Final

Site Investigation Report
Former Rifle/Machine Gun Range, Parcel 98Q

Fort McClellan
Calhoun County, Alabama

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Table of Contents

Table of Contents *(Continued)*

Page

List of Appendices

List of Tables

List of Figures

Executive Summary

In accordance with Contract Number DACA21-96-D-0018, Task Order CK10, Shaw Environmental, Inc. completed a site investigation (SI) at the Former Rifle/Machine Gun Range, Parcel 98Q, at Fort McClellan in Calhoun County, Alabama. The SI was conducted to determine whether chemical constituents are present at the site at concentrations that pose an unacceptable risk to human health or the environment. The SI consisted of the collection and analysis of 32 surface soil samples, 3 depositional soil samples, 32 subsurface soil samples, 1 seep water sample, 1 sediment sample, and 2 groundwater samples. In addition, two permanent monitoring wells were installed in the saturated zone to facilitate groundwater sample collection and to provide site-specific geological and hydrogeological characterization information.

Chemical analysis of samples collected at the site indicates that metals, volatile organic compounds, pesticides, and one herbicide were detected in site media. Neither explosive compounds nor semivolatile organic compounds were detected in site media. To evaluate whether the detected constituents pose an unacceptable risk to human health or the environment, analytical results were compared to human health site-specific screening levels (SSSL), ecological screening values (ESV), and background screening values for Fort McClellan. In addition, site metals data were further evaluated using statistical and geochemcial methods to determine if the metals were site related. A preliminary ecological risk assessment (PERA) was also performed to further characterize potential risks to ecological receptors.

Although the site is projected for passive recreation reuse, the analytical data were screened against residential human health SSSLs to determine if the site is suitable for unrestricted land reuse. Chemicals of potential concern (COPC) were lead and copper in surface soil, the pesticide heptachlor in groundwater, and lead in seep water. Lead and copper concentrations in surface soil, however, were below SSSLs. Although heptachlor was detected at an estimated concentration (0.000062 milligrams per liter [mg/L]) above its SSSL (0.000014 mg/L) in one groundwater sample, the pesticide's concentration was well below the U.S. Environmental Protection Agency maximum contaminant level of 0.0004 mg/L for drinking water. Lead was selected as the only COPC in seep water because its concentration (0.04 mg/L) exceeded its SSSL (0.015 mg/L) and background (0.0087 mg/L). The SSSL, however, is the action level for lead in tap water. Because the incidental nature of exposure to seep water is expected to be far less intense than exposure to tap water, the SSSL is deemed overly conservative. Given these considerations, the metals and pesticide identified in site media at Parcel 98Q are not expected to

pose a threat to human health. These conclusions are consistent with the consensus reached by the BRAC Cleanup Team (BCT) during the September 2006 BCT meeting.

COPECs identified in the PERA were two metals (copper and lead), three pesticides (beta-hexachlorocyclohexane [BHC], gamma-BHC, and dieldrin), and one herbicide (2-[2-methyl-4-chlorophenoxy]propionic acid [MCPP]) in surface soil, heptachlor in groundwater, and lead in seep water. With the exception of lead, the PERA concluded that these COPECs are unlikely to pose significant risk to ecological receptors based on the relative magnitude of the exceedances, comparison to other relevant screening values, and consideration of site-specific conditions. With regard to lead in surface soil at the site, the PERA concluded that the highest detected lead concentrations (92.5 to 349 milligrams per kilogram) are not expected to pose an unacceptable risk to ecological receptors except for potential impacts to only the most sensitive species. Lead in seep water was judged to have the potential to pose adverse ecological effects to aquatic and semi-aquatic species. However, the seep water sample was collected from an intermittent creek (i.e., a wet-weather spring) that is dry during significant portions of the year. The creek would not provide adequate habitat to support an aquatic community. These conclusions are consistent with the conclusions reached by the BCT during the September 2006 BCT meeting.

Based on the results of the SI, past operations at the Former Rifle/Machine Gun Range, Parcel 98Q, have minimally impacted the environment. However, the metals and chemical compounds detected in site media do not pose an unacceptable risk to human health and the environment. Therefore, Shaw Environmental, Inc. recommends "No Further Action" and unrestricted land reuse with regard to Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)-related hazardous substances for the area of investigation at the Former Rifle/Machine Gun Range, Parcel 98Q.

1.0 Introduction

The U.S. Army has selected Fort McClellan (FTMC), located in Calhoun County, Alabama, for closure by the Base Realignment and Closure (BRAC) Commission under Public Laws 100-526 and 101-510. The 1990 Base Closure Act, Public Law 101-510, established the process by which U.S. Department of Defense (DOD) installations would be closed or realigned. The BRAC Environmental Restoration Program requires investigation and cleanup of federal properties prior to transfer to the public domain. The U.S. Army is conducting environmental studies of the impact of suspected contaminants at parcels at FTMC under the management of the U.S. Army Corps of Engineers (USACE)-Mobile District. The USACE contracted Shaw Environmetal, Inc. (Shaw) (formerly IT Corporation [IT]) to perform a site investigation (SI) at the Former Rifle/Machine Gun Range, Parcel 98Q, under Contract Number DACA21-96-D-0018, Task Order CK10.

This report presents specific information and results compiled from the SI, including field sampling and analysis, and monitoring well installation activities conducted at the Former Rifle/Machine Gun Range, Parcel 98Q.

1.1 Project Description

The Former Rifle/Machine Gun Range, Parcel 98Q, was identified as an area to be investigated prior to property transfer. The site was classified as a Category 1 Qualified parcel in the environmental baseline survey (EBS) (Environmental Science and Engineering, Inc. [ESE], 1998). Category 1 Qualified parcels are areas that have no evidence of Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)-related hazardous substance or petroleum product storage, release, or disposal but that do have other environmental or safety concerns. Parcel 98Q was qualified because chemicals of potential concern may be present as a result of historical range activities.

A site-specific work plan, comprised of a field sampling plan (SFSP), a safety and health plan, and an unexploded ordnance (UXO) safety plan, was finalized in January 2002 (IT, 2002a). The work plan was prepared to provide technical guidance for SI field activities at the Former Rifle/Machine Gun Range, Parcel 98Q. The site-specific work plan was used as an attachment to the installation-wide work plan (IT, 1998) and the installation-wide sampling and analysis plan (SAP) (IT, 2000a; IT, 2002b). The SAP includes the installation-wide safety and health plan and quality assurance plan.

The SI consisted of the installation of two groundwater monitoring wells and the collection and analysis of 32 surface soil samples, 32 subsurface soil samples, 3 depositional soil samples, 1 seep water sample, 1 sediment sample, and 2 groundwater samples.

1.2 Purpose and Objectives

The SI program was designed to collect data from site media and provide a level of defensible data and information in sufficient detail to determine whether chemical constituents are present at the Former Rifle/Machine Gun Range, Parcel 98Q, as a result of historical mission-related Army activities. The conclusions of the SI in Chapter 6.0 are based on the comparison of the analytical results 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 Shaw as part of the human health and ecological risk evaluations associated with investigations 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* (Science Applications International Corporation [SAIC], 1998). Site metals data were further evaluated using statistical and geochemical methods to select site-related metals. A preliminary ecological risk assessment (PERA) was also performed to further characterize potential risks to ecological receptors.

Based on the conclusions presented in this SI report, the BRAC Cleanup Team will decide either to propose "No Further Action" or to conduct additional work at the site.

1.3 Site Description and History

The Former Rifle/Machine Gun Range, Parcel 98Q, is located near the intersection of MOUT Road and Syracuse Street in the north-central portion of the Main Post at FTMC (Figure 1-1). Including its range safety fan, Parcel 98Q occupies approximately 700 acres; however, the area of investigation was limited to the firing line and the impact area that occupy approximately 100 acres (Figure 1-2).

According to the EBS, the Former Rifle/Machine Gun Range, Parcel 98Q is one of seven former rifle/machine gun ranges identified in the northern Main Post (ESE, 1998). Dates of operation and types of ordnance fired at this range are unknown; however, based on the range name presented in the EBS, it is assumed that small-arms weapons were used. Aerial photographs indicate that Parcel 98Q was used as a range from 1940 until approximately 1964. An aerial

photograph taken in 1940 (Figure 1-3) clearly indicates activity at Parcel 98Q. A 1954 aerial photograph (Figure 1-4) indicates a clearing on the western side of the parcel with possible target mounds visible. Although areal coverage is incomplete for the entire area of investigation, the 1964 aerial photograph (not shown) shows signs of activity in the northwest area of Parcel 98Q. Vegetation has grown over most of the parcel according to a photograph taken in 1969 (Figure 1-5). By 1998 the parcel had almost entirely re-vegetated; two small clearings remain in the northwest corner (Figure 1-6).

During a SI site walk conducted in November 2001, numerous mounds, berms, targets, and trenches were found. Most of the target berms had an associated pit where the target was likely placed (Figure 1-2).

2.0 Previous Investigations

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 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 have occurred, but required actions have not yet been implemented.

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

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

- A = Asbestos (in buildings)
- L = Lead-based paint (in buildings)
- P = Polychlorinated biphenyls
- R = Radon (in buildings)
- RD = Radionuclides/radiological issues

- X = UXO
- CWM = Chemical warfare material.

The EBS was conducted in accordance with CERFA protocols (Public Law 102-426) and DOD policy regarding contamination assessment. Record searches and reviews were performed on all reasonably available documents from FTMC, the Alabama Department of Environmental Management (ADEM), the U.S. Environmental Protection Agency (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.

Parcel 98Q is an area where no known or recorded storage, release, or disposal (including migration) of hazardous substances or petroleum products has occurred on site property. The parcel, however, was qualified because chemicals of potential concern may be present as a result of range activities. Therefore, the Former Rifle/Machine Gun Range, Parcel 98Q, required additional evaluation to determine its environmental condition.

3.0 Current Site Investigation Activities

This chapter summarizes SI activities conducted by Shaw at the Former Rifle/Machine Gun Range, Parcel 98Q, including UXO avoidance activities, environmental sampling and analysis, and groundwater monitoring well installation activities.

3.1 UXO Avoidance

UXO avoidance was performed at Parcel 98Q following methodology outlined in the SAP. Shaw UXO personnel used a low-sensitivity magnetometer to perform a surface sweep of the area of investigation prior to site access. After the site was cleared for access, sample locations were monitored by UXO personnel following procedures outlined in the SAP.

3.2 Environmental Sampling

Environmental sampling performed during the SI at Parcel 98Q included the collection of surface and depositional soil samples, subsurface soil samples, groundwater samples, one seep water sample, and one sediment sample for chemical analysis. Sample locations were determined by observing site physical characteristics during a site walk and by reviewing historical documents and aerial photographs pertaining to activities conducted at the site. The sample locations, media, and rationale are summarized in Table 3-1. Sampling locations are shown on Figure 3-1. Samples were submitted for laboratory analysis of site-related parameters listed in Section 3.4.

3.2.1 Surface and Depositional Soil Sampling

Surface soil samples were collected from 32 locations and depositional soil samples were collected from 3 locations at Parcel 98Q as shown on Figure 3-1. Soil sampling locations and rationale are presented in Table 3-1. Sample designations and analytical parameters are listed in Table 3-2. Soil sampling locations were determined in the field by the on-site geologist based on UXO avoidance activities, sampling rationale, presence of surface structures, and site topography.

Sample Collection. Surface soil samples were collected from the uppermost foot of soil using a stainless-steel hand auger, following the methodology specified in the SAP. Depositional soil samples were collected from the upper six inches of soil with a stainless-steel spoon. Surface and depositional soil samples were collected by first removing surface debris (e.g., rocks and vegetation) from the immediate sample area. After the soil was collected with the sampling device, it was screened with a photoionization detector (PID) in accordance with procedures outlined in the SAP. As necessary, the soil fraction for volatile organic compound (VOC)

analysis was collected directly from the sampler using three EnCore® samplers. The remaining soil was then transferred to a clean stainless-steel bowl, homogenized, and placed in the appropriate sample containers. Sample collection logs are included in Appendix A. The samples were analyzed for the parameters listed in Table 3-2 using methods outlined in Section 3.4.

3.2.2 Subsurface Soil Sampling

Subsurface soil samples were collected from 32 soil borings at the Former Rifle/Machine Gun Range, Parcel 98Q, as shown on Figure 3-1. Subsurface soil sampling locations and rationale are presented in Table 3-1. Sample designations, depths, and analytical parameters are listed in Table 3-2. Soil boring locations were determined in the field by the on-site geologist based on UXO avoidance activities, sampling rationale, presence of surface structures, and site topography.

Sample Collection. Subsurface soil samples were collected from soil borings at depths greater than one foot below ground surface (bgs) in the unsaturated zone. The soil borings were advanced and soil samples collected using a stainless-steel hand auger following procedures specified in the SAP. Sample collection logs are included in Appendix A. The samples were analyzed for the parameters listed in Table 3-2 using methods outlined in Section 3.4.

Subsurface soil samples were collected continuously to 4 feet bgs or until hand auger refusal was encountered. Samples were field screened using a PID to measure volatile organic vapors. The sample displaying the highest reading was selected and sent to the laboratory for analysis; however, at those locations where PID readings were below background, the deepest sample interval was submitted for analysis. As necessary, the soil fraction for VOC analysis was collected directly from the sampler using three EnCore® samplers. The remaining soil was then transferred to a clean stainless-steel bowl, homogenized, and placed in the appropriate sample containers. The on-site geologist constructed a detailed boring log for each soil boring. The boring logs are included in Appendix B. At the completion of soil sampling, boreholes were abandoned with bentonite pellets and hydrated with potable water following borehole abandonment procedures summarized in the SAP.

3.2.3 Monitoring Well Installation

Two permanent monitoring wells were installed in the saturated zone at Parcel 98Q to collect groundwater samples for laboratory analysis. The well locations are shown on Figure 3-1. Table 3-3 summarizes construction details of the monitoring wells installed at the site. The well construction logs are included in Appendix B.

Shaw contracted Miller Drilling Company to install the permanent wells using a hollow-stem auger drill rig at two of the hand auger soil boring locations (HR-98Q-MW01 and HR-98Q-MW02). The wells were installed following procedures outlined in the SAP. The borehole at each well location was advanced with a 4.25-inch inside diameter (ID) hollow-stem auger from ground surface to the first groundwater-bearing zone in residuum at the well location. Beginning at the completion depth of the hand auger boring, a 2-foot-long, 2-inch ID carbon steel split-spoon sampler was driven at 5-foot intervals to collect residuum for observing and describing lithology. The samples were logged to determine lithologic changes and the approximate depth of groundwater encountered during drilling. This information was used to determine the optimal placement of the monitoring well screen interval and to provide site-specific geological and hydrogeological information. Soil characteristics were described using the "Burmeister Identification System" described in Hunt (1986) and the Unified Soil Classification System as outlined in American Society for Testing and Materials (ASTM) Method D 2488 (ASTM, 2000). The boring logs are included in Appendix B.

Upon reaching the target depth in each borehole, a 15- or 20-foot length of 2-inch ID, 0.010-inch continuous slot, Schedule 40 polyvinyl chloride (PVC) screen with a PVC end cap was placed through the auger to the bottom of the borehole. The screen and end cap were attached to 2-inch ID, flush-threaded Schedule 40 PVC riser. A filter pack consisting of Number 1 filter sand (environmentally safe, clean fine sand, sieve size 20 to 40) was tremied around the well screen to approximately 5 feet above the top of the well screen as the augers were removed. At HR-98Q-MW02, the filter pack also included a 5-foot layer of extra fine filter sand (sieve size 30 to 70). A bentonite seal, consisting of approximately 3 feet of bentonite pellets, was placed immediately on top of the filter pack and hydrated with potable water. The bentonite seal placement and hydration followed procedures in the SAP. Bentonite-cement grout was tremied into the remaining annular space of the well from the top of the bentonite seal to ground surface. A well cap was placed on the PVC well riser. A locking protective steel casing was placed over the PVC well riser and a concrete pad was constructed around the well. Four protective steel posts were installed around the well pad.

The monitoring wells were developed by surging and pumping with a submersible pump in accordance with methodology outlined in the SAP. The submersible pump used for well development was moved in an up-and-down fashion to encourage any residual well installation materials to enter the well. These materials were then pumped out of the well to re-establish the natural hydraulic flow conditions. Development continued for 8 hours or until the water turbidity

was less than 20 nephelometric turbidity units. The well development logs are included in Appendix C.

3.2.4 Water Level Measurements

The depth to groundwater was measured in the permanent wells at the site on July 26, 2002, following procedures outlined in the SAP. Depth to groundwater was measured with an electronic water-level meter. The meter probe and cable were cleaned before use at each well following decontamination methodology presented in the SAP. Measurements were referenced to the top of the PVC well casing, as summarized in Table 3-4.

3.2.5 Groundwater Sampling

Groundwater samples were collected from both of the monitoring wells installed at Parcel 98Q. The well/groundwater sample locations are shown on Figure 3-1. The groundwater sampling locations and rationale are listed in Table 3-1. The groundwater sample designations and analytical parameters are listed in Table 3-5.

Sample Collection. The groundwater samples were collected using either a peristaltic pump or a bladder pump equipped with Teflon™ tubing, following the procedures outlined in the SAP. Only one of the groundwater samples (from well HR-98Q-MW02) was analyzed for VOCs and this sample was collected using a bladder pump. Groundwater was sampled after purging a minimum of three well volumes and after field parameters (temperature, pH, dissolved oxygen, specific conductivity, oxidation-reduction potential, and turbidity) stabilized. Field parameters were measured using a calibrated water-quality meter. Field parameter readings are summarized in Table 3-6. Sample collection logs are included in Appendix A. The samples were analyzed for the parameters listed in Table 3-5 using methods outlined in Section 3.4.

3.2.6 Seep Water Sampling

One seep water sample was collected at Parcel 98Q at the location shown on Figure 3-1. The seep water sample location and rationale are listed in Table 3-1. The seep water sample designation and analytical parameters are listed in Table 3-7. The sampling location was determined in the field, based on field observations.

Sample Collection. Seep water sample collection was conducted similar to surface water collection in accordance with the procedures specified in the SAP. The seep water sample was collected by dipping a stainless-steel pitcher in the water and pouring the water into the sample containers. The seep water sample was collected after field parameters had been measured using

a calibrated water quality meter. Seep water field parameters are listed in Table 3-6. The sample collection log is included in Appendix A. The sample was analyzed for the parameters listed in Table 3-7 using methods outlined in Section 3.4.

3.2.7 Sediment Sampling

One sediment sample was collected at the same location as the seep water sample, as shown on Figure 3-1. The sediment sample location and rationale are presented in Table 3-1. The sediment sample designation and analytical parameters are listed in Table 3-7. The actual sediment sample location was determined in the field, based on field observations.

Sample Collection. The sediment sample was collected in accordance with the procedures specified in the SAP. Sediments were collected with a stainless-steel hand auger and placed in a clean stainless-steel bowl. The sediment fraction for VOC analysis was collected directly from the bowl using three EnCore® samplers. The remaining sediment was homogenized and placed in the appropriate sample containers. The sample collection log is included in Appendix A. The sediment sample was analyzed for the parameters listed in Table 3-7 using methods outlined in Section 3.4.

3.3 Surveying of Sample Locations

Sample locations were surveyed using global positioning system 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.

3.4 Analytical Program

Samples collected during the SI were analyzed for various chemical parameters based on potential site-specific chemicals and on EPA, ADEM, FTMC, and USACE requirements. Samples collected at Parcel 98Q were analyzed for the following parameters using EPA SW-846 methods, including Update III methods where applicable:

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

Approximately ten percent of the samples were analyzed for the following additional parameters:

- Target compound list (TCL) VOCs – EPA Method 8260B
- TCL semivolatile organic compounds (SVOC) – EPA Method 8270C

- Chlorinated herbicides – EPA Method 8151A
- Chlorinated pesticides – EPA Method 8081A
- Organophosphorous pesticides – EPA Method 8141A.

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

3.5 Sample Preservation, Packaging, and Shipping

Sample preservation, packaging, and shipping followed requirements specified in the SAP. Sample containers, sample volumes, preservatives, and holding times for the analyses required in this SI are listed in the SAP. Sample documentation and chain-of-custody records were completed as specified in the SAP.

Completed analysis request and chain-of-custody records (Appendix A) were included with each shipment of sample coolers to EMAX Laboratories, Inc. in Torrance, California.

3.6 Investigation-Derived Waste Management and Disposal

Investigation-derived waste (IDW) was managed and disposed as outlined in the SAP. The IDW generated during the SI at Parcel 98Q was segregated as follows:

- Drill cuttings
- Purge water from well development, sampling activities, and decontamination fluids
- Spent well materials and personal protective equipment.

Solid IDW was stored inside the fenced area surrounding Buildings 335 and 336 in lined roll-off bins prior to characterization and final disposal. Solid IDW was characterized using toxicity characteristic leaching procedure analysis. Based on the results, drill cuttings, spent well materials, and personal protective equipment generated during the SI were disposed as nonhazardous waste at the Three Corners Landfill located in Piedmont, Alabama.

Liquid IDW was contained in the 20,000-gallon sump associated with the Building T-338 vehicle washrack. Liquid IDW was characterized by VOC, SVOC, and metals analyses. Based on the analyses, liquid IDW was discharged as nonhazardous waste to the FTMC wastewater treatment plant on the Main Post.

3.7 Variances/Nonconformances

No variances or nonconformances to the SFSP were recorded during completion of the SI at Parcel 98Q.

3.8 Data Quality

The field sample analytical data are presented in tabular form in Appendix E. The field samples were collected, documented, handled, analyzed, and reported in a manner consistent with the SI work plan, the FTMC SAP and quality assurance plan, and standard, accepted methods and procedures. Data were reported and evaluated in accordance with Corps of Engineers South Atlantic Savannah Level B criteria (USACE, 1994) and the stipulated requirements for the generation of definitive data presented in the SAP. Chemical data were reported by the laboratory via hard-copy data packages using Contract Laboratory Program-like forms.

Data Validation. The reported analytical data were validated in accordance with EPA National Functional Guidelines by Level III criteria. The data validation results are summarized in a quality assurance report, which includes the data validation summary report (Appendix F). Selected results were qualified based on the implementation of accepted data validation procedures and practices. These qualified parameters are highlighted in the report. The validation-assigned qualifiers were added to the FTMC Shaw Environmental Management System database for tracking and reporting. The qualified data were used in comparisons to the SSSLs and ESVs. Rejected data (assigned an "R" qualifier) were not used in the comparisons to the SSSLs and ESVs. The data presented in this report, except where qualified, meet the principle data quality objective for this SI.

4.0 Site Characterization

Subsurface investigations performed at the Former Rifle/Machine Gun Range, Parcel 98Q, provided soil, geologic, and groundwater data used to characterize the geology and hydrogeology of the site.

4.1 Regional and Site Geology

4.1.1 Regional Geology

Calhoun County includes parts of two physiographic provinces: the Piedmont Upland Province and the Valley and Ridge Province. The Piedmont Upland Province occupies the extreme eastern and southeastern portions of the county and is characterized by metamorphosed sedimentary rocks. The generally accepted range in age of these metamorphics is Cambrian to Devonian.

The majority of Calhoun County, including the Main Post of FTMC, lies within the Appalachian fold-and-thrust structural belt (Valley and Ridge Province) where southeastward-dipping thrust faults with associated minor folding are the predominant structural features. The fold-and-thrust belt consists of Paleozoic sedimentary rocks that have been asymmetrically folded and thrust-faulted, with major structures and faults striking in a northeast-southwest direction.

Northwestward transport of the Paleozoic rock sequence along the thrust faults has resulted in the imbricate stacking of large slabs of rock referred to as thrust sheets. Within an individual thrust sheet, smaller faults may splay off the larger thrust fault, resulting in imbricate stacking of rock units within an individual thrust sheet (Osborne and Szabo, 1984). Geologic contacts in this region generally strike parallel to the faults, and repetition of lithologic units is common in vertical sequences. Geologic formations within the Valley and Ridge Province portion of Calhoun County have been mapped by Warman and Causey (1962), Osborne and Szabo (1984), and Moser and DeJarnette (1992) and vary in age from Lower Cambrian to Pennsylvanian.

The basal unit of the sedimentary sequence in Calhoun County is the Cambrian Chilhowee Group. The Chilhowee Group consists of the Cochran, Nichols, Wilson Ridge, and Weisner Formations (Osborne and Szabo, 1984), but in Calhoun County it is either undifferentiated or divided into the Cochran and Nichols Formations and an upper, undifferentiated Wilson Ridge and Weisner Formation. The Cochran is composed of poorly sorted arkosic sandstone and conglomerate with interbeds of greenish gray siltstone and mudstone. Massive to laminated

greenish gray and black mudstone makes up the Nichols Formation, with thin interbeds of siltstone and very fine-grained sandstone (Osborne et al., 1988). These two formations are mapped only in the eastern part of the county.

The Wilson Ridge and Weisner Formations are undifferentiated in Calhoun County and consist of both coarse-grained and fine-grained clastics. The coarse-grained facies appears to dominate the unit and consists primarily of coarse-grained, vitreous quartzite and friable, fine- to coarse-grained, orthoquartzitic sandstone, both of which locally contain conglomerate. The fine-grained facies consists of sandy and micaceous shale and silty, micaceous mudstone, which are locally interbedded with the coarse clastic rocks. The abundance of orthoquartzitic sandstone and quartzite suggests that most of the Chilhowee Group bedrock in the vicinity of FTMC belongs to the Weisner Formation (Osborne and Szabo, 1984).

The Cambrian Shady Dolomite overlies the Weisner Formation northeast, east, and southwest of the Main Post and consists of interlayered bluish gray or pale yellowish gray sandy dolomitic limestone and siliceous dolomite with coarsely crystalline, porous chert (Osborne et al., 1989). A variegated shale and clayey silt have been included within the lower part of the Shady Dolomite (Cloud, 1966). Material similar to this lower shale unit was noted in core holes drilled by the Alabama Geologic Survey on FTMC (Osborne and Szabo, 1984). The character of the Shady Dolomite in the FTMC vicinity and the true assignment of the shale at this stratigraphic interval are still uncertain (Osborne, 1999).

The Rome Formation overlies the Shady Dolomite and locally occurs to the northwest and southeast of the Main Post, as mapped by Warman and Causey (1962) and Osborne and Szabo (1984), and immediately to the west of Reilly Airfield (Osborne and Szabo, 1984). The Rome Formation consists of variegated, thinly interbedded grayish red-purple mudstone, shale, siltstone, and greenish red and light gray sandstone, with locally occurring limestone and dolomite. Weaver Cave, located approximately one mile west of the northwest boundary of the Main Post, is situated in gray dolomite and limestone mapped as the Rome Formation (Osborne et al., 1997). The Conasauga Formation overlies the Rome Formation and occurs along anticlinal axes in the northeastern portion of Pelham Range (Warman and Causey, 1962; Osborne and Szabo, 1984) and the northern portion of the Main Post (Osborne et al., 1997). The Conasauga Formation is composed of dark gray, finely to coarsely crystalline, medium- to thick-bedded dolomite with minor shale and chert (Osborne et al., 1989).

Overlying the Conasauga Formation is the Knox Group, which is composed of the Copper Ridge and Chepultepec dolomites of Cambro-Ordovician age. The Knox Group is undifferentiated in Calhoun County and consists of light medium gray, fine to medium crystalline, variably bedded to laminated, siliceous dolomite and dolomitic limestone that weather to a chert residuum (Osborne and Szabo, 1984). The Knox Group underlies a large portion of the Pelham Range area.

The Ordovician Newala and Little Oak Limestones overlie the Knox Group. The Newala Limestone consists of light to dark gray, micritic, thick-bedded limestone with minor dolomite. The Little Oak Limestone is comprised of dark gray, medium- to thick-bedded, fossiliferous, argillaceous to silty limestone with chert nodules. These limestone units are mapped as undifferentiated at FTMC and in other parts of Calhoun County. The Athens Shale overlies the Ordovician limestone units. The Athens Shale consists of dark gray to black shale and graptolitic shale with localized interbedded dark gray limestone (Osborne et al., 1989). These units occur within an eroded "window" in the uppermost structural thrust sheet at FTMC and underlie much of the developed area of the Main Post.

Other Ordovician-aged bedrock units mapped in Calhoun County include the Greensport Formation, Colvin Mountain Sandstone, and Sequatchie Formation. These units consist of various siltstones, sandstones, shales, dolomites, and limestones and are mapped as one, undifferentiated unit in some areas of Calhoun County. The only Silurian-age sedimentary formation mapped in Calhoun County is the Red Mountain Formation. This unit consists of interbedded red sandstone, siltstone, and shale with greenish gray to red silty and sandy limestone.

The Devonian Frog Mountain Sandstone consists of sandstone and quartzitic sandstone with shale interbeds, dolomudstone, and glauconitic limestone (Osborne et al., 1988). This unit locally occurs in the western portion of Pelham Range.

The Mississippian Fort Payne Chert and the Maury Formation overlie the Frog Mountain Sandstone and are composed of dark to light gray limestone with abundant chert nodules and greenish gray to grayish red phosphatic shale, with increasing amounts of calcareous chert towards the upper portion of the formation (Osborne and Szabo, 1984). These units occur in the northwestern portion of Pelham Range. Overlying the Fort Payne Chert is the Floyd Shale, also of Mississippian age, which consists of thin-bedded, fissile brown to black shale with thin intercalated limestone layers and interbedded sandstone. Osborne and Szabo (1984) reassigned

the Floyd Shale, which was mapped by Warman and Causey (1962) on the Main Post of FTMC, to the Ordovician Athens Shale based on fossil data.

The Pennsylvanian Parkwood Formation overlies the Floyd Shale and consists of a medium to dark gray, silty clay, shale, and mudstone with interbedded light to medium gray, very fine to fine grained, argillaceous, micaceous sandstone. Locally the Parkwood Formation also contains beds of medium to dark gray, argillaceous, bioclastic to cherty limestone and beds of clayey coal up to a few inches thick (Raymond et al., 1988). The Parkwood Formation in Calhoun County is generally found within a structurally complex area known as the Coosa deformed belt. In the deformed belt, the Parkwood Formation and Floyd Shale are mapped as undifferentiated because their lithologic similarity and significant deformation make it impractical to map the contact (Thomas and Drahovzal, 1974; Osborne et al., 1988). The undifferentiated Parkwood Formation and Floyd Shale are found throughout the western quarter of Pelham Range.

The Jacksonville thrust fault is the most significant structural geological feature in the vicinity of the Main Post of FTMC, both for its role in determining the stratigraphic relationships in the area and for its contribution to regional water supplies. The trace of the fault extends northeastward for approximately 39 miles between Bynum, Alabama, and Piedmont, Alabama. The fault is interpreted as a major splay of the Pell City fault (Osborne and Szabo, 1984). The Ordovician sequence that makes up the Eden thrust sheet is exposed at FTMC through an eroded window, or fenster, in the overlying thrust sheet. Rocks within the window display complex folding, with the folds being overturned and tight to isoclinal. The carbonates and shales locally exhibit well-developed cleavage (Osborne and Szabo, 1984). The FTMC window is framed on the northwest by the Rome Formation; north by the Conasauga Formation; northeast, east, and southwest by the Shady Dolomite; and southeast and southwest by the Chilhowee Group (Osborne et al., 1997). Two small klippen of the Shady Dolomite, bounded by the Jacksonville fault, have been recognized adjacent to the Pell City fault at the FTMC window (Osborne et al., 1997).

The Pell City fault serves as a fault contact between the bedrock within the FTMC window and the Rome and Conasauga Formations. The trace of the Pell City fault is also exposed approximately nine miles west of the FTMC window on Pelham Range, where it traverses northeast to southwest across the western quarter of Pelham Range. Here, the trace of the Pell City fault marks the boundary between the Pell City thrust sheet and the Coosa deformed belt.

The eastern three-quarters of Pelham Range is located within the Pell City thrust sheet, while the remaining western quarter of Pelham Range is located within the Coosa deformed belt. The Pell City thrust sheet is a large-scale thrust sheet containing Cambrian and Ordovician rocks and is relatively less structurally complex than the Coosa deformed belt (Thomas and Neathery, 1982). The Pell City thrust sheet is exposed between the traces of the Jacksonville and Pell City faults along the western boundary of the FTMC window and along the trace of the Pell City fault on Pelham Range (Thomas and Neathery, 1982; Osborne et al., 1988). The Coosa deformed belt is a narrow northeast-to-southwest-trending linear zone of complex structure (approximately 5 to 20 miles wide and approximately 90 miles in length) consisting mainly of thin imbricate thrust slices. The structure within these imbricate thrust slices is often internally complicated by small-scale folding and additional thrust faults (Thomas and Drahovzal, 1974).

4.1.2 Site Geology

Soils at Former Rifle/Machine Gun Range, Parcel 98Q generally fall into four mapping units: Anniston and Allen gravelly loams, 6 to 10 percent slopes, eroded (AcC2) in the northern portion of the range; Anniston and Allen stony loams, 10 to 25 percent slopes (AdE) in the middle portion of the range; Philo and Stendal soils, local alluvium, 0-2 percent slopes (PkA) following the contours of the stream; and stony, rough land, sandstone (Ss) at the southern portion of this site (U.S. Department of Agriculture [USDA], 1961).

The Anniston and Allen Series of soils consists of strongly acidic, deep, well-drained soils that have developed in old local alluvium from weathered sandstone, shale, and quartzite. Sandstone and quartzite gravel and cobbles are common throughout the soil. The typical soil description is well-drained stony loam to clay loam over stratified alluvium, limestone, or shale bedrock. The surface soil ranges in color from dark brown to dark reddish brown or dark grayish brown (USDA, 1961).

The Philo series consists of strongly acid, moderately well drained soils that are developing in a local and general alluvium. The parent material washed mainly from sandstone and shale, but some of it originated from limestone. The surface soil is very dark grayish-brown to dark-brown fine sandy loam, and the subsoil is dark-brown, slightly mottled fine sandy loam (USDA, 1961).

Stony rough land, sandstone (Ss) consists of rough, mountainous areas with outcrops of sandstone and quartzite bedrock, loose rock fragments, and scattered patches of sandy soil material. Slopes generally are more than 25 percent. The soil material is generally shallow over bedrock (USDA, 1961).

As shown on the site geologic map (Figure 4-1), the Former Rifle/Machine Gun Range, Parcel 98Q is bisected by an imbricate thrust fault south of the Jacksonville fault. The fault trace and geologic contacts strike generally northeast to southwest with transport direction of the thrust sheet to the northwest. The bedrock north of the fault is mapped as the Cambrian Shady Dolomite (Osborne et al., 1997). This unit is a bluish gray or pale yellowish gray thick bedded sandy dolomitic limestone or siliceous dolomite, characterized by coarsely crystalline porous chert (Moser and DeJarnette, 1992). Bedrock south of the fault is mapped as the undifferentiated Cambrian Chilhowee Group.

The residuum encountered during drilling activities at the Former Rifle/Machine Gun Range, Parcel 98Q, consisted of a light brown to yellowish orange to reddish orange clay with varying amounts of sand, silt, and quartz-rich gravel in shallow borings in the northern portion of the parcel. This description is consistent with the Anniston and Allen Series soils. In the deeper borings, the clay appeared laminated, and mudstone and chert gravel were encountered. The residuum encountered in the shallow borings in the southern portion of the parcel consisted predominately of light brown to yellowish orange sand and clay or sand and silt mixtures containing quartz-rich gravel. This description is consistent with the stony, rough land, sandstone soil type. At HR-98Q-MW02, weathered black shale was encountered at 66.5 feet bgs. Although generally not seen in the Cambrian Shady Dolomite, a lower shale unit has been noted in core holes drilled by the Alabama Geologic Survey (Osborne and Szabo, 1984). The true assignment of the shale at this stratigraphic interval is uncertain (Osborne, 1999).

4.2 Site Hydrology

4.2.1 Surface Hydrology

Precipitation in the form of rainfall averages about 53 inches annually in Anniston, Alabama, with infiltration rates annually exceeding evapotranspiration rates (U.S. Department of Commerce, 1998). The major surface water features at the Main Post of FTMC include Remount Creek, Cane Creek, and Cave Creek. These waterways flow in a general northwest to westerly direction towards the Coosa River on the western boundary of Calhoun County.

Elevation of the Former Rifle/Machine Gun Range, Parcel 98Q, ranges from approximately 975 to 1,300 feet above mean sea level. Surface water runoff in the area of Parcel 98Q drains into an intermittent creek that flows to the northwest from the range.

4.2.2 Hydrogeology

Static groundwater levels were measured in monitoring wells at Parcel 98Q on July 26, 2002, as summarized in Table 3-4. Groundwater elevations were calculated by measuring the depth to groundwater relative to the surveyed top-of-casing elevations. Based on these water level data, groundwater elevations correspond with topography and flow direction appears to be from the southeast to the northwest.

Groundwater was encountered in HR-98Q-MW02 at 60 feet bgs during drilling. As shown in Table 3-4, static water levels in HR-98Q-MW01 and HR-98Q-MW02 were 15.7 and 48.6 feet below top of casing, respectively. Based on the comparison of static water levels and the depth to water observed during drilling activities, groundwater appears to be under confined to semi-confined conditions in the residuum.

5.0 Summary of Analytical Results

The results of the chemical analysis of samples collected at the Former Rifle/Machine Gun Range, Parcel 98Q, indicate that metals, VOCs, herbicides, and pesticides were detected in site media. To evaluate whether the detected constituents present an unacceptable risk to human health and the environment, analytical results were compared to the human health SSSLs and ESVs for FTMC. The SSSLs and ESVs were developed for human health and ecological risk evaluations as part of the ongoing SIs being performed under the BRAC Environmental Restoration Program at FTMC.

Metals concentrations exceeding the SSSLs and ESVs were subsequently compared to metals background screening values to determine if the metals concentrations are within natural background concentrations (SAIC, 1998). Site metals data were further evaluated using statistical and geochemical methods to determine if the metals were site related (Appendix G).

The following sections and Tables 5-1 through 5-5 summarize the results of the comparison of detected constituent concentrations to the SSSLs, ESVs, and background screening values. Complete analytical results are presented in Appendix E.

5.1 Surface and Depositional Soil Analytical Results

Thirty-two surface soil samples and three depositional soil samples were collected for chemical analysis at the Former Rifle/Machine Gun Range, Parcel 98Q. Surface soil samples were collected from the uppermost foot of soil and depositional soil samples were collected from the upper six inches of soil at the locations shown on Figure 3-1. Analytical results were compared to residential human health SSSLs, ESVs, and metals background screening values, as presented in Table 5-1.

Metals. A total of 20 metals were detected in the surface and depositional soil samples. The concentrations of six metals (aluminum, arsenic, chromium, iron, manganese, and vanadium) exceeded SSSLs but were below their respective background concentrations, except for aluminum and iron in two samples each:

- Aluminum (18,200 and 25,900 milligrams per kilogram [mg/kg]) exceeded its SSSL (7,803 mg/kg) and background (16,306 mg/kg) at sample locations HR-98Q-GP08 and HR-98Q-GP13.

- Iron (40,300 and 41,100 mg/kg) exceeded its SSSL (2,345 mg/kg) and background (34,154 mg/kg) at sample locations HR-98Q-GP08 and HR-98Q-GP09.

The concentrations of eleven metals (aluminum, chromium, copper, iron, lead, manganese, mercury, selenium, silver, vanadium, and zinc) exceeded ESVs. Of these, the concentrations of eight metals (aluminum, copper, iron, lead, mercury, selenium, silver, and zinc) also exceeded their respective background concentrations:

- Aluminum (18,200 and 25,900 mg/kg) exceeded its ESV (50 mg/kg) and background (16,306 mg/kg) at two sample locations (HR-98Q-GP08 and HR-98Q-GP13).

- Copper (41.4 to 97.6 mg/kg) exceeded its ESV (40 mg/kg) and background (12.7 mg/kg) at 3 sample locations (HR-98Q-GP09, HR-98Q-GP13, and HR-98Q-GP24).

- Iron (40,300 and 41,100 mg/kg) exceeded its ESV (200 mg/kg) and background (34,154 mg/kg) at two sample locations (HR-98Q-GP08 and HR-98Q-GP09).

- Lead (69.1 to 349 mg/kg) exceeded its ESV (50 mg/kg) and background (40 mg/kg) at 12 sample locations (HR-98Q-GP04, HR-98Q-GP05, HR-98Q-GP06, HR-98Q-GP11, HR-98Q-GP13, HR-98Q-GP19, HR-98Q-GP20, HR-98Q-GP21, HR-98Q-GP22, HR-98Q-GP23, HR-98Q-GP24, and HR-98Q-MW02).

- Mercury (0.102 to 0.279 mg/kg) exceeded its ESV (0.1 mg/kg) and background (0.08 mg/kg) at five sample locations (HR-98Q-GP03, HR-98Q-GP04, HR-98Q-GP08, HR-98Q-GP15, and HR-98Q-GP28).

- Selenium (0.93 to 1.31 mg/kg) exceeded its ESV (0.81 mg/kg) and background (0.48 mg/kg) at 5 sample locations (HR-98Q-GP02, HR-98Q-GP07, HR-98Q-GP08, HR-98Q-GP09, and HR-98Q-GP18).

- Silver (2.06 mg/kg) exceeded its ESV (2 mg/kg) and background (0.36 mg/kg) at 1 sample location (HR-98Q-GP08).

- Zinc (589 mg/kg) exceeded its ESV (50 mg/kg) and background (40.6 mg/kg) at 1 sample location (HR-98Q-GP04).

Volatile Organic Compounds. Three surface soil samples (locations HR-98Q-GP15, HR-98Q-GP19, and HR-98Q-MW01) were analyzed for VOCs. A total of two VOCs (2-butanone and acetone) were detected in the samples at concentrations below SSSLs and ESVs.

Semivolatile Organic Compounds. Three surface soil samples (locations HR-98Q-GP15, HR-98Q-GP19, and HR-98Q-MW01) were analyzed for SVOCs. SVOCs were not detected in the samples.

Pesticides. Three surface soil samples (locations HR-98Q-GP15, HR-98Q-GP19, and HR-98Q-MW01) were analyzed for pesticides. Six pesticides (alpha-hexachlorocyclohexane [BHC], beta-BHC, delta-BHC, dieldrin, gamma-BHC, and heptachlor) were detected at one sample location (HR-98Q-GP15) at concentrations below their respective SSSLs. The concentrations of two pesticides, beta-BHC (0.0027 mg/kg) and gamma-BHC (0.0008 mg/kg), exceeded their respective ESVs. However, both of these results were flagged with a "J" data qualifier, indicating that the compounds were detected at estimated concentrations below the method reporting limit.

Herbicides. Three surface soil samples (locations HR-98Q-GP15, HR-98Q-GP19, and HR-98Q-MW01) were analyzed for herbicides. MCPP was detected at one sample location (HR-98Q-MW01) at a concentration (2 mg/kg) below its SSSL but above its ESV (0.1 mg/kg). However, the MCPP result was flagged with a "J" data qualifier, indicating that the compound was detected at an estimated concentration below the method reporting limit.

Explosives. Explosives were not detected in the surface and depositional soil samples.

5.2 Subsurface Soil Analytical Results

Thirty-two subsurface soil samples were collected for chemical analysis at Parcel 98Q. Subsurface soil samples were collected at depths greater than 1-foot bgs at the locations shown on Figure 3-1. Analytical results were compared to residential human health SSSLs and metals background concentrations, as presented in Table 5-2.

Metals. A total of 20 metals were detected in the subsurface soil samples. The concentrations of five metals (aluminum, arsenic, chromium, iron, and manganese) exceeded their respective SSSLs. Of these metals, only aluminum concentrations (in seven samples) also exceeded its background concentration.

Volatile Organic Compounds. Three subsurface soil samples (locations HR-98Q-GP15, HR-98Q-GP19, and HR-98Q-MW01) were analyzed for VOCs. Two VOCs (acetone and 2-butanone) were detected in the samples at estimated concentrations below SSSLs.

Semivolatile Organic Compounds. Three subsurface soil samples (locations HR-98Q-GP15, HR-98Q-GP19, and HR-98Q-MW01) were analyzed for SVOCs. SVOCs were not detected in the samples.

Pesticides. Three subsurface soil samples (locations HR-98Q-GP15, HR-98Q-GP19, and HR-98Q-MW01) were analyzed for pesticides. Pesticides were not detected in the samples.

Herbicides. Three subsurface soil samples (locations HR-98Q-GP15, HR-98Q-GP19, and HR-98Q-MW01) were analyzed for herbicides. MCPP was detected at one sample location (HR-98Q-GP19) at an estimated concentration below its SSSL.

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

5.3 Groundwater Analytical Results

Two groundwater samples were collected for chemical analysis at the Former Rifle/Machine Gun Range, Parcel 98Q, at the locations shown on Figure 3-1. Analytical results were compared to residential human health SSSLs and metals background concentrations, as presented in Table 5-3.

Metals. A total of 10 metals were detected in the groundwater samples. The concentrations of two metals (arsenic and iron) exceeded SSSLs but were below their respective background values.

Volatile Organic Compounds. One groundwater sample (location HR-98Q-MW02) was analyzed for VOCs. VOCs were not detected in the sample.

Semivolatile Organic Compounds. One groundwater sample (location HR-98Q-MW02) was analyzed for SVOCs. SVOCs were not detected in the sample.

Pesticides. One groundwater sample (location HR-98Q-MW02) was analyzed for pesticides. Two pesticides (heptachlor and delta-BHC) were detected in the sample. Both analytical results were flagged with a "J" data qualifier, indicating that the compounds were detected at estimated concentrations below method reporting limits. Only the heptachlor result (0.000062 mg/L) exceeded its SSSL (0.0000146 mg/L).

Herbicides. One groundwater sample (location HR-98Q-MW02) was analyzed for herbicides. Herbicides were not detected in the sample.

Explosives. Explosives were not detected in the groundwater samples.

5.4 Seep Water Analytical Results

One seep water sample was collected for chemical analysis at Parcel 98Q at the location shown on Figure 3-1. Analytical results were compared to recreational site user SSSLs, ESVs, and metals background concentrations for surface water, as presented in Table 5-4. It should be noted that the assumptions for residential and recreational site user exposure to seep (surface) water are identical.

Metals. Eight metals were detected in the seep water sample collected at the site. Of these metals, only lead was detected at a concentration (0.040 mg/L) exceeding its SSSL (0.015 mg/L). The lead result also exceeded its background value (0.0087 mg/L).

The concentrations of four metals (aluminum, barium, iron, and lead) exceeded their respective ESVs but were below background concentrations except for the aforementioned lead result.

Volatile Organic Compounds. Two VOCs (acetone and methylene chloride) were detected in the seep water sample at concentrations below SSSLs and ESVs.

Semivolatile Organic Compounds. SVOCs were not detected in the seep water sample.

Pesticides. Pesticides were not detected in the seep water sample.

Herbicides. Herbicides were not detected in the seep water sample.

Explosives. Explosives were not detected in the seep water sample.

5.5 Sediment Analytical Results

One sediment sample was collected for chemical and physical analyses at Parcel 98Q at the location shown on Figure 3-1. Analytical results were compared to recreational site user SSSLs and metals background concentrations, as presented in Table 5-5. It should be noted that the assumptions for residential and recreational site user exposure to sediment are identical.

Metals. Fourteen metals were detected in the sediment sample at concentrations below their respective SSSLs. The concentration of one metal (lead, 40 mg/kg) exceeded its ESV (30.2 mg/kg) and background concentration (37.8 mg/kg).

Volatile Organic Compounds. One VOC (acetone) was detected in the sediment sample at an estimated concentration below its SSSL and ESV.

Semivolatile Organic Compounds. SVOCs were not detected in the sediment sample.

Pesticides. Pesticides were not detected in the sediment sample.

Herbicides. Herbicides were not detected in the sediment sample.

Explosives. Explosives were not detected in the sediment sample.

Total Organic Carbon. The sediment sample was analyzed for TOC content. The TOC concentration in the sample was 58.4 mg/kg.

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

5.6 Statistical and Geochemical Evaluation of Site Metals Data

Site metals data were further evaluated using statistical and geochemical methods to determine if the metals are site related. This multi-tiered approach is described in the technical memorandum "Selecting Site-Related Chemicals for Human Health and Ecological Risk Assessments for FTMC: Revision 2" (Shaw, 2003). The statistical and geochemical evaluations determined that the metals detected in site media are present at naturally-occurring levels, except for lead (in several samples) and copper (one sample) in surface soil and lead in the seep water sample (Appendix G).

5.7 Preliminary Ecological Risk Assessment

A preliminary ecological risk assessment (PERA) was performed to further characterize the potential threat to ecological receptors from exposure to environmental media. The PERA approach is a shortened version of the screening-level ecological risk assessment (SLERA) protocol that has been developed for FTMC as a means to evaluate numerous sites in a uniform

and economical way. The fundamentals of the SLERA protocol are presented in the Installation-Wide Work Plan (IT, 1998). The complete PERA for Parcel 98Q is included in Appendix H.

The media of interest at Parcel 98Q are surface soil, groundwater, surface (seep) water, and sediment. Exposures to subsurface soil are unlikely for ecological receptors at this study area. Groundwater intersecting the ground surface (e.g., seep) could be available for ecological exposure.

If constituent concentrations were determined to be less than their naturally occurring background concentration, then a risk management decision could result in eliminating these constituents from further assessment. If a constituent was detected in surface soil at a maximum concentration that exceeded its ESV, was not an essential macro-nutrient, and was greater than the naturally-occurring levels at FTMC, then it was identified as a constituent of potential ecological concern (COPEC). COPECs identified in surface soil at Parcel 98Q were copper, lead, beta-BHC, gamma-BHC, and MCPP. The only surface water COPEC was lead. The only groundwater COPEC was heptachlor. No COPECs were identified in sediment; all detected metals in sediment except lead passed the Tier 1 evaluation presented in Appendix G. Although lead failed the Tier 1 evaluation, it passed the Tier 2 and Tier 3 evaluations and, thus, was excluded as a COPEC.

Copper was detected in one sample at an anomalously high concentration relative to naturally-occurring levels. All of the other detected concentrations of copper were considered to be naturally-occurring (through statistical and geochemical evaluations). Therefore, it can be concluded that copper contamination at Parcel 98Q is sporadic. Additionally, species-specific preliminary remediation goals (PRG) for copper in soil range from 370 to 10,100 mg/kg. All of the detected copper concentrations in soil were less than these PRGs indicating the copper concentrations in soil are unlikely to pose significant risk to ecological receptors.

Beta-BHC and gamma-BHC were detected in one surface soil sample (location HR-98Q-GP15) at concentrations that exceeded their respective ESVs. MCPP was also detected in a single surface soil sample (HR-98Q-MW01) at a concentration that exceeded its ESV. These pesticides were infrequently detected (not widely distributed) in surface soil and the detected concentrations were less than alternative screening values; therefore, they are not expected to pose significant risk to ecological receptors at the site.

Lead was detected in the only seep water sample collected at Parcel 98Q and the detected concentration exceeded the ESV and naturally-occurring levels. Therefore, lead in seep water has the potential to pose adverse ecological effects to aquatic and semi-aquatic species at Parcel 98Q. However, it is important to note that the sample was collected from an intermittent creek that it is dry during significant portions of the year. The creek would not provide adequate habitat to support an aquatic community.

Heptachlor was detected in one groundwater sample at a concentration that exceeded its surface water ESV; however, the detected concentration was less than an alternative ESV based on acute exposure. Heptachlor was not detected in the sample collected from the seep. Based on the infrequency of detection, the relatively low detected concentration, and the fact that the detected concentration was less than the alternative ESV, heptachlor in groundwater was not considered to pose significant risk to ecological receptors at Parcel 98Q.

Lead was detected relatively frequent in surface soil at concentrations that exceeded both its ESV and background. The magnitude of the exceedances was relatively small, however. The highest lead concentrations in surface soil were located in the portion of the site with the greatest density of target features. Although lead in surface soil at Parcel 98Q may pose an uncertain level of risk to sensitive ecological receptors, the PERA concluded that the maximum concentrations of lead in surface soil are expected to be protective of all but the most sensitive ecological receptors. Furthermore, the PERA noted that it is important to consider the high quality of habitat provided by the mature mixed deciduous/coniferous forest when making risk management decisions.

6.0 Summary, Conclusions, and Recommendations

Shaw completed an SI at the Former Rifle/Machine Gun Range, Parcel 98Q, at FTMC in Calhoun County, Alabama. The SI was conducted to determine whether chemical constituents are present at the site as a result of historical mission-related Army activities. The SI consisted of the collection and analysis of 32 surface soil samples, 3 depositional soil samples, 32 subsurface soil samples, 1 seep water sample, 1 sediment sample, and 2 groundwater samples. In addition, two permanent monitoring wells were installed in the saturated zone to facilitate groundwater sample collection and to provide site-specific geological and hydrogeological characterization information.

Chemical analysis of samples collected at the site indicates that metals, VOCs, pesticides, and one herbicide were detected in site media. Explosive compounds and SVOCs were not detected in any of the samples collected at the site. Analytical results were compared to SSSLs, ESVs, and background screening values developed for human health and ecological risk evaluations as part of environmental investigations performed under the BRAC Environmental Restoration Program at FTMC. Site metals data were further evaluated using statistical and geochemical methods to determine if metals were site related. A PERA was also performed to further characterize potential risks to ecological receptors.

Although the site is projected for passive recreation reuse (EDAW, 1997), the analytical data were screened against residential human health SSSLs to determine if the site is suitable for unrestricted land reuse. Chemicals of potential concern (COPC) were lead and copper in surface soil, the pesticide heptachlor in groundwater, and lead in seep water. Lead and copper concentrations in surface soil, however, were below SSSLs. Although heptachlor was detected at an estimated concentration (0.000062 mg/L) above its SSSL (0.000014 mg/L) in one groundwater sample, the pesticide's concentration was well below the EPA maximum contaminant level of 0.0004 mg/L for drinking water. Lead was selected as the only COPC in seep water because its concentration (0.04 mg/L) exceeded its SSSL (0.015 mg/L) and background (0.0087 mg/L). The SSSL, however, is the action level for lead in tap water (EPA, 2000). Because the incidental nature of exposure to seep water is expected to be far less intense than exposure to tap water, the SSSL is deemed overly conservative. Given these considerations, the metals and pesticide identified in site media at Parcel 98Q are not expected to pose a threat to human health. This conclusion is consistent with the consensus reached by the BCT during the September 2006 BCT meeting. Appendix I is a technical memorandum summarizing the BCT's decision regarding Parcel 98Q.

COPECs identified in the PERA were two metals (copper and lead), three pesticides (beta-BHC, gamma-BHC, and dieldrin), and one herbicide (MCPP) in surface soil, heptachlor in groundwater, and lead in seep water. With the exception of lead, the PERA concluded that these COPECs are unlikely to pose significant risk to ecological receptors based on the relative magnitude of the exceedances, comparison to other relevant screening values, and consideration of site-specific conditions. With regard to lead in surface soil at the site, the PERA concluded that the highest detected lead concentrations (92.5 to 349 mg/kg) are not expected to pose an unacceptable risk to ecological receptors except for potential impacts to only the most sensitive species. Lead in seep water was determined to have the potential to pose adverse ecological effects to aquatic and semi-aquatic species. However, the sample was collected from an intermittent creek (i.e., a wet-weather spring) that is dry during significant portions of the year. The creek would not provide adequate habitat to support an aquatic community. These conclusions are consistent with the consensus reached by the BCT during the September 2006 BCT meeting (Appendix I).

Based on the results of the SI, past operations at the Former Rifle/Machine Gun Range, Parcel 98Q, have minimally impacted the environment. However, the metals and chemical compounds detected in site media do not pose an unacceptable risk to human health and the environment. Therefore, Shaw recommends "No Further Action" and unrestricted land reuse with regard to CERCLA-related hazardous substances for the area of investigation at the Former Rifle/Machine Gun Range, Parcel 98Q.

7.0 References

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ATTACHMENT 1

LIST OF ABBREVIATIONS AND ACRONYMS

List of Abbreviations and Acronyms

2-ADNT	2-amino-4,6-dinitrotoluene
4-ADNT	4-amino-2,6-dinitrotoluene
2,4-D	2,4-dichlorophenoxyacetic acid
2,4,5-T	2,4,5-trichlorophenoxyacetic acid
2,4,5-TP	2,4,5-trichlorophenoxypropionic acid
3D	3D International Environmental Group
AB	ambient blank
AbB3	Anniston gravelly clay loam, 2 to 6 percent slopes, severely eroded
AbC3	Anniston gravelly clay loam, 6 to 10 percent slopes, severely eroded
AbD3	Anniston and Allen gravelly clay loams, 10 to 15 percent slopes, eroded
ABLM	adult blood lead model
Abs	skin absorption
ABS	dermal absorption factor
AC	hydrogen cyanide
ACAD	AutoCadd
AcB2	Anniston and Allen gravelly loams, 2 to 6 percent slopes, eroded
AcC2	Anniston and Allen gravelly loams, 6 to 10 percent slopes, eroded
AcD2	Anniston and Allen gravelly loams, 10 to 15 percent slopes, eroded
AcE2	Anniston and Allen gravelly loams, 15 to 25 percent slopes, eroded
ACGIH	American Conference of Governmental Industrial Hygienists
AdE	Anniston and Allen stony loam, 10 to 25 percent slope
ADEM	Alabama Department of Environmental Management
ADPH	Alabama Department of Public Health
AEC	U.S. Army Environmental Center
AEDA	ammunition, explosives, and other dangerous articles
AEL	airborne exposure limit
AET	adverse effect threshold
AF	soil-to-skin adherence factor
AHA	ammunition holding area
AL	Alabama
ALARNG	Alabama Army National Guard
ALAD	δ-aminolevulinic acid dehydratase
ALDOT	Alabama Department of Transportation
amb.	amber
amsl	above mean sea level
ANAD	Anniston Army Depot
ANOVA	Analysis of Variance
AOC	area of concern
AP	armor piercing
APEC	areas of potential ecological concern
APT	armor-piercing tracer
AR	analysis request
ARAR	applicable or relevant and appropriate requirement
AREE	area requiring environmental evaluation
AS/SVE	air sparging/soil vapor extraction
ASP	Ammunition Supply Point
ASR	Archives Search Report
AST	aboveground storage tank
ASTM	American Society for Testing and Materials
AT	averaging time
atm-m^3/mol	atmospheres per cubic meter per mole
ATSDR	Agency for Toxic Substances and Disease Registry
ATV	all-terrain vehicle
AUF	area use factor
AWARE	Associated Water and Air Resources Engineers, Inc.
AWQC	ambient water quality criteria
AWWSB	Anniston Water Works and Sewer Board
‘B’	Analyte detected in laboratory or field blank at concentration greater than the reporting limit (and greater than zero)
BAF	bioaccumulation factor
BBGR	Baby Bains Gap Road
BCF	blank correction factor; bioconcentration factor
BCT	BRAC Cleanup Team
BERA	baseline ecological risk assessment
BEHP	bis(2-ethylhexyl)phthalate
BFB	bromofluorobenzene
BFE	base flood elevation
BFM	bonded fiber matrix
BG	Bacillus globigii
BGR	Bains Gap Road
bgs	below ground surface
BHC	hexachlorocyclohexane
BHHRA	baseline human health risk assessment
BIRTC	Branch Immaterial Replacement Training Center
bkg	background
bls	below land surface
BOD	biological oxygen demand
Bp	soil-to-plant biotransfer factors
BRAC	Base Realignment and Closure
Braun	Braun Intertec Corporation
BSAF	biota-to-sediment accumulation factors
BSC	background screening criterion
BTAG	Biological Technical Assistance Group
BTEX	benzene, toluene, ethyl benzene, and xylenes
BTOC	below top of casing
BTV	background threshold value
BW	biological warfare; body weight
BZ	breathing zone; 3-quinuclidinyl benzilate
C	ceiling limit value
Ca	carcinogen
$CaCO_3$	calcium carbonate
CAA	Clean Air Act
CAB	chemical warfare agent breakdown products
CACM	Chemical Agent Contaminated Media
CAIS	chemical agent identification set
CAMU	corrective action management unit
CBR	chemical, biological, and radiological
CCAL	continuing calibration
CCB	continuing calibration blank
CCV	continuing calibration verification
CD	compact disc
CDTF	Chemical Defense Training Facility
CEHNC	U.S. Army Engineering and Support Center, Huntsville
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERFA	Community Environmental Response Facilitation Act
CESAS	Corps of Engineers South Atlantic Savannah
CF	chloroform
CF	conversion factor
CFC	chlorofluorocarbon
CFDP	Center for Domestic Preparedness
CFR	Code of Federal Regulations
CG	phosgene (carbonyl chloride)
CGI	combustible gas indicator
ch	inorganic clays of high plasticity
CHPPM	U.S. Army Center for Health Promotion and Preventive Medicine
CIH	Certified Industrial Hygienist
CK	cyanogen chloride
cl	inorganic clays of low to medium plasticity
Cl	chlorinated
CLP	Contract Laboratory Program
cm	centimeter
CN	chloroacetophenone
CNB	chloroacetophenone, benzene, and carbon tetrachloride
CNS	chloroacetophenone, chloropicrin, and chloroform
CO	carbon monoxide
CO_2	carbon dioxide
Co-60	cobalt-60
CoA	Code of Alabama
COC	chain of custody; chemical of concern
COE	Corps of Engineers
Con	skin or eye contact
COPC	chemical of potential concern
COPEC	constituent of potential ecological concern
CPOM	coarse particulate organic matter
CPSS	chemicals present in site samples
CQCSM	Contract Quality Control System Manager
CRDL	contract-required detection limit
CRL	certified reporting limit
CRQL	contract-required quantitation limit
CRZ	contamination reduction zone
Cs-137	cesium-137
CS	ortho-chlorobenzylidene-malononitrile
CSEM	conceptual site exposure model
CSM	conceptual site model

CT	central tendency
CT	carbon tetrachloride
ctr.	container
CWA	chemical warfare agent; Clean Water Act
CWM	chemical warfare material; clear, wide mouth
CX	dichloroformoxime
'D'	duplicate; dilution
D&I	detection and identification
DAAMS	depot area agent monitoring station
DAF	dilution-attenuation factor
DANC	decontamination agent, non-corrosive
ºC	degrees Celsius
ºF	degrees Fahrenheit
DCA	dichloroethane
DCE	dichloroethene
DD	Defense Department
DDD	dichlorodiphenyldichloroethane
DDE	dichlorodiphenyldichloroethene
DDT	dichlorodiphenyltrichloroethane
DEH	Directorate of Engineering and Housing
DEHP	di(2-ethylhexyl)phthalate
DEP	depositional soil
DFTPP	decafluorotriphenylphosphine
DI	deionized
DID	data item description
DIMP	di-isopropylmethylphosphonate
DM	dry matter; adamsite
DMBA	dimethylbenz(a)anthracene
DMMP	dimethylmethylphosphonate
DNAPL	dense nonaqueous-phase liquid
DNT	dinitrotoluene
DO	dissolved oxygen
DOD	U.S. Department of Defense
DOJ	U.S. Department of Justice
DOT	U.S. Department of Transportation
DP	direct-push
DPDO	Defense Property Disposal Office
DPT	direct-push technology
DQO	data quality objective
DRMO	Defense Reutilization and Marketing Office
DRO	diesel range organics
DS	deep (subsurface) soil
DS2	Decontamination Solution Number 2
DSERTS	Defense Site Environmental Restoration Tracking System
DWEL	drinking water equivalent level
E&E	Ecology and Environment, Inc.
EB	equipment blank
EBC	Eastern Bypass Corridor
EBS	environmental baseline survey
EBV	EBV Explosives Environmental Co.
EC_{20}	effects concentration for 20 percent of a test population
EC_{50}	effects concentration for 50 percent of a test population
ECBC	Edgewood Chemical Biological Center
ED	exposure duration
EDD	electronic data deliverable
EF	exposure frequency
EDQL	ecological data quality level
EE/CA	engineering evaluation and cost analysis
Eh	oxidation-reduction potential
Elev.	elevation
EM	electromagnetic
EMI	Environmental Management Inc.
EM31	Geonics Limited EM31 Terrain Conductivity Meter
EM61	Geonics Limited EM61 High-Resolution Metal Detector
EOD	explosive ordnance disposal
EODT	explosive ordnance disposal team
EPA	U.S. Environmental Protection Agency
EPC	exposure point concentration
EPIC	Environmental Photographic Interpretation Center
EPRI	Electrical Power Research Institute
EPT	Ephemeroptera, Plecoptera, Trichoptera
ER	equipment rinsate
ERA	ecological risk assessment
ER-L	effects range-low
ER-M	effects range-medium
ESE	Environmental Science and Engineering, Inc.
ESL	ecological screening level
ESMP	Endangered Species Management Plan
ESN	Environmental Services Network, Inc.
ESV	ecological screening value
ET	exposure time
EU	exposure unit
Exp.	Explosives
EXTOXNET	Extension Toxicology Network
E-W	east to west
EZ	exclusion zone
FAR	Federal Acquisition Regulations
FB	field blank
FBI	Family Biotic Index
FD	field duplicate
FDC	Former Decontamination Complex
FDA	U.S. Food and Drug Administration
Fe^{+3}	ferric iron
Fe^{+2}	ferrous iron
FedEx	Federal Express, Inc.
FEMA	Federal Emergency Management Agency
FFCA	Federal Facilities Compliance Act
FFE	field flame expedient
FFS	focused feasibility study
FI	fraction of exposure
Fil	filtered
Flt	filtered
FMDC	Fort McClellan Development Commission
FML	flexible membrane liner
f_{oc}	fraction organic carbon
FOMRA	Former Ordnance Motor Repair Area
FOST	Finding of Suitability to Transfer
Foster Wheeler	Foster Wheeler Environmental Corporation
FR	Federal Register
Frtn	fraction
FS	field split; feasibility study; fuming sulfuric acid
FSP	field sampling plan
ft	feet
ft/day	feet per day
ft/ft	feet per foot
ft/yr	feet per year
FTA	Fire Training Area
FTMC	Fort McClellan
FTRRA	FTMC Reuse & Redevelopment Authority
g	gram
g/m^3	gram per cubic meter
G-856	Geometrics, Inc. G-856 magnetometer
G-858G	Geometrics, Inc. G-858G magnetic gradiometer
GAF	gastrointestinal absorption factor
gal	gallon
gal/min	gallons per minute
GB	sarin (isopropyl methylphosphonofluoridate)
gc	clay gravels; gravel-sand-clay mixtures
GC	gas chromatograph
GCL	geosynthetic clay liner
GC/MS	gas chromatograph/mass spectrometer
GCR	geosynthetic clay liner
GFAA	graphite furnace atomic absorption
GIS	Geographic Information System
gm	silty gravels; gravel-sand-silt mixtures
gp	poorly graded gravels; gravel-sand mixtures
gpm	gallons per minute
GPR	ground-penetrating radar
GPS	global positioning system
GRA	general response action
GS	ground scar
GSA	General Services Administration; Geologic Survey of Alabama
GSBP	Ground Scar Boiler Plant
GSSI	Geophysical Survey Systems, Inc.

GST	ground stain
GW	groundwater
gw	well-graded gravels; gravel-sand mixtures
H&S	health and safety
HA	hand auger
HC	mixture of hexachloroethane, aluminum powder, and zinc oxide (smoke producer)
HCl	hydrochloric acid
HD	distilled mustard (bis-[dichloroethyl]sulfide)
HDPE	high-density polyethylene
HE	high explosive
HEAST	Health Effects Assessment Summary Tables
Herb.	herbicides
HHRA	human health risk assessment
HI	hazard index
HN	hydrogen mustard
H_2O_2	hydrogen peroxide
HPLC	high-performance liquid chromatography
HNO_3	nitric acid
HQ	hazard quotient
HQ_{screen}	screening-level hazard quotient
hr	hour
HRC	hydrogen releasing compound
HSA	hollow-stem auger
HSDB	Hazardous Substance Data Bank
HTRW	hazardous, toxic, and radioactive waste
‘I’	out of control, data rejected due to low recovery
IASPOW	Impact Area South of POW Training Facility
IATA	International Air Transport Authority
ICAL	initial calibration
ICB	initial calibration blank
ICP	inductively-coupled plasma
ICRP	International Commission on Radiological Protection
ICS	interference check sample
ID	inside diameter
IDL	instrument detection limit
IDLH	immediately dangerous to life or health
IDM	investigative-derived media
IDW	investigation-derived waste
IEUBK	Integrated Exposure Uptake Biokinetic
IF	ingestion factor; inhalation factor
ILCR	incremental lifetime cancer risk
IMPA	isopropylmethyl phosphonic acid
IMR	Iron Mountain Road
in.	inch
Ing	ingestion
Inh	inhalation
IP	ionization potential
IPS	International Pipe Standard
IR	ingestion rate
IRDMIS	Installation Restoration Data Management Information System
IRIS	Integrated Risk Information Service
IRP	Installation Restoration Program
IS	internal standard
ISCP	Installation Spill Contingency Plan
IT	IT Corporation
ITEMS	IT Environmental Management System™
‘J’	estimated concentration
JeB2	Jefferson gravelly fine sandy loam, 2 to 6 percent slopes, eroded
JeC2	Jefferson gravelly fine sandy loam, 6 to 10 percent slopes, eroded
JfB	Jefferson stony fine sandy loam, 0 to 10 percent slopes have strong slopes
JPA	Joint Powers Authority
K	conductivity
K_d	soil-water distribution coefficient
kg	kilogram
KeV	kilo electron volt
K_{oc}	organic carbon partioning coefficient
K_{ow}	octonal-water partition coefficient
$KMnO_4$	potassium permanganate
L	liter; Lewisite (dichloro-[2-chloroethyl]sulfide)
L/kg/day	liters per kilogram per day
l	liter
LAW	light anti-tank weapon
lb	pound
LBP	lead-based paint
LC	liquid chromatography
LCS	laboratory control sample
LC_{50}	lethal concentration for 50 percent population tested
LD_{50}	lethal dose for 50 percent population tested
LEL	lower explosive limit
LOAEL	lowest-observed-advserse-effects-level
LOEC	lowest-observable-effect-concentration
LRA	land redevelopment authority
LT	less than the certified reporting limit
LUC	land-use control
LUCAP	land-use control assurance plan
LUCIP	land-use control implementation plan
max	maximum
MB	method blank
MCL	maximum contaminant level
MCLG	maximum contaminant level goal
MCPA	4-chloro-2-methylphenoxyacetic acid
MCPP	2-(2-methyl-4-chlorophenoxy)propionic acid
MCS	media cleanup standard
MD	matrix duplicate
MDC	maximum detected concentration
MDCC	maximum detected constituent concentration
MDL	method detection limit
mg	milligrams
mg/kg	milligrams per kilogram
mg/kg/day	milligram per kilogram per day
mg/kgbw/day	milligrams per kilogram of body weight per day
mg/L	milligrams per liter
mg/m^3	milligrams per cubic meter
mh	inorganic silts, micaceous or diatomaceous fine, sandy or silt soils
MHz	megahertz
µg/g	micrograms per gram
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
µmhos/cm	micromhos per centimeter
MEC	munitions and explosives of concern
MeV	mega electron volt
min	minimum
MINICAMS	miniature continuous air monitoring system
ml	inorganic silts and very fine sands
mL	milliliter
mm	millimeter
MM	mounded material
MMBtu/hr	million Btu per hour
MNA	monitored natural attenuation
MnO_4-	permanganate ion
MOA	Memorandum of Agreement
MOGAS	motor vehicle gasoline
MOUT	Military Operations in Urban Terrain
MP	Military Police
MPA	methyl phosphonic acid
MPC	maximum permissible concentration
MPM	most probable munition
MQL	method quantitation limit
MR	molasses residue
MRL	method reporting limit
MS	matrix spike
mS/cm	millisiemens per centimeter
mS/m	millisiemens per meter
MSD	matrix spike duplicate; minimum separation distance
MTBE	methyl tertiary butyl ether
msl	mean sea level
MtD3	Montevallo shaly, silty clay loam, 10 to 40 percent slopes , severely eroded
mV	millivolts
MW	monitoring well
MWI&MP	Monitoring Well Installation and Management Plan
Na	sodium
NA	not applicable; not available
NAD	North American Datum
NAD83	North American Datum of 1983

$NaMnO_4$	sodium permanganate
NAVD88	North American Vertical Datum of 1988
NAS	National Academy of Sciences
NCEA	National Center for Environmental Assessment
NCP	National Contingency Plan
NCRP	National Council on Radiation Protection and Measurements
ND	not detected
NE	no evidence; northeast
ne	not evaluated
NEW	net explosive weight
NFA	No Further Action
NG	National Guard
NGP	National Guardsperson
ng/L	nanograms per liter
NGVD	National Geodetic Vertical Datum
Ni	nickel
NIC	notice of intended change
NIOSH	National Institute for Occupational Safety and Health
NIST	National Institute of Standards and Technology
NLM	National Library of Medicine
NO_3^-	nitrate
NOEC	no-observable-effect-concentration
NPDES	National Pollutant Discharge Elimination System
NPW	net present worth
No.	number
NOAA	National Oceanic and Atmospheric Administration
NOAEL	no-observed-adverse-effects-level
NR	not requested; not recorded; no risk
NRC	National Research Council
NRCC	National Research Council of Canada
NRHP	National Register of Historic Places
NRT	near real time
ns	nanosecond
N-S	north to south
NS	not surveyed
NSA	New South Associates, Inc.
nT	nanotesla
nT/m	nanoteslas per meter
NTU	nephelometric turbidity unit
nv	not validated
O_2	oxygen
O_3	ozone
O&G	oil and grease
O&M	operation and maintenance
OB/OD	open burning/open detonation
OD	outside diameter
OE	ordnance and explosives
oh	organic clays of medium to high plasticity
OH•	hydroxyl radical
ol	organic silts and organic silty clays of low plasticity
OP	organophosphorus
ORC	Oxygen Releasing Compound
ORP	oxidation-reduction potential
OSHA	Occupational Safety and Health Administration
OSWER	Office of Solid Waste and Emergency Response
OVM-PID/FID	organic vapor meter-photoionization detector/flame ionization detector
OWS	oil/water separator
oz	ounce
PA	preliminary assessment
PAH	polynuclear aromatic hydrocarbon
PARCCS	precision, accuracy, representativeness, comparability, completeness, and sensitivity
Parsons	Parsons Engineering Science, Inc.
Pb	lead
PBMS	performance-based measurement system
PC	permeability coefficient
PCB	polychlorinated biphenyl
PCDD	polychlorinated dibenzo-p-dioxins
PCDF	polychlorinated dibenzofurans
PCE	perchloroethene
PCP	pentachlorophenol
PDS	Personnel Decontamination Station
PEF	particulate emission factor
PEL	permissible exposure limit
PERA	preliminary ecological risk assessment
PERC	perchloroethene
PES	potential explosive site
Pest.	pesticides
PETN	pentaerythritoltetranitrate
PFT	portable flamethrower
PG	professional geologist
PID	photoionization detector
PkA	Philo and Stendal soils local alluvium, 0 to 2 percent slopes
PM	project manager
POC	point of contact
POL	petroleum, oils, and lubricants
POTW	publicly owned treatment works
POW	prisoner of war
PP	peristaltic pump; Proposed Plan
ppb	parts per billion
ppbv	parts per billion by volume
PPE	personal protective equipment
ppm	parts per million
PPMP	Print Plant Motor Pool
ppt	parts per thousand
PR	potential risk
PRA	preliminary risk assessment
PRG	preliminary remediation goal
PS	chloropicrin
PSSC	potential site-specific chemical
pt	peat or other highly organic silts
PVC	polyvinyl chloride
QA	quality assurance
QA/QC	quality assurance/quality control
QAM	quality assurance manual
QAO	quality assurance officer
QAP	installation-wide quality assurance plan
QC	quality control
QST	QST Environmental, Inc.
qty	quantity
Qual	qualifier
QuickSilver	QuickSilver Analytics, Inc.
R	rejected data; resample; retardation factor
R&A	relevant and appropriate
RA	remedial action
RAO	remedial action objective
RBC	risk-based concentration; red blood cell
RBP	Rapid Bioassessment Protocol
RBRG	risk-based remedial goal
RCRA	Resource Conservation and Recovery Act
RCWM	Recovered Chemical Warfare Material
RD	remedial design
RDX	cyclotrimethylenetrinitramine
ReB3	Rarden silty clay loams
REG	regular field sample
REL	recommended exposure limit
RFA	request for analysis
RfC	reference concentration
RfD	reference dose
RGO	remedial goal option
RI	remedial investigation
RL	reporting limit
RME	reasonable maximum exposure
ROD	Record of Decision
RPD	relative percent difference
RR	range residue
RRF	relative response factor
RRSE	Relative Risk Site Evaluation
RSD	relative standard deviation
RTC	Recruiting Training Center
RTECS	Registry of Toxic Effects of Chemical Substances
RTK	real-time kinematic
RWIMR	Ranges West of Iron Mountain Road
SA	exposed skin surface area

SAD	South Atlantic Division
SAE	Society of Automotive Engineers
SAIC	Science Applications International Corporation
SAP	installation-wide sampling and analysis plan
SARA	Superfund Amendments and Reauthorization Act
sc	clayey sands; sand-clay mixtures
Sch.	schedule
SCM	site conceptual model
SD	sediment
SDG	sample delivery group
SDWA	Safe Drinking Water Act
SDZ	safe distance zone; surface danger zone
SEMS	Southern Environmental Management & Specialties, Inc.
SF	cancer slope factor
SFSP	site-specific field sampling plan
SGF	standard grade fuels
Shaw	Shaw Environmental, Inc.
SHP	installation-wide safety and health plan
SI	site investigation
SINA	Special Interest Natural Area
SL	standing liquid
SLERA	screening-level ecological risk assessment
sm	silty sands; sand-silt mixtures
SM	Serratia marcescens
SMDP	Scientific Management Decision Point
s/n	signal-to-noise ratio
SO_4^{-2}	sulfate
SOD	soil oxidant demand
SOP	standard operating procedure
SOPQAM	U.S. EPA's *Standard Operating Procedure/Quality Assurance Manual*
sp	poorly graded sands; gravelly sands
SP	submersible pump
SPCC	system performance calibration compound
SPCS	State Plane Coordinate System
SPM	sample planning module
SQRT	screening quick reference tables
Sr-90	strontium-90
SRA	streamlined human health risk assessment
SRI	supplemental remedial investigation
SRM	standard reference material
Ss	stony rough land, sandstone series
SS	surface soil
SSC	site-specific chemical
SSHO	site safety and health officer
SSHP	site-specific safety and health plan
SSL	soil screening level
SSSL	site-specific screening level
SSSSL	site-specific soil screening level
STB	supertropical bleach
STC	source-term concentration
STD	standard deviation
STEL	short-term exposure limit
STL	Severn-Trent Laboratories
STOLS	Surface Towed Ordnance Locator System®
Std. units	standard units
SU	standard unit
SUXOS	senior UXO supervisor
SVOC	semivolatile organic compound
SW	surface water
SW-846	U.S. EPA's *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods*
SWMU	solid waste management unit
SWPP	storm water pollution prevention plan
SZ	support zone
TAL	target analyte list
TAT	turn around time
TB	trip blank
TBC	to be considered
TCA	trichloroethane
TCDD	2,3,7,8-tetrachlorodibenzo-p-dioxin
TCDF	tetrachlorodibenzofurans
TCE	trichloroethene
TCL	target compound list
TCLP	toxicity characteristic leaching procedure
TDEC	Tennessee Department of Environment and Conservation
TDGCL	thiodiglycol
TDGCLA	thiodiglycol chloroacetic acid
TEA	triethylaluminum
TeCA	1,1,2,2-tetrachloroethane
Tetryl	trinitrophenylmethylnitramine
TERC	Total Environmental Restoration Contract
TEU	Technical Escort Unit
THI	target hazard index
TIC	tentatively identified compound
TLV	threshold limit value
TN	Tennessee
TNB	trinitrobenzene
TNT	trinitrotoluene
TOC	top of casing; total organic carbon
TPH	total petroleum hydrocarbons
TR	target cancer risk
TRADOC	U.S. Army Training and Doctrine Command
TRPH	total recoverable petroleum hydrocarbons
TRV	toxicity reference value
TSCA	Toxic Substances Control Act
TSDF	treatment, storage, and disposal facility
TSS	total suspended solids
TWA	time-weighted average
UCL	upper confidence limit
UCR	upper certified range
'U'	not detected above reporting limit
UIC	underground injection control
UF	uncertainty factor
URF	unit risk factor
USACE	U.S. Army Corps of Engineers
USACHPPM	U.S. Army Center for Health Promotion and Preventive Medicine
USAEC	U.S. Army Environmental Center
USAEHA	U.S. Army Environmental Hygiene Agency
USACMLS	U.S. Army Chemical School
USAMPS	U.S. Army Military Police School
USATCES	U.S. Army Technical Center for Explosive Safety
USATEU	U.S. Army Technical Escort Unit
USATHAMA	U.S. Army Toxic and Hazardous Material Agency
USC	United States Code
USCS	Unified Soil Classification System
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UST	underground storage tank
UTL	upper tolerance level; upper tolerance limit
UXO	unexploded ordnance
UXOQCS	UXO Quality Control Supervisor
UXOSO	UXO safety officer
V	vanadium
VC	vinyl chloride
VOA	volatile organic analyte
VOC	volatile organic compound
VOH	volatile organic hydrocarbon
VQlfr	validation qualifier
VQual	validation qualifier
VX	nerve agent (O-ethyl-S-[diisopropylaminoethyl]-methylphosphonothiolate)
WAC	Women's Army Corps
Weston	Roy F. Weston, Inc.
WP	installation-wide work plan
WRS	Wilcoxon rank sum
WS	watershed
WSA	Watershed Screening Assessment
WWI	World War I
WWII	World War II
XRF	x-ray fluorescence
yd^3	cubic yards
ZVI	zero-valent iron

TABLES

Table 3-1

Sample Locations and Rationale
Former Rifle/Machine Gun Range, Parcel 98Q
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Media	Sample Location Rationale
HR-98Q-GP01	Surface soil Subsurface soil	Surface soil and subsurface soil samples were collected in observed mound or berm near trenches or targets in Parcel 98Q to determine if potential site-specific chemicals have impacted site media.
HR-98Q-GP02	Surface soil Subsurface soil	Surface soil and subsurface soil samples were collected adjacent to a mound in the firing line area of Parcel 98Q to determine if potential site-specific chemicals have impacted site media.
HR-98Q-GP03	Surface soil Subsurface soil	Surface soil and subsurface soil samples were collected adjacent to a mound in the firing line area of Parcel 98Q to determine if potential site-specific chemicals have impacted site media.
HR-98Q-GP04	Surface soil Subsurface soil	Surface soil and subsurface soil samples were collected downslope of a target area with pits and a berm to determine if potential site-specific chemicals have impacted site media.
HR-98Q-GP05	Surface soil Subsurface soil	Surface soil and subsurface soil samples were collected from a target area with pits and a berm to determine if potential site-specific chemicals have impacted site media.
HR-98Q-GP06	Surface soil Subsurface soil	Surface soil and subsurface soil samples were collected from a target area with pits and a berm to determine if potential site-specific chemicals have impacted site media.
HR-98Q-GP07	Surface soil Subsurface soil	Surface soil and subsurface soil samples were collected adjacent to a target area with pits and a berm to determine if potential site-specific chemicals have impacted site media.
HR-98Q-GP08	Surface soil Subsurface soil	Surface soil and subsurface soil samples were collected adjacent to a target area with pits and a berm to determine if potential site-specific chemicals have impacted site media.
HR-98Q-GP09	Surface soil Subsurface soil	Surface soil and subsurface soil samples were collected from a target area with pits and a berm to determine if potential site-specific chemicals have impacted site media.
HR-98Q-GP10	Surface soil Subsurface soil	Surface soil and subsurface soil samples were collected in the northwestern area of Parcel 98Q, downslope of target areas, to determine if potential site-specific chemicals have impacted site media.
HR-98Q-GP11	Surface soil Subsurface soil	Surface soil and subsurface soil samples were collected from a target area with pits and a berm to determine if potential site-specific chemicals have impacted site media.
HR-98Q-GP12	Surface soil Subsurface soil	Surface soil and subsurface soil samples were collected downslope of trenches and berms to determine if potential site-specific chemicals have impacted site media.
HR-98Q-GP13	Surface soil Subsurface soil	Surface soil and subsurface soil samples were collected from a berm to determine if potential site-specific chemicals have impacted site media.

Table 3-1

Sample Locations and Rationale
Former Rifle/Machine Gun Range, Parcel 98Q
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Media	Sample Location Rationale
HR-98Q-GP14	Surface soil Subsurface soil	Surface soil and subsurface soil samples were collected from a mound in the central portion of the area of investigation to determine if potential site-specific chemicals have impacted site media.
HR-98Q-GP15	Surface soil Subsurface soil	Surface soil and subsurface soil samples were collected upslope of a mound in the central portion of the area of investigation to determine if potential site-specific chemicals have impacted site media.
HR-98Q-GP16	Surface soil Subsurface soil	Surface soil and subsurface soil samples were collected from a pit next to a berm in the central portion of the area of investigation to determine if potential site-specific chemicals have impacted site media.
HR-98Q-GP17	Surface soil Subsurface soil	Surface soil and subsurface soil samples were collected downslope of a target area and trenches/berms to determine if potential site-specific chemicals have impacted site media.
HR-98Q-GP18	Surface soil Subsurface soil	Surface soil and subsurface soil samples were collected adjacent to a berm/trenches to determine if potential site-specific chemicals have impacted site media.
HR-98Q-GP19	Surface soil Subsurface soil	Surface soil and subsurface soil samples were collected in the vicinity of a tracked target system to determine if potential site-specific chemicals have impacted site media.
HR-98Q-GP20	Surface soil Subsurface soil	Surface soil and subsurface soil samples were collected from a target area with pits/berms to determine if potential site-specific chemicals have impacted site media.
HR-98Q-GP21	Surface soil Subsurface soil	Surface soil and subsurface soil samples were collected from a target area with pits/berms to determine if potential site-specific chemicals have impacted site media.
HR-98Q-GP22	Surface soil Subsurface soil	Surface soil and subsurface soil samples were collected from a target area with pits/berms to determine if potential site-specific chemicals have impacted site media.
HR-98Q-GP23	Surface soil Subsurface soil	Surface soil and subsurface soil samples were collected downslope of a target berm to determine if potential site-specific chemicals have impacted site media.
HR-98Q-GP24	Surface soil Subsurface soil	Surface soil and subsurface soil samples were collected from a target area in the southern portion of the area of investigation to determine if potential site-specific chemicals have impacted site media.
HR-98Q-GP25	Surface soil Subsurface soil	Surface soil and subsurface soil samples were collected upslope of observed mounds, trenches, or berms in Parcel 98Q to determine if potential site-specific chemicals have impacted site media.
HR-98Q-GP26	Surface soil Subsurface soil	Surface soil and subsurface soil samples were collected upslope of observed mounds, trenches, or berms in Parcel 98Q to determine if potential site-specific chemicals have impacted site media.

Table 3-1

Sample Locations and Rationale
Former Rifle/Machine Gun Range, Parcel 98Q
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Media	Sample Location Rationale
HR-98Q-GP27	Surface soil Subsurface soil	Surface soil and subsurface soil samples were collected in the extreme southern portion of the area of investigation upslope of observed mounds, trenches, or berms in Parcel 98Q to determine if potential site-specific chemicals have impacted site media.
HR-98Q-GP28	Surface soil Subsurface soil	Surface soil and subsurface soil samples were collected in the extreme southern portion of the area of investigation to determine if potential site-specific chemicals have impacted site media.
HR-98Q-GP29	Surface soil Subsurface soil	Surface soil and subsurface soil samples were collected in the extreme southern portion of the area of investigation to determine if potential site-specific chemicals have impacted site media.
HR-98Q-GP30	Surface soil Subsurface soil	Surface soil and subsurface soil samples were collected in the extreme southern portion of the area of investigation to determine if potential site-specific chemicals have impacted site media.
HR-98Q-MW01	Surface soil Subsurface soil Groundwater	Surface soil, subsurface soil, and groundwater samples were collected in the firing line area of Parcel 98Q, downgradient of the target mounds, berms, and trenches, to determine if potential site-specific chemicals have impacted site media.
HR-98Q-MW02	Surface soil Subsurface soil Groundwater	Surface soil, subsurface soil, and groundwater samples were collected in the central portion of the area of investigation to determine if potential site-specific chemicals have impacted site media.
HR-98Q-SEEP01	Seep Water Sediment	Seep water and sediment samples were collected from a seep located upslope of an intermittent streambed in the central area of the site to determine if potential site-specific chemicals have impacted site media.
HR-98Q-DEP01	Depositional soil	A depositional soil sample was collected in an intermittent streambed located in the southeastern portion of the area of investigation, upslope of the target areas, berms, and trenches, to determine if potential site-specific chemicals have impacted site media.
HR-98Q-DEP02	Depositional soil	A depositional soil sample was collected in the intermittent streambed in the central portion of the area of investigation to determine if potential site-specific chemicals have impacted site media.
HR-98Q-DEP03	Depositional soil	A depositional soil sample was collected in the intermittent streambed in the northern portion of the area of investigation to determine if potential site-specific chemicals have impacted site media.

Table 3-2

Soil Sample Designations and Analytical Parameters
Former Rifle/Machine Gun Range, Parcel 98Q
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Designation	Sample Depth (ft)	QA/QC Samples		Analytical Parameters
			Field Duplicates	MS/MSD	
HR-98Q-GP01	HR-98Q-GP01-SS-PF0001-REG	0-1			Metals and Explosives
	HR-98Q-GP01-DS-PF0002-REG	3-4			
HR-98Q-GP02	HR-98Q-GP02-SS-PF0003-REG	0-1	HR-98Q-GP02-SS-PF0004-FD		Metals and Explosives
	HR-98Q-GP02-DS-PF0005-REG	3-4			
HR-98Q-GP03	HR-98Q-GP03-SS-PF0006-REG	0-1			Metals and Explosives
	HR-98Q-GP03-DS-PF0007-REG	1-2			
HR-98Q-GP04	HR-98Q-GP04-SS-PF0008-REG	0-1			Metals and Explosives
	HR-98Q-GP04-DS-PF0009-REG	3-4			
HR-98Q-GP05	HR-98Q-GP05-SS-PF0010-REG	0-1			Metals and Explosives
	HR-98Q-GP05-DS-PF0011-REG	2-3			
HR-98Q-GP06	HR-98Q-GP06-SS-PF0012-REG	0-1			Metals and Explosives
	HR-98Q-GP06-DS-PF0013-REG	3-4	HR-98Q-GP06-DS-PF0014-FD		
HR-98Q-GP07	HR-98Q-GP07-SS-PF0015-REG	0-1			Metals and Explosives
	HR-98Q-GP07-DS-PF0016-REG	3-4			
HR-98Q-GP08	HR-98Q-GP08-SS-PF0017-REG	0-1			Metals and Explosives
	HR-98Q-GP08-DS-PF0018-REG	3-4			
HR-98Q-GP09	HR-98Q-GP09-SS-PF0019-REG	0-1			Metals and Explosives
	HR-98Q-GP09-DS-PF0020-REG	3-4			
HR-98Q-GP10	HR-98Q-GP10-SS-PF0021-REG	0-1		HR-98Q-GP10-SS-PF0021-MS/MSD	Metals and Explosives
	HR-98Q-GP10-DS-PF0022-REG	3-4			
HR-98Q-GP11	HR-98Q-GP11-SS-PF0023-REG	0-1	HR-98Q-GP11-SS-PF0024-FD		Metals and Explosives
	HR-98Q-GP11-DS-PF0025-REG	3-4			
HR-98Q-GP12	HR-98Q-GP12-SS-PF0026-REG	0-1			Metals and Explosives
	HR-98Q-GP12-DS-PF0027-REG	3-4			

Table 3-2

Soil Sample Designations and Analytical Parameters
Former Rifle/Machine Gun Range, Parcel 98Q
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Designation	Sample Depth (ft)	QA/QC Samples		Analytical Parameters
			Field Duplicates	MS/MSD	
HR-98Q-GP13	HR-98Q-GP13-SS-PF0028-REG	0-1			Metals and Explosives
	HR-98Q-GP13-DS-PF0029-REG	3-4			
HR-98Q-GP14	HR-98Q-GP14-SS-PF0030-REG	0-1			Metals and Explosives
	HR-98Q-GP14-DS-PF0031-REG	3-4		HR-98Q-GP14-DS-PF0031-MS/MSD	
HR-98Q-GP15	HR-98Q-GP15-SS-PF0032-REG	0-1			VOCs, SVOCs, Metals, Explosives, Pesticides, and Herbicides
	HR-98Q-GP15-DS-PF0033-REG	3-4	HR-98Q-GP15-DS-PF0034-FD		
HR-98Q-GP16	HR-98Q-GP16-SS-PF0035-REG	0-1			Metals and Explosives
	HR-98Q-GP16-DS-PF0036-REG	2.5-3.5			
HR-98Q-GP17	HR-98Q-GP17-SS-PF0037-REG	0-1			Metals and Explosives
	HR-98Q-GP17-DS-PF0038-REG	3-4			
HR-98Q-GP18	HR-98Q-GP18-SS-PF0039-REG	0-1			Metals and Explosives
	HR-98Q-GP18-DS-PF0040-REG	3-4			
HR-98Q-GP19	HR-98Q-GP19-SS-PF0041-REG	0-1		HR-98Q-GP19-SS-PF0041-MS/MSD	VOCs, SVOCs, Metals, Explosives, Pesticides, and Herbicides
	HR-98Q-GP19-DS-PF0042-REG	3-4			
HR-98Q-GP20	HR-98Q-GP20-SS-PF0043-REG	0-1	HR-98Q-GP20-SS-PF0044-FD		Metals and Explosives
	HR-98Q-GP20-DS-PF0045-REG	3-4			
HR-98Q-GP21	HR-98Q-GP21-SS-PF0046-REG	0-1			Metals and Explosives
	HR-98Q-GP21-DS-PF0047-REG	3-4			
HR-98Q-GP22	HR-98Q-GP22-SS-PF0048-REG	0-1			Metals and Explosives
	HR-98Q-GP22-DS-PF0049-REG	3-4			
HR-98Q-GP23	HR-98Q-GP23-SS-PF0050-REG	0-1			Metals and Explosives
	HR-98Q-GP23-DS-PF0051-REG	2-3			
HR-98Q-GP24	HR-98Q-GP24-SS-PF0052-REG	0-1			Metals and Explosives
	HR-98Q-GP24-DS-PF0053-REG	2-3			

Table 3-2

Soil Sample Designations and Analytical Parameters
Former Rifle/Machine Gun Range, Parcel 98Q
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Designation	Sample Depth (ft)	QA/QC Samples		Analytical Parameters
			Field Duplicates	MS/MSD	
HR-98Q-GP25	HR-98Q-GP25-SS-PF0054-REG	0-1			Metals and Explosives
	HR-98Q-GP25-DS-PF0055-REG	3-4	HR-98Q-GP24-DS-PF0056-FD		
HR-98Q-GP26	HR-98Q-GP26-SS-PF0057-REG	0-1			Metals and Explosives
	HR-98Q-GP26-DS-PF0058-REG	3-4			
HR-98Q-GP27	HR-98Q-GP27-SS-PF0059-REG	0-1			Metals and Explosives
	HR-98Q-GP27-DS-PF0060-REG	2-3			
HR-98Q-GP28	HR-98Q-GP28-SS-PF0061-REG	0-1			Metals and Explosives
	HR-98Q-GP28-DS-PF0062-REG	3-4			
HR-98Q-GP29	HR-98Q-GP29-SS-PF0063-REG	0-1			Metals and Explosives
	HR-98Q-GP29-DS-PF0064-REG	1-2			
HR-98Q-GP30	HR-98Q-GP30-SS-PF0065-REG	0-1			Metals and Explosives
	HR-98Q-GP30-DS-PF0066-REG	2-3			
HR-98Q-MW01	HR-98Q-MW01-SS-PF0067-REG	0-1			VOCs, SVOCs, Metals, Explosives, Pesticides, and Herbicides
	HR-98Q-MW01-DS-PF0068-REG	3-4			
HR-98Q-MW02	HR-98Q-MW02-SS-PF0069-REG	0-1			Metals and Explosives
	HR-98Q-MW02-DS-PF0070-REG	2-3	HR-98Q-MW02-DS-PF0071-FD		
HR-98Q-DEP01	HR-98Q-DEP01-DEP-PF0072-REG	0-0.5			Metals and Explosives
HR-98Q-DEP02	HR-98Q-DEP02-DEP-PF0073-REG	0-0.5			Metals and Explosives
HR-98Q-DEP03	HR-98Q-DEP03-DEP-PF0074-REG	0-0.5			Metals and Explosives

DEP - Depositional soil.
DS - Subsurface soil.
FD - Field duplicate.
MS/MSD - Matrix spike/matrix spike duplicate.
QA/QC - Quality assurance/quality control.
REG - Field sample.
SS - Surface soil.
SVOC - Semivolatile organic compound.
VOC - Volatile organic compound.

Table 3-3

Monitoring Well Construction Summary
Former Rifle/Machine Gun Range, Parcel 98Q
Fort McClellan, Calhoun County, Alabama

Well Location	Northing	Easting	Ground Elevation (ft amsl)	TOC Elevation (ft amsl)	Well Depth (ft bgs)	Screen Length (ft)	Screen Interval (ft bgs)	Well Material
HR-98Q-MW01	1179769.61	680511.89	985.07	987.20	30	15	15 - 30	2" ID Sch. 40 PVC
HR-98Q-MW02	1179007.18	680876.68	1028.00	1030.05	70	20	50 - 70	2" ID Sch. 40 PVC

Permanent wells installed using hollow-stem auger.

Horizontal coordinates referenced to the U.S. State Plane Coordinate System, Alabama East Zone, North American Datum of 1983 (NAD83).
Elevations referenced to the North American Vertical Datum of 1988 (NAVD88).

2" ID Sch. 40 PVC - 2-inch inside diameter, Schedule 40, polyvinyl chloride.
amsl - Above mean sea level.
bgs - Below ground surface.
ft - Feet.

Table 3-4

Groundwater Elevations
Former Rifle/Machine Gun Range, Parcel 98Q
Fort McClellan, Calhoun County, Alabama

Well Location	Date	Depth to Water (ft BTOC)	Top of Casing Elevation (ft amsl)	Ground Elevation (ft amsl)	Groundwater Elevation (ft amsl)
HR-98Q-MW01	26-Jul-02	15.70	987.20	985.07	971.50
HR-98Q-MW02	26-Jul-02	48.55	1030.05	1028.00	981.50

Elevations referenced to the North American Vertical Datum of 1988 (NAVD88).

BTOC - Below top of casing
ft - Feet
amsl - Above mean sea level

Table 3-5

Groundwater Sample Designations and Analytical Parameters
Former Rifle/Machine Gun Range, Parcel 98Q
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Designation	QA/QC Samples		Analytical Parameters
		Field Duplicates	MS/MSD	
HR-98Q-MW01	HR-98Q-MW01-GW-PF3001-REG		HR-98Q-MW01-GW-PF3001-MS/MSD	Metals and Explosives
HR-98Q-MW02	HR-98Q-MW02-GW-PF3002-REG	HR-98Q-MW02-GW-PF3003-FD		VOCs, SVOCs, Metals, Explosives, Pesticides, and Herbicides

* Groundwater samples were collected from the approximate midpoint of the saturated screened interval of the monitoring well.

FD - Field duplicate.
MS/MSD - Matrix spike/matrix spike duplicate.
QA/QC - Quality assurance/quality control.
REG - Field sample.
SVOC - Semivolatile organic compound.
VOC - Volatile organic compound.

Table 3-6

Groundwater and Seep Water Field Parameters
Former Rifle/Machine Gun Range, Parcel 98Q
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Media	Sample Date	Specific Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Temperature (°C)	Turbidity (NTU)	pH (SU)
HR-98Q-MW01	GW	10-May-02	0.023	7.46	215	16.2	24	4.93
HR-98Q-MW02	GW	4-Jun-02	0.027	6.16	195	19.7	115	5.32
HR-98Q-SEEP01	Seep	25-Feb-02	0.046	12.57	NR	13.1	19.2	4.58

°C - Degrees Celsius.
GW - Groundwater.
mg/L - Milligram per liter.
mS/cm - Millisiemen per centimeter.
mV - Millivolt.
NR - Not recorded due to equipment malfunction.
NTU - Nephelometric turbidity unit.
ORP - Oxidation-reduction potential.
SU - Standard unit.

Table 3-7

Seep Water and Sediment Sample Designations and Analytical Parameters
Former Rifle/Machine Gun Range, Parcel 98Q
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Designation	QA/QC Samples[a]		Analytical Parameters
		Field Duplicates	MS/MSD	
HR-98Q-SEEP01	HR-98Q-SEEP01-SEP-PF2001-REG			VOCs, SVOCs, Metals, Explosives, Pesticides, Herbicides, TOC[b], and Grain Size[b]
	HR-98Q-SEEP01-SD-PF1001-REG			

[a]No QA/QC samples specified in site-specific field sampling plan.
[b]Sediment sample only.

MS/MSD - Matrix spike/matrix spike duplicate.
QA/QC - Quality assurance/quality control.
REG - Field sample.
SD - Sediment sample.
SEP - Seep water sample.
SVOC - Semivolatile organic compound.
TOC - Total organic carbon.
VOC - Volatile organic compound.

Table 5-1

Surface and Depositional Soil Analytical Results
Former Rifle/Machine Gun Range, Parcel 98Q
Fort McClellan, Calhoun County, Alabama

Sample Location					HR-98Q-DEP01					HR-98Q-DEP02					HR-98Q-DEP03				
Sample Number					PF0072					PF0073					PF0074				
Sample Date					25-Feb-02					25-Feb-02					25-Feb-02				
Sample Depth (Feet)					0- 0.5					0- 0.5					0- 0.5				
Parameter	Units	BKG[a]	SSSL[b]	ESV[b]	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	1.02E+04			YES	YES	4.83E+03				YES	6.50E+03				YES
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	2.01E+00			YES		1.39E+00	J		YES		1.22E+00	J		YES	
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	4.80E+01					1.95E+01					3.89E+01				
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	7.71E-01	J				ND					ND				
Calcium	mg/kg	1.72E+03	NA	NA	1.47E+02					8.07E+01	J				1.34E+02	J			
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	7.67E+00				YES	4.47E+00				YES	5.65E+00				YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	5.29E+00					ND					4.05E+00				
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	5.76E+00					5.74E+00					7.54E+00				
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	8.14E+03			YES	YES	4.09E+03			YES	YES	4.81E+03			YES	YES
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	1.64E+01					4.68E+01		YES			3.48E+01				
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	3.54E+02					1.72E+02					2.50E+02				
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	3.38E+02				YES	1.72E+01					1.01E+02				YES
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	3.61E-02	J				6.00E-02	J				5.79E-02	J			
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	4.22E+00					1.58E+00	J				2.85E+00				
Potassium	mg/kg	8.00E+02	NA	NA	3.26E+02	J				1.70E+02	J				2.44E+02	J			
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	ND					ND					ND				
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00	ND					ND					ND				
Sodium	mg/kg	6.34E+02	NA	NA	3.69E+01	J				4.53E+01	J				5.41E+01	J			
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	1.30E+01				YES	7.15E+00				YES	1.04E+01				YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	1.24E+01					4.95E+00					8.68E+00				
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	NR					NR					NR				
Acetone	mg/kg	NA	7.76E+02	2.50E+00	NR					NR					NR				
PESTICIDES																			
Dieldrin	mg/kg	NA	3.88E-02	5.00E-04	NR					NR					NR				
Heptachlor	mg/kg	NA	1.40E-01	1.00E-01	NR					NR					NR				
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03	NR					NR					NR				
beta-BHC	mg/kg	NA	3.50E-01	1.00E-03	NR					NR					NR				
delta-BHC	mg/kg	NA	2.33E+00	9.94E+00	NR					NR					NR				
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05	NR					NR					NR				
HERBICIDES																			
MCPP	mg/kg	NA	7.77E+00	1.00E-01	NR					NR					NR				

Table 5-1

Surface and Depositional Soil Analytical Results
Former Rifle/Machine Gun Range, Parcel 98Q
Fort McClellan, Calhoun County, Alabama

Sample Location					HR-98Q-GP01					HR-98Q-GP02					HR-98Q-GP03				
Sample Number					PF0001					PF0003					PF0006				
Sample Date					12-Feb-02					5-Mar-02					11-Feb-02				
Sample Depth (Feet)					0- 1					0- 1					0- 1				
Parameter	Units	BKG[a]	SSSL[b]	ESV[b]	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	6.27E+03				YES	1.38E+04			YES	YES	1.06E+04			YES	YES
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	1.77E+00			YES		3.42E+00	J		YES		2.47E+00			YES	
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	6.96E+01					3.05E+01					7.46E+01				
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	ND					ND					4.54E-01	J			
Calcium	mg/kg	1.72E+03	NA	NA	1.91E+02					5.84E+01	J				1.99E+02				
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	4.38E+00				YES	1.88E+01				YES	7.25E+00				YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	3.77E+00					1.59E+00	J				3.83E+00				
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	4.80E+00					6.49E+00					6.26E+00				
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	3.64E+03			YES	YES	1.45E+04			YES	YES	7.81E+03			YES	YES
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	1.56E+01					7.97E+00	J				1.31E+01				
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	2.46E+02					5.23E+02					4.55E+02				
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	4.60E+02			YES	YES	2.35E+01	J				3.91E+02			YES	YES
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	7.07E-02	B				4.29E-02	J				1.31E-01	B	YES		YES
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	3.42E+00					4.62E+00					5.49E+00				
Potassium	mg/kg	8.00E+02	NA	NA	2.10E+02	J				4.80E+02	J				3.99E+02	J			
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	ND					9.98E-01	J	YES		YES	ND				
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00	ND					ND					ND				
Sodium	mg/kg	6.34E+02	NA	NA	3.83E+01	J				4.37E+01	J				4.50E+01	J			
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	8.23E+00				YES	2.37E+01				YES	1.57E+01				YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	1.68E+01	J				1.48E+01	J				1.82E+01				
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	NR					NR					NR				
Acetone	mg/kg	NA	7.76E+02	2.50E+00	NR					NR					NR				
PESTICIDES																			
Dieldrin	mg/kg	NA	3.88E-02	5.00E-04	NR					NR					NR				
Heptachlor	mg/kg	NA	1.40E-01	1.00E-01	NR					NR					NR				
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03	NR					NR					NR				
beta-BHC	mg/kg	NA	3.50E-01	1.00E-03	NR					NR					NR				
delta-BHC	mg/kg	NA	2.33E+00	9.94E+00	NR					NR					NR				
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05	NR					NR					NR				
HERBICIDES																			
MCPP	mg/kg	NA	7.77E+00	1.00E-01	NR					NR					NR				

Table 5-1

Surface and Depositional Soil Analytical Results
Former Rifle/Machine Gun Range, Parcel 98Q
Fort McClellan, Calhoun County, Alabama

Sample Location					HR-98Q-GP04					HR-98Q-GP05					HR-98Q-GP06				
Sample Number					PF0008					PF0010					PF0012				
Sample Date					5-Feb-02					7-Feb-02					12-Feb-02				
Sample Depth (Feet)					0- 1					0- 1					0- 1				
Parameter	Units	BKG[a]	SSSL[b]	ESV[b]	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	1.27E+04			YES	YES	6.45E+03	J			YES	7.88E+03			YES	YES
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	3.01E+00			YES		1.57E+00			YES		1.81E+00			YES	
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	8.18E+01					7.40E+01					3.59E+01				
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	ND					ND					ND				
Calcium	mg/kg	1.72E+03	NA	NA	5.90E+02					4.97E+02					1.12E+02	J			
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	1.02E+01				YES	4.31E+00				YES	7.40E+00				YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	2.17E+00	J				ND					ND				
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	1.54E+01		YES			1.58E+01		YES			1.76E+01		YES		
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	1.05E+04			YES	YES	4.35E+03	J		YES	YES	6.70E+03			YES	YES
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	1.94E+02		YES		YES	3.49E+02		YES		YES	1.36E+02		YES		YES
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	4.90E+02					2.31E+02					3.86E+02				
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	6.16E+02	J		YES	YES	4.83E+02			YES	YES	1.23E+02				YES
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	2.79E-01		YES		YES	4.09E-02	J				6.71E-02	B			
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	4.23E+00					2.41E+00					2.84E+00				
Potassium	mg/kg	8.00E+02	NA	NA	5.03E+02	J				1.33E+02	J				4.12E+02	J			
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	ND					ND					ND				
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00	ND					ND					ND				
Sodium	mg/kg	6.34E+02	NA	NA	5.47E+01	J				4.53E+01	J				3.85E+01	J			
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	1.92E+01				YES	7.81E+00				YES	1.23E+01				YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	5.89E+02		YES		YES	2.58E+01					1.97E+01	J			
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	NR					NR					NR				
Acetone	mg/kg	NA	7.76E+02	2.50E+00	NR					NR					NR				
PESTICIDES																			
Dieldrin	mg/kg	NA	3.88E-02	5.00E-04	NR					NR					NR				
Heptachlor	mg/kg	NA	1.40E-01	1.00E-01	NR					NR					NR				
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03	NR					NR					NR				
beta-BHC	mg/kg	NA	3.50E-01	1.00E-03	NR					NR					NR				
delta-BHC	mg/kg	NA	2.33E+00	9.94E+00	NR					NR					NR				
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05	NR					NR					NR				
HERBICIDES																			
MCPP	mg/kg	NA	7.77E+00	1.00E-01	NR					NR					NR				

Table 5-1

Surface and Depositional Soil Analytical Results
Former Rifle/Machine Gun Range, Parcel 98Q
Fort McClellan, Calhoun County, Alabama

Sample Location					HR-98Q-GP07					HR-98Q-GP08					HR-98Q-GP09				
Sample Number					PF0015					PF0017					PF0019				
Sample Date					5-Mar-02					5-Feb-02					5-Feb-02				
Sample Depth (Feet)					0- 1					0- 1					0- 1				
Parameter	Units	BKG[a]	SSSL[b]	ESV[b]	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	9.97E+03			YES	YES	2.59E+04		YES	YES	YES	1.40E+04			YES	YES
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	2.60E+00			YES		6.88E+00			YES		5.09E+00			YES	
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	2.33E+01					4.88E+01					5.30E+01				
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	ND					4.24E-01	J				7.45E-01	J			
Calcium	mg/kg	1.72E+03	NA	NA	6.72E+01	J				1.63E+02					7.27E+01	J			
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	2.21E+01				YES	3.42E+01			YES	YES	2.06E+01				YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	1.48E+00	J				2.79E+00					3.20E+00				
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	7.84E+00					3.27E+01		YES			4.14E+01		YES		YES
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	1.78E+04			YES	YES	4.11E+04		YES	YES	YES	4.03E+04		YES	YES	YES
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	1.61E+01					5.57E+00					1.58E+01				
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	3.35E+02					1.34E+03		YES			6.89E+02				
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	4.01E+01					5.05E+01	J				6.75E+01	J			
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	ND					1.14E-01	J	YES		YES	9.86E-02	J	YES		
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	4.49E+00					7.49E+00					8.92E+00				
Potassium	mg/kg	8.00E+02	NA	NA	2.84E+02	J				2.07E+03		YES			1.14E+03		YES		
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	9.27E-01	B	YES		YES	1.31E+00		YES		YES	1.15E+00	J	YES		YES
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00	ND					2.06E+00	J	YES		YES	1.81E+00	J	YES		
Sodium	mg/kg	6.34E+02	NA	NA	4.44E+01	J				5.12E+01	J				4.07E+01	J			
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	2.34E+01				YES	5.51E+01			YES	YES	3.59E+01				YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	1.59E+01	J				3.18E+01					4.64E+01		YES		
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	NR					NR					NR				
Acetone	mg/kg	NA	7.76E+02	2.50E+00	NR					NR					NR				
PESTICIDES																			
Dieldrin	mg/kg	NA	3.88E-02	5.00E-04	NR					NR					NR				
Heptachlor	mg/kg	NA	1.40E-01	1.00E-01	NR					NR					NR				
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03	NR					NR					NR				
beta-BHC	mg/kg	NA	3.50E-01	1.00E-03	NR					NR					NR				
delta-BHC	mg/kg	NA	2.33E+00	9.94E+00	NR					NR					NR				
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05	NR					NR					NR				
HERBICIDES																			
MCPP	mg/kg	NA	7.77E+00	1.00E-01	NR					NR					NR				

Table 5-1

Surface and Depositional Soil Analytical Results
Former Rifle/Machine Gun Range, Parcel 98Q
Fort McClellan, Calhoun County, Alabama

Sample Location					HR-98Q-GP10					HR-98Q-GP11					HR-98Q-GP12				
Sample Number					PF0021					PF0023					PF0026				
Sample Date					4-Mar-02					12-Feb-02					12-Feb-02				
Sample Depth (Feet)					0- 1					0- 1					0- 1				
Parameter	Units	BKG[a]	SSSL[b]	ESV[b]	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	6.87E+03				YES	6.31E+03				YES	5.09E+03				YES
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	2.49E+00			YES		1.93E+00			YES		1.57E+00			YES	
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	5.67E+01					2.80E+01					3.02E+01				
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	ND					ND					ND				
Calcium	mg/kg	1.72E+03	NA	NA	2.64E+02					9.44E+01	J				1.01E+02	J			
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	9.92E+00	J			YES	6.01E+00				YES	5.40E+00				YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	2.45E+00					ND					ND				
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	7.74E+00					1.34E+01		YES			6.13E+00				
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	9.17E+03			YES	YES	6.50E+03			YES	YES	4.88E+03			YES	YES
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	4.47E+01	J	YES			6.91E+01		YES		YES	1.18E+01				
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	2.47E+02					2.01E+02					1.58E+02				
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	2.47E+02	J			YES	4.16E+01					9.58E+01				
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	4.32E-02	J				6.67E-02	B				7.69E-02	B			
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	2.74E+00					2.18E+00	J				1.44E+00	J			
Potassium	mg/kg	8.00E+02	NA	NA	1.13E+02	J				1.89E+02	J				1.14E+02	J			
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	ND					ND					ND				
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00	ND					ND					ND				
Sodium	mg/kg	6.34E+02	NA	NA	ND					2.08E+01	J				ND				
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	1.21E+01	J			YES	1.14E+01				YES	9.22E+00				YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	1.51E+01	J				1.90E+01	J				8.61E+00	J			
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	NR					NR					NR				
Acetone	mg/kg	NA	7.76E+02	2.50E+00	NR					NR					NR				
PESTICIDES																			
Dieldrin	mg/kg	NA	3.88E-02	5.00E-04	NR					NR					NR				
Heptachlor	mg/kg	NA	1.40E-01	1.00E-01	NR					NR					NR				
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03	NR					NR					NR				
beta-BHC	mg/kg	NA	3.50E-01	1.00E-03	NR					NR					NR				
delta-BHC	mg/kg	NA	2.33E+00	9.94E+00	NR					NR					NR				
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05	NR					NR					NR				
HERBICIDES																			
MCPP	mg/kg	NA	7.77E+00	1.00E-01	NR					NR					NR				

Table 5-1

Surface and Depositional Soil Analytical Results
Former Rifle/Machine Gun Range, Parcel 98Q
Fort McClellan, Calhoun County, Alabama

Sample Location					HR-98Q-GP13					HR-98Q-GP14					HR-98Q-GP15				
Sample Number					PF0028					PF0030					PF0032				
Sample Date					11-Feb-02					5-Feb-02					5-Feb-02				
Sample Depth (Feet)					0- 1					0- 1					0- 1				
Parameter	Units	BKG[a]	SSSL[b]	ESV[b]	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	1.82E+04		YES	YES	YES	5.17E+03				YES	4.35E+03				YES
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	3.54E+00			YES		1.06E+00	J		YES		8.16E-01	J		YES	
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	6.17E+01					2.62E+01					2.93E+01				
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	ND					ND					ND				
Calcium	mg/kg	1.72E+03	NA	NA	1.73E+02					1.04E+02	J				7.46E+01	J			
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	2.73E+01			YES	YES	3.23E+00				YES	3.94E+00				YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	1.73E+00	J				ND					1.36E+00	J			
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	4.89E+01		YES		YES	3.12E+00					5.21E+00				
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	2.48E+04			YES	YES	2.90E+03			YES	YES	4.52E+03			YES	YES
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	3.37E+02		YES		YES	4.32E+01		YES			2.43E+01				
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	2.06E+03		YES			2.32E+02					1.71E+02				
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	6.60E+01					5.01E+01	J				2.74E+01	J			
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	9.54E-02	B	YES			9.85E-02	J	YES			1.02E-01	J	YES		YES
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	4.84E+00					1.74E+00	J				2.45E+00				
Potassium	mg/kg	8.00E+02	NA	NA	4.81E+03		YES			2.35E+02	J				1.96E+02	J			
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	6.59E-01	J	YES			ND					ND				
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00	ND					ND					ND				
Sodium	mg/kg	6.34E+02	NA	NA	4.68E+01	J				4.18E+01	J				4.05E+01	J			
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	3.58E+01				YES	6.66E+00				YES	6.59E+00				YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	2.37E+01					8.75E+00					6.76E+00				
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	NR					NR					ND				
Acetone	mg/kg	NA	7.76E+02	2.50E+00	NR					NR					4.50E-02				
PESTICIDES																			
Dieldrin	mg/kg	NA	3.88E-02	5.00E-04	NR					NR					4.10E-04	J			
Heptachlor	mg/kg	NA	1.40E-01	1.00E-01	NR					NR					3.10E-03	J			
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03	NR					NR					1.40E-03	J			
beta-BHC	mg/kg	NA	3.50E-01	1.00E-03	NR					NR					2.70E-03	J			YES
delta-BHC	mg/kg	NA	2.33E+00	9.94E+00	NR					NR					4.40E-04	J			
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05	NR					NR					8.00E-04	J			YES
HERBICIDES																			
MCPP	mg/kg	NA	7.77E+00	1.00E-01	NR					NR					ND				

Table 5-1

Surface and Depositional Soil Analytical Results
Former Rifle/Machine Gun Range, Parcel 98Q
Fort McClellan, Calhoun County, Alabama

Sample Location					HR-98Q-GP16					HR-98Q-GP17					HR-98Q-GP18				
Sample Number					PF0035					PF0037					PF0039				
Sample Date					7-Feb-02					7-Feb-02					7-Feb-02				
Sample Depth (Feet)					0- 1					0- 1					0- 1				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**Qual**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**Qual**	**>BKG**	**>SSSL**	**>ESV**	**Result**	**Qual**	**>BKG**	**>SSSL**	**>ESV**
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	9.72E+03	J		YES	YES	6.31E+03	J			YES	6.23E+03	J			YES
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	4.70E+00			YES		2.59E+00			YES		4.18E+00			YES	
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	1.90E+01					2.32E+01					2.22E+01				
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	ND					ND					4.54E-01	J			
Calcium	mg/kg	1.72E+03	NA	NA	2.30E+02					2.46E+02					8.48E+01	J			
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	1.76E+01				YES	8.00E+00				YES	5.22E+00				YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	ND					ND					2.69E+00				
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	7.44E+00					8.71E+00					1.11E+01				
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	1.82E+04	J		YES	YES	8.34E+03	J		YES	YES	2.34E+04	J		YES	YES
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	4.04E+01		YES			4.96E+01		YES			4.53E+01		YES		
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	1.75E+02					1.52E+02					1.96E+02				
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	2.20E+01					3.87E+01					5.82E+01				
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	7.41E-02	J				5.35E-02	J				3.61E-02	J			
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	1.89E+00	J				1.56E+00	J				5.15E+00				
Potassium	mg/kg	8.00E+02	NA	NA	1.04E+02	J				1.32E+02	J				1.11E+02	J			
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	6.69E-01	J	YES			ND					9.29E-01	J	YES		YES
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00	ND					ND					ND				
Sodium	mg/kg	6.34E+02	NA	NA	ND					ND					3.93E+01	J			
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	3.03E+01				YES	1.50E+01				YES	1.42E+01				YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	1.02E+01					8.18E+00					1.46E+01				
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	NR					NR					NR				
Acetone	mg/kg	NA	7.76E+02	2.50E+00	NR					NR					NR				
PESTICIDES																			
Dieldrin	mg/kg	NA	3.88E-02	5.00E-04	NR					NR					NR				
Heptachlor	mg/kg	NA	1.40E-01	1.00E-01	NR					NR					NR				
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03	NR					NR					NR				
beta-BHC	mg/kg	NA	3.50E-01	1.00E-03	NR					NR					NR				
delta-BHC	mg/kg	NA	2.33E+00	9.94E+00	NR					NR					NR				
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05	NR					NR					NR				
HERBICIDES																			
MCPP	mg/kg	NA	7.77E+00	1.00E-01	NR					NR					NR				

Table 5-1

Surface and Depositional Soil Analytical Results
Former Rifle/Machine Gun Range, Parcel 98Q
Fort McClellan, Calhoun County, Alabama

Sample Location					HR-98Q-GP19					HR-98Q-GP20					HR-98Q-GP21				
Sample Number					PF0041					PF0043					PF0046				
Sample Date					4-Mar-02					12-Feb-02					12-Feb-02				
Sample Depth (Feet)					0- 1					0- 1					0- 1				
Parameter	Units	BKG[a]	SSSL[b]	ESV[b]	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	5.29E+03				YES	8.06E+03			YES	YES	7.67E+03				YES
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	2.81E+00			YES		2.57E+00	J		YES		2.53E+00			YES	
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	2.21E+01					3.46E+01					3.46E+01				
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	ND					ND					ND				
Calcium	mg/kg	1.72E+03	NA	NA	8.41E+01	J				1.22E+02					7.78E+01	J			
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	1.81E+01	J			YES	8.05E+00				YES	7.04E+00				YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	1.52E+00	J				ND					ND				
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	1.10E+01					2.73E+01	J	YES			3.88E+01		YES		
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	1.05E+04			YES	YES	9.83E+03	J		YES	YES	6.31E+03			YES	YES
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	7.83E+01	J	YES		YES	3.46E+02	J	YES		YES	9.25E+01		YES		YES
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	1.81E+02					2.09E+02					2.44E+02				
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	2.93E+01	J				5.61E+01					1.30E+02				YES
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	ND					7.38E-02	B				5.70E-02	B			
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	2.23E+00	J				2.38E+00					2.23E+00	J			
Potassium	mg/kg	8.00E+02	NA	NA	1.15E+02	J				2.21E+02	J				1.93E+02	J			
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	ND					ND					ND				
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00	ND					ND					ND				
Sodium	mg/kg	6.34E+02	NA	NA	ND					3.83E+01	J				3.68E+01	J			
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	1.77E+01	J			YES	1.67E+01				YES	1.17E+01				YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	1.22E+01	J				1.74E+01	J				1.29E+01	J			
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	5.60E-03	J				NR					NR				
Acetone	mg/kg	NA	7.76E+02	2.50E+00	1.30E-01	J				NR					NR				
PESTICIDES																			
Dieldrin	mg/kg	NA	3.88E-02	5.00E-04	ND					NR					NR				
Heptachlor	mg/kg	NA	1.40E-01	1.00E-01	ND					NR					NR				
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03	ND					NR					NR				
beta-BHC	mg/kg	NA	3.50E-01	1.00E-03	ND					NR					NR				
delta-BHC	mg/kg	NA	2.33E+00	9.94E+00	ND					NR					NR				
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05	ND					NR					NR				
HERBICIDES																			
MCPP	mg/kg	NA	7.77E+00	1.00E-01	ND					NR					NR				

Table 5-1

Surface and Depositional Soil Analytical Results
Former Rifle/Machine Gun Range, Parcel 98Q
Fort McClellan, Calhoun County, Alabama

Sample Location					HR-98Q-GP22					HR-98Q-GP23					HR-98Q-GP24				
Sample Number					PF0048					PF0050					PF0052				
Sample Date					13-Feb-02					13-Feb-02					4-Mar-02				
Sample Depth (Feet)					0- 1					0- 1					0- 1				
Parameter	Units	BKG[a]	SSSL[b]	ESV[b]	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	1.03E+04			YES	YES	7.26E+03				YES	6.50E+03				YES
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	2.69E+00			YES		1.66E+00			YES		4.27E+00			YES	
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	3.04E+01					2.77E+01					2.50E+01				
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	ND					ND					ND				
Calcium	mg/kg	1.72E+03	NA	NA	1.69E+02					7.19E+01	J				1.27E+02				
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	1.22E+01				YES	6.36E+00				YES	6.55E+00	J			YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	ND					ND					1.75E+00	J			
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	3.41E+01		YES			5.10E+00					9.76E+01		YES		YES
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	1.12E+04			YES	YES	5.54E+03			YES	YES	1.03E+04			YES	YES
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	2.71E+02		YES		YES	2.24E+02		YES		YES	2.21E+02	J	YES		YES
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	2.74E+02					2.88E+02					2.47E+02				
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	5.15E+01					2.25E+02				YES	7.54E+01	J			
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	8.82E-02	J	YES			6.53E-02	J				ND				
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	2.71E+00					3.20E+00					3.25E+00				
Potassium	mg/kg	8.00E+02	NA	NA	2.63E+02	J				2.22E+02	J				1.48E+02	J			
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	ND					ND					ND				
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00	ND					ND					ND				
Sodium	mg/kg	6.34E+02	NA	NA	3.70E+01	J				3.93E+01	J				ND				
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	2.08E+01				YES	1.10E+01				YES	1.26E+01	J			YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	1.75E+01					1.12E+01					2.68E+01	J			
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	NR					NR					NR				
Acetone	mg/kg	NA	7.76E+02	2.50E+00	NR					NR					NR				
PESTICIDES																			
Dieldrin	mg/kg	NA	3.88E-02	5.00E-04	NR					NR					NR				
Heptachlor	mg/kg	NA	1.40E-01	1.00E-01	NR					NR					NR				
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03	NR					NR					NR				
beta-BHC	mg/kg	NA	3.50E-01	1.00E-03	NR					NR					NR				
delta-BHC	mg/kg	NA	2.33E+00	9.94E+00	NR					NR					NR				
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05	NR					NR					NR				
HERBICIDES																			
MCPP	mg/kg	NA	7.77E+00	1.00E-01	NR					NR					NR				

Table 5-1

Surface and Depositional Soil Analytical Results
Former Rifle/Machine Gun Range, Parcel 98Q
Fort McClellan, Calhoun County, Alabama

Sample Location					HR-98Q-GP25					HR-98Q-GP26					HR-98Q-GP27				
Sample Number					PF0054					PF0057					PF0059				
Sample Date					4-Mar-02					4-Mar-02					11-Feb-02				
Sample Depth (Feet)					0- 1					0- 1					0- 1				
Parameter	Units	BKG[a]	SSSL[b]	ESV[b]	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	6.07E+03				YES	6.26E+03				YES	7.20E+03				YES
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	1.93E+00			YES		1.38E+00			YES		1.97E+00			YES	
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	2.56E+01					3.47E+01					2.47E+01				
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	ND					ND					ND				
Calcium	mg/kg	1.72E+03	NA	NA	9.91E+01	J				1.09E+02	J				6.82E+01	J			
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	4.86E+00	J			YES	3.18E+00	J			YES	5.15E+00				YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	ND					1.61E+00	J				ND				
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	2.48E+00					2.18E+00	J				4.22E+00				
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	5.85E+03			YES	YES	3.20E+03			YES	YES	6.16E+03			YES	YES
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	2.29E+01	J				5.90E+00	J				2.19E+01				
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	2.16E+02					2.07E+02					2.07E+02				
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	4.79E+01	J				4.70E+01	J				2.76E+01				
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	ND					ND					9.31E-02	B	YES		
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	2.66E+00					1.99E+00	J				1.98E+00	J			
Potassium	mg/kg	8.00E+02	NA	NA	1.45E+02	J				9.90E+01	J				1.76E+02	J			
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	ND					ND					ND				
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00	ND					ND					ND				
Sodium	mg/kg	6.34E+02	NA	NA	ND					ND					4.40E+01	J			
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	8.02E+00	J			YES	7.02E+00	J			YES	1.27E+01				YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	1.73E+01	J				6.65E+00	J				8.37E+00				
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	NR					NR					NR				
Acetone	mg/kg	NA	7.76E+02	2.50E+00	NR					NR					NR				
PESTICIDES																			
Dieldrin	mg/kg	NA	3.88E-02	5.00E-04	NR					NR					NR				
Heptachlor	mg/kg	NA	1.40E-01	1.00E-01	NR					NR					NR				
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03	NR					NR					NR				
beta-BHC	mg/kg	NA	3.50E-01	1.00E-03	NR					NR					NR				
delta-BHC	mg/kg	NA	2.33E+00	9.94E+00	NR					NR					NR				
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05	NR					NR					NR				
HERBICIDES																			
MCPP	mg/kg	NA	7.77E+00	1.00E-01	NR					NR					NR				

Table 5-1

Surface and Depositional Soil Analytical Results
Former Rifle/Machine Gun Range, Parcel 98Q
Fort McClellan, Calhoun County, Alabama

Sample Location					HR-98Q-GP28					HR-98Q-GP29					HR-98Q-GP30				
Sample Number					PF0061					PF0063					PF0065				
Sample Date					11-Feb-02					11-Feb-02					7-Feb-02				
Sample Depth (Feet)					0- 1					0- 1					0- 1				
Parameter	Units	BKG[a]	SSSL[b]	ESV[b]	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	8.98E+03			YES	YES	7.71E+03				YES	5.80E+03	J			YES
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	1.55E+00			YES		1.20E+00	J		YES		2.23E+00			YES	
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	5.21E+01					4.97E+01					3.79E+01				
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	ND					ND					ND				
Calcium	mg/kg	1.72E+03	NA	NA	2.43E+02					2.40E+02					8.15E+01	J			
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	4.31E+00				YES	3.37E+00				YES	4.22E+00				YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	ND					ND					ND				
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	4.12E+00					3.08E+00					9.36E+00				
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	4.13E+03			YES	YES	3.14E+03			YES	YES	9.93E+03	J		YES	YES
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	1.13E+01					7.25E+00					1.78E+01				
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	3.98E+02					3.21E+02					1.35E+02				
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	1.03E+02				YES	9.38E+01					1.18E+02				YES
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	1.34E-01	B	YES		YES	9.52E-02	B	YES			ND				
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	3.88E+00					3.54E+00					1.88E+00	J			
Potassium	mg/kg	8.00E+02	NA	NA	2.60E+02	J				2.16E+02	J				9.46E+01	J			
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	ND					ND					ND				
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00	ND					ND					ND				
Sodium	mg/kg	6.34E+02	NA	NA	3.85E+01	J				4.38E+01	J				3.99E+01	J			
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	9.91E+00				YES	7.16E+00				YES	1.28E+01				YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	1.42E+01					1.42E+01					1.07E+01				
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	NR					NR					NR				
Acetone	mg/kg	NA	7.76E+02	2.50E+00	NR					NR					NR				
PESTICIDES																			
Dieldrin	mg/kg	NA	3.88E-02	5.00E-04	NR					NR					NR				
Heptachlor	mg/kg	NA	1.40E-01	1.00E-01	NR					NR					NR				
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03	NR					NR					NR				
beta-BHC	mg/kg	NA	3.50E-01	1.00E-03	NR					NR					NR				
delta-BHC	mg/kg	NA	2.33E+00	9.94E+00	NR					NR					NR				
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05	NR					NR					NR				
HERBICIDES																			
MCPP	mg/kg	NA	7.77E+00	1.00E-01	NR					NR					NR				

Table 5-1

Surface and Depositional Soil Analytical Results
Former Rifle/Machine Gun Range, Parcel 98Q
Fort McClellan, Calhoun County, Alabama

Sample Location					HR-98Q-MW01					HR-98Q-MW02				
Sample Number					PF0067					PF0069				
Sample Date					5-Mar-02					5-Mar-02				
Sample Depth (Feet)					0- 1					0- 1				
Parameter	Units	BKG[a]	SSSL[b]	ESV[b]	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV
METALS														
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	6.24E+03				YES	5.58E+03				YES
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	1.35E+00			YES		1.53E+00			YES	
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	3.27E+01					4.25E+01				
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	ND					ND				
Calcium	mg/kg	1.72E+03	NA	NA	9.29E+01	J				3.46E+02				
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	6.43E+00				YES	6.10E+00				YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	1.56E+00	J				ND				
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	3.78E+00					1.48E+01		YES		
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	4.22E+03			YES	YES	4.56E+03			YES	YES
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	1.13E+01					2.57E+02		YES		YES
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	2.55E+02					2.61E+02				
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	7.81E+01					1.36E+02				YES
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	2.99E-02	J				4.79E-02	J			
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	2.79E+00					2.87E+00				
Potassium	mg/kg	8.00E+02	NA	NA	2.41E+02	J				1.90E+02	J			
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	ND					ND				
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00	ND					ND				
Sodium	mg/kg	6.34E+02	NA	NA	ND					4.48E+01	J			
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	9.10E+00				YES	7.95E+00				YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	1.41E+01	J				1.59E+01	J			
VOLATILE ORGANIC COMPOUNDS														
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	5.70E-03	J				NR				
Acetone	mg/kg	NA	7.76E+02	2.50E+00	1.50E-01	J				NR				
PESTICIDES														
Dieldrin	mg/kg	NA	3.88E-02	5.00E-04	ND					NR				
Heptachlor	mg/kg	NA	1.40E-01	1.00E-01	ND					NR				
alpha-BHC	mg/kg	NA	1.00E-01	2.50E-03	ND					NR				
beta-BHC	mg/kg	NA	3.50E-01	1.00E-03	ND					NR				
delta-BHC	mg/kg	NA	2.33E+00	9.94E+00	ND					NR				
gamma-BHC (Lindane)	mg/kg	NA	4.85E-01	5.00E-05	ND					NR				
HERBICIDES														
MCPP	mg/kg	NA	7.77E+00	1.00E-01	2.00E+00	J			YES	NR				

Table 5-1

Surface and Depositional Soil Analytical Results
Former Rifle/Machine Gun Range, Parcel 98Q
Fort McClellan, Calhoun County, Alabama

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

[a] BKG - Background. Concentration listed is two times (2x) the arithmetic mean of background metals concentration given in SAIC, 1998, *Final Background Metals Survey Report, Fort McClellan, Alabama*, July.

[b] 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.

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 5-2

Subsurface Soil Analytical Results
Former Rifle/Machine Gun Range, Parcel 98Q
Fort McClellan, Calhoun County, Alabama

Sample Location				HR-98Q-GP01				HR-98Q-GP02				HR-98Q-GP03				HR-98Q-GP04			
Sample Number				PF0002				PF0005				PF0007				PF0009			
Sample Date				12-Feb-02				5-Mar-02				11-Feb-02				5-Feb-02			
Sample Depth (Feet)				3 - 4				3 - 4				1 - 2				3 - 4			
Parameter	Units	BKG[a]	SSSL[b]	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL
METALS																			
Aluminum	mg/kg	1.36E+04	7.80E+03	5.38E+03				1.80E+04		YES	YES	1.34E+04			YES	1.25E+04			YES
Arsenic	mg/kg	1.83E+01	4.26E-01	1.86E+00			YES	2.70E+00			YES	5.27E+00			YES	1.85E+00			YES
Barium	mg/kg	2.34E+02	5.47E+02	5.16E+01				5.15E+01				8.18E+01				5.31E+01			
Beryllium	mg/kg	8.60E-01	9.60E+00	ND				ND				7.18E-01	J			ND			
Calcium	mg/kg	6.37E+02	NA	1.51E+02				1.11E+02	J			1.94E+02				1.43E+02			
Chromium	mg/kg	3.83E+01	2.32E+01	4.77E+00				1.27E+01				1.41E+01				9.40E+00			
Cobalt	mg/kg	1.75E+01	4.68E+02	4.44E+00				3.08E+00				8.87E+00				2.48E+00			
Copper	mg/kg	1.94E+01	3.13E+02	3.27E+00				5.85E+00				1.11E+01				5.16E+00			
Iron	mg/kg	4.48E+04	2.34E+03	4.38E+03			YES	1.24E+04			YES	1.45E+04			YES	8.20E+03			YES
Lead	mg/kg	3.85E+01	4.00E+02	6.86E+00				9.04E+00				2.46E+01				1.52E+01			
Magnesium	mg/kg	7.66E+02	NA	1.77E+02				7.04E+02				5.90E+02				5.53E+02			
Manganese	mg/kg	1.36E+03	3.63E+02	3.32E+02				4.65E+01				6.25E+02			YES	9.68E+01	J		
Mercury	mg/kg	7.00E-02	2.33E+00	5.78E-02	B			ND				1.28E-01	B	YES		1.54E-01		YES	
Nickel	mg/kg	1.29E+01	1.54E+02	2.98E+00				6.23E+00				9.10E+00				4.27E+00			
Potassium	mg/kg	7.11E+02	NA	1.57E+02	J			4.54E+02	J			4.75E+02	J			5.54E+02	J		
Selenium	mg/kg	4.70E-01	3.91E+01	ND				6.27E-01	B	YES		ND				ND			
Silver	mg/kg	2.40E-01	3.91E+01	ND				ND				ND				ND			
Sodium	mg/kg	7.02E+02	NA	4.16E+01	J			5.37E+01	J			4.85E+01	J			4.25E+01	J		
Vanadium	mg/kg	6.49E+01	5.31E+01	7.36E+00				2.43E+01				3.12E+01				1.79E+01			
Zinc	mg/kg	3.49E+01	2.34E+03	6.68E+00	J			2.07E+01	J			3.25E+01				3.67E+01		YES	
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	NR				NR				NR				NR			
Acetone	mg/kg	NA	7.76E+02	NR				NR				NR				NR			
HERBICIDES																			
MCPP	mg/kg	NA	7.77E+00	NR				NR				NR				NR			

Table 5-2

Subsurface Soil Analytical Results
Former Rifle/Machine Gun Range, Parcel 98Q
Fort McClellan, Calhoun County, Alabama

Sample Location				HR-98Q-GP05				HR-98Q-GP06				HR-98Q-GP07				HR-98Q-GP08			
Sample Number				PF0011				PF0013				PF0016				PF0018			
Sample Date				7-Feb-02				12-Feb-02				5-Mar-02				5-Feb-02			
Sample Depth (Feet)				2 - 3				3 - 4				3 - 4				3 - 4			
Parameter	Units	BKG[a]	SSSL[b]	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL
METALS																			
Aluminum	mg/kg	1.36E+04	7.80E+03	7.82E+03	J		YES	1.74E+04		YES	YES	6.93E+03				1.56E+04		YES	YES
Arsenic	mg/kg	1.83E+01	4.26E-01	1.55E+00			YES	4.73E+00	J		YES	3.00E+00			YES	2.68E+00			YES
Barium	mg/kg	2.34E+02	5.47E+02	4.53E+01				5.38E+01	J			3.38E+01				4.53E+01			
Beryllium	mg/kg	8.60E-01	9.60E+00	ND				ND				4.03E-01	J			ND			
Calcium	mg/kg	6.37E+02	NA	2.49E+02				2.96E+02	J			1.35E+02				1.08E+02	J		
Chromium	mg/kg	3.83E+01	2.32E+01	5.75E+00				2.03E+01	J			2.58E+01			YES	1.37E+01			
Cobalt	mg/kg	1.75E+01	4.68E+02	1.41E+00	J			1.98E+00	J			2.07E+00	J			1.78E+00	J		
Copper	mg/kg	1.94E+01	3.13E+02	5.01E+00				9.96E+00				4.92E+00				7.45E+00			
Iron	mg/kg	4.48E+04	2.34E+03	6.58E+03	J		YES	2.25E+04	J		YES	2.21E+04			YES	1.29E+04			YES
Lead	mg/kg	3.85E+01	4.00E+02	1.58E+01				1.79E+01	J			9.64E+00				6.03E+00			
Magnesium	mg/kg	7.66E+02	NA	2.38E+02				7.97E+02	J	YES		2.19E+02				7.40E+02			
Manganese	mg/kg	1.36E+03	3.63E+02	1.94E+02				4.93E+01	J			9.64E+01				2.61E+01	J		
Mercury	mg/kg	7.00E-02	2.33E+00	4.69E-02	J			1.18E-01	B	YES		ND				8.18E-02	J	YES	
Nickel	mg/kg	1.29E+01	1.54E+02	2.29E+00	J			7.29E+00				2.57E+00				5.38E+00			
Potassium	mg/kg	7.11E+02	NA	1.28E+02	J			6.19E+02	J			1.70E+02	J			7.44E+02		YES	
Selenium	mg/kg	4.70E-01	3.91E+01	ND				5.66E-01	J	YES		7.74E-01	B	YES		ND			
Silver	mg/kg	2.40E-01	3.91E+01	ND				ND				ND				ND			
Sodium	mg/kg	7.02E+02	NA	5.02E+01	J			3.96E+01	J			ND				4.58E+01	J		
Vanadium	mg/kg	6.49E+01	5.31E+01	1.14E+01				3.23E+01	J			2.87E+01				2.46E+01			
Zinc	mg/kg	3.49E+01	2.34E+03	8.51E+00				1.96E+01	J			1.15E+01	J			1.46E+01			
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	NR				NR				NR				NR			
Acetone	mg/kg	NA	7.76E+02	NR				NR				NR				NR			
HERBICIDES																			
MCPP	mg/kg	NA	7.77E+00	NR				NR				NR				NR			

Table 5-2

Subsurface Soil Analytical Results
Former Rifle/Machine Gun Range, Parcel 98Q
Fort McClellan, Calhoun County, Alabama

Sample Location				HR-98Q-GP09				HR-98Q-GP10				HR-98Q-GP11				HR-98Q-GP12			
Sample Number				PF0020				PF0022				PF0025				PF0027			
Sample Date				5-Feb-02				4-Mar-02				12-Feb-02				12-Feb-02			
Sample Depth (Feet)				3 - 4				3 - 4				3 - 4				3 - 4			
Parameter	Units	BKG[a]	SSSL[b]	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL
METALS																			
Aluminum	mg/kg	1.36E+04	7.80E+03	1.94E+04		YES	YES	9.15E+03			YES	4.98E+03				7.08E+03			
Arsenic	mg/kg	1.83E+01	4.26E-01	5.60E+00			YES	1.97E+00			YES	1.36E+00			YES	1.27E+00			YES
Barium	mg/kg	2.34E+02	5.47E+02	4.52E+01				3.47E+01				2.34E+01				2.19E+01			
Beryllium	mg/kg	8.60E-01	9.60E+00	5.34E-01	J			ND				ND				ND			
Calcium	mg/kg	6.37E+02	NA	2.50E+02				2.13E+02				6.81E+01	J			4.07E+01	J		
Chromium	mg/kg	3.83E+01	2.32E+01	3.45E+01			YES	7.17E+00	J			4.16E+00				7.62E+00			
Cobalt	mg/kg	1.75E+01	4.68E+02	4.02E+00				1.79E+00	J			ND				ND			
Copper	mg/kg	1.94E+01	3.13E+02	2.30E+01		YES		3.62E+00				3.11E+00				3.09E+00			
Iron	mg/kg	4.48E+04	2.34E+03	3.80E+04			YES	6.65E+03			YES	3.61E+03			YES	6.37E+03			YES
Lead	mg/kg	3.85E+01	4.00E+02	1.11E+01				9.38E+00	J			6.01E+00				5.70E+00			
Magnesium	mg/kg	7.66E+02	NA	9.45E+02		YES		3.86E+02				2.36E+02				2.09E+02			
Manganese	mg/kg	1.36E+03	3.63E+02	3.63E+01	J			3.89E+01	J			3.07E+01				8.29E+00			
Mercury	mg/kg	7.00E-02	2.33E+00	1.21E-01		YES		4.08E-02	J			6.13E-02	B			6.90E-02	B		
Nickel	mg/kg	1.29E+01	1.54E+02	9.78E+00				3.09E+00				1.92E+00	J			1.55E+00	J		
Potassium	mg/kg	7.11E+02	NA	1.15E+03		YES		1.74E+02	J			1.51E+02	J			1.27E+02	J		
Selenium	mg/kg	4.70E-01	3.91E+01	9.57E-01	J	YES		ND				ND				ND			
Silver	mg/kg	2.40E-01	3.91E+01	1.67E+00	J	YES		ND				ND				ND			
Sodium	mg/kg	7.02E+02	NA	4.80E+01	J			ND				ND				2.27E+01	J		
Vanadium	mg/kg	6.49E+01	5.31E+01	4.47E+01				1.36E+01	J			7.54E+00				1.56E+01			
Zinc	mg/kg	3.49E+01	2.34E+03	2.73E+01				1.07E+01	J			5.89E+00	J			1.06E+01	J		
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	NR				NR				NR				NR			
Acetone	mg/kg	NA	7.76E+02	NR				NR				NR				NR			
HERBICIDES																			
MCPP	mg/kg	NA	7.77E+00	NR				NR				NR				NR			

Table 5-2

Subsurface Soil Analytical Results
Former Rifle/Machine Gun Range, Parcel 98Q
Fort McClellan, Calhoun County, Alabama

Sample Location				HR-98Q-GP13				HR-98Q-GP14				HR-98Q-GP15				HR-98Q-GP16			
Sample Number				PF0029				PF0031				PF0033				PF0036			
Sample Date				11-Feb-02				5-Feb-02				5-Feb-02				7-Feb-02			
Sample Depth (Feet)				3 - 4				3 - 4				3 - 4				2.5- 3.5			
Parameter	Units	BKG[a]	SSSL[b]	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL
METALS																			
Aluminum	mg/kg	1.36E+04	7.80E+03	1.14E+04			YES	7.33E+03				2.13E+03				1.26E+04	J		YES
Arsenic	mg/kg	1.83E+01	4.26E-01	2.19E+00			YES	1.75E+00			YES	4.91E-01	J		YES	6.97E+00			YES
Barium	mg/kg	2.34E+02	5.47E+02	3.79E+01				2.75E+01				1.49E+01	J			1.58E+01			
Beryllium	mg/kg	8.60E-01	9.60E+00	ND				ND				ND				ND			
Calcium	mg/kg	6.37E+02	NA	1.08E+02	J			1.49E+02				3.01E+01	J			2.99E+02			
Chromium	mg/kg	3.83E+01	2.32E+01	1.01E+01				5.65E+00				2.24E+00	J			3.15E+01			YES
Cobalt	mg/kg	1.75E+01	4.68E+02	1.18E+00	J			1.69E+00	J			ND				ND			
Copper	mg/kg	1.94E+01	3.13E+02	5.88E+00				2.60E+00				2.91E+00				8.40E+00			
Iron	mg/kg	4.48E+04	2.34E+03	9.27E+03			YES	5.51E+03			YES	2.38E+03			YES	2.86E+04	J		YES
Lead	mg/kg	3.85E+01	4.00E+02	9.16E+00				6.86E+00				3.48E+00				1.02E+01			
Magnesium	mg/kg	7.66E+02	NA	6.74E+02				3.32E+02				8.18E+01	J			1.48E+02			
Manganese	mg/kg	1.36E+03	3.63E+02	2.35E+01				3.53E+01	J			4.62E+00	J			1.82E+01			
Mercury	mg/kg	7.00E-02	2.33E+00	7.27E-02	B	YES		9.21E-02	J	YES		6.91E-02	J			1.37E-01		YES	
Nickel	mg/kg	1.29E+01	1.54E+02	4.61E+00				2.73E+00				ND				1.80E+00	J		
Potassium	mg/kg	7.11E+02	NA	8.29E+02		YES		3.03E+02	J			1.32E+02	J			1.25E+02	J		
Selenium	mg/kg	4.70E-01	3.91E+01	ND				ND				ND				9.78E-01	J	YES	
Silver	mg/kg	2.40E-01	3.91E+01	ND				ND				ND				1.54E+00	J	YES	
Sodium	mg/kg	7.02E+02	NA	4.05E+01	J			4.17E+01	J			3.31E+01	J			3.79E+01	J		
Vanadium	mg/kg	6.49E+01	5.31E+01	1.81E+01				1.08E+01				3.16E+00				5.15E+01			
Zinc	mg/kg	3.49E+01	2.34E+03	1.28E+01				8.42E+00				2.04E+00				9.76E+00			
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	NR				NR				ND				NR			
Acetone	mg/kg	NA	7.76E+02	NR				NR				1.30E-02	J			NR			
HERBICIDES																			
MCPP	mg/kg	NA	7.77E+00	NR				NR				ND				NR			

Table 5-2

Subsurface Soil Analytical Results
Former Rifle/Machine Gun Range, Parcel 98Q
Fort McClellan, Calhoun County, Alabama

Sample Location				HR-98Q-GP17				HR-98Q-GP18				HR-98Q-GP19				HR-98Q-GP20			
Sample Number				PF0038				PF0040				PF0042				PF0045			
Sample Date				7-Feb-02				7-Feb-02				4-Mar-02				12-Feb-02			
Sample Depth (Feet)				3 - 4				3 - 4				3 - 4				3 - 4			
Parameter	Units	BKG[a]	SSSL[b]	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL
METALS																			
Aluminum	mg/kg	1.36E+04	7.80E+03	2.00E+04	J	YES	YES	8.25E+03	J		YES	7.00E+03				5.96E+03			
Arsenic	mg/kg	1.83E+01	4.26E-01	6.44E+00			YES	3.41E+00			YES	1.62E+00			YES	1.41E+00			YES
Barium	mg/kg	2.34E+02	5.47E+02	2.51E+01				1.99E+01				3.70E+01				2.90E+01			
Beryllium	mg/kg	8.60E-01	9.60E+00	ND				4.50E-01	J			ND				ND			
Calcium	mg/kg	6.37E+02	NA	4.91E+02				7.28E+01	J			1.51E+02				9.86E+01	J		
Chromium	mg/kg	3.83E+01	2.32E+01	2.63E+01			YES	7.74E+00				6.44E+00	J			4.90E+00			
Cobalt	mg/kg	1.75E+01	4.68E+02	ND				3.46E+00				ND				ND			
Copper	mg/kg	1.94E+01	3.13E+02	9.03E+00				5.63E+00				5.12E+00				4.74E+00			
Iron	mg/kg	4.48E+04	2.34E+03	2.53E+04	J		YES	2.78E+04	J		YES	5.67E+03			YES	3.97E+03			YES
Lead	mg/kg	3.85E+01	4.00E+02	1.22E+01				1.87E+01				2.40E+01	J			2.05E+01			
Magnesium	mg/kg	7.66E+02	NA	2.38E+02				2.03E+02				2.27E+02				2.41E+02			
Manganese	mg/kg	1.36E+03	3.63E+02	2.35E+01				6.12E+01				7.17E+01	J			4.11E+01			
Mercury	mg/kg	7.00E-02	2.33E+00	9.22E-02	J	YES		ND				ND				7.47E-02	B	YES	
Nickel	mg/kg	1.29E+01	1.54E+02	3.11E+00				6.66E+00				2.34E+00				1.91E+00	J		
Potassium	mg/kg	7.11E+02	NA	1.86E+02	J			1.11E+02	J			1.68E+02	J			1.67E+02	J		
Selenium	mg/kg	4.70E-01	3.91E+01	6.70E-01	J	YES		8.54E-01	J	YES		ND				ND			
Silver	mg/kg	2.40E-01	3.91E+01	ND				ND				ND				ND			
Sodium	mg/kg	7.02E+02	NA	ND				3.32E+01	J			ND				3.76E+01	J		
Vanadium	mg/kg	6.49E+01	5.31E+01	4.76E+01				1.83E+01				1.14E+01	J			8.90E+00			
Zinc	mg/kg	3.49E+01	2.34E+03	1.17E+01				1.22E+01				8.72E+00	J			7.97E+00	J		
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	NR				NR				3.10E-03	J			NR			
Acetone	mg/kg	NA	7.76E+02	NR				NR				6.40E-02	J			NR			
HERBICIDES																			
MCPP	mg/kg	NA	7.77E+00	NR				NR				1.40E+00	J			NR			

Table 5-2

Subsurface Soil Analytical Results
Former Rifle/Machine Gun Range, Parcel 98Q
Fort McClellan, Calhoun County, Alabama

Sample Location				HR-98Q-GP21				HR-98Q-GP22				HR-98Q-GP23				HR-98Q-GP24			
Sample Number				PF0047				PF0049				PF0051				PF0053			
Sample Date				12-Feb-02				13-Feb-02				13-Feb-02				4-Mar-02			
Sample Depth (Feet)				3 - 4				3 - 4				2 - 3				2 - 3			
Parameter	Units	BKG[a]	SSSL[b]	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL
METALS																			
Aluminum	mg/kg	1.36E+04	7.80E+03	1.11E+04			YES	6.59E+03				6.44E+03				4.75E+03			
Arsenic	mg/kg	1.83E+01	4.26E-01	2.59E+00			YES	1.37E+00			YES	1.38E+00			YES	1.52E+00			YES
Barium	mg/kg	2.34E+02	5.47E+02	2.86E+01				5.31E+01				3.28E+01				2.92E+01			
Beryllium	mg/kg	8.60E-01	9.60E+00	ND				ND				ND				ND			
Calcium	mg/kg	6.37E+02	NA	1.29E+02				4.42E+02				7.51E+01	J			8.73E+01	J		
Chromium	mg/kg	3.83E+01	2.32E+01	8.80E+00				5.18E+00				4.56E+00				3.32E+00	J		
Cobalt	mg/kg	1.75E+01	4.68E+02	ND				ND				ND				ND			
Copper	mg/kg	1.94E+01	3.13E+02	6.72E+00				6.19E+00				3.58E+00				3.45E+00			
Iron	mg/kg	4.48E+04	2.34E+03	8.87E+03			YES	4.36E+03			YES	4.45E+03			YES	4.75E+03			YES
Lead	mg/kg	3.85E+01	4.00E+02	1.14E+01				1.52E+01				1.67E+01				8.67E+00	J		
Magnesium	mg/kg	7.66E+02	NA	3.46E+02				2.64E+02				2.49E+02				1.82E+02			
Manganese	mg/kg	1.36E+03	3.63E+02	2.50E+01				6.91E+01				5.21E+01				4.83E+01	J		
Mercury	mg/kg	7.00E-02	2.33E+00	1.32E-01	B	YES		5.93E-02	J			6.48E-02	J			ND			
Nickel	mg/kg	1.29E+01	1.54E+02	2.65E+00				2.34E+00				2.75E+00				2.30E+00			
Potassium	mg/kg	7.11E+02	NA	2.40E+02	J			1.74E+02	J			1.86E+02	J			1.72E+02	J		
Selenium	mg/kg	4.70E-01	3.91E+01	ND				ND				ND				ND			
Silver	mg/kg	2.40E-01	3.91E+01	ND				ND				ND				ND			
Sodium	mg/kg	7.02E+02	NA	3.42E+01	J			3.72E+01	J			3.90E+01	J			ND			
Vanadium	mg/kg	6.49E+01	5.31E+01	1.69E+01				9.15E+00				9.33E+00				7.68E+00	J		
Zinc	mg/kg	3.49E+01	2.34E+03	9.95E+00	J			8.95E+00				8.42E+00				8.18E+00	J		
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	NR				NR				NR				NR			
Acetone	mg/kg	NA	7.76E+02	NR				NR				NR				NR			
HERBICIDES																			
MCPP	mg/kg	NA	7.77E+00	NR				NR				NR				NR			

Table 5-2

Subsurface Soil Analytical Results
Former Rifle/Machine Gun Range, Parcel 98Q
Fort McClellan, Calhoun County, Alabama

Sample Location				HR-98Q-GP25				HR-98Q-GP26				HR-98Q-GP27				HR-98Q-GP28			
Sample Number				PF0055				PF0058				PF0060				PF0062			
Sample Date				4-Mar-02				4-Mar-02				11-Feb-02				11-Feb-02			
Sample Depth (Feet)				3 - 4				3 - 4				2 - 3				3 - 4			
Parameter	Units	BKG[a]	SSSL[b]	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL
METALS																			
Aluminum	mg/kg	1.36E+04	7.80E+03	3.07E+04		YES	YES	2.08E+04		YES	YES	7.84E+03			YES	1.34E+04			YES
Arsenic	mg/kg	1.83E+01	4.26E-01	9.65E+00			YES	4.36E+00			YES	2.42E+00			YES	2.94E+00			YES
Barium	mg/kg	2.34E+02	5.47E+02	3.97E+01				3.47E+01				2.64E+01				2.66E+01			
Beryllium	mg/kg	8.60E-01	9.60E+00	ND				ND				ND				ND			
Calcium	mg/kg	6.37E+02	NA	1.49E+02				4.77E+01	J			4.13E+01	J			8.13E+01	J		
Chromium	mg/kg	3.83E+01	2.32E+01	2.41E+01	J		YES	2.50E+01	J		YES	7.78E+00				7.87E+00			
Cobalt	mg/kg	1.75E+01	4.68E+02	2.37E+00				2.04E+00	J			ND				ND			
Copper	mg/kg	1.94E+01	3.13E+02	9.55E+00				8.15E+00				4.03E+00				4.26E+00			
Iron	mg/kg	4.48E+04	2.34E+03	2.72E+04			YES	2.09E+04			YES	7.47E+03			YES	6.78E+03			YES
Lead	mg/kg	3.85E+01	4.00E+02	1.31E+01	J			8.23E+00	J			4.56E+00				5.18E+00			
Magnesium	mg/kg	7.66E+02	NA	6.68E+02				6.74E+02				2.26E+02				3.85E+02			
Manganese	mg/kg	1.36E+03	3.63E+02	7.31E+01	J			1.33E+01	J			1.06E+01				3.85E+01			
Mercury	mg/kg	7.00E-02	2.33E+00	4.80E-02	J			ND				9.77E-02	B	YES		1.10E-01	B	YES	
Nickel	mg/kg	1.29E+01	1.54E+02	7.74E+00				4.42E+00				2.94E+00				4.62E+00			
Potassium	mg/kg	7.11E+02	NA	3.98E+02	J			3.72E+02	J			1.69E+02	J			2.85E+02	J		
Selenium	mg/kg	4.70E-01	3.91E+01	ND				ND				ND				ND			
Silver	mg/kg	2.40E-01	3.91E+01	ND				ND				ND				ND			
Sodium	mg/kg	7.02E+02	NA	5.90E+01	J			ND				3.60E+01	J			4.23E+01	J		
Vanadium	mg/kg	6.49E+01	5.31E+01	4.03E+01	J			3.89E+01	J			1.53E+01				1.52E+01			
Zinc	mg/kg	3.49E+01	2.34E+03	2.48E+01	J			1.52E+01	J			6.48E+00				1.03E+01			
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	NR				NR				NR				NR			
Acetone	mg/kg	NA	7.76E+02	NR				NR				NR				NR			
HERBICIDES																			
MCPP	mg/kg	NA	7.77E+00	NR				NR				NR				NR			

Table 5-2

Subsurface Soil Analytical Results
Former Rifle/Machine Gun Range, Parcel 98Q
Fort McClellan, Calhoun County, Alabama

Sample Location				HR-98Q-GP29				HR-98Q-GP30				HR-98Q-MW01				HR-98Q-MW02			
Sample Number				PF0064				PF0066				PF0068				PF0070			
Sample Date				11-Feb-02				7-Feb-02				5-Mar-02				5-Mar-02			
Sample Depth (Feet)				1 - 2				2 - 3				3 - 4				2 - 3			
Parameter	Units	BKG[a]	SSSL[b]	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL
METALS																			
Aluminum	mg/kg	1.36E+04	7.80E+03	6.30E+03				2.53E+03	J			1.32E+04			YES	1.19E+04			YES
Arsenic	mg/kg	1.83E+01	4.26E-01	1.08E+00	J		YES	1.04E+00	J		YES	2.07E+00			YES	2.25E+00			YES
Barium	mg/kg	2.34E+02	5.47E+02	3.40E+01				8.72E+00				2.49E+01				3.87E+01			
Beryllium	mg/kg	8.60E-01	9.60E+00	ND				ND				ND				ND			
Calcium	mg/kg	6.37E+02	NA	1.83E+02				3.05E+01	J			4.24E+01	J			1.77E+02			
Chromium	mg/kg	3.83E+01	2.32E+01	4.22E+00				3.45E+00				1.11E+01				8.53E+00			
Cobalt	mg/kg	1.75E+01	4.68E+02	ND				ND				1.23E+00	J			2.33E+00			
Copper	mg/kg	1.94E+01	3.13E+02	2.02E+00	J			2.95E+00				7.05E+00				4.77E+00			
Iron	mg/kg	4.48E+04	2.34E+03	3.08E+03			YES	3.10E+03	J		YES	9.73E+03			YES	8.18E+03			YES
Lead	mg/kg	3.85E+01	4.00E+02	4.59E+00				1.84E+00				6.73E+00				1.14E+01			
Magnesium	mg/kg	7.66E+02	NA	2.90E+02				6.43E+01	J			4.60E+02				5.12E+02			
Manganese	mg/kg	1.36E+03	3.63E+02	6.50E+01				6.49E+00				1.90E+01				2.79E+01			
Mercury	mg/kg	7.00E-02	2.33E+00	7.53E-02	B	YES		ND				ND				ND			
Nickel	mg/kg	1.29E+01	1.54E+02	2.70E+00				7.29E-01	J			3.95E+00				4.90E+00			
Potassium	mg/kg	7.11E+02	NA	2.01E+02	J			ND				3.20E+02	J			3.86E+02	J		
Selenium	mg/kg	4.70E-01	3.91E+01	ND				ND				ND				ND			
Silver	mg/kg	2.40E-01	3.91E+01	ND				ND				ND				ND			
Sodium	mg/kg	7.02E+02	NA	3.41E+01	J			4.04E+01	J			ND				4.21E+01	J		
Vanadium	mg/kg	6.49E+01	5.31E+01	7.61E+00				5.97E+00				2.01E+01				1.61E+01			
Zinc	mg/kg	3.49E+01	2.34E+03	9.73E+00				2.12E+00				1.51E+01	J			1.35E+01	J		
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	NR				NR				ND				NR			
Acetone	mg/kg	NA	7.76E+02	NR				NR				1.30E-02	J			NR			
HERBICIDES																			
MCPP	mg/kg	NA	7.77E+00	NR				NR				ND				NR			

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

[a] BKG - Background. Concentration listed is two times (2x) the arithmetic mean of background metals concentration given in SAIC, 1998, *Final Background Metals Survey Report, Fort McClellan, Alabama*, July.

[b] 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.

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 5-3

Groundwater Analytical Results
Former Rifle/Machine Gun Range, Parcel 98Q
Fort McClellan, Calhoun County, Alabama

Sample Location				HR-98Q-MW01				HR-98Q-MW02			
Sample Number				PF3001				PF3002			
Sample Date				10-May-02				4-Jun-02			
Parameter	Units	BKG[a]	SSSL[b]	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL
METALS											
Aluminum	mg/L	2.34E+00	1.56E+00	1.39E+00				5.53E-01			
Arsenic	mg/L	1.78E-02	4.40E-05	ND				3.05E-03	J		YES
Barium	mg/L	1.27E-01	1.10E-01	1.43E-02				1.71E-02	J		
Calcium	mg/L	5.65E+01	NA	4.08E-01	B			2.30E+00			
Iron	mg/L	7.04E+00	4.69E-01	9.36E-01	J		YES	5.00E-01	J		YES
Magnesium	mg/L	2.13E+01	NA	5.17E-01	J			9.07E-01	J		
Manganese	mg/L	5.81E-01	7.35E-02	3.32E-02	J			2.74E-02	J		
Potassium	mg/L	7.20E+00	NA	ND				1.76E+00	B		
Sodium	mg/L	1.48E+01	NA	1.28E+00	B			9.07E-01	J		
Zinc	mg/L	2.20E-01	4.69E-01	ND				3.67E-02	J		
PESTICIDES											
Heptachlor	mg/L	NA	1.40E-05	NR				6.20E-05	J		YES
delta-BHC	mg/L	NA	4.49E-04	NR				7.50E-05	J		

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

[a] BKG - Background. Concentration listed is two times (2x) the arithmetic mean of background metals concentration given in SAIC, 1998, *Final Background Metals Survey Report, Fort McClellan, Alabama*, July.

[b] 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.

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 5-4

Seep Water Analytical Results
Former Rifle/Machine Gun Range, Parcel 98Q
Fort McClellan, Calhoun County, Alabama

Sample Location					HR-98Q-SEEP01				
Sample Number					PF2001				
Sample Date					25-Feb-02				
Parameter	Units	BKG[a]	SSSL[b]	ESV[b]	Result	Qual	>BKG	>SSSL	>ESV
METALS									
Aluminum	mg/L	5.26E+00	1.53E+01	8.70E-02	1.13E+00				YES
Barium	mg/L	7.54E-02	1.10E+00	3.90E-03	1.97E-02				YES
Calcium	mg/L	2.52E+01	NA	1.16E+02	4.07E-01	J			
Iron	mg/L	1.96E+01	4.70E+00	1.00E+00	1.08E+00				YES
Lead	mg/L	8.67E-03	1.50E-02	1.32E-03	4.02E-02		YES	YES	YES
Magnesium	mg/L	1.10E+01	NA	8.20E+01	3.97E-01	J			
Manganese	mg/L	5.65E-01	6.40E-01	8.00E-02	1.92E-02	J			
Sodium	mg/L	3.44E+00	NA	6.80E+02	1.07E+00				
VOLATILE ORGANIC COMPOUNDS									
Acetone	mg/L	NA	1.57E+00	7.80E+01	1.40E-02	J			
Methylene chloride	mg/L	NA	1.42E-01	1.93E+00	2.10E-04	B			

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

[a] BKG - Background. Concentration listed is two times (2x) the arithmetic mean of background metals concentration given in SAIC, 1998, *Final Background Metals Survey Report, Fort McClellan, Alabama*, July.

[b] 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.

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 5-5

Sediment Analytical Results
Former Rifle/Machine Gun Range, Parcel 98Q
Fort McClellan, Calhoun County, Alabama

Sample Location					HR-98Q-SEEP01				
Sample Number					PF1001				
Sample Date					25-Feb-02				
Sample Depth (Feet)					0- 0.5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**Qual**	**>BKG**	**>SSSL**	**>ESV**
METALS									
Aluminum	mg/kg	8.59E+03	1.15E+06	NA	2.87E+03				
Arsenic	mg/kg	1.13E+01	5.58E+01	7.24E+00	3.28E-01	J			
Barium	mg/kg	9.89E+01	8.36E+04	NA	2.56E+01				
Calcium	mg/kg	1.11E+03	NA	NA	8.60E+01	J			
Chromium	mg/kg	3.12E+01	2.79E+03	5.23E+01	2.42E+00	J			
Copper	mg/kg	1.71E+01	4.74E+04	1.87E+01	4.08E+00				
Iron	mg/kg	3.53E+04	3.59E+05	NA	1.28E+03				
Lead	mg/kg	3.78E+01	4.00E+02	3.02E+01	4.00E+01		YES		YES
Magnesium	mg/kg	9.06E+02	NA	NA	1.03E+02	B			
Manganese	mg/kg	7.12E+02	4.38E+04	NA	5.06E+00				
Nickel	mg/kg	1.30E+01	1.76E+04	1.59E+01	1.18E+00	J			
Sodium	mg/kg	6.92E+02	NA	NA	5.37E+01	J			
Vanadium	mg/kg	4.09E+01	4.83E+03	NA	3.81E+00				
Zinc	mg/kg	5.27E+01	3.44E+05	1.24E+02	2.57E+00				
VOLATILE ORGANIC COMPOUNDS									
Acetone	mg/kg	NA	1.03E+05	4.53E-01	4.60E-02	J			
TOTAL ORGANIC CARBON									
Total Organic Carbon	mg/kg	NA	NA	NA	5.84E+01				

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

[a] BKG - Background. Concentration listed is two times (2x) the arithmetic mean of background metals concentration given in SAIC, 1998, *Final Background Metals Survey Report, Fort McClellan, Alabama*, July.

[b] 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.

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

mg/kg - Milligrams per kilogram.

NA - Not available.

ND - Not detected.

Qual - Data validation qualifier.