APPENDIX F

DATA QUALITY ASSESSMENT SUMMARY

APPENDIX F. DATA QUALITY ASSESSMENT

F.1 INTRODUCTION

A standardized quality assurance/quality control (QA/QC) program was followed during the Site Investigation (SI) conducted for the U.S. Army Toxic and Hazardous Material Agency, Fort McClellan, located near Anniston, Alabama, to ensure that analytical results and the decisions based on these results were representative of the environmental condition at the sites. The objectives of the SI were to confirm the presence of contamination, collect and analyze sufficient numbers of samples to support recommendations for further investigation or the development of decision documents that recommend no further remedial investigation, and conduct a hazardous ranking system (HRS) score at the site determined to exhibit the highest level of environmental contamination. The SI was conducted according to the 1986 Region IV U.S. Environmental Protection Agency (EPA) Engineering Support Branch document, *Standard Operating Procedures and Quality Assurance Manual,* the 1990 USATHAMA *Quality Assurance Program* for environmental sample collection and analysis, the 1987 USATHAMA *Geotechnical Requirements for Drilling, Monitoring Wells, Data Acquisition and Reports,* and the guidelines and specifications described in the Quality Assurance Project Plans (QAPPs) submitted as part of the project work plans written by Science Applications International Corporation (SAIC) (i.e., *Site Investigation Sampling and Analysis Plan* for Fort McClellan, Alabama, 1991). The numbers of soil and sediment samples and surface and groundwater samples, respectively, collected during the Fort McClellan SI, in addition to the numbers of field QC samples collected and selected laboratory QC (i.e., matrix spikes and duplicates) samples analyzed, are presented in Appendix E, Tables E-1 through E-26). The QC checks and results are summarized below.

F.1.1 Data Quality Objectives

The following sections summarize the data quality objectives (DQOs) for precision, accuracy, representativeness, comparability, and completeness (PARCC) obtained during the Fort McClellan SI.

F.1.1.1 Precision

Precision was defined as the reproducibility, or degree of agreement, among replicate measurements of the same quantity. The closer the numerical values of the measurements are to each other, the more precise the measurement is. Analytical precision was expressed as the percentage of the difference between results of duplicate samples for a given compound or element. Relative percent difference (RPD) was calculated using the following equation:

$$\frac{/C_1 - C_2/}{\left(\frac{C_1 + C_2}{2}\right)} \times 100$$

where: C_1 = Concentration of the compound or element in the sample

C_2 = Concentration of the compound or element in the duplicate/replicate.

Precision was determined using matrix spike/matrix spike duplicate (MS/MSD) and duplicate sample analyses conducted in samples collected for volatile organic compound (VOC), semivolatile organic compound (SVOC), pesticide/polychlorinated biphenyl (PCBs) analyses, explosives, agent breakdown product analysis, and trace metals during the Fort McClellan SI. The laboratory selected 1 sample in 20 and split the sample into 2 additional aliquots. MS/MSD samples were prepared by routinely analyzing the first aliquot for the parameters of interest, while the remaining two aliquots were spiked with known quantities of the parameters of interest before analysis. The RPD between the spike results was calculated and used as an indication of the analytical precision for the VOC, SVOC, pesticide/PCB, explosives, and agent breakdown product analyses performed. Duplicate samples (i.e., for trace metals) were prepared by subdividing 1 sample of every 20 samples received and analyzing both samples of the duplicate pair. The RPD between the two detected concentrations was calculated and used by the laboratory as an indication of the analytical precision for the analyses performed.

For each lot of samples, USATHAMA spiked QC samples (i.e., standard matrix spike standard matrix spike duplicate) were analyzed for VOC, SVOC, pesticide/PCB, explosives,

agent breakdown products and metals as specified by the 1990 USATHAMA *Quality Assurance Plan* and the specific method for each analyte. The RPD between the spike results was calculated, plotted on the single day $\bar{x}$ - R control charts, and submitted to USATHAMA. These control charts have established control limits and are used by USATHAMA to determine the acceptability of the applicable data. USATHAMA may approve or reject data associated with a lot based on the control chart results. Lot SZX was rejected due to its inability to meet the QC criteria established for Method LH17. This lot is the 84 pesticide/PCB data points that were not included in the HRS score.

Sample collection reproducibility and media variability were measured in the laboratory by the analysis of field replicates. Field replicates were collected using the same techniques as those used to collect the environmental samples. One sample in 10 similar matrices was collected, and sample collection reproducibility and media variability were evaluated based on the RPD values between two duplicate samples. No corrective action was taken based on RPD values.

Field RPD values were calculated only for compounds and elements detected in concentrations greater than the certified reporting limits (CRLs) in both replicate pair samples and only for those compounds and elements not considered to be common laboratory contaminants (e.g., methylene chloride and zinc).

1,1,2,2-tetrachloroethene was detected in two groundwater replicate pairs. The RPD value for one replicate pairs met criteria, the RPD for the other replicate pair was 87 percent. Trichloroethene was detected in one replicate pair. The RPD was calculated as 45 percent. All RPD criteria were met for SVOCs and pesticide/PCBs. All trace metals RPDs met criteria except for lead and nickel in one soil sample, and beryllium and aluminum in one groundwater. RPD values for explosives and agent breakdown products were not calculated. A comprehensive discussion of all replicate sample results is presented in Section F.2.4.

F.1.1.2 Accuracy

Accuracy was defined as the degree of difference between measured or calculated values and the true value. The closer the numerical value of the measurement approaches the true value, or actual concentration, the more accurate the measurement is. Analytical accuracy is expressed as the percent recovery of a compound or element that has been added to the environmental sample at a known concentration before analysis. The percent recovery values were calculated using the following equation:

$$\frac{A_r - A_o}{A_f} \times 100$$

where: A_r = Total compound or element concentration detected in the spiked sample

A_o = Concentration of the compound or element detected in the unspiked sample

A_f = Concentration of the compound or element added to the sample.

In addition, laboratory accuracy was qualitatively assessed by evaluating the following laboratory QC information: sample holding times, method blanks, tuning and mass calibration (gas chromatography/mass spectrophotometry [GC/MS] only), surrogate recovery (GC/MS only), internal standards (GC/MS only), USATHAMA quality control samples, and initial and continuing calibration results calculated from all analyses conducted on environmental samples.

Data validation qualifiers were applied to selected data points by USATHAMA. These qualifiers, their definitions, and the applicable samples, can be found in Table F1a and 1b. These qualifiers indicate that the environmental samples and their responding data were rejected, accepted with limitations, or accepted as originally submitted. Based on the evaluation of these qualifiers, the overall laboratory accuracy was found to be acceptable.

Sampling accuracy was maximized by adherence to the strict QA program presented in the SI QAPP. Field QC blanks (i.e., trip blanks, field blanks, and equipment blanks) were prepared to ensure that all samples represent the particular site from which they were collected,

Table F-1a. Data Validation Worksheet for Fort McClellan SI (Main Post)

Laboratory	Lot	File Type	Method	Site ID	Field Sample Number	Depth	ISC	Commments
ES	JSX	CQC	T8	RB-001	RB-001	0		
				RB-003	RB-003	0		
				RB004	RB-004	0		
				RB005	RB-005	0		
				FAS001	FAS001	0		
		CSW	T8	BK-W01	BK-W01	0		
				T24A-W01	T24A-W01	0		
				T31-W01	T31-W01	0		
				T31-W01	T31SW01	0	D	
				T5-W01	T5-W01	0		
ES	JSY	CGW	T8	FMP001		0		
				LF2-G02	01			
				LF2-G03	01			
				OLF-G01	01			
				OLF-G03	01			
				OLF-G04	01			
				OLF-G05	01			
				OLF-G06	01			
				OLF-G07	01			
				OLF-G08	01			
				OLF-G09	01			
				OLF-G10	01			
		CQC	T8	RB008		0		
				RB009		0		
		CSW	T8	OLF-W01		0		
ES	KPX	CQC	99 (IPA)					
		CSE	99 (IPA)	BK-D01	BK-D01	0		
		CSO	99 (IPA)	BK-S01	BK-S0101	1		
				BK-S01	BK-S0102	5		
				T5-S02	T5-S0201	1		
				T5-S02	T5-S0202	5		
				T5-S03	T5-S0301	1		
				T5-S03	T5-S0302	5		
				T5-S04	T5-S0401	1		
ES	KPY	CQC	99 (IPA)					
		CSO	99 (IPA)	T5-S01	T5-S0101	1		
				T5-S01	T5-S0102	5		
				T38-S01	T38-S010	1		
				T38-S01	T38-S010	5		
				T38-S02	T38-S020	1		
				T38-S02	T38-S020	5		
				T38-S03	T38-S030	1		
				T38-S03	T38DS030	1	D	
				T38-S04	T38-S040	1		
				T38-S04	T38-S040	5		
ES	KPZ	CQC	99 (IPA)	RB-001	RB-001	0		
				RB-003	RB-003	0		
				FAS001	FAS001	0		
		CSW	99 (IPA)	BK-W01	BK-W01	0		
				T5-W01	T5-W01	0		
ES	OYT	CQC	UL04	RB-001	RB-001	0		
				RB-002	RB-002	0		
				RB-003	RB-003	0		
				FAS001	FAS001	0		
		CSW	UL04	BK-W01	BK-W01	0		

Table F-1a. Data Validation Worksheet for Fort McClellan SI (Main Post)

Laboratory	Lot	File Type	Method	Site ID	Field Sample Number	Depth	ISC	Commments
				T5-W01	T5-W01		0	
ES	OYU	CQC	UL04	RB004	RB-004		0	
				RB005	RB-005		0	
		CSW	UL04	T31-W01	T31-W01		0	
				T31-W01	T31SW01		0 D	
				T24A-W01	T24A-W01		0	
ES	OYW	CQC	UL04					
		CSW	UL04					
ES	OYX	CGW	UL04					
		CQC	UL04					
		CSW	UL04					
ES	OYY	CGW	UL04					
		CWC	UL04					
ES	PLQ	CQC	TT9	DIASS01	DIASS01		1 N	
		CSE	TT9	BK-D01	BK-D01		0	
				T5-D01	T5-D01		0	
				T5-D01	T5DD01		0 D	
		CSO	TT9	BK-S01	BK-S0101		1	
				BK-S01	BK-S0102		5	
				DIA-S01	DIA-S010		1	
				DIA-S01	DIASS010		1 D	
				DIA-S01	DIA-S010		5	
				DIA-S02	DIA-S020		1	
				DIA-S02	DIA-S020		5	
				T5-S02	T5-S0201		1	
				T5-S02	T5-S0202		5	
				T5-S03	T5-S0301		1	
				T5-S03	T5-S0302		5	
				T5-S04	T5-S0401		1	
				T5-S04	T5-S0402		5	
ES	PLR	CQC	TT9					
		CSE	TT9	T31-D01	T31-D01		0	
				T31-D01	T31DD01		0 D	
		CSO	TT9	T31-S01	T31-S010		1	
				T31-S01	T31-S010		5	
				T31-S02	T31-S020		1	
				T31-S02	T31-S020		5	
				T31-S03	T31-S030		1	
				T31-S03	T31-S030		5	
				T31-S04	T31-S040		1	
				T31-S04	T31-S040		5	
				T5-S01	T5-S0101		1	
				T5-S01	T5-S0102		5	
				T38-S01	T38-S010		1	
				T38-S01	T38-S010		5	
				T38-S02	T38-S020		1	
				T38-S02	T38-S020		5	
				T38-S03	T38-S030		1	
				T38-S03	T38DS030		1 D	
				T38-S04	T38-S040		1	
				T38-S04	T38-S040		5	
ES	PLS	CQC	TT9					
		CSO	TT9	T24A-S01	T24A-S01		1	
				T24A-S01	T24A-S01		5	
				T24A-S02	T24A-S02		1	

Table F-1a. Data Validation Worksheet for Fort McClellan SI (Main Post)

Laboratory	Lot	File Type	Method	Site ID	Field Sample Number	Depth	ISC	Commments
				T24A-S02	T24A-S02		5	
ES	PLT	CQC	TT9	T31SS01	T31SS010		1 N	
		CSE	TT9	T24A-D01	T24A-D01		0	
		CSO	TT9	T31-S01	T31SS01		1 D	
ES	PLV	CQC	TT9					
		CSE	TT9					
ES	RGE	CQC	LL03	DIASS01	DIASS01		1 N	
		CSE	LL03	BK-D01	BK-D01		0	
				T5-D01	T5-D01		0	
				T5-D01	T5DD01		0 D	
		CSO	LL03	BK-S01	BK-S0101		1	
				BK-S01	BK-S0102		5	
				OTA-S01	OTA-S010		1	
				OTA-S01	OTADS010		1 D	
				OTA-S01	OTA-S010		5	
				OTA-S02	OTA-S020		1	
				OTA-S02	OTA-S020		5	
				DIA-S01	DIA-S010		1	
				DIA-S01	DIASS010		1 D	
				DIA-S01	DIA-S010		5	
				DIA-S02	DIA-S020		1	
				DIA-S02	DIA-S020		5	
				T5-S02	T5-S0201		1	
				T5-S02	T5-S0202		5	
				T5-S03	T5-S0301		1	
				T5-S03	T5-S0302		5	
				T5-S04	T5-S0401		1	
				T5-S04	T5-S0402		5	
ES	RGF	CQC	LL03					
		CSE	LL03	T31-D01	T31-D01		0	
				T31-D01	T31DD01		0 D	
		CSO	LL03	T31-S01	T31-S010		1	
				T31-S01	T31-S010		5	
				T31-S02	T31-S020		1	
				T31-S02	T31-S020		5	
				T31-S03	T31-S030		1	
				T31-S03	T31-S030		5	
				T31-S04	T31-S040		1	
				T31-S04	T31-S040		5	
				T5-S01	T5-S0101		1	
				T5-S01	T5-S0102		5	
				T38-S01	T38-S010		1	
				T38-S01	T38-S010		5	
				T38-S02	T38-S020		1	
				T38-S02	T38-S020		5	
				T38-S03	T38-S030		1	
				T38-S03	T38DS030		1 D	
				T38-S04	T38-S040		1	
				T38-S04	T38-S040		5	
ES	RGG	CQC	LL03					
		CSO	LL03	T6-S03	T6-S0301		1	
				T6-S03	T6-S0302		5	
				T24A-S01	T24A-S01		1	
				T24A-S01	T24A-S01		5	
				T24A-S02	T24A-S02		1	

Table F-1a. Data Validation Worksheet for Fort McClellan SI (Main Post)

Laboratory	Lot	File Type	Method	Site ID	Field Sample Number	Depth	ISC	Commments
				T24A-S02	T24A-S02		5	
ES	RGH	CQC	LL03					
		CSE	LL03	T24A-D01	T24A-D01		0	
ES	RGI	CQC	LL03	T6-S02	T6-S0201		1 N	
				T31SS01	T31SS01		1 N	
		CSO	LL03	T6-S01	T6-S0101		1	
				T6-S01	T6-S0102		5	
				T6-S02	T6-S0201		1	
				T6-S02	T6-S0202		5	
				T31-S01	T31SS01		1 D	
ES	RGJ	CQC	LL03					
		CSE	LL03					
ES	SXS	CQC	AAA9	DIASS01	DIASS01		1 N	
		CSE	AAA9	BK-D01	BK-D01		0	
				T5-D01	T5-D01		0	
				T5-D01	T5DD01		0 D	
				T24A-D01	T24A-D01		0	
		CSO	AAA9	BK-S01	BK-S0101		1	
				BK-S01	BK-S0102		5	
				DIA-S01	DIA-S010		1	
				DIA-S01	DIASS010		1 D	
				DIA-S01	DIA-S010		5	
				DIA-S02	DIA-S020		1	
				DIA-S02	DIA-S020		5	
				T5-S02	T5-S0201		1	
				T5-S02	T5-S0202		5	
				T5-S03	T5-S0301		1	
				T5-S03	T5-S0302		5	
				T5-S04	T5-S0401		1	
				T5-S04	T5-S0402		5	
ES	SXU	CQC	AAA9	T24A-S02	T24A-S02		1 N	
		CSE	AAA9	T31-D01	T31-D01		0	
				T31-D01	T31DD01		0 D	
		CSO	AAA9	T31-S01	T31-S010		1	
				T31-S01	T31-S010		5	
				T31-S02	T31-S020		1	
				T31-S02	T31-S020		5	
				T31-S03	T31-S030		1	
				T31-S03	T31-S030		5	
				T31-S04	T31-S040		1	
				T31-S04	T31-S040		5	
				T5-S01	T5-S0101		1	
				T5-S01	T5-S0102		5	
				T38-S01	T38-S010		1	
				T38-S01	T38-S010		5	
				T38-S02	T38-S020		1	
				T38-S02	T38-S020		5	
				T38-S03	T38-S030		1	
				T38-S03	T38DS030		1 D	
				T38-S04	T38-S040		1	
				T38-S04	T38-S040		5	
				T24A-S01	T24A-S01		1	
				T24A-S01	T24A-S01		5	
				T24A-S02	T24A-S02		1	
				T24A-S02	T24A-S02		5	

Table F-1a. Data Validation Worksheet for Fort McClellan SI (Main Post)

Laboratory	Lot	File Type	Method	Site ID	Field Sample Number	Depth	ISC	Commments
ES	SXV	CQC	AAA9	T31SS01	T31SS010	1	N	
		CSO	AAA9	T31-S01	T31SS010	1	D	
ES	TDN	CQC	LW18	DIASS01	DIASS010	1	N	
		CSE	LW18	BK-D01	BK-D01	0		
				T5-D01	T5-D01	0		
				T5-D01	T5DD01	0		
		CSO	LW18	BK-S01	BK-S0101	1		
				BK-S01	BK-S0102	5		
				OTA-S01	OTA-S010	1		
				OTA-S01	OTADS010	1	D	
				OTA-S01	OTA-S010	5		
				OTA-S02	OTA-S020	1		
				OTA-S02	OTA-S020	5		
				DIA-S01	DIA-S010	1		
				DIA-S01	DIASS010	1	D	
				DIA-S01	DIA-S010	5		
				DIA-S02	DIA-S020	1		
				DIA-S02	DIA-S020	5		
				T5-S02	T5-S0201	1		
				T5-S02	T5-S0202	5		
				T5-S03	T5-S0301	1		
				T5-S03	T5-S0302	5		
				T5-S04	T5-S0401	1		
				T5-S04	T5-S0402	5		
ES	TDO	CQC	LW18					
		CSE	LW18	T31-D01	T31-D01			
				T31-D01	T31DD01			
		CSO	LW18	T31-S01	T31-S010	1		
				T31-S01	T31-S010	5		
				T31-S02	T31-S020	1		
				T31-S02	T31-S020	5		
				T31-S03	T31-S030	1		
				T31-S03	T31-S030	5		
				T31-S04	T31-S040	1		
				T31-S04	T31-S040	5		
				T5-S01	T5-S0101	1		
				T5-S01	T5-S0102	5		
				T38-S01	T38-S010	1		
				T38-S01	T38-S010	5		
				T38-S02	T38-S020	1		
				T38-S02	T38-S020	5		
				T38-S03	T38-S030	1		
				T38-S04	T38-S040	1		
				T38-S04	T38-S040	5		
ES	TDP	CQC	LW18					Acceptable (6/25)
		CSO	LW18	T38-S03	T38DS030	1	D	
				T6-S03	T6-S0301	1		
				T6-S03	T6-S0302	5		
				T24A-S01	T24A-S01	1		
				T24A-S01	T24A-S01	5		
				T24A-S02	T24A-S02	1		
				T24A-S02	T24A-S02	5		
ES	TDQ	CQC	LW18	T6-S02	T6-S02	1	N	Acceptable w/ "I" Flag (7/10)
				T31SS01	T31SS010	1	N	
		CSE	LW18	T24A-D01	T24A-D01	0		

Table F-1a. Data Validation Worksheet for Fort McClellan SI (Main Post)

Laboratory	Lot	File Type	Method	Site ID	Field Sample Number	Depth	ISC	Commments
		CSO	LW18	T6-S01	T6-S0101	1		
				T6-S01	T6-S0102	5		
				T6-S02	T6-S0201	1		
				T6-S02	T6-S0202	5		
				T31-S01	T31SS01	1	D	
ES	TDV	CQC	LW18					
		CSE	LW18					
ES	TDW	CQC	LW18					Acceptable (8/10)
ES	YDE	CQC	UW22					
		CSW	UW22	FMP001	FMP001	0		
ES	YDM	CQC	UW22	RB-002	RB-002	0		
				RB-003	RB-003	0		
				FAS001	FAS001	0		
		CSW	UW22	T5-W01	T5-W01	0		
ES	YDN	CQC	UW22	T31SW01	T31SW01	0	N	
		CSW	UW22	T31-W01	T31-W01	0		
				T31-W01	T31SW01	0	D	
ES	YDO	CQC	UW22	RB-001	RB-001	0		
		CSW	UW22	BK-W01	BK-W01	0		
ES	YDP	CQC	UW22	RB004	RB-004	0		
				RB005	RB-005	0		
		CSW	UW22	T24A-W01	T24A-W01	0		
ES	YDR	CQC	UW22					
		CSW	UW22					
ES	YDW	CGW	UW22					
		CQC	UW22					
		CSW	UW22					
ES	YFH	CQC	UT02	T31SW01	T31SW01	0	N	
				RB-001	RB-001	0		
				RB-003	RB-003	0		
				RB004	RB-004	0		
				RB005	RB-005	0		
				FAS001	FAS001	0		
		CSW	UT02	BK-W01	BK-W01	0		
				T5-W01	T5-W01	0		
				T31-W01	T31-W01	0		
				T31-W01	T31SW01	0	D	
				T24A-W01	T24A-W01	0		
ES	YFJ	CGW	UT02					
		CQC	UT02					
		CSW	UT02					
ES	YZB	CQC	99 (IPA)					
		CSE	99 (IPA)					
ES	YZC	CGW	99 (IPA)					
		CQC	99 (IPA)					
		CSW	99 (IPA)					
ES	ZBB	CQC	AAA9					
		CSE	AAA9					
UB	SKL	CQC	CC8					Acceptable (4/7)
		CSW	CC8	FMP001	FMP001	0		Submit No = 1
UB	SKV	CQC	UM25					Submit No = 1
		CSW	UM25	FMP001	FMP001	0		Submit No = 1
UB	SKW	CQC	UM21	TB001	TB001	0		Acceptable (4/7)
				TB002	TB002	0		
				TB003	TB003	0		

Table F-1a. Data Validation Worksheet for Fort McClellan SI (Main Post)

Laboratory	Lot	File Type	Method	Site ID	Field Sample Number	Depth	ISC	Commments
				TB004	TB004	0		
		CSW	UM21	FMP001	FMP001	0		
UB	SKX	CQC	UH20					Submit No = 1
		CSW	UH20	FMP001	FMP001	0		Submit No = 1
UB	SKZ	CQC	SD25					Submit No = 1
		CSW	SD25	FMP001	FMP001	0		Submit No = 1
UB	SLA	CQC	AX8					Submit No = 1
		CSW	AX8	FMP001	FMP001	0		Submit No = 1
UB	SLB	CQC	SS12					
		CSW	SS12	FMP001	FMP001	0		
UB	SLC	CQC	UW25					Acceptable (4/7)
		CSW	UW25	FMP001	FMP001	0		Submit No = 1
UB	STP	CQC	UM21	TB005	TB005	0		
		CSW	UM21	FMP001	FMP002	0		
UB	SZV	CQC	LM23					
		CSE	LM23	BK-D01	BK-D01	0		
		CSO	LM23	BK-S01	BK-S01	1		
				BK-S01	BK-S01	5		
UB	SZW	CQC	LM25					Acceptable (7/16)
		CSE	LM25	BK-D01	BK-D01	0		
		CSO	LM25	BK-S01	BK-S01	1		
				BK-S01	BK-S01	5		
UB	SZY	CQC	B9	DIASS01	DIASS01	1	N	
		CSE	B9	BK-D01	BKD01	0	D	
		CSO	B9	BK-S01	BK-S01	1		
				BK-S01	BK-S01	5		
				DIA-S01	DIA-S01	1		
				DIA-S01	DIASS01	1	D	
				DIA-S01	DIA-S01	5		
				DIA-S02	DIA-S02	1		
				DIA-S02	DIA-S02	5		
UB	SZZ	CQC	JD20	DIA-S01	DIA-S01	1	N	
		CSE	JD20	BK-D01	BK-D01	0		
		CSO	JD20	BK-S01	BK-S01	1		
				BK-S01	BK-S01	5		
UB	SZX	CSW	LH17	FMP001	FMP001			Unacceptable;
				DIA-S01	DIA-S01	1		submitted as method "99"
				DIA-S01	DIA-S01	1	D	
				DIA-S01	DIA-S01	5		
				DIA-S02	DIA-S02	1		
				DIA-S02	DIA-S02	5		
UB	TAA	CQC	LW23					Acceptable (7/16)
		CSE	LW23	BK-D01	BK-D01	0		
		CSO	LW23	BK-S01	BK-S01	1		
				BK-S01	BK-S01	5		
UB	TAB	CQC	Y9					
		CSE	Y9	BK-D01	BK-D01	0		
		CSO	Y9	BK-S01	BK-S01	1		
				BK-S01	BK-S01	5		
UB	TAC	CQC	JS12	DIA-S01	DIA-S01	1	N	Acceptable if Sb
		CSE	JS12	BK-D01	BK-D01	0		submitted as method "99"
		CSO	JS12	BK-S01	BK-S01	1		
				BK-S01	BK-S01	5		
				DIA-S01	DIA-S01	1		
				DIA-S01	DIA-S01	1	D	

Table F-1a. Data Validation Worksheet for Fort McClellan SI (Main Post)

Laboratory	Lot	File Type	Method	Site ID	Field Sample Number	Depth	ISC	Commments
				DIA-S01	DIA-S01	5		
				DIA-S02	DIA-S02	1		
				DIA-S02	DIA-S02	5		
UB	TAD	CQC	UM21	RB-001		0		
				TB-006		0		
		CSW	UM21	BK-W01		0		
UB	TAE	CQC	UM25	RB-001	RB-001	0		
		CSW	UM25	BK-W01	BK-W01	0		
UB	TAF	CQC	UH20	RB-001	RB-001	0		Acceptable (7/16)
		CSW	UH20	BK-W01	BK-W01	0		
UB	TAG	CQC	CC8	RB-001		0		
				RB003		0		
				FAS001		0		
		CSW	CC8	BK-W01		0		
UB	TAH	CQC	SS12	RB-001	RB-001	0		Acceptable if Cu
				RB003	RB003	0		submitted as method "99"
				FAS001	FAS001	0		
		CSW	SS12	BK-W01	BK-W01	0		
UB	TAJ	CQC	AX8	RB-001		0		
				RB003		0		
				FAS001		0		
		CSW	AX8	BK-W01		0		
UB	TAK	CQC	SD25	RB-001	RB-001	0		Acceptable if Se
				RB003	RB003	0		submitted w/ "H" flag.
				FAS001	FAS001	0		
		CSW	SD25	BK-W01	BK-W01	0		
UB	TAP	CQC	UW25	RB-001	RB-001	0		Acceptable if reported
		CSW	UW25	BK-W01	BK-W01	0		submitted w/ "H" flag.
UB	TCZ	CQC	UM21	FAS001	FAS001	0		
				TB007	TB007	0		
UB	TEL	CQC	UW25	FAS001		0		Acceptable (7/16)
UB	TER	CQC	UH20	FAS001	FAS001	0		Acceptable if ENDRN and
UB	TFB	CQC	UM25	FAS001	FAS001	0		HPCL submitted as method "99".
UB	UMU	CGW	AX8	OLF-G05	01	30.7		Acceptable (8/17)
				OLF-G07	01	41.3		
				OLF-G07	01	41.3	D	
				OLF-G08	01	29.34		
				OLF-G09	01	20.1		
		CQC	AX8	OLF-G07	01	41.3	N	
		CSW	AX8	FMP001	FMP003	0		
UB	UMW	CGW	SD25	OLF-G05	01	30.7		
				OLF-G07	01	41.3		
				OLF-G07	01	41.3	D	
				OLF-G08	01	29.34		
				OLF-G09	01	20.1		
		CQC	SD25	OLF-G07	01	41.3	N	
		CSW	SD25	FMP001	FMP003	0		
UB	UMY	CGW	SS12	OLF-G05	01	30.7		Acceptable (8/7)
				OLF-G07	01	41.3		
				OLF-G07	01	41.3	D	
				OLF-G08	01	29.34		
				OLF-G09	01	20.1		
		CQC	SS12	OLF-G07	01	41.3	N	
		CSW	SS12	FMP001	FMP003	0		
UB	UNV	CGW	CC8	OLF-G05	01	30.7		Acceptable (8/7)

Table F-1a. Data Validation Worksheet for Fort McClellan SI (Main Post)

Laboratory	Lot	File Type	Method	Site ID	Field Sample Number	Depth	ISC	Commments
				OLF-G07	01	41.3		
				OLF-G07	01	41.3	D	
				OLF-G08	01	29.34		
				OLF-G09	01	20.1		
		CQC	CC8	OLF-G07	01	41.3	N	
		CSW	CC8	FMP001	FMP003	0		
UB	UON	CGW	UW25	OLF-G05	01	30.7		
				OLF-G07	01	41.3		
				OLF-G07	01	41.3	D	
				OLF-G08	01	29.34		
				OLF-G09	01	20.1		
		CQC	UW25	OLF-G07	01	41.3	N	
		CSW	UW25	FMP001	FMP003	0		
UB	UOO	CGW	UM21	OLF-G05	01	30.7		Acceptable
				OLF-G07	01	41.3		
				OLF-G07	01	41.3	D	
				OLF-G08	01	29.34		
				OLF-G09	01	20.1		
		CQC	UM21	TB008		0		
				TB0010	TB0010	0		
		CSW	UM21	FMP001	FMP003	0		
UB	UOP	CGW	UM25	OLF-G01	01	15.1		Acceptable (8/7)
				OLF-G05	01	30.7		
				OLF-G06	01	64.4		
				OLF-G07	01	41.3		
				OLF-G07	01	41.3	D	
				OLF-G08	01	29.34		
				OLF-G09	01	20.1		
		CQC	UM25	RB008		0		
		CSW	UM25	FMP001	FMP003	0		
				OLF-W01	OLF-W01	0		
UB	UOQ	CGW	UH20	OLF-G01	01	15.1		Acceptable if MEXCLR
				OLF-G05	01	30.7		and ENDRN submitted w/
				OLF-G06	01	64.4		"H" flag (8/17)
				OLF-G07	01	41.3		
				OLF-G07	01	41.3	D	
				OLF-G08	01	29.34		
				OLF-G09	01	20.1		
		CQC	UH20	RB008		0		
				OLF-G07	01	41.3	N	
		CSW	UH20	FMP001	FMP003	0		
				OLF-W01	OLF-W01	0		
UB	UOV	CQC	LW23					
		CSE	LW23	OLF-D01		0		
UB	UOX	CGW	AX8	LF2-G01	01	17.89		Acceptable (8/17)
				LF2-G02	01	3.93		
				LF2-G03	01	4.7		
				OLF-G01	01	15.1		
				OLF-G02	01	12.2		
				OLF-G03	01	11.7		
				OLF-G03	01	11.7	D	
				OLF-G04	01	39.4		
				OLF-G06	01	64.4		
				OLF-G10	01	16.42		
		CQC	AX8	RB008		0		

Table F-1a. Data Validation Worksheet for Fort McClellan SI (Main Post)

Laboratory	Lot	File Type	Method	Site ID	Field Sample Number	Depth	ISC	Commments
				RB009		0		
		CSW	AX8	OLF-W01	OLF-W01	0		
UB	UOZ	CGW	SD25	LF2-G01	01	17.89		Acceptable (8/17)
				LF2-G02	01	3.93		
				LF2-G03	01	4.7		
				OLF-G01	01	15.1		
				OLF-G02	01	12.2		
				OLF-G03	01	11.7		
				OLF-G03	01	11.7	D	
				OLF-G04	01	39.4		
				OLF-G06	01	64.4		
				OLF-G10	01	16.42		
		CQC	SD25	RB008		0		
				RB009		0		
		CSW	SD25	OLF-W01		0		
UB	UPB	CGW	SS12	LF2-G01	01	17.89		
				LF2-G02	01	3.93		
				LF2-G03	01	4.7		
				OLF-G01	01	15.1		
				OLF-G02	01	12.2		
				OLF-G03	01	11.7		
				OLF-G03	01	11.7	D	
				OLF-G04	01	39.4		
				OLF-G06	01	64.4		
				OLF-G10	01	16.42		
		CQC	SS12	RB008		0		
				RB009		0		
		CSW	SS12	OLF-W01	OLF-W01	0		
UB	UPC	CGW	UW25	OLF-G01	01	15.1		
				OLF-G02	01	12.2		
				OLF-G03	01	11.7		
				OLF-G03	01	11.7	D	
				OLF-G04	01	39.4		
				OLF-G06	01	64.4		
		CQC	UW25	RB008		0		
				RB009		0		
		CSW	UW25	OLF-W01		0		
UB	UPD	CGW	CC8	LF2-G01	01	17.89		Acceptable (8/7)
				LF2-G02	01	3.93		
				LF2-G03	01	4.7		
				OLF-G01	01	15.1		
				OLF-G02	01	12.2		
				OLF-G03	01	11.7		
				OLF-G03	01	11.7	D	
				OLF-G04	01	39.4		
				OLF-G06	01	64.4		
				OLF-G10	01	16.42		
		CQC	CC8	RB008		0		
				RB009		0		
		CSW	CC8	OLF-W01	OLF-W01	0		
UB	UPI	CGW	UM21	OLF-G01	01	15.1		Acceptable (7/25)
				OLF-G02	01	12.2		
				OLF-G03	01	11.7	D	
				OLF-G03	01	11.7	D2	
				OLF-G04	01	39.4		

Table F-1a. Data Validation Worksheet for Fort McClellan SI (Main Post)

Laboratory	Lot	File Type	Method	Site ID	Field Sample Number	Depth	ISC	Commments
				OLF-G06	01	64.4		
		CQC	UM21	RB008		0		
				RB009		0		
				TB0013		0		
				TB0014		0		
				TB0015		0		
		CSW	UM21	OLF-W01	OLF-W01	0		Acceptable (8/7)
UB	UPK	CQC	LM25					
		CSE	LM25	OLF-D01	OLF-D01	0		Acceptable (8/7)
UB	UPL	CQC	LH17					
		CSE	LH17	OLF-D01	OLF-D01	0		
UB	UPM	CQC	JS12					
		CSE	JS12	OLF-D01	OLF-D01	0		
UB	UPN	CQC	Y9					Acceptable (8/17)
		CSE	Y9	OLF-D01	OLF-D01	0		
UB	UPO	CQC	JD20					
		CSE	JD20	OLF-D01		0		
UB	UPP	CQC	B9					Acceptable (8/17)
		CSE	B9	OLF-D01		0		
UB	UPQ	CQC	LM23					Acceptable (8/7)
		CSE	LM23	OLF-D01	OLF-D01	0		
UB	UPR	CGW	UM25	LF2-G01	01	17.89		Acceptable (7/28)
				LF2-G02	01	3.93		
				LF2-G03	01	4.7		
				OLF-G02	01	12.2		
				OLF-G03	01	11.7		
				OLF-G03	01	11.7	D	
				OLF-G04	01	39.4		
				OLF-G10	01	16.42		
		CQC	UM25	RB009		1		
UB	UPS	CGW	UH20	LF2-G01	01	17.89		Acceptable
				LF2-G02	01	3.93		
				LF2-G03	01	4.7		
				OLF-G02	01	12.2		
				OLF-G03	01	11.7		
				OLF-G03	01	11.7	D	
				OLF-G04	01	39.4		
				OLF-G10	01	16.42		
		CQC	UH20	RB009		1		
UB	UPU	CGW						
		CQC						
UB	UPV	CGW						
		CQC						
UB	UQU	CGW	UM21	LF2-G01	01	17.89		
				LF2-G02	01	3.93		
				LF2-G03	01	4.7		
				OLF-G10	01	16.42		
		CQC	UM21	TB0016		0		
UB	UQV	CGW	UW25	LF2-G01	01	17.89		Acceptable (7/28)
				LF2-G02	01	3.93		
				LF2-G03	01	4.7		
				OLF-G10	01	16.42		
		CQC	UW25					

Table F-1b. Data Validation Worksheet for Fort McClellan SI (Pelham Range)

Laboratory	Lot	File Type	Method	Site ID	Field Sample Number	Depth	ISC	Commments
ES	JSX	CQC	T8	RB006	RB-006		0	
		CSW	T8	T31-W01	T31DW01		0 D	
ES	KPZ	CQC	99 (IPA)	RB006	RB-006		0	
ES	OYV	CQC	UL04	RB006	RB-006		0	
				RB007	RB-007		0	
ES	OYW	CQC	UL04					
		CSW	UL04	T31-W01	T31DW01		0 D	
ES	PLT	CQC	TT9	RKDD01	RKDD01		0 N	
		CSE	TT9	RK-D01	RK-D01		0	
				RK-D01	RKDD01		0 D	
		CSO	TT9	RI-S01	RI-S0101		1	
				RI-S01	RI-S0102		5	
				RI-S02	RI-S0201		1	
				RI-S02	RI-S0202		5	
ES	RGH	CQC	LL03	RJSS02	RJSS0201		1 N	
		CSE	LL03	RK-D01	RK-D01		0	
				RK-D01	RKDD01		0 D	
		CSO	LL03	RI-S01	RI-S0101		1	
				RI-S01	RI-S0102		5	
				RI-S02	RI-S0201		1	
				RI-S02	RI-S0202		5	
				RJ-S01	RJ-S0101		1	
				RJ-S01	RJ-S0102		5	
				RJ-S02	RJSS0201		1	
				RJ-S02	RJ-S0202		5	
				RJ-S03	RJ-S0301		1	
				RJ-S03	RJDS0301		1 D	
				RJ-S03	RJ-S0302		5	
				RJ-S04	RJ-S0401		1	
ES	RGI	CQC	LL03					
		CSO	LL03	RJ-S02	RJ-S0201		1	
ES	SXV	CQC	AAA9	RK-D01	RK-D01		0 N	
		CSE	AAA9	RK-D01	RK-D01		0	
				RK-D01	RKDD01		0 D	
		CSO	AAA9	RI-S01	RI-S0101		1	
				RI-S01	RI-S0102		5	
				RI-S02	RI-S0201		1	
				RI-S02	RI-S0202		5	
ES	TDQ	CQC	LW18	RJSS02	RJSS0201		1 N	
		CSE	LW18	RK-D01	RK-D01		0	
				RK-D01	RKDD01		0 D	
		CSO	LW18	RI-S01	RI-S0101		1	
				RI-S01	RI-S0102		5	
				RI-S02	RI-S0201		1	
				RI-S02	RI-S0202		5	
				RJ-S01	RJ-S0101		1	
				RJ-S01	RJ-S0102		5	
				RJ-S02	RJ-S0201		1	
				RJ-S02	RJSS0201		1 D	
				RJ-S02	RJ-S0202		5	
				RJ-S03	RJ-S0301		1	
				RJ-S03	RJDS0301		1 D	
				RJ-S03	RJ-S0302		5	
				RJ-S04	RJ-S0401		1	
ES	YDE	CQC	UW22					

Table F-1b. Data Validation Worksheet for Fort McClellan SI (Pelham Range)

Laboratory	Lot	File Type	Method	Site ID	Field Sample Number	Depth	ISC	Commments
		CSW	UW22	FPR001	FPR001	0		
ES	YDP	CQC	UW22	RB006	RB-006	0		
ES	YDQ	CQC	UW22	RB007	RB-007	0		
ES	YDR	CQC	UW22					
		CSW	UW22	T31-W01	T31DW01	0	D	
ES	YFH	CQC	UT02	RB006	RB-006	0		
		CSW	UT02	T31-W01	T31DW01	0	D	
ES	YZA	CQC	99 (IPA)	RK-D01	RK-D01	0	N	
		CSE	99 (IPA)	RK-D01	RK-D01	0		
				RK-D01	RKDD01	0	D	
UB	SKL	CQC						Submit No = 1 Acceptable (4/7)
		CSW						Submit No = 1
UB	SKV	CQC						Submit No = 1
		CSW						Submit No = 1
UB	SKX	CQC						Submit No = 1
		CSW						Submit No = 1
UB	SKZ	CQC						Submit No = 1
		CSW						Submit No = 1
UB	SLA	CQC						Submit No = 1
		CSW						Submit No = 1
UB	SLC	CQC						Submit No = 1 Acceptable (4/7)
		CSW						Submit No = 1

assess any cross-contamination that may have occurred, and qualify the associated analytical data accordingly.

Data validation qualifiers should be applied to the benzene detected in one groundwater and α-BHC detected in three groundwaters to indicate that these compounds were not detected due to associated field QC blank inference. Several metals (i.e., barium, calcium, magnesium, sodium, iron, manganese, zinc, potassium and selenium) were detected in the field blanks prepared with potable water. The data associated with these were not qualified, since all sampling equipment was rinsed with diagnostic-grade water which did not contain these metals. Based on an evaluation of the compounds and elements detected in the field blanks, the overall field accuracy is acceptable.

F.1.1.3 Representativeness

Representativeness was defined as the degree to which the data accurately and precisely represent a characteristic of a population, parameter variations at a sampling location, a process condition, or an environmental condition. Sample representativeness was ensured during the SI by collecting sufficient samples of a population medium, properly distributed with respect to location and time. Representativeness was assessed by reviewing the drilling techniques and equipment; well installation procedures and materials; and sample collection methods, equipment, and sample containers used during the Fort McClellan SI, in addition to evaluating the RPD values calculated from the duplicate samples and the concentrations of interferants detected in the field and laboratory QC blanks. The reproducibility of a representative set of samples reflects the degree of heterogeneity of the sampled medium, as well as the effectiveness of the sample collection techniques.

Based on the evaluation of the factors described above and summarized in Section F.3, the samples collected during the SI are considered to be representative of the environmental condition at Fort McClellan.

F.1.1.4 Comparability

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared to another and is limited to the other PARCC parameters, because only when precision and accuracy are known can one data set be compared to another. To optimize comparability, only the specific methods and protocols that were specified in the SI QAPP, as required by USATHAMA, were used to collect and analyze samples during the Fort McClellan SI. By using consistent sampling and analysis procedures, all data sets were comparable within the sites at Fort McClellan, between sites at the installation, or among USATHAMA facilities nationwide, to ensure that remedial action decisions and priorities were based on a consistent data base.

All samples collected for VOC, SVOC, pesticide/PCB, metals, and explosives were analyzed using DataChem Laboratories, Inc. USATHAMA certified methods. Samples collected for HD, GB, and VX Agent Breakdown Products, except for isopropylamine, were analyzed using Environmental Sciences and Engineering, Inc. (ESE) USATHAMA certified methods. Isopropylamine was analyzed by Mobile Phase Ion Chromatography by ESE. Based on the precision and accuracy assessment presented above, the data collected during the SI are considered to be comparable with the data collected during previous investigations.

Based on the precision and accuracy assessment presented above, the data collected during the SI are considered to be comparable with the data collected during previous investigations.

F.1.1.5 Completeness

Completeness was defined as the percentage of valid data obtained from a measurement system. For data to be considered valid, they must have met all acceptance criteria, including accuracy and precision, as well as any other criteria specified by the analytical methods used.

Furthermore, project completeness was defined as the percentage of data used to prepare a preliminary risk evaluation and upon which recommendations for site remediation are based. For analytical data to be considered usable for the preliminary risk evaluation and remediation

recommendations, each data point must be satisfactorily validated. Rejected (e.g., due to USATHAMA Quality Control Samples being outside of allowable limits) concentrations reported for all analyses were not used in the risk estimates or for remediation recommendations due to the increased potential of using the concentrations of compounds and elements (i.e., false positives) or omitting compounds or elements (i.e., false negatives) that may have an adverse impact on human health. In addition to this, some analyses were not performed due to laboratory problems (i.e., loss of sample during extraction, insufficient sample volume). As a result, 84 pesticide/PCB, 1 thiodiglycol, 1 IMPA and MPA, 1 isopropylamine, and 1 DIMP and DMMP data points were not included in the hazard ranking system (HRS) score. The 84 pesticide/PCB data points were rejected due to the Lot's (i.e., SZX) inability to meet QC criteria. The analysis of the following data points was not performed due to insufficient sample volume: sample OLF-G06 for thiodiglycol, and sample LF2-G01 for IMPA, MPA, isopropylamine, DIMP and DMMP.

F.2 FIELD QUALITY CONTROL ASSESSMENT

Fourteen trip blanks, 6 field blanks, 9 equipment blanks, and 10 field replicates were collected and analyzed for the same compounds and using the same laboratory techniques as those used for the environmental samples. The analytical results obtained from the field QC blanks are used to assess the efficiency and effectiveness of the sample collection, handling, and equipment decontamination procedures used in the field. Tables E-1 through E-26 in Appendix E cross-reference environmental samples to the associated field QC blank sample.

F.2.1 Trip Blanks

Trip blanks were prepared by DataChem Laboratories, located in Salt Lake City, Utah. These blanks were prepared with American Society for Testing and Materials (ASTM) Type II water, sent to Fort McClellan, stored with the unused sample bottles, and returned to the laboratory with each cooler containing the environmental samples to be analyzed for VOCs using DataChem Laboratories, Inc. USATHAMA Method UM21. Table F-2 summarizes the concentrations of the detected VOCs in the trip blank samples collected during the Fort McClellan SI.

Table F–2. Trip Blank Summary, Ft. McClellan, Anniston, Alabama

SAIC ID Number				TB–001	TB–002	TB–003	TB–004	TB–005
Collection Date								
Parameter	Units	CRL	UCR					
Method UM21 (VOCs in Water)								
1,3–Dimethylbenzene	µg/L	1	150	1 LT	1 LT	1 LT	1 LT	1 LT
Acetone	µg/L	8	100	8 LT	8 LT	8 LT	59.3	8 LT
Benzene	µg/L	1	150	1 LT	1 LT	1 LT	1 LT	1 LT
Methylene Chloride	µg/L	1	150	1 LT	15.2	1 LT	1 LT	1 LT
Chloroform	µg/L	1	150	1.4	1	1	1.1	1 LT
Ethylbenzene	µg/L	1	150	1 LT	1 LT	1 LT	1 LT	1 LT
Toluene	µg/L	1	150	1 LT	1 LT	1 LT	1 LT	1 LT
Unknown	µg/L	--	--	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)

-- The certification ofthese analyteswill be submitted at a later date
CRL – Certified Reporting Limit
UCR – Upper Certified Range
LT – less than the certified reporting limit
NOTE: TB–0011 was shipped to the laboratory,however, it was not analyzed.

Table F–2. Trip Blank Summary, Ft. McClellan, Anniston, Alabama (Continued)

SAIC ID Number				TB–006	TB–007	TB–008	TB–0010
Collection Date							
Parameter	Units	CRL	UCR				
Method UM21 (VOCs in Water)							
1,3–Dimethylbenzene	µg/L	1	150	1 LT	1 LT	4.2	4.04
Acetone	µg/L	8	100	8 LT	8 LT	8 LT	8 LT
Benzene	µg/L	1	150	1 LT	1 LT	1 LT	1 LT
Methylene Chloride	µg/L	1	150	1 LT	1 LT	1 LT	1 LT
Chloroform	µg/L	1	150	1 LT	1 LT	1 LT	1 LT
Ethylbenzene	µg/L	1	150	1 LT	1 LT	1.7	1.6
Toluene	µg/L	1	150	1 LT	1 LT	4.4	4.3
Unknown	µg/L	––	––	0 (0)	0 (0)	0 (0)	0 (0)

–– The certification of these analytes will be submitted at a later date
CRL – Certified Reporting Limit
UCR – Upper Certified Range
LT – less than the certified reporting limit
NOTE: TB–0011 was shipped to the laboratory, however, it was not analyzed.

Table F–2. Trip Blank Summary, Ft. McClellan, Anniston, Alabama (Continued)

SAIC ID Number Collection Date Parameter	Units	CRL	UCR	TB–0013	TB–0014	TB–0015	TB–0016
Method UM21 (VOCs in Water)							
1,3–Dimethylbenzene	µg/L	1	150	5	4.4	4.4	4.3
Acetone	µg/L	8	100	8 LT	8 LT	8 LT	8 LT
Benzene	µg/L	1	150	1 LT	1 LT	1	1 LT
Methylene Chloride	µg/L	1	150	1 LT	1 LT	1 LT	1 LT
Chloroform	µg/L	1	150	1 LT	1 LT	1 LT	1 LT
Ethylbenzene	µg/L	1	150	2.1	1.8	1.8	1.5
Toluene	µg/L	1	150	5.7	5.2	5	4.6
Unknown	µg/L	––	––	8 (1)	0 (0)	0 (0)	0 (0)

–– The certification of these analytes will be submitted at a later date
CRL – Certified Reporting Limit
UCR – Upper Certified Range
LT – less than the certified reporting limit
NOTE: TB–0011 was shipped to the laboratory, however, it was not analyzed.

Fourteen trip blanks were collected and analyzed for VOCs using USATHAMA Method UM21. Chloroform was detected in TB-001, TB-002, TB-003, and TB-004; acetone was detected in TB-004 associated with Field Blanks collected February 27, 1992. 1,3-dimethyl-benzene, ethylbenzene, toluene, and xylenes were detected in TB-008, TB-0010, TB-0013, TB-0014, TB-0015, and TB-0016; benzene was detected in TB-0015 associated with water samples collected June 5 through 11, 1992.

The presence of chloroform, acetone, 1,3-dimethylbenzene, ethylbenzene, toluene, and xylene are not considered to be representative of environmental conditions at Fort McClellan, since these VOCs were not detected in the associated surface and groundwater samples. The benzene concentration detected in sample OLF-G04, associated with TB-0015, should be qualified as "U[TB]."

F.2.2 Field Blanks

Field blanks were collected to provide baseline analytical data for each source of water (i.e., Diagnostic Grade Water and Potable Water) used for equipment decontamination during each field event. Field blanks were collected by randomly selecting sample containers from the supply, filling them with the appropriate water source, and then preserving and analyzing these blanks for the same compounds and using the same laboratory methods as those used for the associated environmental samples. Table F-3 summarizes the concentrations of the elements and compounds detected in the field blanks collected during the Fort McClellan SI.

Five field blanks (i.e., FMP001, FMP002, FMP003, FPR001, and FPR002), prepared with potable water used to decontaminate the drilling equipment, and one field blank (i.e., FAS001) prepared with Diagnostic Grade water used as the final water rinse in the equipment decontamination procedure, were collected. These blanks were sent to the DataChem Laboratories and Environmental Sciences and Engineering, Inc. for analyses.

Volatile Organic Compound Analysis -- Six field blanks (i.e., FMP001, FPR001, FMP002, FPR002, FMP003, and FAS001 were collected and analyzed for VOCs using

Table F–3. Data Summary: Field Blanks and Potable Water Samples, Ft. McClellan, Anniston, Alabama

SAIC ID Number				FMP001	FMP002	FMP003	FAS001	FPR001	FPR002
Collection Date				2/27/92	4/2/92	6/5/92	4/16/92	2/27/92	4/2/92
Parameter	Units	CRL	UCR						
Method SS12 (ICP Metals in Water)									
Barium	µg/L	2.82	12,000	21.6	Analysis not	29.4	2.82 LT	351	Analysis not
Calcium	µg/L	105	200,000	22500	Requested	23300	105 LT	25700	Requested
Iron	µg/L	77.5	500,000	140	|	77.5 LT	77.5 LT	5450	|
Magnesium	µg/L	135	250,000	10400	|	10800	135 LT	8230	|
Manganese	µg/L	9.67	10,000	9.67 LT	|	9.67 LT	9.67 LT	460	|
Potassium	µg/L	1240	250,000	1440	|	1240 LT	1240 LT	1240 LT	|
Sodium	µg/L	279	50,000	1123	|	1260	279 LT	6750	|
Zinc	µg/L	18.0	10,000	21.8	|	45.5	18.0 LT	418	|
Method UM21 (VOCs in Water)									
Chloroform	µg/L	1	150	Reanalyzed because of	1 LT	1 LT	2.2	Reanalyzed because of	1 LT
Trichloroethene	µg/L	1	150	Missed holding time	2.1	2.4	1 LT	Missed holding time	1 LT
				See FMP002				See FPR002	
Method UM25 (SVOCs in Water)									
Unknown	µg/L	--	--	4 (1)	Analysis not	10 (1)	0 (0)	0 (0)	Analysis not
					Requested				Requested
Method UH20 (Organochlorine Pesticides in Water)									
alpha–Hexachlorocyclohexane	µg/L	0.0025	0.500	0.0025 LT	Analysis not	0.003 LT	0.004	0.003 LT	Analysis not
delta–BHC	µg/L	0.0034	0.500	0.005	Requested	0.003 LT	0.003 LT	0.005 LT	Requested
Isodrin	µg/L	0.0025	0.500	0.0025 LT	|	0.003	0.003 LT	0.003 LT	|
Lindane	µg/L	0.0025	0.500	0.0025 LT	|	0.003	0.003 LT	0.003 LT	|

-- The certification of these analytes will be submitted by the analytical laboratory at a later date.
CRL – Certified Reporting Limit
UCR – Upper Certified Range
LT – less than the certified reporting limit
Unknown – The following tentatively identified compounds were identified for sample:
FMP001 – UNK533 4 S µg/L
FMP003 – UNK563 10 S µg/L

USATHAMA Method UM21. No data is reported for FMP001 or FPR001 due to missed hold times. These samples were recollected as FMP002 and FPR002. Chloroform was detected in FAS001, and trichloroethene was detected in FMP002 and FMP003.

The presence of chloroform is not considered to be representative of environmental conditions at Fort McClellan, since it was not detected in the environmental samples associated with FAS001. For samples OLF-G07 and OLF-G07D, associated with FMP003, the trichlorethene concentrations were not qualified, since all sampling equipment was rinsed with diagnostic-grade water which did not contain trichloroethene.

Semivolatile Organic Compound Analysis -- Four field blanks (i.e., FMP001, FPR001, FMP003, and FAS001) were collected and analyzed for SVOCs using USATHAMA Method UM25. No SVOCs were detected.

Pesticide/PCB Analysis -- Four field blanks (i.e., FMP001, FMP003, FPR001, and FAS001) were collected and analyzed for pesticides/PCBs using USATHAMA Method UH20. Delta-BHC was detected in FMP001 and FPR001, and Alpha-BHC was detected in FAS001.

These pesticides were not detected in the associated environmental samples. Isodrin and lindane were detected in FMP003. Isodrin was detected in the blank associated with FMP003, therefore, the concentration of isodrin in FMP003 should be qualified "U[MB]." The lindane concentrations for LF2-G02 and OLF-W01, associated with FMP003, were not qualified, since all sampling equipment was rinsed with diagnostic-grade water which did not contain lindane.

Trace Metals Analysis -- Four field blanks (i.e., FMP001, FMP003, FPR001, and FAS001) were prepared during the Fort McClellan SI and analyzed by DataChem Laboratories, Inc. for trace metals analysis. Barium, calcium, magnesium, and sodium were detected in FMP001, FPR001, FMP003, iron, manganese, and zinc were detected in FPR001; potassium in FMP001; and selenium in FMP003. Samples associated with these field blanks were not qualified, since all sampling equipment was rinsed with diagnostic-grade water which did not contain the above metals.

Explosives Analysis -- Four field blanks (i.e., FMP001, FMP003, FPR001, and FAS001) were prepared during the Fort McClellan SI and analyzed by DataChem Laboratories, Inc. for explosives by USATHAMA Method UW25. No explosives were detected.

Agent Breakdown Products Analysis -- Four field blanks (i.e., FMP001, FPR001, FMP003, and FAS001) were collected and analyzed for agent breakdown products by Environmental Sciences and Engineering, Inc. No agent breakdown products were detected.

F.2.3 Equipment Blanks

Equipment blanks were prepared for manual and small automated sampling equipment used to collect environmental samples. One equipment blank was collected for each 10 environmental samples collected by pouring Diagnostic Grade water through a recently decontaminated piece of equipment into a prepared sample container appropriate for the required analysis. Equipment blanks were shipped to the laboratory to be analyzed using the methods required for the environmental samples collected on the same day. Table F-4 summarizes the concentrations of the compounds and elements detected in the equipment blanks collected during the Fort McClellan SI. The following subsections summarize the compounds and elements detected in these blanks and the impact of this interference on the environmental data quality.

Volatile Organic Compound Analysis -- Three equipment blanks (i.e., RB008, RB009, and RB001) were collected and analyzed by DataChem Laboratories, Inc. for VOCs using USATHAMA Method UM21. Chloroform was detected in RB001. UNK037 was detected in RB008 and RB009. UNK037 is isopropanol which was used to decon the equipment. Therefore, UNK037 is not considered to be representative of environmental conditions at Fort McClellan SI. The presence of chloroform is not considered to be representative of environmental conditions at Fort McClellan, since this VOC was not detected in the associated environmental sampling.

Semivolatile Organic Compound Analysis -- Three equipment blanks (i.e., RB008, RB009, and RB001) were collected and analyzed by DataChem Laboratories, Inc. for SVOCs using USATHAMA Method UM25. No SVOCs were detected.

Table F–4. Data Summary: Rinsate Blanks, Ft. McClellan, Anniston, Alabama

SAIC ID Number				RB–001		RB002	RB003	RB004	RB005
Collection Date				4/13/92		4/14/92	4/15/92	4/22/92	4/26/92
Parameter	Units	CRL	UCR						
Method SS12 (ICP Metals in Water)									
Cadmium	µg/L	6.78	12,500	6.78 LT		Analysis not	6.78 LT	Analysis not	Analysis not
Sodium	µg/L	279	50,000	279 LT		Requested	279 LT	Requested	Requested
Method UM21 (VOCs in Water)									
Chloroform	µg/L	1	150	2.1					
Unknown	µg/L	--	--	0 (0)			Analysis not Requested		
Method UH20 (Organochlorine Pesticides in Water)									
alpha–Hexachlorocyclohexane	µg/L	0.0025	0.500	0.0071	C				
delta–BHC	µg/L	0.0034	0.500	0.0034 LT					
Isodrin	µg/L	0.0025	0.500	0.0025 LT					

-- The certification of these analytes will be submitted at a later date
CRL – Certified Reporting Limit
UCR – Upper Certified Range
C–analysis is confirmed
LT – less than the certified reporting limit
ND – not detected
R – analyte required for reporting purposes, but not currently certified
U – analysis is unconfirmed

Table F–4. Data Summary: Rinsate Blanks, Ft. McClellan, Anniston, Alabama (Continued)

SAIC ID Number				RB006		RB007		RB008		RB009	
Collection Date				4/27/92		4/28/92		6/9/92		6/10/92	
Parameter	Units	CRL	UCR								
Method SS12 (ICP Metals in Water)											
Cadmium	µg/L	6.78	12,500	Analysis not		Analysis not		165		6.78 LT	
Sodium	µg/L	279	50,000	Requested		Requested		818		3420	
Method UM21 (VOCs in Water)											
Chloroform	µg/L	1	150					1 LT		1 LT	
Unknown	µg/L	--	--					500 (1)		40 (1)	
Method UH20 (Organochlorine Pesticides in Water)											
alpha–Hexachlorocyclohexane	µg/L	0.0025	0.500					0.0025 LT		0.0025 LT	
delta–BHC	µg/L	0.0034	0.500					0.00601		0.0034 ND	R
Isodrin	µg/L	0.0025	0.500					0.0172	U	0.0158	U

-- The certification of these analytes will be submitted at a later date
CRL – Certified Reporting Limit
UCR – Upper Certified Range
C–analysis is confirmed
LT – less than the certified reporting limit
ND – not detected
R – analyte required for reporting purposes, but not currently certified
U – analysis is unconfirmed
Unknown – The following tentatively identified compounds were identified for sample:
RB008 – UNK037 500 S µg/L
RB009 – UNK037 40 S µg/L

Pesticide/PCB Analysis -- Three equipment blanks (i.e., RB008, RB009, and RB001) were collected and analyzed for pesticides/PCBs using USATHAMA Method UH20. Alpha-BHC was detected in RB001, RB008, and RB009; and delta-BHC was detected in RB008. Isodrin was detected in RB008 and RB009. Isodrin was detected in the laboratory method blank associated with RB008 and RB009, therefore the concentration of isodrin in these equipment blanks should be qualified "U[MB]." Alpha-BHC and delta-BHC were not detected in any of the samples associated with RB-001 or RB-008. OLF-G02, OLF-G04, and OLF-G01, associated with RB-009, should have the alpha-BHC concentration qualified "U[EB]."

Explosives Analysis -- Three equipment blanks (i.e., RB008, RB009, and RB001) were analyzed by the DataChem Laboratories, Inc. for explosives by UW25. No explosives were detected.

Trace Metals Analysis -- Four equipment blanks (i.e., RB001, RB003, RB008, and RB009) were collected and analyzed by DataChem Laboratories, Inc. for trace metals. Calcium was detected in RB008 and sodium was detected in RB008 and RB009. Sodium was detected in the laboratory method blank associated with RB008 and RB009, therefore, the concentration of sodium detected in RB008 and RB009 should be qualified "U[MB]." All environmental samples associated with RB008 which contained calcium at less than five times the CRDL should be qualified "U[EB]." The samples are OLF-G01, OLF-G05 through OLF-G10 and OLF-W01.

Agent Breakdown Product Analysis -- Nine equipment blanks (i.e., RB001, RB002, RB003, RB004, RB005, RB006, RB007, RB008, and RB009) were collected and analyzed for agent breakdown products by Environmental Sciences and Engineering, Inc. No agent breakdown products were detected.

F.2.4 Field Replicates

One replicate environmental sample was collected for every 10 environmental samples, as required by the SI QAPP for Fort McClellan. The RPD value of each detected compound or element was reviewed to assess the sample collection reproducibility and matrix variability. A total of 61 soil (i.e., soil and sediment) and 6 replicate samples, in addition to 17 water (i.e.,

surface and groundwater) and 4 replicate samples were collected. One field replicate soil sample was collected after each 10 environmental samples, as indicated on the chain-of-custody forms applicable to shipment numbers DC-7, DC-9, ES-3, ES-4, ES-6, ES-8, ES-10, ES-11, ES-13, ES-16, and ES-17.

Replicate results were evaluated using 30 and 50 percent RPD guidelines for water and soil samples, respectively, analyzed for VOCs, SVOCs, pesticides/PCBs, explosives, and agent breakdown products and for a control limit of trace metals, concentrations greater than five times the applicable CRDL. For sample and replicate concentrations less than five times the applicable CRDL, control limits of ± 2 times and ± 4 times the CRDL (i.e., for water and soil samples, respectively) were used for those samples collected and analyzed for trace metals, as suggested by EPA Region I. Appendix E, Tables E1 through E26 summarize the concentrations of the compounds and elements detected in the soil, sediment, and groundwater replicate pairs collected during the Fort McClellan SI.

Volatile Organic Compound Analysis -- Four soil/sediment samples and 15 surface and groundwater samples were collected during the Fort McClellan SI and analyzed for VOCs using USATHAMA Methods LM23 and UM21. Two groundwater samples (i.e., OLF-G0701 and OLF-G0301) were collected in duplicate. RPD values were not calculated for compounds not detected in both the sample and duplicate sample, for compounds detected in one sample and not in the duplicate sample, for compounds detected in one sample and reported at concentrations below the sample detection limit in the duplicate sample, and compounds commonly considered laboratory contaminants (i.e., methylene chloride and acetone).

1,1,2,2-tetrachloroethene was detected in two groundwater replicate pairs. The RPD value for one replicate pair met criteria; the RPD for the other replicate pair was 87 percent. Trichloroethene was detected in one replicate pair. The RPD was calculated as 45 percent.

Semivolatile Organic Compound Analysis -- Four soil and sediment samples and 15 surface and groundwater samples were collected during the Fort McClellan SI and analyzed for SVOCs using USATHAMA Methods LM25 and UM25. Two groundwater samples (i.e., OLF-

G0701 and OLF-G0301) were collected in duplicate. RPD values were not calculated for compounds not detected in both the sample and duplicate sample, for compounds detected in one sample and not in the duplicate sample, for compounds detected in one sample and reported at concentrations below the sample detection limit in the duplicate sample, or for compounds commonly considered laboratory contaminants (e.g., phthalates) and tentatively identified compounds (TICs). All RPD criteria were met.

Pesticide/PCB Analysis -- Three soil and sediment samples and 15 surface and groundwater samples were collected during the Fort McClellan SI and analyzed for pesticides/PCBs using USATHAMA Methods LH17 and UM20. Two groundwater samples (i.e., OLF-G070 and OLF-G0301) were collected in duplicate. RPD values were not calculated for compounds not detected in both the sample and duplicate sample or for elements detected in one sample and not detected in the duplicate sample. Therefore, no RPD values were calculated for the replicate samples collected at Fort McClellan. All RPD criteria were met.

Trace Metals Analysis -- Eight soil and sediment samples and 14 surface and groundwater samples were collected during the Fort McClellan SI and analyzed for trace metals using USATHAMA Methods for metals. One soil (DIA - SOI), two groundwater samples (i.e., OLF-G0701 and OLF-G0301) were collected in duplicate. RPD values were not calculated for elements not detected in both the sample and duplicate samples. RPD criteria were not calculated for those elements also found in the potable water used as field blanks.

The CRL criteria were met for all elements detected in concentrations less than five times the CRL in the sample or in the duplicate samples, or in both the sample and duplicate samples, except for lead in the replicate pair for DIA-S01 (i.e., 56 percent), and beryllium (i.e., 57 percent) in the replicate pair for OLF-G03.

All RPD values were within control limits for all element concentrations greater than five times the CRL in both the sample and duplicate samples except for aluminum (i.e., 86 percent) in the replicate pair for OLF-G03, and nickel (68 percent) in replicate pair DIA-S01. These RPD values for DIA-S01 are most likely due to the matrix variability of the soils.

Explosive Analysis -- Four soil and sediment samples and 15 surface and groundwater samples were collected during the Fort McClellan SI and analyzed for explosives using USATHAMA Methods LW23 and UW25. Two groundwater samples (i.e., OLF-G0701 and OLF-G0301) were collected in duplicate. RPD values were not calculated for explosives that were not detected in both the sample and duplicate sample or for explosives detected in one sample and not in the duplicate sample. Therefore, RPD values were not calculated for the replicate samples at Fort McClellan.

Agent Breakdown Product Analysis -- Twenty soil and sediment samples and 56 surface and groundwater samples were collected during the Fort McClellan SI and analyzed for agent breakdown products. Six soil samples (i.e., OTA-S0101, T5-D01, T31-D01, T38-S0301, RK-D01, and RJ-S0301) were collected in duplicate. Four surface and groundwater samples (i.e., T31-W01, OLF-G0701, OLF-G0301, and LF2-G0301) were collected in duplicate. RPD values were not calculated for agent breakdown products that were not detected in both the sample and duplicate sample or for agent breakdown products detected in one sample and not in the duplicate sample. Therefore, no RPD values were calculated for the replicate samples collected at Fort McClellan.

F.3 LABORATORY QUALITY CONTROL ASSESSMENT

All environmental (i.e., soil, sediment, and groundwater) samples and field QC blanks (i.e., trip blanks, field blanks, and equipment blanks) collected during the Fort McClellan SI were analyzed using the following USATHAMA methodology:

DataChem Laboratories, Inc. USATHAMA Certified Methods

- The determination of volatile organics by GCMS. Method No. UM21 (water), Method No. LM23 (soil)
- The determination of semivolatiles by GCMS. Method No. UM25 (water), Method No. LM25 (soil)
- The determination of organochlorine pesticides by GC. Method No. UH 20 (water), Method No. LH17 (soil)
- The determination of explosives by HPLC. Method No. UW25 (water), Method No. LW23 (soil)

- The determination of metals by ICP. Method No. SS12 (water, Method No. JS12 (soil)
- The determination of selenium by GFAA. Method No. SD25 (water), Method No. JD20 (soil)
- The determination of arsenic by GFAA. Method No. AX8 (water), Method No. B9 (soil)
- The determination of mercury by CVAA. Method No. CC8 (water), Method No. Y9 (soil)

Environmental Sciences and Engineering Inc. USATHAMA Certified Methods

- Determination of organosulfur compounds by GC with FID. Method No. VL04 (water), Method No. LL03 (soil)
- Determination of thiodiglycol and chloroacetic acid by GC. Method No. LW18 (soil)
- Determination of thiodiglycol by GC. Method No. UW22 (water)
- Method for the analysis of IMPA and MPA by ion chromatography. Method No. UT02 (water), Method No. AAA9 (soil)
- DIMP and DMMP in environmental samples. Method No. T8 (water), Method No. TT9 (soil)
- Isopropylamine by mobile phase ion chromatography. Method No. 99 (water and soils).

All data were submitted by the laboratories using the guidelines and specifications described in the 1990 USATHAMA *Quality Assurance Program*, and validated and qualified by the Installation Restoration Data Management Information System (IRDMIS). IRDMIS is used for the entry, validation, and output of chemical data and the generation of data files to be submitted to USATHAMA IR and base closure programs. As data are entered into the IRDMIS system, they are validated by comparison to the program's chemical data base files. IRDMIS contains specifications for data validation (i.e., acceptable criteria, acceptable entries). Chemical data are compared to these specifications to determine their validity. The laboratory is required to initially validate the data and comment on the data's usability through the use of flagging codes. The qualifiers are entered into the IRDMIS Flagging Code Field and indicate other than usual analytical conditions or results.

Data that is found in error must be corrected by the laboratory. The laboratory/contractor are notified of lots which must be corrected and resubmitted. Some errors (i.e., out of control but data accepted due to high recoveries) may be qualified useable (i.e., Flagging Code = H) by the USATHAMA Chemistry Branch.

Data is entered by the laboratory as Level 1, if approved, it is elevated to Level 3, at which time it has been accepted and validate in the IRDMIS Data Base Subsystem. Table F1a and 1b contains the status of all Fort McClellan data in the IRDMIS system. The comments field contains any flags that have been applied to the data by USATHAMA, and whether the data has been found acceptable or not acceptable.