2.0 Summary of Existing Environmental Studies

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

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

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

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

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

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

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

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

The EBS was conducted in accordance with the Community Environmental Response Facilitation Act (CERFA) protocols (CERFA-Public Law 102-426) and DOD policy regarding contamination assessment. Record searches and reviews were performed on all reasonably available documents from FTMC, ADEM, EPA Region 4, and Calhoun County, as well as a database search of CERCLA-regulated substances, petroleum products, and Resource Conservation and Recovery Act-regulated facilities. Available historical maps and aerial photographs were reviewed to document historical land uses. Personal and telephone interviews of past and present FTMC employees and military personnel were conducted. In addition, visual site inspections were conducted to verify conditions of specific property parcels.

The Former 37mm Antitank Range, Parcel 230Q-X was identified as a Category 1 qualified parcel. CERFA Category 1 qualified parcels are areas where no known or recorded storage,

release, or disposal (including migration) has occurred on site property. The parcel, however, was qualified "X" because chemicals of potential concern and UXO may be present as a result of historical range activities.

The following sections summarize site investigation (SI) activities conducted by IT at the Former 37mm Antitank Range, Parcel 230Q-X and Former Rifle Range, Parcel 149Q, including UXO avoidance activities, environmental sampling and analysis, and groundwater monitoring well installation activities. The scope of the SI was outlined in the Site-Specific Field Sampling Plan (SFSP) for the Former 37mm Antitank Range, Parcel 230Q-X and Former Rifle Range, Parcel 149Q (IT, 2002c).

2.1 Site Investigation

The purpose of the SI at the Former 37mm Antitank Range, Parcel 230Q-X was to determine the presence or absence of potential site-specific chemicals (PSSC) and to recommend further actions, if appropriate. The scope of the SI was outlined in the *Final Site-Specific Field Sampling Plan, Site-Specific Safety and Health Plan, and Site-Specific Unexploded Ordnance Safety Plan Attachments, Former 37mm Antitank Range, Parcel 230Q-X, and Former Rifle Range, Parcel 149Q* (IT, 2002c). The following sections summarize the SI activities conducted at Parcel 230Q-X.

2.1.1 Summary of Field Activities

SI field activities at Parcel 230Q-X consisted of the collection and analysis of 13 surface soil samples, 13 subsurface soil samples, 3 groundwater samples, 2 surface water samples, and 2 sediment samples. In addition, three monitoring wells were installed at the site to facilitate collection of the groundwater samples and to provide site-specific geological and hydrogeological characterization information. The sample locations, media, and rationale for the SI at Parcel 230Q-X are summarized in Table 2-1. SI sampling locations are shown on Figure 2-1. Sample collection logs and chain of custody records are included in Appendix B.

Samples collected during the SI at Parcel 230Q-X were analyzed for the following parameters using EPA SW-846 methods, including Update III methods where applicable:

- Target analyte list metals – EPA Methods 6010B/7471A
- Nitroaromatic/nitramine explosives – EPA Method 8330.

DRAFT CHCK. BY:
ENGR. CHCK. BY: S. MORAN
INITIATOR: J. BOND
PROJ. MGR.: J. JACOBS
DWG NO.: ...\796887es602
PROJ. NO.: 796887
STARTING DATE: 01/30/02
DRAWN BY: D. BONAR
DATE LAST REV:
DRAWN BY:
02/19/03
04:35:51 PM
c:\acad\design\796887es.602
cbonar

E 673,400
E 675,400
N 1,176,400
N 1,174,900
PARCEL 230Q-X
PARCEL 149Q
FIRING LINE
WOODS
UNITED ROAD
IMPACT AREA AS DEFINED BY EBS
FLOW
PPMP-230-SW/SD03
PPMP-230-GP03
PPMP-230-SEP03
PPMP-230-DEP03
PPMP-230-GP07
CWM-185-MW02
PPMP-230-SW/SD02
CWM-185-MW01
PPMP-230-SEP02
PPMP-230-GP02
PPMP-230-DEP02
HR-230Q-GP05
HR-230Q-GP04
CWM-185-DEP01
FA-230-SB01
CWM-185-SW/SD02
HR-230Q-GP06
HR-230Q-MW03
HR-230Q-MW03(SS)
PPMP-230-GP05
HR-230Q-MW01
HR-230Q-GP03
HR-230Q-GP07
HR-230Q-SW/SD01
HR-230Q-GP01
HR-230Q-MW02
HR-230Q-GP10
PPMP-230-SEP01
PPMP-230-GP04
PPMP-230-DEP01
HR-230Q-SW/SD02
HR-230Q-GP02
HR-230Q-MW02(SS)
HR-230Q-GP09
HR-230Q-GP08
PPMP-230-GP01
PPMP-230-SW/SD01
FA-230-SB02
4410
4411
4417
4427
825
850
855
875
900

SCALE
0 200 400 FEET

LEGEND

- UNIMPROVED ROADS AND PARKING
- PAVED ROADS AND PARKING
- BUILDING
- TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 5 FOOT)
- TREES / TREELINE
- EXTENDED AREA OF INVESTIGATION
- 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 GROUNDWATER, SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION
- EXISTING DEPOSITIONAL SOIL SAMPLE LOCATION
- EXISTING SEEP WATER SAMPLE LOCATION
- GROUNDWATER SAMPLE LOCATION
- SURFACE WATER/SEDIMENT SAMPLE LOCATION
- SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION
- 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

FIGURE 2-1
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

Table 2-1

Sampling Locations and Rationale
Former 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	Surface soil subsurface soil and groundwater	Surface soil, subsurface soil, and groundwater samples were collected downslope of the pop-up targets in the mid-range area to determine if contaminant releases into the environment have occurred from former activities at this area of the site and if contaminated soil exists at this location. Soil sample data were also used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes. The monitoring well location was used to establish a local groundwater flow direction and site-specific geology, and provide information on groundwater quality in the residuum aquifer.
HR-230Q-MW02	Surface soil subsurface soil and groundwater	Surface soil and subsurface soil samples were collected directly in the berm located in the south-central section of the former range to determine if contaminant releases into the environment have occurred from former activities at this area of the site and if contaminated soil exists at this location. A monitoring well for groundwater samples was installed adjacent and downslope of the berm. Soil sample data were also used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes. The monitoring well location was used to establish a local groundwater flow direction and site-specific geology, and provide information on groundwater quality in the residuum aquifer.
HR-230Q-MW03	Surface soil subsurface soil and groundwater	Surface and subsurface soil samples were collected in the berm at the northeasternmost corner of the parcel. A monitoring well for groundwater samples was installed immediately adjacent and downslope of the berm. Sample data were used to determine if contaminant releases into the environment have occurred from former activities at this area of the site and if contaminated soil exists at this location. Soil sample data were also used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes. The monitoring well location was used to establish a local groundwater flow direction and site-specific geology, and provide information on groundwater quality in the residuum aquifer.
HR-230Q-GP01	Surface soil and subsurface soil	Surface and subsurface soil samples were collected in the trench, located near the former firing line, to determine if contaminant releases into the environment have occurred from former activities at this area of the site and if contaminated soil exists at this location. Soil sample data were also used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
HR-230Q-GP02	Surface soil and subsurface soil	Surface soil and subsurface soil samples were collected at one of the southernmost pop-up targets in the mid-range area (and adjacent to the target). Sample data were used to determine if contaminant releases into the environment have occurred from former activities at this area of the site and if contaminated soil exists at this location. Soil sample data were also used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
HR-230Q-GP03	Surface soil and subsurface soil	Surface and subsurface soil samples were collected at one of the centrally located pop-up targets in the mid-range area (and adjacent to the target). Sample data were used to determine if contaminant releases into the environment have occurred from former activities at this area of the site and if contaminated soil exists at this location. Soil sample data were also used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
HR-230Q-GP04	Surface soil and subsurface soil	Surface and subsurface soil samples were collected at one of the northernmost pop-up targets in this mid-range area (and adjacent to the target). Sample data were used to determine if contaminant releases into the environment have occurred from former activities at this area of the site and if contaminated soil exists at this location. Soil sample data were also used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
HR-230Q-GP05	Surface soil and subsurface soil	Surface and subsurface soil samples were collected in the berm located at the north-central parcel boundary to determine if contaminant releases into the environment have occurred from former activities at this area of the site and if contaminated soil exists at this location. Soil sample data were also used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
HR-230Q-GP06	Surface soil and subsurface soil	Surface and subsurface soil samples collected at one of the northernmost pop-up targets in the down-range area (and adjacent to the target). Sample data were used to determine if contaminant releases into the environment have occurred from former activities at this area of the site and if contaminated soil exists at this location. Soil sample data were also used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
HR-230Q-GP07	Surface soil and subsurface soil	Surface and subsurface soil samples were collected at one of the southernmost pop-up targets in this down-range area (and adjacent to the target). Sample data were used to determine if contaminant releases into the environment have occurred from former activities at this area of the site and if contaminated soil exists at this location. Soil sample data were also used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
HR-230Q-GP08	Surface soil and subsurface soil	Surface soil and subsurface soil samples were collected in the berm located east of the parcel boundary to determine if contaminant releases into the environment have occurred from former activities at this area of the site and if contaminated soil exists at this location. Soil sample data were also used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
HR-230Q-GP09	Surface soil and subsurface soil	Surface soil and subsurface soil samples were collected in the creater, located east of the parcel boundary, to determine if contaminant releases into the environment have occurred from former activities at this area of the site and if contaminated soil exists at this location. Soil sample data were used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.

Table 2-1

Sampling Locations and Rationale
Former 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-GP10	Surface soil and subsurface soil	Surface soil and subsurface soil samples were collected in the berm located east of the parcel boundary, near the northeastern corner of the extended area of investigation. Sample data were used to determine if contaminant releases into the environment have occurred from former activities at this area of the site and if contaminated soil exists at this location. Soil sample data were also used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
HR-230Q-SW/SD01	Surface water and Sediment	Surface water and sediment samples were collected at the upgradient location of the surface water feature that flows southwest across the parcel. Sample data were used to assess potential impacts to aquatic biota in the creek and other ecological receptors that may utilize the creek for food and/or habitat purposes.
HR-230Q-SW/SD02	Surface water and sediment	Surface water and sediment samples were collected at a downgradient location from the surface water feature that flows southwest across the parcel. Sample data were also used to assess potential impacts to aquatic biota in the creek and other ecological receptors that may utilize the creek for food and/or habitat purposes.

A select number of select samples were analyzed for the following additional parameters:

- Target compound list (TCL) volatile organic compounds (VOC) – EPA Method 8260B
- TCL semivolatile organic compounds (SVOC) – EPA Method 8270C
- Chlorinated herbicides – EPA Method 8151A
- Chlorinated pesticides – EPA Method 8081A
- Organophosphorus pesticides – EPA Method 8141A.

In addition one sediment samples was analyzed for total organic carbon (TOC) content (EPA method 9060) and grain size (ASTM Method D-422).

Environmental sampling at Parcel 230Q-X was performed following procedures outlined in the SI SFSP (IT, 2002c) and in conjunction with the SSHP as attachments to the SAP (IT, 2000a, 2002a). The monitoring wells were installed and developed as described in the SAP. The lithological logs and well construction logs are included in Appendix A. Table 1-1 summarizes construction details of the monitoring wells installed at the site. Well development logs are included in Appendix C. Table 2-2 summarizes the groundwater field parameters.

Sample locations were surveyed using global positioning system (GPS) and conventional civil survey techniques described in the SAP. Horizontal coordinates were referenced to the U.S. State Plane Coordinate System, Alabama East Zone, North American Datum of 1983. Elevations were referenced to the North American Vertical Datum of 1988. Horizontal coordinates and elevations are included in Appendix D.

No variances to the SFSP were recorded during the completion of the SI at Parcels 230Q-X and 149Q.

2.1.2 Summary of Analytical Results

The results of the chemical analysis of samples collected at the Former 37mm Antitank Range, Parcel 230Q-X indicate that metals, VOCs, pesticides, and two explosives were detected in various site media. Herbicides and SVOCs were not detected in any of the samples collected. To evaluate the nature and extent of contamination at the site, the analytical results were compared to human health site-specific screening levels (SSSL), ecological screening values (ESV), and background screening values for FTMC. The SSSLs and ESVs were developed by IT as part of the human health and ecological risk evaluations associated with SIs being

Table 2-2

Groundwater and Surface Water Field Parameters
Former 37mm Antitank Range, Parcel 230Q-X, and Former Rifle Range, Parcel 149Q
Fort McClellan, Calhoun County, Alabama

Sample Location	Media	Sample Date	Specific Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Temperature (°C)	Turbidity (NTU)	pH (SU)
HR-230Q-MW01	GW	15-Jul-02	0.222	4.16	55	19.1	4.7	7.59
HR-230Q-MW02	GW	18-Jul-02	0.157	6.34	80	20.1	42	6.87
HR-230Q-MW03	GW	19-Jul-02	0.172	7.38	105	20.3	24	6.66
HR-230Q-SW/SD01	SW	16-May-02	0.050	4.40	NR	16.0	1	5.10
HR-230Q-SW/SD02	SW	16-May-02	0.100	7.80	NR	18.0	11	6.70

°C - Degrees Celsius.
GW - Groundwater.
mg/L - Milligrams per liter.
mS/cm - Millisiemens per centimeter.
mV - Millivolts.
NR - Not recorded.
NTU - Nephelometric turbidity units.
ORP - Oxidation-reduction potential.
SU - Standard units.
SW - Surface water.

performed under the BRAC Environmental Restoration Program at FTMC. The SSSLs and ESVs are presented in the *Final Human Health and Ecological Screening Values and PAH Background Summary Report* (IT, 2000b). Background metals screening values are presented in the *Final Background Metals Survey Report, Fort McClellan, Alabama* (SAIC, 1998). Summary statistics for background metals samples collected at FTMC are included in Appendix E.

The following sections and Tables 2-4 through 2-7 summarize the results of the comparison of the detected constituents to the SSSLs, ESVs, and background screening values. Complete analytical data are presented in Appendix F. The data validation results are summarized in a quality assurance report, which includes the data validation summary report (Appendix G).

2.1.2.1 Surface Soil Analytical Results

Thirteen surface soil samples were collected at the Former 37mm Antitank Range, Parcel 230Q-X. Surface soil samples were collected from the uppermost foot of soil at the locations shown on Figure 2-1. Analytical results were compared to residential human health SSSLs, ESVs, and metals background screening values, as presented in Table 2-3.

Metals. A total of 20 metals were detected in the surface soil samples collected at the site. The concentrations of eight metals (aluminum, antimony, arsenic, chromium, iron, lead, manganese, and thallium) exceeded SSSLs. Of these, aluminum (at one location), antimony (one location), and lead (three locations) also exceeded their respective background values. The antimony and lead results also exceeded their respective upper background ranges as follows:

- Antimony (6.92 milligrams per kilogram [mg/kg]) exceeded its SSSL (3.11 mg/kg) and upper background range (2.6 mg/kg) at sample location HR-230Q-MW02.

- Lead (409 to 1,290 mg/kg) exceeded its SSSL (400 mg/kg) and upper background range (83 mg/kg) at 3 sample locations (HR-230Q-GP08, HR-230Q-MW02, and HR-230Q-MW03).

It should be noted that upper background range values are provided as additional information for risk managers.

Nine metals were detected at concentrations exceeding ESVs: aluminum, antimony, arsenic, chromium, copper, iron, lead, manganese, and thallium. Of these, aluminum (at 1 location) antimony (1 location), copper (2 locations), and lead (7 locations) also exceeded their respective background concentrations; however, these metals results were within their respective upper background ranges except for the following:

Table 2-3

Surface Soil Analytical Results
Former 37mm Antitank Range, Parcel 230Q-X, and Former Rifle Range, Parcel 149Q
Fort McClellan, Calhoun County, Alabama

Sample Location						HR-230Q-GP01						HR-230Q-GP02						HR-230Q-GP03					
Sample Number						QT0001						QT0003						QT0006					
Sample Date						18-Jun-02						21-Jun-02						18-Jun-02					
Sample Depth (Feet)						0- 1						0- 1						0- 1					
Parameter	Units	UBR[a]	BKG[b]	SSSL[c]	ESV[c]	Result	Qual	>UBR	>BKG	>SSSL	>ESV	Result	Qual	>UBR	>BKG	>SSSL	>ESV	Result	Qual	>UBR	>BKG	>SSSL	>ESV
METALS																							
Aluminum	mg/kg	3.99E+04	1.63E+04	7.80E+03	5.00E+01	4.40E+03					YES	5.74E+03					YES	1.04E+04				YES	YES
Antimony	mg/kg	2.60E+00	1.99E+00	3.11E+00	3.50E+00	ND						ND						ND					
Arsenic	mg/kg	4.90E+01	1.37E+01	4.26E-01	1.00E+01	1.02E+00	J			YES		1.40E+00				YES		2.16E+00				YES	
Barium	mg/kg	2.88E+02	1.24E+02	5.47E+02	1.65E+02	2.62E+01						5.10E+01						4.33E+01					
Beryllium	mg/kg	8.70E-01	8.00E-01	9.60E+00	1.10E+00	ND						4.96E-01	J					3.95E-01	J				
Calcium	mg/kg	1.79E+04	1.72E+03	NA	NA	2.50E+02						8.26E+02	J					9.38E+01	J				
Chromium	mg/kg	1.34E+02	3.70E+01	2.32E+01	4.00E-01	5.61E+00	J				YES	5.87E+00					YES	8.57E+00	J				YES
Cobalt	mg/kg	7.10E+01	1.52E+01	4.68E+02	2.00E+01	ND						1.77E+00	J					1.61E+00	J				
Copper	mg/kg	2.40E+01	1.27E+01	3.13E+02	4.00E+01	2.20E+00	J					3.39E+00						7.55E+00					
Iron	mg/kg	5.63E+04	3.42E+04	2.34E+03	2.00E+02	3.47E+03	J			YES	YES	4.04E+03				YES	YES	9.46E+03	J			YES	YES
Lead	mg/kg	8.30E+01	4.01E+01	4.00E+02	5.00E+01	1.01E+01						1.27E+01						6.29E+01			YES		YES
Magnesium	mg/kg	9.60E+03	1.03E+03	NA	4.40E+05	3.78E+02						5.58E+02						4.60E+02					
Manganese	mg/kg	6.85E+03	1.58E+03	3.63E+02	1.00E+02	1.24E+01						7.68E+01	J					1.17E+02					YES
Mercury	mg/kg	3.20E-01	8.00E-02	2.33E+00	1.00E-01	3.84E-02	J					7.66E-02	J					ND					
Nickel	mg/kg	2.20E+01	1.03E+01	1.54E+02	3.00E+01	1.94E+00	J					2.29E+00	B					3.71E+00					
Potassium	mg/kg	6.01E+03	8.00E+02	NA	NA	2.86E+02	J					4.35E+02	J					4.48E+02	J				
Sodium	mg/kg	5.63E+02	6.34E+02	NA	NA	ND						2.60E+01	J					2.01E+01	J				
Thallium	mg/kg	3.40E+01	3.43E+00	5.08E-01	1.00E+00	ND						ND						2.61E+00	J			YES	YES
Vanadium	mg/kg	1.58E+02	5.88E+01	5.31E+01	2.00E+00	7.87E+00					YES	8.84E+00					YES	1.56E+01					YES
Zinc	mg/kg	2.09E+02	4.06E+01	2.34E+03	5.00E+01	8.95E+00	J					1.41E+01	J					1.37E+01	J				
VOLATILE ORGANIC COMPOUNDS																							
Acetone	mg/kg	NA	NA	7.76E+02	2.50E+00	NR						NR						NR					
PESTICIDES																							
4,4'-DDD	mg/kg	NA	NA	2.54E+00	2.50E-03	NR						NR						NR					
4,4'-DDT	mg/kg	NA	NA	1.79E+00	2.50E-03	NR						NR						NR					
Heptachlor	mg/kg	NA	NA	1.40E-01	1.00E-01	NR						NR						NR					
beta-BHC	mg/kg	NA	NA	3.50E-01	1.00E-03	NR						NR						NR					

Table 2-3

Surface Soil Analytical Results
Former 37mm Antitank Range, Parcel 230Q-X, and Former Rifle Range, Parcel 149Q
Fort McClellan, Calhoun County, Alabama

Sample Location						HR-230Q-GP04						HR-230Q-GP05						HR-230Q-GP06					
Sample Number						QT0008						QT0010						QT0012					
Sample Date						21-Jun-02						20-Jun-02						18-Jun-02					
Sample Depth (Feet)						0- 1						0- 1						0- 1					
Parameter	Units	UBR[a]	BKG[b]	SSSL[c]	ESV[c]	Result	Qual	>UBR	>BKG	>SSSL	>ESV	Result	Qual	>UBR	>BKG	>SSSL	>ESV	Result	Qual	>UBR	>BKG	>SSSL	>ESV
METALS																							
Aluminum	mg/kg	3.99E+04	1.63E+04	7.80E+03	5.00E+01	4.20E+03					YES	1.08E+04				YES	YES	8.07E+03				YES	YES
Antimony	mg/kg	2.60E+00	1.99E+00	3.11E+00	3.50E+00	ND						ND						ND					
Arsenic	mg/kg	4.90E+01	1.37E+01	4.26E-01	1.00E+01	9.48E-01	J			YES		1.85E+00				YES		1.87E+00				YES	
Barium	mg/kg	2.88E+02	1.24E+02	5.47E+02	1.65E+02	3.81E+01						4.32E+01						5.03E+01					
Beryllium	mg/kg	8.70E-01	8.00E-01	9.60E+00	1.10E+00	ND						ND						3.77E-01	J				
Calcium	mg/kg	1.79E+04	1.72E+03	NA	NA	2.12E+02						2.62E+02						1.38E+02					
Chromium	mg/kg	1.34E+02	3.70E+01	2.32E+01	4.00E-01	4.27E+00					YES	9.58E+00	J				YES	6.36E+00	J				YES
Cobalt	mg/kg	7.10E+01	1.52E+01	4.68E+02	2.00E+01	1.30E+00	J					2.63E+00						1.33E+00	J				
Copper	mg/kg	2.40E+01	1.27E+01	3.13E+02	4.00E+01	3.16E+00						4.79E+00						7.16E+00					
Iron	mg/kg	5.63E+04	3.42E+04	2.34E+03	2.00E+02	3.67E+03				YES	YES	1.02E+04				YES	YES	6.38E+03	J			YES	YES
Lead	mg/kg	8.30E+01	4.01E+01	4.00E+02	5.00E+01	1.05E+01						9.41E+00						2.48E+02		YES	YES		YES
Magnesium	mg/kg	9.60E+03	1.03E+03	NA	4.40E+05	3.63E+02						6.97E+02						3.83E+02					
Manganese	mg/kg	6.85E+03	1.58E+03	3.63E+02	1.00E+02	1.80E+02					YES	1.00E+02					YES	1.11E+02					YES
Mercury	mg/kg	3.20E-01	8.00E-02	2.33E+00	1.00E-01	3.62E-02	J					3.22E-02	J					ND					
Nickel	mg/kg	2.20E+01	1.03E+01	1.54E+02	3.00E+01	2.08E+00	B					4.09E+00						3.48E+00					
Potassium	mg/kg	6.01E+03	8.00E+02	NA	NA	4.03E+02	J					6.61E+02						3.49E+02	J				
Sodium	mg/kg	5.63E+02	6.34E+02	NA	NA	2.06E+01	J					4.02E+01	J					4.08E+01	J				
Thallium	mg/kg	3.40E+01	3.43E+00	5.08E-01	1.00E+00	ND						ND						ND					
Vanadium	mg/kg	1.58E+02	5.88E+01	5.31E+01	2.00E+00	6.17E+00					YES	1.53E+01					YES	1.10E+01					YES
Zinc	mg/kg	2.09E+02	4.06E+01	2.34E+03	5.00E+01	1.24E+01	J					1.64E+01	J					1.27E+01	J				
VOLATILE ORGANIC COMPOUNDS																							
Acetone	mg/kg	NA	NA	7.76E+02	2.50E+00	NR						1.60E-01						NR					
PESTICIDES																							
4,4'-DDD	mg/kg	NA	NA	2.54E+00	2.50E-03	NR						2.50E-03	J				YES	NR					
4,4'-DDT	mg/kg	NA	NA	1.79E+00	2.50E-03	NR						ND						NR					
Heptachlor	mg/kg	NA	NA	1.40E-01	1.00E-01	NR						ND						NR					
beta-BHC	mg/kg	NA	NA	3.50E-01	1.00E-03	NR						ND						NR					

Table 2-3

Surface Soil Analytical Results
Former 37mm Antitank Range, Parcel 230Q-X, and Former Rifle Range, Parcel 149Q
Fort McClellan, Calhoun County, Alabama

Sample Location						HR-230Q-GP07						HR-230Q-GP08						HR-230Q-GP09					
Sample Number						QT0014						QT0016						QT0018					
Sample Date						18-Jun-02						20-Jun-02						19-Jun-02					
Sample Depth (Feet)						0- 1						0- 1						0- 1					
Parameter	Units	UBR[a]	BKG[b]	SSSL[c]	ESV[c]	Result	Qual	>UBR	>BKG	>SSSL	>ESV	Result	Qual	>UBR	>BKG	>SSSL	>ESV	Result	Qual	>UBR	>BKG	>SSSL	>ESV
METALS																							
Aluminum	mg/kg	3.99E+04	1.63E+04	7.80E+03	5.00E+01	6.42E+03					YES	1.86E+04			YES	YES	YES	1.11E+04				YES	YES
Antimony	mg/kg	2.60E+00	1.99E+00	3.11E+00	3.50E+00	ND						ND						ND					
Arsenic	mg/kg	4.90E+01	1.37E+01	4.26E-01	1.00E+01	1.50E+00				YES		5.15E+00				YES		3.38E+00				YES	
Barium	mg/kg	2.88E+02	1.24E+02	5.47E+02	1.65E+02	3.60E+01						5.37E+01						4.75E+01					
Beryllium	mg/kg	8.70E-01	8.00E-01	9.60E+00	1.10E+00	ND						4.57E-01	J					5.18E-01	J				
Calcium	mg/kg	1.79E+04	1.72E+03	NA	NA	8.46E+01	J					3.89E+02						2.00E+02					
Chromium	mg/kg	1.34E+02	3.70E+01	2.32E+01	4.00E-01	6.61E+00	J				YES	2.40E+01	J			YES	YES	1.19E+01	J				YES
Cobalt	mg/kg	7.10E+01	1.52E+01	4.68E+02	2.00E+01	1.76E+00	J					3.64E+00						2.92E+00					
Copper	mg/kg	2.40E+01	1.27E+01	3.13E+02	4.00E+01	1.44E+01			YES			1.59E+02		YES	YES		YES	2.80E+01		YES	YES		
Iron	mg/kg	5.63E+04	3.42E+04	2.34E+03	2.00E+02	6.23E+03	J			YES	YES	2.03E+04				YES	YES	1.79E+04	J			YES	YES
Lead	mg/kg	8.30E+01	4.01E+01	4.00E+02	5.00E+01	3.03E+02		YES	YES		YES	4.09E+02		YES	YES	YES	YES	9.83E+01		YES	YES		YES
Magnesium	mg/kg	9.60E+03	1.03E+03	NA	4.40E+05	3.94E+02						6.28E+02						5.37E+02					
Manganese	mg/kg	6.85E+03	1.58E+03	3.63E+02	1.00E+02	1.10E+02					YES	3.27E+02					YES	4.07E+02				YES	YES
Mercury	mg/kg	3.20E-01	8.00E-02	2.33E+00	1.00E-01	ND						4.84E-02	J					8.45E-02	J		YES		
Nickel	mg/kg	2.20E+01	1.03E+01	1.54E+02	3.00E+01	2.48E+00						8.69E+00						6.73E+00					
Potassium	mg/kg	6.01E+03	8.00E+02	NA	NA	3.93E+02	J					6.48E+02						7.44E+02					
Sodium	mg/kg	5.63E+02	6.34E+02	NA	NA	ND						5.67E+01	J					4.27E+01	J				
Thallium	mg/kg	3.40E+01	3.43E+00	5.08E-01	1.00E+00	ND						7.26E-01	J			YES		ND					
Vanadium	mg/kg	1.58E+02	5.88E+01	5.31E+01	2.00E+00	1.03E+01					YES	4.09E+01					YES	2.94E+01					YES
Zinc	mg/kg	2.09E+02	4.06E+01	2.34E+03	5.00E+01	1.34E+01	J					3.80E+01	J					3.04E+01	J				
VOLATILE ORGANIC COMPOUNDS																							
Acetone	mg/kg	NA	NA	7.76E+02	2.50E+00	NR						NR						NR					
PESTICIDES																							
4,4'-DDD	mg/kg	NA	NA	2.54E+00	2.50E-03	NR						NR						NR					
4,4'-DDT	mg/kg	NA	NA	1.79E+00	2.50E-03	NR						NR						NR					
Heptachlor	mg/kg	NA	NA	1.40E-01	1.00E-01	NR						NR						NR					
beta-BHC	mg/kg	NA	NA	3.50E-01	1.00E-03	NR						NR						NR					

Table 2-3

Surface Soil Analytical Results
Former 37mm Antitank Range, Parcel 230Q-X, and Former Rifle Range, Parcel 149Q
Fort McClellan, Calhoun County, Alabama

Sample Location						HR-230Q-GP10						HR-230Q-MW01					
Sample Number						QT0020						QT0022					
Sample Date						20-Jun-02						14-Jun-02					
Sample Depth (Feet)						0- 1						0- 1					
Parameter	Units	UBR[a]	BKG[b]	SSSL[c]	ESV[c]	Result	Qual	>UBR	>BKG	>SSSL	>ESV	Result	Qual	>UBR	>BKG	>SSSL	>ESV
METALS																	
Aluminum	mg/kg	3.99E+04	1.63E+04	7.80E+03	5.00E+01	8.95E+03				YES	YES	4.81E+03					YES
Antimony	mg/kg	2.60E+00	1.99E+00	3.11E+00	3.50E+00	ND						ND					
Arsenic	mg/kg	4.90E+01	1.37E+01	4.26E-01	1.00E+01	2.32E+00				YES		8.90E-01	J			YES	
Barium	mg/kg	2.88E+02	1.24E+02	5.47E+02	1.65E+02	7.14E+01						3.70E+01					
Beryllium	mg/kg	8.70E-01	8.00E-01	9.60E+00	1.10E+00	5.25E-01	J					ND					
Calcium	mg/kg	1.79E+04	1.72E+03	NA	NA	3.35E+02						1.20E+02					
Chromium	mg/kg	1.34E+02	3.70E+01	2.32E+01	4.00E-01	7.68E+00	J				YES	4.60E+00					YES
Cobalt	mg/kg	7.10E+01	1.52E+01	4.68E+02	2.00E+01	8.19E+00						1.27E+00	J				
Copper	mg/kg	2.40E+01	1.27E+01	3.13E+02	4.00E+01	5.26E+00						1.67E+00	J				
Iron	mg/kg	5.63E+04	3.42E+04	2.34E+03	2.00E+02	7.53E+03				YES	YES	3.45E+03				YES	YES
Lead	mg/kg	8.30E+01	4.01E+01	4.00E+02	5.00E+01	2.67E+01						5.58E+00					
Magnesium	mg/kg	9.60E+03	1.03E+03	NA	4.40E+05	6.18E+02						4.57E+02					
Manganese	mg/kg	6.85E+03	1.58E+03	3.63E+02	1.00E+02	8.55E+02				YES	YES	3.21E+01					
Mercury	mg/kg	3.20E-01	8.00E-02	2.33E+00	1.00E-01	3.50E-02	J					ND					
Nickel	mg/kg	2.20E+01	1.03E+01	1.54E+02	3.00E+01	4.88E+00						2.70E+00	B				
Potassium	mg/kg	6.01E+03	8.00E+02	NA	NA	5.25E+02	J					4.49E+02	J				
Sodium	mg/kg	5.63E+02	6.34E+02	NA	NA	ND						4.29E+01	J				
Thallium	mg/kg	3.40E+01	3.43E+00	5.08E-01	1.00E+00	ND						ND					
Vanadium	mg/kg	1.58E+02	5.88E+01	5.31E+01	2.00E+00	1.32E+01					YES	6.90E+00					YES
Zinc	mg/kg	2.09E+02	4.06E+01	2.34E+03	5.00E+01	1.69E+01	J					6.96E+00					
VOLATILE ORGANIC COMPOUNDS																	
Acetone	mg/kg	NA	NA	7.76E+02	2.50E+00	2.10E-01						NR					
PESTICIDES																	
4,4'-DDD	mg/kg	NA	NA	2.54E+00	2.50E-03	ND						NR					
4,4'-DDT	mg/kg	NA	NA	1.79E+00	2.50E-03	2.80E-03	J				YES	NR					
Heptachlor	mg/kg	NA	NA	1.40E-01	1.00E-01	1.40E-03	J					NR					
beta-BHC	mg/kg	NA	NA	3.50E-01	1.00E-03	1.50E-03	J				YES	NR					

Table 2-3

Surface Soil Analytical Results
Former 37mm Antitank Range, Parcel 230Q-X, and Former Rifle Range, Parcel 149Q
Fort McClellan, Calhoun County, Alabama

Sample Location						HR-230Q-MW02						HR-230Q-MW03					
Sample Number						QT0024						QT0026					
Sample Date						17-Jun-02						17-Jun-02					
Sample Depth (Feet)						0- 1						0- 1					
Parameter	Units	UBR[a]	BKG[b]	SSSL[c]	ESV[c]	Result	Qual	>UBR	>BKG	>SSSL	>ESV	Result	Qual	>UBR	>BKG	>SSSL	>ESV
METALS																	
Aluminum	mg/kg	3.99E+04	1.63E+04	7.80E+03	5.00E+01	7.64E+03					YES	5.95E+03					YES
Antimony	mg/kg	2.60E+00	1.99E+00	3.11E+00	3.50E+00	6.92E+00	J	YES	YES	YES	YES	ND					
Arsenic	mg/kg	4.90E+01	1.37E+01	4.26E-01	1.00E+01	2.10E+00				YES		1.74E+00				YES	
Barium	mg/kg	2.88E+02	1.24E+02	5.47E+02	1.65E+02	3.61E+01						2.01E+01					
Beryllium	mg/kg	8.70E-01	8.00E-01	9.60E+00	1.10E+00	ND						ND					
Calcium	mg/kg	1.79E+04	1.72E+03	NA	NA	1.71E+02						9.16E+01	J				
Chromium	mg/kg	1.34E+02	3.70E+01	2.32E+01	4.00E-01	9.22E+00					YES	1.12E+01					YES
Cobalt	mg/kg	7.10E+01	1.52E+01	4.68E+02	2.00E+01	2.99E+00						1.80E+00	J				
Copper	mg/kg	2.40E+01	1.27E+01	3.13E+02	4.00E+01	8.67E+01		YES	YES		YES	3.90E+01		YES	YES		
Iron	mg/kg	5.63E+04	3.42E+04	2.34E+03	2.00E+02	8.09E+03				YES	YES	8.55E+03				YES	YES
Lead	mg/kg	8.30E+01	4.01E+01	4.00E+02	5.00E+01	1.29E+03		YES	YES	YES	YES	6.61E+02		YES	YES	YES	YES
Magnesium	mg/kg	9.60E+03	1.03E+03	NA	4.40E+05	3.73E+02						3.74E+02					
Manganese	mg/kg	6.85E+03	1.58E+03	3.63E+02	1.00E+02	1.70E+02					YES	5.88E+01					
Mercury	mg/kg	3.20E-01	8.00E-02	2.33E+00	1.00E-01	ND						3.18E-02	J				
Nickel	mg/kg	2.20E+01	1.03E+01	1.54E+02	3.00E+01	4.07E+00	B					3.19E+00	B				
Potassium	mg/kg	6.01E+03	8.00E+02	NA	NA	3.79E+02	J					4.98E+02	J				
Sodium	mg/kg	5.63E+02	6.34E+02	NA	NA	4.79E+01	J					5.63E+01	J				
Thallium	mg/kg	3.40E+01	3.43E+00	5.08E-01	1.00E+00	ND						ND					
Vanadium	mg/kg	1.58E+02	5.88E+01	5.31E+01	2.00E+00	1.37E+01					YES	1.21E+01					YES
Zinc	mg/kg	2.09E+02	4.06E+01	2.34E+03	5.00E+01	3.41E+01						1.16E+01					
VOLATILE ORGANIC COMPOUNDS																	
Acetone	mg/kg	NA	NA	7.76E+02	2.50E+00	NR						NR					
PESTICIDES																	
4,4'-DDD	mg/kg	NA	NA	2.54E+00	2.50E-03	NR						NR					
4,4'-DDT	mg/kg	NA	NA	1.79E+00	2.50E-03	NR						NR					
Heptachlor	mg/kg	NA	NA	1.40E-01	1.00E-01	NR						NR					
beta-BHC	mg/kg	NA	NA	3.50E-01	1.00E-03	NR						NR					

Analyses performed using U.S. Environmental Protection Agency (EPA) SW-846 analytical methods.

[a] UBR - Upper background range as given in Science Applications International Corporation (SAIC), 1998, *Final Background Metals Survey Report, Fort McClellan, Alabama*, July.

[b] BKG - Background. Concentration listed is two times (2x) the arithmetic mean of background metals concentration given in SAIC, 1998.

[c] Residential human health site-specific screening level (SSSL) and ecological screening value (ESV) as given in IT, 2000, *Final Human Health and Ecological Screening Values and PAH Background Summary Report, Fort McClellan, Calhoun County, Alabama*, July.

B - Analyte detected in laboratory or field blank at concentration greater than the reporting limit (and greater than zero).

J - Compound was positively identified; reported value is an estimated concentration.

mg/kg - Milligrams per kilogram.

NA - Not available.

ND - Not detected.

NR - Not requested.

Qual - Data validation qualifier.

Table 2-4

Subsurface Soil Analytical Results
Former 37mm Antitank Range, Parcel 230Q-X, and Former Rifle Range, Parcel 149Q
Fort McClellan, Calhoun County, Alabama

Sample Location					HR-230Q-GP01					HR-230Q-GP02					HR-230Q-GP03					HR-230Q-GP04				
Sample Number					QT0002					QT0005					QT0007					QT0009				
Sample Date					18-Jun-02					21-Jun-02					18-Jun-02					21-Jun-02				
Sample Depth (Feet)					1 - 2					1 - 2					2 - 3					3 - 4				
Parameter	Units	UBR[a]	BKG[b]	SSSL[c]	Result	Qual	>UBR	>BKG	>SSSL	Result	Qual	>UBR	>BKG	>SSSL	Result	Qual	>UBR	>BKG	>SSSL	Result	Qual	>UBR	>BKG	>SSSL
METALS																								
Aluminum	mg/kg	2.46E+04	1.36E+04	7.80E+03	1.64E+04			YES	YES	7.04E+03					1.26E+04				YES	6.87E+03				
Antimony	mg/kg	9.90E-01	1.31E+00	3.11E+00	ND					ND					ND					ND				
Arsenic	mg/kg	3.80E+01	1.83E+01	4.26E-01	2.67E+00				YES	1.27E+00				YES	1.96E+00				YES	7.22E-01	J			YES
Barium	mg/kg	4.50E+03	2.34E+02	5.47E+02	6.70E+01					4.02E+01					3.89E+01					3.37E+01				
Beryllium	mg/kg	2.00E+00	8.60E-01	9.60E+00	ND					1.17E+00	J		YES		ND					ND				
Calcium	mg/kg	3.65E+03	6.37E+02	NA	6.03E+02					4.71E+02					4.25E+01	J				1.22E+02				
Chromium	mg/kg	5.50E+01	3.83E+01	2.32E+01	1.59E+01	J				1.00E+01					1.16E+01	J				6.14E+00				
Cobalt	mg/kg	9.60E+01	1.75E+01	4.68E+02	3.07E+00					2.65E+00					2.22E+00	J				1.68E+00	J			
Copper	mg/kg	6.10E+01	1.94E+01	3.13E+02	4.44E+00					2.16E+00	J				5.65E+00					2.79E+00				
Iron	mg/kg	4.80E+04	4.48E+04	2.34E+03	1.16E+04	J			YES	9.15E+03				YES	1.61E+04	J			YES	5.03E+03				YES
Lead	mg/kg	5.00E+02	3.85E+01	4.00E+02	9.64E+00					1.17E+01					9.15E+00					5.84E+00				
Magnesium	mg/kg	5.94E+03	7.66E+02	NA	1.38E+03			YES		5.20E+02					7.63E+02					5.50E+02				
Manganese	mg/kg	1.90E+04	1.36E+03	3.63E+02	1.40E+01					4.28E+01					4.61E+01					1.41E+01				
Mercury	mg/kg	1.20E-01	7.00E-02	2.33E+00	4.15E-02	J				ND					ND					3.56E-02	J			
Nickel	mg/kg	3.80E+01	1.29E+01	1.54E+02	6.54E+00					4.11E+00					3.90E+00					2.49E+00	B			
Potassium	mg/kg	6.15E+03	7.11E+02	NA	1.30E+03			YES		3.58E+02	J				9.94E+02			YES		4.06E+02	J			
Sodium	mg/kg	6.43E+02	7.02E+02	NA	5.42E+01	J				2.45E+01	J				ND					2.37E+01	J			
Thallium	mg/kg	2.40E+01	1.40E+00	5.08E-01	ND					ND					ND					ND				
Vanadium	mg/kg	9.90E+01	6.49E+01	5.31E+01	3.31E+01					1.62E+01					1.90E+01					9.62E+00				
Zinc	mg/kg	8.90E+01	3.49E+01	2.34E+03	1.40E+01	J				1.04E+01	J				1.16E+01	J				8.23E+00	J			
VOLATILE ORGANIC COMPOUNDS																								
Acetone	mg/kg	NA	NA	7.76E+02	NR					NR					NR					NR				
Methylene chloride	mg/kg	NA	NA	8.41E+01	NR					NR					NR					NR				
PESTICIDES																								
beta-BHC	mg/kg	NA	NA	3.50E-01	NR					NR					NR					NR				

Table 2-4

Subsurface Soil Analytical Results
Former 37mm Antitank Range, Parcel 230Q-X, and Former Rifle Range, Parcel 149Q
Fort McClellan, Calhoun County, Alabama

Sample Location					HR-230Q-GP05					HR-230Q-GP06					HR-230Q-GP07					HR-230Q-GP08				
Sample Number					QT0011					QT0013					QT0015					QT0017				
Sample Date					19-Jun-02					18-Jun-02					18-Jun-02					20-Jun-02				
Sample Depth (Feet)					3 - 4					3 - 4					3 - 4					2 - 3				
Parameter	Units	UBR[a]	BKG[b]	SSSL[c]	Result	Qual	>UBR	>BKG	>SSSL	Result	Qual	>UBR	>BKG	>SSSL	Result	Qual	>UBR	>BKG	>SSSL	Result	Qual	>UBR	>BKG	>SSSL
METALS																								
Aluminum	mg/kg	2.46E+04	1.36E+04	7.80E+03	1.27E+04				YES	1.35E+04				YES	2.02E+04			YES	YES	1.86E+04			YES	YES
Antimony	mg/kg	9.90E-01	1.31E+00	3.11E+00	ND					ND					ND					7.14E+00	J	YES	YES	YES
Arsenic	mg/kg	3.80E+01	1.83E+01	4.26E-01	2.08E+00				YES	1.64E+00				YES	2.66E+00				YES	4.31E+00				YES
Barium	mg/kg	4.50E+03	2.34E+02	5.47E+02	4.09E+01					6.66E+01					6.42E+01					2.31E+01				
Beryllium	mg/kg	2.00E+00	8.60E-01	9.60E+00	ND					4.58E-01	J				ND					1.19E+00	J		YES	
Calcium	mg/kg	3.65E+03	6.37E+02	NA	1.75E+02					1.40E+02					2.29E+02					9.22E+01	J			
Chromium	mg/kg	5.50E+01	3.83E+01	2.32E+01	1.07E+01	J				1.02E+01	J				1.69E+01	J				4.15E+01	J		YES	YES
Cobalt	mg/kg	9.60E+01	1.75E+01	4.68E+02	2.84E+00					7.03E+00					2.24E+00	J				6.28E+00				
Copper	mg/kg	6.10E+01	1.94E+01	3.13E+02	4.89E+00					4.95E+00					7.22E+00					2.31E+01			YES	
Iron	mg/kg	4.80E+04	4.48E+04	2.34E+03	9.81E+03	J			YES	9.70E+03	J			YES	1.71E+04	J			YES	8.12E+04		YES	YES	YES
Lead	mg/kg	5.00E+02	3.85E+01	4.00E+02	1.32E+01					1.23E+01					1.92E+01					3.16E+01				
Magnesium	mg/kg	5.94E+03	7.66E+02	NA	7.35E+02					9.57E+02			YES		1.25E+03			YES		6.12E+02				
Manganese	mg/kg	1.90E+04	1.36E+03	3.63E+02	7.88E+01					1.81E+02					3.90E+01					6.25E+02				YES
Mercury	mg/kg	1.20E-01	7.00E-02	2.33E+00	ND					3.12E-02	J				7.99E-02	J		YES		7.71E-02	J		YES	
Nickel	mg/kg	3.80E+01	1.29E+01	1.54E+02	4.78E+00					7.33E+00					6.95E+00					1.13E+01				
Potassium	mg/kg	6.15E+03	7.11E+02	NA	7.64E+02			YES		7.31E+02			YES		1.32E+03			YES		8.68E+02			YES	
Sodium	mg/kg	6.43E+02	7.02E+02	NA	7.87E+01	J				3.95E+01	J				4.50E+01	J				ND				
Thallium	mg/kg	2.40E+01	1.40E+00	5.08E-01	ND					ND					ND					3.89E+00			YES	YES
Vanadium	mg/kg	9.90E+01	6.49E+01	5.31E+01	1.70E+01					1.63E+01					2.92E+01					6.66E+01			YES	YES
Zinc	mg/kg	8.90E+01	3.49E+01	2.34E+03	2.26E+01	J				1.46E+01	J				1.81E+01	J				3.33E+01	J			
VOLATILE ORGANIC COMPOUNDS																								
Acetone	mg/kg	NA	NA	7.76E+02	8.10E-02	J				NR					NR					NR				
Methylene chloride	mg/kg	NA	NA	8.41E+01	ND					NR					NR					NR				
PESTICIDES																								
beta-BHC	mg/kg	NA	NA	3.50E-01	ND					NR					NR					NR				

Table 2-4

Subsurface Soil Analytical Results
Former 37mm Antitank Range, Parcel 230Q-X, and Former Rifle Range, Parcel 149Q
Fort McClellan, Calhoun County, Alabama

Sample Location					HR-230Q-GP09					HR-230Q-GP10					HR-230Q-MW01				
Sample Number					QT0019					QT0021					QT0023				
Sample Date					19-Jun-02					20-Jun-02					14-Jun-02				
Sample Depth (Feet)					3 - 4					3 - 4					3 - 4				
Parameter	Units	UBR[a]	BKG[b]	SSSL[c]	Result	Qual	>UBR	>BKG	>SSSL	Result	Qual	>UBR	>BKG	>SSSL	Result	Qual	>UBR	>BKG	>SSSL
METALS																			
Aluminum	mg/kg	2.46E+04	1.36E+04	7.80E+03	7.43E+03					9.83E+03				YES	9.70E+03				YES
Antimony	mg/kg	9.90E-01	1.31E+00	3.11E+00	ND					ND					ND				
Arsenic	mg/kg	3.80E+01	1.83E+01	4.26E-01	1.63E+00				YES	2.03E+00				YES	1.67E+00				YES
Barium	mg/kg	4.50E+03	2.34E+02	5.47E+02	2.82E+01					4.82E+01					4.85E+01				
Beryllium	mg/kg	2.00E+00	8.60E-01	9.60E+00	ND					5.52E-01	J				ND				
Calcium	mg/kg	3.65E+03	6.37E+02	NA	5.36E+01	J				9.57E+01	J				1.50E+02				
Chromium	mg/kg	5.50E+01	3.83E+01	2.32E+01	7.82E+00	J				1.12E+01	J				1.06E+01				
Cobalt	mg/kg	9.60E+01	1.75E+01	4.68E+02	2.07E+00	J				9.91E+00					3.61E+00				
Copper	mg/kg	6.10E+01	1.94E+01	3.13E+02	2.98E+00					5.50E+00					2.92E+00				
Iron	mg/kg	4.80E+04	4.48E+04	2.34E+03	6.73E+03	J			YES	1.09E+04				YES	1.23E+04				YES
Lead	mg/kg	5.00E+02	3.85E+01	4.00E+02	5.96E+00					1.41E+01					6.59E+00				
Magnesium	mg/kg	5.94E+03	7.66E+02	NA	3.05E+02					1.14E+03			YES		8.11E+02			YES	
Manganese	mg/kg	1.90E+04	1.36E+03	3.63E+02	1.55E+02					4.97E+02				YES	1.10E+02				
Mercury	mg/kg	1.20E-01	7.00E-02	2.33E+00	ND					ND					ND				
Nickel	mg/kg	3.80E+01	1.29E+01	1.54E+02	3.28E+00					5.96E+00					4.00E+00	B			
Potassium	mg/kg	6.15E+03	7.11E+02	NA	2.52E+02	J				1.44E+03			YES		1.13E+03			YES	
Sodium	mg/kg	6.43E+02	7.02E+02	NA	ND					4.23E+01	J				4.69E+01	J			
Thallium	mg/kg	2.40E+01	1.40E+00	5.08E-01	ND					ND					ND				
Vanadium	mg/kg	9.90E+01	6.49E+01	5.31E+01	1.29E+01					1.66E+01					1.80E+01				
Zinc	mg/kg	8.90E+01	3.49E+01	2.34E+03	8.60E+00	J				1.82E+01	J				8.54E+00				
VOLATILE ORGANIC COMPOUNDS																			
Acetone	mg/kg	NA	NA	7.76E+02	NR					1.50E-01					NR				
Methylene chloride	mg/kg	NA	NA	8.41E+01	NR					1.60E-03	B				NR				
PESTICIDES																			
beta-BHC	mg/kg	NA	NA	3.50E-01	NR					2.00E-03	J				NR				

Table 2-4

Subsurface Soil Analytical Results
Former 37mm Antitank Range, Parcel 230Q-X, and Former Rifle Range, Parcel 149Q
Fort McClellan, Calhoun County, Alabama

Sample Location					HR-230Q-MW02					HR-230Q-MW03				
Sample Number					QT0025					QT0028				
Sample Date					17-Jun-02					17-Jun-02				
Sample Depth (Feet)					3 - 4					3 - 4				
Parameter	Units	UBR[a]	BKG[b]	SSSL[c]	Result	Qual	>UBR	>BKG	>SSSL	Result	Qual	>UBR	>BKG	>SSSL
METALS														
Aluminum	mg/kg	2.46E+04	1.36E+04	7.80E+03	9.29E+03				YES	1.94E+04			YES	YES
Antimony	mg/kg	9.90E-01	1.31E+00	3.11E+00	ND					ND				
Arsenic	mg/kg	3.80E+01	1.83E+01	4.26E-01	1.77E+00				YES	2.29E+00				YES
Barium	mg/kg	4.50E+03	2.34E+02	5.47E+02	4.69E+01					5.28E+01				
Beryllium	mg/kg	2.00E+00	8.60E-01	9.60E+00	ND					ND				
Calcium	mg/kg	3.65E+03	6.37E+02	NA	1.73E+02					9.17E+01	J			
Chromium	mg/kg	5.50E+01	3.83E+01	2.32E+01	9.82E+00					1.64E+01				
Cobalt	mg/kg	9.60E+01	1.75E+01	4.68E+02	3.66E+00					3.10E+00				
Copper	mg/kg	6.10E+01	1.94E+01	3.13E+02	6.26E+00					6.46E+00				
Iron	mg/kg	4.80E+04	4.48E+04	2.34E+03	9.63E+03				YES	2.02E+04				YES
Lead	mg/kg	5.00E+02	3.85E+01	4.00E+02	4.84E+01			YES		1.02E+01				
Magnesium	mg/kg	5.94E+03	7.66E+02	NA	5.66E+02					1.09E+03			YES	
Manganese	mg/kg	1.90E+04	1.36E+03	3.63E+02	1.75E+02					2.26E+01				
Mercury	mg/kg	1.20E-01	7.00E-02	2.33E+00	ND					ND				
Nickel	mg/kg	3.80E+01	1.29E+01	1.54E+02	4.09E+00	B				7.13E+00	B			
Potassium	mg/kg	6.15E+03	7.11E+02	NA	6.98E+02					1.16E+03			YES	
Sodium	mg/kg	6.43E+02	7.02E+02	NA	4.68E+01	J				7.14E+01	J			
Thallium	mg/kg	2.40E+01	1.40E+00	5.08E-01	ND					ND				
Vanadium	mg/kg	9.90E+01	6.49E+01	5.31E+01	1.59E+01					3.13E+01				
Zinc	mg/kg	8.90E+01	3.49E+01	2.34E+03	1.03E+01					2.00E+01				
VOLATILE ORGANIC COMPOUNDS														
Acetone	mg/kg	NA	NA	7.76E+02	NR					NR				
Methylene chloride	mg/kg	NA	NA	8.41E+01	NR					NR				
PESTICIDES														
beta-BHC	mg/kg	NA	NA	3.50E-01	NR					NR				

Analyses performed using U.S. Environmental Protection Agency (EPA) SW-846 analytical methods.

[a] UBR - Upper background range as given in Science Applications International Corporation (SAIC), 1998, *Final Background Metals Survey Report, Fort McClellan, Alabama* , July.

[b] BKG - Background. Concentration listed is two times (2x) the arithmetic mean of background metals concentration given in SAIC, 1998.

[c] Residential human health site-specific screening level (SSSL) as given in IT Corporation (2000), *Final Human Health and Ecological Screening Values and PAH Background Summary Report, Fort McClellan, Calhoun County, Alabama* , July.

B - Analyte detected in laboratory or field blank at concentration greater than the reporting limit (and greater than zero).

J - Compound was positively identified; reported value is an estimated concentration.

mg/kg - Milligrams per kilogram.

NA - Not available.

ND - Not detected.

NR - Not requested.

Qual - Data validation qualifier.

Table 2-5

Groundwater Analytical Results
Former 37mm Antitank Range, Parcel 230Q-X, and Former Rifle Range, Parcel 149Q
Fort McClellan, Calhoun County, Alabama

Sample Location					HR-230Q-MW01					HR-230Q-MW02					HR-230Q-MW03				
Sample Number					QT3001					QT3002					QT3004				
Sample Date					15-Jul-02					18-Jul-02					19-Jul-02				
Parameter	Units	UBR[a]	BKG[b]	SSSL[c]	Result	Qual	>UBR	>BKG	>SSSL	Result	Qual	>UBR	>BKG	>SSSL	Result	Qual	>UBR	>BKG	>SSSL
METALS																			
Aluminum	mg/L	9.60E+00	2.34E+00	1.56E+00	ND					2.50E+00			YES	YES	5.01E-01	J			
Arsenic	mg/L	2.24E-01	1.78E-02	4.40E-05	ND					ND					2.65E-03	B			YES
Barium	mg/L	4.01E-01	1.27E-01	1.10E-01	1.05E-02					2.24E-02					2.67E-02				
Calcium	mg/L	4.52E+02	5.65E+01	NA	2.57E+01					1.84E+01					1.73E+01				
Iron	mg/L	2.58E+01	7.04E+00	4.69E-01	4.85E-02	J				2.39E+00				YES	1.03E+00				YES
Lead	mg/L	2.70E-02	8.00E-03	1.50E-02	ND					1.31E-03	J				1.60E-03	J			
Magnesium	mg/L	1.49E+02	2.13E+01	NA	1.53E+01					1.13E+01					1.12E+01				
Manganese	mg/L	5.82E+00	5.81E-01	7.35E-02	2.23E-02	J				2.09E-01				YES	1.91E-01				YES
Potassium	mg/L	6.85E+01	7.20E+00	NA	ND					1.95E+00	B				ND				
Selenium	mg/L	NA	NA	7.82E-03	3.15E-03	J				ND					ND				
Sodium	mg/L	6.47E+01	1.48E+01	NA	9.45E-01	B				1.22E+00					2.39E+00				
VOLATILE ORGANIC COMPOUNDS																			
Methylene chloride	mg/L	NA	NA	7.85E-03	3.40E-04	B				NR					NR				
EXPLOSIVES																			
2-Nitrotoluene	mg/L	NA	NA	1.53E-02	ND					9.80E-04	J				ND				
4-Amino-2,6-dinitrotoluene	mg/L	NA	NA	9.30E-05	ND					2.90E-04	J			YES	ND				

Analyses performed using U.S. Environmental Protection Agency (EPA) SW-846 analytical methods.

[a] UBR - Upper background range as given in Science Applications International Corporation (SAIC), 1998, *Final Background Metals Survey Report, Fort McClellan, Alabama* , July.

[b] BKG - Background. Concentration listed is two times (2x) the arithmetic mean of background metals concentration given in SAIC, 1998.

[c] Residential human health site-specific screening level (SSSL) as given in IT Corporation (2000), *Final Human Health and Ecological Screening Values and PAH Background Summary Report, Fort McClellan, Calhoun County, Alabama* , July.

B - Analyte detected in laboratory or field blank at concentration greater than the reporting limit (and greater than zero).

J - Compound was positively identified; reported value is an estimated concentration.

mg/L - Milligrams per liter.

NA - Not available.

ND - Not detected.

NR - Not requested.

Qual - Data validation qualifier.

Table 2-6

Surface Water Analytical Results
Former 37mm Antitank Range, Parcel 230Q-X, and Former Rifle Range, Parcel 149Q
Fort McClellan, Calhoun County, Alabama

Sample Location						HR-230Q-SW/SD01						HR-230Q-SW/SD02					
Sample Number						QT2001						QT2003					
Sample Date						16-May-02						16-May-02					
Parameter	Units	UBR[a]	BKG[b]	SSSL[c]	ESV[c]	Result	Qual	>UBR	>BKG	>SSSL	>ESV	Result	Qual	>UBR	>BKG	>SSSL	>ESV
METALS																	
Aluminum	mg/L	4.78E+01	5.26E+00	1.53E+01	8.70E-02	9.31E-02	J				YES	4.59E-01					YES
Arsenic	mg/L	1.10E-02	2.17E-03	7.30E-04	1.90E-01	2.08E-03	B			YES		ND					
Barium	mg/L	2.00E-01	7.54E-02	1.10E+00	3.90E-03	2.66E-02					YES	1.86E-02					YES
Calcium	mg/L	6.41E+01	2.52E+01	NA	1.16E+02	9.61E-01	J					5.79E+00					
Iron	mg/L	2.32E+02	1.96E+01	4.70E+00	1.00E+00	8.36E-02	J					4.31E-01	J				
Magnesium	mg/L	2.44E+01	1.10E+01	NA	8.20E+01	9.46E-01	J					3.68E+00					
Manganese	mg/L	6.06E+00	5.65E-01	6.40E-01	8.00E-02	3.15E-02	J					2.22E-02	J				
Potassium	mg/L	7.12E+00	2.56E+00	NA	5.30E+01	1.38E+00	J					1.29E+00	B				
Sodium	mg/L	1.52E+01	3.44E+00	NA	6.80E+02	1.50E+00						1.23E+00					

Analyses performed using U.S. Environmental Protection Agency (EPA) SW-846 analytical methods.

[a] UBR - Upper background range as given in Science Applications International Corporation (SAIC), 1998, *Final Background Metals Survey Report, Fort McClellan, Alabama*, July.

[b] BKG - Background. Concentration listed is two times (2x) the arithmetic mean of background metals concentration given in SAIC, 1998.

[c] Recreational site user site-specific screening level (SSSL) and ecological screening value (ESV) as given in IT Corporation (2000), *Final Human Health and Ecological Screening Values and PAH Background Summary Report, Fort McClellan, Calhoun County, Alabama,* July.

B - Analyte detected in laboratory or field blank at concentration greater than the reporting limit (and greater than zero).

J - Compound was positively identified; reported value is an estimated concentration.

mg/L - Milligrams per liter.

NA - Not available.

ND - Not detected.

Qual - Data validation qualifier.

Table 2-7

Sediment Analytical Results
Former 37mm Antitank Range, Parcel 230Q-X, and Former Rifle Range, Parcel 149Q
Fort McClellan, Calhoun County, Alabama

Sample Location						HR-230Q-SW/SD01						HR-230Q-SW/SD02					
Sample Number						QT1001						QT1003					
Sample Date						16-May-02						16-May-02					
Sample Depth (Feet)						0- 0.5						0- 0.5					
Parameter	**Units**	**UBR[a]**	**BKG[b]**	**SSSL[c]**	**ESV[c]**	**Result**	**Qual**	**>UBR**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**Qual**	**>UBR**	**>BKG**	**>SSSL**	**>ESV**
METALS																	
Aluminum	mg/kg	1.74E+04	8.59E+03	1.15E+06	NA	1.14E+04			YES			7.40E+03					
Arsenic	mg/kg	2.00E+01	1.13E+01	5.58E+01	7.24E+00	2.13E+00						2.02E+00					
Barium	mg/kg	2.72E+02	9.89E+01	8.36E+04	NA	5.80E+01						3.86E+01					
Beryllium	mg/kg	1.20E+00	9.70E-01	1.50E+02	NA	6.22E-01	J					7.82E-01	J				
Calcium	mg/kg	2.81E+03	1.11E+03	NA	NA	1.67E+02						4.15E+02					
Chromium	mg/kg	6.30E+01	3.12E+01	2.79E+03	5.23E+01	9.45E+00						1.03E+01					
Cobalt	mg/kg	2.20E+01	1.10E+01	6.72E+04	5.00E+01	5.11E+00						3.06E+00					
Copper	mg/kg	5.90E+01	1.71E+01	4.74E+04	1.87E+01	1.38E+01	J					4.58E+00					
Iron	mg/kg	5.75E+04	3.53E+04	3.59E+05	NA	7.90E+03						1.01E+04					
Lead	mg/kg	1.10E+02	3.78E+01	4.00E+02	3.02E+01	7.96E+01	J		YES		YES	1.05E+01	J				
Magnesium	mg/kg	3.27E+03	9.06E+02	NA	NA	7.21E+02						5.62E+02					
Manganese	mg/kg	2.05E+03	7.12E+02	4.38E+04	NA	1.69E+02						5.83E+01	J				
Mercury	mg/kg	2.80E-01	1.10E-01	2.99E+02	1.30E-01	5.11E-02	J					6.81E-02	J				
Nickel	mg/kg	3.30E+01	1.30E+01	1.76E+04	6-Feb	6.72E+00						3.96E+00					
Potassium	mg/kg	4.81E+03	1.01E+03	NA	NA	7.00E+02						4.77E+02	J				
Vanadium	mg/kg	6.70E+01	4.09E+01	4.83E+03	NA	1.54E+01						2.69E+01					
Zinc	mg/kg	1.11E+02	5.27E+01	3.44E+05	1.24E+02	1.66E+01						9.01E+00	J				
HERBICIDES																	
MCPP	mg/kg	NA	NA	1.04E+03	NA	4.60E+00	J					NR					
PESTICIDES																	
alpha-BHC	mg/kg	NA	NA	1.17E+01	6.00E-03	1.90E-03	J					NR					
TOTAL ORGANIC CARBON																	
Total Organic Carbon	mg/kg	NA	NA	NA	NA	1.07E+04						1.04E+04					

Analyses performed using U.S. Environmental Protection Agency (EPA) SW-846 analytical methods.

[a] UBR - Upper background range as given in Science Applications International Corporation (SAIC), 1998, *Final Background Metals Survey Report, Fort McClellan, Alabama* , July.

[b] BKG - Background. Concentration listed is two times (2x) the arithmetic mean of background metals concentration given in SAIC, 1998.

[c] Recreational site user site-specific screening level (SSSL) and ecological screening value (ESV) as given in IT Corporation (2000), *Final Human Health and Ecological Screening Values and PAH Background Summary Report, Fort McClellan, Calhoun County , Alabama,* July.

B - Analyte detected in laboratory or field blank at concentration greater than the reporting limit (and greater than zero).

J - Compound was positively identified; reported value is an estimated concentration.

mg/kg - Milligrams per kilogram.

NA - Not available.

ND - Not detected.

NR - Not requested.

Qual - Data validation qualifier.

- Antimony (6.92 mg/kg) exceeded its ESV (3.5 mg/kg) and upper background range (2.6 mg/kg) at sample location HR-230Q-MW02.

- Copper (86.7 to 159 mg/kg) exceeded its ESV (40 mg/kg) and upper background range (24 mg/kg) at 2 sample locations (HR-230Q-GP08 and HR-230Q-MW02).

- Lead (98.3 to 1,290 mg/kg) exceeded its ESV (50 mg/kg) and upper background range (83 mg/kg) at 6 sample locations.

Lead concentrations in surface soil are presented on Figure 2-2.

Volatile Organic Compounds. Two surface soil samples were analyzed for VOCs. Acetone was detected in both at concentrations below its SSSL and ESV.

Semivolatile Organic Compounds. Two surface soil samples were analyzed for SVOCs. SVOCs were not detected in the samples.

Pesticides. Two surface soil samples were analyzed for pesticides. A total of four pesticides (4,4'-dichlorodiphenyldichloroethane (DDD), 4,4'-dichlorodiphenyltrichloroethane (DDT), beta-hexachlorocyclohexane (BHC), and heptachlor) were detected in the samples. The detected pesticide concentrations were below all SSSLs, however; three of the pesticides equalled or exceeded exceeded ESVs:

- 4,4'-DDD (0.0025 mg/kg) equalled its ESV (0.0025 mg/kg) at sample location HR-230Q-GP05.

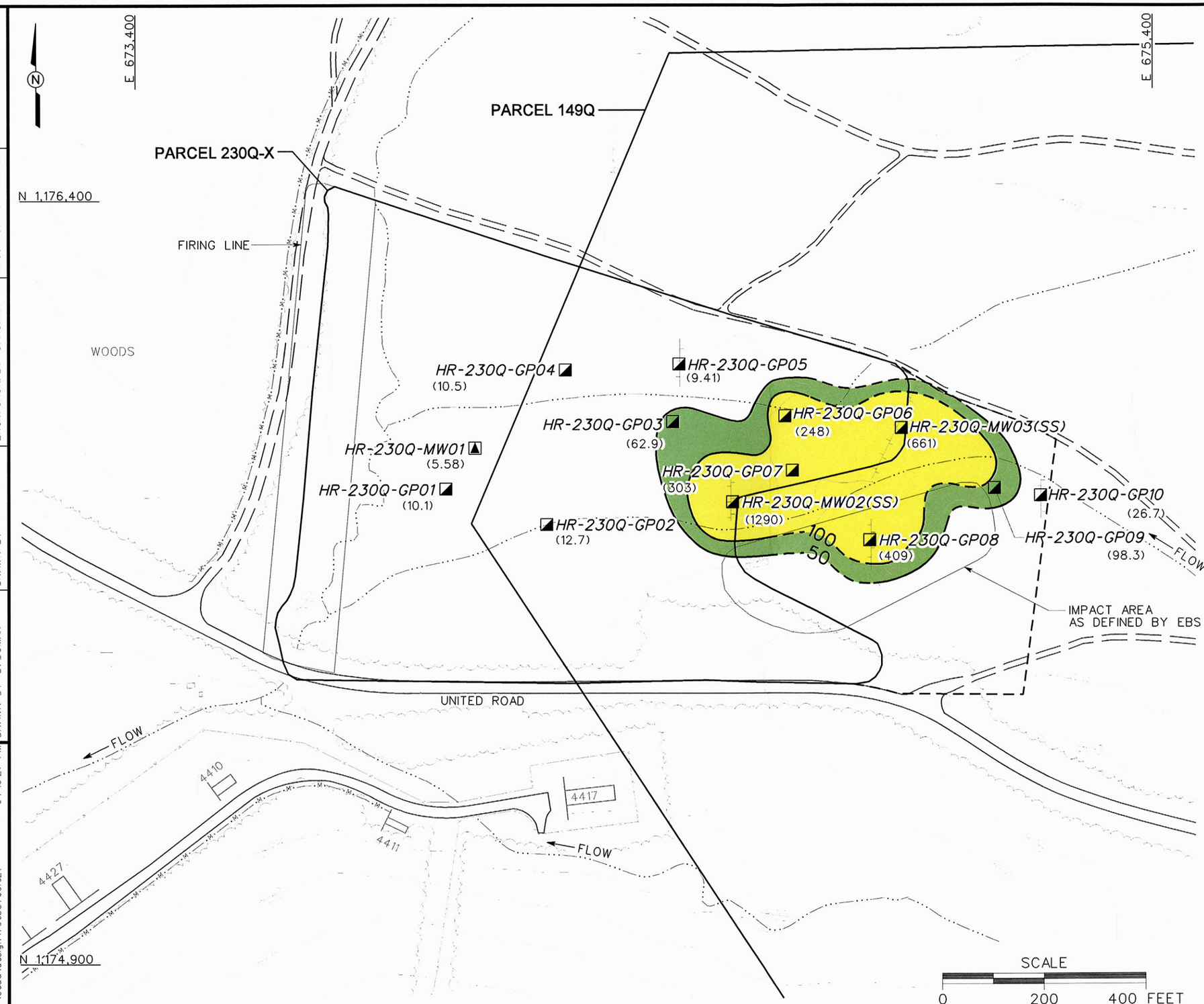
- 4,4'-DDT (0.0028 mg/kg) exceeded its ESV (0.0025 mg/kg) at sample location HR-230Q-GP10.

- Beta-BHC (0.0015 mg/kg) exceeded its ESV (0.001 mg/kg) at sample location HR-230Q-GP10.

These pesticide results were flagged with a "J" data qualifier, indicating that the compounds were detected at estimated concentrations below method reporting limits.

Herbicides. Two surface soil samples were analyzed for herbicides. Herbicides were not detected in the samples.

Explosives. Explosives were not detected in the surface soil samples collected at the site.



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
- BERM
- SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION
- GROUNDWATER, SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION
- 50 — LEAD CONCENTRATION (mg/kg) (DASHED WHERE INFERRED)
- (98.3) — CONCENTRATION IN MILLIGRAMS PER KILOGRAM (mg/kg)
- UBR — UPPER BACKGROUND RANGE
- ESV — ECOLOGICAL SCREENING VALUE

NOTES:

1. ESV FOR LEAD IN SURFACE AND DEPOSITIONAL SOIL IS 50 mg/kg.
2. UBR FOR LEAD IN SURFACE AND DEPOSITIONAL SOIL IS 83 mg/kg.

FIGURE 2-2
LEAD IN SURFACE AND DEPOSITIONAL SOIL
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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DWG. NO.: ..\796887es.621 | PROJ. NO.: 796887
INITIATOR: J. BOND | PROJ. MGR.: J. YACOUB
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2.1.2.2 Subsurface Soil Analytical Results

Thirteen subsurface soil samples were collected at the Former 37mm Antitank Range, Parcel 230Q-X, as shown on Figure 2-1. Analytical results were compared to residential human health SSSLs and metals background concentrations, as presented in Table 2-4.

Metals. A total of 20 metals were detected in subsurface soil samples. The concentrations of eight metals (aluminum, antimony, arsenic, chromium, iron, manganese, thallium, and vanadium) exceeded SSSLs. Of the metals that exceeded SSSLs, aluminum (at four locations), antimony (HR-230Q-GP08), chromium (HR-230Q-GP08), iron (HR-230Q-GP08), thallium (HR-230Q-GP08), and vanadium (HR-230Q-GP08) also exceeded their respective background values. These metals results, however, were within their respective upper background ranges except for the following:

- Antimony (7.14 mg/kg) exceeded its SSSL (3.11 mg/kg) and upper background range (0.99 mg/kg) at one sample location (HR-230Q-GP08).

- Iron (81,200 mg/kg) exceeded its SSSL (2,345 mg/kg) and upper background range (48,000 mg/kg) at one sample location (HR-230Q-GP08).

Volatile Organic Compounds. Two subsurface soil samples were analyzed for VOCs. Two VOCs (acetone and methylene chloride) were detected in the samples at concentrations below their respective SSSLs.

Semivolatile Organic Compounds. Two subsurface soil samples were analyzed for SVOCs. SVOCs were not detected in the samples.

Pesticides. Two subsurface soil samples were analyzed for pesticides. One pesticide (beta-BHC) was detected in one sample at a concentration below its SSSL.

Herbicides. Two subsurface soil samples were analyzed for herbicides. Herbicides were not detected in any of the samples.

Explosives. Explosives were not detected in the subsurface soil samples.

2.1.2.3 Groundwater Analytical Results

Three groundwater samples were collected for chemical analysis at the Former 37mm Antitank Range, Parcel 230Q-X, at the locations shown on Figure 2-1. Analytical results were compared to residential human health SSSLs and metals background screening values, as presented in Table 2-5.

Metals. Eleven metals (aluminum, arsenic, barium, calcium, iron, lead, magnesium, manganese, potassium, selenium, and sodium) were detected in the groundwater samples collected at the site. Of these, only aluminum, arsenic, iron, and manganese were detected at concentrations exceeding their respective SSSLs. However, these metals concentrations were below their background values except for aluminum in one sample. The aluminum concentration (2.5 milligrams per liter [mg/L]) exceeded its SSSL (1.56 mg/L) and background concentration (2.33 mg/L) at sample location HR-230Q-MW02. The aluminum result, however, was within its upper background range.

Volatile Organic Compounds. One groundwater sample was analyzed for VOCs. Methylene chloride, was detected at a concentration below its SSSL.

Semivolatile Organic Compounds. One groundwater sample was analyzed for SVOCs. SVOCs were not detected in the sample.

Pesticides. One groundwater sample was analyzed for pesticides. Pesticides were not detected in the sample.

Herbicides. One groundwater sample was analyzed for herbicides. Herbicides were not detected in the sample.

Explosives. Two explosive compounds (2-nitrotoluene and 4-amino-2,6-dinitrotoluene) were detected at one groundwater sample location (HR-230Q-MW02). The 4-amino-2,6-dinitrololuene result (0.00029 mg/L) exceeded its SSSL (0.000094 mg/L); however, the result was "J" flagged, indicating that the compound was detected at an estimated concentration below the analytical results method reporting limit.

2.1.2.4 Surface Water

Two surface water samples were collected at the Former 37mm Antitank Range, Parcel 230Q-X, as shown on Figure 2-1. Analytical results were compared to recreational site user SSSLs, ESVs, and background screening values, as presented in Table 2-7.

Metals. A total of nine metals (aluminum, arsenic, barium, calcium, iron, magnesium, manganese, potassium, and sodium) were detected in surface water samples. Arsenic (0.0021 mg/L) was detected at a concentration exceeding its SSSL (0.00073 mg/L) at sample location HR-230Q-SW/SD01. Two metals (aluminum and barium) were detected at concentrations

exceeding their respective ESVs in both samples. However, all metals results were below their respective background values.

Volatile Organic Compounds. One surface water sample was analyzed for VOCs. VOCs were not detected in the sample.

Semivolatile Organic Compounds. One surface water sample was analyzed for SVOCs. SVOCs were not detected in the sample.

Pesticides. One surface water sample was analyzed for pesticides. Pesticides were not detected in the sample.

Herbicides. One surface water sample was analyzed for herbicides. Herbicides were not detected in the sample.

Explosives. Explosives were not detected in the surface water samples.

2.1.2.5 Sediment Analytical Results

Two sediment samples were collected at the same locations as the surface water samples, as shown on Figure 2-1. Analytical results were compared to recreational site user SSSLs, ESVs, and background screening values, as presented in Table 2-8.

Metals. A total of seventeen metals were detected in the two sediment samples. These metals results were below their respective SSSLs; however, one lead result (79.6 mg/kg) exceeded its ESV (30.2 mg/kg) and background value (37.8 mg/kg) at sample location HR-230Q-SW/SD01. The lead result was within its upper background range.

Volatile Organic Compounds. One sediment sample was analyzed for VOCs. VOCs were not detected in the sample.

Semivolatile Organic Compounds. One sediment sample was analyzed for SVOCs. SVOCs were not detected in the sample.

Pesticides. One sediment sample was analyzed for pesticides. Alpha-BHC was detected in sample at a concentration below its SSSL and ESV.

Herbicides. One sediment sample was analyzed for herbicides. MCPP was detected in sediment sample at a concentration below its SSSL (Note: an ESV for MCPP was not available).

Explosives. Explosives were not detected in the sediment samples.

Total Organic Carbon. One sediment sample was analyzed for TOC content. The TOC content in the sample was 10,700 mg/kg.

Grain Size. The results of grain size analysis for the sediment sample are included in Appendix F.

2.1.3 SI Summary and Conclusions

Comparison of the analytical data to the SSSLs, ESVs, and background screening values indicates the human health chemicals of potential concern at the Former 37mm Antitank Range, Parcel 230Q-X are three metals in soils and one explosive in groundwater. Antimony, lead, and iron exceeded their respective SSSLs and upper background ranges in a total of 6 samples at three surface and one subsurface soil sample locations. One explosive (4-amino-2,6-dinitrotoluene), was detected in one groundwater sample at a concentration exceeding its SSSL.

Constituents of potential ecological concern include metals and pesticides in surface soil and lead in sediment. Three metals (antimony, copper, and lead) exceeded their respective ESVs and upper background ranges in a total of 9 samples at six surface soil sample locations. Lead also exceeded its ESV and background value in one sediment sample. Three pesticides were detected in one surface soil sample each at concentrations exceeding their respective ESVs.

Based on the results of the SI, past training operations at Parcels 230Q-X and 149Q, appear to have adversely impacted the environment. The most significant finding of the SI was the detection of the aforementioned metals in surface and subsurface soils. The lead detected in site media may pose an unacceptable risk to human health and the environment. The SI data for Parcels 230Q-X and 149Q were presented to the BCT in November 2002. Therefore, the BCT recommended that the nature and extent of the lead contamination in soil be defined at Parcels 230Q-X and 149Q. Also, the BCT agreed that the three existing monitoring wells at Parcels 230Q-X and 149Q will be resampled to verify the previous SI results and to install and sample five additional monitoring wells to determine if contaminants are present.

3.0 Site-Specific Data Quality Objectives

3.1 Overview

The data quality objective (DQO) process is followed to establish data requirements. This process ensures that the proper quantity and quality of data are generated to support the decision-making process associated with the future action for Former 37mm Antitank Range, Parcel 230Q-X and Former Rifle Range, Parcel 149Q. This section incorporates the components of the DQO process described in the publication EPA 600/R-96/005 *Guidance for the Data Quality Objectives Process* (EPA, 2000). The DQO process as applied to Former 37mm Antitank Range, Parcel 230Q-X and Former Rifle Range, Parcel 149Q is described in more detail in Section 3.4 of this RI SFSP. Table 3-1 provides a summary of the factors used to determine the appropriate quantity of samples and the procedures necessary to meet the objectives of the RI and establish a basis for future action at this site.

To support the RI at Former 37mm Antitank Range, Parcel 230Q-X and Former Rifle Range, Parcel 149Q, five sample media will be collected for analysis: groundwater, surface soil, subsurface soil, surface water, and sediment. The samples will be analyzed for this RI using EPA SW-846 methods, including Update III Methods where applicable, as presented in Chapter 4.0 in this RI SFSP and Section 5.0 of the QAP. Data will be reported in accordance with the definitive data requirements of the USACE Engineer Manual, *Chemical Quality Assurance for Hazardous, Toxic and Radioactive Waste (HTRW) Projects* (USACE, 1997) and evaluated by the stipulated requirements for the generation of definitive data (Section 7.2.2 of the QAP). Chemical data will be reported by the laboratory via hard-copy data packages using Contract Laboratory Program-like forms along with electronic copies. These packages will be validated in accordance with EPA National Functional Guidelines Level III criteria.

3.2 Data Users and Available Data

The available data related to the RI SFSP at Former 37mm Antitank Range, Parcel 230Q-X and Former Rifle Range, Parcel 149Q, presented in Table 3-1, have been used to formulate a site-specific conceptual model. This conceptual model was developed to support the development of this RI SFSP, which is necessary to meet the objectives of these activities and to establish a basis for future action at the site. The data users for information generated during field activities are primarily EPA, USACE, ADEM, FTMC, and the USACE supporting contractors. This RI SFSP, along with the necessary companion documents, has been designed to provide the regulatory agencies with sufficient detail to reach a determination as to the adequacy of the scope of work. The program has also been designed to provide defensible information required to confirm or deny the existence and nature of residual chemical contamination in site media.

Table 3-1

Summary of Data Quality Objectives
Former 37mm Antitank Range, Parcel 230Q-X, and Former Rifle Range, Parcel 149Q
Remedial Investigation
Fort McClellan, Calhoun County, Alabama

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	Previous site investigation by IT that show potential metals contamination.	Contaminant Source Former 37mm Antitank Range and Former Rifle Range training activities. Migration Pathways Rain runoff and erosion to surface soil, infiltration and leaching to subsurface soil and groundwater, dust emissions and volatilization to ambient air, runoff to surface water, erosion to sediment, and biotransfer to venison. Potential Receptors Recreational site user (current and future) Resident (future) PSSC Primarily metals	Surface soil Subsurface Soil Groundwater Surface water Sediment	RI to delineate vertical and horizontal extent of contamination in the site media Definitive quality data for future decision-making	Surface soil VOCs, SVOCs, metals, nitroaromatic/nitramine explosives, chlorinated and organophosphorus pesticides, chlorinated herbicides and PCBs	Definitive data in data packages (as defined in USACE EM200-1-6)	20 surface soil samples + QC
					Subsurface Soil VOCs, SVOCs, metals, nitroaromatic/nitramine explosives, chlorinated and organophosphorus pesticides, chlorinated herbicides and PCBs	Definitive data in data packages (as defined in USACE EM200-1-6)	40 subsurface soil samples + QC
					Groundwater VOCs, SVOCs, metals, nitroaromatic/nitramine explosives, chlorinated and organophosphorus pesticides, chlorinated herbicides and PCBs	Definitive data in data packages (as defined in USACE EM200-1-6)	8 groundwater samples + QC
					Surface water VOCs, SVOCs, metals, nitroaromatic/nitramine explosives, chlorinated and organophosphorus pesticides, chlorinated herbicides and PCBs	Definitive data in data packages (as defined in USACE EM200-1-6)	8 surface water samples + QC
					Sediment VOCs, SVOCs, metals, nitroaromatic/nitramine explosives, chlorinated and organophosphorus pesticides, chlorinated herbicides and PCBs; plus TOC and grain size	Definitive data in data packages (as defined in USACE EM200-1-6)	8 sediment samples + QC

ADEM - Alabama Department of Environmental Management.
EPA - U.S. Environmental Protection Agency.
FTMC - Fort McClellan.
PSSC - Potential site-specific chemical.
QC - Quality control.
RI - Remedial investigation.
TOC - Total organic carbon
PCB - polychlorinated biphenyls
VOC - Volatile Organic Compounds.
SVOC - Semi-volatile Organic Compounds.
EM200-1-6 - USACE Engineering Manual, Chemical Quality Assurance for HTRW Projects, October 10, 1997.
USACE - U.S. Army Corps of Engineers.

3.3 Conceptual Site Exposure Model

The conceptual site exposure model (CSEM) provides the basis for identifying and evaluating potential risks to human health in the risk assessment. The CSEM includes all receptors and potential exposure pathways appropriate to all plausible scenarios. The CSEM facilitates consistent and comprehensive evaluation of risk to human health through graphically presenting all possible exposure pathways, including all sources, release and transport pathways, and exposure routes. In addition, the CSEM helps to ensure that potential pathways are not overlooked. The elements of a complete exposure pathway and CSEM are:

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

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

Primary contaminant release mechanisms were associated with training exercises and possibly through leaks and spills. Potential contaminant transport pathways include rain runoff and erosion to surface soil, infiltration and leaching to subsurface soil and groundwater, dust emissions and volatilization to ambient air, surface water runoff and erosion to surface water and sediment, and biotransfer to deer through browsing.

Former 37mm Antitank Range, Parcel 230Q-X and Former Rifle Range, Parcel 149Q, is a heavily wooded area and is not currently used by Base personnel. The site is not fenced and, thus, is accessible to trespassers. Because trespassers or hunters may access the site, a recreational site user who hunts will be evaluated for the current land-use scenario. The site is no longer used for training and no construction is occurring at the site, nor is it currently maintained by a groundskeeper. Therefore, the only plausible receptor evaluated under the current land-use scenario is the recreational site user who hunts. Fish ingestion will not be evaluated because the surface water is insufficient to support fish for consumption. Other potential receptors considered, but not included under current land-use scenarios, are the:

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

Future land use for the area of investigation is shown as part of the remediation reserve to be used for passive recreation (EDAW, Inc., 1997). Potential receptor scenarios evaluated for the future include the following:

- ***Recreational Site User.*** Because future land use is likely passive recreation, and hunting may be possible, the recreational site user who hunts is included.

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

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

3.4 Decision-Making Process, Data Uses, and Needs

3.4.1 Risk Evaluation

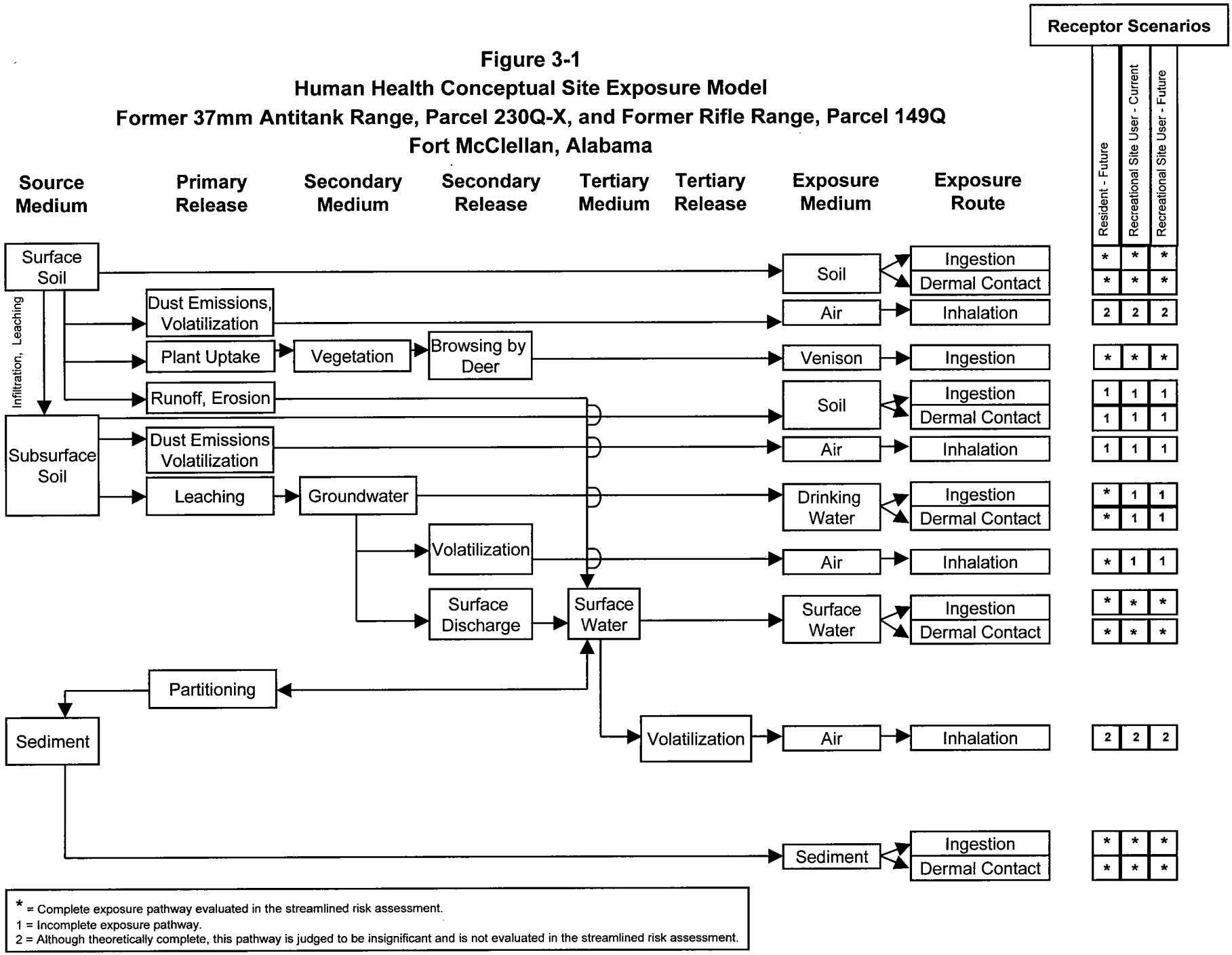
Confirmation of contamination at Former 37mm Antitank Range, Parcel 230Q-X and Former Rifle Range, Parcel 149Q, will be based on using EPA-definitive data to determine whether or not PSSCs are detected in site media. Results from these analyses will be compared with SSSLs, ESVs, and background values to determine if PSSCs are present at the site at concentrations that pose an unacceptable risk to human health or the environment. Definitive data will be adequate for confirming the presence of site contamination and for supporting a FS and risk assessment. Assessment of potential ecological risk associated with sites or parcels (e.g., surface water and sediment sampling, specific ecological assessment methods) will be addressed in accordance with the procedures in Section 5.3 of the work plan (IT, 2002b).

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 RI at Former 37mm Antitank Range, Parcel 230Q-X and Former Rifle Range, Parcel 149Q. In association with these definitive samples, quality assurance/quality control (QA/QC) samples will be collected for sample types as described in Chapter 5.0 of this RI SFSP.

Samples will be analyzed by EPA-approved SW-846 methods Update III, where available comply with EPA-definitive data requirements, and be reported using hard-copy data packages. In addition to meeting the quality needs of this RI SFSP, data analyzed at this level of quality are appropriate for all phases of site characterization, RI, and risk assessment.

Figure 3-1
Human Health Conceptual Site Exposure Model
Former 37mm Antitank Range, Parcel 230Q-X, and Former Rifle Range, Parcel 149Q
Fort McClellan, Alabama



3.4.3 Precision, Accuracy, and Completeness

Laboratory requirements of precision, accuracy, and completeness for this RI SFSP are defined in Section 3.1 and presented in Section 5.0 of the QAP (IT, 2002a).

4.0 Field Investigations

This remedial investigation will consist of a five-phase approach. The investigation phases are as follows:

- XRF survey of surface soil to determine soil boring and monitoring well locations.
- Install a total of 20 soil borings and collect one surface soil sample and two discrete subsurface soil samples from each soil boring (a total of 20 surface soil samples and 40 subsurface soil samples).
- Install five monitoring wells.
- Collect eight groundwater samples from five proposed and three pre-existing monitoring wells.
- Collect eight surface water and eight sediment samples.

XRF surface soil screening will be carried out in situ at approximately 80 locations within a grid installed in the area of investigation at Parcels 230Q-X and 149Q, as shown on Figure 4-1. Samples for XRF screening will be collected at the grid line intersections or "grid nodes." Additional XRF screening locations will be selected in the area of investigation not covered by the grid to screen for hot spots. The purpose of the XRF surface soil screening will be to screen the surface soils in the area of SI sample locations HR-230-GP06, HR-230-GP07, HR-230-GP08, HR-230-MW02(SS), and HR-230-MW03(SS). Soil borings and monitoring wells will be installed using the XRF surface soil screening results to collect samples for analysis to define the horizontal extent of the presence of lead.

A total of 20 soil borings will be installed at Parcels 230Q-X and 149Q to provide data to determine the vertical and horizontal extent of potential metals contamination in soil. A total of 20 surface soil samples and 40 subsurface soil samples will be collected from the 20 soil borings. Six of the twenty soil boring locations have been selected and are shown on Figure 4-2. XRF surface soil screening data may be used to adjust the final locations of these selected soil borings. The selection of the intervals for the discrete subsurface samples from these soil borings will be based on XRF screening of the subsurface soil showing the highest lead concentrations. The 14 remaining soil borings will be installed based on XRF surface soil screening data and field conditions to select the locations.