5. FIELD SAMPLING PROCEDURES AND EQUIPMENT

The following sections provide details of the field procedures, sampling protocols, equipment requirements and operation, and sampling schedules that will be used during the Fort McClellan Remedial Investigation (RI). A summary of the field activities to be conducted at each site on the Main Post and Pelham Range is listed in Table 5-1. Laboratory requirements for sample analysis are provided in the Quality Assurance Project Plan (QAPP) which comprises Volume II of the project Sampling and Analysis Plan (SAP).

5.1 SOIL SAMPLING

Soil sampling at Fort McClellan will be conducted jointly by Science Applications International Corporation (SAIC) and U.S. Army Technical Escort Unit (USATEU) personnel during the RI field effort. Table 5-2 summarizes soil sampling activities for each site. USATEU will collect surface soil samples (0 to 0.5 feet) in all areas suspected of having chemical warfare agent (CWA) contamination. Collected soil samples will be field analyzed by the USATEU for the presence of CWA using a MINICAMS unit. Subsurface soil samples collected by SAIC during monitoring well installation at Area T-38, Range L, and Old Water Hole also will be screened by USATEU for CWA prior to handling by site and laboratory personnel.

5.1.1 Soil and Sediment Sampling

This section details procedures to be used while collecting soil and sediment samples from test pits, shallow borings, and surface locations. Soil samples will be collected from test pits excavated using a backhoe. Soil samples collected from the test pits will be obtained from the backhoe bucket at the ground surface. Samples for volatile organic compounds (VOC) analysis will be collected from the bucket of the backhoe and placed into two 40-milliliter (mL) vials. The collected sample will not have had direct contact with the backhoe bucket or immediate contact with the air. A subsample will be simultaneously analyzed in the field by the USATEU for CWA. A small stainless steel spoon will be used to scrape off the surficial layer of soil, collect the soil underneath, and place the soil into the 40-mL vials within 15 seconds to 1 minute to minimize sample volatilization. The remaining analysis parameters will be collected by removing a sufficient amount of soil from the backhoe bucket using a stainless steel trowel

Table 5-1. Summary of RI Field Activities

Site No.	Site Name	RI Field Activities
1	Area T-4	MINICAMS screening; shallow soil sampling and analysis.
2	Area T-5	MINICAMS screening; shallow soil, surface water, and sediment sampling and analysis.
3	Area T-24A	Magnetometer and EM geophysical surveys; MINICAMS screening; test pits; shallow soil, surface water, and sediment sampling and analysis.
4	Area T-38	Magnetometer, EM, and GPR surveys; MINICAMS screening; surface and subsurface soil sampling and analysis; well installation (4); slug testing; groundwater sampling and analysis.
5	Range K	MINICAMS screening; shallow soil sampling and analysis; spent ordnance/canister removal (USATEU).
6	Range J	Magnetometer and EM geophysical surveys; MINICAMS screening; test pits; shallow soil sampling and analysis; well installation (3); groundwater sampling/analysis; slug testing.
7	D and I Area	MINICAMS screening; test pits; shallow soil sampling and analysis.
8	Range L (Lima Pond)	Topographic surveying; magnetometer, EM, GPR geophysical surveys; MINICAMS screening; soil, surface water, sediment sampling and analysis; well installations (7); slug testing; groundwater sampling and analysis.
9	Former Landfill #1	Magnetometer and EM surveys; well installations (4); groundwater sampling and analysis; slug testing.
10	Former Landfill #2	Surface water, sediment, groundwater sampling and analysis; slug testing.
11	Former Landfill #3	Subsurface soil, surface water, and sediment sampling and analysis; well installations (9); groundwater sampling and analysis; slug testing.
12	Old Water Hole	Topgraphic surveying; magnetometer, EM, and GPR surveys; MINICAMS screening; monitoring well installations (5); subsurface soil, groundwater sampling and analysis; slug testing.
Background	Reilly Lake (MP) Landfill #4 (MP) Upgradient of T-24A (MP) Rideout Hall (PR)	Monitoring well installations (2); groundwater sampling and analysis (all parameters); soil sampling and analysis (all parameters).
--	City of Weaver Wells	Groundwater sampling and analysis.
--	Off-Post Potable Wells	Groundwater sampling and analysis (dependent on locating wells in use).

MP- Main Post PR- Pelham Range

Table 5–2. Summary of RI/FS Sampling and Analysis

Site	Soil Analyses												Water Analyses											
	Field Screening Soil Samples (HD,VX,GB)	Laboratory Soil Samples	Sediment Samples	Agent Breakdown Products				SVOC	Metals	Pesticides/ PCB's	Explosives	TCLP	Groundwater Samples (2 rounds)	Surface Water Samples	Agent Breakdown Products									
				HD	GB	VX	VOC								HD	GB	VX	VOC	SVOC	Metals	Pesticides/ PCB's	BOD	TCLP	Explosives
T–4	10	4	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T–5	26	4	2	6	6	6	2	2	2	2	2	0	0	2	2	2	2	2	2	2	2	2	0	2
T–24A	7	6	1	7	7	0	7	7	7	0	7	0	0	1	1	1	1	1	1	1	1	1	0	1
T–38	56	6	0	6	6	6	6	6	6	6	6	3	8	0	8	8	8	8	8	8	8	0	2	8
Range J	11	4	0	4	0	0	0	0	0	0	0	1	6	0	6	0	0	0	0	0	0	0	0	0
Range K	10	4	0	4	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0
Range L	50	8	2	10	10	10	10	10	10	10	10	3	14	4	18	18	18	18	18	18	18	4	2	18
Detection & Identification	13	4	0	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Old Water Hole	50	8	0	8	8	8	8	8	8	8	8	2	10	0	10	10	10	10	10	10	10	0	2	10
Landfill #1	0	8	2	0	0	0	10	10	10	10	10	2	8	2	0	0	0	10	10	10	10	2	2	10
Landfill #2	0	0	2	0	0	0	2	2	2	2	0	0	6	2	0	0	0	8	8	8	8	2	2	8
Landfill #3	0	12	2	0	0	0	14	14	14	14	14	4	38	4	0	0	0	42	42	42	42	4	2	42
Background	0	4	2	6	6	6	6	6	6	6	6	1	8	3	11	11	11	11	11	11	11	3	0	11
Town of Weaver	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	2	2	2	0	0	2
Potable Water	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4	4	4	4	4	4	4	0	0	4
Quarterly LF–3	0	0	0	0	0	0	0	0	0	0	0	0	19	0	0	0	0	19	19	19	19	0	2	19
Total	233	72	13	59	47	36	65	65	65	58	67	16	123	18	60	54	54	135	135	135	135	18	14	135

and placing it into a stainless steel bowl. The soil will be composited and distributed into the appropriately labeled containers.

Metals and VOC samples will be collected at shallow soil locations using a 6-inch steel core sampler with stainless steel sleeves and a hand held slide hammer attachment. This method will expedite the VOC containerization process, collect an in situ sample, and allow more effective sediment collection from stream locations with higher energy flow. The core sampler will be placed on the location to be sampled and the slide hammer extended and accelerated downward to advance the sampler into the ground. The sampler will be retrieved after being driven 6 inches and the stainless steel inner sleeves will be immediately removed and sealed with a 2- by 2-inch sheet of Teflon®. Plastic caps will be placed over the Teflon® tape at each end of the sleeve. The seam between the plastic cap and the sleeve will be covered by wrapping 1-inch Teflon® tape around it. The sleeve will be wrapped in aluminum foil and placed in a plastic ziplock bag. All sampling equipment will be decontaminated using the procedures in Section 5.5. Sediment samples from low energy streams and ponds will be collected using a decontaminated stainless steel trowel.

Surface samples will be collected and analyzed by the USATEU using a MINICAMS unit. Collection of surface samples will be by drive hammer or stainless steel trowel. The field screening samples will be collected in a sample bag, heated to evolve CWA vapors, and analyzed by injecting the vapor sample into the MINICAMS analysis port. Once clearance of the samples has been obtained from the USATEU, the remaining samples will be prepared for shipment to the laboratory with intact chain-of-custody. The sampled locations will be marked with a wooden stake painted fluorescent orange and labeled with the sample point identification number. The locations of the field screening points will be determined by static differential global positioning system (GPS) or conventional surveying techniques.

5.1.2 Soil Sampling During Monitoring Well Installation

Subsurface soil samples will be collected for chemical analysis, lithologic description, and geotechnical testing during hollow stem auger drilling at the sites T-38, Range L, Old Water Hole, and Former Landfills #1 and #3. Soil samples will be collected at 5-foot intervals and at

distinct lithologic changes by driving a 3-inch outside diameter (OD) split spoon sampler. A 3-inch OD sampler will be used because of the volume of sample required for the analytical parameters and field screening.

Samplers retrieved from a borehole will be screened using an organic vapor analyzer (OVA). Soil from the drive head of the sampler will be removed for CWA screening and the OVA probe will be inserted into the sampler (top and bottom) to obtain a measurement. The sampler will be opened after it has been screened and the VOC sample will be extracted and placed in two 40-mL vials within 15 seconds to 1 minute to minimize sample volatilization. The VOC vials will be labeled and stored in a cooler at 4°C. The remainder of the sample will be composited in a stainless steel bowl, distributed to the appropriate containers, labeled, and stored at 4°C.

The OVA and MINICAMS readings will be recorded in a field logbook and will be used to determine which samples will be submitted for laboratory analysis. If the MINICAMS results are negative and the OVA does not significantly indicate any potential contamination, samples from near the surface (within 2 feet below land surface [BLS]) and at the water table interface will be sent to the laboratories for analysis. The chemical analyses for each site's samples are presented in Table 5-2.

5.1.3 Geotechnical Protocols

Subsurface drilling will be conducted at sites T-38, Range J, Range L, Old Water Hole, and Former Landfills #1 and #3. The number of boreholes to be drilled at each site and their estimated depths are shown below.

Site	Number of Boreholes		Estimated Depth (feet)	IN	NEXT DAYS	FU
Area T-38	4	4	35-80	3	1	0
Range L	7	1	25-35	1	0	6
Old Water Hole	5	0	25-35	0	0	5
Former Landfill #1	4	4 (5)	25-60	4	0	0
Former Landfill #3	~~8~~ 8	4	35-65	4	1	3
Background	1	1	20	1	-	0
Range J	3	0	30-50	0	0	3
T-24A	3	2 (+1) 11		0	3	0
	35	5-5 16		13	5	17

18

The geotechnical aspects of the field investigations at Fort McClellan are described below.

5.1.3.1 Monitoring Well Drilling

Before any drilling activities occur at a site, all underground utility maps for the immediate vicinity of the drilling site will be reviewed. Planned drilling locations will be staked in the field for inspection and clearance by Fort McClellan utilities personnel. In the event a boring needs to be relocated for any reason, an area sufficiently large enough to relocate one or two borings (within 20 feet of the original location) will be cleared through the Post at the time of the initial digging permit application. Digging permits will be obtained (if required) before any drilling activity is initiated. Drilling in off-Post locations will be coordinated with the City of Anniston. All drilling will comply with the applicable laws and regulations of the State of Alabama, the City of Anniston, Fort McClellan, and U.S. Army Environmental Center (USAEC).

Boreholes for monitoring well installation will be drilled using nominal $6^1/_4$ to $6^5/_8$-inch inside diameter (ID), continuous flight hollow-stem augers operated from a truck-mounted drilling rig. Each drilling rig will be equipped with a sufficient number of 3-inch OD split-spoons to collect samples for lithologic, chemical, or geotechnical analysis. The drilling equipment will be capable of driving a 3-inch OD split spoon sampler, circulating borehole fluids, and mixing grout. The number of hammer blows required to drive the sampler 18 inches will be recorded in a field logbook to estimate the relative density of the soil being sampled. A representative portion of material from each split-spoon will be placed in a labeled sample jar for archive purposes. Approximately 10 percent of the samples collected during the RI will be submitted for geotechnical analysis consisting of grain size (ASTM D-422 [1972]) and Atterberg limits (ASTM D-4318[1984]) analyses. Each drilling operation will be continuously monitored using an explosimeter and an OVA.

The SAIC onsite geologist will record the lithology and complete the drilling logs and an as-built diagram for all borings and wells. Each log will include a complete description of the characteristics of the material collected in each split-spoon sampler, as well as conditions

encountered during drilling. An example of a field boring log is shown on Figure 5-1. The following sample characteristics will be included in each log:

- OVA and MINICAMS monitoring results
- Percent recovery
- Lithology
- Particle size (visual estimates) and sortiness
- Color (Munsell)
- Consistency and texture
- Relative density (based on blow counts for noncohesive materials)
- Moisture (visual estimate)
- Fabric/bedding
- Standard penetration tests (ASTM D-1586)
- Other distinctive features.

Soil borings will be advanced to the depth at which the initial groundwater interface is reached and will be advanced approximately 10 feet beyond this depth to accommodate the length of well screen. In the event that bedrock is encountered prior to the groundwater table, rock coring will be conducted to the total borehole depth using a 3- or 4-inch OD core barrel ($1^7/_8$-inch to 3-inch diameter core). Rock core will be removed from the core barrel and placed in a core box for archive purposes. The box will be divided into rows to accommodate each core run with wooden spacers to separate runs. The starting depth of the first core run (top of the core) will be marked on the box to ensure proper vertical orientation. The site identification number, run number, core interval, percent recovery, and down pressure will be recorded and marked on the core box lid. The top and bottom of each core run will be marked on one side of the vertical spacers.

Each boring will be reamed (if necessary) using water/mud rotary with a nominal 8-inch tri-cone bit to total depth after coring activities are completed. Water will be used during coring and rotary activities as a lubricant, coolant, and a means of lifting cuttings out of the hole. Several feet of over-reaming may be necessary to accommodate cuttings that cannot be removed

SAIC

Field Boring Log Page ____ of ____

Site File No. _____ County _____ Boring No. _____ Monitor Well No _____

Site File Name _____ Surface Elev. _____ Completion Depth _____

Fed. ID. No _____ Auger Depth _____ Rotary Depth _____

Quadrangle _____ Sec. ____ T ____ R ____ Date: Start _____ Finish _____

Boring Location _____

Drilling Equipment

Elev.	DESCRIPTION	Depth in feet	SAMPLES: Sample No	Sample Type	Sample Recovery	Penetrometer	N Values (Blows)	OVA or HNU readings	Personnel: G - D - H - H -	REMARKS

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Aberdeen Proving Ground, Maryland

Field Boring Log

Fort McClellan, Alabama

Figure: 5-1 | Project: 01-0827-03-6520-006

from the borehole. Attempts will be made to remove cuttings remaining in the borehole after reaming by pumping or bailing. The volume of water lost to the formation during these drilling activities will be recorded and 5 times that volume will be removed during the well development process. Water loss may be substantial if karst areas are encountered during drilling.

Locating the groundwater table is difficult when using coring and rotary methods because water is used during drilling operations. The borehole will be pumped down periodically using a submersible pump or bailer to determine if the water table has been reached. The borehole groundwater level will be allowed to stabilize after pumping. Groundwater levels will be obtained until a static level can be determined. If groundwater is not encountered, the pumped water that was temporarily containerized will be recirculated and coring will continue until groundwater is encountered.

5.1.3.2 Monitoring Well Installation

Once the borehole has been drilled to total depth (approximately 10 to 12 feet below the water table), the end cap, well screen, and well riser will be assembled and placed inside of the auger or borehole for shallow wells (approximately 20 feet BLS or less). Specific construction parameters, such as the exact screen settings, will be determined in the field based on information obtained during the well drilling process. The well screen lengths will be 10 feet with a 0.10-inch slot size. The well casings and screen will have flush-threaded joints. After well placement, the filter pack will be tremied into place using a rigid tremie pipe or poured into the annulus between the augers and the well. The granular filter pack will be an inert siliceous material (i.e., quartz sand) of proper size and gradation from a source approved by USAEC prior to RI field activities. The filter pack will extend 5 feet above the top of the screen.

A bentonite pellet seal will be placed on top of the filter pack. The seal will extend at least 5 feet above the filter pack. Potable water will be poured into the borehole if any portion of the pellet seal was placed above the water table. After the pellets have been permitted to set approximately one hour, a bentonite/cement seal (grout) will be placed extending to the land surface. The grout will be composed by weight of 20 parts cement (Portland cement type II or V) to 1 part bentonite with a maximum of 8 gallons of approved water per 94-pound bag of

cement. The grout will be pumped in place through a rigid tremie pipe with a side discharge attachment on the end.

A steel well protective casing will be installed into the fresh grout and allowed to set for 24 hours. Four-inch monitoring wells will be protected by a 5-foot steel casing with a minimum diameter of 8 inches. More grout will be added after the initial 24 hours if any settling has occurred. After the grouting phase has been completed, a 3 by 3 by .5 foot concrete pad will be placed around the well. A mortar collar will be installed between the annulus of the protective casing and the well riser and will extend above the concrete pad. Four steel, 3-inch diameter, concrete-filled posts will be anchored around the perimeter of the pad. The protective casing and pickets will be painted orange with the well identification number stenciled in black paint on the side of the casing and on top of the lid using a brush. A boring log and monitoring well construction diagram will be prepared for each well/borehole. A field schematic is shown in Figure 5-2.

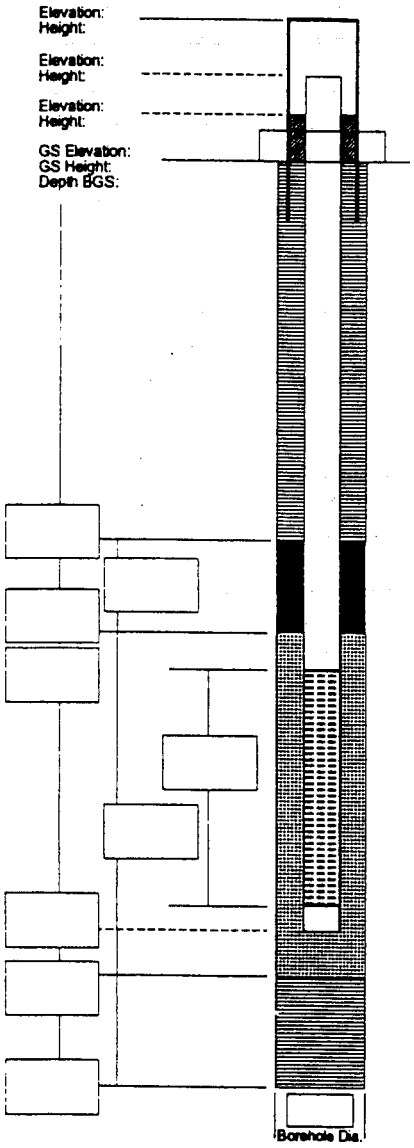
5.1.3.3 Well Development

After well construction, each monitoring well will be developed by surging and/or pumping using a hand pump, small-diameter submersible pump, or centrifugal pump until visual water clarity is obtained and specific conductivity, temperature, and pH are stable. These parameters will be measured following the removal of each well volume from the well. A minimum of five well volumes to include the water volume contained in the well screen, casing, and saturated annulus will be removed from each well. The total volume of water removed from the well will be recorded. The monitoring well will not be developed within 48 hours of the placement of the grout seals and mortar collar. All equipment lowered into the well will be decontaminated prior to use in accordance with the procedures outlined in Section 5.5.

The water level and well depth will be measured before any development activities. An electric water level indicator and weighted tape will be used to measure the well depth and water level from a permanently marked point on the well casing. The water level will be recorded to

Page __ of __

MONITORING WELL CONSTRUCTION LOG - Standard			Rev: 4/92
Well No.:	Installation:		Site:
Project No.:	Client / Project:		
Drilling Contractor:		Driller:	
Comp. Start:		Comp. End:	
Built By:		Well Coord.:	



PROTECTIVE CGS Material Type	Length:	
Diameter	Water Tight Seal( )	
Depth BGS	Drainage Hole ( )	Height: Size:
GUARD POSTS( ) No.: Configuration:	Type	
SURFACE PAD Composition & Size		
RISER PIPE Type		
Diameter		
GROUT Composition: Proportions :		
Interval	Tremied( )	
CENTRALIZERS( ) Type: Depth(s)		
SEAL Type		
Source		
Setup / Hydration time	Vol. Fluid Added	
Tremied( )		
FILTER PACK Type		
Amount Used	Tremied( )	
Source		
Gr. Size Dist		
SCREEN	Type: Manufacturer:	
Diameter ID:	OD:	
Slot Size: Schedule / Thickness		
Interval BGS		
SUMP( ) Interval BGS	Bottom Cap( )	
BACKFILL PLUG Material		
Setup / Hydration time	Tremied( )	
WATER ADDED( ) Interval	Amount	
Interval	Amount	

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Monitoring Well Construction Log

Fort McClellan, Alabama

Figure: 5-2 | Project: 01-0827-03-6520-006

SAIC

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MONITORING WELL CONSTRUCTION LOG - Standard		Rev 4/92
Well No	Installation	Site
Project No	Client / Project	
Drilling Contractor	Driller	
Comp Start	Comp End	
Built By	Well Coord	

DRILLING EQUIPMENT			
Rig Manufacturer			
Rig Model			
DRILLING METHOD	( ) Auger ( ) Mud Rotary	( ) Air Rotary ( ) Cable Tool	( ) Other (Specify) _____
Auger Type & Size			
Casing Size			
Bit Type and Size			
Hammer Weight and Percussion Method			
Rod Size			
Mud Mixture (Mud Rotary) Air Filter Method (Air Rotary)			
SAMPLING METHOD & NUMBER COLLECTED			
	( ) Split Spoon No ( ) ( ) Grab Sample No ( ) ( ) Misc No ( )	( ) Shelby Tube No ( ) ( ) Core Barrel No ( )	
MATERIALS USED (TOTALS)			
Sand	Bentonite Pellets		
GROUT Bentonite	Cement		
SURFACE PAD MATERIALS			
Screen (ft)			
Riser (ft)			
Misc			
MISC			

U.S. Army Environmental Center
Aberdeen Proving Ground, Maryland

Monitoring Well Construction Log

Fort McClellan, Alabama

Figure: 5-2 | Project: 01-0827-03-6520-006

the nearest 0.01 foot. A sample form to record water levels is provided in Figure 5-3. Groundwater levels will be measured in all wells before purging, using the following procedure:

- Decontaminate the water level meter and tape (i.e., sounding device) according to the procedures summarized in Section 5.5
- Lower the tip of the water level meter into the well until the tip comes into contact with the groundwater surface (sound begins)
- Place the meter on the top of the casing and raise and lower the tip of the water level meter to adjust the length of the cable
- Mark the point on the cable with thumb nail and hold the cable in place
- Read the cable to nearest foot marker and use an engineer's ruler (tenths and hundredths of a foot) to measure increments of a foot to the nearest 0.01 foot
- Record the water level in the field notebook.

The addition of water to the wells will be avoided whenever possible; however, the addition of small quantities of potable water may be required to successfully complete the well installation. The following are examples of when it may be necessary to add water to the well: 1) to control running sands, 2) to tremie the filter pack, or 3) hydrate bentonite pellets placed as a seal above the saturated interval. If water is introduced into the borehole during drilling or well installation, the volume will be recorded in the site logbook. In addition to meeting the stability and clarity requirements, at least five times the volume of water introduced during drilling will be removed before well development will be considered complete.

After all development activities are complete, a $3^{7}/_{8}$-inch OD blank pump will be lowered into the well and will pass unobstructed through the entire well depth and be removed before the well will be considered acceptable by the SAIC Field Manager. This will ensure that the well was not damaged during development and is sufficiently straight to allow for future sampling and other testing. Monitoring wells will be permanently marked with an identification number before demobilization from the site.

Water from well development will be collected and stored in tanks or drums at each well. The disposition of the development water will be determined based on the groundwater samples collected from the well. If the development water is determined by testing to be nonhazardous,

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Water Level Measurements

(Field Sheet)

Measurement Team: _____

Project Number and Location: _____

_____

Measuring Method: _____

_____

Measuring Point: _____

_____

_____

Well No.	Date	Time	Tape Reading		Depth to Water (ft)	Remarks
			Measure Pt.	Water Level		

Measuring Point: Point where measurement was taken. Top of PVC casing (TOC); Top of Protective Steel Casing (TOSC); Land Surface (LS), etc.
Depth to Water: Measurements should be recorded to the nearest 0.01 ft. (e.g., 10.06 feet below TOC).
Remarks: Any conditions that may influence the water level measurements.

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White File Pink Field Manager Yellow Supervisory Geologist Goldenrod Field Book

U.S. Army Environmental Center
Aberdeen Proving Ground, Maryland

Water Level Measurement Form

Fort McClellan, Alabama

Figure: 5-3 | Project: 01-0827-03-6520-006

- Information about any activities, extraneous to sampling activities, that may affect the integrity of the samples (such as low-flying aircraft nearby, fossil-fueled motors being used nearby, painting operations being carried out upwind of sampling sites)
- Analyses, required sample treatment techniques, and solution preparation
- Coolant blank temperature readings.

5.4.3 Field Equipment Logbook

The Field Equipment Logbook (FEL) will document the proper use, maintenance, and calibration of all field testing equipment used during the RI/FS at Fort McClellan. Before using field equipment, the Site Field Manager will inspect and approve the use of the field testing equipment by initialing the appropriate form in this document. A calibration log sheet will be maintained for each instrument used during the RI/FS and will be kept in the log. The following items will be tracked in the FEL, as a minimum, during the RI/FS:

- Equipment calibration status
- Equipment decontamination status
- Equipment nonconformance
- Equipment inspection and repair records.

The person using, maintaining, or calibrating field equipment will document his/her actions in the FEL. Entries will contain the following information:

- Name and signature of person making entry
- Date of entry
- Name of equipment and its identifying number
- Decontamination status
- Nature of work conducted
- List of reference or procedures used for calibration or maintenance
- Manufacturer, lot number, and expiration date of calibration standards
- Names of all persons conducting work
- Measurement results (whether acceptable or unacceptable).

Entries in the logbook will be signed and dated by the person making the entry. Every page in the log will be signed and dated by the Site Field Manager.

5.4.4 Sampling Forms

The following forms are required and copies will be maintained onsite during the RI/FS at Fort McClellan:

- Field equipment calibration log
- Soil boring log with descriptive text
- Groundwater sampling form
- Monitoring well construction log with descriptive text
- Well development log
- Water/sediment sampling form
- Field change request form.

Original copies of all forms will be submitted to USAEC within 3 days of completion.

These forms are presented in an attachment to the Sampling and Analysis Plan (SAP) developed for this RI/FS. Each space provided for sampling information will be completed. If some information is not available or not applicable to the RI/FS, the space will be marked as "N/A." Blank spaces are not acceptable. All entries will be made in permanent black ink. All forms used will be recorded in the site logbook and kept in the field office in the same location as the site logbook in a three-ring binder or equivalent for the duration of the RI/FS.

5.4.5 Sample Tracking

Most methods of analysis of environmental samples must be accomplished within a specific amount of time after the sample is collected. Where required, these timeframes ("holding times") are provided in the method. Careful tracking of the analytical status of samples is required to ensure that these holding times are met.

Sample tracking will be accomplished by assigning each sample a unique Installation Restoration Data Management Information System (IRDMIS) Site ID and field sample number following the procedures described in Section 4.12.3 of this Quality Assurance Project Plan (QAPP) and the procedures outlined in the Data Management Plan (DMP). This number will be traceable back to the day, time, site, and depth (where appropriate) of collection. The site ID and field sample number will be recorded on the sample label and chain-of-custody form, as well as in the field logbook. A master log of the site identification numbers used will be maintained by the Site Field Manager and Data Manager. All containers will be labeled before actual sampling. Each number or letter in the site ID and field sample number provides vital information pertaining to site identification, sample location, and sampling interval.

Sample tracking will be accomplished in the laboratory by assigning each sample a USAEC sample identification number when it is logged into the laboratory. The number will be traceable back to the field sample identification number. This unique sample number will be used to identify the sample during storage, analysis and data reduction, data validation, and reporting.

The following sample information will be recorded into the computerized Laboratory Information Management System (LIMS):

- Customer and project information
- Date of receipt
- Client identification
- Date sampled
- Field sample number
- Matrix type
- USAEC sample identification number
- Number of containers
- Analytical requirements
- Other pertinent information.

After the sample is logged in, an internal chain-of-custody form will be generated. This internal chain-of-custody document requires that the sample be formally relinquished by one party and accepted by another at each step of the analytical process. This document will accompany the sample through each step of the analytical process. When the analytical activities are complete, internal and external chain-of-custody documents will be completed and filed in the appropriate project file. Based on specific contract requirements, any remaining samples either will be properly disposed of or archived in secure storage areas.

In addition to the external and internal chain-of-custody documents, a computer-generated listing of the various parameters for sample analysis will be used to control sample flow and facilitate tracking within the laboratory. Each laboratory section participating in the analyses will be given the list of parameters and will be responsible for maintaining sample integrity, fulfilling chain-of-custody requirements, scheduling sample flow, and tracking sample status. All sample data will be entered into the LIMS in accordance with the established protocols for sample control chain-of-custody requirements.

5.4.6 Materials Certification

Documentation (or copies) concerning the quality of all materials used onsite will be retained onsite for the duration of the RI/FS at Fort McClellan. The following lists the materials certification documentation that will be kept, as a minimum:

- Analysis of all decontamination rinse water (i.e., USAEC-approved water)
- Sieve analysis of filter pack material
- Manufacturer and lot number for calibration standards
- Material certificates for all construction materials
- Certificates of analysis for materials used in decontamination
- Certificates of acceptable calibration for thermometers
- Certificates of cleaning or decontamination furnished by the container or equipment manufacturer (the certificate will detail the cleaning procedure).

Material blanks are samples of the construction materials used in sampling equipment, such as monitoring wells and lysimeters, that are archived for future analysis. Material blanks are required for all of the applicable construction materials used during the RI/FS at Fort McClellan. The types of material that will be sampled are pipe, well screen, filter pack material, drilling additives, bentonite, and cement.

Dry measure materials (e.g., cement, bentonite, and silica sand) will be sampled and labeled in the same manner described for the environmental and field QC samples. Approximately 2 pounds of dry material are required per sample for analysis. Liquid materials, such as drilling additives, paint, and lubricants, will require at least 1 liter of sample for analysis. Rigid materials, such as riser pipe and well screen, will require at least 2 feet of material per sample. The archived samples will be stored in clean containers and protected from exposure for the duration of the RI/FS. The USAEC Project Manager will determine the length of time material blanks are to be stored after completion of the RI/FS.

5.4.7 Corrections to Documentation and Variances

A variance is a deviation from project requirements. All variances from procedural and planning/design documents and other project requirements will be documented on the Field Change Request Form. The USAEC Project Manager for the Fort McClellan RI/FS will approve field changes that have a major impact on cost, schedule, and/or technical performance before incorporation.

Field changes and deviations from project planning documents will be reviewed and approved by the Project Manager, Site Field Manager, or the project QA Manager. All deviations from procedural and planning documents will be recorded in the site logbook. Project reports will detail all field changes and deviations. The USAEC Project Chemist will be consulted for changes or deviations involving any technical or QA issues.

When it becomes necessary to make corrections to any form of documentation (e.g., sample labels, chain-of-custody forms, daily logbooks), the obsolete information will be

crossed out with a single line and the changes made, dated, and initialed by the person making the change.

5.4.8 Photographs

A photographic record may be made during the field program, documenting field activities (i.e., drilling, soil boring, well installation, and sample collection). A photographic logbook will document the date and time the picture was taken, the subject, and the photo number. This photographic record may be used to highlight and enhance appropriate sections in the report resulting from these activities.

5.4.9 Disposition of Documentation

Upon conclusion of the field effort at Fort McClellan, all field documentation (i.e., maps, well logs, logbooks, and photographs) will be clearly labeled and placed in the project files.

5.5 FINAL EVIDENCE FILES

The RI/FS will require the administration of a central project file. The data and records management protocols will provide adequate controls and retention of all materials related to the project. Record control will include receipt from external sources, transmittals, transfer to storage, and indication of record status. Record retention will include receipt at storage areas, indexing, filing, storage, maintenance, and retrieval.

5.5.1 Record Control

All incoming materials related to the RI/FS, including sketches, correspondence, authorizations, and logs, will be forwarded to the Project Manager or his designated assistant. These documents will be placed in the project file as soon as placement becomes practical. If correspondence is needed for reference by project personnel, a copy will be made, rather than retaining the original. All records will be legible and easily identifiable.

4) Install the pump (i.e., submersible, centrifugal) approximately 1 foot above the transducer and wait 3 to 4 minutes to allow the water in the well to stabilize.

5) Collect another water level measurement and record it in the logbook. NOTE: Record water level measurements between each test (3 tests).

6) Set up the hermit data logger as discussed in the operators manual.

7) Purge the well water level down to the transducer and simultaneously turn off the pump and start the data logger.

8) The test will run for approximately 10 minutes. The test will be terminated after 10 minutes, if the well has recharged to 90 percent of the original draw down.

9) Steps 5 through 8 will be repeated twice more after the water level has stabilized. NOTE: The reference to zero must be set prior to each test.

5.3 GEOPHYSICAL SURVEYS

Quantitative geophysical surveys will be conducted at Area T-24A, Area T-38, Range J, Range L, Detection and Identification Area, Old Water Hole, and Landfill #1. The purpose of the surveys is to geophysically characterize the source areas within these sites and to provide guidance for sample collection and drilling placements based on these characterizations. Electromagnetic (EM), magnetometer, and ground penetrating radar (GPR) measurements have been selected as the techniques that will be the most useful for source characterization. A summary of the sites that are designated for geophysical activities and the techniques to be used at each site is shown below. USATEU will conduct surface metal detection sweeps at each sampling location.

Site	EM	Magnetometer	GPR
T-24A	•	•	
T-38	•	•	•
Range J	•	•	
Range L	•	•	•
D & I	•	•	
Landfill #1	•	•	
Old Water Hole	•	•	•
Landfill #2	•	•	

5.3.1 Magnetometer Surveys

Magnetometer surveys will be conducted at Area T-24A, Area T-38, Range L, Old Water Hole, D&I Area, Range J, Landfill #1, and Landfill #2 because these sites contain areas that were used for subsurface disposals. The magnetometer surveys will be conducted over transects or grids, and over all planned monitoring well locations at Fort McClellan prior to the commencement of drilling activities. Survey results will be used to confirm the presence of suspected buried metallic objects (i.e., drums, munitions), characterize the source areas, and locate monitoring wells and soil sampling points relative to detected geophysical anomalies at these sites. The survey locations will concentrate on the suspected locations of subsurface burials in the areas of concern and will not encompass the entire site areas.

Total-field and gradient magnetic measurements will be used to conduct magnetometer surveys at Fort McClellan. The magnetometer will be an EG&G Model G-856AX or EDA Instruments OMNI IV "Tie-line" instrument or equivalent. Either of these instruments will provide accuracy on the order of ± 1 gamma unit. Total-field and gradient magnetic measurements differ in that the former measures the absolute value of the ambient geomagnetic field using one sensor; the latter measures the gradient of the field by using two sensors separated by a known distance. The total-field magnetic data provides an indication of the distribution of magnetic materials, whereas the gradient magnetic anomalies provide greater lateral resolution than the total-field data. Magnetic anomalies may be caused by the natural distribution of iron oxides within soil and rock or by the presence of ferrous metals such as iron and steel. Magnetic anomalies are not generally produced by nonferrous metals such as aluminum, copper, tin, and brass. The fundamental assumption of the magnetic method is that anomalies caused by near-surface features can be discerned from the natural field. Interpretations may be made concerning the source of the anomaly (i.e., natural or artificial) based on the size and shape of the anomalous signature.

Prior to initiating each magnetometer survey, grids or transects will be superimposed over the measurement area. The grids and transects will be land surveyed to ensure that the data is accurately referenced and plotted over the site base maps. The stations will be marked with wooden hubs at designated intervals ranging from 10 to 25 feet. Smaller intervals will provide

better resolution for detecting smaller objects (i.e., 55-gallon drums). The transect lines will be cleared and the operator will set up a base station to automatically record diurnal variations during the magnetometer survey. The operator will remove magnetic objects from his person prior to conducting any geophysical activities. Readings from a hand held unit will be recorded in the instruments memory and will be simultaneously recorded in a field notebook. Measurements of the total magnetic field will be obtained at each transect interval. Several measurements will be obtained at each location to provide information on measurement repeatability.

The survey data will be downloaded to a portable computer and processed using a plotting software package. A plan view contour map will be generated for each transect or grid using the survey data posted at each measurement location. The interpretation of the resulting data will focus on steep magnetic gradients and anomalously elevated total field readings.

5.3.2 EM Surveys

EM surveys will be conducted at Area T-24A, Area T-38, Range L, the Old Water Hole, D&I, Range J, Landfill #1, and Landfill #2. The EM measurements will be obtained over the same transects or grids used for the magnetometer surveys. EM surveys will be conducted prior to the commencement of drilling activities. Contour maps of apparent ground conductivity and in-phase data will be produced and used to show any subsurface anomalies. Data results from the EM survey will be correlated with magnetometer results to delineate trends or patterns for the site. Correlating data will be used to confirm the presence of suspected buried metallic objects (i.e., drums, munitions), characterize the source, locate monitoring wells and soil sampling points at these sites.

The survey instrument will be either a Geonics EM-31 or EM-34-3 instrument or equivalent. Each of these instruments measures the apparent ground conductivity by inducing EM eddy currents into the ground between a transmitter and receiver coil. Standard EM instruments measure both a quadrature-phase and in-phase component of the induced magnetic field. The quadrature-phase component is a measure of apparent ground conductivity in milliSiemens per meter (mS/m), and the in-phase component is the response of the secondary to primary magnetic

field measured in parts per thousand (ppt). The in-phase component is typically more sensitive to the presence of metallic objects. The EM-34-3 instrument will provide a greater depth of ground penetration because of the larger intercoil spacings used by the instrument. The EM-31 will provide information related to surface or shallow-buried conductive features and will be applicable to surveys at Range J, T-24A, and the D&I. The EM-34-3 instrument will provide deeper EM penetration for detecting subsurface burials or ground disturbances at depths exceeding 20 to 25 feet. This instrument will be applicable to the Old Water Hole, T-38, and Landfill #1. Because of logistical difficulties associated with access at Range L (i.e., inaccessible pond bottom, surface debris, steeply sloping terrain), the EM-31 would be used to investigate several transects across the pond bottom provided that a remote means of transporting the instrument across the pond could be effected (i.e., unmanned rubber raft) or a nonconductive, movable, temporary bridge span could be erected across the pond floor.

A base station will be set up prior to conducting the EM survey and the meter will be calibrated. Readings will be automatically recorded at a designated time interval and stored in the data logger while the operator walks along the transect over a predetermined distance at a designated pace. The meter will be oriented in a direction parallel to the transect. Data will be transferred from the data logger to diskettes using a portable computer during the course of the day.

5.3.3 Ground Penetrating Radar Survey

Ground Penetrating Radar (GPR) will be used at Range L, T-38, and the Old Water Hole to provide additional information on the buried material at these sites. GPR works well on targets that have a distinct change in electrical properties as compared to their surroundings (i.e., buried drums).

GPR is an active time-domain electromagnetic method that is based on measuring the two-way travel time of reflected pulses of high frequency (10 to 1,000 MHz) radio waves. Pulses of short-duration, broadband, non-ionizing, electromagnetic energy are transmitted into the subsurface from a radiating antenna which is towed over the ground surface. As the energy propagates, it interacts with the subsurface in a variety of ways including reflection, refraction,

attenuation, diffraction, scattering, and geometric spreading. At abrupt discontinuities in electrical properties, as characterized by changes in electrical conductivity and relative dielectric constant, a portion of the energy is reflected back to the surface. This "echo" or signal of reflected energy is detected by a receiver after the transmitter is switched off. Reflections are often associated with natural geologic and hydrological conditions as well as manmade features.

Depth of the investigation and resolution are dependent upon frequency of transmitted energy and site conditions. Typical environmental applications use frequencies between 100 and 500 MHz. Lower frequencies sense deeper but have poorer resolution. This method works well in detecting targets that are above the water table and surrounded by homogeneous material having a low fraction of clay and silt (i.e., dry sandy soils). The presence of even minor amounts of clay may effectively limit depth of investigation to less than a few feet due to absorption and reflection of energy.

GPR surveys will be attempted at Range L and Old Water Hole as a means of imaging the potential munitions burials at these sites. While GPR results are generally unpredictable, the potential contrast between buried munitions and natural soils is promising enough to warrant the risk of nondetection of the subsurface targets. Radar surveys at Range L will be subject to the same logistical difficulties that were detailed for the electromagnetics surveys (see Section 5.3.2). GPR will be utilized at Area T-38 as a backup method for locating the former disposal sump.

5.4 FIELD SCREENING

The following sections will describe the equipment and procedures used to screen samples for CWAs and volatile organics. Field screening for CWA will be conducted by the USATEU at all sites suspected of CWA training or disposal activities. Depending on the model of the MINICAMS units, additional quantitative VOC screening could be completed by USATEU, particularly for 1,1,2,2-tetrachlorethane, carbon tetrachloride, and benzene. These compounds have a history of usage associated with decontamination solutions. SAIC will conduct qualitative VOC screening using an OVA.

Procedures for the analysis of samples collected for field screening are relatively nonstandardized. However, because conventional analytical laboratories are not equipped or licensed to handle chemical surety materials, the need for field analyses for CWA is essential for containing surety materials at their point of origin. While the potential for encountering surety materials is relatively low based on the elapsed time since the sites were used, the need to semi-quantitatively screen the samples onsite is important for minimizing risks to site and laboratory personnel. Since these types of analyses cannot be completed by conventional laboratories, the field data for CWA will be used in the baseline risk assessment.

Screening-level surveys will be conducted at the RI/FS sites to provide broader-based areal coverage of the site areas and to provide non-intrusive investigation methods for areas containing uncontrolled munitions or chemical agents. MINICAMS surveys will be conducted to provide broader spatial analysis of the distribution of detected chemical agent in the surficial and shallow subsurface site soils. MINICAMS sampling distribution were determined using a systematic (triangular grid) sampling scheme combined with biased sampling of known training localities. U.S. Environmental Protection Agency (EPA) (1989) guidance (*Methods for Evaluating the Attainment of Cleanup Standards, Volume 1: Soils and Solid Media)* was used for selection of sampling locations.

5.4.1 MINICAMS Analytical Procedures

USATEU will conduct onsite field screening of groundwater, surface, and subsurface soil samples using a MINICAMS unit to analyze for chemical agents (HD, GB, and VX). Screening results will be used to potentially locate soil sampling points and monitoring well locations, to map areas of positive detections for residual CWA, and to detect CWA in samples prior to handling by site and laboratory personnel.

The MINICAMS units can analyze vapors (caused by thermal desorption) from a soil sample or can accept direct injection of liquids that are potentially contaminated with a CWA or other organic compounds. The vapors that evolve are collected and injected into the MINICAMS for analysis. Depending on the availability of standard solutions, the MINICAMS units will be used to provide real-time quantitative data onsite to direct field decisions. A series

3000 MINICAMS unit equipped with a flame photometric detector (FPD) and a flame ionization detector (FID) is recommended for the work at Fort McClellan. The following procedures will be used to analyze soil samples using a MINICAMS unit at Fort McClellan:

- 5 to 10 grams of soil will be collected in a 40-mL volatile organic analysis (VOA) vial with a Teflon® septum lid. Consistent headspace will be maintained between samples.
- The soil sample will be heated using a temperature-controlled hot water bath. Each sample will be equilibrated in the water bath at the same temperature, for the same duration, and with approximately equal headspace volume in each sample container. The temperature and equilibration time for the headspace vials will be determined by experiment in the field prior to sampling.
- After sample equilibration, the septum lid will be punctured using a disposable syringe (Hamilton model 701N) and up to 2 mL of headspace vapor will be withdrawn for direct injection into the MINICAMS unit.
- Bulk water samples (1-liter volume) will be analyzed by direct injection of a 100 microliter (μL) sample into the MINICAMS unit with a MINICAMS sample period of 3 to 5 minutes.
- Detection limits and detectors for MINICAMS analysis of target compounds in bulk water samples are shown below:

Compound	Detector	Detection Limit (ppbv**)
HD	FPD	0.15
VX	FPD	.0005
GB	FPD	.00009
OSDMP	FPD	.0007
DIMP	FPD	.0007
DFP	FPD	.0007
Dimethyl disulfide	FPD	21
DMMP	FPD	.001
Benzene	FID	5
Carbon Tetrachloride	FID	51
1,1,2,2-TCA	FID	5

Data from CMS Research Corporation, 1993.
**Detection limit for a 1-L sample volume when using solid-sorbent sampling.

Detection limits for this procedure may vary widely among samples because of the large variability in sample matrices. Detection limits for the target compounds in the samples also will vary depending on injection size and chromatographic interferences. Detection limits will be determined by extrapolating the three point calibration curve to the minimum discernable peak using the normal peak threshold settings on the integrator divided by the maximum injection volume (2,000 μL) and the response factor (RF) for the particular compound of interest.

The analytical sequence for daily operations is as follows:

1. instrument blank
2. daily calibration
3. check standard solution and/or performance evaluation sample, if available
4. field and laboratory air samples
5. samples
6. calibration check.

5.4.1.1 MINICAMS Calibration Procedures

MINICAMS units will be calibrated for a given agent by injecting the quantity of agent that would be found in the volume of air sampled by the MINICAMS during one cycle if the concentration of agent in the air sample was equal to 1.00 time weighted average (TWA). For example, if a MINICAMS sampled air at 1 liter per minute (1.00 LPM) for 3 minutes during a given cycle, then a total of 3 liters of air would be sampled. If the MINICAMS were being used to sample GB at its TWA level, then the 3 liters of air would contain 0.3 nanograms (ng) of GB (that is, 3 L by 0.1 ng/L). Thus, to calibrate the MINICAMS for the detection of 1.00 TWA of GB for the flow rate and cycle time given, 0.3 ng of GB would be injected into the monitor. The GB is normally contained in a solution of the agent in an organic solvent, such as hexane. For the example given, one μL of a standard solution containing 0.3 ng per μg/L (ng/μL) of GB could be injected into the MINICAMS inlet during its sample period to calibrate the unit.

Ideally, every time the proper quantity of agent is injected into the MINICAMS after it had been calibrated, the unit will report a concentration reading of 1.00 TWA. That is, any reading at or above 1.00 TWA would cause the unit to sound an alarm. In reality, there is scatter in the concentration data reported by the MINICAMS. For this reason, if the alarm level were set to 1.00 TWA, then an alarm would sound only half the time (if the distribution of the concentrations reported is gaussian or bell-shaped). The alarm level for the MINICAMS is set to correspond to a 95 percent confidence level which would sound an alarm if the instrument were challenged with the equivalent of 1.00 TWA of agent. Statistical studies have shown that an alarm level of 0.80 TWA is a suitable setpoint for MINICAMS to achieve a 95 percent confidence level; that is, at this alarm level setpoint, a 1.00 TWA challenge of the MINICAMS will result in a concentration reading greater than or equal to 0.80, and thus, an alarm, 95 percent of the time.

Calibration of the MINICAMS will be accomplished using external standards provided by the U.S. Army for CWA and from commercially available sources for other organic compounds. Gas phase standards will be prepared prior to calibration and prior to each calibration check since these standards have short holding times. The gas phase standards will be prepared by injecting 5 μL of the standard compound into a 40-mL vial to form a stock solution. The concentration of the stock solution is based on the vapor pressure of the compound. Dilution of the initial stock solution into another vial can be made using a gas-tight syringe to create a less concentrated working standard for use in calibration. The MINICAMS will be set up and calibrated every morning before being used. All accepted readings will be recorded on a floppy disk and printed to a field printer. A 20- to 30-minute calibration period each day is usually the norm and helps ensure stable operation. The MINICAMS will be calibrated with the appropriate chemical agent (HD, GB, and/or VX) standards for that day's sampling needs.

Prior to the start and at intervals throughout the project, calibration standards at a minimum of three concentrations will be prepared for construction of calibration curves. The concentration of one of the standards should be near the method detection limit. The remaining concentration levels should define the approximate working range of the gas chromatography

(GC): one standard at the upper linear range and the other midway between it and the lowest standard.

A single mid-point calibration standard will be run at the beginning of each day to determine the RF and retention time for each of the target compounds. The standards will be injected directly into the gas chromatograph in the same manner as the soil headspace samples. At least one additional continuing calibration will be run during or at the end of the day.

The sample quantification is based on the single point calibrations performed daily. Standards also will be run at the end of the sampling day to verify GC performance. Standards also may be run if problems are suspected. An RF will be determined by dividing the area of the standard peak by the amount of analyte injected. The RF is calculated from the following equation.

$$RF = \frac{A_s}{A}$$

where:

A = amount of standard injected, in nanograms

A_s = response for external standard, in area units.

The concentrations of the single point calibrations performed on a daily basis during he soil headspace screening will be within the linear response range of the detectors as determined by the three-point calibration curves. The retention time for each standard compound is determined directly from the time listed on the chromatogram.

5.4.1.2 MINICAMS TWA Analysis

TWA concentrations are 8-hour exposure limits established for worker safety. The relationship between the concentration of CWA detected in the desorbed vapor sample and the concentration of CWA contained in the soil is variable and depends on the lithology, moisture content, and pH of the soil sample. In general, more CWA vapor is recovered from coarse soils

than from fine-grained soils at an optimum moisture content that varies with soil type (Sage and Howard 1989).

To avoid confusion about decimal points and to make it easier for operators to interpret MINICAMS data, the monitoring system is normally set up to report concentrations in relative units. For example, if a concentration of 0.003 mg/m^3 of HD is detected by the MINICAMS, then it is reported as 1.00 TWA. If a concentration of 0.00001 mg/m^3 of VX is detected, then it is reported as 1.00 TWA. Thus, the TWA reading has the same significance no matter which agent is being detected. The TWA reading reported for a given agent may be converted to mg/m^3 simply by multiplying the reported TWA reading by the definition given above. For example, a reading of 0.5 TWA for GB corresponds to 0.00005 mg/m^3. TWA concentrations for HD, GB, and VX are established by the Surgeon General of the United States and are shown below:

Agent	TWA* (mg/m^3)	TWA* (ng/L)	MINICAMS Detection Limit* (ng/L)
HD	.003	3	1
GB	.0001	0.1	.005
VX	.00001	0.01	.005

* Data provided by CMS Research Corporation (1993, written communication).

Target Compound Identification and Quantification—Identification of the target compounds in soil headspace samples will be based on a single column analysis and a peak on the chromatogram being within the retention time window of a compound. The retention time window will be determined by evaluating the drift in the retention time of the standards. Typically, a retention time window of ±3 to 5 percent of the retention time of a target compound in the soil headspace sample may be unconfirmed.

Sample quantification is based on RFs calculated from continuing calibrations. The quantity of a target compound in a soil sample will be determined from the following equation:

$$Concentration\ (\mu g/kg) = \frac{(A_x)(A)(V_t)(D)}{(A_s)(V_i)(W)}$$

where:

A_x = response for analyte in the sample, in area units

A = amount of standard injected, in ng

A_s = response for external standard, in area units

V_i = volume of headspace gas injected for analysis, in μL

D = dilution factor, if no dilution made, D = 1, dimensionless

V_t = volume of total headspace gas in vial, in μL

W = weight of sample extracted or purged, in grams.

The concentration of each identified analyte in the sample will be reported in units of μg/kg. If matrix spike and matrix spike duplicate analyses are performed, results will be reported without correction for spike recovery. If the size of a peak on a chromatogram is much beyond the linear response range of the detector, the injection volume of the sample will be decreased or the sample diluted in order to bring the sample concentration within or near the linear response range of the detector.

In the case of complex mixtures of hydrocarbons, sample chromatograms may not match identically with those of the analytical standards. When positive identification is questionable, a maximum value will be calculated and the result flagged to indicate that the value could be significantly less than the numerical value. The concentration of target compounds and identification of the target compounds by the computing integrator will be checked by the chemist to ensure that the data reduction is correct.

In field work that involves monitoring at the extremely low concentrations represented by TWA levels, there is the distinct possibility of an interference. A concentration reading of

0.75 TWA is within the capabilities of the MINICAMS, but this concentration reading may be the result of a non-agent compound that is present in high concentrations and that causes a false positive. The FPD used in the MINICAMS is about 10,000 times more sensitive to compounds that contain phosphorus (such as VX) than to compounds that do not contain phosphorus (such as hexane). Thus, if the concentration of a nonphosphorus-containing compound is more than 10,000 times greater than the TWA level for a given agent, it may interfere with the agent resulting in a false positive for the agent. This will occur only if the interferant compound is present at extremely high concentrations relative to the agent and if the boiling point of the interferant compound is about the same as the agent so that the two compounds elute from the gas-chromatographic column and enter the detector at the same time. Interferences in field monitoring may result, for example, if the exhaust from a portable power generator or from a vehicle is allowed to blow across the inlet or intake of the MINICAMS or a sample line attached to the MINICAMS. Impurities in the carrier gas, solvent vapors in the field laboratory and exhaust fumes in the air during sampling account for the majority of sampling and laboratory contamination problems.

Contamination by syringe and column carry-over can occur whenever high-level and low-level samples are sequentially analyzed. To reduce syringe carry-over, the injection syringe must be rinsed with methanol, dried in an oven, then stored in a desiccator between sample analyses. For samples containing large amounts of volatile organics, it may be necessary to wash out the syringe with a detergent solution, rinse it with distilled water, and then dry it in an oven up to 105°C between analyses. Column carry-over is characterized by compounds from a sample eluting during a subsequent analysis. To eliminate this problem, it may be necessary to heat the column up and bake out residual compounds remaining in the column between sample injections.

5.4.1.3 QC Procedures

A number of QC procedures will be followed to insure that valid data is obtained during sampling. These procedures are described below. A summary of QC measures, frequency, and corrective actions is shown below:

Summary of Quality Control Measures for Field Screening of Soil Headspace Samples by Gas Chromatography

Quality Assurance/Quality Control (QA/QC) Sample	Frequency	Action if out of Control Limits
Ion Chromatography (IC)	1 per day	Instrument is recalibrated
Continuing Calibration Verification (CCV)	1 to 2 per day	Instrument is recalibrated
3-Point calibration	as needed[1]	Establish linear range of instrument
Duplicates:		
Analytical	1 in 20[2]	Check calibration, run CCV
Samples	1 in 10	None
Blanks		
Instrument	1 per day	Data is flagged at < 5 times blank level[3]
Air/Site	1 per day	Noted in interpretation of data
Air/Lab	1 per day	Data is flagged at < 5 times blank level

[1] A calibration curve will be established prior to analyzing site soil samples. The calibration curve will be re-established as needed.

[2] The frequencies here are minimums

[3] If blank levels are very consistent, this may be lowered to <2 times blank level

- ***Soil Headspace Sampling QA/QC Procedures***—Soil samples collected for analysis must be representative of the material being sampled. To assess the representativeness of the sample collection procedures, duplicate samples will be collected for approximately 10 percent of the soil samples.
- ***Analytical QA/QC Procedures***—In order to determine the relative concentrations of compounds in the samples, precision must be demonstrated. Precision is demonstrated by the internal consistency of the analytical system. Internal consistency is demonstrated in two ways: (1) the consistent response of the detectors over the course of the day coupled with the consistency of the daily RFs for various compounds demonstrates consistency of the detector and; (2) the reproducibility of sample results is demonstrated by the relative percent difference (RPD) for duplicate analysis of the same sample being within 30 percent.

Accuracy may be assessed by analyzing a performance evaluation sample of known concentration. Matrix spike samples will be analyzed to assess the recovery of volatiles from the matrix.

- **Calibration Curves**—Prior to the start of the soil headspace screening, instrument response will be checked by constructing calibration curves for each of the target compounds. The results of the calibration curves completed before, during, and after the soil headspace screening will be presented as a part of the report.

  Calibration curves will be constructed to demonstrate the linear response range of the FID and FPD. A measure of the linear response of the detector is the correlation coefficient. The closer the correlation coefficient is to 1, the more linear the detector response. The correlation coefficient for the calibration curves should be greater than 0.995.

  Another way of evaluating the linear response range is to calculate the percent relative standard deviation (RSD) for each target analyte at all concentration levels. This may be calculated from the following equation:

$$\%RSD = \frac{SD}{X} \times 100$$

where:

SD, the standard deviation is given by

$$SD = \sum_{i=1}^{N} \frac{(Xi - X)^2}{N - 1}$$

where:

X_i = individual RF (per analyte)

X = mean of initial three RFs (per analyte)

N = number of calibration standards

The % RSD must be less than 25 percent.

Calibration curves for chloroform, 1,1,1-trichloroethane, carbon tetrachloride, trichloroethene, benzene, toluene, and tetrachloroethene will be determined using the FID. Calibration curves will be constructed by either analyzing the same standard concentration using three different injection volumes or by using three different concentrations and holding the injection volume constant. Points on the

calibration curve will be less than an order of magnitude in concentration or injection volume apart.

- **Continuing Calibration**—An initial calibration (IC) will be performed on a daily basis and will be within the linear response range of the detectors as determined by the calibration curves. At the beginning of each day standards containing the compounds targeted for analysis will be run through the gas chromatograph to determine the RF for each of the target compounds. The RF is defined as the area units of the standard peak divided by the amount of standard injected.

  If the RPD for a target analyte RF changes by more than 25 percent during a 24 hour period, the detector will be recalibrated and a new RF will be determined. The samples run prior to each recalibration will not be recalculated if the compounds were not detected. The RPD is calculated from the following equation.

$$RPD = \frac{|RF_i - RF_c|}{\frac{RF_i + RF_c}{2}} \times 100$$

where:

RF_i = mean RF from the initial calibration for each analyte

RF_c = measured RF from the continuing calibration for the same analyte.

- **Duplicate Sample Analyses**—Approximately 15 percent of the analysis performed will be duplicate samples. Five percent of the analyses performed will be analytical duplicates which consist of analyzing the same sample twice. These duplicates should have RPDs of less than 30 percent. Another 10 percent of the analyses will be field duplicates (co-located samples). These are two different soil samples collected over the same depth and at the same time.

- **Other QA/QC Samples**—Blank samples will include air samples from the site and field laboratory. The sample bottles used to collect soil samples may be analyzed to check for ambient contamination in the sample vials.

  After the instrument has been calibrated, a method blank will be analyzed. An ambient air sample from the field lab may be analyzed at the beginning of each day. An ambient air sample will be collected by filling a decontaminated syringe with air at the site. The sample will then be transported to the GC and analyzed to determine ambient air quality and levels of volatile organics. Ambient air samples may be collected and analyzed at other times as deemed necessary.

  Alternatively, a blank sample described as a washed sample container filled with water at the lab, sent out to the field, and returned to the lab along with soil and

water samples may be analyzed in place of the method blank, ambient air sample from the site, rinsate blank and air sample from the field lab.

5.4.1.4 Recordkeeping

Information to be recorded in the field laboratory logbook will include personnel working at the laboratory and activities being performed. Recordkeeping for analytical portion of the soil headspace screening will include a logbook kept to record the details of the analytical work. Information in this logbook will include the data for the calibration curves and the RFs calculated during the continuing calibrations. Sample information such as the time, sample number, depth of sample, injection volume, and injection time also will be recorded. Records of all MINICAMS maintenance also will be recorded in the logbook for the analytical work.

System operating conditions should be noted for each batch of samples. The conditions that should be recorded are:

- instrument and detectors
- column packing, coating, length, and ID
- oven temperature
- injector/detector temperatures
- gases and flow rates
- GC operator.

The following information must be included on each chromatogram:

- site name
- sample number
- injection volume
- date and time of sample injection.

The sampling results should be available within 24 hours of sampling.

5.4.2 Deliverables and Data Storage

Deliverables will include the following items: A data summary of all sample results in units of μg/kg reported to two significant figures, a summary table for the blank and duplicate results for each target analyte, a statement by analyte that initial, continuing, and final RFs met QC requirements, and a table of matrix spike and matrix spike duplicate results. A hard copy or computer disk storage of all raw and summary data will be maintained at the field or home office for a period of six months.

5.5 DECONTAMINATION PROCEDURES

Drilling equipment (i.e., the rig, tools, augers, bits), well purging equipment (except submersible pumps), well screen and casing will be decontaminated by steam washing the equipment with a laboratory grade nonphosphorous detergent (i.e., Alconox®) solution and rinsing materials with water from the approved potable source. Drilling equipment will be decontaminated onsite between drilling locations. Decontaminated equipment will be wrapped in plastic for transport to the site to prevent contamination of the equipment and materials. Decontamination requirement for the submersible pump and tubing will include circulating an Alconox® solution and a potable water rinse through the pump system.

Sampling equipment (i.e., bailers, core sampler, hand auger) coming in direct contact with the sample media will be decontaminated using the procedure listed below:

- Scrub the equipment with a solution of laboratory-grade detergent (i.e., Alconox® or Liquinox®) using a brush
- Rinse the equipment with potable water
- Rinse equipment with ASTM water
- Rinse equipment with isopropanol and air dry
- Rinse with ASTM water again, air dry, and wrap in aluminum foil.

Decontamination rinsate from soil sampling activities will be collected and containerized pending the results of chemical analyses at the respective sites. Generated waste streams will be segregated by site to reduce potential disposal. Before groundwater sampling activities begin,

and after sampling activities at a well have been completed, all sampling equipment (e.g., bailers, hand auger) will be decontaminated. SAIC will assist Fort McClellan with waste packaging, determination of waste characteristics, and preparing manifests for waste transfer.

5.6 FIELD EQUIPMENT

Instruments and equipment used to gather, generate, or measure environmental data will be calibrated with sufficient frequency and in such a manner that accuracy and reproducibility of results are consistent with the manufacturer's specifications. Table 5-3 summarizes the calibration procedures required for the field equipment used during the RI at Fort McClellan. All field equipment will be calibrated and operated in accordance with the field standard operating procedures (SOPs) in Appendix B (Volume III, Fort McClellan SAP).

The satisfactory operating condition of equipment and instrumentation used onsite will be verified before each piece of equipment is shipped to Fort McClellan. All equipment and instrumentation will be calibrated daily before field activities begin and immediately recalibrated if field personnel suspect that calibration may have been altered.

5.6.1 Health and Safety (H&S) Monitoring Instrumentation

Calibration of H&S instruments will be performed daily, before use at the intervals specified by the manufacturer, or more frequently if field personnel suspect that calibration may have been altered. H&S instruments will include an OVA, an HNu photoionization detector (PID), and/or a Mine Safety Appliances, Inc. (MSA) combustible gas indicator.

The OVA, Hnu PID, and/or MSA will be used for field personnel safety purposes. Because the instrumentation and procedures are continually being updated, field personnel are required to consult the appropriate instruction manual for calibration instructions.

Table 5-3. Summary of Field Monitoring Equipment Calibration Procedures and Frequencies

Equipment	Use	Units of Measure	Calibration Procedures
HNu PID	Air monitoring during field operations for presence of organic vapors. Soil vapor monitoring at selected sites.	Parts per million	Calibrate daily using 100 ppm Iso - C_4H_8/Air nontoxic calibration gas manufactured by HNu Systems, Inc.; see Appendix B*, SOP FP 2-2.
Organic Vapor Analyzer	Air monitoring during field operations for presence of organic vapors.	Parts per million	Calibrate daily using 100 ppm methane calibration gas; see Appendix B*, SOP FP 2-3.
MSA Combustible Gas Indicator	Air monitoring during field operations for presence of combustible gases.	percent of lower explosive limit (LEL)	Calibrate daily using an MSA manufactured calibration gas - a nonflammable pentane (0.75 percent v/v. in air, 50 percent lower explosive limit); see Appendix B*, SOP 2-1.
pH Meter	Measure groundwater pH during development, purging, and sampling of monitoring wells and sampling of surface waters.	Standard units	Calibrate in the field using Fisher Scientific solutions standardized at 25°C against NIST standard reference material; see Appendix B*, SOP FP 7-4.
Specific Conductance Meter	Measure groundwater specific conductance during development, purging, and sampling of monitoring wells and sampling of surface waters.	Micromhos per centimeter	Calibrate daily using YSI 3162 conductivity calibration solution (potassium chloride, water, and 0.002 percent iodine); see Appendix B*, SOP FP 7-5.
Mercury Thermometer	Groundwater temperature measurements during development purging and sampling of monitoring wells and surface water sampling locations.	Degree celsius	Calibrated by manufacturer. Calibration check will be made semiannually against NIST certified thermometer.
Water Level Indicator	Groundwater level measurements in monitoring wells.	Feet	Calibrated by manufacturer. Calibration check will be made periodically using a surveyor's tape.

* Appendix B of the SAP

Note: NIST = National Institute of Standards and Technology.

5.6.2 Water Quality Measurements

All instruments used to conduct water quality measurements will be calibrated daily before use and more frequently if field personnel suspect that calibration may have been affected by an external factor (e.g., temperature or humidity). Water quality measurement instrumentation will include a hand-held pH meter, conductivity meter, and mercury or digital thermometer. The calibration of this equipment is discussed in greater detail in Section 6.1 of the QAPP and Appendix B (Volume III, Fort McClellan SAP).

6. SAMPLING HANDLING AND ANALYSIS

Sample handling including sampling, labeling, preservation, containerization and transport are detailed in Volume II (QAPP) of the Fort McClellan Sampling and Analysis Plan. Sample preservation, containerization, and tracking are reiterated below.

6.1 SAMPLE PRESERVATION METHODS

A detailed discussion of soil and water sample preservation methods is in Section 4.12.4 of the QAPP. Tables 6-1 and 6-2 summarize preservation requirements for each media and parameter being sampled.

6.2 SAMPLE CONTAINERS

The water and soil sample containers that will be used to ship samples to the laboratories are discussed in greater detail in sections 4.5.2 and 4.8.1, respectively. The quantity and type of containers to be used during sampling are summarized in Tables 6-1 and 6-2.

6.3. SAMPLE SHIPPING AND TRACKING

SAIC's sample tracking system (STS) will be used during the RI/FS at Fort McClellan to complete sample labels and COC forms. STS is a computer program that is composed of multiple data bases, which will be used to enter, store, and access sample specific information. The data bases will include data that was collected during the field investigation (i.e., site IDs, site types, and field sample numbers), entered on the COC forms (i.e., date, depth, and time of sample collection), and specified by the laboratory (i.e., sample number, lot names). Figure 6-1 shows the type of information that will be used in the STS and the way in which this information will flow.

From the information that has been entered at Fort McClellan during the field investigation, the STS will generate sample status reports, including holding time requirements, and identify data deliverable milestones. STS will automate the SAIC data management tracking procedures for samples from collection in the field through laboratory analyses. In addition,

Table 6-1. Summary of Sample Containment and Sample Preservation Methods for Soil and Sediment Samples

Parameter	Analytical Method[a]	Equivalent USEPA Method	Sample Container		Preservation Methods	Holding Times[c]
			Quantity[b]	Type		
Organics						
VOCs	LM23	8240	2	40-mL, amber glass VOA vials, Teflon®-lined cap	Cool, 4°C	14 days
				or		
			1	3-inch brass sleeve, Teflon®-lined cap		
SVOCs Pesticides/PCBs	LM25 LH17	8270 8080	1	4-ounce, wide-mouth, amber glass, Teflon®-lined lid	Cool, 4°C	Extraction: 7 days Analysis: 40 days
Explosive-related compounds[d] plus Nitroglycerin PETN	LW23 LW27 LW27	8330 8330 8330	1	4-ounce, wide-mouth, amber glass, Teflon®-lined lid	Cool, 4°C	Extraction: 7 days Analysis: 40 days
Chemical agent breakdown products						
HD[e] GB[f] VX[g]	LW18/LT03/LL03 LT03/TT9 LT03/IC	N/A N/A N/A	3	4-ounce, wide-mouth, amber glass, Teflon®-lined lid	Cool, 4°C	Extraction: 7 days Analysis: 40 days

Table 6-1. Summary of Sample Containment and Sample Preservation Methods for Soil and Sediment Samples (continued)

Parameter	Analytical Method[a]	Equivalent USEPA Method	Sample Container		Preservation Methods	Holding Times [c]
			Quantity[b]	Type		
Inorganics, Metals						
Metals (trace), including silver, aluminum, boron, barium, beryllium, calcium, cadmium, cobalt, chromium, copper, iron, potassium, magnesium, manganese, molybdenum, sodium, nickel, tin, tellurium, vanadium, and zinc	JS12	6010	1	4-ounce, wide-mouth, amber glass, Teflon®-lined lid	Cool, 4°C	6 months; mercury - 28 days
				or		
			1	3-inch stainless steel sleeve, Teflon®-lined caps		
Antimony	SW7041	7041				
Arsenic	B9	7061				
Lead	JD21	7420				
Mercury	Y9	7471				
Selenium	JD20	7740				

Footnotes follow Table 4-2.

Table 6-2. Summary of Sample Containment and Sample Preservation Methods for Water Samples

Parameter	Analytical Method[a]	Equivalent USEPA Method	Sample Container		Preservation Methods	Holding Times[c]
			Quantity[b]	Type		
Organics						
VOCs	UM21	8240	3	40-mL, amber glass VOA vials, Teflon®-lined septum cap	Cool, 4°C	7 days
Vinyl Chloride	SW8010	8010	3	40-mL, amber glass VOA vials, Teflon®-lined septum cap	Cool, 4°C	7 days
SVOCs	UM25	8270	2	1-liter, narrow-mouth amber glass, Teflon®-lined cap	Cool, 4°C	Extraction: 7 days Analysis: 40 days
PAHs	SW8310	8310	2	1-liter, narrow-mouth amber glass, Teflon®-lined cap	Cool, 4°C	Extraction: 7 days Analysis: 40 days
Pentachlorophenol	SW8040	8040	2	1-liter, narrow-mouth amber glass, Teflon®-lined cap	Cool, 4°C	Extraction: 7 days Analysis: 40 days
Hexachlorobenzene & Hexachlorocyclopentadiene	KK8	8270	2	1-liter, narrow-mouth amber glass, Teflon®-lined cap	Cool, 4°C	Extraction: 7 days Analysis: 40 days
Pesticides/PCBs	UH20	8080	2	1-liter, narrow-mouth amber glass, Teflon®-lined cap	Cool, 4°C	Extraction: 7 days Analysis: 40 days
Explosive-related compounds[d] plus Nitroglycerin PETN	UW25 UW27 UW27	8330 8330 8330	2	1-liter, narrow-mouth amber glass, Teflon®-lined cap	Cool, 4°C	Extraction: 7 days Analysis: 40 days
Chemical agent breakdown products HD[e] GB[f] VX[g]	 UW22/UT03/UL04 UT03/T8 UT03/IC	 N/A N/A N/A	6	1-liter, narrow-mouth amber glass, Teflon®-lined cap	Cool, 4°C	Extraction: 7 days Analysis: 40 days

Table 6-2. Summary of Sample Containment and Sample Preservation Methods for Water Samples (continued)

Parameter	Analytical Method[a]	Equivalent USEPA Method	Sample Container		Preservation Methods	Holding Times[c]
			Quantity[b]	Type		
Inorganics, Metals						
Metals (total), including silver, aluminum, boron, barium, beryllium, calcium, cadmium, cobalt, chromium, copper, iron, potassium, magnesium, manganese, molybdenum, sodium, nickel, tin, tellurium, vanadium, and zinc	SS12	6010	2	1-liter, polyethylene bottle	HNO_3 to pH < 2	6 months; mercury - 28 days
Antimony	SW7041	7041				
Arsenic	AX8	7061				
Cadmium	SW6010	6010				
Lead	SD18	7420				
Mercury	CC8	7470				
Selenium	SD25	7740				
Thallium	SW7841	7841				
BOD	E405.1	E405.1	1	1-liter, polyethylene bottle	Cool, 4°C	48 hours

Footnotes follow Table 4-3.

Footnotes to Tables 6-1 and 6-2

[a] The methods cited are USAEC-certified methods specific to Environmental Science and Engineering, Inc., (chemical agent breakdown products only) and DataChem Laboratories (all other parameters) with the following exceptions: antimony (SW7041) and all TCLP analysis (to be analyzed by SW846 protocols as prescribed in the TCLP regulations).

[b] Soil sample volumes may be combined in a single container for the following analyses: SVOCs and pesticide/PCBs. Soil samples collected for VOC and metals analyses will be collected in separate containers at all locations. The following sample volumes will be used when preparing field QC blanks: three 40-mL vials for VOC analyses; two 1-liters each for SVOC and pesticide/PCB analyses; two 1-liters each for HD, SB, and VX analyses; two 1-liters for explosives-related compound analyses, including nitroglycerin and PETN; and 1-liter for total metals analyses. All field QC blanks will be preserved as specified in Table 4-1. Specific instructions for preparing field QC blanks are described in Section 4.5.2.

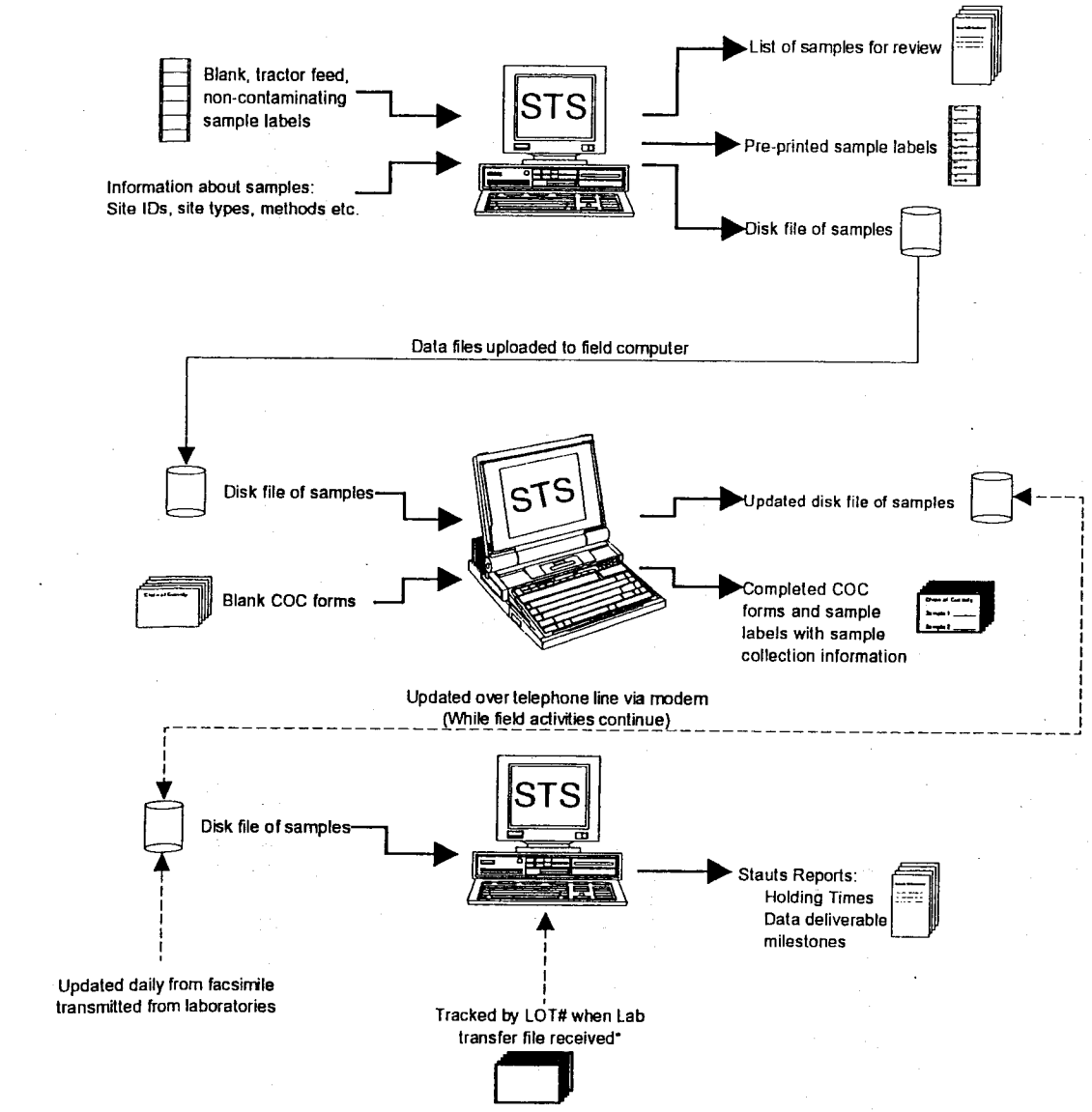
[c] For data validation and useability purposes, holding times are defined as the maximum amount of time allowed to elapse between the date and time of sample collection and the date and time of sample analysis (e.g., VOCs) or the date and time of sample extraction and analysis (e.g., SVOCs), including all second column confirmation analyses, if required. Extraction hold times are further defined as the maximum amount of time allowed to elapse between the date and time of sample collection and the date and time the sample is placed into solvent. Samples should be analyzed as soon as possible after collection. The times listed are the maximum times that samples may be held before analysis and still be considered valid.

[d] Explosive-related compounds include 2,4,6-trinitrotoluene (246TNT), 2,4-dinitrotoluene (24DNT), 2,6-dinitrotoluene (26DNT), 1,3,5-trinitrobenzene (135TNB), 1,3-dinitrobenzene (13DNB), nitrobenzene (NB), TETRYL, RDX, and HMX.

[e] HD (i.e., bis(2-chloroethyl)sulfide) breakdown products include chloroacetic acid USAEC certification number LT03 [soil] and UT03 [water], thiodiglycol (USAEC certification number UW22 [water] and LW18 [soil]), organosulfur compounds (USAEC certification number LL03 [soil] and UL04 [water]).

[f] GB (i.e., methylphosphonofluoridic acid, 1-methylethyl ester) breakdown products include isopropyl methylphosphonate and methylphosphonic acid (USAEC certification LT03 [soil] and UT03 [water]), and dimethyl methylphosphonate and diisopropyl methylphosphonate (USAEC certification number TT9 [soil] and T8 [water]).

[g] VX (i.e., methylphosphonothioic acid, S-[2-[bis(1-methylethyl)amino]ethyl]o-ethyl ester) breakdown products include ethyl methylphosphonate (or its sodium salt-$NaSC_4H_2N$-$(CH(CH_3)2)2$) [USAEC certification number LT03 {soil} and UT03 {water}] and isopropyl amine (no USAEC-certified method required — ES&E will use ion chromatography [IC]).



Initiation Phase

Completed in office

Access:
- Project Data Manager - read/write
- Division Data Manager - read/write

Chain of Custody Phase

Completed in field office

Access:
- Sample Manager - read/write
- Field Manager - read/write

Tracking Phase

Completed in office

Access:
- Project Data Manager - read/write
- QA Manager/staff - read only
- Technical Staff - read only

U.S. Army Environmental Center
Aberdeen Proving Ground, Maryland

Data Flow Diagram for Sample Tracking System

Fort McClellan, Alabama

Figure: 6-1 | Project: 01-0827-03-6520-006

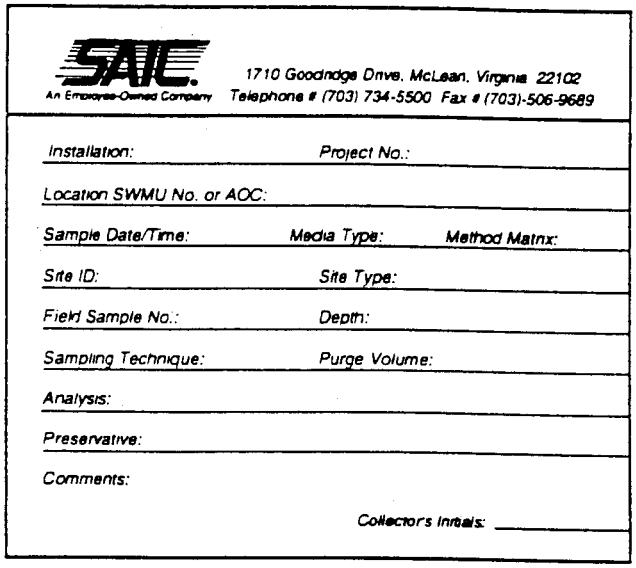
SAIC's quality assurance (QA) staff will use STS to automatically verify that Data Chem Laboratories (DCL) and Environmental Science and Engineering (ESE) have analyzed the samples for all requested analytical parameters. STS will be used during the field investigation to preprint sample labels, automate completion of COC forms, and complete and print field reporting forms. Figure 6-2 presents an example of the type of sample label and Figure 6-3 presents an example of the COC form that will be used during the RI/FS at Fort McClellan. The following sections depict SAIC's three phases of STS and COC procedures.

6.3.1 Initiation of Sample Tracking Procedures

The STS procedures are initiated during the planning stages prior to mobilization. The data bases in the STS have been created using record and field specifications consistent with those in the Installation Restoration Data Management Information System (IRDMIS), (see Section 7). The number and type of samples that will be collected will be determined and approved by USAEC, the state of Alabama Department of Environmental Management (ADEM), and SAIC before the field investigation is initiated. This information will be input into the STS before mobilization to the field.

All available sample collection information related to the field effort will be entered into the STS data bases before the field investigation begins at Fort McClellan. Information that can be initially entered includes the installation code, project number, site IDs, site types, and field sample numbers. Information such as the time and date of sample collection will be entered into STS by the field sampling team at Fort McClellan after the samples have been collected.

The site IDs, site types, field sample numbers, and analytical methods have been included in Section 4. These data will be entered and stored in STS after the sample locations have been approved by the USAEC, ADEM, and SAIC, preprinted sample labels will be generated with the installation code, project number, location, media type, method matrix, site IDs, field sample numbers, installation codes, sampling technique, and analytical parameters. The remaining fields on the labels (e.g., depth, date, and time of collection) will be completed at Fort McClellan after samples have been collected.



U.S. Army Environmental Center
Aberdeen Proving Ground, Maryland

Sample Label

Fort McClellan, Alabama

Figure: 6-2 | Project: 01-0827-03-6520-006

SAIC Science Applications International Corporation
An Employee Owned Company

Chain of Custody Record

Date _____ Page ____ of ____

Shipment No

Name
Address
Phone Number
Project Manager
Project Name
Job/P.O. No

Sampler (Signature) (Printed Name)

Laboratory No	Site ID	Field Sample No	Date	Time	Matrix	Requested Parameters	NO OF CONTAINERS	OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS

Laboratory Name
Address
Phone
Contact Name

Relinquished by	Date	Received by	Date
Signature		Signature	
Printed Name	Time	Printed Name	Time
Company		Company	
Relinquished by	Date	Received by	Date
Signature		Signature	
Printed Name	Time	Printed Name	Time
Company		Company	

Total Number of Containers:

Instructions

1. Fill out form completely except for shaded areas (lab use only)
2. Complete in ballpoint pen. Draw one line through errors and initial.
3. Request analyses using EPA method numbers only. Consult the project QAPP for instructions. Complete as shown.
4. Reference all field QC samples to the applicable site or zone
5. Note all applicable preservatives
6. Group all sample containers and requested analyses from one sampling location together. Do not list individually

Shipment Method:

SAIC Location (circle)

Washington, D.C.
1710 Goodridge Dr., McLean, VA 22102
(703) 734-2500

Oak Ridge
800 Oak Ridge Tnpk., Oak Ridge, TN 37830
(615) 482-9031

Paramus
One Sears Drive, Paramus, NJ 07852
(201) 599-0100

Dayton
1321 Research Park Drive, Dayton, OH 45432
(513) 429-8550

Columbus
655 Metro Place South, Suite 745, Dublin, OH 43017
(614) 793-7800

Cincinnati
635 West 7th St., Suite 403, Cincinnati, OH 45203
(513) 723-2600

Science Applications International Corporation 8431 10/93

White Laboratory *Pink Project Manager* *Yellow Project QAO* *Goldenrod Field Project Manager*

U.S. Army Environmental Center
Aberdeen Proving Ground, Maryland

Chain of Custody Record Form

Fort McClellan, Alabama

Figure: 6-3 | Project: 01-(5520-006

6.3.2 Sample Tracking During Collection

Field sampling teams will be provided with the preprinted site-specific sample labels, blank COC forms, sample containers, and coolers prior to sample collection. The field sampling team also will be provided with the STS program. After samples have been collected, the field sampling team will complete sample labels and COC forms at the sampling site. When the sampling team returns to the field office, COC will be transferred to the sample manager. The sample manager is responsible for ensuring that environmental samples are properly preserved, appropriate numbers of containers have been collected for each analytical parameter, sufficient numbers of QC samples (i.e., trip blanks, equipment rinsates, and field replicates) have been collected, sample labels and COCs are prepared properly, and sample custody has been maintained throughout the sample collection process.

The sample manager will then consolidate the samples by analysis in separate coolers. The COC generated at the sampling location will be input into STS and an updated COC form will be printed in the field office on pre-printed COC forms (Figure 6-3). COC forms are printed on carbonless, 4-page, bound paper with copies designated for the laboratory, SAIC Project Manager, SAIC Project QA Officer, and Project Field Manager. A copy of the COCs will be included with the samples shipped to DCL and ESE to maintain COC during analyses. COC forms are transmitted daily from the field office to SAIC-McLean for QA review.

The QA staff will determine if all personnel with sample custody responsibilities have signed, dated, and noted the time on the COC record correctly when they are either relinquished or received samples from their immediate custody. Any discrepancies in the COC will be noted at this time. A sample is considered to be in an individual's custody if it is: (1) in the physical possession or view of the responsible party, (2) secured to prevent tampering, or (3) placed in a controlled area by the responsible party.

Express mail service will be used to ship samples to the analytical laboratories. Freight airbills will be used as custody documentation during sample shipment to the laboratories. Shipments will be tracked electronically by the express courier to monitor delivery to DCL and ESE. SAIC will also track the sample shipments electronically and will confirm sample arrival

at the laboratory by telephone. Upon receipt at the laboratory, COC will be transferred to the analytical laboratory the moment the sample receipt officer or designee signs the COC.

6.3.3 Sample Tracking During Chemical Analysis

During the field investigation the STS data bases will be transmitted via modem from the field office to SAIC-McLean. The SAIC-McLean data management staff will upload the field information daily into the STS, and track the samples through the laboratory analytical process. DCL and ESE will transmit facsimiles of the COCs to SAIC-McLean for sample tracking and will provide lot numbers for samples and analyses.

6.4 INVESTIGATION DERIVED WASTE

Soil and water investigation derived waste (IDW) will be generated as part of the RI field activities conducted at Fort McClellan. Soil and water will be containerized in 55-gallon drums at each sampling location pending laboratory results. If analytical results indicate potential contamination, soil samples will be collected from the appropriate drum, composited, and analyzed for toxicity characteristics leaching procedure (TCLP) VOCs, TCLP SVOCs, TCLP pesticides, TCLP herbicides, and TCLP metals. If TCLP results are under regulatory limits, soil will be spread onsite and water will be disposed in the Post sanitary sewer. If levels exceed regulatory limits, the IDW will be disposed of by Fort McClellan.

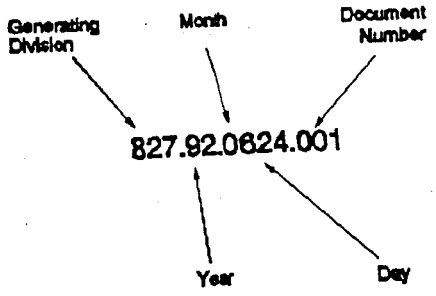
7. INFORMATION MANAGEMENT SYSTEMS

Information developed during the course of the Fort McClellan RI/FS will be archived for storage and retrieval using the Science Applications International Corporation (SAIC) Central record Facility (CRF) and the U.S. Army Environmental Center's (USAEC) Installation Restoration Data Management Information System (IRDMIS). These systems are designed with quality assurance/quality control (QA/QC) measures to control access and to monitor transactions and are also capable of manipulating large volumes of information. The following sections detail the procedures that will be used to ensure the integrity of the information generated as a result of the RI/FS.

7.1 DOCUMENT CONTROL SYSTEM

SAIC maintains a CRF in Oak Ridge, Tennessee to archive information generated in support of environmental investigations. The CRF is a computer-based document repository that incorporates scanned documents into library archives. The CRF will be used to provide audit accountability for any project-related transactions between regulatory agencies, USAEC, and SAIC. Information generated during the investigation, beginning with the planning stages and ending at project closeout, will be maintained in the CRF.

A document control number (DCN) will be assigned to all deliverables, correspondence, and other project-generated documents to facilitate system access and document retrieval. The DCN is a 12-digit number designating the SAIC division number generating the document, year and date of generation, and document number which is incremented daily. For example, the series of numbers 827.92.0624.001 represents the first document generated on June 24, 1992, by Division 827:



After the document has been submitted to the CRF, copies may be requested according to information provided on the indexing/transmittal form (Figure 7-1). Documents also may be accessed according to various keywords that are entered on the form.

7.2 IRDMIS

The Installation Restoration Data Management Information System (IRDMIS) is used by USAEC for entering and storing environmental monitoring data pertinent to U.S. Army installations. Potomac Research, Inc. (PRI) maintains, administrates, and manages IRDMIS for USAEC. IRDMIS is a two-component system that is used to integrate collection, verification, validation, storage, retrieval, and presentation of data. SAIC, Data Chem Laboratories (DCL), and Environmental Science and Engineering (ESE) will use USAEC's PC Data Entry and Validation Subsystem (PCTool, Version 5.0) of IRDMIS to enter and validate data that have been collected and measured during this investigation. The PCTool software will also be used to create output files (transfer files) for transmitting data from SAIC and the laboratories to the IRDMIS. Transfer files may be uploaded into PCTools to exchange information between SAIC and the laboratories or to upload data into the Pyramid databases. The Pyramid, which is the second subsystem of IRDMIS, is a series of INGRES relational databases residing on a minicomputer at USAEC headquarters in Edgewood, Maryland.

Map, geotechnical, and chemical data are entered and stored in the IRDMIS. The map data relate geotechnical and chemical results through geographic coordinates. Geographic coordinates will be read from maps for the majority of the sampling locations (i.e., soil boring or surface water and sediment sampling points) or surveyed for the monitoring well locations. Geotechnical measurements and observations made during soil boring or monitoring well construction, such as the soil type and depth to groundwater, will be entered into the IRDMIS. Chemical results from sample analyses will be entered by the laboratory.

The PCTool software ensures that all entries for inclusion in the project databases are formatted correctly (e.g., that an alphabetical character has not been entered where a numerical value is required) and do not contain values that are unrecognizable by the system. Valid entries are provided in the USAEC's *IRDMIS User's Guide, Volume II: Data Dictionary* (May 1, 1993).

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Records Indexing / Transmital Form

Fort McClellan, Alabama

Figure: 7-1 | Project: 01-0827-03-6520-006

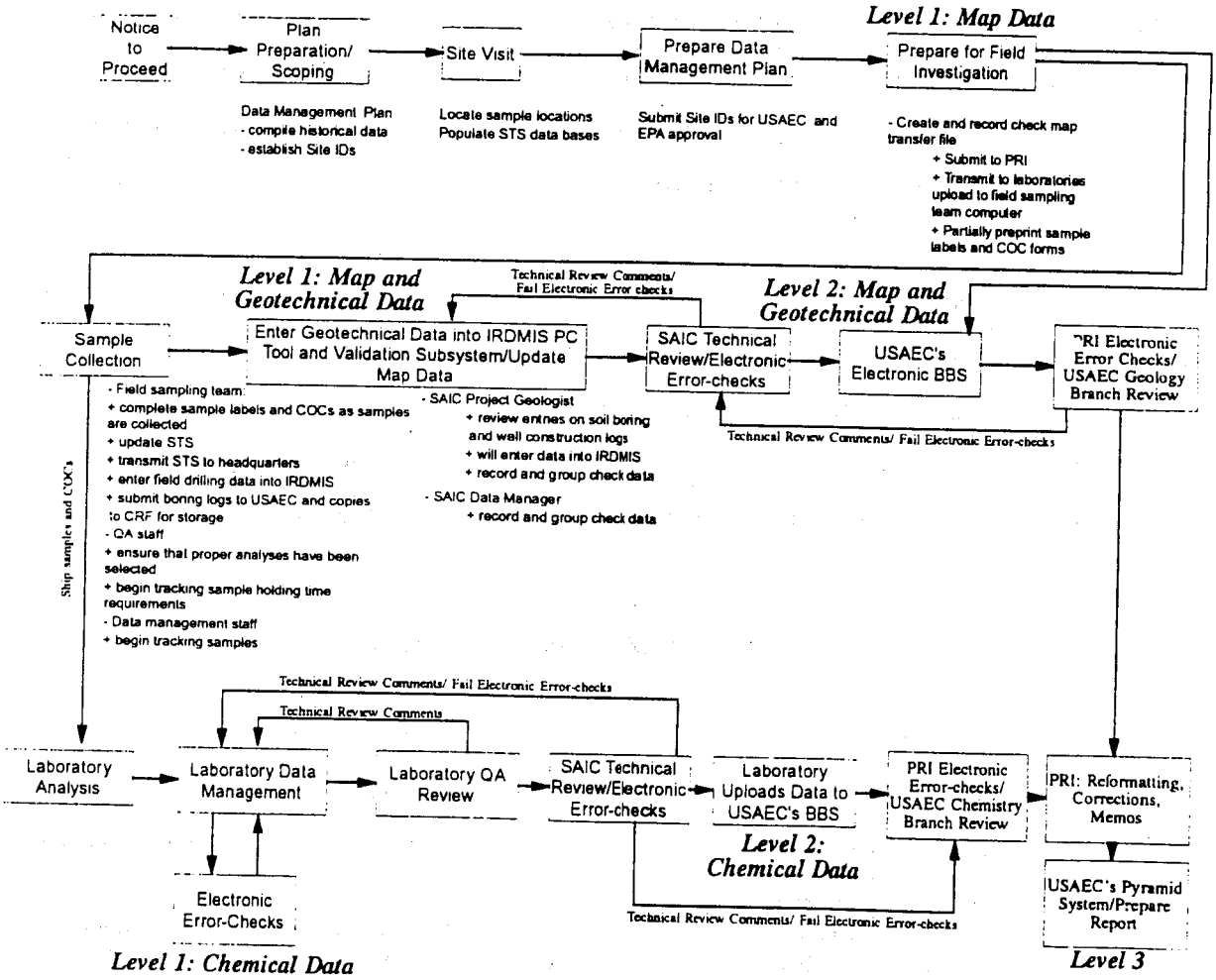
The record check routine will not detect incorrect entries that are formatted correctly. For example, the record check routine will not detect incorrect dates where a date is required. Record checking for maps is slightly different because map coordinates for all the sample locations must fall within the boundaries of the installation. The record check routines for map entries will verify that all coordinates are within the minimum and maximum coordinates for Fort McClellan and Pelham Range.

The group checking routine, which is also included in the PCTool software, confirms that coordinates for sampling locations have been entered into the IRDMIS. Although this process is part of the PC-based system, group checking is most important for data which are stored in the Pyramid databases. Therefore, map data must be entered by PRI into the Pyramid databases before any geotechnical or chemical data are submitted.

SAIC will enter and record check map data after the sampling locations have been approved at the site visit. During the field investigation, SAIC will enter and record/group check geotechnical data prior to submission to USAEC. The field investigation team will also revise map entries, including any changes after the site visit. SAIC's field sampling team will submit samples to the laboratories for analysis. After the laboratories have analyzed the samples, entered the chemical results, and performed record/group checks, SAIC will repeat the electronic error-checking routines. If the chemical data transfer files pass record and group checks, SAIC will authorize their submission to USAEC.

7.2.1 IRDMIS Data Levels

The IRDMIS recognizes three data levels (1 through 3) with increasing tiers of security (Figure 7-2). Level 1 data reside on computers at SAIC and the laboratories. Since Level 1 chemical data are not corrected for moisture content, they will only be used to prepare the internal draft RI report if Level 3 data are not available (i.e., elevation to Level 3 predates the RI/FS report deliverable date). The draft RI report will be revised using Level 3 data before submission for regulatory review. After the results are entered into PCTool and error-checked, SAIC and the laboratories will create and submit transfer files to PRI.



U.S. Army Environmental Center
Aberdeen Proving Ground, Maryland

Data Management Process Diagram for the Fort McClellan RI

Fort McClellan, Alabama

Figure: 7-2 | Project: 01-0827-03-6520-006

Upon receipt, PRI will repeat same record and group checks and will process the transfer files if the files are error-free. When the transfer files are uploaded onto USAEC's electronic bulletin board system, the data are regarded as Level 2 (i.e., property of the USAEC). The schedule for SAIC to deliver transfer files to PRI is shown on Table 7-1. After the transfer files are received and while they are being processed, PRI will send laboratory status reports to SAIC regarding the disposition of submitted data files. Laboratory status reports are transmitted weekly and consist of transfer file names, numbers of records in each file, dates received at PRI, dates checked by PRI, dates submitted to the Pyramid (Level 3 status), and rejected status, error status, and control chart submission requirements.

Following successful record and group checks by PRI or sanctioning by the USAEC, Level 2 data will be elevated to Level 3 on USAEC's Pyramid system. SAIC, DCL, ESE, and PRI do not have the authority to modify data that have been elevated to Level 3 without approval by USAEC. Errors noted at this point must be corrected by submitting memoranda to the USAEC project officer, who will advise PRI to make the appropriate corrections.

Table 7-1. File Submission Schedule

File Type	File Description	Submission Requirement
GMA	Geotechnical Map	Not later than 14 days after sample collection
GFD GWC	Geotechnical Field Drilling Geotechnical Well Construction	Not later than 30 days after completion of last soil boring
CSO CSE CSW CGW CQC	Chemical Soil Results Chemical Sediment Results Chemical Surface Water Chemical Groundwater Chemical Quality Control	Not later than 40 days after collection of sample (Submission is complete upon entry to Level 2 of all data except those requiring USAEC Chemistry Branch approval)
GGS	Geotechnical Groundwater Stabilized	Not later than 14 days after measurement

7.2.2. Map Data Entry

Site IDs and site types are essential elements of map records in IRDMIS. Section 4 presents the site IDs and site types that will be used during this investigation. This section identifies the procedures that will be used when entering map data. X-Y coordinates will be entered for all site IDs using the Alabama state planar coordinate system. Surface elevations will be entered in feet above mean sea level. The proposed coordinates and site IDs are listed on Table 7-2.

Before collecting any samples, all locations will be entered into IRDMIS using the lowest accuracy level (i.e., M9 = read from map and accuracy is unknown). After record check, SAIC will create and transmit the map transfer files to USAEC's electronic bulletin board. These transfer files will also be submitted to the laboratories to group check the chemical data.

After samples have been collected, the map data bases in IRDMIS will be updated with accurate coordinates for the sample locations. These revisions will be submitted to USAEC. The following information will be entered in map files generated during the Fort McClellan RI:

- Installation code: MC (Fort McClellan) or PR (Pelham Range)
- File name: SAMCGMAx.TRN or SAPRGMAx.TRN,

where:

SA	=	prime contractor code for SAIC
MC	=	installation code for Fort McClellan
PR	=	installation code for Pelham Range
GMA	=	map file type
x	=	sequentially numbered submission
TRN	=	transfer file extension.

- Site type: see Tables 4-1 and 7-2
- Site ID: see Table 4-1 and 7-2
- Coordinate system: S (state planar coordinate system)

Table 7–2. Site Identification and IRDMIS Map Data Entry Specifications, Ft. McClellan, Alabama

Location	Site Designation	Installation Code (11.04)	Site Type (9.17)	STATUS	Site ID (9.16)	Description (9.07)	Pointer Site Type (9.14)	Pointer Site ID (9.13)	Aquifer Name (9.01)	LSMP Coordinate System (9.05)	LSMP Coordinate Source/ Accuracy (9.03)	LSMP x–Coordinate (Easting) (9.20)	LSMP y–Coordinate (Northing) (9.21)	Elevation Elevation Source/ Accuracy (9.08)	Elevation Surface Elevation (9.18)
Area T–4	T4	MC	AHOL	P	T4–S01					S	M9	506445	1164979		
				P	T4–S02					S	M9	506397	1164937		
				P	T4–S03					S	M9	506498	1164943		
				P	T4–S04					S	M9	506464	1164893		
Area T–5	T5	MC	CREK	P	T5–D02					S	M9	512542	1165159		
				P	T5–D03					S	M9	512722	1164422		
			CREK	P	T5–W02					S	M9	512542	1165159		
				P	T5–W03					S	M9	512722	1164422		
			AHOL	P	T5–S05					S	M9	512088	1164940		
				P	T5–S06					S	M9	512347	1165005		
				P	T5–S07					S	M9	512149	1164573		
				P	T5–S08					S	M9	512383	1164533		
Area T–24A	T24A	MC	CREK	P	T24A–D02					S	M9	522900	1158515		
			CREK	P	T24A–W02					S	M9	522900	1158515		
			EXCV	P	T24A–S03					S	M9	523300	1158540		
				P	T24A–S04					S	M9	523250	1158531		
				P	T24A–S05					S	M9	523350	1158530		
				P	T24A–S06					S	M9	523350	1158530		
				P	T24A–S07					S	M9	523288	1158437		
				P	T24A–S08					S	M9	523288	1158437		
Area T–38	T38	MC	BORE	P	T38–S05					S	M9	518432	1173700		
				P	T38–S06					S	M9	518842	1173614		
				P	T38–S07					S	M9	518908	1173479		
				P	T38–S08					S	M9	518879	1173004		
				P	T38–S09					S	M9	518780	1173529		
			WELL	P	T38–G05					S	M9	518432	1173700		
				P	T38–G06					S	M9	518842	1173614		
				P	T38–G07					S	M9	518908	1173479		
				P	T38–G08					S	M9	518879	1173004		
Range K	RK	PR	AHOL	P	RK–S01					S	M9	450250	1177450		
				P	RK–S02					S	M9	450300	1177305		
				P	RK–S03					S	M9	450200	1177300		
				P	RK–S04					S	M9	450010	1177350		
Range J	RJ	PR	BORE	P	RJ–S05					S	M9	470650	1173990		
				P	RJ–S06					S	M9	470690	1173990		
				P	RJ–S07					S	M9	470740	1173995		
				P	RJ–S08					S	M9	470655	1173966		
			EXCV	P	RJ–S05					S	M9	470650	1173990		
				P	RJ–S06					S	M9	470690	1173990		
				P	RJ–S07					S	M9	470740	1173995		
				P	RJ–S08					S	M9	470655	1173966		
			WELL	P	RJ–G05					S	M9	470663	1173038		
				P	RJ–G06					S	M9	470632	1173925		
				P	RJ–G07					S	M9	470772	1173934		
Detection and Identification Area	DIA	MC	EXCV	P	DIA–S03					S	M9	512143	1166009		
				P	DIA–S04					S	M9	512144	1165991		
				P	DIA–S05					S	M9	512146	1165970		
				P	DIA–S06					S	M9	512146	1165970		

Table 7–2. Site Identification and IRDMIS Map Data Entry Specifications, Ft. McClellan, Alabama (cont)

Location	Site Designation	Installation Code (11.04)	Site Type (9.17)	STATUS	Site ID (9.16)	Description (9.07)	Pointer Site Type (9.14)	Pointer Site ID (9.13)	Aquifer Name (9.01)	LSMP Coordinate System (9.05)	LSMP Coordinate Source/ Accuracy (9.03)	LSMP x–Coordinate (Easting) (9.20)	LSMP y–Coordinate (Northng) (9.21)	Elevation Elevation Source/ Accuracy (9.08)	Elevation Surface Elevation (9.18)
Range L (Lima Pond)	RL	PR	POND	P	RL–D01					S	M9	449992	1176673		
			STRM	P	RL–D02					S	M9	449993	1176674		
			POND	P	RL–W01					S	M9	449994	1176675		
			STRM	P	RL–W02					S	M9	449995	1176676		
				P	RL–W03					S	M9	449996	1176677		
				P	RL–W04					S	M9	449997	1176678		
			BORE	P	RL–S01					S	M9	449998	1176679		
				P	RL–S02					S	M9	449999	1176680		
				P	RL–S03					S	M9	449989	1176681		
				P	RL–S04					S	M9	449988	1176682		
				P	RL–S05					S	M9	449987	1176683		
				P	RL–S06					S	M9	449986	1176684		
				P	RL–S07					S	M9	449985	1176685		
			WELL	P	RL–G01					S	M9	449991	1176687		
				P	RL–G02					S	M9	449912	1176890		
				P	RL–G03					S	M9	449672	1176895		
				P	RL–G04					S	M9	449917	1176895		
				P	RL–G05					S	M9	449677	1176599		
				P	RL–G06					S	M9	449591	1176728		
				P	RL–G07					S	M9	449591	1176838		
Former Landfill #1	LF1	MC	BORE	P	LF1–S01					S	M9	508689	1170081		
				P	LF1–S02					S	M9	509390	1170047		
				P	LF1–S03					S	M9	509162	1169717		
				P	LF1–S04					S	M9	508604	1169599		
			CREK	P	LF1–D01					S	M9	508587	1169498		
				P	LF1–D02					S	M9	509618	1170205		
			WELL	P	LF1–G01					S	M9	508689	1170081		
				P	LF1–G02					S	M9	509390	1170047		
				P	LF1–G03					S	M9	509162	1169717		
				P	LF1–G04					S	M9	508604	1169599		
			CREK	P	LF1–W01					S	M9	508587	1169498		
				P	LF1–W02					S	M9	509618	1170205		
Former Landfill #2	LF2	MC	CREK	P	LF2–D01					S	M9	517500	1175300		
				P	LF2–D02					S	M9	516600	1174950		
			CREK	P	LF2–W01					S	M9	517500	1175300		
				P	LF2–W02					S	M9	516600	1174950		
			WELL	E	LF2–G01		BORE	NONE	ALL	S	S0	516724	1175404	S8	807.2
				E	LF2–G02		BORE	NONE	ALL	S	S0	516586	1175100	S8	791.3
				E	LF2–G03		BORE	NONE	ALL	S	S0	516948	1175178	S8	794.2
Former Landfill #3	OLF	MC	BORE	P	OLF–S11					S	M9	513000	1180250		
				P	OLF–S12					S	M9	512750	1179990		
				P	OLF–S13					S	M9	513500	1180300		
				P	OLF–S14					S	M9	513300	1179980		
				P	OLF–S15					S	M9	513100	1181000		
				P	OLF–S16					S	M9	512750	1180800		
				P	OLF–S17					S	M9	512300	1180070		
				P	OLF–S18					S	M9	512250	1179900		
				P	OLF–S19					S	M9	512100	1180010		
			CREK	P	OLF–D02					S	M9	512700	1180500		
				P	OLF–D03					S	M9	512701	1180501		
			CREK	P	OLF–W02					S	M9	512700	1180500		
				P	OLF–W03					S	M9	512702	1180502		
				P	OLF–W04					S	M9	512703	1180503		
				P	OLF–W05					S	M9	512704	1180504		

Table 7–2. Site Identification and IRDMIS Map Data Entry Specifications, Ft. McClellan, Alabama (cont)

Location	Site Designation	Installation Code (11.04)	Site Type (9.17)	STATUS	Site ID (9.16)	Description (9.07)	Pointer Site Type (9.14)	Pointer Site ID (9.13)	Aquifer Name (9.01)	LSMP Coordinate System (9.05)	LSMP Coordinate Source/ Accuracy (9.03)	LSMP x–Coordinate (Easting) (9.20)	LSMP y–Coordinate (Northing) (9.21)	Elevation Elevation Source/ Accuracy (9.08)	Elevation Surface Elevation (9.18)
Former Landfill #3 (cont.)	OLF	MC	WELL	E	OLF–G01					S	S0	512533	1180275	S8	741.3
				E	OLF–G02					S	S0	512588	1179585	S8	742.7
				E	OLF–G03					S	S0	513570	1180578	S8	737.2
				E	OLF–G04					S	S0	512955	1180704	S8	745
				E	OLF–G05					S	S0	512263	1179904	S8	737.7
				E	OLF–G06		BORE	NONE	ALL	S	S0	512566	1180593	S8	747.4
				E	OLF–G07		BORE	NONE	ALL	S	S0	512351	1180113	S8	738.9
				E	OLF–G08		BORE	NONE	ALL	S	S0	512279	1179910	S8	737.3
				E	OLF–G09		BORE	NONE	ALL	S	S0	513343	1180784	S8	738.5
				E	OLF–G10		BORE	NONE	ALL	S	S0	512538	1179304	S8	746
				P	OLF–G11					S	M9	513000	1180250		
				P	OLF–G12					S	M9	512750	1179990		
				P	OLF–G13					S	M9	513500	1180300		
				P	OLF–G14					S	M9	513300	1179980		
				P	OLF–G15					S	M9	513100	1181000		
				P	OLF–G16					S	M9	512750	1180800		
				P	OLF–G17					S	M9	512300	1180070		
				P	OLF–G18					S	M9	512250	1179900		
				P	OLF–G19					S	M9	512100	1180010		
Old Water Hole	OWH	MC	BORE	P	OWH–S01					S	M9	472277	1179167		
				P	OWH–S02					S	M9	472278	1179168		
				P	OWH–S03					S	M9	472279	1179169		
				P	OWH–S04					S	M9	472280	1179170		
				P	OWH–S05					S	M9	472281	1179171		
			WELL	P	OWH–G01					S	M9	472276	1179166		
				P	OWH–G02					S	M9	472160	1179187		
				P	OWH–G03					S	M9	472416	1179116		
				P	OWH–G04					S	M9	472153	1179454		
				P	OWH–G05					S	M9	472366	1179462		
Background	BK	MC	BORE	P	BK–S02					S	M9	522626	1157551		
				P	BK–S03					S	M9	522627	1157552		
				P	BK–S04					S	M9	522628	1157553		
			AHOL	P	BK–S02					S	M9	522629	1157554		
				P	BK–S03					S	M9	522630	1157555		
				P	BK–S04					S	M9	522631	1157556		
			CREK	P	BK–D01					S	M9	522632	1157557		
			BORE	P	BK–G02					S	M9	522625	1157550		
				P	BK–G03					S	M9	516001	1178751		
				P	BK–G04					S	M9	516000	1178750		
			WELL	P	BK–G02					S	M9	522625	1157550		
				P	BK–G03					S	M9	516000	1178750		
				P	BK–G04					S	M9	516002	1178752		
			CREK	P	BK–W01					S	M9	516003	1178753		
				P	BK–W02					S	M9	516004	1178754		
				P	BK–W03					S	M9	516005	1178755		
	BK	PR	BORE	P	BK–S05					S	M9	451626	1176377		
			AHOL	P	BK–S05					S	M9	451626	1176377		
		PR	CREK	P	BK–D01					S	M9	451627	1176378		
		PR	BORE	P	BK–G01					S	M2	451625	1176376		
			WELL	P	BK–G01					S	M2	451625	1176376		
	FPR	PR	TAPW	E	FPR001	PELHAMBLDG8802				S	M2	451625	1176376		
Potable Water – Main Post	FMP	MC	TAPW	E	FMP001	MAINPOSTBLDG1298				S	M2	513326	1177313		
	FRL	MC	TAPW	E	FRL–1					S	M9	515997	1181805		
City of Weaver	CW	MC [c]	WELL		CW–G01					S	M9	515999	1181801		
					CW–G02					S	M9	515998	1181802		

TBD – to be determined

[a] – The base maps are unavailable for these sites. Consequently, the map data entry specifications are also not complete. When the coordinates become available, the data will be entered into IRDMIS.

[c] – The map data from these drinking water wells will not pass the IRDMIS PC Tool record check because they are not located on the properties of Fort McClellan or Pelham Range. A memo will be submitted to USAEC with the map transfer files for these site IDs requesting their acceptance as part of the Fort McClellan R[illegible]

- Coordinate source and accuracy code: M9 (will be updated after sampling)
- X coordinate (MC): Table 7-2 (from minimum = 499404; maximum = 555593)
- Y coordinate (MC): Table 7-2 (from minimum = 1146677; maximum = 1182141)
- X coordinate (PR): Table 7-2 (from minimum = 443657; maximum = 486723)
- Y coordinate (PR): Table 7-2 (from minimum = 1150588; maximum = 1186202)
- Ground surface elevation (ft MSL): see Table 7-2
- Ground surface elevation source code and accuracy code: see Table 7-2.

7.2.3 Geotechnical Data Entry

Geotechnical field drilling (GFD) data, geotechnical well construction (GWC) data, and geotechnical groundwater stabilized (GGS) data will be collected during this investigation and entered into IRDMIS. In addition, soil samples will be collected during drilling and measured for Atterberg limits, grain sizes, and moisture content; geophysical surveys; field screening data; and rising head aquifer tests will be conducted at the site. Results from these analyses will be included in the RI report, but will not be entered into IRDMIS.

Soil boring and groundwater monitoring well construction forms will be completed by the rig geologist as the wells and borings are installed. Examples of the soil boring and well construction forms are included in Section 5. These forms will be reviewed by the site geologist or field manager, and submitted to USAEC within 3 days of bore/well completion. Copies of the forms will be transmitted to the SAIC Project Manager for quality assurance review. Information on Tables 7-3 and 7-4 in conjunction with the completed soil boring and well construction forms will be used to enter data into IRDMIS. In addition, static groundwater levels in the monitoring wells will be measured. The following sections summarize the geotechnical data entries into IRDMIS for the Fort McClellan RI.

7.2.3.1 Geotechnical Field Drilling (GFD) Data Entry

Soil boring logs will be used to record geotechnical observations and measurements as the soil borings are drilled. After completing the soil boring logs, the field manager will submit

Table 7-3. Acceptable Entries for Geotechnical Field Drilling Data Entry

Action/ Measure	Method Number	Method Units	Geotechnical Method Description
ADVAU	02	None	6-1/4 inch ID hollow stem auger
ADVAU	08	None	4-1/4 inch ID hollow stem auger
ADVAU	17	None	8 inch hole, water or mud rotary
ADVAU	16	None	Rock core, water or mud rotary
ADVAU[a]	Not Available	None	6-5/8 inch ID hollowstem auger
ADVAU[a]	Not Available	None	3 inch OD corebarrel
BFILL	02	None	Direct measurement in feet of borehole fill (grout)
BFILL	04	None	Direct measurement in feet of borehole fill (bentonite)
COLOR	01	None	Field inspection of cuttings or samples, Munsell color classification chart
DPTOT	01	FT	Direct measurement from ground surface to deepest point encountered during drilling and/or sampling in borehole (ft)
GRDWT	02	FT	Estimated depth to first-encountered groundwater level at time of drilling as determined from water returns to surface.
HABLO	01	BL	Count of hammer blows per foot
MODIF	01	None	Field observation of cuttings or samples
RFUSL	01	FT	Direct depth measurement from ground surface to refusal (ft)
SAMPL	13	None	Thin wall, Shelby tube, 3 inch
SAMPL	26	None	Split spoon, 3.0 inch O.D., 140 pound hammer, 30 inch drop
USCS	01	None	Visual classification using the Unified Soil Classification System in the file (expanded to include rock classifications and special codes)

GRDWT or **NOGWT** - Depth to groundwater, to nearest tenth foot, from land surface (or NOGWT if groundwater was not encountered during drilling activities).

[a] - Codes are not currently available in the Data Dictionary for these entries.

Table 7-4. Acceptable Entries for Geotechnical Well Construction Data Entry

Action/ Measure	Method Number	Method Units	Geotechnical Method Description
BAILT	01	MIN	Direct measurement of time in minutes taken to bail or pump volume of water specified in "BAILV." BAILT must be paired with BAILV. Code date measurement and method number for BAILT as indicated for BAILV.
BAILV	01	L	Direct measurement of volume of water bailed or pumped from well in liters (BAILV must be paired with BAILT). To indicate date of measurement, code date under element named "Well Construction Date" rather than coding the date when the well construction was completed (unless the two dates are the same). Method numbers should refer to the number of measurements made, 02 = second measurement, etc.
BFILL	02	None	Direct measurement in feet of borehole fill (grout).
BFILL	04	None	Direct measurement in feet of borehole fill (bentonite).
BFILL	05	None	Direct measurement in feet of borehole fill (sand or gravel pack).
BSEAL	01	None	Measurement of length of bentonite seal.
CASE	01	FT	Length of casing from ground surface to top of screen.
CASED	01	FT	Inside diameter of casing.
DPTOT	01	FT	Direct measurement from ground surface to deepest point encountered during drilling and/or sampling in borehole (ft).
GFILT	01	None	Direct measurement of length of gravel filter/sand pack (ft).
GROUT	01	None	Length of grout in feet (neat cement slurry, pumped or poured from top).
GROUT	04	None	Length or grout in feet (20 parts cement to 1 part bentonite by weight, pumped or poured from the top).
RECVR	01	FT	Direct measurement in feet of recovery or rise of water in well after pumping or bailing the well dry (must be paired with RECVT). To indicate date of measurement, code date under element named "Well Construction Date" rather than coding the date on which well construction was completed (unless the two dates are the same). Method numbers should refer to the number of measurements taken at any given date (i.e., 01 = first measurement, etc.).
RECVT	01	MIN	Direct measurement of time in minutes of the recovery or rise in water in well after pumping or bailing borehole dry (must be paired with RECVR). Code date of measurement and method number for RECVT as indicated for RECVR.
SCREN	02	None	Length of screen in feet, PVC, 4-inch diameter, schedule 40, 0.010 inch slot width.
STKUP	01	FT	Field measurement of length of PVC riser above ground surface (use negative value if below ground surface).
SURF	01	None	Observation of surface cover at well site.

DEPTH (GEOTECHNICAL): Depth, to nearest tenth foot, from land surface to the top of the interval for the action or measure. A dry well is indicated by "-9999."

INTERVAL THICKNESS: Thickness of the action/measurement interval. The intervals must be contiguous and must represent the range from the surface to the total depth (DPTOT). An entry is required for BFILL, BSEAL, GFILT, GROUT, and SCREN. This field must be blank for the following actions/measurements: BAILT, BAILV, CASE, CASED, CASES, CSEAL, DPTOT, LYSDP, RECVR, RECVT, STKUP, SURF, TOPO, and WSTAT.

VALUE (GEOTECHNICAL): The value associated with the action/measure as defined by the METHOD NO. unit of measurement and the INTERVAL THICKNESS. Entry is required for the following actions/measurements: BAILT, BAILV, CASE, CASED, CASES, DPTOT, LYSDP, RECVR, RECVT, and STKUP. Entry must be blank for the following actions/measurements: BFILL, BSEAL, GFILT, GROUT, SCREN, TOPO, and WSTAT.

UNIT OF MEAS: "FT" - feet, "L" - liters, "MIN" - minutes, or blank where values are inappropriate.

the forms for technical and quality assurance review. After SAIC's Project Manager has approved the soil boring logs, SAIC's Data Manager will enter the data into IRDMIS and record/group check the data prior to creating and submitting the transfer files to USAEC's BBS. The following information will be used when entering geotechnical data into IRDMIS:

- Installation code: MC (Fort McClellan) or PR (Pelham Range)
- File name: SAMCGFDx.TRN or SAPRGFDx.TRN

where:

SA = prime contractor code for SAIC
MC = installation code for Fort McClellan
PR = installation code for Pelham Range
GFD = geotechnical field drilling file type
x = submission number
TRN = transfer file extension.

- Site type: BORE
- Site ID: see Table 4-1
- Prime contractor: SA
- Drilling date: will be completed after boring completion
- Organization (drilling company): the drilling company has not yet been determined
- Depth to top of interval being described or logged: measured during drilling (BLS)
- Interval thickness: measured during drilling (BLS)
- Action/Measure: Table 7-3
- Method of measurement: Table 7-3
- Value measured and units: Table 7-3.

7.2.3.2 Geotechnical Well Construction (GWC) Data Entry

In addition to collecting geotechnical information during the installation of groundwater monitoring wells, the construction specifications will be recorded on well construction forms.

The processes for reviewing and entering well construction data into IRDMIS is similar to the process for geotechnical data. The specific entries are described below:

- Installation code: MC (Fort McClellan) or PR (Pelham Range)
- File name: SAMCGWCx.TRN or SAPRGWCx.TRN.

where:

SA = prime contractor code for SAIC
MC = installation code for Fort McClellan
PR = installation code for Pelham Range
GWC = well construction file type
x = submission number
TRN = transfer file extension.

- Site type: WELL
- Site ID: see Table 4-1
- Prime contractor: SA
- Construction date: will be completed after boring completion
- Organization (drilling company): the drilling company has not yet been determined
- Total depth of hole: see Table 7-4
- Stick-up measurement: see Table 7-4
- Well casing inside diameter: see Table 7-4
- Bentonite seal interval: see Table 7-4
- Grouted interval: see Table 7-4
- Gravel or sand filter pack interval: see Table 7-4
- Length of casing from ground surface to top of screened interval: see Table 7-4
- Screened interval: see Table 7-4.

7.2.3.3 Geotechnical Groundwater Stabilized (GGS) Data Entry

After the groundwater monitoring wells have been completed and surveyed, the SAIC field sampling team will measure groundwater levels in relation to the top of the well casing and

enter these results on water level measurement forms. These groundwater levels will be entered into IRDMIS as geotechnical groundwater stabilized (GGS) files, reviewed by the Project Geologist, record and group checked, and submitted to USAEC's BBS:

- Installation code: MC (Fort McClellan)
- Installation code: PR (Pelham Range)
- File name: SAMCGGSx.TRN or SAPRGGSx.TRN.

where:

SA = prime contractor code for SAIC
MC = installation code for Fort McClellan
PR = installation code for Pelham Range
GGS = groundwater stabilized file type
x = submission number
TRN = transfer file extension.

- Site type: WELL
- Site ID: see Table 4-1
- Organization measuring groundwater level: SA
- Measurement date (TBD)
- Depth to groundwater (TBD)
- Initials of person recording measurement (TBD)

7.2.4 Chemical Data Entry

Unlike geotechnical and map data, SAIC will not enter or correct chemical data. Data Chem Laboratories (DCL) and Environmental Science and Engineering (ESE) will submit all transfer files to SAIC. SAIC will record and group check read-only versions of the chemical transfer files to ensure that the laboratories are submitting error-free files. If any errors are detected, SAIC will notify the data management staff at the laboratories to make the necessary corrections. After making the corrections, the laboratory re-submittals will be re-checked by SAIC to ensure that all errors have been corrected. Final verification that the transfer files have

been submitted without errors will be made by PRI during their routine record/group checks prior to elevating the data to Level 3. The results of PRI's record and group checks are reported on weekly Lab Status Reports.

The PCTool software will be used by the data management staff in the laboratories to enter chemical data, initially validate the data, and comment on the usability of the data. After data are entered, they are validated by comparison to the program's chemical data base files using USAEC's Installation Restoration Control Chart (IRCC) Subsystem and IRDMIS Non-USAEC (NTAM) Data Base Management System. These subsystem contains specifications for data validation (i.e., acceptable criteria, acceptable entries) that are compared to chemical data to determine their validity. The qualifiers are entered into the IRDMIS Flagging Code and Data Qualifier Fields to indicate out-of-control, or notable analytical conditions or results. Data that are found in error must be corrected by the laboratory.

Certain errors may be qualified as usable by the USAEC Chemistry Branch. Samples which were analyzed beyond the holding time may be qualified as usable by the Chemistry Branch if they determine the results were not adversely impacted. Such data will be qualified in accordance with requirements in *U.S. Army Toxic and Hazardous Material Agency, PAM 11-41* (January 1990).

Hard copies of the data packages will be available to SAIC upon request. COC procedures will be implemented between the laboratories and SAIC when data packages are exchanged to validate 20 to 30 percent of the data packages. See Section 6.1 and SAIC's Quality Assurance Project Plan (QAPP) provides a more detailed discussion of the validation associated with the hard copy data packages.

Table 7-5 and the following bulleted items present the information that will be needed to enter lot, sample, and analysis records into IRDMIS chemical data bases.

- Installation code: MC (Fort McClellan)
- Installation code: PR (Pelham Range)
- Filename: MCUByyyy.TRN, PRUByyyy.TRN, MCESyyyy.TRN, or PRESyyyy.TRN

where:

MC = installation code for Fort McClellan

PR = installation code for Pelham Range

UB = laboratory code for Data Chem Laboratories

ES = laboratory code for Environmental Science and Engineering

yyyy = laboratory analytical lot designation

TRN = transfer file extension.

- Site type: Table 7-5
- Site ID: Table 7-5
- Field sample number: Used to distinguish samples collected from same location (e.g., samples have been collected from the same Site, but at different times or depths)
- Sample date: Will be completed after sample has been collected
- Sample program: Table 7-5
- Sample depth from ground surface: Will be completed after sample has been collected
- Sampling technique: Table 7-5
- Sample preparation date in the laboratory: Will be completed by laboratory analyst
- Laboratory identification: UB = laboratory code for Data Chem Laboratories
- Laboratory identification: ES = laboratory code for Environmental Science and Engineering
- Analytical lot number: Will be completed by laboratory analyst
- Internal laboratory sample number: Will be completed by laboratory analyst
- Date of analysis: Will be completed by laboratory analyst
- Method matrix: Table 7-5
- Analytical test method: see QAPP (Volume II of SAP)
- Analyte name: see QAPP (Volume II of SAP)
- Boolean qualifier (LT, GT, etc.): Will be completed by laboratory analyst
- Mantissa of uncorrected analysis value: Will be completed by laboratory analyst
- Exponent of uncorrected analysis value: Will be completed by laboratory analyst
- Mantissa of dilution factor: Will be completed by laboratory analyst
- Exponent of dilution factor: Will be completed by laboratory analyst

Table 7–5. Lot, Sample, and Analysis Record Entry Specifications for IRDMIS Chemical Databases

Site Designation	Site ID (9.16)	Field Sample No. (8.07)	Lot Data Entry Specifications: Installation (9.11)	Lab (8.09)	Lot No. (8.11)	IRDMIS Method No. (8.13)	Method Matrix (8.34)	Units Measure (9.19)	CLASS Indicator (8.04)
T4	T4–S01 to T4–S04	[a]	MC	ES	[b]	LW18,LT03,LL03	SO	UGG	Y
T5	T5–D02 T5–D03	[a]	MC	ES UB	[b]	LW18,LT03,LL03,TT9,IC JD20,JD21,JS12,LH17,LW23,LW27,7041,LM23,LM25,Y9,B9	SO	UGG	Y
	T5–S05 to T5–S08		MC	ES	[b]	LW18,LT03,LL03, TT9, IC	SO	UGG	Y
	T5–W02 T5–W03			ES UB		UW22, UT03, UL04, T8, IC, SD18, CC8, SD25, 6010, 7841, 4051, UH20, UW25, UW27 8010, 8310, 8040, KK8,UM21,UM25,SS12,7041,AX8	WA	UGL	Y
T24A	T24A–D02 T24A–S03 to T24A–S08	[a]	MC	ES UB	[b]	LW18,LT03,LL03,TT9 JS12, 7041, B9, JD21, JD20, Y9,LW23, LW27, LM23, LM25	SO SO	UGG UGG	Y Y
	T24A–W02			ES UB		UW22, UT03, UL04, T8, IC SD18, CC8, SD25, 6010, 7841, 4051, UH20, UW25, UW27, 8010, 8310, 8040, KK8, UM21, UM25, SS12, 7041, AX8	WA	UGL	Y
T38	T38–S05 to T38–S09	[a]	MC	ES UB	[b]	LW18,LT03,LL03,TT9,IC JD20,JD21,JS12,LH17,LW23,LW27,7041,LM23,LM25,Y9,B9	SO	UGG	Y
	T38–G05 to T38–G08			ES UB		UW22,UT03,UL04,T8,IC UM21,UM25,SS12,7041,AX8,SD18, 6010,CC8,SD25,7841, UH20,UW25,UW27,8010,8040,8310,KK8	WA	UGL	Y
RK	RK–S01 to RK–S04	[a]	PR	ES UB	[b]	LW18,LT03,LL03 LW23,LW27	SO	UGG	Y
RJ	RJ–S05 to RJ–S07	[a]	PR	ES	[b]	LW18,LT03,LL03	SO	UGG	Y
	RJ–G05 to RJ–G07		PR	ES	[b]	UW22,UT03,UL04	WA	UGL	Y
DIA	DIA–S03 to DIA–S06	[a]	MC	ES	[b]	LW18,LT03,LL03,TT9	SO	UGG	Y

Table 7–5. Lot, Sample, and Analysis Record Entry Specifications for IRDMIS Chemical Databases (continued)

Site Designation	Site ID (9.16)	Field Sample No. (8.07)	Lot Data Entry Specifications						
			Installation (9.11)	Lab (8.09)	Lot No. (8.11)	IRDMIS Method No. (8.13)	Method Matrix (8.34)	Units Measure (9.19)	CLASS Indicator (8.04)
RL	RL–D01	[a]	PR	ES	[b]	LW18,LT03,LL03,TT9,IC	SO	UGG	Y
	RL–D02			UB		JD20,JD21,JS12,LH17,LW23,LW27,7041,LM23,LM25,Y9,B9			
	RL–S01 to RL–S07			ES UB		LW18,LT03,LL03,TT9,IC JD20,JD21,JS12,LH17,LW23,LW27,7041,LM23,LM25,Y9,B9	SO	UGG	Y
	RL–G01 to RL–G07			ES UB		UW22,UT03,UL04,T8,IC AX8,SD18,CC8,SD25,UH20,UW25,UW27,7841, 8010,8040,KK8,8310,UM21,UM25,SS12,7041,6010	WA	UGL	Y
	RL–W01 RW–W02 to RL–W04			ES UB		UW22,UT03,UL04,T8,IC AX8,SD18,CC8,SD25,UH20,UW25,UW27,7841, 8010,8040,KK8,8310,UM21,UM25,SS12,7041,6010,4051	WA	UGL	Y
LF1	LF1–G01 to LF1–G04	[a]	MC	UB	[b]	UM21,UM25,SS12,7041, AX8,SD18,CC8,SD25,6010, UH20,UW25,UW27,7841,8010,8040,KK8,8310	WA	UGL	Y
	LF1–D01 LF1–D02			UB		LM23,LM25,Y9,B9,JD20,JD21,JS12,LH17,LW23,LW27,7041	SO	UGG	Y
	LF1–S01 to LF1–S04			UB		LM23,LM25,Y9,B9,JD20,JD21,JS12,LH17,LW23,LW27,7041	SO	UGG	Y
	LF1–W01 LF1–W02			UB		UM21,UM25,SS12,7041,AX8,6010,SD18,CC8,SD25,7841, UH20,UW25,UW27,4051,8010,8310,8040,KK8	WA	UGL	Y
LF2	LF2–D01 LF2–D02	[a]	MC	UB	[b]	LM23,LM25,Y9,B9,JD20,JD21,JS12,LH17,7041	SO	UGG	Y
	LF2–W01 LF2–W02			UB		UM21,UM25,SS12,7041,6010,KK8,8010,8040,4051,8310, AX8,SD18,CC8,SD25,UH20,UW25,UW27,7841	WA	UGL	Y
	LF2–G01 to LF2–G03			UB		UM21,UM25,SS12,7041,6010,8010,8040,KK8,8310, AX8,SD18,CC8,SD25,UH20,UW25,UW27,7841,	WA	UGL	Y
OLF	OLF–D02 OLF–D03	[a]	MC	UB	[b]	LM23,LM25,Y9,B9,JD20,JD21,JS12,LH17, LW23,LW27,7041	SO	UGG	Y
	OLF–S11 to OLF–S19			UB		LM23,LM25,Y9,B9,JD20,JD21,JS12,LH17, LW23,LW27,7041	SO	UGG	Y
	OLF–G01 to OLF–G19			UB		UM21,UM25,SS12,7041,6010,7841,AX8,SD18,CC8,SD25, UH20,UW25,UW27,8010,8040,8310,KK8	WA	UGL	Y
	OLF–W02 to OLF–W05			UB		UM21,UM25,SS12,7041,6010,8310,4051 AX8,SD18,CC8,SD25,UH20,UW25,UW27,7841, 8010,804[illegible]K8	WA	UGL	Y

Table 7-5. Lot, Sample, and Analysis Record Entry Specifications for IRDMIS Chemical Databases (continued)

Site Designation	Site ID (9.16)	Field Sample No. (8.07)	Installation (9.11)	Lab (8.09)	Lot No. (8.11)	IRDMIS Method No. (8.13)	Method Matrix (8.34)	Units Measure (9.19)	CLASS Indicator (8.04)
						Lot Data Entry Specifications			
OWH	OWH-S01 to OWH-S05	[a]	MC	ES UB	[b]	LW18,LT03,LL03,TT9,IC JD20,JD21,JS12,LH17,LW23,LW27,7041,LM23,LM25,Y9,B9	SO	UGG	Y
	OWH-G01 to OWH-G05			ES UB		UW22,UT03,UL04,T8,IC AX8,SD18,CC8,SD25,UH20,UW25,UW27,8010, 8310,8040,KK8,UM21,UM25,SS12,7041,6010,7841	WA	UGL	Y
BK	BK-S02 to BK-S04	[a]	MC	ES UB	[b]	LW18,LT03,LL03,TT9,IC JD20,JD21,JS12,7041,LH17,LW23,LW27,LM23,LM25,Y9,B9	SO	UGG	Y
	BK-D02						SO	UGG	Y
	BK-G02 to BK-G04			ES UB		UW22,UT03,UL04,T8,IC UM21,UM25,SS12,7041, AX8,SD18,CC8,SD25,6010, UH20,UW25,UW27,7841,8010,8040,KK8,8310	WA	UGL	Y
	BK-W02 to BK-W04			ES UB		UW22,UT03,UL04,T8,IC UM21,UM25,SS12,7041, AX8,SD18,CC8,SD25,6010, UH20,UW25,UW27,7841,8010,8040,KK8,8310,4051	WA	UGL	Y
	BK-S05	[a]	PR	ES	[b]	LW18,LT03,LL03,TT9,IC	WA	UGL	Y
	BK-D01			UB		JD20,JD21,JS12,LH17,LW23,LW27,7041,LM23,LM25,Y9,B9	SO	UGG	Y
	BK-G01			ES UB		UW22,UT03,UL04,T8,IC UM21,UM25,SS12,7041,AX8,SD18,CC8,SD25,6010,UH20,UW25, UW27,7841,8010,8040,8310,KK8	WA	UGL	Y
FMP	FMP001	[a]	MC	ES	[b]	UW22,UT03,UL04,T8,IC	WA	UGL	Y
PR	FPR001		PR	UB		UM21,UM25,SS12,7041,AX8,SD18,CC8,SD25,UH20,UW25,			
FRL	FRL-1		MC			UW27,7841,6010			
CW	CW-G01	[a]		ES UB	[b]	UW22,UT03,UL04,T8,IC UM21,UM25,SS12,7041,AX8,SD18,CC8,SD25,6010,7841,	WA	UGL	Y
	CW-G02					8010,8040,8310,KK8,UH20,UW25,UW27			

[a] – Field sample numbers for soil borings distinguish samples collected from different depths within the same bore hole (i.e., the site IDs are identical), and field sample numbers for groundwater samples distinguish samples collected from the same well.
[b] – To be completed by laboratory
[c] – To be completed after sample collection.
[d] – The only flagging code that will be specified before analyses is "D" for duplicate sample. Note, that field sample numbers will also be different for the sample and its duplicate.
[e] – Samples collected for natural matrix spikes will be designated on the COC form with a "N" in the QC Test Code Field.
[f] – Groundwater samples will be collected from a well that will be installed by a different contractor; the site ID is not yet known.

Table 7–5. Lot, Sample, and Analysis Record Entry Specifications for IRDMIS Chemical Databases (continued)

Sample Data Entry Specifications																
Site ID (9.16)	Field Sample No. (8.07)	Sample Analysis No. (8.20)	Prime Contractor (9.15)	File/ Media Type (9.09)	Site Type (9.17)	Sampling Date (8.19)	Sampling Program (8.22)	Sampling Depth (ft) (8.05)	Sampling Technique (8.23)	Lab Sample No. (8.10)	Sample Prep Date (8.21)	Analysis Date (8.02)	Base Closure Indicator (9.02)	Delivery Order No. (8.28)	Flagging Code (8.08)	QC Test Code (8.16)
T4–S01 to T4–S04	[a]	[b]	SA	CSO	AHOL	See COC [c]	C	See COC [c]	U	[b]	[b]	[b]	N	0005	See COC [d]	See COC [e]
T5–D02 T5–D03	[a]	[b]	SA	CSE	CREK	See COC [c]	C	See COC [c]	U	[b]	[b]	[b]	N	0005	See COC [d]	See COC [e]
T5–S05 to T5–S08				CSO	AHOL				U							
T5–W02 T5–W03				CSW	CREK				G							
T24A–D02 T24A–S03 to T24A–S08	[a]	[b]	SA	CSE CSO	CREK EXCV	See COC [c]	C	See COC [c]	U G	[b]	[b]	[b]	N	0005	See COC [d]	See COC [e]
T24A–W02				CSW	CREK				G							
T38–S05 to T38–S09	[a]	[b]	SA	CSO	BORE	See COC [c]	C	See COC [c]	S	[b]	[b]	[b]	N	0005	See COC [d]	See COC [e]
T38–G05 to T38–G08				CGW	WELL				B							
RK–S01 to RK–S04	[a]	[b]	SA	CSO	AHOL	See COC [c]	C	See COC [c]	U	[b]	[b]	[b]	N	0005	See COC [d]	See COC [e]
RJ–S05 to RJ–S07	[a]	[b]	SA	CSO	EXCV	See COC [c]	C	See COC [c]	G	[b]	[b]	[b]	N	0005	See COC [d]	See COC [e]
RJ–G05 to RJ–G07	[a]	[b]	SA	CGW	WELL	See COC [c]	C	See COC [c]	B	[b]	[b]	[b]	N	0005	See COC [d]	See COC [e]
DIA–S03 to DIA–S06	[a]	[b]	SA	CSO	EXCV	See COC [c]	C	See COC [c]	G	[b]	[b]	[b]	N	0005	See COC [d]	See COC [e]