investigation
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Designation	Sample Matrix	Sample Depth (feet)	QA/QC Samples		Analytical Suite
				Field Duplicates	MS/MSD	
HR-230Q-SW/SD03	HR-230Q-SW/SD03-SW-QT2002-REG	Surface water	N/A	HR-230Q-SW/SD03-SW-QT2003-FD		VOC, SVOC, TAL Metals, Nitroaromatic/Nitramine Explosives, Pesticides, Herbicides and PCB's. (Also for Sediment - TOC and Grain Size)
	HR-230Q-SW/SD03-SD-QT1002-REG	sediment	0-0.5	HR-230Q-SW/SD03-SD-QT1003-FD		
HR-230Q-SW/SD04	HR-230Q-SW/SD04-SW-QT2004-REG	Surface water	N/A			VOC, SVOC, TAL Metals, Nitroaromatic/Nitramine Explosives, Pesticides, Herbicides and PCB's. (Also for Sediment - TOC and Grain Size)
	HR-230Q-SW/SD04-SD-QT1004-REG	sediment	0-0.5			
HR-230Q-SW/SD05	HR-230Q-SW/SD05-SW-QT2005-REG	Surface water	N/A			VOC, SVOC, TAL Metals, Nitroaromatic/Nitramine Explosives, Pesticides, Herbicides and PCB's. (Also for Sediment - TOC and Grain Size)
	HR-230Q-SW/SD05-SD-QT1005-REG	sediment	0-0.5			
HR-230Q-SW/SD06	HR-230Q-SW/SD06-SW-QT2006-REG	Surface water	N/A		HR-230Q-SW/SD05-SW-QT2006-MS/MSD	VOC, SVOC, TAL Metals, Nitroaromatic/Nitramine Explosives, Pesticides, Herbicides and PCB's. (Also for Sediment - TOC and Grain Size)
	HR-230Q-SW/SD06-SD-QT1006-REG	sediment	0-0.5		HR-230Q-SW/SD05-SD-QT1006-MS/MSD	
HR-230Q-SW/SD07	HR-230Q-SW/SD07-SW-QT2007-REG	Surface water	N/A			VOC, SVOC, TAL Metals, Nitroaromatic/Nitramine Explosives, Pesticides, Herbicides and PCB's. (Also for Sediment - TOC and Grain Size)
	HR-230Q-SW/SD07-SD-QT1007-REG	sediment	0-0.5			
HR-230Q-SW/SD08	HR-230Q-SW/SD08-SW-QT2008-REG	Surface water	N/A			VOC, SVOC, TAL Metals, Nitroaromatic/Nitramine Explosives, Pesticides, Herbicides and PCB's. (Also for Sediment - TOC and Grain Size)
	HR-230Q-SW/SD08-SD-QT1008-REG	sediment	0-0.5			
HR-230Q-SW/SD09	HR-230Q-SW/SD09-SW-QT2009-REG	Surface water	N/A			VOC, SVOC, TAL Metals, Nitroaromatic/Nitramine Explosives, Pesticides, Herbicides and PCB's. (Also for Sediment - TOC and Grain Size)
	HR-230Q-SW/SD09-SD-QT1009-REG	sediment	0-0.5			
HR-230Q-SW/SD10	HR-230Q-SW/SD10-SW-QT2010-REG	Surface water	N/A			VOC, SVOC, TAL Metals, Nitroaromatic/Nitramine Explosives, Pesticides, Herbicides and PCB's. (Also for Sediment - TOC and Grain Size)
	HR-230Q-SW/SD10-SD-QT1010-REG	sediment	0-0.5			

FD - Field duplicate.
MS/MSD - Matrix spike/matrix spike duplicate.
N/A - Not applicable
QA/QC - Quality assurance/quality control.
REG - Field sample.
SVOCs - Semivolatile organic compounds.
TAL - Target analyte list.
TCL - Target compound list.
TOC - Total organic carbon.
VOCs - Volatile organic compounds.

4.3.6.2 Sample Collection

The sediment samples will be collected in accordance with the procedures specified in Section 6.1.1.2 of the SAP. Sample documentation and COC will be recorded as specified in Chapter 6.0 of the SAP. Sample containers, sample volumes, preservatives, and holding times for the analyses required in this SFSP are discussed in Chapter 4.0 and listed in Table 4-1 of the QAP. The sediment samples will be analyzed for the parameters listed in Section 4.6 of this SFSP and will be analyzed for VOCs, SVOCs, metals, explosives, pesticides, herbicides, PCBs, total organic carbon, and grain size.

4.4 Decontamination Requirements

Decontamination will be performed on sampling and nonsampling equipment to prevent cross-contamination between sampling locations. Decontamination of sampling equipment will be performed in accordance with the requirements presented in Section 6.5.1.1 of the SAP (IT, 2002a). Decontamination of non-sampling equipment will be performed in accordance with the requirements presented in Section 6.5.1.2 of the SAP.

4.5 Surveying of Sample Locations

Sampling locations will be marked with pin flags, stakes, and/or flagging and will be surveyed using either 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 one meter. Because of the need to use monitoring wells to determine water levels, a higher level of accuracy is required. Monitoring wells will be surveyed to an accuracy of 0.1 foot for horizontal coordinates and 0.01 foot for elevations, using survey-grade GPS techniques and/or conventional civil survey techniques, as required. Procedures to be used for GPS surveying are described in Section 4.4.1.1 of the SAP. Conventional land survey requirements are presented in Section 4.4.1.2 of the SAP.

4.6 Analytical Program

Selected 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 and previous investigation data, as well as EPA, ADEM, FTMC, and USACE requirements. Definitive target analyses for samples collected from the Former 37mm Antitank Range, Parcel 230Q-X and Former Rifle Range, Parcel 149Q site consist of the following list of analytical suites:

- TCL VOCs - EPA Method 5035/8260B
- TCL SVOCs - EPA Method 8270C
- Target Analyte List metals - EPA Method 6010B/7000
- Nitroaromatic/Nitramine Explosives - EPA Method 8330
- Chlorinated pesticides - EPA Method 8081A
- Organophosphorus pesticides - EPA Method 8141A
- Chlorinated herbicides - EPA Method 8151A
- PCBs - EPA Method 8082.

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

- Total Organic Carbon – EPA Method 9060
- Grain size – ASTM D421/D422.

The following is the analysis summary of the of the proposed samples to be collected at Parcels 230Q-X and 149Q:

- Analyze 10 surface soil samples for metals and explosives, only.

- Analyze 10 surface soil samples for VOCs, SVOCs, metals, explosives, pesticides, herbicides and PCBs.

- Analyze 25 subsurface soil samples for metals and explosives, only.

- Analyze 15 subsurface soil samples for VOCs, SVOCs, metals, explosives, pesticides, herbicides and PCBs.

- Analyze groundwater, surface water and sediment samples for VOCs, SVOCs, metals, explosives, pesticides, herbicides and PCBs.

The samples will be analyzed using EPA SW-846 Update III methods where applicable, as presented in Table 4-7 of this RI SFSP and Section 5.0 of the QAP. Data will be reported in accordance with definitive data requirements of Chapter 2.0 of the USACE Engineer Manual 200-1-6, *Chemical Quality Assurance for Hazardous, Toxic, and Radioactive Waste (HTRW) Projects* (USACE, 1997), and evaluated by the stipulated requirements for the generation of definitive data (Section 7.2.2 of the QAP). Chemical data will be reported 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.

Table 4-7

Analytical Samples for the Remedial Investigation
Former 37mm Antitank Range, Parcel 230Q-X, Former Rifle Range, Parcel 149Q
Fort McClellan, Calhoun County, Alabama

Parameters	Analysis Method	Sample Matrix	TAT Needed	Field Samples			QA/QC Samples[a]				EMAX
				No. of Sample Points	No. of Events	No. of Field Samples	Field Dups (10%)	MS/MSD (5%)	Trip Blank (1/ship)	Eq. Rinse (1/wk/matrix)	Total No. Analysis
Parcels 230Q-X/149Q: 19 water matrix samples (11 groundwater and 8 surface water samples) and 68 soil matrix samples (20 surface soil samples, 40 subsurface soil samples, and 8 sediment samples)											
TCL VOCs	8260B	water	normal	19	1	19	2	1	8	1	32
TCL SVOCs	8270C	water	normal	19	1	19	2	1	0	1	24
TAL Metals	6010B/7000	water	normal	19	1	19	2	1	0	1	24
Explosives	8330	water	normal	19	1	19	2	1	0	1	24
Cl Pesticides	8081	water	normal	19	1	19	2	1	0	1	24
Op Pesticides	8141A	water	normal	19	1	19	2	1	0	1	24
Cl Herbicides	8151	water	normal	19	1	19	2	1	0	1	24
PCB's	8082	water	normal	19	1	19	2	1	0	1	24
TCL VOCs	8260B	soil	normal	33	1	33	3	1	0	1	39
TCL SVOCs	8270C	soil	normal	33	1	33	3	1	0	1	39
TAL Metals	6010B/7000	soil	normal	68	1	68	6	1	0	1	77
Explosives	8330	soil	normal	68	1	68	6	1	0	1	77
Cl Pesticides	8081	soil	normal	33	1	33	3	1	0	1	39
Op Pesticides	8141A	soil	normal	33	1	33	3	1	0	1	39
Cl Herbicides	8151	soil	normal	33	1	33	3	1	0	1	39
PCB's	8082	soil	normal	33	1	33	3	1	0	1	39
Also, sediment samples will be analyzed for the following parameters:											
Total Organic Carbon	9060	sediment	normal	8	1	8	3	1	0	1	14
Grain size	ASTM D421/D422	sediment	normal	8	1	8	3	1	0	1	14
Parcels 230Q-X/149Q Subtotal:				464			48	16	0	16	560

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

Cl - Chlorinated
Explosives - Nitroaromatic and Nitramine.
MS/MSD - Matrix spike/matrix spike duplicate.
Op - Organophosphorus
QA/QC - Quality assurance/quality control.
SVOCs - Semivolatile organic compounds.
TAL - Target analyte list.
TAT - Turn-around time
TCL - Target compound list.
VOCs - Volatile organic compounds.

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

4.7 Sample Preservation, Packaging, and Shipping

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

The samples will be shipped to the following laboratory:

Attention: Sample Receiving/ Elizabeth McIntyre
EMAX Laboratories Inc.
1835 205th Street
Torrence, California 90501
Telephone: (310) 618-8889.

4.8 Investigation-Derived Waste Management

Management and disposal of IDW will follow procedures and requirements described in Appendix D of the SAP (IT, 2002a). The IDW expected to be generated at Former 37mm Antitank Range, Parcel 230Q-X and Former Rifle Range, Parcel 149Q will include drill cuttings, purge water from permanent monitoring well development and sampling activities, decontamination fluids, and disposable personal protective equipment. The IDW will be characterized and staged at a secure location designated by the site manager while awaiting final disposal. Sampling of IDW to obtain analytical results for characterizing the waste for disposal will follow the procedures specified in Section 6.1.1.8 of the SAP (IT, 2002a). The cuttings and water shall be containerized per methodology previously established during drilling activities at FTMC.

4.9 Site-Specific Safety and Health

Safety and health requirements for the RI are provided in the SSHP attachment for the Former 37mm Antitank Range, Parcel 230Q-X and Former Rifle Range, Parcel 149Q Site. The SSHP attachment will be used in conjunction with the installation-wide safety and health plan, Appendix A of the SAP (IT, 2002a), and the site-specific UXO safety plan.

5.0 Project Schedule

The project schedule for the RI activities will be provided by the IT project manager to the BCT.

6.0 References

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ATTACHMENT 1

LIST OF ABBREVIATIONS AND ACRONYMS