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April 26, 2004

SHAW-MC-CK05-0791
Project No. 774645

Mr. Lee Coker
U.S. Army Corps of Engineers, Mobile District
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Mobile, Alabama 36602

**Contract: DACA21-96-D-0018, Task Order CK05
Fort McClellan, Alabama**

Subject: Final Supplemental RI Results, Range L – Lima Pond, Parcel 204(7)

Dear Mr. Coker:

I am enclosing one copy (including compact disc) of the subject document. Comments received on the draft report were incorporated into this final version as discussed in the responses to comments included with this submittal. Please file this document in your records and provide a letter of concurrence.

At your request, I have distributed copies of this document as indicated below. If you have questions, or need further information, please contact me at (770) 663-1429 or Steve Moran at (865) 694-7361.

Sincerely,

A handwritten signature in cursive script that reads "Jeanne A. Yacoub for".

Jeanne A. Yacoub, P.E.
Project Manager

Attachments

Distribution: Lisa Holstein, FTMC (7 copies, 1 CD)
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1.0 Site Description and History

Range L – Lima Pond, Parcel 204(7), is an approximately 0.3-acre area located within Training Area 10B in the northwest portion of Pelham Range (Figure 1) at Fort McClellan (FTMC). The site is fenced and consists of a man-made pond surrounded by a berm, approximately 10 to 15 feet high. Rainwater accumulates within the bermed area and the depth of water varies based on precipitation and evaporation rates. The site was reportedly used for the disposal of unknown chemical munitions (U.S. Army Center for Health Promotion and Preventative Medicine [CHPPM], 1999).

It is unknown when the berm was constructed. A map from a 1955 U.S. Army Chemical School lesson plan shows a “Chemical Obstacle Course” located within the Former Toxic Gas Area in Training Area 10B. One of the obstacle course stations was a large depression intended to represent an atomic bomb crater for training exercises. The mapped location of the crater coincides with the location of Range L (CHPPM, 1999). The lesson plan specified that five or six radioactive sources be placed in and around the pond. The types and disposition of the sources are unknown.

2.0 Previous Investigations

Previous investigations at Range L included a field survey by the Army and a limited site investigation and remedial investigation (RI) by Science Applications International Corporation (SAIC).

U.S. Army (1979-1982). In 1979, the Army conducted a field survey of Range L to verify the presence or absence of nerve agent, mustard, and cobalt substances. The field tests, using Army chemical kits and radiation survey equipment, were conducted at the pond’s edge, on the berm, in a drainage ditch west of the pond, and at a number of suspected training sites just north of the area. All results were negative. The Army performed additional investigations in 1980 and 1982 consisting of soil and water sampling. The samples were analyzed for distilled mustard, sarin, and nerve agent; however, these chemical agents were not detected in the samples (CHPPM, 1999).

SAIC (1993-1995). In 1993, SAIC conducted a geophysical investigation at Range L. Metallic objects were found in the pond. Based on these results, SAIC conducted RI activities including a

geophysical survey, chemical warfare material (CWM) field screening, monitoring well installation, and environmental sampling and analysis. Eleven surface and subsurface soil samples, four surface water and sediment samples, and seven groundwater samples were collected and analyzed for metals, volatile organic compounds (VOC), semivolatile organic compounds (SVOC), pesticides, polychlorinated biphenyls (PCB), explosive compounds, and CWM breakdown products (SAIC, 2000).

The RI concluded that there is no current or imminent hazard at Range L based on its present land use (i.e., military training). Under other reuse scenarios (e.g., residential or construction worker), however, human health chemicals of concern (COC) were identified in soil and groundwater. COCs included metals in soil and metals, SVOCs (primarily polynuclear aromatic hydrocarbon [PAH] compounds), one PCB, two pesticides, and one explosive compound in groundwater (SAIC, 2000).

Constituents of potential ecological concern (COPEC) identified in sediment were metals and one pesticide (dieldrin). COPECs identified in surface soil were metals and benzyl alcohol. No COPECs were identified in surface water. The RI report recommended additional surface water and sediment sampling within the fenced area at Range L to further evaluate potential residual contamination (SAIC, 2000).

3.0 Supplemental RI Field Activities

Supplemental RI field activities conducted by Shaw (formerly IT Corporation [IT]) included the collection and analysis of surface water samples, sediment samples, and groundwater samples.

Surface Water and Sediment Sampling. Six surface water samples and six sediment samples were collected for chemical analysis at Range L at the locations shown on Figure 2 (IT, 2002a). The sampling locations were selected to ensure adequate areal coverage of the pond to evaluate potential residual contamination. Because of a concurrent CWM investigation at the site, the samples were collected and screened for CWM by the U.S. Army Corps of Engineers, Huntsville Division/Parsons Engineering Science, Inc. personnel on behalf of Shaw, following procedures specified in the sampling and analysis plan (SAP) (IT, 2000a, 2002b). Prior to collecting the surface water samples, field parameters (pH, temperature, dissolved oxygen, oxidation-reduction potential, conductivity, and turbidity) were recorded, as summarized in Table 1. The surface water samples were collected before the sediment samples to minimize the possibility of introducing sediments into the surface water samples. The samples were analyzed

for the following parameters using U.S. Environmental Protection Agency (EPA) analytical methods:

- Metals – EPA Methods 6010B/7470A
- VOCs – EPA Method 8260B
- SVOCs – EPA Method 8270C
- Nitroaromatic/nitramine explosives – EPA Method 8330
- CWM breakdown products (including orthosulfur compounds) – EPA Methods 8321 and 8270M
- Nitrate/nitrite – EPA Method 353.1 (surface water only)
- Sulfate/sulfite – EPA Method 300/376.1 (surface water only)
- Total dissolved solids – EPA Method 160.1 (surface water only)
- Total suspended solids – EPA Method 160.2 (surface water only)
- Hardness – EPA Method 130.2 (surface water only)
- Total organic carbon – EPA Method 9060 (sediment only)
- Grain size – ASTM International Method D422 (sediment only).

Groundwater Sampling. Groundwater samples were collected from each of the seven existing SAIC monitoring wells (RL-G01 through RL-G07) (IT, 2002c). The monitoring well locations are shown on Figure 2. Prior to sampling, the wells were developed in accordance with procedures specified in the SAP. The well development logs are included in Appendix A. The wells were purged and sampled following procedures outlined in the SAP. Field parameters (Table 1) were recorded during purging to ensure stabilization of groundwater prior to sampling. The samples were analyzed for the following parameters:

- Metals – EPA Methods 6010B/7470A
- SVOCs – EPA Method 8270C
- Chlorinated herbicides – EPA Method 8151A
- Chlorinated pesticides – EPA Method 8081A
- Organophosphorous pesticides – EPA Method 8141A
- Nitroaromatic/nitramine explosives (plus nitroglycerin) – EPA Method 8330
- PCBs – EPA Method 8082.

Sample Preservation, Packaging, and Shipping. Sample preservation, packaging, and shipping followed requirements specified 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 B) were included with each shipment of sample coolers to EMAX Laboratories, Inc. in Torrance, California.

Surveying. The monitoring well locations were surveyed by Shaw using global positioning system and conventional civil survey techniques described in the SAP. Horizontal coordinates and elevations for the surface water and sediment samples were provided by Parsons Engineering Science, Inc. The survey data are included in Table 2.

4.0 Supplemental RI Data Summary

The results of the chemical analysis of samples collected at Range L – Lima Pond, Parcel 204(7), indicate that metals, VOCs, and SVOCs were detected in site media. PCBs, explosive compounds, and CWM breakdown products were not detected in any of the samples. The reported analytical data were validated in accordance with EPA National Functional Guidelines by Level III criteria and are presented in Appendix C.

To evaluate whether the detected constituents present an unacceptable risk to human health and the environment, the analytical results were compared to residential human health site-specific screening levels (SSSL), ecological screening values (ESV), and metals background screening values for FTMC. The SSSLs and ESVs were developed for human health and ecological risk evaluations as part of investigations conducted under the Base Realignment and Closure Environmental Restoration Program at FTMC (IT, 2000b). Background metals screening values are presented in the *Final Background Metals Survey Report, Fort McClellan, Alabama* (SAIC, 1998). Site metals data were further evaluated using statistical and geochemical methods to select site-related metals.

Surface Water Analytical Results. Metals, VOCs, SVOCs, nitrate/nitrite, and sulfate were detected in the surface water samples (Table 3). Two metals (arsenic and manganese) were detected at concentrations exceeding their respective SSSLs and background values. All of the arsenic results were “J” flagged, indicating that the metal was detected at estimated concentrations below the method reporting limit. The VOC and SVOC concentrations ranged from 0.00026 milligrams per liter (mg/L) to 0.012 mg/L and were all below SSSLs.

The concentrations of seven metals (aluminum, barium, cobalt, copper, iron, lead, and manganese) exceeded ESVs. Of these, only barium (in one sample) and manganese (all samples) also exceeded their respective background values (note: a background value was not available for cobalt, which exceeded its ESV in all six samples). The VOC and SVOC results were all below ESVs.

Nitrate/nitrite was detected in three samples at concentrations ranging from 0.132 to 0.388 mg/L. Sulfate was detected in each of the samples at concentrations ranging from 0.47 to 1.25 mg/L. Total dissolved solids concentrations ranged from 33 to 80 mg/L; total suspended solids concentrations ranged from 15 to 93 mg/L. Hardness values (as calcium carbonate) ranged from 20 to 40 mg/L.

Sediment Analytical Results. Metals and VOCs were the only constituents detected in the sediment samples (Table 4). The metals results were all below SSSLs. The concentrations of seven metals (arsenic, cadmium, cobalt, copper, lead, nickel, and zinc) exceeded their respective ESVs and background values. Eight additional metals exceeded their respective background values but did not have ESVs for comparison: aluminum, barium, beryllium, iron, manganese, potassium, thallium, and vanadium. The VOC concentrations ranged from 0.00034 milligrams per kilogram (mg/kg) to 0.41 mg/kg and all results were below SSSLs and ESVs. TOC concentrations in the samples ranged from 1,820 to 7,820 mg/kg. The grain size results are included in Appendix C.

Groundwater Analytical Results. Metals were the only detected constituents in the groundwater samples (Table 5). Arsenic (in two samples), barium (one sample), and chromium (one sample) exceeded SSSLs. However, these metals results were below their respective background values (note: a background value for chromium was not available). Chromium was not detected in any of the other groundwater samples.

Statistical and Geochemical Evaluation of Metals. Site metals data were further evaluated using statistical and geochemical methods to determine if the metals detected in site media are naturally occurring (Appendix D). 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 evaluation concluded that the metals detected in site media are present at naturally occurring levels except for the single detection of chromium in groundwater previously discussed.

5.0 Conclusions and Recommendations

The results of this investigation indicate that contaminant levels have decreased significantly compared to previous levels. Constituents detected at concentrations exceeding SSSLs and background (where available) were identified as chemicals of potential concern (COPC) in site media. COPCs were two metals (arsenic and manganese) in surface water. Chromium was conservatively identified as a COPC in groundwater because it exceeded its SSSL in one sample and has no background value. The statistical and geochemical evaluation concluded that these metals are present at naturally occurring levels except for the aforementioned chromium detection in groundwater. However, chromium was not detected in any other groundwater or surface water samples. Furthermore, chromium concentrations in sediment were below the SSSL and background except for one sample in which chromium exceeded its background value only. Based on its infrequent detection and low levels in site media, chromium is not believed to be a site-related metal and, thus, does not pose a site-related threat to human health. No COPCs were identified in sediment.

Constituents detected at concentrations exceeding ESVs and background (where available) were identified as COPECs in surface water and sediment. Exposures to groundwater are unlikely for ecological receptors at this site. COPECs were three metals (barium, cobalt, and manganese) in surface water and several metals in sediment. The statistical and geochemical evaluation concluded that these metals are present at naturally occurring levels.

Although no apparent site-related threats to human health or the environment exist at Range L - Lima Pond, Shaw recommends grading the area to level the berm, thereby filling the pond. This course of action would be consistent with the future land use of the site (i.e., military training) and the National Guard's intention of filling the pond to remove potential training safety hazards. Once the regrading is complete, the FTMC Base Realignment and Closure Team (BCT) recommends that confirmatory soil samples be collected to verify that no residual contamination remains.

6.0 References

IT Corporation (IT), 2002a, *Site-Specific Work Plan for the Supplemental Remedial Investigation of Range L – Lima Pond, Pelham Range, Parcel 204(7)*, March.

IT Corporation (IT), 2002b, ***Draft Installation-Wide Sampling and Analysis Plan, Fort McClellan, Calhoun County, Alabama***, Revision 3, February.

IT Corporation (IT), 2002c, “Well Development and Sampling of Existing Monitoring Wells at Range L (Lima Pond), Parcel 204(7)”, IT memorandum, November.

IT Corporation (IT), 2000a, ***Final Installation-Wide Sampling and Analysis Plan, Fort McClellan, Calhoun County, Alabama***, March.

IT Corporation (IT), 2000b, ***Final Human Health and Ecological Screening Values and PAH Background Summary Report, Fort McClellan, Calhoun County, Alabama***, July.

Science Applications International Corporation (SAIC), 2000, ***Final Remedial Investigation/Baseline Risk Assessment Report, Fort McClellan, Alabama***, July.

Science Applications International Corporation (SAIC), 1998, ***Final Background Metals Survey Report, Fort McClellan, Alabama***, July.

Shaw Environmental, Inc. (Shaw), 2003, “Selecting Site-Related Chemicals for Human Health and Ecological Risk Assessments for FTMC: Revision 2,” technical memorandum, June 24.

U.S. Army Center for Health Promotion and Preventative Medicine (CHPPM), 1999, ***Draft Preliminary Assessment No. 38-EH-1775-99, Fort McClellan Army National Guard Training Center, Fort McClellan, Alabama***, June.

ATTACHMENT 1
LIST OF ABBREVIATIONS AND ACRONYMS

List of Abbreviations and Acronyms

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

List of Abbreviations and Acronyms (Continued)

DAF	dilution-attenuation factor	EM31	Geonics Limited EM31 Terrain Conductivity Meter	FS	field split; feasibility study
DANC	decontamination agent, non-corrosive	EM61	Geonics Limited EM61 High-Resolution Metal Detector	FSP	field sampling plan
°C	degrees Celsius	EOD	explosive ordnance disposal	ft	feet
°F	degrees Fahrenheit	EODT	explosive ordnance disposal team	ft/day	feet per day
DCA	dichloroethane	EPA	U.S. Environmental Protection Agency	ft/ft	feet per foot
DCE	dichloroethene	EPC	exposure point concentration	ft/yr	feet per year
DDD	dichlorodiphenyldichloroethane	EPIC	Environmental Photographic Interpretation Center	FTA	Fire Training Area
DDE	dichlorodiphenyldichloroethene	EPRI	Electrical Power Research Institute	FTMC	Fort McClellan
DDT	dichlorodiphenyltrichloroethane	EPT	Ephemeroptera, Plecoptera, Trichoptera	FTRRA	FTMC Reuse & Redevelopment Authority
DEH	Directorate of Engineering and Housing	ER	equipment rinsate	g	gram
DEHP	di(2-ethylhexyl)phthalate	ERA	ecological risk assessment	g/m ³	gram per cubic meter
DEP	depositional soil	ER-L	effects range-low	G-856	Geometrics, Inc. G-856 magnetometer
DFTPP	decafluorotriphenylphosphine	ER-M	effects range-medium	G-858G	Geometrics, Inc. G-858G magnetic gradiometer
DI	deionized	ESE	Environmental Science and Engineering, Inc.	GAF	gastrointestinal absorption factor
DID	data item description	ESL	ecological screening level	gal	gallon
DIMP	di-isopropylmethylphosphonate	ESMP	Endangered Species Management Plan	gal/min	gallons per minute
DM	dry matter; adamsite	ESN	Environmental Services Network, Inc.	GB	sarin (isopropyl methylphosphonofluoridate)
DMBA	dimethylbenz(a)anthracene	ESV	ecological screening value	gc	clay gravels; gravel-sand-clay mixtures
DMMP	dimethylmethylphosphonate	ET	exposure time	GC	gas chromatograph
DNAPL	dense nonaqueous-phase liquid	EU	exposure unit	GCL	geosynthetic clay liner
DO	dissolved oxygen	Exp.	Explosives	GC/MS	gas chromatograph/mass spectrometer
DOD	U.S. Department of Defense	EXTOXNET	Extension Toxicology Network	GCR	geosynthetic clay liner
DOJ	U.S. Department of Justice	E-W	east to west	GFAA	graphite furnace atomic absorption
DOT	U.S. Department of Transportation	EZ	exclusion zone	GIS	Geographic Information System
DP	direct-push	FAR	Federal Acquisition Regulations	gm	silty gravels; gravel-sand-silt mixtures
DPDO	Defense Property Disposal Office	FB	field blank	gp	poorly graded gravels; gravel-sand mixtures
DPT	direct-push technology	FBI	Family Biotic Index	gpm	gallons per minute
DQO	data quality objective	FD	field duplicate	GPR	ground-penetrating radar
DRMO	Defense Reutilization and Marketing Office	FDC	Former Decontamination Complex	GPS	global positioning system
DRO	diesel range organics	FDA	U.S. Food and Drug Administration	GRA	general response action
DS	deep (subsurface) soil	Fe ⁺³	ferric iron	GS	ground scar
DS2	Decontamination Solution Number 2	Fe ⁺²	ferrous iron	GSA	General Services Administration; Geologic Survey of Alabama
DSERTS	Defense Site Environmental Restoration Tracking System	FedEx	Federal Express, Inc.	GSBP	Ground Scar Boiler Plant
DWEL	drinking water equivalent level	FEMA	Federal Emergency Management Agency	GSSI	Geophysical Survey Systems, Inc.
E&E	Ecology and Environment, Inc.	FFCA	Federal Facilities Compliance Act	GST	ground stain
EB	equipment blank	FFE	field flame expedient	GW	groundwater
EBS	environmental baseline survey	FFS	focused feasibility study	gw	well-graded gravels; gravel-sand mixtures
EC ₂₀	effects concentration for 20 percent of a test population	FI	fraction of exposure	H&S	health and safety
EC ₅₀	effects concentration for 50 percent of a test population	Fil	filtered	HA	hand auger
ECBC	Edgewood Chemical Biological Center	Flt	filtered	HC	mixture of hexachloroethane, aluminum powder, and zinc oxide (smoke producer)
ED	exposure duration	FMDC	Fort McClellan Development Commission	HCl	hydrochloric acid
EDD	electronic data deliverable	FML	flexible membrane liner	HD	distilled mustard (bis-[dichloroethyl]sulfide)
EF	exposure frequency	f _{oc}	fraction organic carbon	HDPE	high-density polyethylene
EDQL	ecological data quality level	FOMRA	Former Ordnance Motor Repair Area	HE	high explosive
EE/CA	engineering evaluation and cost analysis	FOST	Finding of Suitability to Transfer	HEAST	Health Effects Assessment Summary Tables
Elev.	elevation	Foster Wheeler	Foster Wheeler Environmental Corporation	Herb.	herbicides
EM	electromagnetic	FR	Federal Register	HHRA	human health risk assessment
EMI	Environmental Management Inc.	Frtm	fraction	HI	hazard index

List of Abbreviations and Acronyms (Continued)

H ₂ O ₂	hydrogen peroxide	kg	kilogram	MINICAMS	miniature continuous air monitoring system
HPLC	high-performance liquid chromatography	KeV	kilo electron volt	ml	inorganic silts and very fine sands
HNO ₃	nitric acid	K _{oc}	organic carbon partitioning coefficient	mL	milliliter
HQ	hazard quotient	K _{ow}	octonal-water partition coefficient	mm	millimeter
HQ _{screen}	screening-level hazard quotient	KMnO ₄	potassium permanganate	MM	mounded material
hr	hour	L	liter; Lewisite (dichloro-[2-chloroethyl]sulfide)	MMBtu/hr	million Btu per hour
HRC	hydrogen releasing compound	L/kg/day	liters per kilogram per day	MNA	monitored natural attenuation
HSA	hollow-stem auger	l	liter	MnO ₄ ⁻	permanganate ion
HSDB	Hazardous Substance Data Bank	LAW	light anti-tank weapon	MOA	Memorandum of Agreement
HTRW	hazardous, toxic, and radioactive waste	lb	pound	MOGAS	motor vehicle gasoline
'I'	out of control, data rejected due to low recovery	LBP	lead-based paint	MOUT	Military Operations in Urban Terrain
IASPOW	Impact Area South of POW Training Facility	LC	liquid chromatography	MP	Military Police
IATA	International Air Transport Authority	LCS	laboratory control sample	MPA	methyl phosphonic acid
ICAL	initial calibration	LCS ₅₀	lethal concentration for 50 percent population tested	MPC	maximum permissible concentration
ICB	initial calibration blank	LD ₅₀	lethal dose for 50 percent population tested	MPM	most probable munition
ICP	inductively-coupled plasma	LEL	lower explosive limit	MQL	method quantitation limit
ICRP	International Commission on Radiological Protection	LOAEL	lowest-observed-advserse-effects-level	MR	molasses residue
ICS	interference check sample	LOEC	lowest-observable-effect-concentration	MRL	method reporting limit
ID	inside diameter	LRA	land redevelopment authority	MS	matrix spike
IDL	instrument detection limit	LT	less than the certified reporting limit	mS/cm	millisiemens per centimeter
IDLH	immediately dangerous to life or health	LUC	land-use control	mS/m	millisiemens per meter
IDM	investigative-derived media	LUCAP	land-use control assurance plan	MSD	matrix spike duplicate
IDW	investigation-derived waste	LUCIP	land-use control implementation plan	MTBE	methyl tertiary butyl ether
IEUBK	Integrated Exposure Uptake Biokinetic	max	maximum	msl	mean sea level
IF	ingestion factor; inhalation factor	MB	method blank	MtD3	Montevallo shaly, silty clay loam, 10 to 40 percent slopes , severely eroded
ILCR	incremental lifetime cancer risk	MCL	maximum contaminant level	mV	millivolts
IMPA	isopropylmethyl phosphonic acid	MCLG	maximum contaminant level goal	MW	monitoring well
IMR	Iron Mountain Road	MCPA	4-chloro-2-methylphenoxyacetic acid	MWI&MP	Monitoring Well Installation and Management Plan
in.	inch	MCPP	2-(2-methyl-4-chlorophenoxy)propionic acid	Na	sodium
Ing	ingestion	MCS	media cleanup standard	NA	not applicable; not available
Inh	inhalation	MD	matrix duplicate	NAD	North American Datum
IP	ionization potential	MDC	maximum detected concentration	NAD83	North American Datum of 1983
IPS	International Pipe Standard	MDCC	maximum detected constituent concentration	NaMnO ₄	sodium permanganate
IR	ingestion rate	MDL	method detection limit	NAVD88	North American Vertical Datum of 1988
IRDMIS	Installation Restoration Data Management Information System	mg	milligrams	NAS	National Academy of Sciences
IRIS	Integrated Risk Information Service	mg/kg	milligrams per kilogram	NCEA	National Center for Environmental Assessment
IRP	Installation Restoration Program	mg/kg/day	milligram per kilogram per day	NCP	National Contingency Plan
IS	internal standard	mg/kgbw/day	milligrams per kilogram of body weight per day	NCRP	National Council on Radiation Protection and Measurements
ISCP	Installation Spill Contingency Plan	mg/L	milligrams per liter	ND	not detected
IT	IT Corporation	mg/m ³	milligrams per cubic meter	NE	no evidence; northeast
ITEMS	IT Environmental Management System™	mh	inorganic silts, micaceous or diatomaceous fine, sandy or silt soils	ne	not evaluated
'J'	estimated concentration	MHz	megahertz	NEW	net explosive weight
JeB2	Jefferson gravelly fine sandy loam, 2 to 6 percent slopes, eroded	µg/g	micrograms per gram	NFA	No Further Action
JeC2	Jefferson gravelly fine sandy loam, 6 to 10 percent slopes, eroded	µg/kg	micrograms per kilogram	NG	National Guard
JfB	Jefferson stony fine sandy loam, 0 to 10 percent slopes have strong slopes	µg/L	micrograms per liter	NGP	National Guardsperson
JPA	Joint Powers Authority	µmhos/cm	micromhos per centimeter	ng/L	nanograms per liter
K	conductivity	MeV	mega electron volt	NGVD	National Geodetic Vertical Datum
K _d	soil-water distribution coefficient	min	minimum	Ni	nickel

List of Abbreviations and Acronyms (Continued)

NIC	notice of intended change	PC	permeability coefficient	RA	remedial action
NIOSH	National Institute for Occupational Safety and Health	PCB	polychlorinated biphenyl	RAO	remedial action objective
NIST	National Institute of Standards and Technology	PCDD	polychlorinated dibenzo-p-dioxins	RBC	risk-based concentration; red blood cell
NLM	National Library of Medicine	PCDF	polychlorinated dibenzofurans	RBRG	risk-based remedial goal
NO ₃ ⁻	nitrate	PCE	perchloroethene	RCRA	Resource Conservation and Recovery Act
NOEC	no-observable-effect-concentration	PCP	pentachlorophenol	RCWM	Recovered Chemical Warfare Material
NPDES	National Pollutant Discharge Elimination System	PDS	Personnel Decontamination Station	RD	remedial design
NPW	net present worth	PEF	particulate emission factor	RDX	cyclotrimethylenetrinitramine
No.	number	PEL	permissible exposure limit	ReB3	Rarden silty clay loams
NOAA	National Oceanic and Atmospheric Administration	PERA	preliminary ecological risk assessment	REG	regular field sample
NOAEL	no-observed-adverse-effects-level	PERC	perchloroethene	REL	recommended exposure limit
NR	not requested; not recorded; no risk	PES	potential explosive site	RFA	request for analysis
NRC	National Research Council	Pest.	pesticides	RfC	reference concentration
NRCC	National Research Council of Canada	PETN	pentaerythritoltetranitrate	RfD	reference dose
NRHP	National Register of Historic Places	PFT	portable flamethrower	RGO	remedial goal option
NRT	near real time	PG	professional geologist	RI	remedial investigation
ns	nanosecond	PID	photoionization detector	RL	reporting limit
N-S	north to south	PkA	Philo and Stendal soils local alluvium, 0 to 2 percent slopes	RME	reasonable maximum exposure
NS	not surveyed	PM	project manager	ROD	Record of Decision
NSA	New South Associates, Inc.	POC	point of contact	RPD	relative percent difference
nT	nanotesla	POL	petroleum, oils, and lubricants	RR	range residue
nT/m	nanoteslas per meter	POTW	publicly owned treatment works	RRF	relative response factor
NTU	nephelometric turbidity unit	POW	prisoner of war	RRSE	Relative Risk Site Evaluation
nv	not validated	PP	peristaltic pump; Proposed Plan	RSD	relative standard deviation
O ₂	oxygen	ppb	parts per billion	RTC	Recruiting Training Center
O ₃	ozone	ppbv	parts per billion by volume	RTECS	Registry of Toxic Effects of Chemical Substances
O&G	oil and grease	PPE	personal protective equipment	RTK	real-time kinematic
O&M	operation and maintenance	ppm	parts per million	RWIMR	Ranges West of Iron Mountain Road
OB/OD	open burning/open detonation	PPMP	Print Plant Motor Pool	SA	exposed skin surface area
OD	outside diameter	ppt	parts per thousand	SAD	South Atlantic Division
OE	ordnance and explosives	PR	potential risk	SAE	Society of Automotive Engineers
oh	organic clays of medium to high plasticity	PRA	preliminary risk assessment	SAIC	Science Applications International Corporation
OH•	hydroxyl radical	PRG	preliminary remediation goal	SAP	installation-wide sampling and analysis plan
ol	organic silts and organic silty clays of low plasticity	PS	chloropicrin	SARA	Superfund Amendments and Reauthorization Act
OP	organophosphorus	PSSC	potential site-specific chemical	sc	clayey sands; sand-clay mixtures
ORC	Oxygen Releasing Compound	pt	peat or other highly organic silts	Sch.	schedule
ORP	oxidation-reduction potential	PVC	polyvinyl chloride	SCM	site conceptual model
OSHA	Occupational Safety and Health Administration	QA	quality assurance	SD	sediment
OSWER	Office of Solid Waste and Emergency Response	QA/QC	quality assurance/quality control	SDG	sample delivery group
OVM-PID/FID	organic vapor meter-photoionization detector/flame ionization detector	QAM	quality assurance manual	SDWA	Safe Drinking Water Act
OWS	oil/water separator	QAO	quality assurance officer	SDZ	safe distance zone; surface danger zone
oz	ounce	QAP	installation-wide quality assurance plan	SEMS	Southern Environmental Management & Specialties, Inc.
PA	preliminary assessment	QC	quality control	SF	cancer slope factor
PAH	polynuclear aromatic hydrocarbon	QST	QST Environmental, Inc.	SFSP	site-specific field sampling plan
PARCCS	precision, accuracy, representativeness, comparability, completeness, and sensitivity	qty	quantity	SGF	standard grade fuels
Parsons	Parsons Engineering Science, Inc.	Qual	qualifier	Shaw	Shaw Environmental, Inc.
Pb	lead	R	rejected data; resample; retardation factor	SHP	installation-wide safety and health plan
PBMS	performance-based measurement system	R&A	relevant and appropriate	SI	site investigation

List of Abbreviations and Acronyms (Continued)

SINA	Special Interest Natural Area	TCA	trichloroethane	UST	underground storage tank
SL	standing liquid	TCDD	2,3,7,8-tetrachlorodibenzo-p-dioxin	UTL	upper tolerance level; upper tolerance limit
SLERA	screening-level ecological risk assessment	TCDF	tetrachlorodibenzofurans	UXO	unexploded ordnance
sm	silty sands; sand-silt mixtures	TCE	trichloroethene	UXOQCS	UXO Quality Control Supervisor
SM	Serratia marcescens	TCL	target compound list	UXOSO	UXO safety officer
SMDP	Scientific Management Decision Point	TCLP	toxicity characteristic leaching procedure	V	vanadium
s/n	signal-to-noise ratio	TDEC	Tennessee Department of Environment and Conservation	VC	vinyl chloride
SO ₄ ⁻²	sulfate	TDGCL	thiodiglycol	VOA	volatile organic analyte
SOD	soil oxidant demand	TDGCLA	thiodiglycol chloroacetic acid	VOC	volatile organic compound
SOP	standard operating procedure	TEA	triethylaluminum	VOH	volatile organic hydrocarbon
SOPQAM	U.S. EPA's <i>Standard Operating Procedure/Quality Assurance Manual</i>	Tetryl	trinitrophenylmethylnitramine	VQlfr	validation qualifier
sp	poorly graded sands; gravelly sands	TERC	Total Environmental Restoration Contract	VQual	validation qualifier
SP	submersible pump	THI	target hazard index	VX	nerve agent (O-ethyl-S-[diisopropylaminoethyl]-methylphosphonothiolate)
SPCC	system performance calibration compound	TIC	tentatively identified compound	WAC	Women's Army Corps
SPCS	State Plane Coordinate System	TLV	threshold limit value	Weston	Roy F. Weston, Inc.
SPM	sample planning module	TN	Tennessee	WP	installation-wide work plan
SQRT	screening quick reference tables	TNB	trinitrobenzene	WRS	Wilcoxon rank sum
Sr-90	strontium-90	TNT	trinitrotoluene	WS	watershed
SRA	streamlined human health risk assessment	TOC	top of casing; total organic carbon	WSA	Watershed Screening Assessment
SRI	supplemental remedial investigation	TPH	total petroleum hydrocarbons	WWI	World War I
SRM	standard reference material	TR	target cancer risk	WWII	World War II
Ss	stony rough land, sandstone series	TRADOC	U.S. Army Training and Doctrine Command	XRF	x-ray fluorescence
SS	surface soil	TRPH	total recoverable petroleum hydrocarbons	yd ³	cubic yards
SSC	site-specific chemical	TRV	toxicity reference value		
SSHO	site safety and health officer	TSCA	Toxic Substances Control Act		
SSHP	site-specific safety and health plan	TSDF	treatment, storage, and disposal facility		
SSL	soil screening level	TWA	time-weighted average		
SSSL	site-specific screening level	UCL	upper confidence limit		
SSSSL	site-specific soil screening level	UCR	upper certified range		
STB	supertropical bleach	'U'	not detected above reporting limit		
STC	source-term concentration	UIC	underground injection control		
STD	standard deviation	UF	uncertainty factor		
STEL	short-term exposure limit	URF	unit risk factor		
STL	Severn-Trent Laboratories	USACE	U.S. Army Corps of Engineers		
STOLS	Surface Towed Ordnance Locator System [®]	USACHPPM	U.S. Army Center for Health Promotion and Preventive Medicine		
Std. units	standard units	USAEC	U.S. Army Environmental Center		
SU	standard unit	USAEHA	U.S. Army Environmental Hygiene Agency		
SUXOS	senior UXO supervisor	USACMLS	U.S. Army Chemical School		
SVOC	semivolatile organic compound	USAMPS	U.S. Army Military Police School		
SW	surface water	USATCES	U.S. Army Technical Center for Explosive Safety		
SW-846	U.S. EPA's <i>Test Methods for Evaluating Solid Waste: Physical/Chemical Methods</i>	USATEU	U.S. Army Technical Escort Unit		
SWMU	solid waste management unit	USATHAMA	U.S. Army Toxic and Hazardous Material Agency		
SWPP	storm water pollution prevention plan	USC	United States Code		
SZ	support zone	USCS	Unified Soil Classification System		
TAL	target analyte list	USDA	U.S. Department of Agriculture		
TAT	turn around time	USEPA	U.S. Environmental Protection Agency		
TB	trip blank	USFWS	U.S. Fish and Wildlife Service		
TBC	to be considered	USGS	U.S. Geological Survey		

TABLES

Table 1

**Groundwater and Surface Water Field Parameters
Range L - Lima Pond, Parcel 204(7)
Fort McClellan, Calhoun County, Alabama**

Sample Location	Sample Date	Sample Media	Specific Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Temperature (°C)	Turbidity (NTU)	pH (SU)
RL-G01	21-Jan-03	GW	0.120	5.10	235	16.7	1.6	6.73
RL-G02	16-Jan-03	GW	0.217	2.24	286	16.7	6.6	6.83
RL-G03	14-Jan-03	GW	0.259	5.21	205	15.6	1.0	8.17
RL-G04	15-Jan-03	GW	0.206	6.24	336	16.0	5.0	6.82
RL-G05	6-Jan-03	GW	0.051	8.25	482	14.1	5.3	5.28
RL-G06	15-Jan-03	GW	0.071	5.12	325	15.0	3.4	5.77
RL-G07	6-Jan-03	GW	0.064	7.01	380	15.8	2.8	5.38
RLR-204-SW/SD01	15-Apr-02	SW	0.050	9.08	205	21.7	50	5.45
RLR-204-SW/SD02	15-Apr-02	SW	0.031	9.13	190	22.0	10	7.67
RLR-204-SW/SD03	15-Apr-02	SW	0.021	15.66	200	27.4	10	6.43
RLR-204-SW/SD04	15-Apr-02	SW	0.022	11.14	205	30.5	1.0	5.90
RLR-204-SW/SD05	16-Apr-02	SW	0.017	9.07	250	20.1	10	5.56
RLR-204-SW/SD06	16-Apr-02	SW	0.049	9.24	285	19.7	10	5.15

°C - Degrees Celsius.
 GW - Groundwater.
 mg/L - Milligrams per liter.
 mS/cm - Millisiemens per centimeter.
 mV - Millivolts.
 NTU - Nephelometric turbidity units.
 ORP - Oxidation-reduction potential.
 SU - Standard units.
 SW - Surface water.

Table 2

**Survey Data
Range L - Lima Pond, Parcel 204(7)
Fort McClellan, Calhoun County, Alabama**

Sample Location	Northing	Easting	Ground Elevation (ft amsl)
RL-G01	1176717.77	606158.24	NA
RL-G02	1176939.67	605886.33	NA
RL-G03	1176694.10	605926.79	584.99
RL-G04	1176842.43	605870.63	NA
RL-G05	1176661.92	606061.74	587.85
RL-G06	1176880.46	606009.90	576.54
RL-G07	1176713.41	605792.16	NA
RLR-204-SW/SD01	1176840.49	606015.00	576.67
RLR-204-SW/SD02	1176829.15	606026.84	576.44
RLR-204-SW/SD03	1176803.21	605998.94	575.13
RLR-204-SW/SD04	1176800.17	605970.33	576.15
RLR-204-SW/SD05	1176786.22	606005.92	576.02
RLR-204-SW/SD06	1176773.89	605977.85	576.09

Horizontal coordinates referenced to the U.S. State Plane Coordinate System, Alabama East Zone, North American Datum of 1983.

Elevations referenced to the North American Vertical Datum of 1988.

ft amsl - Feet above mean sea level.

NA - Not available.

Table 3

Surface Water Analytical Results
Range L - Lima Pond, Parcel 204(7)
Fort McClellan, Calhoun County, Alabama

(Page 1 of 3)

Sample Location Sample Number Sample Date					RLR-204-SW/SD01 MJ2001 15-Apr-02					RLR-204-SW/SD02 MJ2002 15-Apr-02					RLR-204-SW/SD03 MJ2004 15-Apr-02				
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/L	5.26E+00	1.53E+01	8.70E-02	6.93E-01				YES	5.20E-01				YES	7.00E-01				YES
Arsenic	mg/L	2.17E-03	7.30E-04	1.90E-01	3.18E-03	J	YES	YES		3.00E-03	J	YES	YES		ND				
Barium	mg/L	7.54E-02	1.10E+00	3.90E-03	1.30E-02				YES	1.40E-02	J			YES	3.86E-02				YES
Calcium	mg/L	2.52E+01	NA	1.16E+02	1.08E+00					1.32E+00					1.43E+00				
Cobalt	mg/L	NA	9.31E-01	3.00E-03	2.08E-02				YES	3.37E-02				YES	4.85E-02				YES
Copper	mg/L	1.27E-02	6.23E-01	6.54E-03	ND					1.06E-02	J			YES	7.78E-03	J			YES
Iron	mg/L	1.96E+01	4.70E+00	1.00E+00	3.07E+00				YES	3.04E+00				YES	3.49E+00				YES
Lead	mg/L	8.67E-03	1.50E-02	1.32E-03	5.64E-03	J			YES	5.06E-03	J			YES	6.53E-03	J			YES
Magnesium	mg/L	1.10E+01	NA	8.20E+01	3.93E-01	J				4.67E-01	J				4.52E-01	J			
Manganese	mg/L	5.65E-01	6.40E-01	8.00E-02	1.62E+00		YES	YES	YES	1.58E+00		YES	YES	YES	3.50E+00		YES	YES	YES
Nickel	mg/L	2.25E-02	3.10E-01	8.77E-02	2.27E-02		YES			2.34E-02		YES			2.76E-02		YES		
Potassium	mg/L	2.56E+00	NA	5.30E+01	7.67E-01	B				1.30E+00	B				1.22E+00	B			
Sodium	mg/L	3.44E+00	NA	6.80E+02	5.83E-01	J				7.18E-01	J				7.18E-01	J			
Zinc	mg/L	4.04E-02	4.65E+00	5.89E-02	ND					3.29E-02	J				4.33E-02	J	YES		
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/L	NA	9.38E+00	7.10E+00	ND					ND					ND				
Acetone	mg/L	NA	1.57E+00	7.80E+01	7.70E-03	J				7.70E-03	J				8.40E-03	J			
Carbon disulfide	mg/L	NA	1.30E+00	8.40E-02	2.70E-04	J				ND					ND				
Ethylbenzene	mg/L	NA	9.61E-01	4.53E-01	ND					ND					ND				
N-Propylbenzene	mg/L	NA	7.48E-02	NA	ND					ND					ND				
Toluene	mg/L	NA	2.32E+00	1.75E-01	3.70E-03					2.00E-03					3.00E-03				
p-Cymene	mg/L	NA	1.02E+00	NA	6.00E-04	J				4.30E-04	J				4.90E-04	J			
SEMIVOLATILE ORGANIC COMPOUNDS																			
1,2-Dichlorobenzene	mg/L	NA	9.21E-01	1.58E-02	ND					ND					ND				
4-Methylphenol	mg/L	NA	7.22E-02	4.89E-01	ND					ND					ND				
HARDNESS																			
Hardness (as CaCO ₃)	mg/L	NA	NA	NA	2.40E+01					2.00E+01					2.80E+01				
WET CHEMISTRY																			
Nitrite, Nitrate	mg/L	NA	NA	NA	1.87E-01					ND					1.32E-01				
Sulfate	mg/L	NA	NA	NA	4.70E-01	J				5.51E-01	J				7.75E-01	J			
Total Dissolved Solids	mg/L	NA	NA	NA	8.00E+01					6.80E+01					3.30E+01				
Total Suspended Solids	mg/L	NA	NA	NA	3.70E+01					1.50E+01					4.10E+01				

Table 3

Surface Water Analytical Results
Range L - Lima Pond, Parcel 204(7)
Fort McClellan, Calhoun County, Alabama

(Page 2 of 3)

Sample Location Sample Number Sample Date					RLR-204-SW/SD04 MJ2005 15-Apr-02					RLR-204-SW/SD05 MJ2006 16-Apr-02					RLR-204-SW/SD06 MJ2007 16-Apr-02				
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/L	5.26E+00	1.53E+01	8.70E-02	5.54E-01				YES	6.38E-01				YES	6.49E-01				YES
Arsenic	mg/L	2.17E-03	7.30E-04	1.90E-01	3.60E-03	J	YES	YES		3.53E-03	J	YES	YES		3.66E-03	J	YES	YES	
Barium	mg/L	7.54E-02	1.10E+00	3.90E-03	1.93E-02				YES	8.74E-02		YES		YES	4.46E-02				YES
Calcium	mg/L	2.52E+01	NA	1.16E+02	1.44E+00					1.32E+00					1.28E+00				
Cobalt	mg/L	NA	9.31E-01	3.00E-03	3.14E-02				YES	1.14E-01				YES	5.52E-02				YES
Copper	mg/L	1.27E-02	6.23E-01	6.54E-03	ND					7.66E-03	J			YES	6.42E-03	J			
Iron	mg/L	1.96E+01	4.70E+00	1.00E+00	3.18E+00				YES	3.84E+00				YES	4.15E+00				YES
Lead	mg/L	8.67E-03	1.50E-02	1.32E-03	3.68E-03	J			YES	5.99E-03	J			YES	7.60E-03	J			YES
Magnesium	mg/L	1.10E+01	NA	8.20E+01	4.49E-01	J				4.86E-01	J				4.74E-01	J			
Manganese	mg/L	5.65E-01	6.40E-01	8.00E-02	2.02E+00		YES	YES	YES	8.18E+00		YES	YES	YES	4.15E+00		YES	YES	YES
Nickel	mg/L	2.25E-02	3.10E-01	8.77E-02	2.59E-02		YES			2.83E-02		YES			3.25E-02		YES		
Potassium	mg/L	2.56E+00	NA	5.30E+01	1.23E+00	B				9.65E-01	B				9.91E-01	B			
Sodium	mg/L	3.44E+00	NA	6.80E+02	1.23E+00					7.18E-01	J				7.18E-01	J			
Zinc	mg/L	4.04E-02	4.65E+00	5.89E-02	4.06E-02	J	YES			5.45E-02	J	YES			4.59E-02	J	YES		
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/L	NA	9.38E+00	7.10E+00	2.50E-03	J				ND					ND				
Acetone	mg/L	NA	1.57E+00	7.80E+01	1.20E-02	R				6.20E-03	J				ND				
Carbon disulfide	mg/L	NA	1.30E+00	8.40E-02	6.20E-04	J				ND					ND				
Ethylbenzene	mg/L	NA	9.61E-01	4.53E-01	2.60E-04	J				ND					ND				
N-Propylbenzene	mg/L	NA	7.48E-02	NA	8.40E-04	J				ND					ND				
Toluene	mg/L	NA	2.32E+00	1.75E-01	9.70E-03					1.40E-03					8.40E-04	J			
p-Cymene	mg/L	NA	1.02E+00	NA	2.40E-03					ND					ND				
SEMIVOLATILE ORGANIC COMPOUNDS																			
1,2-Dichlorobenzene	mg/L	NA	9.21E-01	1.58E-02	7.40E-03	J				ND					ND				
4-Methylphenol	mg/L	NA	7.22E-02	4.89E-01	4.90E-03	J				ND					ND				
HARDNESS																			
Hardness (as CaCO ₃)	mg/L	NA	NA	NA	2.40E+01					4.00E+01					3.20E+01				
WET CHEMISTRY																			
Nitrite, Nitrate	mg/L	NA	NA	NA	3.88E-01					ND					ND				
Sulfate	mg/L	NA	NA	NA	1.25E+00	J				8.06E-01	J				7.62E-01	J			
Total Dissolved Solids	mg/L	NA	NA	NA	4.30E+01					6.10E+01					4.90E+01				
Total Suspended Solids	mg/L	NA	NA	NA	4.30E+01					9.30E+01					6.30E+01				

Table 3

Surface Water Analytical Results Range L - Lima Pond, Parcel 204(7) Fort McClellan, Calhoun County, Alabama

(Page 3 of 3)

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, 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.

Qual - Data validation qualifier.

Table 4

Sediment Analytical Results
Range L - Lima Pond, Parcel 204(7)
Fort McClellan, Calhoun County, Alabama

(Page 1 of 3)

Sample Location Sample Number Sample Date Sample Depth (Feet)					RLR-204-SW/SD01 MJ1001 15-Apr-02 0- 0.5					RLR-204-SW/SD02 MJ1002 15-Apr-02 0- 0.5					RLR-204-SW/SD03 MJ1004 15-Apr-02 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	8.59E+03	1.15E+06	NA	1.43E+04		YES			2.46E+04		YES			2.86E+04		YES		
Arsenic	mg/kg	1.13E+01	5.58E+01	7.24E+00	7.93E+00				YES	1.37E+01		YES		YES	1.40E+01		YES		YES
Barium	mg/kg	9.89E+01	8.36E+04	NA	5.21E+01	J				6.78E+01	J				8.26E+01	J			
Beryllium	mg/kg	9.70E-01	1.50E+02	NA	5.76E-01	J				1.11E+00	J	YES			1.24E+00	J	YES		
Cadmium	mg/kg	4.30E-01	1.71E+02	1.00E+00	ND					ND					3.37E+00		YES		YES
Calcium	mg/kg	1.11E+03	NA	NA	2.47E+02					3.75E+02					3.66E+02				
Chromium	mg/kg	3.12E+01	2.79E+03	5.23E+01	1.58E+01					3.11E+01					3.33E+01		YES		
Cobalt	mg/kg	1.10E+01	6.72E+04	5.00E+01	8.32E+01		YES	YES	YES	6.75E+01	J	YES		YES	6.98E+01		YES		YES
Copper	mg/kg	1.71E+01	4.74E+04	1.87E+01	2.12E+01		YES	YES	YES	3.24E+01		YES		YES	3.92E+01		YES		YES
Iron	mg/kg	3.53E+04	3.59E+05	NA	2.28E+04					3.93E+04		YES			4.21E+04		YES		
Lead	mg/kg	3.78E+01	4.00E+02	3.02E+01	3.78E+01				YES	3.10E+01				YES	4.15E+01		YES		YES
Magnesium	mg/kg	9.06E+02	NA	NA	4.92E+02					6.91E+02					8.19E+02				
Manganese	mg/kg	7.12E+02	4.38E+04	NA	2.46E+03		YES			1.61E+03	J	YES			6.27E+03		YES		
Mercury	mg/kg	1.10E-01	2.99E+02	1.30E-01	4.49E-02	J				5.20E-02	J				1.02E-01	J			
Nickel	mg/kg	1.30E+01	1.76E+04	1.59E+01	6.77E+01		YES	YES	YES	8.14E+01		YES		YES	1.74E+02		YES		YES
Potassium	mg/kg	1.01E+03	NA	NA	9.84E+02					1.68E+03		YES			1.76E+03		YES		
Sodium	mg/kg	6.92E+02	NA	NA	7.85E+01	J				1.01E+02	J				1.03E+02	J			
Thallium	mg/kg	1.30E-01	7.78E+01	NA	ND					1.11E+00	J	YES			1.34E+00	J	YES		
Vanadium	mg/kg	4.09E+01	4.83E+03	NA	3.42E+01					5.69E+01		YES			7.01E+01		YES		
Zinc	mg/kg	5.27E+01	3.44E+05	1.24E+02	7.09E+01		YES			1.11E+02		YES			1.48E+02		YES		YES
TOTAL ORGANIC CARBON																			
Total Organic Carbon	mg/kg	NA	NA	NA	7.82E+03					4.57E+03					2.58E+03				
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	6.23E+05	1.37E-01	3.70E-02	J				ND					3.60E-02	J			
Acetone	mg/kg	NA	1.03E+05	4.53E-01	4.10E-01	J				1.00E-01	J				4.10E-01	J			
Carbon disulfide	mg/kg	NA	1.04E+05	1.34E-01	4.90E-03	J				9.60E-03					ND				
Methylene chloride	mg/kg	NA	9.84E+03	1.26E+00	4.00E-03	B				3.50E-03	B				3.60E-03	B			
Toluene	mg/kg	NA	2.11E+05	6.70E-01	3.40E-03	J				3.50E-03	J				ND				
p-Cymene	mg/kg	NA	2.08E+05	NA	ND					2.50E-02					ND				

Table 4

Sediment Analytical Results
 Range L - Lima Pond, Parcel 204(7)
 Fort McClellan, Calhoun County, Alabama

(Page 2 of 3)

Sample Location Sample Number Sample Date Sample Depth (Feet)					RLR-204-SW/SD04 MJ1005 15-Apr-02 0- 0.5					RLR-204-SW/SD05 MJ1006 16-Apr-02 0- 0.5					RLR-204-SW/SD06 MJ1007 16-Apr-02 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	8.59E+03	1.15E+06	NA	1.62E+04		YES			2.15E+04		YES			2.62E+04		YES		
Arsenic	mg/kg	1.13E+01	5.58E+01	7.24E+00	8.93E+00				YES	1.82E+01		YES		YES	1.41E+01		YES		YES
Barium	mg/kg	9.89E+01	8.36E+04	NA	4.07E+01	J				8.63E+02	J	YES			1.12E+02	J	YES		
Beryllium	mg/kg	9.70E-01	1.50E+02	NA	ND					1.80E+00	J	YES			1.08E+00	J	YES		
Cadmium	mg/kg	4.30E-01	1.71E+02	1.00E+00	ND					6.77E+00		YES		YES	ND				
Calcium	mg/kg	1.11E+03	NA	NA	1.77E+02					3.51E+02					4.80E+02				
Chromium	mg/kg	3.12E+01	2.79E+03	5.23E+01	1.83E+01					2.06E+01					3.04E+01				
Cobalt	mg/kg	1.10E+01	6.72E+04	5.00E+01	2.27E+01		YES			2.03E+02		YES		YES	7.09E+01		YES		YES
Copper	mg/kg	1.71E+01	4.74E+04	1.87E+01	2.43E+01		YES		YES	4.27E+01		YES		YES	3.27E+01		YES		YES
Iron	mg/kg	3.53E+04	3.59E+05	NA	2.10E+04					4.16E+04		YES			3.96E+04		YES		
Lead	mg/kg	3.78E+01	4.00E+02	3.02E+01	4.37E+01		YES		YES	5.61E+01		YES		YES	4.52E+01		YES		YES
Magnesium	mg/kg	9.06E+02	NA	NA	6.03E+02					7.06E+02					8.47E+02				
Manganese	mg/kg	7.12E+02	4.38E+04	NA	2.97E+02					1.71E+04		YES			1.49E+03		YES		
Mercury	mg/kg	1.10E-01	2.99E+02	1.30E-01	4.57E-02	J				7.67E-02	J				6.83E-02	J			
Nickel	mg/kg	1.30E+01	1.76E+04	1.59E+01	5.33E+01		YES		YES	2.55E+02		YES		YES	7.75E+01		YES		YES
Potassium	mg/kg	1.01E+03	NA	NA	1.15E+03		YES			1.71E+03		YES			1.72E+03		YES		
Sodium	mg/kg	6.92E+02	NA	NA	8.29E+01	J				1.23E+02	J				1.06E+02	J			
Thallium	mg/kg	1.30E-01	7.78E+01	NA	ND					2.94E+00	J	YES			1.37E+00	J	YES		
Vanadium	mg/kg	4.09E+01	4.83E+03	NA	4.01E+01					4.80E+01		YES			6.43E+01		YES		
Zinc	mg/kg	5.27E+01	3.44E+05	1.24E+02	7.07E+01		YES			1.51E+02		YES		YES	1.28E+02		YES		YES
TOTAL ORGANIC CARBON																			
Total Organic Carbon	mg/kg	NA	NA	NA	1.82E+03					ND					4.73E+03				
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	6.23E+05	1.37E-01	ND					4.60E-02	J				ND				
Acetone	mg/kg	NA	1.03E+05	4.53E-01	5.90E-02	B				3.80E-01	J				2.70E-01	J			
Carbon disulfide	mg/kg	NA	1.04E+05	1.34E-01	ND					ND					ND				
Methylene chloride	mg/kg	NA	9.84E+03	1.26E+00	3.60E-03	B				ND					ND				
Toluene	mg/kg	NA	2.11E+05	6.70E-01	ND					ND					ND				
p-Cymene	mg/kg	NA	2.08E+05	NA	ND					ND					ND				

Table 4

Sediment Analytical Results Range L - Lima Pond, Parcel 204(7) Fort McClellan, Calhoun County, Alabama

(Page 3 of 3)

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, 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.

Table 5

**Groundwater Analytical Results
Range L - Lima Pond, Parcel 204(7)
Fort McClellan, Calhoun County, Alabama**

(Page 1 of 2)

Sample Location				RL-G01				RL-G02				RL-G03				RL-G04			
Sample Number				MJ3001				MJ3002				MJ3004				MJ3005			
Sample Date				21-Jan-03				16-Jan-03				14-Jan-03				15-Jan-03			
Parameter	Units	BKG ^a	SSSL ^b	Result	Qual	>BKG	>SSSL												
METALS																			
Aluminum	mg/L	2.34E+00	1.56E+00	5.57E-02	J			5.54E-02	J			ND				4.12E-01			
Arsenic	mg/L	1.78E-02	4.46E-05	ND				ND				3.68E-03	B		YES	2.20E-03	B		YES
Barium	mg/L	1.27E-01	1.10E-01	1.19E-01			YES	1.40E-02				1.91E-02				1.64E-02			
Calcium	mg/L	5.65E+01	NA	1.99E+01				4.36E+01				5.21E+01	J			4.73E+01	J		
Chromium	mg/L	NA	4.69E-03	ND															
Cobalt	mg/L	2.34E-02	9.39E-02	1.19E-02	J			ND				ND				ND			
Copper	mg/L	2.55E-02	6.26E-02	ND															
Iron	mg/L	7.04E+00	4.69E-01	8.37E-03	B			4.70E-02	J			2.56E-02	J			2.00E-01	J		
Magnesium	mg/L	2.13E+01	NA	4.34E-01	J			7.60E-01	J			1.31E+00				1.17E+00			
Manganese	mg/L	5.81E-01	7.35E-02	9.40E-03	J			ND				ND				ND			
Potassium	mg/L	7.20E+00	NA	2.15E+00	B			ND				ND				ND			
Selenium	mg/L	NA	7.82E-03	ND															
Sodium	mg/L	1.48E+01	NA	3.09E+00				1.39E+00				1.63E+00				3.12E+00			
Vanadium	mg/L	1.70E-02	1.10E-02	ND															

Table 5

**Groundwater Analytical Results
Range L - Lima Pond, Parcel 204(7)
Fort McClellan, Calhoun County, Alabama**

(Page 2 of 2)

Sample Location Sample Number Sample Date				RL-G05 MJ3006 6-Jan-03				RL-G06 MJ3007 15-Jan-03				RL-G07 MJ3008 6-Jan-03			
Parameter	Units	BKG ^a	SSSL ^b	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL
METALS															
Aluminum	mg/L	2.34E+00	1.56E+00	2.80E-01				7.12E-02	J			6.89E-02	J		
Arsenic	mg/L	1.78E-02	4.46E-05	ND				ND				ND			
Barium	mg/L	1.27E-01	1.10E-01	3.42E-02				7.41E-03	J			1.29E-02			
Calcium	mg/L	5.65E+01	NA	7.72E+01		YES		1.72E+01	J			1.18E+01			
Chromium	mg/L	NA	4.69E-03	2.25E-02			YES	ND				ND			
Cobalt	mg/L	2.34E-02	9.39E-02	ND				ND				ND			
Copper	mg/L	2.55E-02	6.26E-02	5.31E-03	J			ND				ND			
Iron	mg/L	7.04E+00	4.69E-01	3.11E-02	J			8.07E-02	J			3.34E-02	J		
Magnesium	mg/L	2.13E+01	NA	9.66E-02	J			4.36E-01	J			3.94E-01	J		
Manganese	mg/L	5.81E-01	7.35E-02	ND				5.63E-02	J			ND			
Potassium	mg/L	7.20E+00	NA	1.75E+01		YES		ND				1.02E+00	J		
Selenium	mg/L	NA	7.82E-03	ND				2.77E-03	J			ND			
Sodium	mg/L	1.48E+01	NA	6.63E+00				6.24E-01	J			1.17E+00	B		
Vanadium	mg/L	1.70E-02	1.10E-02	8.07E-03	J			ND				ND			

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, 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.

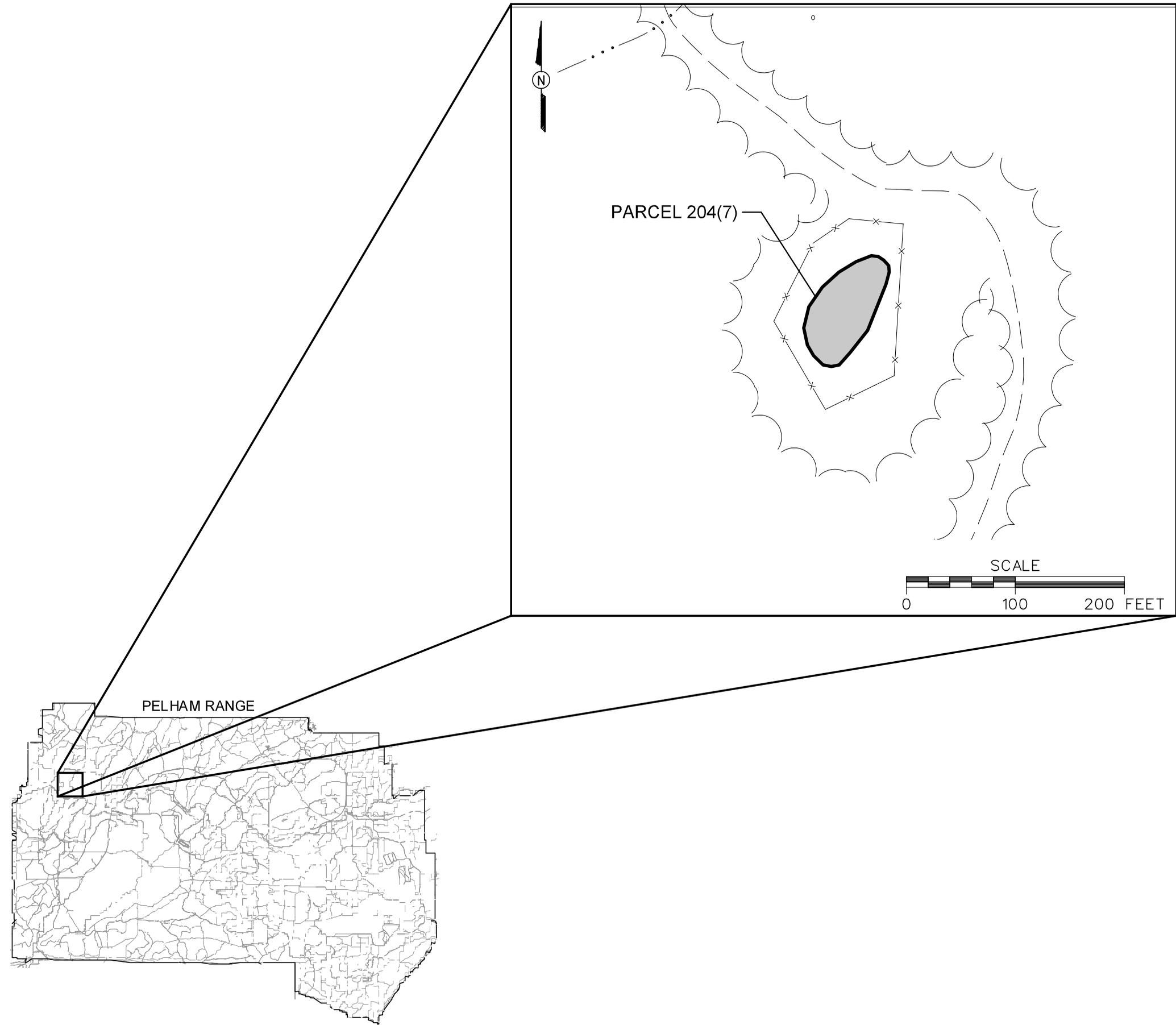
NA - Not available.

ND - Not detected.

Qual - Data validation qualifier.

FIGURES

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 INITIATOR: T. WINTON
 PROJ. MGR.: J. YACOUB
 DRAFT. CHCK. BY:
 ENGR. CHCK. BY: J. JENKINS
 DATE LAST REV.:
 DRAWN BY:
 STARTING DATE: 04/15/03
 DRAWN BY: D. BOMAR
 4/20/2004 5:32:22 PM
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LEGEND

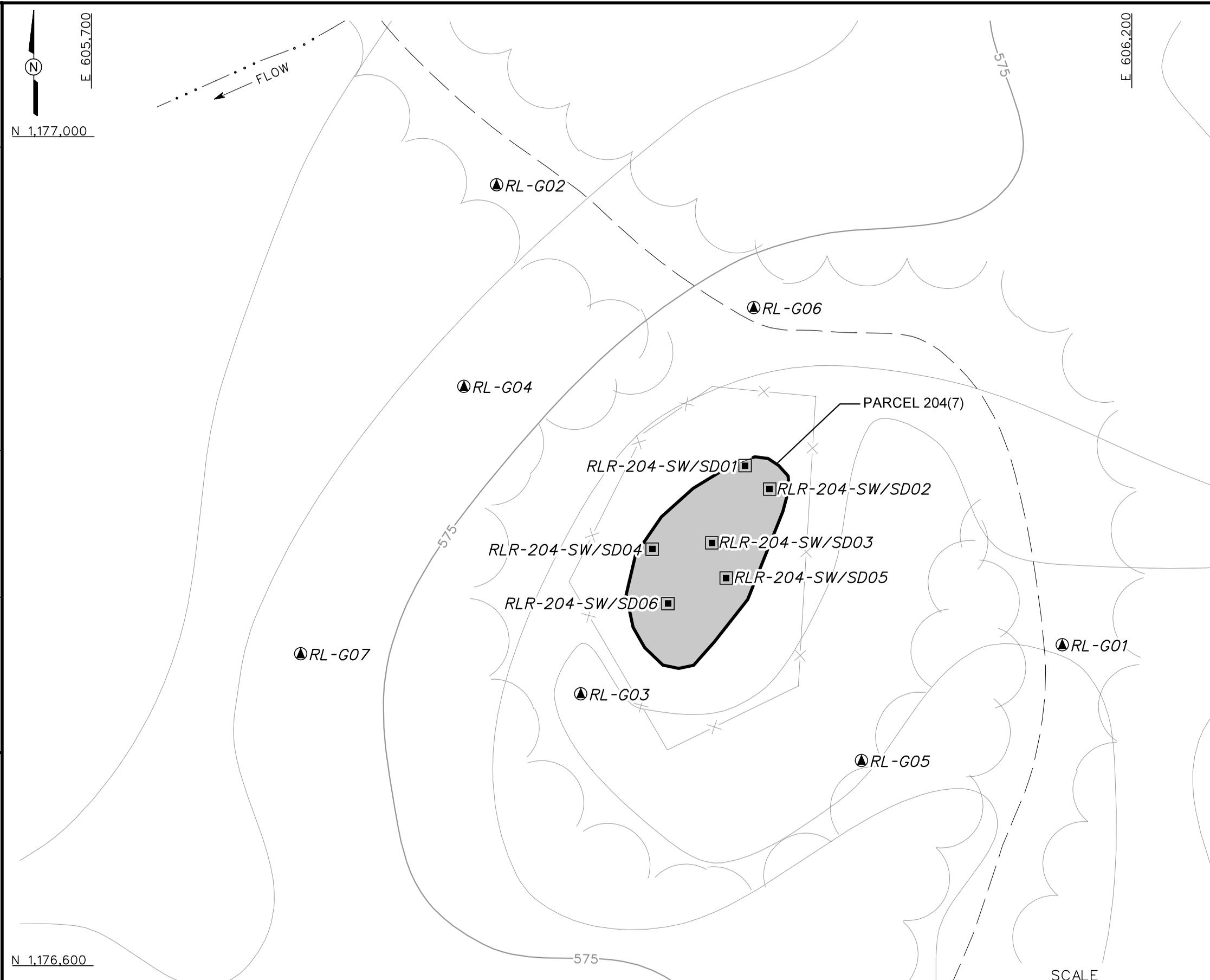
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- ~~~~~ TREES / TREELINE
- █ PARCEL BOUNDARY
- . . . SURFACE DRAINAGE / CREEK
- ××× FENCE

FIGURE 1
SITE LOCATION MAP
RANGE L - LIMA POND
PARCEL 204(7)

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



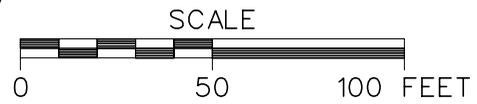
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 PROJ. MGR.: J. YACOUB
 DRAFT. CHCK. BY:
 ENGR. CHCK. BY: S. MORAN
 DATE LAST REV.:
 DRAWN BY:
 STARTING DATE: 04/15/03
 DRAWN BY: D. BOMAR
 4/21/2004
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- LEGEND**
- UNIMPROVED ROAD
 - 575 TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 5 FOOT)
 - Trees / TREELINE
 - ▭ PARCEL BOUNDARY
 - SURFACE DRAINAGE / CREEK
 - FENCE
 - ▣ SURFACE WATER/SEDIMENT SAMPLE LOCATION
 - ⊙ MONITORING WELL / GROUNDWATER SAMPLE LOCATION

FIGURE 2
SAMPLE LOCATION MAP
RANGE L - LIMA POND
PARCEL 204(7)

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



SOURCE: SCIENCE APPLICATIONS INTERNATIONAL CORPORATION, (SAIC), 2000,
 "REMEDIAL INVESTIGATION/BASELINE RISK ASSESSMENT REPORT", JULY.