

**Final
Site-Specific Field Sampling Plan Addendum**

**Remedial Investigation
Former Base Service Station, Building 2109,
Parcels 21(7) and 22(7)**

**Fort McClellan
Calhoun County, Alabama**

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List of Acronyms_____

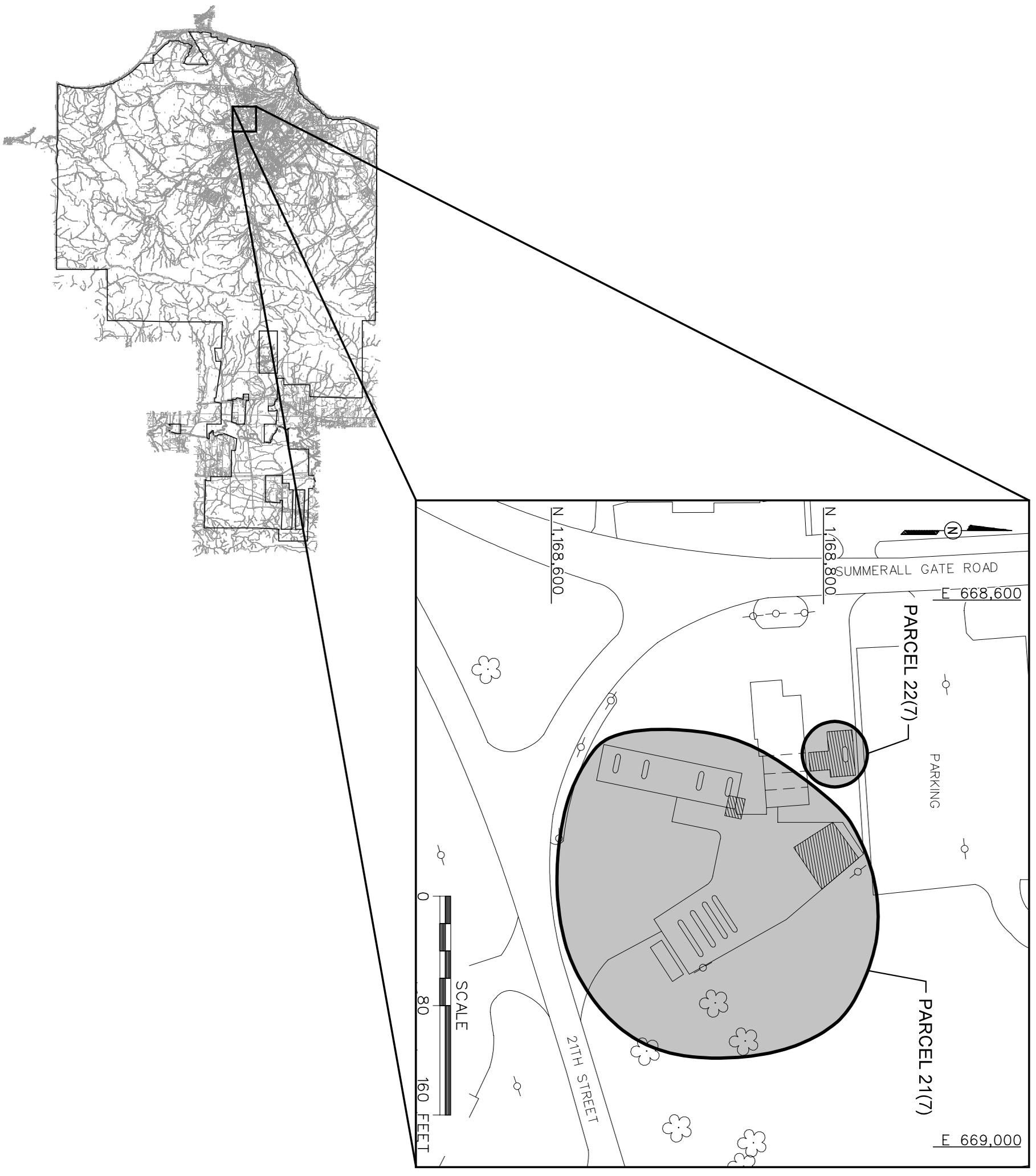
See Attachment 1, List of Abbreviations and Acronyms.

1.0 Introduction

The Former Base Service Station, Building 2109, Parcels 21(7) and 22(7) (Figure 1-1) was identified as an area to be investigated prior to property transfer. The site was identified as a Category 7 site in the environmental baseline survey (Environmental Science and Engineering, 1998). Category 7 sites are areas that are not evaluated and/or require further evaluation. In 1998, IT Corporation (IT) was retained by the U.S Army Corps of Engineers (USACE)-Mobile District to conduct a records review of all past investigations/closures related to underground storage tank (UST) activities at Fort McClellan (FTMC). A UST summary report documenting the status of all USTs at FTMC was prepared and submitted to the USACE-Mobile District, Alabama Department of Environmental Management (ADEM), and U.S. Environmental Protection Agency (EPA) on April 13, 1999 (IT, 1999a). Based on the findings of the UST summary report, the Base Service Station, Building 2109, Parcels 21(7) and 22(7) required further evaluation to achieve closure in compliance with ADEM UST closure regulations. A site-specific field sampling plan (SFSP) attachment and a site-specific safety and health plan (SSHP) attachment were finalized in September, 1999 (IT, 1999b) to address field activities associated with the site investigation (SI). The UST closure assessment SI field work consisted of the collection of eight subsurface soil samples and twelve groundwater samples for chemical analysis. The UST closure assessment SI was conducted to determine the current environmental condition of the site and to determine if UST operations impacted the soil and/or groundwater. The SI analytical results were compared to human health site-specific screening levels (SSSL) and background screening values for FTMC. The SSSLs were compiled by IT as part of the human health and ecological risk evaluations associated with site investigations being conducted under the Base Realignment and Closure (BRAC) Environmental Restoration Program at FTMC. Based on the comparisons of the analytical data collected during the UST closure assessment SI to the SSSLs, a remedial investigation (RI) is required to determine the horizontal and vertical extent of petroleum hydrocarbon contamination in groundwater.

This Addendum to the SFSP attachment will be used in conjunction with the SSHP, the installation-wide work plan (IT, 1998) and installation-wide sampling and analysis plan (SAP) (IT, 2000). The SAP includes the installation-wide safety and health plan, waste management plan, and quality assurance plan. Site-specific hazard analyses are included in the SSHP.

This addendum to the SFSP attachment for FTMC has been prepared to provide technical guidance and rationale for sample collection and analysis at the Former Base Service Station,



- LEGEND**
- UNIMPROVED ROADS AND PARKING
 - PAVED ROADS AND PARKING
 - BUILDING
 - TREES / TREELINE
 - PARCEL BOUNDARY
 - UTILITY POLE

FIGURE 1-1
SITE LOCATION MAP
BASE SERVICE STATION
BUILDING 2109
PARCELS 21(7) AND 22(7)

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



Building 2109, Parcels 21(7) and 22(7) (Figure 1-1). IT will collect samples at this site as part of a RI effort. The purpose of the RI is to delineate the horizontal and vertical extent of petroleum hydrocarbon contamination in groundwater. The proposed RI field activities are based on the discussions and site visit May 10, 2000 with ADEM, EPA Region IV, and USACE-Mobile District.

2.0 Summary of Site Investigations

This section summarizes the UST closure assessment SI activities conducted by IT at the Former Base Service Station, Building 2109, Parcels 21(7) and 22(7), including subsurface soil and groundwater sampling.

2.1 Environmental Sampling

The environmental sampling performed during the UST closure assessment SI at the Base Service Station, Building 2109, Parcels 21(7) and 22(7) included the collection of subsurface soil samples and groundwater samples for chemical analysis. Subsurface soil sample locations were determined by the on-site geologist based on the sampling rationale, presence of surface structures, and buried and overhead utilities. The analytical results were compared to residential human health SSSLs, and background screening values (metals), as presented in Table 2-1 and Table 2-2. Sample locations are presented on Figure 2-1. Sample locations exceeding SSSLs are presented on Figure 2-2.

2.2 Subsurface Soil Sampling

Eight subsurface soil samples were collected from eight soil borings at the Base Service Station, Building 2109, Parcels 21(7) and 22(7), as shown on Figure 2-1. Subsurface soil samples were collected in accordance with the direct-push sampling procedures specified in Section 4.9.11 of the SAP (IT, 2000). Analytical results were compared to the residential human health SSSLs. As presented in Table 2-1 and shown on Figure 2-2, one polynuclear aromatic hydrocarbon (PAH), benzo(a)pyrene, was detected at one sample location (UST-21-GP01) exceeding residential human health SSSLs.

2.3 Groundwater Sampling

Groundwater was sampled from 12 existing monitoring wells at the Base Service Station, Building 2109, Parcels 21(7) and 22(7). The well/groundwater sampling locations are shown on Figure 2-1. Groundwater samples were collected in accordance with the groundwater sampling procedures outlined in Section 4.7 of the SAP (IT, 2000). Analytical results were compared to the residential human health SSSLs. As presented in Table 2-2 and shown on Figure 2-2, benzene was detected in 5 groundwater samples exceeding human health SSSLs. Lead was detected in 1 groundwater sample (UST-21-MW05) exceeding background concentrations and residential human health SSSLs. The PAHs benzo(a)anthracene, benzo(a)pyrene,

Table 2-1

**Subsurface Soil Sample Results
Remedial Investigation
Former Base Service Station, Parcels 21(7) and 22(7)
Fort McClellan, Calhoun County, Alabama**

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Parcel		UST-21-GP01				UST-21-GP02				UST-21-GP03					
Sample Location		UST-21/22				UST-21/22				UST-21/22					
Sample Number		CJ0004				CJ0005				CJ0006					
Sample Date		8-Nov-99				8-Nov-99				8-Nov-99					
Sample Depth (Feet)		5-7				11-12				10-12					
Parameter	Units	BKG ^a	SSSL ^b	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL
BTEX															
Benzene	mg/kg		2.17E+01	ND				3.10E-02				ND			
Ethylbenzene	mg/kg		7.77E+02	1.20E-02				6.10E-02				1.50E-02			
Toluene	mg/kg		1.55E+03	6.10E-03				1.20E-01				6.50E-03			
Xylene, Total	mg/kg		1.55E+04	2.10E-02				2.30E-01				2.70E-02			
LEAD															
Lead	mg/kg	3.85E+01	4.00E+02	1.68E+01				3.65E+01				3.28E+01			
POLYNUCLEAR AROMATIC HYDROCARBONS															
Anthracene	mg/kg		2.33E+03	3.00E-02				ND				ND			
Benzo(a)anthracene	mg/kg		8.51E-01	7.70E-02				6.70E-03				ND			
Benzo(a)pyrene	mg/kg		8.51E-02	1.20E-01			YES	ND				ND			
Benzo(b)fluoranthene	mg/kg		8.51E-01	9.70E-02				ND				ND			
Benzo(ghi)perylene	mg/kg		2.32E+02	9.40E-02				ND				ND			
Benzo(k)fluoranthene	mg/kg		8.51E+00	7.10E-02				ND				ND			
Chrysene	mg/kg		8.61E+01	1.20E-01				3.20E-03				ND			
Dibenz(a,h)anthracene	mg/kg		8.61E-02	1.50E-02				ND				ND			
Fluoranthene	mg/kg		3.09E+02	1.30E-01				ND				ND			
Indeno(1,2,3-cd)pyrene	mg/kg		8.51E-01	8.60E-02				ND				ND			
Phenanthrene	mg/kg		2.32E+03	2.90E-02				ND				ND			
Pyrene	mg/kg		2.33E+02	1.20E-01				1.70E-02				ND			

Table 2-1

**Subsurface Soil Sample Results
Remedial Investigation
Former Base Service Station, Parcels 21(7) and 22(7)
Fort McClellan, Calhoun County, Alabama**

(Page 2 of 4)

Parcel				UST-21-GP04				UST-21-GP05				UST-22-GP01			
Sample Location				UST-21/22				UST-21/22				UST-21/22			
Sample Number				CJ0007				CJ0008				CJ0009			
Sample Date				8-Nov-99				8-Nov-99				9-Nov-99			
Sample Depth (Feet)				10-12				10-12				4-6			
Parameter	Units	BKG ^a	SSSL ^b	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL
BTEX															
Benzene	mg/kg		2.17E+01	ND				ND				ND			
Ethylbenzene	mg/kg		7.77E+02	ND				1.20E-02				1.50E-02			
Toluene	mg/kg		1.55E+03	5.60E-03				7.40E-03				1.10E-02			
Xylene, Total	mg/kg		1.55E+04	1.70E-02				2.70E-02				4.40E-02			
LEAD															
Lead	mg/kg	3.85E+01	4.00E+02	2.46E+01				5.89E+01		YES		1.47E+01			
POLYNUCLEAR AROMATIC HYDROCARBONS															
Anthracene	mg/kg		2.33E+03	ND				ND				ND			
Benzo(a)anthracene	mg/kg		8.51E-01	ND				ND				ND			
Benzo(a)pyrene	mg/kg		8.51E-02	ND				ND				ND			
Benzo(b)fluoranthene	mg/kg		8.51E-01	ND				ND				ND			
Benzo(ghi)perylene	mg/kg		2.32E+02	ND				ND				ND			
Benzo(k)fluoranthene	mg/kg		8.51E+00	ND				ND				ND			
Chrysene	mg/kg		8.61E+01	ND				ND				ND			
Dibenz(a,h)anthracene	mg/kg		8.61E-02	ND				ND				ND			
Fluoranthene	mg/kg		3.09E+02	ND				ND				ND			
Indeno(1,2,3-cd)pyrene	mg/kg		8.51E-01	ND				ND				ND			
Phenanthrene	mg/kg		2.32E+03	ND				ND				ND			
Pyrene	mg/kg		2.33E+02	ND				ND				ND			

Table 2-1

**Subsurface Soil Sample Results
Remedial Investigation
Former Base Service Station, Parcels 21(7) and 22(7)
Fort McClellan, Calhoun County, Alabama**

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Parcel				UST-22-GP02				UST-22-GP03			
Sample Location				UST-21/22				UST-21/22			
Sample Number				CJ0010				CJ0011			
Sample Date				9-Nov-99				9-Nov-99			
Sample Depth (Feet)				10-12				10-12			
Parameter	Units	BKG ^a	SSSL ^b	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL
BTEX											
Benzene	mg/kg		2.17E+01	ND				ND			
Ethylbenzene	mg/kg		7.77E+02	1.20E-02				1.20E-02			
Toluene	mg/kg		1.55E+03	ND				ND			
Xylene, Total	mg/kg		1.55E+04	2.00E-02				2.30E-02			
LEAD											
Lead	mg/kg	3.85E+01	4.00E+02	7.30E+00				2.23E+01			
POLYNUCLEAR AROMATIC HYDROCARBONS											
Anthracene	mg/kg		2.33E+03	ND				ND			
Benzo(a)anthracene	mg/kg		8.51E-01	ND				ND			
Benzo(a)pyrene	mg/kg		8.51E-02	ND				ND			
Benzo(b)fluoranthene	mg/kg		8.51E-01	ND				ND			
Benzo(ghi)perylene	mg/kg		2.32E+02	ND				ND			
Benzo(k)fluoranthene	mg/kg		8.51E+00	ND				ND			
Chrysene	mg/kg		8.61E+01	ND				ND			
Dibenz(a,h)anthracene	mg/kg		8.61E-02	ND				ND			
Fluoranthene	mg/kg		3.09E+02	ND				ND			
Indeno(1,2,3-cd)pyrene	mg/kg		8.51E-01	ND				ND			
Phenanthrene	mg/kg		2.32E+03	ND				ND			
Pyrene	mg/kg		2.33E+02	ND				ND			

Table 2-1

Subsurface Soil Sample Results Former Base Service Station, Parcels 21(7) and 22(7) Fort McClellan, Calhoun County, Alabama

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Analyses performed by Quanterra Environmental Services using U.S. Environmental Protection Agency (EPA) SW-846 analytical methods, including Update III methods where applicable.

^a Background. Concentration listed is two times the arithmetic mean of background metals concentration given in Science Applications International Corporation (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 Corporation (2000) *Final Human Health and Ecological Screening Values and PAH Background Summary Report*, Fort McClellan, Calhoun County, Alabama, July.

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

J - Result is greater than stated method detection limit but less than or equal to specified reporting limit.

mg/kg - Milligrams per kilogram

ND - Not detected

Qual - Data validation qualifier

Table 2-2

**Groundwater Sample Results
Remedial Investigation
Former Base Service Station, Parcels 21(7) and 22(7)
Fort McClellan, Calhoun County, Alabama**

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Parcel				UST-21-MW05				UST-21-MW06				UST-21-MW07			
Sample Location				UST-21/22				UST-21/22				UST-21/22			
Sample Number				CJ3011				CJ3012				CJ3013			
Sample Date				11-Feb-00				10-Feb-00				9-Feb-00			
Parameter	Units	BKG ^a	SSSL ^b	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL
BTEX															
Benzene	mg/L		1.40E-03	ND				2.20E-02				YES	ND		
Ethylbenzene	mg/L		1.40E-01	ND				2.30E-02					ND		
Toluene	mg/L		2.59E-01	ND				1.30E-03					ND		
Xylene, Total	mg/L		2.80E+00	ND				1.30E-02					ND		
LEAD															
Lead	mg/L	7.99E-03	1.50E-02	1.95E-01	NV	YES	YES	ND					ND		
POLYNUCLEAR AROMATIC HYDROCARBONS															
Acenaphthene	mg/L		6.58E-02	ND				ND					ND		
Anthracene	mg/L		3.19E-01	ND				ND					ND		
Benzo(a)anthracene	mg/L		2.00E-05	1.20E-04			YES	ND					ND		
Benzo(a)pyrene	mg/L		0.00E+00	2.20E-04			YES	ND					ND		
Benzo(b)fluoranthene	mg/L		1.00E-05	3.00E-04			YES	ND					ND		
Benzo(k)fluoranthene	mg/L		1.90E-04	1.30E-04				ND					ND		
Chrysene	mg/L		3.40E-03	3.10E-04				ND					ND		
Fluoranthene	mg/L		3.05E-02	6.40E-04				4.00E-04					ND		
Fluorene	mg/L		4.66E-02	ND				ND					ND		
Indeno(1,2,3-cd)pyrene	mg/L		1.00E-05	1.90E-04			YES	ND					ND		
Naphthalene	mg/L		3.00E-03	ND				1.40E-02				YES	ND		
Phenanthrene	mg/L		2.81E-01	ND				ND					ND		
Pyrene	mg/L		2.95E-02	4.60E-04				1.30E-04					ND		

Table 2-2

**Groundwater Sample Results
Remedial Investigation
Former Base Service Station, Parcels 21(7) and 22(7)
Fort McClellan, Calhoun County, Alabama**

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Parcel				UST-21-MW10				UST-21-MW11				UST-21-MW12			
Sample Location				UST-21/22				UST-21/22				UST-21/22			
Sample Number				CJ3016				CJ3017				CJ3066			
Sample Date				10-Feb-00				10-Feb-00				11-Feb-00			
Parameter	Units	BKG ^a	SSSL ^b	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL
BTEX															
Benzene	mg/L		1.40E-03	ND				1.10E-01				YES	4.40E-04		
Ethylbenzene	mg/L		1.40E-01	ND				4.50E-02					ND		
Toluene	mg/L		2.59E-01	ND				5.80E-03					ND		
Xylene, Total	mg/L		2.80E+00	ND				9.20E-02					3.90E-04		
LEAD															
Lead	mg/L	7.99E-03	1.50E-02	1.04E-02	NV	YES		ND					ND		
POLYNUCLEAR AROMATIC HYDROCARBONS															
Acenaphthene	mg/L		6.58E-02	ND				ND					ND		
Anthracene	mg/L		3.19E-01	ND				ND					ND		
Benzo(a)anthracene	mg/L		2.00E-05	ND				ND					ND		
Benzo(a)pyrene	mg/L		0.00E+00	ND				ND					ND		
Benzo(b)fluoranthene	mg/L		1.00E-05	ND				ND					ND		
Benzo(k)fluoranthene	mg/L		1.90E-04	ND				ND					ND		
Chrysene	mg/L		3.40E-03	ND				ND					ND		
Fluoranthene	mg/L		3.05E-02	ND				ND					ND		
Fluorene	mg/L		4.66E-02	ND				ND					ND		
Indeno(1,2,3-cd)pyrene	mg/L		1.00E-05	ND				ND					ND		
Naphthalene	mg/L		3.00E-03	ND				7.30E-02				YES	ND		
Phenanthrene	mg/L		2.81E-01	ND				ND					ND		
Pyrene	mg/L		2.95E-02	ND				ND					ND		

Table 2-2

**Groundwater Sample Results
Remedial Investigation
Former Base Service Station, Parcels 21(7) and 22(7)
Fort McClellan, Calhoun County, Alabama**

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Parcel				UST-21-MW13				UST-21-MW14				UST-21-MW15			
Sample Location				UST-21/22				UST-21/22				UST-21/22			
Sample Number				CJ3067				CJ3068				CJ3069			
Sample Date				14-Feb-00				15-Feb-00				15-Feb-00			
Parameter	Units	BKG ^a	SSSL ^b	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL
BTEX															
Benzene	mg/L		1.40E-03	5.00E-04				6.30E-03				YES	7.70E-03		YES
Ethylbenzene	mg/L		1.40E-01	ND				1.30E-02				ND			
Toluene	mg/L		2.59E-01	ND				2.40E-03				4.40E-04			
Xylene, Total	mg/L		2.80E+00	ND				1.80E-02				4.00E-03			
LEAD															
Lead	mg/L	7.99E-03	1.50E-02	ND				ND				ND			
POLYNUCLEAR AROMATIC HYDROCARBONS															
Acenaphthene	mg/L		6.58E-02	ND				7.80E-03				1.90E-03			
Anthracene	mg/L		3.19E-01	ND				4.40E-03				ND			
Benzo(a)anthracene	mg/L		2.00E-05	ND				ND				ND			
Benzo(a)pyrene	mg/L		0.00E+00	ND				ND				ND			
Benzo(b)fluoranthene	mg/L		1.00E-05	ND				ND				ND			
Benzo(k)fluoranthene	mg/L		1.90E-04	ND				ND				ND			
Chrysene	mg/L		3.40E-03	ND				ND				ND			
Fluoranthene	mg/L		3.05E-02	ND				4.00E-03				6.90E-04			
Fluorene	mg/L		4.66E-02	ND				8.50E-03				ND			
Indeno(1,2,3-cd)pyrene	mg/L		1.00E-05	ND				ND				ND			
Naphthalene	mg/L		3.00E-03	ND				8.50E-03			YES	4.50E-03			YES
Phenanthrene	mg/L		2.81E-01	ND				2.20E-02				ND			
Pyrene	mg/L		2.95E-02	ND				1.60E-03				5.40E-04			

Table 2-2

**Groundwater Sample Results
Remedial Investigation
Former Base Service Station, Parcels 21(7) and 22(7)
Fort McClellan, Calhoun County, Alabama**

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Parcel				UST-21-MW16				UST-21-MW17				UST-22-MW01			
Sample Location				UST-21/22				UST-21/22				UST-21/22			
Sample Number				CJ3070				CJ3071				CJ3020			
Sample Date				16-Feb-00				16-Feb-00				14-Feb-00			
Parameter	Units	BKG ^a	SSSL ^b	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL
BTEX															
Benzene	mg/L		1.40E-03	ND				ND				3.40E-02			YES
Ethylbenzene	mg/L		1.40E-01	ND				ND				6.50E-03			
Toluene	mg/L		2.59E-01	ND				ND				6.70E-03			
Xylene, Total	mg/L		2.80E+00	ND				ND				2.50E-02			
LEAD															
Lead	mg/L	7.99E-03	1.50E-02									ND			
POLYNUCLEAR AROMATIC HYDROCARBONS															
Acenaphthene	mg/L		6.58E-02	ND				ND				8.50E-03			
Anthracene	mg/L		3.19E-01	ND				ND				3.50E-03			
Benzo(a)anthracene	mg/L		2.00E-05	ND				ND				8.40E-05			YES
Benzo(a)pyrene	mg/L		0.00E+00	ND				ND				ND			
Benzo(b)fluoranthene	mg/L		1.00E-05	ND				ND				ND			
Benzo(k)fluoranthene	mg/L		1.90E-04	ND				ND				ND			
Chrysene	mg/L		3.40E-03	ND				ND				ND			
Fluoranthene	mg/L		3.05E-02	ND				ND				5.10E-03			
Fluorene	mg/L		4.66E-02	ND				ND				7.30E-03			
Indeno(1,2,3-cd)pyrene	mg/L		1.00E-05	ND				ND				ND			
Naphthalene	mg/L		3.00E-03	ND				ND				1.60E-02			YES
Phenanthrene	mg/L		2.81E-01	ND				ND				1.60E-02			
Pyrene	mg/L		2.95E-02	ND				ND				3.10E-03			

Table 2-2

**Groundwater Sample Results
Remedial Investigation
Former Base Service Station, Parcels 21(7) and 22(7)
Fort McClellan, Calhoun County, Alabama**

(Page 5 of 5)

Analyses performed by Quanterra Environmental Services using U.S. Environmental Protection Agency (EPA) SW-846 analytical methods, including Update III methods where applicable.

^a Background. Concentration listed is two times the arithmetic mean of background metals concentration given in Science Applications International Corporation (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 Corporation (2000) *Final Human Health and Ecological Screening Values and PAH Background Summary Report*, Fort McClellan, Calhoun County, Alabama, July.

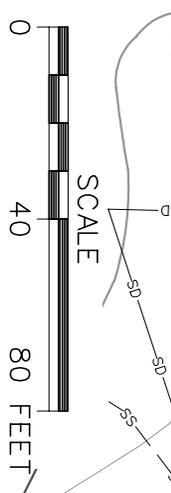
B - Analyte detected in laboratory or field blank at concentration greater than the reporting limit (and greater than zero).

J - Result is greater than stated method detection limit but less than or equal to specified reporting limit.

mg/kg - Milligrams per kilogram

ND - Not detected

Qual - Data validation qualifier



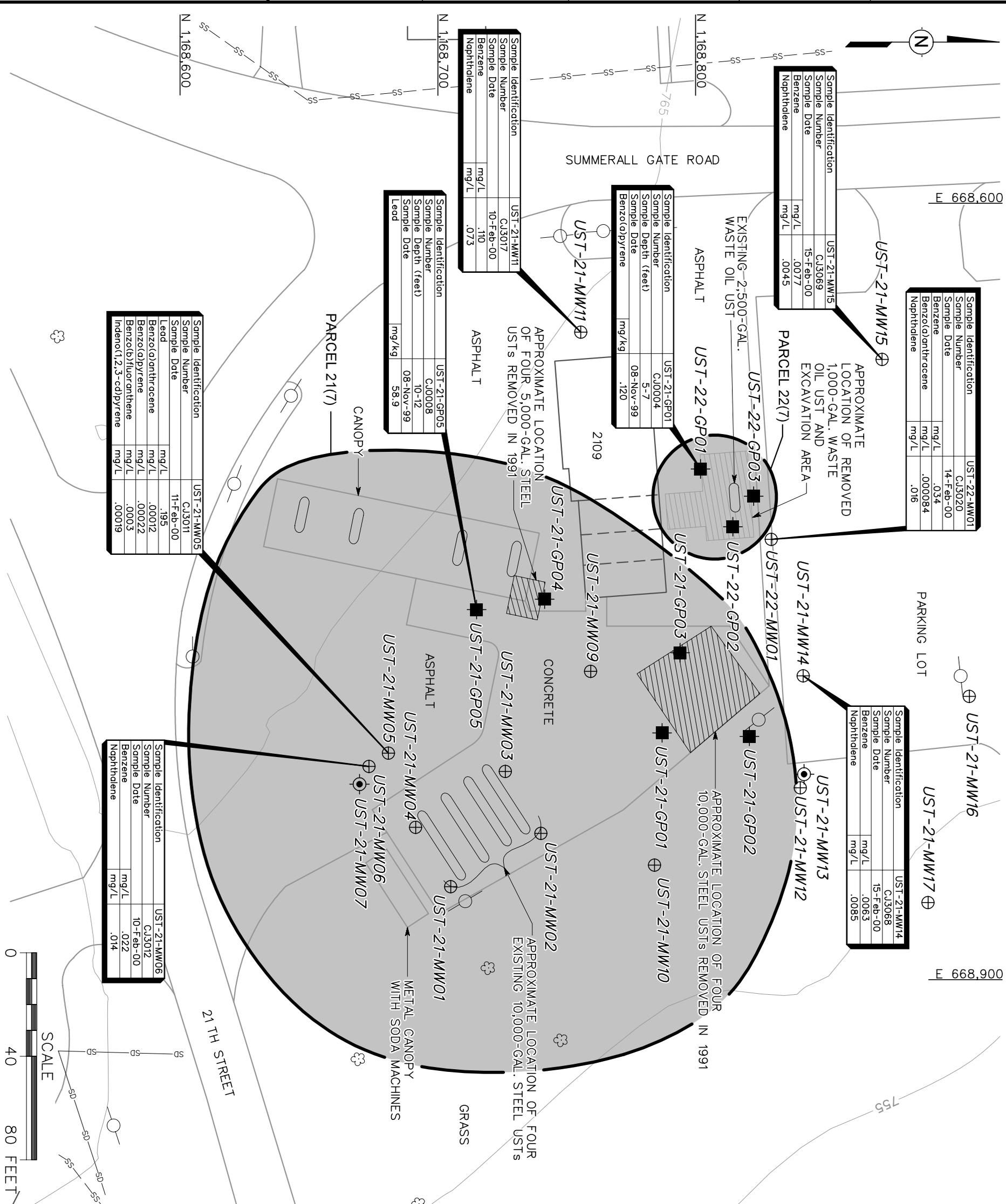
LEGEND

	UNIMPROVED ROADS AND PARKING
	PAVED ROADS AND PARKING
	BUILDING
	TOPOGRAPHIC CONTOURS
	TREES / TREELINE
	PARCEL BOUNDARY
	UTILITY POLE
	SANITARY SEWER LINE
	STORM DRAINAGE LINE
	UST
	UNDERGROUND STORAGE TANK
	EXISTING RESIDUUM/BEDROCK MONITORING WELL LOCATION
	EXISTING RESIDUUM MONITORING WELL LOCATION
	EXISTING SUBSURFACE SOIL SAMPLE LOCATION

FIGURE 2-1
SAMPLE LOCATION MAP
BASE SERVICE STATION
BUILDING 2109
PARCELS 21(7) AND 22(7)

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

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LEGEND

- UNIMPROVED ROADS AND PARKING
- PAVED ROADS AND PARKING
- BUILDING
- TOPOGRAPHIC CONTOURS
- TREES / TREELINE
- PARCEL BOUNDARY
- UTILITY POLE
- SANITARY SEWER LINE
- STORM DRAINAGE LINE
- UST UNDERGROUND STORAGE TANK
- EXISTING RESIDUUM/BEDROCK MONITORING WELL LOCATION
- EXISTING RESIDUUM MONITORING WELL LOCATION
- EXISTING SUBSURFACE SOIL SAMPLE LOCATION
- ANALYTE DETECTED IN METHOD BLANK AT CONCENTRATION GREATER THAN THE REPORTING LIMIT (AND GREATER THAN ZERO)
- RESULT IS GREATER THAN STATED METHOD DETECTION LIMIT BUT LESS THAN OR EQUAL TO SPECIFIED REPORTING LIMIT
- SSSLS SITE SPECIFIC SCREENING LEVELS
- mg/L MILLIGRAMS PER LITER
- mg/kg MILLIGRAMS PER KILOGRAMS

FIGURE 2-2
SOIL AND GROUNDWATER SAMPLE LOCATIONS EXCEEDING RESIDENTIAL HUMAN HEALTH SSSLS
BASE SERVICE STATION BUILDING 2109
PARCELS 21(7) AND 22(7)

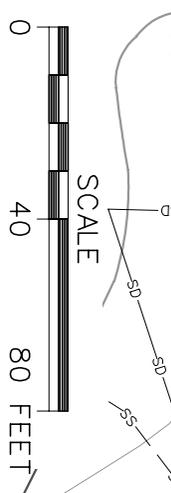
U. S. ARMY CORPS OF ENGINEERS
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 CALHOUN COUNTY, ALABAMA
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benzo(b)fluoranthene, naphthalene, and indeno(1,2,3-cd)pyrene were detected in groundwater samples exceeding human health SSSLs.

2.4 Water Level Measurements and Groundwater Flow

The depth to groundwater was measured in existing monitoring wells at the Base Service Station, Building 2109, Parcels 21(7) and 22(7) in March 2000 following procedures outlined in Section 4.18 of the SAP (IT, 2000). Measurements were referenced to the top-of-casing. A groundwater elevation map constructed from the March 13, 2000 data is shown on Figure 2-3. Based on the March groundwater levels, groundwater flow in the vicinity of the Base Service Station, Building 2109, Parcels 21(7) and 22(7), is not well defined. This is particularly true to the south-southeast of the site. The March groundwater levels indicate horizontal groundwater flow is semiradial with the main component to the northeast, toward Cane Creek. Cane Creek is located approximately 300 feet east of the site. Based on the data, the site is located on a northeast-southwest trending groundwater divide, which may influence the flow direction of groundwater. The interpreted groundwater divide is mapped to coincide with the axis of an anticline located in the approximate central portion of the parcel. In addition, the site has had USTs removed and replaced with fill material, causing localized groundwater mounding.



LEGEND

- UNIMPROVED ROADS AND PARKING
- PAVED ROADS AND PARKING
- BUILDING
- TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 5 FOOT)
- GROUNDWATER ELEVATION CONTOUR (DASHED WHERE INFERRED)
- GROUNDWATER ELEVATION (FT-MSL) (APRIL 12, 2000)
- GROUNDWATER FLOW DIRECTION
- APPROXIMATE AXIS OF SUBSURFACE ANTICLINE
- TREES / TREELINE
- PARCEL BOUNDARY
- UTILITY POLE
- SANITARY SEWER LINE
- STORM DRAINAGE LINE
- UST
- EXISTING RESIDUUM MONITORING WELL LOCATION
- EXISTING BEDROCK MONITORING WELL LOCATION

NOTE:

1. COMPLIANCE WELLS AND BEDROCK WELLS NOT USED TO DETERMINE GROUNDWATER FLOW DIRECTION.

FIGURE 2-3
GROUNDWATER ELEVATION MAP
BASE SERVICE STATION
BUILDING 2109
PARCELS 21(7) AND 22(7)

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



3.0 Proposed Field Activities

3.1 Environmental Sampling

The proposed environmental sampling program during the RI at the Former Base Service Station, Building 2109, Parcels 21(7) and 22(7) includes the installation and sampling of eight residuum monitoring wells and one bedrock monitoring well. These samples will be collected and analyzed to provide data in order to determine the horizontal and vertical extent of groundwater contamination.

3.2 Residuum Monitoring Wells

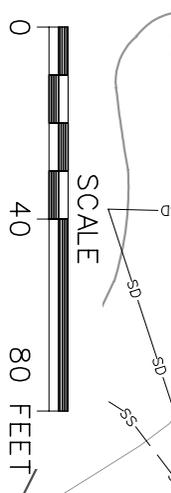
Eight permanent residuum monitoring wells will be installed at the Former Base Service Station, Building 2109, Parcels 21(7) and 22(7). The eight proposed permanent wells will be installed as perimeter monitoring wells to delineate the horizontal extent of groundwater contamination. The proposed permanent residuum monitoring well locations are shown on Figure 3-1. Well installation rationale is presented in Table 3-1. The exact monitoring well locations will be determined in the field by the on-site geologist based on actual field conditions.

Soil samples will be collected at 5-foot intervals to the total depth of the hole during hollow-stem auger drilling. Samples will be collected using a 2-inch diameter or larger split-spoon sampler. Lithologic samples will be collected for all monitoring wells during drilling to provide a detailed lithologic log. All soil borings will be logged in accordance with American Society for Testing and Materials Method D 2488 using the Unified Soil Classification System. All soil samples will be screened in the field using a photoionization detector to verify the potential presence of contamination. None of the subsurface soil samples will be sent to the laboratory. The permanent residuum monitoring wells will be drilled, installed, and developed as specified in Section 4.8 and Appendix C of the SAP (IT, 2000). Groundwater samples will not be collected from residuum wells for a period of at least 14 days after well development.

3.3 Bedrock Monitoring Well

One permanent bedrock monitoring well will be installed at the Former Base Service Station, Building 2109, Parcels 21(7) and 22(7). The proposed bedrock monitoring well location is shown on Figure 3-1. The permanent bedrock monitoring well will be drilled, installed, and developed as specified in Section 4.8 and Appendix C of the SAP (IT, 2000).

The bedrock monitoring well borehole will be drilled using a combination of air rotary drilling and bedrock coring techniques. A drill rig able to employ both methods will be used, if possible,



LEGEND

- UNIMPROVED ROADS AND PARKING
- PAVED ROADS AND PARKING
- BUILDING
- TOPOGRAPHIC CONTOURS
- TREES / TREELINE
- PARCEL BOUNDARY
- UTILITY POLE
- SANITARY SEWER LINE
- STORM DRAINAGE LINE
- UST
- UNDERGROUND STORAGE TANK
- EXISTING RESIDUUM/BEDROCK MONITORING WELL LOCATION
- EXISTING RESIDUUM MONITORING WELL LOCATION
- EXISTING SUBSURFACE SOIL SAMPLE LOCATION
- PROPOSED RESIDUUM MONITORING WELL LOCATION
- PROPOSED BEDROCK WELL LOCATION

FIGURE 3-1
PROPOSED SAMPLE LOCATION MAP
 BASE SERVICE STATION
 BUILDING 2109
 PARCELS 21(7) AND 22(7)

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



Table 3-1

**Site Sampling Rationale
Remedial Investigation
Former Base Service Station, Building 2109, Station, Parcels 21(7) and 22(7)
Fort McClellan, Calhoun County, Alabama**

(Page 1 of 3)

Sample Location	Sample Media	Site Sampling Rationale
UST-21-MW05	Groundwater	Existing residuum groundwater monitoring well UST-21-MW05 will be resampled. Groundwater samples will be collected to verify the presence of benzene in groundwater.
UST-21-MW06	Groundwater	Existing residuum groundwater monitoring well UST-21-MW06 will be resampled. Groundwater samples will be collected to verify the presence of benzene in groundwater.
UST-21-MW07	Groundwater	Existing residuum groundwater monitoring well UST-21-MW07 will be resampled. Groundwater samples will be collected to verify the presence of benzene in groundwater.
UST-21-MW10	Groundwater	Existing residuum groundwater monitoring well UST-21-MW10 will be resampled. Groundwater samples will be collected to verify the presence of benzene in groundwater.
UST-21-MW11	Groundwater	Existing residuum groundwater monitoring well UST-21-MW11 will be resampled. Groundwater samples will be collected to verify the presence of benzene in groundwater.
UST-21-MW12	Groundwater	Existing residuum groundwater monitoring well UST-21-MW12 will be resampled. Groundwater samples will be collected to verify the presence of benzene in groundwater.
UST-21-MW13	Groundwater	Existing residuum groundwater monitoring well UST-21-MW13 will be resampled. Groundwater samples will be collected to verify the presence of benzene in groundwater.
UST-21-MW14	Groundwater	Existing residuum groundwater monitoring well UST-21-MW14 will be resampled. Groundwater samples will be collected to verify the presence of benzene in groundwater.
UST-21-MW15	Groundwater	Existing residuum groundwater monitoring well UST-21-MW15 will be resampled. Groundwater samples will be collected to verify the presence of benzene in groundwater.
UST-21-MW16	Groundwater	Existing residuum groundwater monitoring well UST-21-MW16 will be resampled. Groundwater samples will be collected to verify the presence of benzene in groundwater.
UST-21-MW17	Groundwater	Existing residuum groundwater monitoring well UST-21-MW17 will be resampled. Groundwater samples will be collected to verify the presence of benzene in groundwater.
UST-21-MW18	Groundwater	Permanent residuum groundwater monitoring well UST-21-MW18 will be installed approximately 80 feet east-south of monitoring well UST-21-MW10. The monitoring well will be constructed to an estimated depth of approximately 40 feet below ground surface. Groundwater samples will be collected and analyzed to determine the horizontal extent of benzene in groundwater.
UST-21-MW19	Groundwater	Permanent residuum groundwater monitoring well UST-21-MW19 will be installed approximately 130 feet east of existing monitoring well UST-21-MW07. The monitoring well will be constructed to an estimated depth of approximately 40 feet below ground surface. Groundwater samples will be collected and analyzed to determine the horizontal extent of benzene in groundwater and the boundary of the Parcels.

Table 3-1

**Site Sampling Rationale
Remedial Investigation
Former Base Service Station, Building 2109, Station, Parcels 21(7) and 22(7)
Fort McClellan, Calhoun County, Alabama**

(Page 2 of 3)

Sample Location	Sample Media	Site Sampling Rationale
UST-21-MW20	Groundwater	Permanent residuum groundwater monitoring well UST-21-MW20 will be installed approximately 70 feet southeast 21-MW07. The monitoring well will be constructed to an estimated depth of approximately 40 feet below ground surface. Samples will be collected and analyzed to determine the horizontal extent of benzene in groundwater on the southern Parcels.
UST-21-MW21	Groundwater	Permanent residuum groundwater monitoring well UST-21-MW21 will be installed approximately 70 feet southwest 21-MW07. The monitoring well will be constructed to an estimated depth of approximately 40 feet below ground surface. Samples will be collected and analyzed to determine the horizontal extent of benzene in groundwater on the southern Parcels.
UST-21-MW22	Groundwater	Permanent residuum groundwater monitoring well UST-21-MW22 will be installed approximately 70 feet south-southwest monitoring well UST-21-MW11. The monitoring well will be constructed to an estimated depth of approximately 40 feet below ground surface. A groundwater sample will be collected and analyzed to define the horizontal extent of benzene in groundwater on the southern Parcels.
UST-21-MW23	Groundwater	A permanent bedrock groundwater monitoring well UST-21-MW23 will be installed adjacent to existing well location monitoring well will be installed with as a double cased well, with the outer casing installed to approximately 45 feet and the inner casing installed to an estimated total depth of approximately 75 feet below ground surface. A groundwater sample will be collected and analyzed to determine the vertical extent of benzene in groundwater.
UST-21-MW24	Groundwater	Permanent residuum groundwater monitoring well UST-21-MW24 will be installed approximately 90 feet west-northwest of UST-21-MW11. The monitoring well will be constructed to an estimated depth of approximately 40 feet below ground surface. A groundwater sample will be collected and analyzed to determine the horizontal extent of benzene in groundwater on the southern Parcels.
UST-21-MW25	Groundwater	Permanent residuum groundwater monitoring well UST-21-MW25 will be installed approximately 60 feet northeast of UST-21-MW15. The monitoring well will be constructed to an estimated depth of approximately 40 feet below ground surface. A groundwater sample will be collected and analyzed to determine the horizontal extent of benzene in groundwater northwest of the southern Parcels.
UST-21-MW26	Groundwater	A permanent bedrock groundwater monitoring well UST-21-MW26 will be installed approximately 60 feet northeast of UST-21-MW15. The monitoring well will be constructed to an estimated depth of approximately 40 feet below ground surface. A groundwater sample will be collected and analyzed to determine the horizontal extent of benzene in groundwater northwest of the southern Parcels.

Table 3-1

**Site Sampling Rationale
Remedial Investigation
Former Base Service Station, Building 2109, Parcels 21(7) and 22(7)
Fort McClellan, Calhoun County, Alabama**

(Page 3 of 3)

Analyses performed by Quanterra Environmental Services using U.S. Environmental Protection Agency (EPA) SW-846 analytical methods, including Update III methods where applicable.

^a Background. Concentration listed is two times the arithmetic mean of background metals concentration given in Science Applications International Corporation (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 Corporation (2000) *Final Human Health and PAH Background Summary Report*, Fort McClellan, Calhoun County, Alabama, July

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

J - Result is greater than stated method detection limit but less than or equal to specified reporting limit.

mg/kg - Milligrams per kilogram

ND - Not detected

Qual - Data validation qualifier

to minimize mobilization costs. The bedrock monitoring wells will be drilled a minimum of 20 feet into competent bedrock.

Bedrock monitoring well UST-21-MW23 will be installed prior to installation of the residuum wells. Split-spoon samples will not be collected from the bedrock borings. An air rotary rig with a 12-inch percussion bit or rotary bit will be used to drill the borehole from land surface to 5 feet into competent bedrock. An 8-inch ID carbon steel International Pipe Standard (IPS) outer casing will then be installed into the borehole from land surface to 5 feet into bedrock. The depth of the 8-inch carbon steel casing is anticipated to be approximately 45 feet below ground surface, based on the refusal depth of nearby existing monitoring wells. A minimum of 2-inch annular space between the outer casing and borehole wall will be required. The 8-inch carbon steel outer casing will be grouted in-place using a tremie pipe suspended in the annulus outside of the casing. Bentonite-cement grout will be mixed using approximately 6.5 to 7 gallons of water, and 5 pounds of bentonite per 94 pound bag of Type I Portland cement. After the grout has cured a minimum of 48 hours, the borehole will be advanced an additional 15 feet utilizing a PQ wireline core barrel, which will be used to collect core samples continuously. The hole depth into competent bedrock will be increased if groundwater is not encountered. After completion of core sample collection, a 7 7/8-inch air percussion bit will be used to ream the hole a minimum of 15 feet below the bottom of the surface casing and into competent bedrock. The compressor on the drill rig will be equipped with an air filter between the compressor and the drill bit. Water will be the only lubricant allowed during drilling operations.

A four-inch monitoring well will be installed inside the outer casing at the proposed well location. The well casing diameter will consist of new, four-inch ID, Schedule 80, threaded, flush-joint, polyvinyl chloride (PVC) pipe. Attached to the bottom of the well casing will be a section of new threaded, flush joint 0.010-inch continuous wrap PVC well screen, approximately 10 to 15 feet long. Attached to the bottom of the well will be a sump, approximately 3 to 5 feet long, composed of new, four-inch ID, Schedule 80, threaded, flush joint PVC pipe. After the casing and screen material are lowered into the boring, a gravel pack will be installed around the well screen and the inside casing will be grouted from the top of the gravel pack to land surface. The gravel pack will be tremied into place from the bottom of the sump to approximately 5 feet above the top of the screen. The gravel pack will consist of 20/40 silica sand. A bentonite seal,

Table 3-2

**Groundwater Sample Designations and QA/QC Sample Quantities
Remedial Investigation
Former Base Service Station, Building 2109, Parcels 21(7) and 22(7)
Fort McClellan, Calhoun County, Alabama**

(Page 1 of 2)

Sample Location	Sample Designation	Sample Matrix	Sample Depth (ft)	QA/QC Samples			Analytical Suite
				Field Duplicates	Field Splits	MS/MSD	
UST-21-MW05	UST-21-MW05-GW-CJJ3001-REG	Groundwater	a				BTEX, Lead
UST-21-MW06	UST-21-MW06-GW-CJJ3002-REG	Groundwater	a				BTEX, Lead
UST-21-MW07	UST-21-MW07-GW-CJJ3003-REG	Groundwater	a	UST-21-MW07-GW-CJJ3004-FD	UST-21-MW07-GW-CJJ3005-FS		BTEX, Lead
UST-21-MW10	UST-21-MW10-GW-CJJ3006-REG	Groundwater	a			UST-21-MW10-GW-CJJ3006-MS/MSD	BTEX, Lead
UST-21-MW11	UST-21-MW11-GW-CJJ3007-REG	Groundwater	a				BTEX, Lead
UST-21-MW12	UST-21-MW12-GW-CJJ3008-REG	Groundwater	a				BTEX, Lead
UST-21-MW13	UST-21-MW13-GW-CJJ3009-REG	Groundwater	a				BTEX, Lead
UST-21-MW14	UST-21-MW14-GW-CJJ3010-REG	Groundwater	a				BTEX, Lead
UST-21-MW15	UST-21-MW15-GW-CJJ3011-REG	Groundwater	a				BTEX, Lead
UST-21-MW16	UST-21-MW16-GW-CJJ3012-REG	Groundwater	a				BTEX, Lead
UST-21-MW17	UST-21-MW17-GW-CJJ3013-REG	Groundwater	a				BTEX, Lead
UST-21-MW18	UST-21-MW18-GW-CJJ3014-REG	Groundwater	a				BTEX, Lead
UST-21-MW19	UST-21-MW19-GW-CJJ3015-REG	Groundwater	a	UST-21-MW19-GW-CJJ3016-FD			BTEX, Lead
UST-21-MW20	UST-21-MW20-GW-CJJ3017-REG	Groundwater	a				BTEX, Lead
UST-21-MW21	UST-21-MW21-GW-CJJ3018-REG	Groundwater	a				BTEX, Lead
UST-21-MW22	UST-21-MW22-GW-CJJ3019-REG	Groundwater	a			UST-21-MW23-GW-CJJ3008-MS/MSD	BTEX, Lead
UST-21-MW23	UST-21-MW23-GW-CJJ3020-REG	Groundwater	a				BTEX, Lead
UST-21-MW24	UST-21-MW24-GW-CJJ3021-REG	Groundwater	a				BTEX, Lead

Table 3-2

**Groundwater Sample Designations and QA/QC Sample Quantities
Remedial Investigation
Former Base Service Station, Building 2109, Parcels 21(7) and 22(7)
Fort McClellan, Calhoun County, Alabama**

(Page 2 of 2)

Sample Location	Sample Designation	Sample Matrix	Sample Depth (ft)	QA/QC Samples			Analytical Suite
				Field Duplicates	Field Splits	MS/MSD	
UST-21-MW25	UST-21-MW25-GW-CJJ3022-REG	Groundwater	a				BTEX, Lead
UST-22-MW01	UST-22-MW01-GW-CJJ3023-REG	Groundwater	a				BTEX, Lead

^aSample depth will depend on where sufficient first water is encountered to collect a water sample.

BTEX - Benzene, toluene, ethylbenzene, xylene
 FD - Field duplicate.
 FS - Field split.
 GP - Geoprobe/direct push.
 MS/MSD - Matrix spike/matrix spike duplicate.
 MW - Monitoring well.
 REG - Field sample.

approximately 5 feet thick, will be placed above the gravel pack. The remaining annular space will be grouted with a bentonite-cement mixture seal to ground surface. The bedrock monitoring well will be developed as specified in Section 4.8 and Appendix C of the SAP (IT, 2000).

Groundwater samples will not be collected from the bedrock well for a period of 14 days after well development.

3.4 Groundwater Sampling Locations and Rationale

Groundwater samples will be collected from the proposed eight residuum and one bedrock well installed at the site. Groundwater sampling rationale is presented in Table 3-1. The groundwater sample designations and required quality assurance/quality control sample quantities are listed in Table 3-2. The groundwater samples will be collected in accordance with the procedures specified in Addendum I of the SAP.

3.5 Investigative-Derived Waste Management and Disposal

Investigative-derived waste (IDW) will be managed and disposed of as outlined in Appendix D of the SAP (IT, 2000). The IDW expected to be generated from the field sampling at FTMC will consist of soils from the hollow-stem auger sampling, purge water from monitoring well development and sampling activities, decontamination fluids, spent well materials, and personal protective equipment. The IDW will be staged inside the fenced area near Buildings 335 and 336 while awaiting final disposal.

3.6 Site-Specific Safety and Health

Health and safety requirements for the field activities are provided in the SSHP attachment for the Former Base Service Station, Building 2109, Parcels 21(7) and 22(7) (IT, 1999b). The SSHP attachment will be used in conjunction with the installation-wide safety and health plan.

4.0 Project Schedule

The project schedule for the RI activities will be provided by the IT Project Manager to the BRAC Cleanup Team on a monthly basis.

5.0 References

Environmental Science and Engineering, Inc. (ESE), 1998, *Final Environmental Baseline Survey, Fort McClellan, Alabama*, prepared for U.S. Army Environmental Center, Aberdeen Proving Ground, Maryland, January.

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

IT Corporation (IT), 1999a, *Final UST Summary Report, Fort McClellan, Calhoun County, Alabama* April.

IT Corporation (IT), 1999b, *Final Site-Specific Field Sampling Plan for Underground Storage Tank Closure Assessments* September.

IT Corporation (IT), 1998, *Final Installation-Wide Work Plan, Fort McClellan, Calhoun County, Alabama*, October.

ATTACHMENT 1

LIST OF ABBREVIATIONS AND ACRONYMS

List of Abbreviations and Acronyms

Abs	skin absorption	COE	Corps of Engineers	FS	field split
AC	hydrogen cyanide	Con	skin or eye contact	ft	feet
AcB2	Anniston and Allen gravelly loams, 2 to 6 percent slopes, eroded	CRL	certified reporting limit	ft/ft	feet per foot
AcC2	Anniston and Allen gravelly loams, 6 to 10 percent slopes, eroded	CRZ	contamination reduction zone	FTA	fire training area
AcD2	Anniston and Allen gravelly loams, 10 to 15 percent slopes, eroded	CS	ortho-chlorobenzylidene-malononitrile	FTMC	Fort McClellan
AcE2	Anniston and Allen gravelly loams, 15 to 25 percent slopes, eroded	CSEM	conceptual site exposure model	g	gram
ACGIH	American Conference of Governmental Industrial Hygienists	ctr.	container	G-856	Geometrics, Inc. G-856 magnetometer
ADEM	Alabama Department of Environmental Management	CWA	chemical warfare agent	G-858G	Geometrics, Inc. G-858G magnetic gradiometer
AEL	airborne exposure limit	CWM	chemical warfare materials, clear wide mouth	gal	gallon
AL	Alabama	CX	dichloroformoxime	gal/min	gallons per minute
amb.	Amber	D	duplicate	GB	saria
ANAD	Anniston Army Depot	DANC	decontamination agent, non-corrosive	gc	clay gravels; gravel-sand-clay mixtures
APT	armor piercing tracer	DDT	dichlorodiphenyltrichloroethane	GC	gas chromatograph
ASP	Ammunition Supply Point	DEP	depositional soil	GC/MS	gas chromatograph/mass spectrometer
ASR	Archives Search Report, July 1999	DI	deionized	GFAA	graphite furnace atomic absorption
AST	aboveground storage tank	DIMP	di-isopropylmethylphosphonate	gm	silty gravels; gravel-sand-silt mixtures
ASTM	American Society for Testing and Materials	DMMP	dimethylmethylphosphonate	gp	poorly graded gravels; gravel-sand mixtures
B	analyte detected in laboratory or field blank at concentration greater than the reporting limit (and greater than zero)	DOD	U.S. Department of Defense	gpm	gallons per minute
BCT	BRAC Cleanup Team	DP	direct-push	GPR	ground-penetrating radar
BFB	bromofluorobenzene	DPDO	Defense Property Disposal Office	GPS	global positioning system
bgs	below ground surface	DQO	data quality objective	GSBP	Ground Scar Boiler Plant
bkg	background	DRMO	Defense Reutilization and Marketing Office	GSSI	Geophysical Survey Systems, Inc.
bls	below land surface	DS	deep (subsurface) soil	GW	groundwater
BOD	biological oxygen demand	DS2	Decontamination Solution Number 2	gw	well-graded gravels; gravel-sand mixtures
BRAC	Base Realignment and Closure	E&E	Ecology and Environment, Inc.	HA	hand auger
Braun	Braun Intertec Corporation	EBS	environmental baseline survey	HCl	hydrochloric acid
BTEX	benzene, toluene, ethylbenzene, and xylenes	Elev.	elevation	HD	distilled mustard
BTOC	below top of casing	EM	electromagnetic	HDPE	high-density polyethylene
BZ	breathing zone	EM31	Geonics Limited EM31 Terrain Conductivity Meter	HNO ₃	nitric acid
C	ceiling limit value	EM61	Geonics Limited EM61 High-Resolution Metal Detector	hr	hour
Ca	carcinogen	EOD	explosive and ordnance disposal	HSA	hollow stem auger
CCAL	continuing calibration	EODT	explosive and ordnance disposal team	HTRW	hazardous, toxic, and radioactive waste
CCB	continuing calibration blank	EPA	U.S. Environmental Protection Agency	ICAL	initial calibration
CD	compact disc	EPC	exposure point concentration	ICB	initial calibration blank
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act	EPIC	Environmental Photographic Interpretation Center	ICP	inductively-coupled plasma
CERFA	Community Environmental Response Facilitation Act	ER	equipment rinse	ICS	interference check sample
CESAS	Corps of Engineers South Atlantic Savannah	ESE	Environmental Science and Engineering, Inc.	ID	inside diameter
CFC	chlorofluorocarbon	ESV	ecological screening value	IDL	instrument detection limit
CG	cyanogen chloride	E-W	east to west	IDLH	immediately dangerous to life or health
ch	inorganic clays of high plasticity	EZ	exclusion zone	IDW	investigation-derived waste
CK	carbonyl chloride	FB	field blank	IMPA	isopropylmethyl phosphonic acid
cl	inorganic clays of low to medium plasticity	FD	field duplicate	in.	inch
Cl.	chlorinated	FedEx	Federal Express, Inc.	Ing	ingestion
CLP	Contract Laboratory Program	FFE	field flame expedient	Ing	inhalation
CN	chloroacetophenone	Fil	filtered	IP	ionization potential
CNB	chloroacetophenone, benzene, and carbon tetrachloride	Flt	filtered	IPS	International Pipe Standard
CNS	chloroacetophenone, chloropicrin, and chloroform	FMP 1300	Former Motor Pool 1300 Site	IRDMIS	Installation Restoration Data Management Information System
COC	chain of custody	Frtn	fraction	IT	IT Corporation

List of Abbreviations and Acronyms (Continued)

ITEMS	IT Environmental Management System™ estimated concentration	No.	number	RI	remedial investigation
JeC2	Jefferson gravelly fine sandy loam, 6 to 10 percent slopes, eroded	NOAA	National Oceanic and Atmospheric Administration	RL	reporting limit
JfB	Jefferson stony fine sandy loam, 0 to 10 percent slopes have strong slopes	NR	not requested	RPD	relative percent difference
K	conductivity	ns	nanosecond	RRF	relative response factor
L	lewisite; liter	N-S	north to south	RSD	relative standard deviation
LC ₅₀	lethal concentration for 50 percent of population tested	nT	nanotesla	RTK	real-time kinematic
LD ₅₀	lethal dose for 50 percent of population tested	NTU	nephelometric turbidity unit	SAD	South Atlantic Division
l	liter	O&G	oil and grease	SAIC	Science Applications International Corporation
LCS	laboratory control sample	°C	degrees Celsius	SAP	installation-wide sampling and analysis plan
LEL	lower explosive limit	OD	outside diameter	sc	clayey sands; sand-clay mixtures
LT	less than the certified reporting limit	°F	degrees Fahrenheit	Sch.	schedule
max	maximum	OE	ordnance and explosives	SD	sediment
MDL	method detection limit	oh	organic clays of medium to high plasticity	SDG	sample delivery group
mg/kg	milligrams per kilogram	ol	organic silts and organic silty clays of low plasticity	SDZ	safe distance zone
mg/L	milligrams per liter	OP	organophosphorus pesticide	SEMS	Southern Environmental Management & Specialties
mg/m ³	milligrams per cubic meter	OSHA	Occupational Safety and Health Administration	SFSP	site-specific field sampling plan
mh	inorganic silts, micaceous or diatomaceous fine, sandy or silt soils	OWS	oil/water separator	SHP	installation-wide safety and health plan
MHz	megahertz	oz	ounce	SI	site investigation
µg/g	micrograms per gram	PAH	polynuclear aromatic hydrocarbon	sm	silty sands; sand-silt mixtures
µg/kg	micrograms per kilogram	Pb	lead	SOP	standard operating procedure
µg/L	micrograms per liter	PCB	polychlorinated biphenyl	sp	poorly graded sands; gravelly sands
µmhos/cm	micromhos per centimeter	PCE	perchloroethene	SP	sump pump
min	minimum	PEL	permissible exposure limit	Ss	stony rough land, sandstone series
MINICAMS	miniature continuous air sampling system	PG	professional geologist	SS	surface soil
ml	inorganic silts and very fine sands	PID	photoionization detector	SSC	site-specific chemical
mL	milliliter	PkA	Philo and Stendal soils local alluvium, 0 to 2 percent slopes	SSHO	site safety and health officer
mm	millimeter	POL	petroleum, oils, and lubricants	SSHP	site-specific safety and health plan
MOGAS	motor vehicle gasoline	PP	peristaltic pump	SSSL	site-specific screening level
MPA	methyl phosphonic acid	ppb	parts per billion	STB	supertropical bleach
MR	molasses residue	PPE	personal protective equipment	STEL	short-term exposure limit
MS	matrix spike	ppm	parts per million	STOLS	Surface Towed Ordnance Locator System®
mS/cm	milliSiemens per centimeter	PPMP	Print Plant Motor Pool	Std. units	standard units
MSD	matrix spike duplicate	ppt	parts per thousand	SU	standard unit
msl	mean sea level	PSSC	potential site-specific chemical	SVOC	semivolatile organic compound
MtD3	Montevallo shaly, silty clay loam, 10 to 40 percent slopes, severely eroded	pt	peat or other highly organic silts	SW	surface water
mV	millivolts	PVC	polyvinyl chloride	SW-846	U.S. EPA Test Methods for Evaluating Solid Waste: Physical/Chemical Methods
MW	monitoring well	QA	quality assurance	SZ	support zone
N/A	not applicable; not available	QA/QC	quality assurance/quality control	TAL	target analyte list
NAD	North American Datum	QAP	installation-wide quality assurance plan	TAT	turn around time
NAD83	North American Datum of 1983	QC	quality control	TB	trip blank
NAVD88	North American Vertical Datum of 1988	QST	QST Environmental Inc.	TCE	trichloroethene
ND	not detected	qty	quantity	TCL	target compound list
NE	no evidence	Qual	qualifier	TCLP	toxicity characteristic leaching procedure
NFA	No Further Action	R	rejected	TDGCL	thiodiglycol
ng/L	nanograms per liter	RCRA	Resource Conservation and Recovery Act	TDGCLA	thiodiglycol chloroacetic acid
NGVD	National Geodetic Vertical Datum	REG	field sample	TERC	Total Environmental Restoration Contract
NIC	notice of intended change	REL	recommended exposure limit	TIC	tentatively identified compounds
NIOSH	National Institute for Occupational Safety and Health	RFA	request for analysis		

List of Abbreviations and Acronyms (Continued)

TLV	threshold limit value
TN	Tennessee
TOC	top of casing
TPH	total petroleum hydrocarbons
TRADOC	U.S. Army Training and Doctrine Command
TRPH	total recoverable petroleum hydrocarbons
TWA	time weighted average
UCL	upper confidence limit
UCR	upper certified range
UJ	not detected above reporting limit; result should be estimated
USACE	U.S. Army Corps of Engineers
USAEC	U.S. Army Environmental Center
USAEHA	U.S. Army Environmental Hygiene Agency
USAMCLS	U.S. Army Chemical School
USATEU	U.S. Army Technical Escort Unit
USATHAMA	U.S. Army Toxic and Hazardous Material Agency
USCS	Unified Soil Classification System
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
UST	underground storage tank
UXO	unexploded ordnance
VOA	volatile organic analyte
VOC	volatile organic compound
VOH	volatile organic hydrocarbon
VQual	validated qualifier
VX	nerve agent (O-ethyl-S- [diisopropylaminoethyl]-methylphosphonothiolate)
Weston	Roy F. Weston, Inc.
WP	installation-wide work plan
WS	watershed
WSA	Watershed Screening Assessment
WWI	World War I
WWII	World War II
XRF	x-ray fluorescence
yd ³	cubic yards