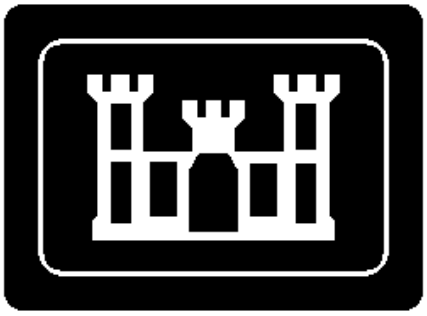
RCRA FACILITY INVESTIGATION REPORT

FOR

FH-038D (Holding Tank, Building 32019) FORT HOOD, TEXAS

PREPARED FOR



U.S. ARMY CORPS OF ENGINEERS FORT WORTH DISTRICT

CONTRACT NO. DACA63-96-D-0021

September 17, 1999

SAIC Science Applications International Corporation
An Employee-Owned Company

RCRA Facility Investigation Report
For Site FH-038D
(Electrolyte Holding Tank, Bldg. 32019)

Prepared for
U.S. Army Corps of Engineers
Fort Worth District
Fort Worth, Texas

Under Contract Number
DACA63-96-D-0021

Prepared by
Science Applications International Corp.
4900 Blazer Parkway
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September 17, 1999

EXECUTIVE SUMMARY

FH-038D is one of four Solid Waste Management Units adjacent to battery shops. Each battery shop is a free-standing building within a tactical motor pool facility in the main cantonment. Each shop has an underground holding tank located adjacent to the building. According to the RFI Work Plan for 35 SWMUs (USACE 1995), the underground tank at FH-038D was made of fiberglass, was installed in 1982 and used until 1992 (CP&Y, Inc.1998), and removed in May 1998. The only known material handled in the tank was spent lead-acid battery electrolyte which was neutralized to pH of 7 prior to discharge from the battery shop to the tanks. Sludge or sediment may also have settled in the bottom of the tank. The tank was constructed with a grated top, allowing access for a final pH test before the effluent was discharged to the sanitary sewer. The tank was contained in a reinforced concrete vault.

Three sampling events occurred at FH-038D. The initial sampling event, which took place in February 1997, included four soil borings advanced around the tank in accordance with the approved Work Plan. All soil samples and one groundwater sample were analyzed for lead. Lead concentrations in the soil samples were all below the Practical Quantitation Limit (PQL) and lead was not detected in the groundwater sample.

Fort Hood had the tank system removed from service, separate from the RFI, in May 1998. Four confirmatory soil samples were collected from the tankhold and analyzed for lead. All four samples had lead concentrations exceeding the background lead concentration of 19 mg/kg. Sample concentrations ranged from 73 mg/kg to 992 mg/kg.

In October 1998, five additional soil samples were collected around the former tankhold to determine the extent of lead contamination detected in the previous sampling event. Three geoprobe soil borings were advanced along the outer edge of the tankhold and two more were advanced below the base of the former excavation. None of the soil samples collected had lead concentrations above the PQL. No groundwater was encountered. This sampling event confirmed that the previously detected lead contamination is confined to the remnant bedding material and soil in the former tankhold pit.

Based on this investigation, it is recommended that FH-038D be closed under TNRCC RRS Number 2, and no further action is required to address the contamination associated with SWMU FH-038D. Certification of Remediation documentation is accordance to 30 TAC Section 335.560(b) relating to Post Closure Care and Deed Certification will be provided as an addendum to this report once the TNRCC approves this report.

TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

ACRONYMS

AA	Atomic absorption
BEGM	Bureau of Economic Geology
bkg	background
bgs	below ground surface
CQAR	Corps Quality Assurance Report
DOT	Department of Transportation
FH	Fort Hood
ft	feet or foot
GC/MS	Gas Chromatography/Mass Spectrometry
HSA	hollow stem auger
ICP	Inductively Coupled Plasma
IDW	Investigation Derived Waste
LCS	Laboratory Control Samples
msl	mean sea level
MS/MSD	Matrix Spike/Matrix Spike Duplicate
mg/l	milligrams per liter
ppm	parts per million
PQL	Practical Quantitation Limit
QA/QC	Quality Assurance/Quality Control
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RRS	Risk Reduction Standards
SAIC	Science Applications International Corporation
SWMU	Solid Waste Management Unit
TAC	Texas Administrative Code
TCLP	Toxicity Characteristic Leaching Procedure
TNRCC	Texas Natural Resources Conservation Commission
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
UTL	upper tolerance limit

1.0 INTRODUCTION

Fort Hood is an active U.S. Army installation occupying 217,551 acres (339 square miles) in southern Coryell and Bell Counties in central Texas. It is situated 60 miles north of Austin, and about 50 miles south of Waco. The installation is located north of and adjacent to the city of Killeen, east of and adjacent to the city of Copperas Cove, and four miles south of the city of Gatesville. A vicinity map is shown in Figure 1.1.

Fort Hood began operations in 1942. Robert Gray Air Field, originally operated by the Air Force as Robert Gray Air Force Base, was established in 1947 (U. S. Army 1996a). Fort Hood's mission is training, testing, and deployment of military personnel and equipment. The post is commanded by the III Corps Commander. Currently, the post supports two full armored divisions (the 1st Cavalry and 4th Infantry Divisions). Forty-three thousand military personnel are stationed there; and an additional 30,000 family members, civilians, volunteers, and private-sector employees also live or work at Fort Hood (U.S. Army 1996a). Among the military assets of Fort Hood are approximately 2,500 tracked vehicles, over 11,000 wheeled vehicles, six fixed wing aircraft, and 230 rotary-wing aircraft. The post has 67 active firing and demolition ranges.

The Fort Hood military reservation is regulated under the Resource Conservation and Recovery Act (RCRA) as a hazardous waste management facility. Fort Hood has a RCRA permit to operate three hazardous waste storage units. The RCRA permit requires that Fort Hood perform a RCRA Facility Investigation (RFI) for 40 solid waste management units (SWMUs) listed in the permit. These SWMUs are distributed across the military reservation, in the main cantonment, West Fort Hood, and North Fort Hood. They include former solid waste landfills and burial sites, former and inactive underground storage tank locations, active wash rack/sewer systems, effluent ponds, and a sanitary sewer network. An installation map is shown in Figure 1.2.

FH-038D is located immediately northwest of Building 32019, near the intersection of 73st Street and Hell-On-Wheels Avenue. This report describes the collection and analysis of soil data from SWMU FH-038D, Building 32019 Electrolyte Holding Tank which is one of 35 SWMUs investigated during the RFI conducted November 1996 through October 1998.

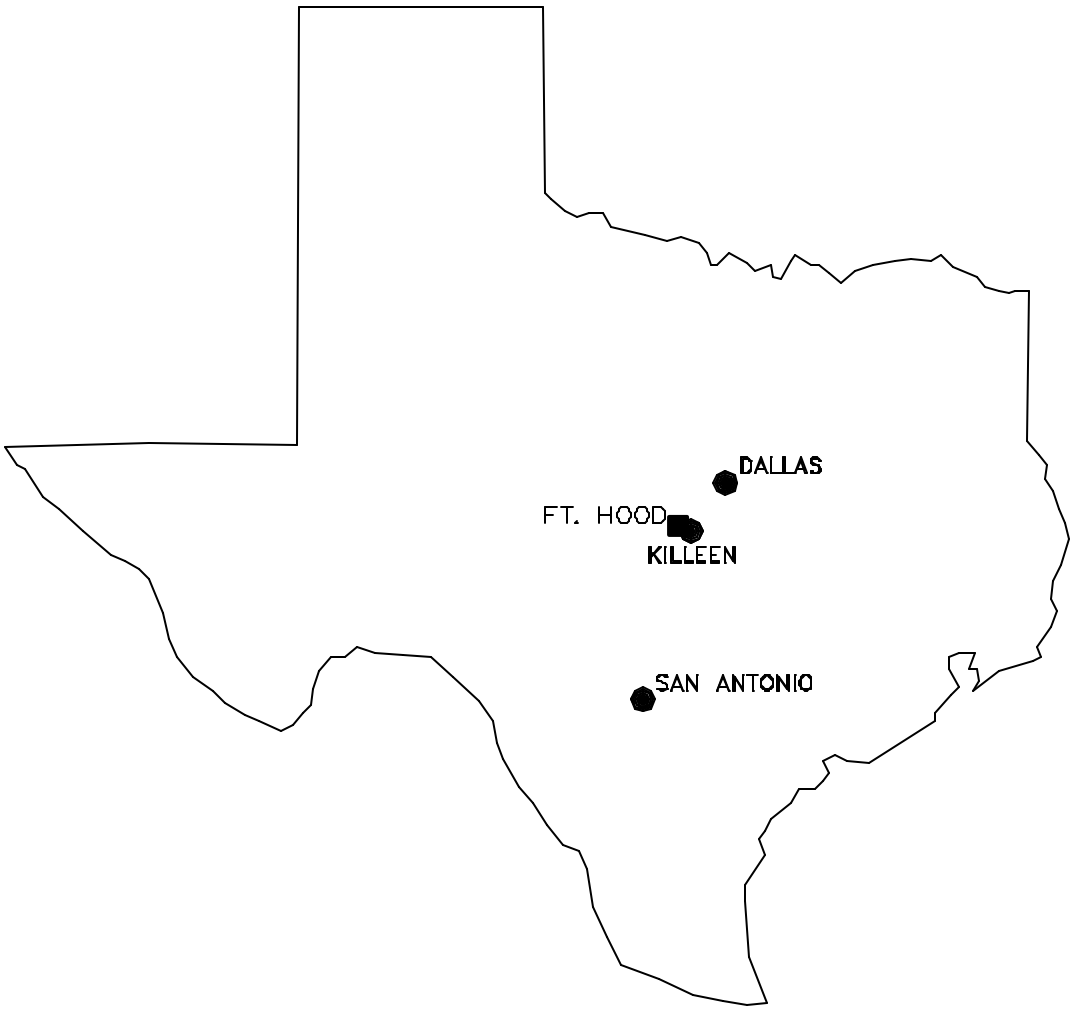
1.1 BACKGROUND

FH-038D is one of four SWMUs adjacent to battery shops. Each battery shop is a free-standing building within a tactical motor pool facility in the main cantonment. Each shop is approximately 35 ft by 35 ft in size, with an underground holding tank located adjacent to the building. According to the RFI Work Plan for 35 SWMUs (USACE 1995) and the Tank Removal Report (ACE, Inc. 1998) these underground tanks are reported to have been 300-gallon fiberglass cylindrical tanks contained within concrete vaults with a steel cover. They were installed in 1982 and used until 1992 (CP&Y, Inc.1998), and removed in April and May 1998. The only known material handled in the tank was neutralized spent lead-acid battery electrolyte.

1.2 SCOPE AND OBJECTIVES

The objective of the RFI at FH-038D was to determine if a release of spent electrolyte drained to the tank has occurred. This report assesses the nature of soil contamination at the site and evaluates what, if any, corrective measures are needed.

The specific objectives of the investigation of FH-038D were as follows:



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FORT HOOD, TEXAS

RCRA FACILITY INVESTIGATION

FORT HOOD
VICINITY MAP

Science Applications International Corporation — Columbus, Ohio

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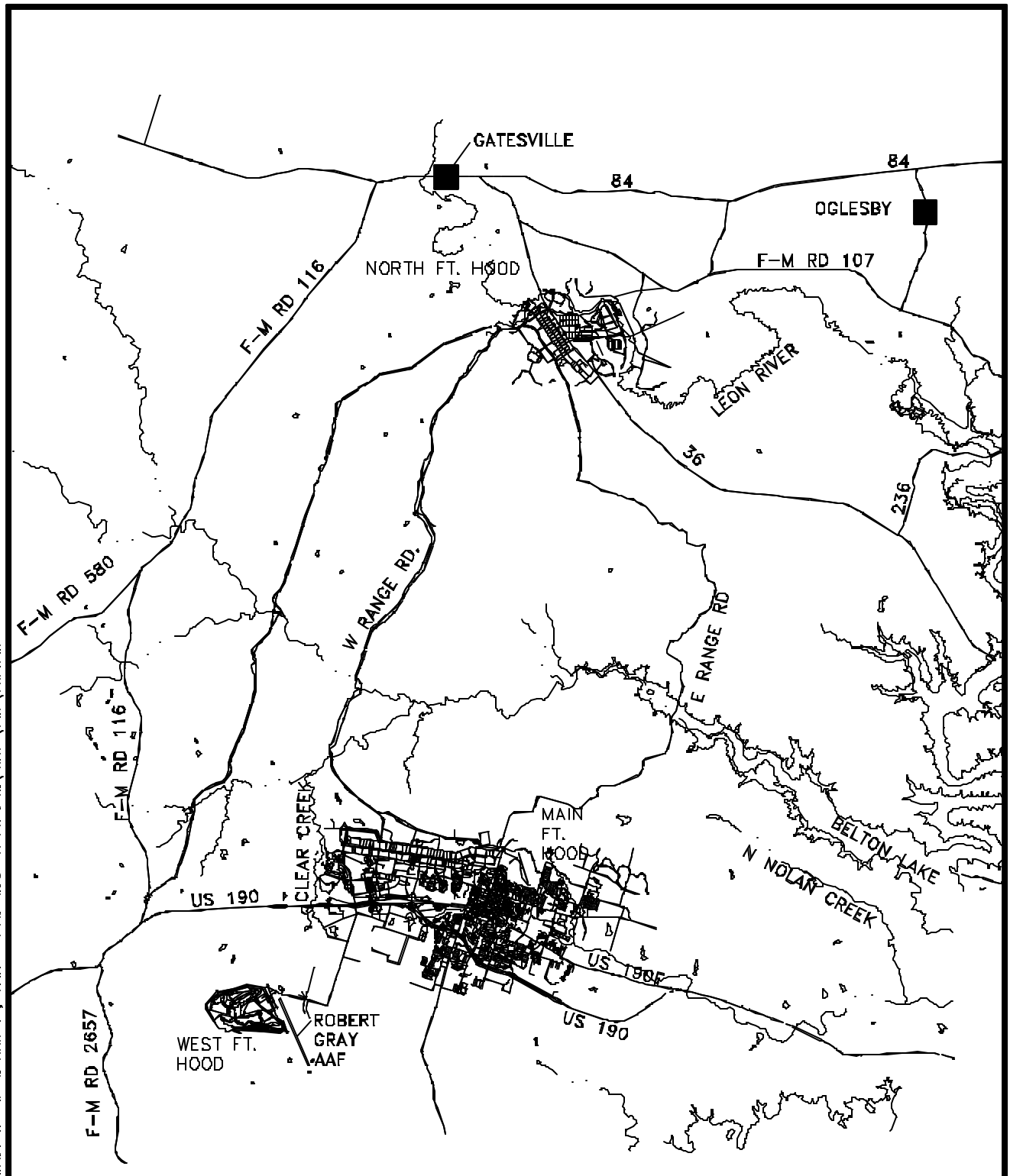

LEGEND

- MAJOR ROADS
- RIVERS/STREAMS
- WATER BODIES

U.S. ARMY
FORT HOOD, TEXAS

RCRA FACILITY INVESTIGATION

FT. HOOD INSTALLATION MAP

Science Applications International Corporation — Columbus, Ohio

DRAWN	CHECKED	DATE	SCALE	PROJECT NO.	FIGURE NO.
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- determine presence or absence of lead in surface and subsurface soils associated with the tank and piping;
- characterize migration potential of any lead contamination identified in the surface and subsurface soils;
- determine if groundwater is present below the former tank pit and if present, determine if the groundwater is contaminated;
- evaluate the potential human health risks associated with contaminants detected in surface and subsurface soils; and
- determine what, if any, corrective measures are needed to address contamination associated with SWMU FH-038D.

RFI investigations included field sampling and laboratory analysis of surface and subsurface soils. The sampling and analysis program was conducted in accordance with the Final RCRA Facility Investigation Work Plan for Fort Hood Site FH-038D (USACE 1995).

2.0 ENVIRONMENTAL SETTING

This section describes the physical characteristics of FH-038D and its surroundings. The geology, physiography, and climate are presented using regional and site-specific data where available.

2.1 PHYSIOGRAPHIC SETTING

Fort Hood is located within the eastern edge of the Lampasas Cut Plains region of the North-Central Plains physiographic province. The topography of Fort Hood consists of small stream valleys separated by ridge-forming mesas. Relief is as great as 340 ft. The Black and Blackwell Mountains are prominent features north of the main cantonment, as are Seven Mile Mountain at West Fort Hood, and the Dalton Mountains southwest of North Fort Hood. A topographic map of the main cantonment of Fort Hood is provided in Figure 2.1.

Local relief of the main cantonment and at West Fort Hood is generally less than 100 ft, with flat to gently rolling topography. Elevations on the main cantonment range from 860 to 940 ft above mean sea level (msl). SWMU FH-038D elevation is approximately 930 ft above msl.

The rivers, streams, and creeks that constitute the main surface water pathways at Fort Hood are shown on Figure 2.1. The main cantonment lies along a watershed divide between Belton Lake and the Leon River, downstream from the lake. The western and north-central parts of the main cantonment are drained by Clear Creek, which discharges to House Creek. House Creek is a tributary to the eastward-flowing Cowhouse Creek, which discharges to Belton Lake, a man-made reservoir. South Nolan Creek and North Nolan Creek both originate on Fort Hood and flow eastward to the Leon River, below Belton Lake.

2.2 GEOLOGIC CONDITIONS

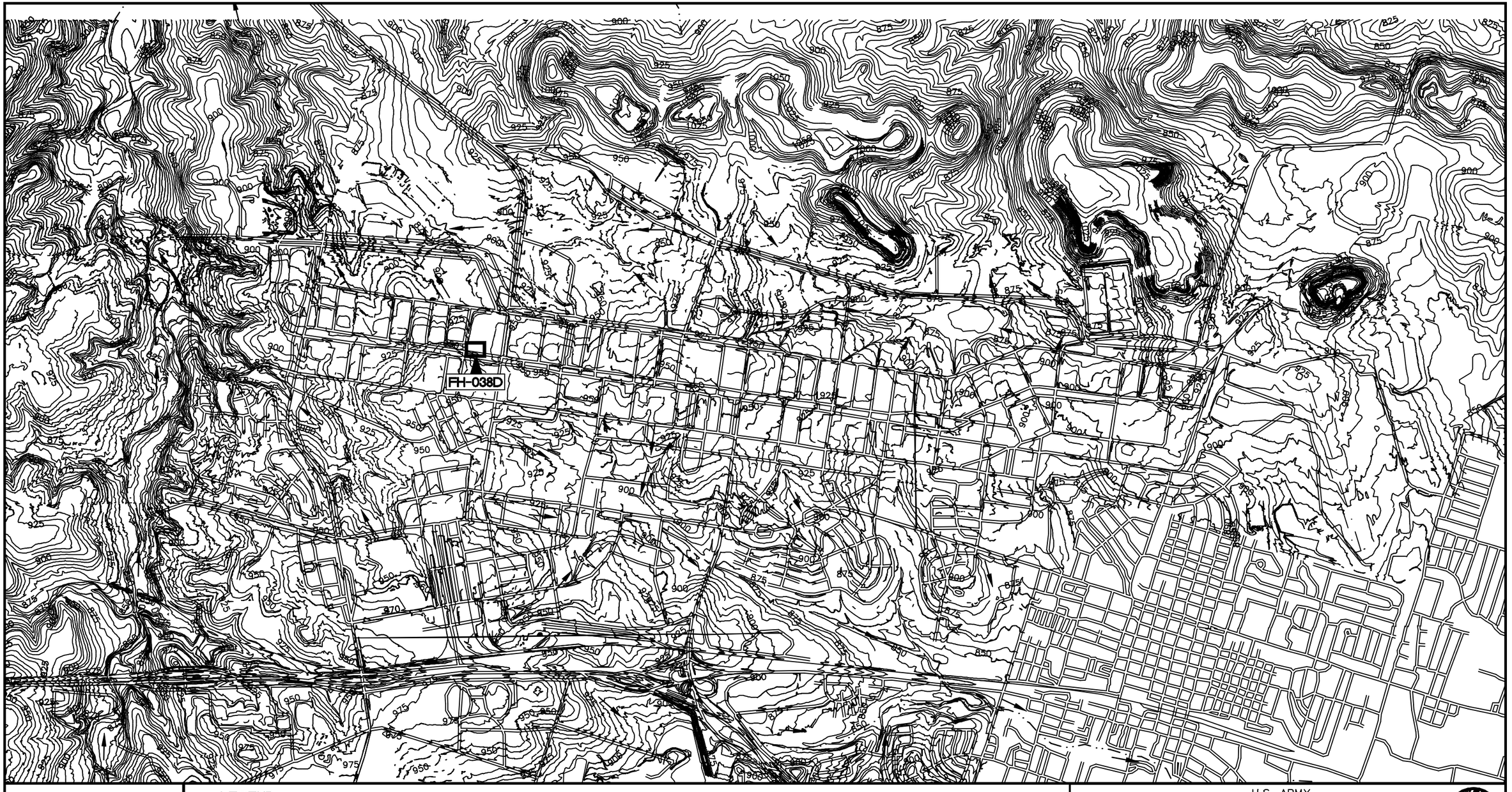
A summary of the geology of the Fort Hood area relevant to this RFI is adapted from the Final RCRA Facility Investigation Work Plan, 35 Solid Waste Management Units, Fort Hood, Texas (USACE 1995). Relevant information on the occurrences of soils and bedrock has been incorporated to further characterize the geology of FH-038D and its surroundings.

2.2.1 Bedrock

Lower Cretaceous marine sedimentary rocks make up the stratigraphy underlying Fort Hood. The Fredericksburg Group consists of several stratigraphic units. The Walnut Formation is the lowermost unit of the Fredericksburg Group and is the dominant stratigraphic unit in the main cantonment. It consists of shales with inter-bedded limestone, chalky nodular limestone, and shell aggregates. The fossiliferous Walnut Formation is exposed in many locations at Fort Hood. It varies in thickness from 100 to 150 ft (BEGM 1979). The Comanche Peak Formation and an undifferentiated unit overlie the Walnut Formation, but are present at the surface only north of the main cantonment in the Black and Blackwell Mountains, and on West Fort Hood on Seven Mile Mountain. Bedrock dips gently to the southeast throughout the area. Inactive faults are present in the subsurface to the east of Fort Hood along the Balcones Fault Zone, which runs through Bell, McLennan, and Hill Counties.

2.2.2 Unconsolidated Materials

Alluvial deposits of Quaternary age are present along stream valleys on the main cantonment, specifically



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N
True North

400 0 400 800
METERS

LEGEND

- TOPOGRAPHIC CONTOUR (FT.)
- DRAINAGE
- SURFACE DRAINAGE FLOW
- FH-038D

U.S. ARMY
FORT HOOD, TEXAS

RCRA FACILITY INVESTIGATION

TOPOGRAPHY AND DRAINAGE
OF MAIN FT. HOOD

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DRAWN	CHECKED	DATE	SCALE	PROJECT NO.	FIGURE NO.
SC			AS SHOWN		2.1

along South Nolan Creek on the southern edge of the cantonment (USACE 1995). It is suspected that much alluvium and other natural surface deposits have been reworked during construction projects throughout the active life of Fort Hood.

2.3 CHARACTERIZATION OF SOILS

In many areas of the main cantonment, silty clay or sandy clay soils overlie bedrock. In upland areas, these soils contain abundant rock fragments. In general, these soils have low permeabilities (USDA 1985a,b). They range in thickness from 15 to 20 ft. Because soils have been extensively reworked for construction and landfilling in the SWMUs that were investigated, it is difficult to apply the USDA classification to the soils encountered on the main cantonment.

No investigations prior to the RFI have been performed at any of the electrolyte tank sites to determine if a release has occurred. However, one soil boring was installed at FH-038D in 1980 by the USACE. The boring was completed to a depth of 3 ft. The boring log for this hole is provided in the RFI Work Plan for 35 SWMUs (USACE 1995) and was originally part of the as-built drawings.

2.4 CHARACTERIZATION OF CLIMATE

The climate of the Fort Hood-Killeen area can be characterized as semi-arid continental. Winters (December-March) are mild, with the average daily maximum temperature in January (the coldest month) reaching 60° F. Below-freezing temperatures occur on an average of 23 days per year. The normal daily winter temperature range is 42 to 62° F. At times, strong northerly winds accompanied by sharp drops in temperature occur during the winter months. Summers (June-September) are hot and dry. The average daily maximum temperature in August, the hottest month, reaches 95.9° F. The normal daily temperature range for summer is 75 to 95° F. The average daily temperature in Killeen is 68.1° F.

Average annual rainfall in the Killeen area is 30.4 inches, and is most concentrated from September to May (U.S. Army 1996). Snowfall is rare. The average annual humidity in the region is 55 percent. Total rainfall for 1996 at Fort Hood was 26.7 inches. Severe weather in the form of heavy rain, hail storms, and ice storms is common in the winter months.

3.0 UNIT CHARACTERIZATION

FH-038D is in an industrial area of the main cantonment where the ground surface is covered with a thick concrete hardstand. Figure 3.1 shows the location of FH-038D. The only known material handled at this and the other three FH-038 SWMUs was spent lead-acid battery electrolyte. Electrolyte from batteries was poured into a stainless steel sink, diluted with water, and neutralized with sodium bicarbonate (U.S. Army 1992). The pH of the solution was checked with pH paper. When a pH of 7 was achieved, the sink drain was opened, and the mixture was allowed to drain to the underground 300-gallon fiberglass storage tank. Sludge or sediment may also have settled in the bottom of the tank. The tank was constructed with a grated top, allowing access for a final pH test before the effluent was discharged to the sanitary sewer. The tank was contained in a reinforced concrete vault.

The tank removal action took place during May 12, 1998 through June 8, 1998. The physical condition of the fiberglass tank was sound with no evidence of cracks. However, the influent and effluent piping entering the tank were deteriorated and had holes. Figure 3.2 shows two photographs: one photograph of the FH-038D area prior to the tank and containment vault removal (taken May 20, 1998) and another of the removal of the concrete vault (taken May 28, 1998). The top photograph in Figure 3.2 is facing east and the bottom photograph is facing northeast. The containment-vault's inside dimensions were approximately 6 ft by 8 ft by 7 ft deep with a wall thickness of roughly 10 inches made of reinforced concrete. Presented in Figure 3.3 are two photographs: one of FH-038D looking down into the tankhold during the tank and containment vault removal action (May 28, 1998), and another of the site (facing east) after repaving of the area (taken April 1999). No other construction details or historical operational data about the site relevant to the RFI have been discovered. No previous investigations have been performed at any of the electrolyte tank sites to determine if a release has occurred.

MOTOR REPAIR SHOP

BN STO BLDG

BN STO BLDG
32001

FH-038D
FORMER
TANKHOLD

35016

CE

32019

32018 DISPATCH
OFFICE

CALI BL

950

AREA

PARK AVE

PARKING

940

AREA

930

MAIN FT. HOOD LOCATION MAP

N
True North

10 0 10 20
METERS

LEGEND

825 — TOPOGRAPHIC CONTOUR (FT.)

FENCE

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FORT HOOD, TEXAS

RCRA FACILITY INVESTIGATION

FH-038D LOCATION MAP

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SCALE	FIGURE NO.
AS SHOWN	3.1

Surface of FH-038D prior to removal of tank and concrete vault.

Tankhold Pit during removal of tank and concrete vault.

Figure 3.2 Photographs of FH-038D

Tankhold Pit during removal of tank and concrete vault.

FH-038D after removal action and repaving.

Figure 3.3 Photographs of FH-038D

4.0 CHARACTERIZATION OF UNIT CONTAMINATION

The RFI field program was designed to do the following at SWMU FH-038D:

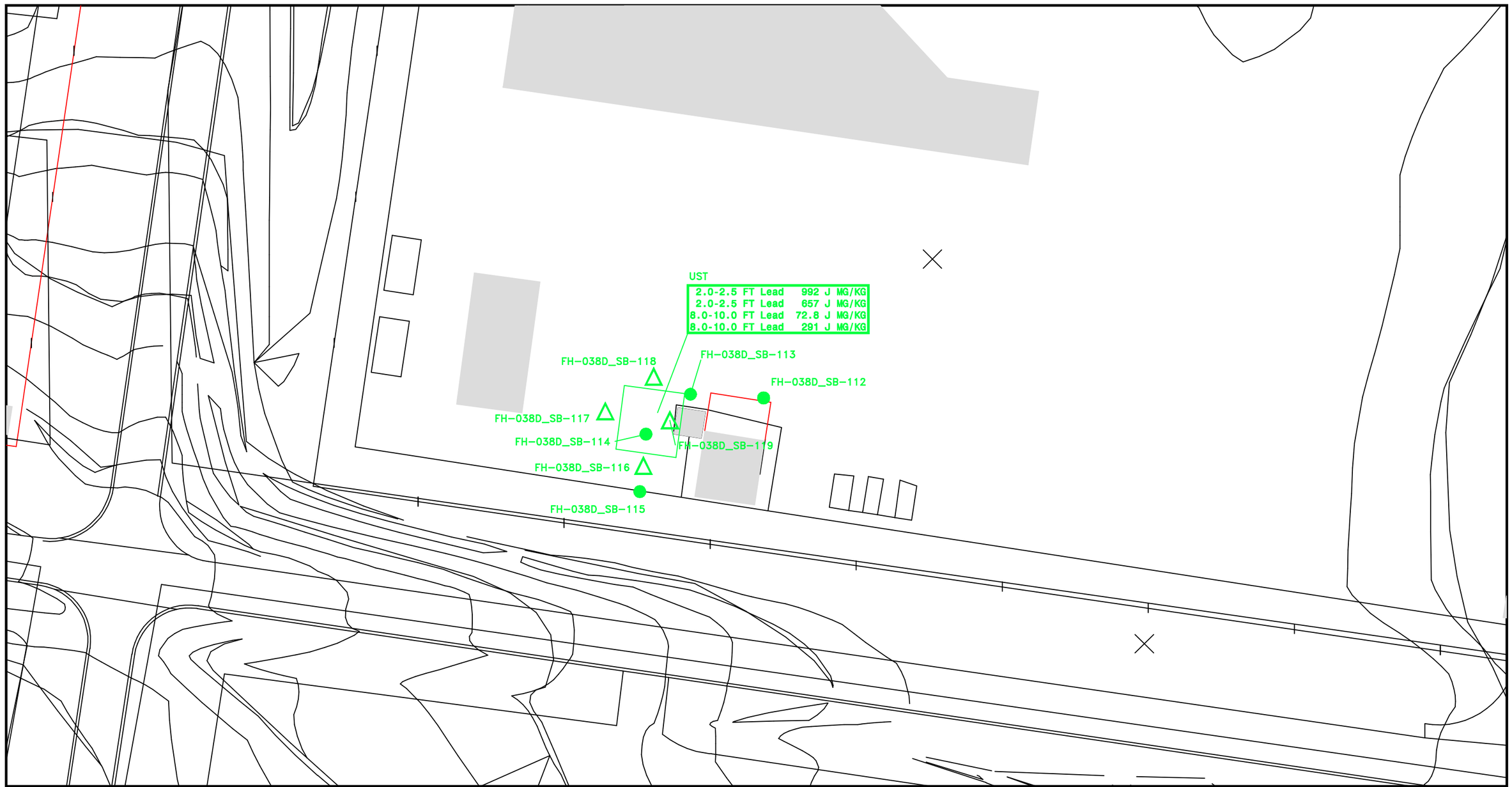
- confirm the presence or absence of contaminants in the soils associated with the tank and its piping;
- determine if groundwater is present below the tank and if present, determine if the groundwater is contaminated;
- characterize the migration potential of the contaminants identified in the soils; and
- obtain information about the local geological conditions at the site.

4.1 TECHNICAL APPROACH

Both surface (0 - 2 ft below the concrete hardstand) and subsurface soils (> 2 ft below the concrete hardstand) were sampled at FH-038D. Contaminant concentrations will vary based on soil depth due to the chemical nature of the contaminant and the method by which the contaminant is deposited in the soil (i.e., spills, leaks and atmospheric deposition). At FH-038D the contaminant of concern is lead which readily adheres to soil particles and would, therefore, be transported along with the soil particles. The highest concentrations of lead would be found in the immediate area of the source of contamination (leak or spill from tank or piping) with concentrations decreasing as one moves away from the source. Exposures associated with surface soils (direct contact) will differ from exposure, if any, associated with contaminants in deeper soils. At FH-038D, direct contact with surface soils is not likely because the entire site is covered with concrete.

The initial investigation, which took place in February 1997, included four soil borings (SB112, SB113, SB114 and SB115) advanced along the northeast, north, west, and southwest sides of the underground tank at FH-038D, respectively. The locations of the sampling points in FH-038D are shown in Figure 4.1. The borings were sited around the underground tank at distances of 14 to 40 ft. Figure 4.1 shows the offset distances for all the soil boring /geoprobe locations. These four soil borings were advanced using a hollow stem auger rig (4 1/4 inch, 1D augers) and all samples were collected using a 2 inch split spoon sampler. Down-hole, breathing-zone, and head-space organic vapors were monitored during sampling activities. There was no indication of contamination from the field monitoring or visual inspection. The samples were analyzed for lead, the principal material associated with the battery acid tanks. Groundwater was encountered at SB114 and a sample was collected and analyzed for lead. All sample collection, sample handling, chain-of-custody, and other field activities were conducted in accordance with the RCRA Facility Investigation Work Plan for 35 SWMUs (USACE 1995).

The initial four soil borings at FH-038D were sampled at the surface (0 to 2.0 feet), at 4.0 feet, at 9.0 feet, and at total depth (approximately 34.0). Because of the presence of the concrete hardstand, 1-2 ft below ground surface (bgs) is regarded as a surface soil sample. No bottom of hole sample (approximately 35.0) was collected from SB115 since there was no sample recovery from that depth. Soil borings SB112, SB113, SB114 and SB115 were advanced 34.0 feet, 34.0 feet, 35.0 feet and 35.0 feet deep, respectively. Bedrock was encountered at 32 ft in SB112, SB113, and SB115, and at 31.5 ft in SB114. There was no visual signs of contamination in any of the soil borings. No groundwater was immediately encountered at any of the soil borings. However, when the sampling team returned to the soil borings at FH-038D after a few days, at SB114 groundwater was present at approximately 10.5 feet bgs. A groundwater sample was collected and analyzed for lead. The boring logs for FH-038D are presented in Appendix A.



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MAIN FT. HOOD LOCATION MAP

N
True North

8 0 8 16
METERS

LEGEND

825 — TOPOGRAPHIC CONTOUR (FT.)

— · · — DRAINAGE

——— FENCE

Arsenic 13.3 MG/KG — MAY 1998 SAMPLING

● SOIL BORING

◇ ESTIMATED SOIL BORING LOCATION

U.S. ARMY
FORT HOOD, TEXAS

RCRA FACILITY INVESTIGATION

FH-038D Soil Sample Locations and Results Above Screening Criteria

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SCALE		FIGURE NO.
AS SHOWN		4.1

Fort Hood had planned to remove the tank at FH-038D from service separate from the RFI. A copy of a section of the removal action report for the FH-038D tank prepared by Anderson Columbia Environmental is included in Appendix B. During May 1998 the 300 gallon fiberglass holding tank and the containment- vault were removed and disposed. After the tank, containment-vault, bedding, and fill material had been removed, the resulting tankhold pit's dimensions were approximately 15 ft by 15 ft by 10 ft deep. The bedding and fill was not entirely removed and some soil/fill/gravel still remained in place. The tankhold pit remained dry after the concrete vault removal. Four confirmatory soil samples were collected from the tankhold pit: two from the bottom of the tankhold pit (three feet from the center of the east and west walls), and two from the side walls (immediately below the inlet and outlet drain pipes). Soil samples 38SB167 and 38SB169 were collected from side walls, six inches below the outlet pipe (west wall) and the inlet pipe (east wall), respectively. Soil samples 38SB168 and 38SB170 were collected from the bottom of the tankhold pit (10 feet deep) 3 feet east of the west wall and 3 feet west of the east wall, respectively. The soil samples were collected by hand method and analyzed for lead. No water was encountered during this sampling event. After confirmatory sample collection the tankhold pit was backfilled to prevent a potential falling and confined-space hazard and then, re-paved with concrete.

In October 1998 additional soil samples were taken to determine the extent of contamination previously identified by sampling at the site during the tank removal. Five geoprobe soil borings were advanced with continuous sampling attempted every 2 feet from ground surface until refusal except within the former tankhold pit. Two geoprobe soil borings SB119 and SB120 were advanced approximately 4.5 feet from the east and west walls within the former tankhold pit. Samples were collected at a beginning depth of 10.0 feet bgs that represents the depth to soil after the tank removal action. Three soil borings were advanced within a few feet of the south, west, and north sides of the former tankhold pit at FH-038D (SB116, SB117, and SB118). Water was encountered in SB117. However, it was apparent that the water was flowing into the borehole from the sub-base gravel beneath the pavement, and, therefore was not sampled. All soil borings have been closed in accordance with applicable requirements and the Work Plan.

4.2 UNIT INVESTIGATION AND ANALYTICAL RESULTS

Summary analytical results for FH-038D are provided in their entirety in Appendix C. Table 4.1 summarizes the lead analytical results in soil above practical quantitation limits (PQLs) during the three phases of investigation conducted at FH-038D. Samples which contained lead above the PQL were screened against background screening criteria as described in Section 4.3 and Section 5.0.

4.2.1 Surface Soil Analytical Results

Because of the presence of concrete hardstand throughout the FH-038D area, 1-2 ft below ground surface (bgs) is regarded as a surface soil sample. Lead was detected above the PQL in all surface soil samples collected from the nine soil borings at FH-038D at concentrations ranging from 2.7 ppm (SB113) to 5.3 ppm (SB117). None of these values exceeds the 95% UTL background screening value for lead of 19.0 ppm.

4.2.2 Subsurface Soil Analytical Results

Lead was present above PQLs in every subsurface soil sample collected in February 1997 and October 1998 from the tankhold pit and soil borings completed in the vicinity of FH-038D. Concentrations of lead in samples collected from the soil borings ranged from 2.3 ppm at SB116 (10.0 ft to 11.5 ft) to 15.7 ppm at SB119 (10.0 ft to 10.5 ft deep). None of the subsurface soil samples collected from the soil borings exceeded the 95% UTL background screening value for lead of 19.0 ppm.

Table 4.1 FH-038D Analytes Detected in Soil Above Practical Quantitation Limits (PQLs)

Location	Sample ID	Depth	Analysis Type	Parameter	Result	PQL	Units
SB116	38SB174	6.0-8.0	Metals	Lead	7.3	0.18	mg/kg
	38SB175	8.0-10.0	Metals	Lead	3.7	0.18	mg/kg
	38SB176	10.0-11.5	Metals	Lead	2.3	0.15	mg/kg
SB117	38SB177	0.0-2.0	Metals	Lead	5.3	0.16	mg/kg
	38SB178	4.0-6.0	Metals	Lead	6.7	0.18	mg/kg
	38SB179	6.0-8.0	Metals	Lead	13.1	0.18	mg/kg
	38SB180	8.0-10.0	Metals	Lead	8.4	0.18	mg/kg
	38SB181	10.0-11.5	Metals	Lead	3.4	0.16	mg/kg
SB118	38SB198	0.0-2.0	Metals	Lead	4.4	0.16	mg/kg

Table 4.1 FH-038D Analytes Detected in Soil Above Practical Quantitation Limits (PQLs)

Location	Sample ID	Depth	Analysis Type	Parameter	Result	PQL	Units
SB114	38SB109	4.0-4.5	Metals	Lead	4.9	0.16	mg/kg
	38SB110	9.0-10.0	Metals	Lead	5.7	0.21	mg/kg
	38SB111	34.0-35.0	Metals	Lead	2	0.20	mg/kg
SB115	38SB105	1.0-2.0	Metals	Lead	4.9	0.17	mg/kg
	38SB106	4.0-5.0	Metals	Lead	6	0.17	mg/kg
	38SB107	9.0-10.0	Metals	Lead	2.7	0.15	mg/kg
SB116	38SB171	0.0-2.0	Metals	Lead	4.5	0.16	mg/kg
	38SB172	2.0-4.0	Metals	Lead	4.0	0.16	mg/kg
	38SB173	4.0-6.0	Metals	Lead	4.6	0.16	mg/kg

Table 4.1 FH-038D Analytes Detected in Soil Above Practical Quantitation Limits (PQLs)

Location	Sample ID	Depth	Analysis Type	Parameter	Result	PQL	Units
SB112	38SB125	1.0-2.0	Metals	Lead	4.2	0.20	mg/kg
	38SB126	4.0-5.0	Metals	Lead	3.7	0.20	mg/kg
	38SB127	9.0-10.0	Metals	Lead	4	0.21	mg/kg
	38SB128	33.0-34.0	Metals	Lead	2.7	0.21	mg/kg
SB113	38SB121	1.0-2.0	Metals	Lead	2.7	0.21	mg/kg
	38SB122	4.0-5.0	Metals	Lead	2.7	0.20	mg/kg
	38SB123	9.0-10.0	Metals	Lead	6.8	0.23	mg/kg
	38SB124	33.0-34.0	Metals	Lead	2.6	0.19	mg/kg
SB114	38SB108	1.0-2.0	Metals	Lead	4.6	0.17	mg/kg

Table 4.1 FH-038D Analytes Detected in Soil Above Practical Quantitation Limits (PQLs)

Location	Sample ID	Depth	Analysis Type	Parameter	Result	PQL	Units
SB118	38SB199	2.0-4.0	Metals	Lead	4.7	0.16	mg/kg
	38SB400	4.0-6.0	Metals	Lead	4.3	0.16	mg/kg
	38SB401	6.0-8.0	Metals	Lead	7.8	0.18	mg/kg
	38SB402	8.0-10.0	Metals	Lead	3.3	0.15	mg/kg
	38SB403	10.0-11.5	Metals	Lead	3.9	0.15	mg/kg
SB119	38SB185	10.0-11.5	Metals	Lead	4.3	0.16	mg/kg
	38SB404	10.0-10.5	Metals	Lead	15.7	0.16	mg/kg
SB120	38SB405	10.0-11.1	Metals	Lead	8.9	0.17	mg/kg
UST	38SB167	2.0-2.5	Metals	Lead	992 J	0.15	mg/kg

Table 4.1 FH-038D Analytes Detected in Soil Above Practical Quantitation Limits (PQLs)

Location	Sample ID	Depth	Analysis Type	Parameter	Result	PQL	Units
UST	38SB168	8.0-10.0	Metals	Lead	657 J	0.16	mg/kg
	38SB169	2.0-2.5	Metals	Lead	72.8 J	0.15	mg/kg
	38SB170	8.0-10.0	Metals	Lead	291 J	0.16	mg/kg

J - Indicates estimated value

The four subsurface confirmation soil samples collected from the open tankhold in May 1998 exceeded the 95% UTL background criterion for lead of 19.0 ppm. The values ranged from 72.8J ppm (SB169, 6 inches inlet pipe on the east wall) and 992J ppm (SB167, 6 inches below the outlet pipe on the west wall). The two sampled from the bottom of the pit had lead concentrations of 657J ppm (SB168) and 291J ppm (SB170).

4.2.3 Groundwater Analytical Results

One water sample was collected during the February 1997 sampling event from SB115 and analyzed for lead. No other groundwater was encountered during the subsequent sampling events. Lead was not detected in the sampled groundwater.

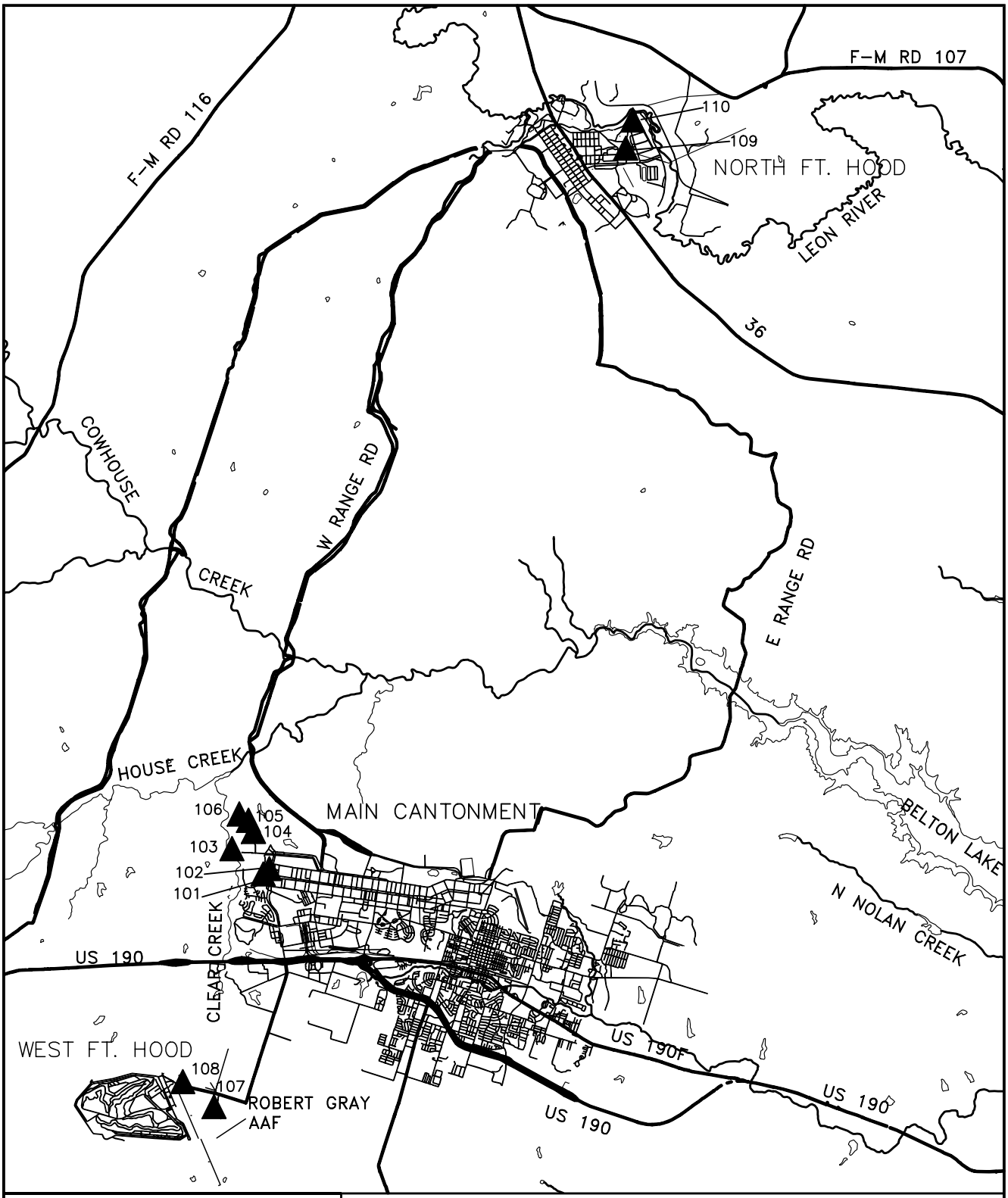
4.2.4 Disposition of Investigation Derived Waste (IDW)

All IDW generated during drilling at FH-038D was stored in 55 gallon drums. All drums were clearly identified with Department of Transportation (DOT) - approved labels containing the drum's contents, the date they were filled, and the SWMU where the IDW was generated. IDW from the FH-038 drums were staged in the SAIC compound pending disposition. Analytical results from corresponding soil samples were used to determine whether a drum's contents were hazardous or non-hazardous. Contaminant levels were screened against the Resource Conservation and Recovery Act (RCRA) "20 times" rule for the Toxicity Characteristic Leaching Procedure (TCLP). The "20 times" rule for TCLP means that lead would have to be detected in the corresponded soil samples at concentrations greater than or equal to twenty times the respective leachate concentration listed in 30 TAC Chapter 335, Subchapter R, Appendix 1, Table 1,for the IDW to be considered hazardous. A total of 19 drums of solid IDW and 14 drums of liquid IDW was generated at the four FH-038 areas (FH-038A, FH-038D, FH-038C, and FH-038D). Eighteen drums of solid IDW was determined to be non-hazardous by this method was transported to the Fort Hood Sanitary Landfill for disposal. One drum of solid IDW was determined to be hazardous and was delivered to the Fort Hood Directorate of Public Works Classification Units with the accompanying characterization data. Fourteen drums of liquid IDW were generated from the four FH-038 SWMUs from the decontamination of the geoprobe rig and other sampling equipment. Thirteen drums of liquid IDW was non-hazardous and was disposed of at the 1st Calvary Division Tactical Vehicle Wash Facility. The drums containing the non-hazardous liquid are expected to contain a significant amount of sediment. The Vehicle Wash Facility is a closed loop system consisting of three ponds used to settle out the dirt and sediment washed off the armored vehicles. For this reason, disposal at the 1st Calvary Division Tactical Vehicle Wash Facility was determined to be more appropriate than discharging the liquid to the sanitary sewer system. One liquid IDW drum was determined to by hazardous and was delivered to the Fort Hood Directorate of Public Works Classification Units with the accompanying characterization data.

4.3 BACKGROUND CHARACTERIZATION AND COMPARISONS WITH WASTE UNIT SAMPLING RESULTS

In order to characterize naturally occurring constituents in soils at Fort Hood, background samples were collected at 10 separate locations within the facility boundaries in the north, west, and main cantonments. Sampling locations were selected to be outside the influence of past or current industrial and/or waste activities at the facility. The general background sampling locations are presented in Figure 4.2. Background soils data and soil boring logs are presented in Appendices D and E, respectively.

Background soil samples were analyzed for the following metals: arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver. Two statistical methods could be used to determine if there is a statistically



LEGEND

- MAJOR ROADS
- RIVERS/STREAMS
- WATER BODIES
- BACKGROUND SOIL SAMPLE LOCATION

U.S. ARMY
FORT HOOD, TEXAS

RCRA FACILITY INVESTIGATION

LOCATIONS OF BACKGROUND SOIL SAMPLES

SAIC® Science Applications International Corporation — Columbus, Ohio

DRAWN	CHECKED	DATE	SCALE	PROJECT NO.	FIGURE NO.
SC			1"=5000M		4.2

NAME: S:\HOOD\BACK.DWG DATE: OCT 13, 1999 TIME: 5:22 PM PCP: S:\HOOD\PCP\FRP.PCP

significant difference between background soil concentrations and the concentrations of lead detected in FH-038D samples. Background statistical calculations were determined based on metal results from the combined data set of surface soil (0 - 2 ft bgs) and subsurface soil (> 2 ft bgs) results with duplicate results excluded from the data sets.

The statistical methods to be used to evaluate the background soil results are presented in Section 6 of the Final RCRA Facility Investigation Work Plan (USACE 1995). The methods include a 95% upper tolerance limit (UTL) calculation and an overall data set mean background concentration. The primary statistical method for screening data is to compare SWMU data to the respective background 95% UTL values. The 95% UTL is an estimate of the 95th percentile of the population of background concentrations. The UTL is a value such that, with a high degree of confidence, 95% of all concentrations would be less than the UTL value. The result of the 95% UTL calculation for lead in background soils is 19.0 mg/kg (Table 4.2) which was used as the background screening value.

The second statistical method to be used is either a mean comparison using the t-test, or the Wilcoxon Rank Sum Test. The second statistical method to be used is dependent on the distribution of the data set. The t-test is to be used on data sets that have a normal distribution or that can be transformed to a normal distribution. For the FH-038D results were collected from three rounds of sampling. The lead concentrations from the first and third round of sampling found no lead at concentrations greater than the 95% UTL. The results of the second round, May 1998, sampling event indicated lead was present in all four samples at concentrations greater than the 95% UTL. A statistical evaluation was not necessary to determine that these results were significantly different than background, therefore neither the T-test nor the Wilcoxon Rank Sum Test were calculated.

The flow chart from the RCRA Facility Investigation Work Plan for 35 SWMU's (USACE 1995) used for the statistical evaluations is provided in Appendix F. Spreadsheets with the calculations for the 95% UTLs, means, standard deviations, and Shapiro-Wilk test along with equations are presented in Appendix F.

Table 4.2 Statistical Analysis of 95% UTL Concentrations Background Soils

Analyte (units)	Mean	95% UTL	Maximum Detect	Results > Detection Limit	Distribution
Background Soils:					
Lead (mg/kg)	5.77	19.04	33.20	44/44	L

L-distribution most similar to log normal.

5.0 SCREENING ANALYSIS

The Texas Natural Resource Conservation Commission (TNRCC) has promulgated risk reduction standards (30 TAC 335, Subchapter S) for soils and groundwater for residential and industrial land uses. Risk Reduction Standards (RRSs) Number 1 are defined as 95% UTL background concentrations or PQL values, whichever are greater. RRSs Number 2 are health-based standards and criteria that are deemed protective of human health or the environment. The TNRCC RRSs have been used to screen the data generated at FH-038D to determine whether or not constituents are present at the site at concentrations that warrant further investigation.

The TNRCC RRS, Number 1 for lead was used to determine if there has been a release of hazardous constituents from the site. In order to determine whether there has been a release at FH-038D, soil sample results were compared to the 95% UTL background concentration level for lead. Background soil levels (95% UTL) were determined for lead in accordance to the Work Plan, and the results are presented in Section 4.3. Lead detected above background levels could indicate a potential release from the unit. In order to determine whether or not the concentrations of lead detected at FH-038D warrant further action, sample results were screened against the TNRCC RRS Number 2 for lead.

5.1 SHALLOW SOIL SCREENING RESULTS

The results from the shallow soil samples (1 ft to 2 ft bgs) collected in February 1997, prior to tank removal, and in October 1998 indicated that lead was present in shallow soils at concentrations greater than the PQL but not greater than the 95% UTL (TNRCC RRS Number 1) for lead (19.0 ppm). Consequently, the shallow soils present no risk to human health and the environment.

5.2 SUBSURFACE SOIL SCREENING RESULTS

The results of the subsurface soil sampling collected in February 1997, prior to tank removal, and in October 1998 indicated that lead was present at concentrations above PQLs but not greater than the 95% UTL for lead. Subsurface soil samples collected in May 1998, during the tank removal action, had lead concentrations (657J ppm and 291J ppm) in subsurface soils taken from two locations at the bottom of the excavated tankhold (approximately 10.0 bgs) that exceeded the TNRCC RRS Number 1 (95% UTL of 19.0 ppm), identifying a release at the unit. Two samples were also taken in May 1998 from the tankhold walls, directly below the inlet and outlet piping (2-2.5 ft bgs), and had lead concentrations of 72.8 J ppm and 992 J ppm, respectively, that also exceeded the TNRCC RRS Number 1. Table 5.1 presents the sampling results above the screening criteria. Appendix G includes the screening results for all samples collected.

Table 5.1 FH-038D Soil Analytes Above Screening Criteria

Location	Sample ID	Depth	Parameter	Result		Units	Screening Criteria	Screening Concentration	Units
UST	38SB167	2.0-2.5	Lead	992	J	mg/kg	Soil Background	19	mg/kg
	38SB168	8.0-10.0	Lead	657	J	mg/kg	Soil Background	19	mg/kg
	38SB169	2.0-2.5	Lead	72.8	J	mg/kg	Soil Background	19	mg/kg
	38SB170	8.0-10.0	Lead	291	J	mg/kg	Soil Background	19	mg/kg

J - Indicates estimated value

6.0 INVESTIGATION ANALYSIS

6.1 DATA QUALITY ASSURANCE/QUALITY CONTROL

The Fort Hood RFI Work Plan, the contract laboratory's Quality Assurance Plan, and USEPA SW-846 or other approved procedures for analytical chemistry and physical testing methods were followed for field and laboratory quality assurance/quality control (QA/QC) of FH-038D samples. Field QC samples included; trip blanks, rinsate blanks, field duplicates, and split samples. All QA and QC samples were collected as replicate samples of the same field sample. The QA and QC samples were collected at a frequency of 10 percent and analyzed along with the associated environmental samples. Laboratory QC procedures as prescribed by each analytical method were followed by the contract laboratory and included, where applicable; gas chromatography/mass spectrometry (GC/MS) tuning, initial and continuing calibrations, method/extraction blanks, laboratory control samples (LCS), surrogate spikes, internal and external standards, duplicates, matrix spikes/matrix spike duplicates (MS/MSDs), inductively coupled plasma (ICP) and atomic absorption (AA) related QC procedures/samples and spiked sample clean-up results.

Quality control analyses were conducted by the contract laboratory as an internal control measure of the accuracy and precision of the data. Quality assurance sample analyses were performed by the Army Corps of Engineers' Southwest District Laboratory as an external control measure of the accuracy and precision of the contract laboratory's results and of sampling procedures. The QA/QC, and corresponding field sample results are reviewed by Army Corps of Engineers quality assurance personnel, who then issues a Corps Quality Assurance Report (CQAR).

According to the CQAR, a total of four sample pairs (primary and QC/QA splits) were collected from FH-038A, FH-038D, FH-038C, and FH-038D. The QA splits were analyzed by the Southwestern Division Laboratory and the results of all four sample pairs agreed within acceptable limits. Additionally, the CQAR presented findings that indicated there was potential for:

- false positives and high bias in the sample results for soil boring field locations numbers SB101 through SB109 (FH-038C and FH-038D) due to method blank contamination;
- low bias in the sample results for soil boring field locations numbers SB129 through SB137 (FH-038D) due to low matrix spike recoveries;
- high variability in the sample results for soil boring locations numbers SB129 through SB148 (FH-038A, FH-038D and FH-038C) due to high variation in matrix duplicate results; and
- no potential weaknesses in the groundwater data.

These findings in the CQAR indicate that caution needs to be applied when interpreting the results due to the above analytical deviations. Based on these findings, no data would be rejected and all data is useable. The only impact that these CQAR findings would have on the data set is that the above samples would be qualified as estimated detects (J or N) or estimated non-detects (UJ) if data validation was conducted on those samples. The split QA/QC sample analyses by the Corp's laboratory indicated agreement in lead results in three of the four QA samples received with the associated primary sample results. This does not impact the usability of the data because the QC sample results agreed with the primary samples according to the guidelines for replication.

It should be noted that replication of a concentration of a constituent in soil samples is difficult due to the heterogeneity of soils. Analyses are considered good and reproducible for soil samples if the highest

concentration reported in a set of samples for a single field sample is less than five times the lowest concentration reported in the same set of samples. This holds true as long as all other quality control measures and data quality objectives (e.g. holding times, surrogate recoveries, internal standards, etc) are met. A review of the data results for the primary and QC split samples indicate the replicate soil sample results are considered good and reproducible for this site based on the criteria cited above.

Data QA/QC procedures also included an independent data validation of 10 percent of the results for compliance of analyses to data quality objectives. All results for FH-038D data that were reviewed as a function of the data validation task met project data quality objectives, and are useable data. No other problems with the data were encountered that would have resulted in rejection of the data.

6.2 INVESTIGATION RESULTS

The quality of the data set for surface and subsurface soils at FH-038D are useable for the objectives of the RFI as described in Section 1.2 of this report. During the course of the RFI at FH-038D a total of 39 soil samples (7 surface, 32 subsurface) were collected from 9 soil boring and the 4 tankhold pit locations and analyzed according to the Final RCRA Facility Investigation Work Plan for 35 SWMUs (USACE 1995). Groundwater was encountered at SB114, and a sample was collected and analyzed for lead. The number and location of the samples were adequate to provide information regarding the presence or absence of lead contamination.

The initial sampling event conducted during February 1997 involved the sampling of soils from four soil borings (SB112, SB113, SB114, and SB115) surrounding the tank's location. Analysis of the samples indicated that lead was present in all 15 soil samples (4 surface, 11 subsurface) but was present at concentrations below the 95% UTL background screening value for lead of 19.0 ppm. These initial results of soil analysis indicated that lead is present in surface and subsurface soils at concentrations consistent with naturally occurring background values and no release was detected in the area of FH-038D prior to tank removal.

The confirmatory samples collected in May 1998, after the tank and containment-vault were removed, indicated that lead was present above the 95% UTL background screening value in soil remaining in the bottom of the tankhold pit. The soil remaining at the bottom of the tankhold was a combination of native soil and a small amount of backfill material that had surrounded the tank. The confirmatory samples from the base of the tankhold pit were collected at a depth of 8.0 ft to 10.0 ft bgs. Lead was detected in samples 38SB168 at 657 J mg/kg and 38SB170 at 291 J mg/kg. The confirmatory samples collected from the excavated tankhold pit wall, beneath the effluent (SB167) and influent (SB169) pipes at 2-2.5 ft bgs and had lead concentrations of 992 J ppm and 72.8 J ppm. The tankhold pit was then backfilled. After the backfill material had settled the area was paved in concrete to match the surrounding area. No water was encountered during this sampling event.

In light of the lead concentrations detected in the confirmatory samples, additional soil samples were taken during October 1998 to determine the possible extent of contamination in the FH-038D area. Five soil borings were advanced with a geoprobe and used to collect 20 samples (3 surface, 17 subsurface). Three soil borings were advanced within roughly 1 to 4 ft of the south, west, and north sides of the former tankhold at FH-038D (SB116, SB117, and SB118). Soil borings SB119 and SB120 were located within the former tankhold. None of the samples collected in the October 1998 sampling round had lead concentrations that exceed the 95% UTL background screening value. No groundwater was encountered during this investigation.

Confirmatory sample results collected during May 1998 indicate that a release of lead contamination was identified during the tank and containment-vault removal process. Subsequent sampling results indicate that lead contamination is confined to the remaining bedding material and soil in the tankhold pit. Additional soil samples collected in October 1998 indicate that the contamination did not extend farther than the lateral extent or depth of the excavated tankhold pit area. The lead contamination at FH-038D remains in the soil in the bottom of the former tankhold pit and in the walls that contained the influent and effluent pipes. No groundwater was encountered during this third sampling event. A conservative estimate of the amount of contaminated soil in place is approximately 21.9 cu yds. The calculation was based on the area of the bottom of the tankhold excavation as approximately 15 feet by 15 feet to a depth of 0.5 feet for a total of 4.2 cubic yards, and two walls (2-10 feet depth below the piping to bottom), for an area of 2 walls times 15 feet by 8 feet by a depth of contamination of 2 foot or roughly 17.8 cubic yards.

7.0 CONCLUSIONS AND RECOMMENDATIONS

Analytical results of the soil investigation at FH-038D indicate that lead is present in soils at concentrations above the corresponding background concentrations. However the only location where lead is present above the 95% UTL background screening value is in the bottom of the former tankhold pit approximately 8-10 ft bgs and on the east and west walls of the former tankhold area from under the influent and effluent piping (2 to 2.5 feet bgs). The lead contamination detected in the end walls may extend down to the bottom of the tankhold excavation. Based on the RFI results, a release was identified during the May 1998 removal of the tank and associated containment-vault. Several facts verify the supposition that the remaining lead contamination is only in the soils in the bottom and the east and west walls of the former tankhold pit and is immobile:

- The only lead contamination detected at FH-038D above the 95% UTL background screening value was found at the bottom and sides of the tankhold pit during confirmatory sampling in May 1998.
- All the samples collected both before and after tank removal (February 1997 and October 1998), have had concentrations of lead below the 95% UTL background screening value.
- All the surface soil samples collected in the vicinity of FH038D had concentrations of lead below the 95% UTL background screening value.
- Bedrock was encountered at a depth of 10.0 to 10.5 ft bgs and the land surface is covered with concrete.
- A conservative approximate volume of lead contaminated soil left in-place is 21.9 cubic yards.
- The predominant silty clay lithology surrounding the tankhold pit will inhibit the mobility of any dissolved or suspended lead contamination should it reach groundwater.
- The presence of groundwater was noted in just one of nine soil borings (SB114) completed in the vicinity of FH038D, suggesting that the groundwater observed is an isolated perched zone, not a continuous aquifer.
- The water that was encountered at SB114 was not sampled until the sampling team returned after a few days to the soil boring because of the slow flow, and was found to have a lead concentration less than the PQL.

Although surface soils in the vicinity of FH038D comply with the TNRCC RRS Number 1 for lead, subsurface soils do not. Additionally, TNRCC RRS Number 2 for subsurface soils was exceeded only in the confirmatory samples collected in may 1998. The impacted subsurface soils are covered with concrete. As a result the potential for risk due to direct exposure to surface or subsurface soil at FH038D is very low. Based on professional judgement the remaining lead in the soil poses no risk to human health and the environment.

FH038D is located in an area of predominantly silty clay lithology which will inhibit the mobility of any dissolved or suspended lead contamination in groundwater. Also, since groundwater was collected from just one of nine soil borings completed in the vicinity, the groundwater that was observed is believed to be an isolated perched zone, not a continuous aquifer. Therefore, the potential for migration of lead identified in subsurface soils to groundwater is also quite low.

Based upon these findings, it is recommended that FH-038D be closed under TNRCC RRSs Number 2, and no further action (no corrective measures) is needed to address the contamination associated with SWMU FH-038D. Certification of Remediation documentation in accordance to 30 TAC Section 335.560(b) relating to Post Closure Care and Deed Certification will be submitted as an addendum to this report once the TNRCC has approved this report.

8.0 REFERENCES

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APPENDIX A

FH-038D Soil Boring Logs

RCRA
Facilities
Investigation
Fort Hood, Texas

U. S. Army Corp of Engineers
Fort Worth District
Fort Worth, Texas

Boring FH038-SB112

(Page 1 of 1)

SWMU FH038D	: Electrolyte Holding Tanks
Start Date	: 02/13/97
End Date	: 02/13/97
Northing Coord.	: 3446278.02 m
Easting Coord.	: 615549.02 m UTM 14 North
Total Depth of Boring	: 34.0 feet

Drilling Company	: Terra-Mar
Driller	: Bill Christopher
Designation of Drill	: Mobile Drill B-59
Type of Drill Rig	: Hollow Stem Auger
Geologist	: Jeff DeVaughn
Depth to Bedrock	: 32.0 feet
Depth Drilled Into Rock	: 2.0 feet
Borehole Diameter	: 8 inches
Sampling Equipment	: 4.25" Augers
	: CME Sampler 5' long

Depth in feet	Surf. Elev. 931.90ft	USCS	GRAPHIC	Water Levels	DESCRIPTION	REMARKS
0					Concrete.	Sample 38SB125 collected 1.0-2.0' bgs.
1	931	CL			Silty CLAY; rock fragments and gravel; damp; moderately plastic; 2.5Y6/4 light yellowish brown, trace green staining.	
2	930	CL				
3	929	CL			Silty CLAY; damp; highly plastic; 2.5Y2.5/1 black and no green staining.	
4	928	CL				Sample 38SB126 collected 4.0-5.0' bgs.
5	927				Silty CLAY; rock fragments and gravel; damp; moderately plastic; 2.5Y6/4 light yellowish brown, trace green staining.	
6	926					
7	925	CL			Silty CLAY; weathered limestone fragments; damp; firm; moderately plastic; 2.5Y5/3 light olive brown.	Description from soil cuttings 6.0-9.0' bgs.
8	924					
9	923				CLAY; abundant fossils; trace limestone fragments; firm; highly plastic; mottle of 2.5Y6/8 olive yellow and 2.5Y5/1 gray.	
10	922					Sample 38SB127 collected 9.0-10.0' bgs.
11	921				Same as above; except more silt; with limestone fragments and interbeds; dry.	
12	920					
13	919					
14	918				Same as above; dry.	No sample in rocky layers.
15	917					
16	916					
17	915	CL				
18	914	LS				
19	913				Same as above; dry.	
20	912					
21	911				Same as above; dry.	Description from soil cuttings 20.0-24.0' bgs.
22	910					
23	909					
24	908				Same as above; dry.	
25	907					
26	906				Silty CLAY with limestone; dry; firm; non-plastic; 2.5Y8/2 pale yellow.	
27	905				Same as above; dry.	
28	904					
29	903	CL				
30	902					
31	901					
32	900					
33	899	LS			LIMESTONE; dry; blue-gray.	
34	898				Saturated in a thin zone, rest dry.	Sample 38SB128 collected 33.0-34.0' bgs.
35	897				Bottom of Boring @ 34.0' bgs.	Soil colors from Munsell Soil Color Chart, 1992 Revised Edition.

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RCRA Facilities Investigation
Fort Hood, Texas

U. S. Army Corp of Engineers
Fort Worth District
Fort Worth, Texas

Boring FH038-SB113

(Page 1 of 1)

SWMU FH038D	: Electrolyte Holding Tanks
Start Date	: 02/13/97
End Date	: 02/13/97
Northing Coord.	: 3446278.64 m
Easting Coord.	: 615536.95 m UTM 14 North
Total Depth of Boring	: 34.0 feet

Drilling Company	: Terra-Mar
Driller	: Bill Christopher
Designation of Drill	: Mobile Drill B-59
Type of Drill Rig	: Hollow Stem Auger
Geologist	: Jeff DeVaughn
Depth to Bedrock	: 32.0 feet
Depth Drilled Into Rock	: 2.0 feet
Borehole Diameter	: 8 inches
Sampling Equipment	: 4.25" Augers
	: CME Sampler 5' long

Depth in feet	Surf. Elev. 931.97ft	USCS	GRAPHIC	Water Levels	DESCRIPTION	REMARKS
0					Concrete.	Sample 38SB121 collected 1.0-2.0' bgs. 8 ppm in hole.
1	931	CL			Silty CLAY; gravel/rock fragments; dry; firm; moderately plastic; 2.5Y7/3 pale yellow, green staining.	
2	930				at 1.5' bgs	
3	929	CL			Same as above; except 2.5Y4/2 dark grayish brown.	
4	928				Silty CLAY; weathered limestone fragments; damp; firm; moderately plastic; 2.5Y5/2 grayish brown.	Sample 38SB122 collected 4.0-5.0' bgs. 0 ppm in hole.
5	927					
6	926				Silty CLAY (minor silt); fossil oyster fragments; weathered limestone; damp; highly plastic; 2.5Y6/4 light yellowish brown with 2.5Y6/8 olive yellow mottle.	
7	925					
8	924	CL				
9	923					
10	922				Same as above; damp.	Sample 38SB123 collected 9.0-10.0' bgs.
11	921				Same as above; more silt; more limestone fragments and interbeds; dry.	Geotechnical sample collected 10.0-11.0' bgs.
12	920					
13	919					
14	918				Same as above; dry.	No sample in rock.
15	917					
16	916					
17	915					
18	914					
19	913				Same as above; dry.	
20	912					
21	911	CL LS			Same as above; dry.	Description from soil cuttings 20.0-22.0' bgs.
22	910					
23	909					
24	908					
25	907				Same as above; dry.	
26	906					
27	905					
28	904					
29	903					Description from soil cuttings 26.0-32.0' bgs.
30	902					
31	901					
32	900					
33	899	SH			SHALE; dry; blue-gray.	Sample 38SB124 collected 33.0-34.0' bgs.
34	898				Bottom of Boring @ 34.0' bgs.	Soil colors from Munsell Soil Color Chart, 1992 Revised Edition.
35	897					

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RCRA
Facilities
Investigation
Fort Hood, Texas

U. S. Army Corp of Engineers
Fort Worth District
Fort Worth, Texas

Boring FH038-SB114

(Page 1 of 1)

SWMU FH038D	: Electrolyte Holding Tanks
Start Date	: 02/07/97
End Date	: 02/07/97
Northing Coord.	: 3446272.05 m
Easting Coord.	: 615529.59 m UTM 14 North
Total Depth of Boring	: 35.0 feet

Drilling Company	: Terra-Mar
Driller	: Bill Christopher
Designation of Drill	: Mobile Drill B-59
Type of Drill Rig	: Hollow Stem Auger
Geologist	: Jeff DeVaughn
Depth to Bedrock	: 31.5 feet
Depth Drilled Into Rock	: 3.5 feet
Borehole Diameter	: 8 inches
Sampling Equipment	: 4.25" Augers
	: CME Sampler 5' long

Depth in feet	Surf. Elev. 931.89ft	USCS	GRAPHIC	Water Levels	DESCRIPTION	REMARKS
0					Concrete.	
1	931	CL			Silty CLAY; weathered limestone fragments; dry; hard; moderately plastic; 2.5Y6/4 light yellowish brown, trace green staining.	Sample 38SB108 collected 1.0-2.0' bgs.
2	930					
3	929	CL			Silty CLAY; weathered limestone fragments; dry; hard; mottled 2.5Y7/4 pale yellow and 2.5Y6/8 olive yellow.	
4	928				Same as above; more clay; damp 4.0-4.5' bgs.	Sample 38SB109 collected 4.0-4.5' bgs.
5	927					
6	926	CL			Silty CLAY; weathered limestone fragments; damp; firm; highly plastic; mottled 2.5Y7/4 pale yellow and 2.5Y7/1 light gray.	
7	925					
8	924					
9	923				Same as above; fossil oyster shells; damp.	Sample 38SB110 collected 9.0-10.0' bgs.
10	922	CL LS			Same as above; interbedded with tan weathered LIMESTONE and Silty CLAY; dry.	
11	921					
12	920					
13	919					
14	918				Same as above; dry.	
15	917					
16	916					No sample recovery due to rock layers.
17	915					
18	914					
19	913				Same as above; dry.	
20	912					
21	911				Same as above; dry.	
22	910					Description from soil cuttings 10.0-34.0' bgs.
23	909					
24	908					
25	907				Same as above; dry.	
26	906					No sample recovery due to rock layers.
27	905					
28	904					
29	903				Same as above; dry.	
30	902					
31	901					
32	900	SH			SHALE; dry; blue-gray.	
33	899					
34	898					Sample 38SB111 collected 34.0-35.0' bgs.
35	897				Bottom of Boring @ 35.0' bgs.	Soil colors from Munsell Soil Color Chart, 1992 Revised Edition.

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Fort Worth, Texas

Boring FH038-SB115

(Page 1 of 1)

SWMU FH038D	: Electrolyte Holding Tanks
Start Date	: 02/07/97
End Date	: 02/07/97
Northing Coord.	: 3446262.55 m
Easting Coord.	: 615528.58 m UTM 14 North
Total Depth of Boring	: 34.0 feet

Drilling Company	: Terra-Mar
Driller	: Bill Christopher
Designation of Drill	: Mobile Drill B-59
Type of Drill Rig	: Hollow Stem Auger
Geologist	: Jeff DeVaughn
Depth to Bedrock	: 32.0 feet
Depth Drilled Into Rock	: 2.0 feet
Borehole Diameter	: 8 inches
Sampling Equipment	: 4.25" Augers
	: CME Sampler 5' long

Depth in feet	Surf. Elev. 931.89ft	USCS	GRAPHIC	Water Levels	DESCRIPTION	REMARKS
0					Concrete.	
1	931	CL			Silty CLAY; some coarse sand; weathered limestone fragments; dry; non-plastic; 10YR7/4 very pale brown.	Sample 38SB105 collected 1.0-2.0' bgs.
2	930					
3	929	CL			Silty CLAY; weathered limestone fragments; dry; hard; mottled 2.5Y7/4 pale yellow and 2.5Y6/8 olive yellow.	
4	928				CLAY; weathered limestone fragments; damp; firm; highly plastic; mottled 2.5Y7/4 pale yelllow and 2.5Y7/1 light gray.	Sample 38SB106 collected 4.0-4.5' bgs.
5	927					
6	926				Same as above; damp.	
7	925	CL				
8	924					
9	923				Same as above; more silt and less plastic 9.0-10.0' bgs.	Sample 38SB107 collected 9.0-10.0' bgs.
10	922					
11	921	CL LS			Same as above; interbeds of tan weathered LIMESTONE; dry.	
12	920				LIMESTONE, weathered; dry; tan.	
13	919					
14	918				Same as above; dry.	
15	917					
16	916					Description from soil cuttings 14.0-19.0' bgs.
17	915					
18	914					
19	913				Same as above; dry.	
20	912					
21	911				Same as above; dry.	
22	910	LS				
23	909					
24	908					
25	907				Same as above; dry.	
26	906					Description from soil cuttings 20.0-32.0' bgs.
27	905					
28	904					
29	903					
30	902					
31	901					
32	900					
33	899	LS			LIMESTONE; dry; blue-gray.	No recovery.
34	898					
35	897				Bottom of Boring @ 35.0' bgs.	Soil colors from Munsell Soil Color Chart, 1992 Revised Edition.

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Fort Worth, Texas

Boring FH038-SB116

(Page 1 of 1)

SWMU FH038D	: Electrolyte Holding Tanks
Start Date	: 10/27/98
End Date	: 10/27/98
Northing Coord.	: Not
Easting Coord.	: Surveyed
Total Depth of Boring	: 11.5 feet

Drilling Company	: SAIC
Driller	: John Haselhoff
Designation of Drill	: Geoprobe 5400
Type of Drill Rig	: Direct Push Technology
Geologist	: Paul Parrish
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2 inches
Sampling Equipment	: 2" Core Barrel 4' Long

Depth in feet	Surf. Elev. NS	USCS	GRAPHIC	Water Levels	DESCRIPTION	REMARKS
0	0				Concrete.	
1	-1	CL			CLAY; trace silt; trace gravel to 10mm, subangular; trace fine to medium sand; dry; medium stiff; medium plastic to plastic; 2.5Y6/6 olive yellow.	Sample 38SB171 collected 0.0-2.0' bgs.
2	-2				CLAY; trace silt; dry; soft; plastic; 5Y5/3 olive with 5Y8/1 white, 2.5Y6/8 olive yellow and 5Y3/2 olive gray mottling.	
3	-3					Sample 38SB172 collected 2.0-4.0' bgs.
4	-4	CL			Same as above; trace gravel to 25mm, subangular.	
5	-5					Sample 38SB173 collected 4.0-6.0' bgs.
6	-6				CLAY; trace medium to coarse sand; dry; stiff; medium plastic; 2.5Y5/6 light olive brown with 5Y6/4 pale olive mottling.	
7	-7					Samples 38SB174 and duplicate FHSB233 collected 6.0-8.0' bgs.
8	-8					
9	-9	CL			Same as above; trace limestone gravel to 30mm, subroiunded.	Sample 38SB175 collected 8.0-10.0' bgs.
10	-10					
11	-11					Sample 38SB176 collected 10.0-11.5' bgs.
12	-12				Bottom of Boring @ 11.5' bgs. Refusal.	Refusal at 11.5' bgs.
13	-13					
14	-14					
15						Soil colors from Munsell Soil Color Chart, 1992 Revised Edition.

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Boring FH038-SB117

SWMU FH038D	: Electrolyte Holding Tanks
Start Date	: 10/27/98
End Date	: 10/27/98
Northing Coord.	: Not
Easting Coord.	: Surveyed
Total Depth of Boring	: 11.5 feet

Drilling Company	: SAIC
Driller	: John Haselhoff
Designation of Drill	: Geoprobe 5400
Type of Drill Rig	: Direct Push Technology
Geologist	: Paul Parrish
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2 inches
Sampling Equipment	: 2" Core Barrel 4' Long

Depth in feet	Surf. Elev. NS	USCS	GRAPHIC	Water Levels	DESCRIPTION	REMARKS
0	0				Concrete.	
1	-1	GP			GRAVEL, to 30mm, angular; 2.5Y7/4 pale yellow. (Fill material below concrete).	Sample 38SB177 collected 0.0-2.0' bgs.
2	-2	CL			CLAY; trace silt; dry; soft; plastic; 5Y5/3 olive with 5Y8/1 white, 2.5Y6/8 olive yellow, and 5Y3/2 olive gray mottling.	
3	-3	NR			No recovery.	No sample collected because of lack of recovery.
4	-4	CL			CLAY; trace medium to coarse sand; dry; medium stiff; medium plastic; 2.5Y5/6 light olive brown with 5Y6/4 pale olive mottling.	
5	-5					Sample 38SB178 collected 4.0-6.0' bgs.
6	-6					
7	-7					Sample 38SB179 collected 6.0-8.0' bgs.
8	-8					
9	-9					Sample 38SB180 collected 8.0-10.0' bgs.
10	-10					Problems with hole filling up with water. Rain water in gravel beneath the concrete is running into the boring.
11	-11	CL LS			CLAY and weathered LIMESTONE interbeds; trace medium sand; dry; stiff; medium plastic; 2.5Y6/3 light yellowish brown.	Sample 38SB181 collected 10.0-11.5' bgs.
12	-12				Bottom of Boring @ 11.5' bgs. Refusal.	Refusal at 11.5' bgs.
13	-13					
14	-14					
15						Soil colors from Munsell Soil Color Chart, 1992 Revised Edition.

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U. S. Army Corp of Engineers
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Boring FH038-SB118

(Page 1 of 1)

SWMU FH038D	: Electrolyte Holding Tanks
Start Date	: 10/29/98
End Date	: 10/29/98
Northing Coord.	: Not
Easting Coord.	: Surveyed
Total Depth of Boring	: 11.5 feet

Drilling Company	: SAIC
Driller	: John Haselhoff
Designation of Drill	: Geoprobe 5400
Type of Drill Rig	: Direct Push Technology
Geologist	: Pete Ferron
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2 inches
Sampling Equipment	: 2" Core Barrel 4' Long

Depth in feet	Surf. Elev. NS	USCS	GRAPHIC	Water Levels	DESCRIPTION	REMARKS
0	0				Concrete.	
1	-1	GP			GRAVEL FILL; subangular to subrounded.	Sample 38SB198 collected 0.0-2.0' bgs.
2	-2	CL			CLAY; some gravel to 25mm, angular to subangular; moist; stiff; slightly plastic.	
3	-3					Samples 38SB199, duplicate FHSB234, and split sample FHSB334 collected 2.0-4.0' bgs.
4	-4					
5	-5				Same as above.	Sample 38SB400 collected 4.0-6.0' bgs.
6	-6	CL			CLAY; firm; 2.5Y6/8 olive yellow mottled 5Y6/3 pale olive.	
7	-7					Sample 38SB401 collected 6.0-8.0' bgs.
8	-8					
9	-9					Sample 38SB402 collected 8.0-10.0' bgs.
10	-10				Same as above.	
11	-11					Sample 38SB403 collected 10.0-11.5' bgs.
12	-12				Bottom of Boring @ 11.5' bgs. Refusal.	Refusal at 11.5' bgs.
13	-13					
14	-14					
15						Soil colors from Munsell Soil Color Chart, 1992 Revised Edition.

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Boring FH038-SB119

(Page 1 of 1)

SWMU FH038D	: Electrolyte Holding Tanks
Start Date	: 10/29/98
End Date	: 10/29/98
Northing Coord.	: Not
Easting Coord.	: Surveyed
Total Depth of Boring	: 10.5 feet

Drilling Company	: SAIC
Driller	: John Haselhoff
Designation of Drill	: Geoprobe 5400
Type of Drill Rig	: Direct Push Technology
Geologist	: Pete Ferron
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2 inches
Sampling Equipment	: 2" Core Barrel 4' Long

Depth in feet	Surf. Elev. NS	USCS	GRAPHIC	Water Levels	DESCRIPTION	REMARKS
0	0				Concrete.	
1	-1	FL			FILL.	
2	-2					
3	-3					
4	-4					
5	-5					
6	-6					
7	-7					
8	-8	GM			GRAVEL, well rounded; some silt; wet.	
9	-9					
10	-10					Sample 38SB404 collected 10.0-10.5' bgs.
11	-11				Bottom of Boring @ 10.5' bgs.	Sample 38SB185 collected 10.0-11.2' bgs on 10/28/95 from original boring.
12	-12					
13	-13					Two borings used to collect samples on different days.
14	-14					Soil colors from Munsell Soil Color Chart, 1992 Revised Edition.
15						

10-22-1999 t:\gov\coe\fthood\boringlogs\FH038\SB119.BOR

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Boring FH038-SB120

SWMU FH038D	: Electrolyte Holding Tanks
Start Date	: 10/29/98
End Date	: 10/29/98
Northing Coord.	: Not
Easting Coord.	: Surveyed
Total Depth of Boring	: 11.1 feet

Drilling Company	: SAIC
Driller	: John Haselhoff
Designation of Drill	: Geoprobe 5400
Type of Drill Rig	: Direct Push Technology
Geologist	: Pete Ferron
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2 inches
Sampling Equipment	: 2" Core Barrel 4' Long

Depth in feet	Surf. Elev. NS	USCS	GRAPHIC	Water Levels	DESCRIPTION	REMARKS
0	0				Concrete.	
1	-1	FL			FILL.	
2	-2					
3	-3					
4	-4					
5	-5					
6	-6					
7	-7					
8	-8					
9	-9					
10	-10	CL			CLAY; firm; 2.5Y6/8 olive yellow mottled with 5Y6/3 pale olive.	Sample 38SB405 collected 10.0-11.1' bgs.
11	-11				Bottom of Boring @ 11.1' bgs.	
12	-12					
13	-13					
14	-14					
15						Soil colors from Munsell Soil Color Chart, 1992 Revised Edition.

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APPENDIX B

Tank Removal Report

FIELD REPORT

for

Fort Hood Military Installation

Fort Hood, Texas

COPY

DELIVERY ORDER NO. 0001

Contract Number DACW63-98-D-004

Prepared by:

ANDERSON COLUMBIA ENVIRONMENTAL, INC.

P. O. Box 1386

Lake City, Fl. 32056

(904) 755-1196

UNITED STATES ARMY CORPS OF ENGINEERS

Fort Worth District

Facility 32019

Summary

The scope of work at this facility included the removal of one (1) 300-gallon fiberglass lead acid battery neutralization tank and associated concrete vault. Also included was the installation of a dual direction cleanout in the drain line to the sanitary sewer.

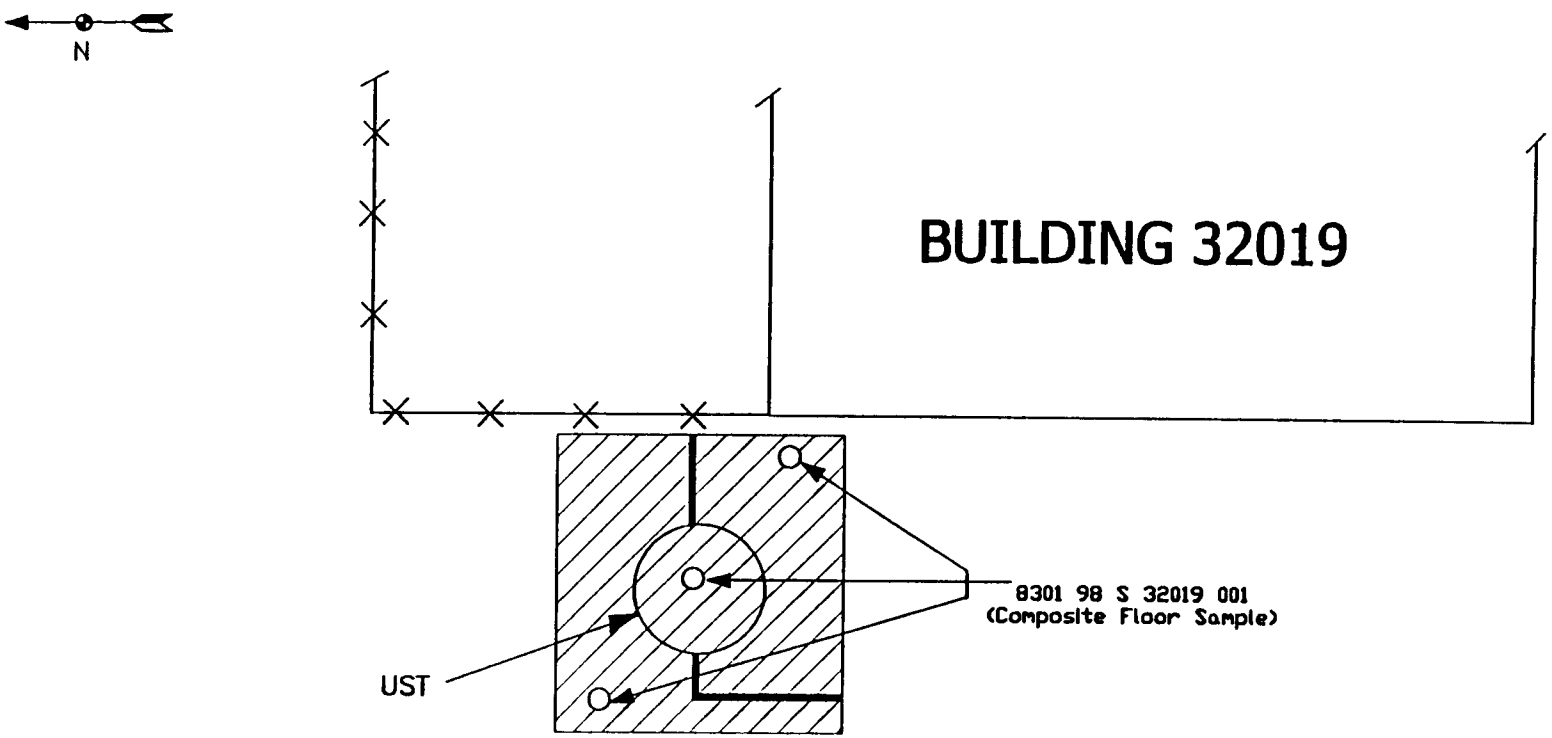
Chronology

May 12, 1998	The tank and vault contents were sampled.
May 20, 1998	Cleaning of the tank was begun. Tank contents and rinsate were drummed.
May 26, 1998	Tank cleaning was completed.
May 27, 1998	The tank was removed, and demolition of the vault was begun.
May 28, 1998	Demolition of the vault was completed. Soil samples were collected
June 1, 1998	A cleanout was installed in the sewer drain line, and the caution signs were removed.
June 8,1998	Concrete was poured around new cleanout.

Site Characterization and Field Investigation

Description of Facility

The tank/vault structure was located on the west side of building 32019 at the Fort Hood Military installation. The structure consisted of a 300-gallon fiberglass cylindrical tank contained within a concrete vault with a steel cover. The tank was used as a sediment trap for the lead acid neutralization waste lines that were connected to the Fort Hood sewer system.



5' 0' 5' 10' 15'

Legend

- Excavation Limits
- O Composite Soil Sub-Samples
- 1E Sample ID
- Drain Line

ANDERSON COLUMBIA ENVIRONMENTAL INC.
GEOSCIENCE DIVISION
SAMPLING AND DRAFTING BRANCH

Fort Hood, Building 32019
Fort Hood, Texas

Lead Acid Battery Neutralization Tank
Sampling Site Map

KEVIN P. HOYLE
PROJECT GEOLOGIST
GEOSCIENCE DIVISION

DATE: AUGUST 1994
SEQUENCE NO

In-Place Soil Assessment and Remedial Operations

One (1) soil sample was collected from the floor of the completed excavation for Total Lead (6010B) and pH (9045B) analysis. This sample was a composite of three (3) aliquots collected diagonally across the bottom of the excavation. Results of the laboratory analyses appear below, and complete data reports can be found in Appendix N.

SOIL ANALYTICAL DATA SUMMARY

Date Sampled	Lab ID No.	Field ID No.	Matrix	Total Pb (mg/Kg)	pH* (su)
5/28/98	71885	8301 98 S 32019 001	Soil	140	10.8
BDL = Below Detection Limit					

Table 20 – Soil Analytical Summary – Facility 32019

Site Excavated Soil Assessment and Disposition

All soil was returned to the excavation.

Site Groundwater/Surface Water Assessment

Groundwater samples were not collected at this facility.

Free Product (PSH)/Tank Contents Assessment and Disposition

A composite sample of the liquid from the tank and vault was analyzed for BTEX, Flashpoint, pH and Lead. BTEX and Flashpoint analyses were conducted due to the presence of a sheen on the contents. Laboratory anaytical data reports can be found in Appendix N. Tank contents were drummed with rinsate waters generated during tank/vault cleaning activities.

PRODUCT ANALYTICAL DATA SUMMARY

Date Sampled	Lab ID No.	Field ID No.	Matrix	Total Pb (mg/L)	Total BTEX (mg/L)	Flashpoint (°F)	pH* (su)
5/12/98	71607	8301 98 P 32019001	Liquid	0.19	18	>160	8.8
BDL = Below Detection Limit							

Table 21 – Product Analytical Summary – Facility 32019

Waste Management and Disposition

After cleaning and removal, the fiberglass tank was crushed and placed in a rolloff along with debris from other facilities covered under this delivery order for final disposal in the Fort Hood Landfill. The concrete removed from this site was also disposed of at the Fort Hood Landfill.

Five (5) drums of rinsate and tank contents and ten (10) drums of sludge were generated during tank cleaning activities. These drums were taken to ACE's storage yard for temporary storage until disposal was arranged. On July 22, 1998, the rinsate drums, along with drums from other sites included in this delivery order, were transported by Re-Claim Environmental to their reclamation/disposal facility in Shreveport, Louisiana. The drums of sludge were sampled, and were determined to be hazardous based upon lead concentrations. These drums are awaiting disposal at an appropriate facility.

WASTE ANALYTICAL DATA SUMMARY

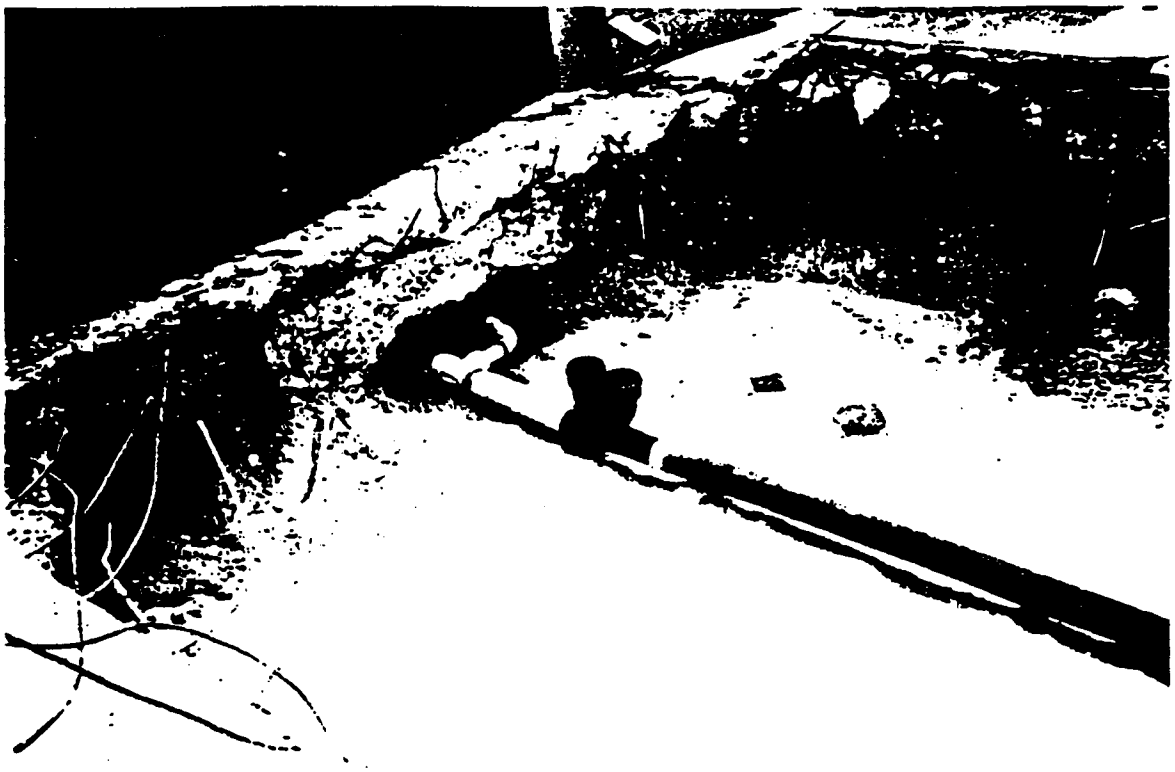
Date Sampled	Lab ID No.	Field ID No.	Matrix	TCLP Metals (mg/Kg)	pH (su)
6/2/98	71962	8301 98 P 32019002	Sludge	0.59 – Ba 0.006 - Cd 6.7 - Pb	6.62

BDL = Below Detection Limit
* Only those metals detected are listed. All others were BDL.

Table 22 – Waste Analytical Summary – Facility 32019

Demolition of vault at Building 32019

Excavation after removal of vault and UST at Building 32019



New drain line to sanitary sewer at Building 32019

New concrete pour at Building 32019

APPENDIX C

FH-038D Analytical Results

Location: SB112
Sample ID: 38SB125 **Depth:** 1.0-2.0
COE Sample ID: FH038-SB125/02-13-97/1.0-2.0
Date Collected: 2/13/97

Parameter	CAS Number	Result	Detection Limit	Lab Qual	Data Qual	Units	Method
INORGANICS							
Lead	7439-92-1	4.2	0.20			mg/kg	SW846 6010

Location: SB112
Sample ID: 38SB126 **Depth:** 4.0-5.0
COE Sample ID: FH038-SB126/02-13-97/4.0-5.0
Date Collected: 2/13/97

Parameter	CAS Number	Result	Detection Limit	Lab Qual	Data Qual	Units	Method
INORGANICS							
Lead	7439-92-1	3.7	0.20			mg/kg	SW846 6010

Location: SB112
Sample ID: 38SB127 **Depth:** 9.0-10.0
COE Sample ID: FH038-SB127/02-13-97/9.0-10.0
Date Collected: 2/13/97

Parameter	CAS Number	Result	Detection Limit	Lab Qual	Data Qual	Units	Method
INORGANICS							
Lead	7439-92-1	4	0.21			mg/kg	SW846 6010

Location: SB112
Sample ID: 38SB128 **Depth:** 33.0-34.0
COE Sample ID: FH038-SB128/02-13-97/33.0-34.0
Date Collected: 2/13/97

Parameter	CAS Number	Result	Detection Limit	Lab Qual	Data Qual	Units	Method
INORGANICS							
Lead	7439-92-1	2.7	0.21			mg/kg	SW846 6010

Location: SB113
Sample ID: 38SB121 **Depth:** 1.0-2.0
COE Sample ID: FH038-SB121/02-13-97/1.0-2.0
Date Collected: 2/13/97

Parameter	CAS Number	Result	Detection Limit	Lab Qual	Data Qual	Units	Method
INORGANICS							
Lead	7439-92-1	2.7	0.21			mg/kg	SW846 6010

Location: SB113
Sample ID: 38SB122 **Depth:** 4.0-5.0
COE Sample ID: FH038-SB122/02-13-97/4.0-5.0
Date Collected: 2/13/97

Parameter	CAS Number	Result	Detection Limit	Lab Qual	Data Qual	Units	Method
INORGANICS							
Lead	7439-92-1	2.7	0.20			mg/kg	SW846 6010

Location: SB113
Sample ID: 38SB123 **Depth:** 9.0-10.0
COE Sample ID: FH038-SB123/02-13-97/9.0-10.0
Date Collected: 2/13/97

Parameter	CAS Number	Result	Detection Limit	Lab Qual	Data Qual	Units	Method
INORGANICS							
Lead	7439-92-1	6.8	0.23			mg/kg	SW846 6010

Location: SB113
Sample ID: 38SB124 **Depth:** 33.0-34.0
COE Sample ID: FH038-SB124/02-13-97/33.0-34.0
Date Collected: 2/13/97

Parameter	CAS Number	Result	Detection Limit	Lab Qual	Data Qual	Units	Method
INORGANICS							
Lead	7439-92-1	2.6	0.19			mg/kg	SW846 6010

Location: SB114
Sample ID: 38SB108 **Depth:** 1.0-2.0
COE Sample ID: FH038-SB108/02-07-97/1.0-2.0
Date Collected: 2/7/97

Parameter	CAS Number	Result	Detection Limit	Lab Qual	Data Qual	Units	Method
INORGANICS							
Lead	7439-92-1	4.6	0.17			mg/kg	SW846 6010

Location: SB114
Sample ID: 38SB109 **Depth:** 4.0-4.5
COE Sample ID: FH038-SB109/02-07-97/4.0-4.5
Date Collected: 2/7/97

Parameter	CAS Number	Result	Detection Limit	Lab Qual	Data Qual	Units	Method
INORGANICS							
Lead	7439-92-1	4.9	0.16			mg/kg	SW846 6010

Location: SB114
Sample ID: 38SB110 **Depth:** 9.0-10.0
COE Sample ID: FH038-SB110/02-07-97/9.0-10.0
Date Collected: 2/7/97

Parameter	CAS Number	Result	Detection Limit	Lab Qual	Data Qual	Units	Method
INORGANICS							
Lead	7439-92-1	5.7	0.21			mg/kg	SW846 6010

Location: SB114
Sample ID: 38SB111 **Depth:** 34.0-35.0
COE Sample ID: FH038-SB111/02-07-97/34.0-35.0
Date Collected: 2/7/97

Parameter	CAS Number	Result	Detection Limit	Lab Qual	Data Qual	Units	Method
INORGANICS							
Lead	7439-92-1	2	0.20			mg/kg	SW846 6010

Location: SB114
Sample ID: FHGW130 **Depth:** NA
COE Sample ID: FH038-GW130/02-13-97
Date Collected: 2/13/97

Parameter	CAS Number	Result	Detection Limit	Lab Qual	Data Qual	Units	Method
INORGANICS							
Lead	7439-92-1	0.9	0.90	U		ug/l	SW846 6010

Location: SB115
Sample ID: 38SB105 **Depth:** 1.0-2.0
COE Sample ID: FH038-SB105/02-07-97/1.0-2.0
Date Collected: 2/7/97

Parameter	CAS Number	Result	Detection Limit	Lab Qual	Data Qual	Units	Method
INORGANICS							
Lead	7439-92-1	4.9	0.17			mg/kg	SW846 6010

Location: SB115
Sample ID: 38SB106 **Depth:** 4.0-5.0
COE Sample ID: FH038-SB106/02-07-97/4.0-5.0
Date Collected: 2/7/97

Parameter	CAS Number	Result	Detection Limit	Lab Qual	Data Qual	Units	Method
INORGANICS							
Lead	7439-92-1	6	0.17			mg/kg	SW846 6010

Location: SB115
Sample ID: 38SB107 **Depth:** 9.0-10.0
COE Sample ID: FH038-SB107/02-07-97/9.0-10.0
Date Collected: 2/7/97

Parameter	CAS Number	Result	Detection Limit	Lab Qual	Data Qual	Units	Method
INORGANICS							
Lead	7439-92-1	2.7	0.15			mg/kg	SW846 6010

Location: SB116
Sample ID: 38SB171 **Depth:** 0.0-2.0
COE Sample ID: FH038-SB171/10-27-98/0.0-2.0
Date Collected: 10/27/98

Parameter	CAS Number	Result	Detection Limit	Lab Qual	Data Qual	Units	Method
INORGANICS							
Lead	7439-92-1	4.5	0.16			mg/kg	SW 6010B

Location: SB116
Sample ID: 38SB172 **Depth:** 2.0-4.0
COE Sample ID: FH038-SB172/10-27-98/2.0-4.0
Date Collected: 10/27/98

Parameter	CAS Number	Result	Detection Limit	Lab Qual	Data Qual	Units	Method
INORGANICS							
Lead	7439-92-1	4.0	0.16			mg/kg	SW 6010B

Location: SB116
Sample ID: 38SB173 **Depth:** 4.0-6.0
COE Sample ID: FH038-SB173/10-27-98/4.0-6.0
Date Collected: 10/27/98

Parameter	CAS Number	Result	Detection Limit	Lab Qual	Data Qual	Units	Method
INORGANICS							
Lead	7439-92-1	4.6	0.16			mg/kg	SW 6010B

Location: SB116
Sample ID: 38SB174 **Depth:** 6.0-8.0
COE Sample ID: FH038-SB174/10-27-98/6.0-8.0
Date Collected: 10/27/98

Parameter	CAS Number	Result	Detection Limit	Lab Qual	Data Qual	Units	Method
INORGANICS							
Lead	7439-92-1	7.3	0.18			mg/kg	SW 6010B

Location: SB116
Sample ID: 38SB175 **Depth:** 8.0-10.0
COE Sample ID: FH038-SB175/10-27-98/8.0-10.0
Date Collected: 10/27/98

Parameter	CAS Number	Result	Detection Limit	Lab Qual	Data Qual	Units	Method
INORGANICS							
Lead	7439-92-1	3.7	0.18			mg/kg	SW 6010B

Location: SB116
Sample ID: 38SB176 **Depth:** 10.0-11.5
COE Sample ID: FH038-SB176/10-27-98/10.0-11.5
Date Collected: 10/27/98

Parameter	CAS Number	Result	Detection Limit	Lab Qual	Data Qual	Units	Method
INORGANICS							
Lead	7439-92-1	2.3	0.15			mg/kg	SW 6010B

Location: SB117
Sample ID: 38SB177 **Depth:** 0.0-2.0
COE Sample ID: FH038-SB177/10-27-98/0.0-2.0
Date Collected: 10/27/98

Parameter	CAS Number	Result	Detection Limit	Lab Qual	Data Qual	Units	Method
INORGANICS							
Lead	7439-92-1	5.3	0.16			mg/kg	SW 6010B

Location: SB117
Sample ID: 38SB178 **Depth:** 4.0-6.0
COE Sample ID: FH038-SB178/10-27-98/4.0-6.0
Date Collected: 10/27/98

Parameter	CAS Number	Result	Detection Limit	Lab Qual	Data Qual	Units	Method
INORGANICS							
Lead	7439-92-1	6.7	0.18			mg/kg	SW 6010B

Location: SB117
Sample ID: 38SB179 **Depth:** 6.0-8.0
COE Sample ID: FH038-SB179/10-27-98/6.0-8.0
Date Collected: 10/27/98

Parameter	CAS Number	Result	Detection Limit	Lab Qual	Data Qual	Units	Method
INORGANICS							
Lead	7439-92-1	13.1	0.18			mg/kg	SW 6010B

Location: SB117
Sample ID: 38SB180 **Depth:** 8.0-10.0
COE Sample ID: FH038-SB180/10-27-98/8.0-10.0
Date Collected: 10/27/98

Parameter	CAS Number	Result	Detection Limit	Lab Qual	Data Qual	Units	Method
INORGANICS							
Lead	7439-92-1	8.4	0.18			mg/kg	SW 6010B

Location: SB117
Sample ID: 38SB181 **Depth:** 10.0-11.5
COE Sample ID: FH038-SB181/10-27-98/10.0-11.5
Date Collected: 10/27/98

Parameter	CAS Number	Result	Detection Limit	Lab Qual	Data Qual	Units	Method
INORGANICS							
Lead	7439-92-1	3.4	0.16			mg/kg	SW 6010B

Location: SB118
Sample ID: 38SB198 **Depth:** 0.0-2.0
COE Sample ID: FH038-SB198/10-29-98/0.0-2.0
Date Collected: 10/29/98

Parameter	CAS Number	Result	Detection Limit	Lab Qual	Data Qual	Units	Method
INORGANICS							
Lead	7439-92-1	4.4	0.16			mg/kg	SW 6010B

Location: SB118
Sample ID: 38SB199 **Depth:** 2.0-4.0
COE Sample ID: FH038-SB19910-29-98/2.0-4.0
Date Collected: 10/29/98

Parameter	CAS Number	Result	Detection Limit	Lab Qual	Data Qual	Units	Method
INORGANICS							
Lead	7439-92-1	4.7	0.16			mg/kg	SW 6010B

Location: SB118
Sample ID: 38SB400 **Depth:** 4.0-6.0
COE Sample ID: FH038-SB400/10-29-98/4.0-6.0
Date Collected: 10/29/98

Parameter	CAS Number	Result	Detection Limit	Lab Qual	Data Qual	Units	Method
INORGANICS							
Lead	7439-92-1	4.3	0.16			mg/kg	SW 6010B

Location: SB118
Sample ID: 38SB401 **Depth:** 6.0-8.0
COE Sample ID: FH038-SB401/10-29-98/6.0-8.0
Date Collected: 10/29/98

Parameter	CAS Number	Result	Detection Limit	Lab Qual	Data Qual	Units	Method
INORGANICS							
Lead	7439-92-1	7.8	0.18			mg/kg	SW 6010B

Location: SB118
Sample ID: 38SB402 **Depth:** 8.0-10.0
COE Sample ID: FH038-SB402/10-29-98/8.0-10.0
Date Collected: 10/29/98

Parameter	CAS Number	Result	Detection Limit	Lab Qual	Data Qual	Units	Method
INORGANICS							
Lead	7439-92-1	3.3	0.15			mg/kg	SW 6010B

Location: SB118
Sample ID: 38SB403 **Depth:** 10.0-11.5
COE Sample ID: FH038-SB403/10-29-98/10.0-11.5
Date Collected: 10/29/98

Parameter	CAS Number	Result	Detection Limit	Lab Qual	Data Qual	Units	Method
INORGANICS							
Lead	7439-92-1	3.9	0.15			mg/kg	SW 6010B

Location: SB119
Sample ID: 38SB185 **Depth:** 10.0-11.5
COE Sample ID: FH038-SB185/10-28-98/10.0-11.5
Date Collected: 10/28/98

Parameter	CAS Number	Result	Detection Limit	Lab Qual	Data Qual	Units	Method
INORGANICS							
Lead	7439-92-1	4.3	0.16			mg/kg	SW 6010B

Location: SB119
Sample ID: 38SB404 **Depth:** 10.0-10.5
COE Sample ID: FH038-SB404/10-29-98/10.0-10.5
Date Collected: 10/29/98

Parameter	CAS Number	Result	Detection Limit	Lab Qual	Data Qual	Units	Method
INORGANICS							
Lead	7439-92-1	15.7	0.16			mg/kg	SW 6010B

Location: SB120
Sample ID: 38SB405 **Depth:** 10.0-11.1
COE Sample ID: FH038-SB405/10-29-98/10.0-11.1
Date Collected: 10/29/98

Parameter	CAS Number	Result	Detection Limit	Lab Qual	Data Qual	Units	Method
INORGANICS							
Lead	7439-92-1	8.9	0.17			mg/kg	SW 6010B

Location: UST
Sample ID: 38SB167 **Depth:** 2.0-2.5
COE Sample ID: FH038-SB167/05-28-98/0.0-2.5
Date Collected: 5/28/98

Parameter	CAS Number	Result	Detection Limit	Lab Qual	Data Qual	Units	Method
INORGANICS							
Lead	7439-92-1	992	0.15	*	J	mg/kg	SW846 6010

Location: UST
Sample ID: 38SB168 **Depth:** 8.0-10.0
COE Sample ID: FH038-SB168/05-28-98/8.0-10.0
Date Collected: 5/28/98

Parameter	CAS Number	Result	Detection Limit	Lab Qual	Data Qual	Units	Method
INORGANICS							
Lead	7439-92-1	657	0.16	*	J	mg/kg	SW846 6010

Location: UST
Sample ID: 38SB169 **Depth:** 2.0-2.5
COE Sample ID: FH038-SB169/05-28-98/2.0-2.5
Date Collected: 5/28/98

Parameter	CAS Number	Result	Detection Limit	Lab Qual	Data Qual	Units	Method
INORGANICS							
Lead	7439-92-1	72.8	0.15	*	J	mg/kg	SW846 6010

Location: UST
Sample ID: 38SB170 **Depth:** 8.0-10.0
COE Sample ID: FH038-SB170/05-28-98/8.0-10.0
Date Collected: 5/28/98

Parameter	CAS Number	Result	Detection Limit	Lab Qual	Data Qual	Units	Method
INORGANICS							
Lead	7439-92-1	291	0.16	*	J	mg/kg	SW846 6010

APPENDIX D

Fort Hood RFI Background Soils Data

Ft. Hood RCRA Facility Investigation

FH-BKG Fort Hood Background

Analytical Results

Station: SB101 Background Soil Boring SB101

Sample ID: FH000-SB10112-10-96/2.0-2.5 (BKSB101) Sample Depth: 2.0-2.5 FT

Matrix: Soil Field Sample Type: Grab Collected: 12/10/96

Metals	Result	Detection Limit	Units	Qualifiers Lab	Qualifiers Data
Arsenic	3	0.41	MG/KG		
Barium	21.3	0.10	MG/KG	*	J
Cadmium	0.12	0.05	MG/KG	B	
Chromium	5.1	0.10	MG/KG	E*	J
Lead	6	0.17	MG/KG	EN*	J
Mercury	0.04	0.04	MG/KG	U	U
Selenium	0.37	0.37	MG/KG	U	U
Silver	0.24	0.24	MG/KG	U	U

Sample ID: FH000-SB10212-10-96/4.0-4.7 (BKSB102) Sample Depth: 4.0-4.7 FT

Matrix: Soil Field Sample Type: Grab Collected: 12/10/96

Metals	Result	Detection Limit	Units	Qualifiers Lab	Qualifiers Data
Arsenic	2	0.39	MG/KG		
Barium	8	0.10	MG/KG	*	J
Cadmium	0.05	0.05	MG/KG	B	
Chromium	10.3	0.10	MG/KG	E*	J
Lead	5	0.17	MG/KG	EN*	J
Mercury	0.04	0.04	MG/KG	U	U
Selenium	0.36	0.36	MG/KG	U	U
Silver	0.23	0.23	MG/KG	U	U

Sample ID: FH000-SB10312-10-96/10.5-11.0 (BKSB103) Sample Depth: 10.5-11.0 FT

Matrix: Soil Field Sample Type: Grab Collected: 12/10/96

Metals	Result	Detection Limit	Units	Qualifiers Lab	Qualifiers Data
Arsenic	9.1	0.42	MG/KG		
Barium	14.7	0.10	MG/KG	*	J
Cadmium	0.05	0.05	MG/KG	U	U
Chromium	10.1	0.10	MG/KG	E*	J
Lead	9.5	0.18	MG/KG	EN*	J
Mercury	0.04	0.04	MG/KG	U	U
Selenium	0.38	0.38	MG/KG	U	U
Silver	0.24	0.24	MG/KG	U	U

Ft. Hood RCRA Facility Investigation

FH-BKG Fort Hood Background

Analytical Results

Station: SB102 Background Soil Boring SB102

Sample ID: FH000-SB12112-12-96/0.0-1.5 (BKSB121) Sample Depth: 0.0-1.5 FT

Matrix: Soil Field Sample Type: Grab Collected: 12/12/96

Metals	Result	Detection Limit	Units	Qualifiers Lab	Qualifiers Data
Arsenic	4.1	0.38	MG/KG		
Barium	24	0.09	MG/KG		
Cadmium	0.18	0.05	MG/KG	B	
Chromium	6.3	0.09	MG/KG		
Lead	10.2	0.16	MG/KG	EN	J
Mercury	0.04	0.04	MG/KG	U	U
Selenium	0.34	0.34	MG/KG	U	U
Silver	0.22	0.22	MG/KG	U	U

Sample ID: FH000-SB12212-12-96/14.0-14.5 (BKSB122) Sample Depth: 14.0-14.5 FT

Matrix: Soil Field Sample Type: Grab Collected: 12/12/96

Metals	Result	Detection Limit	Units	Qualifiers Lab	Qualifiers Data
Arsenic	3.2	0.36	MG/KG		
Barium	6.1	0.09	MG/KG		
Cadmium	0.06	0.04	MG/KG	B	
Chromium	4.9	0.09	MG/KG		
Lead	4.1	0.15	MG/KG	EN	J
Mercury	0.04	0.04	MG/KG	U	U
Selenium	0.33	0.33	MG/KG	U	U
Silver	0.21	0.21	MG/KG	U	U

Sample ID: FH000-SB12312-12-96/19.0-19.5 (BKSB123) Sample Depth: 19.0-19.5 FT

Matrix: Soil Field Sample Type: Grab Collected: 12/12/96

Metals	Result	Detection Limit	Units	Qualifiers Lab	Qualifiers Data
Arsenic	3.8	0.36	MG/KG		
Barium	5.5	0.09	MG/KG		
Cadmium	0.08	0.04	MG/KG	B	
Chromium	4.3	0.09	MG/KG		
Lead	3.8	0.15	MG/KG	EN	J
Mercury	0.04	0.04	MG/KG	U	U
Selenium	0.33	0.33	MG/KG	U	U
Silver	0.21	0.21	MG/KG	U	U

Sample ID: FH000-SB20212-12-96/0.0-1.5 (BKSB202) Sample Depth: 0.0-1.5 FT

Matrix: Soil Field Sample Type: Field Duplicate Collected: 12/12/96

Metals	Result	Detection Limit	Units	Qualifiers Lab	Qualifiers Data
Arsenic	4.2	0.37	MG/KG		
Barium	18.2	0.09	MG/KG		
Cadmium	0.12	0.04	MG/KG	B	
Chromium	5.9	0.09	MG/KG		
Lead	4.5	0.16	MG/KG	EN	J
Mercury	0.04	0.04	MG/KG	U	U
Selenium	0.34	0.34	MG/KG	U	U
Silver	0.21	0.21	MG/KG	U	U

Ft. Hood RCRA Facility Investigation

FH-BKG Fort Hood Background

Analytical Results

Station: SB103 Background Soil Boring SB103

Sample ID: FH000-SB10412-10-96/0.0-1.5 (BKSB104) Sample Depth: 0.0-1.5 FT

Matrix: Soil Field Sample Type: Grab Collected: 12/10/96

Metals	Result	Detection Limit	Units	Qualifiers Lab	Qualifiers Data
Arsenic	6.2	0.35	MG/KG		
Barium	28.2	0.08	MG/KG	*	J
Cadmium	0.15	0.04	MG/KG	B	
Chromium	3.1	0.08	MG/KG	E*	J
Lead	5.3	0.15	MG/KG	EN*	J
Mercury	0.04	0.04	MG/KG	U	U
Selenium	0.32	0.32	MG/KG	U	U
Silver	0.2	0.20	MG/KG	U	U

Sample ID: FH000-SB10512-10-96/4.0-6.0 (BKSB105) Sample Depth: 4.0-6.0 FT

Matrix: Soil Field Sample Type: Grab Collected: 12/10/96

Metals	Result	Detection Limit	Units	Qualifiers Lab	Qualifiers Data
Arsenic	4.3	0.36	MG/KG		
Barium	23.4	0.09	MG/KG	*	J
Cadmium	0.11	0.04	MG/KG	B	
Chromium	4	0.09	MG/KG	E*	J
Lead	3.9	0.15	MG/KG	EN*	J
Mercury	0.04	0.04	MG/KG	U	U
Selenium	0.33	0.33	MG/KG	U	U
Silver	0.21	0.21	MG/KG	U	U

Sample ID: FH000-SB10612-10-96/9.0-9.4 (BKSB106) Sample Depth: 9.0-9.4 FT

Matrix: Soil Field Sample Type: Grab Collected: 12/10/96

Metals	Result	Detection Limit	Units	Qualifiers Lab	Qualifiers Data
Arsenic	4.4	0.37	MG/KG		
Barium	43.7	0.09	MG/KG	*	J
Cadmium	0.16	0.04	MG/KG	B	
Chromium	7.6	0.09	MG/KG	E*	J
Lead	5	0.16	MG/KG	EN*	J
Mercury	0.04	0.04	MG/KG	U	U
Selenium	0.33	0.33	MG/KG	U	U
Silver	0.21	0.21	MG/KG	U	U

Sample ID: FH000-SB10712-10-96/14.0-15.0 (BKSB107) Sample Depth: 14.0-15.0 FT

Matrix: Soil Field Sample Type: Grab Collected: 12/10/96

Metals	Result	Detection Limit	Units	Qualifiers Lab	Qualifiers Data
Arsenic	53	0.39	MG/KG		
Barium	1350	0.09	MG/KG	*	J
Cadmium	0.35	0.05	MG/KG	B	
Chromium	5.1	0.09	MG/KG	E*	J
Lead	6.1	0.17	MG/KG	EN*	J
Mercury	0.04	0.04	MG/KG	U	U
Selenium	0.36	0.36	MG/KG	U	U
Silver	0.23	0.23	MG/KG	U	U

Ft. Hood RCRA Facility Investigation

FH-BKG Fort Hood Background

Analytical Results

Station: SB104 Background Soil Boring SB104

Sample ID: FH000-SB10812-11-96/0.0-1.0 (BKSB108) Sample Depth: 0.0-1.0 FT

Matrix: Soil Field Sample Type: Grab Collected: 12/11/96

Metals	Result	Detection Limit	Units	Qualifiers Lab	Qualifiers Data
Arsenic	6	0.40	MG/KG		
Barium	72.4	0.10	MG/KG	*	J
Cadmium	0.2	0.05	MG/KG	B	
Chromium	12.9	0.10	MG/KG	E*	J
Lead	9.8	0.17	MG/KG	EN*	J
Mercury	0.04	0.04	MG/KG	U	U
Selenium	0.37	0.37	MG/KG	U	U
Silver	0.23	0.23	MG/KG	U	U

Sample ID: FH000-SB10912-11-96/4.0-5.0 (BKSB109) Sample Depth: 4.0-5.0 FT

Matrix: Soil Field Sample Type: Grab Collected: 12/11/96

Metals	Result	Detection Limit	Units	Qualifiers Lab	Qualifiers Data
Arsenic	3.5	0.38	MG/KG		
Barium	155	0.09	MG/KG	*	J
Cadmium	0.07	0.05	MG/KG	B	
Chromium	6.5	0.09	MG/KG	E*	J
Lead	3.2	0.16	MG/KG	EN*	J
Mercury	0.04	0.04	MG/KG	U	U
Selenium	0.34	0.34	MG/KG	U	U
Silver	0.22	0.22	MG/KG	U	U

Sample ID: FH000-SB11012-11-96/11.0-11.5 (BKSB110) Sample Depth: 11.0-11.5 FT

Matrix: Soil Field Sample Type: Grab Collected: 12/11/96

Metals	Result	Detection Limit	Units	Qualifiers Lab.	Qualifiers Data
Arsenic	4.8	0.40	MG/KG		
Barium	24.1	0.10	MG/KG	*	J
Cadmium	0.06	0.05	MG/KG	B	
Chromium	16.6	0.10	MG/KG	E*	J
Lead	7.8	0.17	MG/KG	EN*	J
Mercury	0.04	0.04	MG/KG	U	U
Selenium	0.36	0.36	MG/KG	U	U
Silver	0.23	0.23	MG/KG	U	U

Sample ID: FH000-SB11112-11-96/18.0-18.5 (BKSB111) Sample Depth: 18.0-18.5 FT

Matrix: Soil Field Sample Type: Grab Collected: 12/11/96

Metals	Result	Detection Limit	Units	Qualifiers Lab	Qualifiers Data
Arsenic	5.2	0.38	MG/KG		
Barium	7.2	0.09	MG/KG	*	J
Cadmium	0.05	0.05	MG/KG	B	
Chromium	6.2	0.09	MG/KG	E*	J
Lead	5.3	0.16	MG/KG	EN*	J
Mercury	0.04	0.04	MG/KG	U	U
Selenium	0.35	0.35	MG/KG	U	U
Silver	0.22	0.22	MG/KG	U	U

Ft. Hood RCRA Facility Investigation

FH-BKG Fort Hood Background

Analytical Results

Station: SB105 Background Soil Boring SB105

Sample ID: FH000-SB11212-11-96/1.0-1.5 (BKSB112) Sample Depth: 1.0-1.5 FT

Matrix: Soil Field Sample Type: Grab Collected: 12/11/96

Metals	Result	Detection Limit	Units	Qualifiers Lab	Qualifiers Data
Arsenic	1.6	0.35	MG/KG		
Barium	6.6	0.09	MG/KG	*	J
Cadmium	0.04	0.04	MG/KG	U	U
Chromium	4	0.09	MG/KG	E*	J
Lead	1.5	0.15	MG/KG	EN*	J
Mercury	0.04	0.04	MG/KG	U	U
Selenium	0.32	0.32	MG/KG	U	U
Silver	0.2	0.20	MG/KG	U	U

Sample ID: FH000-SB11312-11-96/4.0-5.0 (BKSB113) Sample Depth: 4.0-5.0 FT

Matrix: Soil Field Sample Type: Grab Collected: 12/11/96

Metals	Result	Detection Limit	Units	Qualifiers Lab	Qualifiers Data
Arsenic	5.7	0.40	MG/KG		
Barium	20.5	0.10	MG/KG	*	J
Cadmium	0.07	0.05	MG/KG	B	
Chromium	8.9	0.10	MG/KG	E*	J
Lead	6	0.17	MG/KG	EN*	J
Mercury	0.04	0.04	MG/KG	U	U
Selenium	0.36	0.36	MG/KG	U	U
Silver	0.23	0.23	MG/KG	U	U

Sample ID: FH000-SB11412-11-96/11.0-12.0 (BKSB114) Sample Depth: 11.0-12.0 FT

Matrix: Soil Field Sample Type: Grab Collected: 12/11/96

Metals	Result	Detection Limit	Units	Qualifiers Lab	Qualifiers Data
Arsenic	5.2	0.42	MG/KG		
Barium	25.2	0.10	MG/KG	*	J
Cadmium	0.05	0.05	MG/KG	U	U
Chromium	20.3	0.10	MG/KG	E*	J
Lead	7.7	0.18	MG/KG	EN*	J
Mercury	0.04	0.04	MG/KG	U	U
Selenium	0.38	0.38	MG/KG	U	U
Silver	0.24	0.24	MG/KG	U	U

Sample ID: FH000-SB11512-11-96/15.0-15.5 (BKSB115) Sample Depth: 15.0-15.5 FT

Matrix: Soil Field Sample Type: Grab Collected: 12/11/96

Metals	Result	Detection Limit	Units	Qualifiers Lab	Qualifiers Data
Arsenic	5.3	0.36	MG/KG		
Barium	10.6	0.09	MG/KG	*	J
Cadmium	0.06	0.04	MG/KG	B	
Chromium	7.3	0.09	MG/KG	E*	J
Lead	5.1	0.15	MG/KG	EN*	J
Mercury	0.04	0.04	MG/KG	U	U
Selenium	0.32	0.32	MG/KG	U	U
Silver	0.2	0.20	MG/KG	U	U

Ft. Hood RCRA Facility Investigation

FH-BKG Fort Hood Background

Analytical Results

Sample ID: FH000-SB11612-11-96/22.0-22.5 (BKSB1161) Sample Depth: 22.0-22.5 FT

Matrix: Soil Field Sample Type: Grab Collected: 12/11/96

Metals	Result	Detection Limit	Units	Qualifiers Lab	Qualifiers Data
Arsenic	11.6	0.37	MG/KG		
Barium	4.9	0.09	MG/KG	*	J
Cadmium	0.2	0.04	MG/KG	B	
Chromium	2.7	0.09	MG/KG	E*	J
Lead	5.6	0.16	MG/KG	EN*	J
Mercury	0.04	0.04	MG/KG	U	U
Selenium	0.33	0.33	MG/KG	U	U
Silver	0.21	0.21	MG/KG	U	U

Ft. Hood RCRA Facility Investigation

FH-BKG Fort Hood Background

Analytical Results

Station: SB106 Background Soil Boring SB106

Sample ID: FH000-SB11712-12-96/0.0-1.0 (BKSB117) Sample Depth: 0.0-1.0 FT

Matrix: Soil Field Sample Type: Grab Collected: 12/12/96

Metals	Result	Detection Limit	Units	Qualifiers Lab	Qualifiers Data
Arsenic	4.4	0.37	MG/KG		
Barium	27.9	0.09	MG/KG	*	J
Cadmium	0.18	0.04	MG/KG	B	
Chromium	5.7	0.09	MG/KG	E*	J
Lead	8.3	0.16	MG/KG	EN*	J
Mercury	0.04	0.04	MG/KG	U	U
Selenium	0.33	0.33	MG/KG	U	U
Silver	0.21	0.21	MG/KG	U	U

Sample ID: FH000-SB11812-12-96/9.0-9.5 (BKSB118) Sample Depth: 9.0-9.5 FT

Matrix: Soil Field Sample Type: Grab Collected: 12/12/96

Metals	Result	Detection Limit	Units	Qualifiers Lab	Qualifiers Data
Arsenic	2.6	0.37	MG/KG		
Barium	4.4	0.09	MG/KG	*	J
Cadmium	0.19	0.04	MG/KG	B	
Chromium	2.2	0.09	MG/KG	E*	J
Lead	3.7	0.16	MG/KG	EN*	J
Mercury	0.04	0.04	MG/KG	U	U
Selenium	0.34	0.34	MG/KG	U	U
Silver	0.21	0.21	MG/KG	U	U

Sample ID: FH000-SB11912-12-96/14.0-14.5 (BKSB119) Sample Depth: 14.0-14.5 FT

Matrix: Soil Field Sample Type: Grab Collected: 12/12/96

Metals	Result	Detection Limit	Units	Qualifiers Lab	Qualifiers Data
Arsenic	0.66	0.37	MG/KG	B	
Barium	3	0.09	MG/KG		
Cadmium	0.06	0.04	MG/KG	B	
Chromium	2.1	0.09	MG/KG		
Lead	1.3	0.16	MG/KG	EN	J
Mercury	0.04	0.04	MG/KG	U	U
Selenium	0.33	0.33	MG/KG	U	U
Silver	0.21	0.21	MG/KG	U	U

Sample ID: FH000-SB12012-12-96/19.0-20.0 (BKSB120) Sample Depth: 19.0-20.0 FT

Matrix: Soil Field Sample Type: Grab Collected: 12/12/96

Metals	Result	Detection Limit	Units	Qualifiers Lab	Qualifiers Data
Arsenic	0.44	0.35	MG/KG	B	
Barium	2	0.08	MG/KG		
Cadmium	0.04	0.04	MG/KG	U	U
Chromium	0.93	0.08	MG/KG	B	
Lead	0.72	0.15	MG/KG	EN	J
Mercury	0.04	0.04	MG/KG	U	U
Selenium	0.32	0.32	MG/KG	U	U
Silver	0.2	0.20	MG/KG	U	U

Ft. Hood RCRA Facility Investigation

FH-BKG Fort Hood Background

Analytical Results

Sample ID: FH000-SB20112-12-96/0.0-1.0 (BKSB201) Sample Depth: 0.0-1.0 FT

Matrix: Soil Field Sample Type: Field Duplicate Collected: 12/12/96

Metals	Result	Detection Limit	Units	Qualifiers Lab	Qualifiers Data
Arsenic	4.4	0.36	MG/KG		
Barium	17.9	0.09	MG/KG		
Cadmium	0.14	0.04	MG/KG	B	
Chromium	2.6	0.09	MG/KG		
Lead	5.9	0.15	MG/KG	EN	J
Mercury	0.04	0.04	MG/KG	U	U
Selenium	0.33	0.33	MG/KG	U	U
Silver	0.21	0.21	MG/KG	U	U

Ft. Hood RCRA Facility Investigation

FH-BKG Fort Hood Background

Analytical Results

Station: SB107 Background Soil Boring SB107

Sample ID: FH000-SB12412-12-96/0.0-1.0 (BKSB124) Sample Depth: 0.0-1.0 FT

Matrix: Soil Field Sample Type: Grab Collected: 12/12/96

Metals	Result	Detection Limit	Units	Qualifiers Lab	Qualifiers Data
Arsenic	6	0.37	MG/KG		
Barium	19.3	0.09	MG/KG		
Cadmium	0.11	0.04	MG/KG	B	
Chromium	7.2	0.09	MG/KG		
Lead	4.5	0.16	MG/KG	EN	J
Mercury	0.04	0.04	MG/KG	U	U
Selenium	0.34	0.34	MG/KG	U	U
Silver	0.21	0.21	MG/KG	U	U

Sample ID: FH000-SB12512-12-96/4.0-4.5 (BKSB125) Sample Depth: 4.0-4.5 FT

Matrix: Soil Field Sample Type: Grab Collected: 12/12/96

Metals	Result	Detection Limit	Units	Qualifiers Lab	Qualifiers Data
Arsenic	3.2	0.35	MG/KG		
Barium	18.1	0.09	MG/KG		
Cadmium	0.11	0.04	MG/KG	B	
Chromium	5.1	0.09	MG/KG		
Lead	1.7	0.15	MG/KG	EN	J
Mercury	0.04	0.04	MG/KG	U	U
Selenium	0.36	0.32	MG/KG	B	
Silver	0.2	0.20	MG/KG	U	U

Sample ID: FH000-SB12612-12-96/5.5-6.0 (BKSB126) Sample Depth: 5.5-6.0 FT

Matrix: Soil Field Sample Type: Grab Collected: 12/12/96

Metals	Result	Detection Limit	Units	Qualifiers Lab	Qualifiers Data
Arsenic	2.5	0.36	MG/KG		
Barium	5.4	0.09	MG/KG		
Cadmium	0.06	0.04	MG/KG	B	
Chromium	5.5	0.09	MG/KG		
Lead	1.5	0.15	MG/KG	EN	J
Mercury	0.04	0.04	MG/KG	U	U
Selenium	0.44	0.33	MG/KG	B	
Silver	0.21	0.21	MG/KG	U	U

Sample ID: FH000-SB20312-12-96/0.0-1.0 (BKSB203) Sample Depth: 0.0-1.0 FT

Matrix: Soil Field Sample Type: Field Duplicate Collected: 12/12/96

Metals	Result	Detection Limit	Units	Qualifiers Lab	Qualifiers Data
Arsenic	5.9	0.37	MG/KG		
Barium	39	0.09	MG/KG		
Cadmium	0.17	0.05	MG/KG	B	
Chromium	9.3	0.09	MG/KG		
Lead	6.6	0.16	MG/KG	EN	J
Mercury	0.04	0.04	MG/KG	U	U
Selenium	0.34	0.34	MG/KG	U	U
Silver	0.21	0.21	MG/KG	U	U

Ft. Hood RCRA Facility Investigation

FH-BKG Fort Hood Background

Analytical Results

Station: SB108 Background Soil Boring SB108

Sample ID: FH000-SB135/01-14-97/0.0-1.0 (BKSB135) Sample Depth: 0.0-1.0 FT

Matrix: Soil Field Sample Type: Grab Collected: 01/14/97

Metals	Result	Detection Limit	Units	Qualifiers Lab	Qualifiers Data
Arsenic	2.7	0.38	MG/KG		
Barium	15.4	0.09	MG/KG	*	J
Cadmium	0.17	0.04	MG/KG	B*	J
Chromium	6.1	0.09	MG/KG		
Lead	2.5	0.15	MG/KG	*	J
Mercury	0.04	0.04	MG/KG	U	U
Selenium	1.5	1.5	MG/KG	UWN	R
Silver	0.21	0.21	MG/KG	U	U

Sample ID: FH000-SB136/01-14-97/5.0-5.5 (BKSB136) Sample Depth: 5.0-5.5 FT

Matrix: Soil Field Sample Type: Grab Collected: 01/14/97

Metals	Result	Detection Limit	Units	Qualifiers Lab	Qualifiers Data
Arsenic	4.3	0.38	MG/KG		
Barium	14.8	0.09	MG/KG	*	J
Cadmium	0.2	0.05	MG/KG	B*	J
Chromium	8.3	0.09	MG/KG		
Lead	3	0.16	MG/KG	*	J
Mercury	0.04	0.04	MG/KG	U	U
Selenium	0.32	0.32	MG/KG	UWN	R
Silver	0.22	0.22	MG/KG	U	U

Sample ID: FH000-SB137/01-14-97/9.0-9.5 (BKSB137) Sample Depth: 9.0-9.5 FT

Matrix: Soil Field Sample Type: Grab Collected: 01/14/97

Metals	Result	Detection Limit	Units	Qualifiers Lab	Qualifiers Data
Arsenic	8.2	0.38	MG/KG		
Barium	7.8	0.09	MG/KG	*	J
Cadmium	0.18	0.04	MG/KG	B*	J
Chromium	8.1	0.09	MG/KG		
Lead	2.3	0.15	MG/KG	*	J
Mercury	0.04	0.04	MG/KG	U	U
Selenium	0.31	0.31	MG/KG	UWN	R
Silver	0.21	0.21	MG/KG	U	U

Sample ID: FH000-SB138/01-14-97/14.0-14.5 (BKSB138) Sample Depth: 14.0-14.5 FT

Matrix: Soil Field Sample Type: Grab Collected: 01/14/97

Metals	Result	Detection Limit	Units	Qualifiers Lab	Qualifiers Data
Arsenic	9.2	0.38	MG/KG		
Barium	12.2	0.09	MG/KG	*	J
Cadmium	0.21	0.05	MG/KG	B*	J
Chromium	11.1	0.09	MG/KG		
Lead	4.1	0.16	MG/KG	*	J
Mercury	0.04	0.04	MG/KG	U	U
Selenium	0.32	0.32	MG/KG	UWN	R
Silver	0.22	0.22	MG/KG	U	U

Ft. Hood RCRA Facility Investigation

FH-BKG Fort Hood Background

Analytical Results

Sample ID: FH000-SB139/01-14-97/16.5-17.0 (BKSB139) Sample Depth: 16.5-17.0 FT

Matrix: Soil Field Sample Type: Grab Collected: 01/14/97

Metals	Result	Detection Limit	Units	Qualifiers Lab	Qualifiers Data
Arsenic	7.6	0.37	MG/KG		
Barium	7.3	0.09	MG/KG	*	J
Cadmium	0.2	0.04	MG/KG	B*	J
Chromium	8.4	0.09	MG/KG		
Lead	3.6	0.16	MG/KG	*	J
Mercury	0.04	0.04	MG/KG	U	U
Selenium	0.31	0.31	MG/KG	UWN	R
Silver	0.21	0.21	MG/KG	U	U

Ft. Hood RCRA Facility Investigation

FH-BKG Fort Hood Background

Analytical Results

Station: SB109 Background Soil Boring SB109

Sample ID: FH000-SB140/01-15-97/0.0-1.0 (BKSB140) Sample Depth: 0.0-1.0 FT

Matrix: Soil Field Sample Type: Grab Collected: 01/15/97

Metals	Result	Detection Limit	Units	Qualifiers Lab	Qualifiers Data
Arsenic	4.8	0.41	MG/KG		
Barium	108	0.10	MG/KG	*	J
Cadmium	0.79	0.05	MG/KG	*	J
Chromium	16.1	0.10	MG/KG		
Lead	33.2	0.17	MG/KG	*	J
Mercury	0.04	0.04	MG/KG	U	U
Selenium	0.35	0.35	MG/KG	UWN	R
Silver	0.24	0.24	MG/KG	U	U

Sample ID: FH000-SB141/01-15-97/4.0-5.0 (BKSB141) Sample Depth: 4.0-5.0 FT

Matrix: Soil Field Sample Type: Grab Collected: 01/15/97

Metals	Result	Detection Limit	Units	Qualifiers Lab	Qualifiers Data
Arsenic	5.6	0.43	MG/KG		
Barium	127	0.10	MG/KG	*	J
Cadmium	0.45	0.05	MG/KG	B*	J
Chromium	23.6	0.10	MG/KG		
Lead	12.1	0.18	MG/KG	*	J
Mercury	0.04	0.04	MG/KG	U	U
Selenium	1.8	1.8	MG/KG	UN	R
Silver	0.25	0.25	MG/KG	U	U

Sample ID: FH000-SB142/01-15-97/9.0-10.0 (BKSB142) Sample Depth: 9.0-10.0 FT

Matrix: Soil Field Sample Type: Grab Collected: 01/15/97

Metals	Result	Detection Limit	Units	Qualifiers Lab	Qualifiers Data
Arsenic	3.8	0.44	MG/KG		
Barium	63	0.11	MG/KG	*	J
Cadmium	0.29	0.05	MG/KG	B*	J
Chromium	8.4	0.11	MG/KG		
Lead	5	0.19	MG/KG	*	J
Mercury	0.04	0.04	MG/KG	U	U
Selenium	1.9	1.9	MG/KG	UWN	R
Silver	0.25	0.25	MG/KG	U	U

Sample ID: FH000-SB143/01-15-97/14.5-15.0 (BKSB143) Sample Depth: 14.5-15.0 FT

Matrix: Soil Field Sample Type: Grab Collected: 01/15/97

Metals	Result	Detection Limit	Units	Qualifiers Lab	Qualifiers Data
Arsenic	3.8	0.41	MG/KG		
Barium	39.3	0.10	MG/KG	*	J
Cadmium	0.27	0.05	MG/KG	B*	J
Chromium	12.2	0.10	MG/KG		
Lead	6.6	0.17	MG/KG	*	J
Mercury	0.04	0.04	MG/KG	U	U
Selenium	0.35	0.35	MG/KG	UWN	R
Silver	0.24	0.24	MG/KG	U	U

Ft. Hood RCRA Facility Investigation

FH-BKG Fort Hood Background

Analytical Results

Sample ID: FH000-SB144/01-15-97/19.0-19.3 (BKSB144) Sample Depth: 19.0-19.3 FT

Matrix: Soil Field Sample Type: Grab Collected: 01/15/97

Metals	Result	Detection Limit	Units	Qualifiers Lab	Qualifiers Data
Arsenic	3.7	0.37	MG/KG		
Barium	36.1	0.09	MG/KG	*	J
Cadmium	0.2	0.04	MG/KG	B*	J
Chromium	6.5	0.09	MG/KG		
Lead	4	0.16	MG/KG	*	J
Mercury	0.04	0.04	MG/KG	U	U
Selenium	0.31	0.31	MG/KG	UWN	R
Silver	0.21	0.21	MG/KG	U	U

Ft. Hood RCRA Facility Investigation

FH-BKG Fort Hood Background

Analytical Results

Station: SB110 Background Soil Boring SB110

Sample ID: FH000-SB12712-13-96/0.0-1.0 (BKSB127) Sample Depth: 0.0-1.0 FT

Matrix: Soil Field Sample Type: Grab Collected: 12/13/96

Metals	Result	Detection Limit	Units	Qualifiers Lab	Qualifiers Data
Arsenic	1.9	0.36	MG/KG		
Barium	18.8	0.09	MG/KG		
Cadmium	0.04	0.04	MG/KG	U	U
Chromium	3.7	0.09	MG/KG		
Lead	3.8	0.15	MG/KG	EN	J
Mercury	0.04	0.04	MG/KG	U	U
Selenium	0.33	0.33	MG/KG	U	U
Silver	0.21	0.21	MG/KG	U	U

Sample ID: FH000-SB12812-13-96/4.0-6.0 (BKSB128) Sample Depth: 4.0-6.0 FT

Matrix: Soil Field Sample Type: Grab Collected: 12/13/96

Metals	Result	Detection Limit	Units	Qualifiers Lab	Qualifiers Data
Arsenic	3.8	0.38	MG/KG		
Barium	36.3	0.09	MG/KG		
Cadmium	0.05	0.05	MG/KG	U	U
Chromium	8.5	0.09	MG/KG		
Lead	7.5	0.16	MG/KG	EN	J
Mercury	0.04	0.04	MG/KG		
Selenium	0.35	0.35	MG/KG	U	U
Silver	0.22	0.22	MG/KG	U	U

Sample ID: FH000-SB12912-13-96/10.0-11.0 (BKSB129) Sample Depth: 10.0-11.0 FT

Matrix: Soil Field Sample Type: Grab Collected: 12/13/96

Metals	Result	Detection Limit	Units	Qualifiers Lab	Qualifiers Data
Arsenic	2.6	0.36	MG/KG		
Barium	26.3	0.09	MG/KG		
Cadmium	0.04	0.04	MG/KG	U	U
Chromium	4.6	0.09	MG/KG		
Lead	4.1	0.15	MG/KG	EN	J
Mercury	0.04	0.04	MG/KG	U	U
Selenium	0.33	0.33	MG/KG	U	U
Silver	0.21	0.21	MG/KG	U	U

Sample ID: FH000-SB13012-13-96/15.0-16.0 (BKSB130) Sample Depth: 15.0-16.0 FT

Matrix: Soil Field Sample Type: Grab Collected: 12/13/96

Metals	Result	Detection Limit	Units	Qualifiers Lab	Qualifiers Data
Arsenic	1	0.35	MG/KG	B	
Barium	8.1	0.08	MG/KG		
Cadmium	0.07	0.04	MG/KG	B	
Chromium	1.8	0.08	MG/KG		
Lead	3.1	0.15	MG/KG	EN	J
Mercury	0.04	0.04	MG/KG	U	U
Selenium	0.32	0.32	MG/KG	U	U
Silver	0.2	0.20	MG/KG	U	U

Ft. Hood RCRA Facility Investigation

FH-BKG Fort Hood Background

Analytical Results

Sample ID: FH000-SB13112-13-96/20.0-21.0 (BKSB131) Sample Depth: 20.0-21.0 FT
Matrix: Soil Field Sample Type: Grab Collected: 12/13/96

Metals	Result	Detection Limit	Units	Qualifiers Lab	Qualifiers Data
Arsenic	5.3	0.38	MG/KG		
Barium	65.9	0.09	MG/KG		
Cadmium	0.15	0.05	MG/KG	B	
Chromium	7.7	0.09	MG/KG		
Lead	10.1	0.16	MG/KG	EN	J
Mercury	0.04	0.04	MG/KG	U	U
Selenium	0.34	0.34	MG/KG	U	U
Silver	0.22	0.22	MG/KG	U	U

Sample ID: FH000-SB13212-13-96/25.0-26.0 (BKSB132) Sample Depth: 25.0-26.0 FT
Matrix: Soil Field Sample Type: Grab Collected: 12/13/96

Metals	Result	Detection Limit	Units	Qualifiers Lab	Qualifiers Data
Arsenic	4.2	0.37	MG/KG		
Barium	41.7	0.09	MG/KG		
Cadmium	0.04	0.04	MG/KG	U	U
Chromium	5.9	0.09	MG/KG		
Lead	7.8	0.16	MG/KG	EN	J
Mercury	0.04	0.04	MG/KG	U	U
Selenium	0.34	0.34	MG/KG	U	U
Silver	0.21	0.21	MG/KG	U	U

Sample ID: FH000-SB13312-13-96/30.0-31.0 (BKSB133) Sample Depth: 30.0-31.0 FT
Matrix: Soil Field Sample Type: Grab Collected: 12/13/96

Metals	Result	Detection Limit	Units	Qualifiers Lab	Qualifiers Data
Arsenic	3.2	0.39	MG/KG		
Barium	68.6	0.09	MG/KG		
Cadmium	0.11	0.05	MG/KG	B	
Chromium	4.9	0.09	MG/KG		
Lead	6.3	0.17	MG/KG	EN	J
Mercury	0.04	0.04	MG/KG	U	U
Selenium	0.35	0.35	MG/KG	U	U
Silver	0.22	0.22	MG/KG	U	U

Sample ID: FH000-SB13412-13-96/34.0-34.5 (BKSB134) Sample Depth: 34.0-34.5 FT
Matrix: Soil Field Sample Type: Grab Collected: 12/13/96

Metals	Result	Detection Limit	Units	Qualifiers Lab	Qualifiers Data
Arsenic	2.9	0.36	MG/KG		
Barium	20.1	0.09	MG/KG		
Cadmium	0.08	0.04	MG/KG	B	
Chromium	1.2	0.09	MG/KG		
Lead	2.3	0.15	MG/KG	EN	J
Mercury	0.04	0.04	MG/KG	U	U
Selenium	0.33	0.33	MG/KG	U	U
Silver	0.21	0.21	MG/KG	U	U

Ft. Hood RCRA Facility Investigation

FH-BKG Fort Hood Background

Analytical Results

Sample ID: FH000-SB20412-13-96/4.0-6.0 (BKSB204) Sample Depth: 4.0-6.0 FT

Matrix: Soil Field Sample Type: Field Duplicate Collected: 12/13/96

Metals	Result	Detection Limit	Units	Qualifiers Lab	Qualifiers Data
Arsenic	3.2	0.38	MG/KG		
Barium	31.9	0.09	MG/KG		
Cadmium	0.05	0.05	MG/KG	U	U
Chromium	6.5	0.09	MG/KG		
Lead	7.1	0.16	MG/KG	EN	J
Mercury	0.04	0.04	MG/KG	U	U
Selenium	0.35	0.35	MG/KG	U	U
Silver	0.22	0.22	MG/KG	U	U

APPENDIX E

Fort Hood RFI Background Soil Boring Logs

RCRA
Facilities
Investigation
Fort Hood, Texas

U. S. Army Corp of Engineers
Fort Worth District
Fort Worth, Texas

Boring FHBKG-SB101

(Page 1 of 1)

FHBKG	: Background
Start Date	: 12/10/96
End Date	: 12/10/96
Northing Coord.	: 3446458.08 m
Easting Coord.	: 61375.50 m UTM 14 North
Total Depth of Boring	: 18.5 feet

Drilling Company	: Terra-Mar
Driller	: Bill Christopher
Designation of Drill	: Mobile Drill B-59
Type of Drill Rig	: Hollow Stem Auger
Geologist	: Jeff DeVaughn
Depth to Bedrock	: 15.0 feet
Depth Drilled Into Rock	: 3.5 feet
Borehole Diameter	: 8 inches
Sampling Equipment	: 4.25" Augers
	: CME Sampler 5' long

Depth in feet	Surf. Elev. 887.80ft	USCS	GRAPHIC	Water Levels	DESCRIPTION	REMARKS
0					Topsoil. 0.0-0.5' bgs.; weathered tan limestone.	No sample recovery.
1	887	CL			CLAY; weathered limestone fragments; damp; soft; moderately plastic; 10YR5/4 yellowish brown.	
2	886					Sample BKSB101 collected 2.0-2.5' bgs.
3	885				Same as above; dry.	
4	884				Same as above; dry; more weathered limestone.	Description from soil cuttings.
5	883	CH			CLAY, fat; fewer fragments; damp; firm; highly plastic; mottled 10YR6/6 brownish yellow and 2.5Y7/1 light gray.	Sample BKSB102 collected 4.0-4.7' bgs.
6	882				Same CLAY as above; more silty; interbedded with weathered limestone; dry.	Description from soil cuttings.
7	881					
8	880					
9	879					
10	878				Same as above; dry.	
11	877	CL			Silty CLAY; dry; firm; non-plastic; 10YR6/6 brownish yellow.	Sample BKSB103 collected 10.5-11.0' bgs.
12	876				Same as above; interbedded with tan weathered limestone; dry.	
13	875					
14	874					
15	873	LS			LIMESTONE, weathered; dry; blue-gray.	Description from soil cuttings.
16	872					
17	871					
18	870					Soil colors from Munsell Soil Color Chart, 1992 Revised Edition.
19	869				Bottom of Boring @ 18.5' bgs.	
20	868					

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RCRA
Facilities
Investigation
Fort Hood, Texas

U. S. Army Corp of Engineers
Fort Worth District
Fort Worth, Texas

Boring FHBKG-SB102

(Page 1 of 1)

FHBKG	: Background
Start Date	: 12/12/96
End Date	: 12/12/96
Northing Coord.	: 3446503.40 m
Easting Coord.	: 613980.64 m UTM 14 North
Total Depth of Boring	: 19.5 feet

Drilling Company	: Terra-Mar
Driller	: Bill Christopher
Designation of Drill	: Mobile Drill B-59
Type of Drill Rig	: Hollow Stem Auger
Geologist	: Jeff DeVaughn
Depth to Bedrock	: 16.0 feet
Depth Drilled Into Rock	: 3.5 feet
Borehole Diameter	: 8 inches
Sampling Equipment	: 4.25" Augers
	: CME Sampler 5' long

Depth in feet	Surf. Elev. 912.28ft	USCS	GRAPHIC	Water Levels	DESCRIPTION	REMARKS
0	912				Topsoil. 0.0-0.4' bgs.	Sample BKSB121, duplicate BKSB202, and split sample BKSB302 collected 0.0-0.5' bgs.
1	911	CL			Silty CLAY; weathered limestone fragments; dry; firm; non-plastic; mottled 10YR5/3 brown and 10YR8/2 very pale brown.	
2	910				Same as above; dry.	
3	909					Description from soil cuttings.
4	908	CL			LIMESTONE, weathered, tan; and Silty Clay interbeds; dry.	
5	907					
6	906	CL			Zones of limestone and highly indurated silty clay (weathered limestone?); shell fragments; roots; dry; very hard; 2.5Y8/2 pale yellow.	
7	905					
8	904					
9	903				Same as above; dry.	
10	902					
11	901				Same as above; dry.	
12	900					
13	899					Description from soil cuttings.
14	898					Sample BKSB122 collected 14.0-14.5' bgs.
15	897				Same as above; dry.	
16	896	LS			LIMESTONE, weathered; dry; blue-gray.	
17	895					
18	894				Same as above; dry.	
19	893				Same as above; dry.	Sample BKSB123 collected 19.0-19.5' bgs.
20					Bottom of Boring @ 19.5' bgs.	Soil colors from Munsell Soil Color Chart, 1992 Revised Edition.

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Fort Worth District
Fort Worth, Texas

Boring FHBKG-SB103

(Page 1 of 1)

FHBKG	: Background
Start Date	: 12/10/96
End Date	: 12/10/96
Northing Coord.	: 3447405.80 m
Easting Coord.	: 606690.49 m UTM 14 North
Total Depth of Boring	: 17.0 feet

Drilling Company	: Terra-Mar
Driller	: Bill Christopher
Designation of Drill	: Mobile Drill B-59
Type of Drill Rig	: Hollow Stem Auger
Geologist	: Jeff DeVaughn
Depth to Bedrock	: 15.0 feet
Depth Drilled Into Rock	: 2.0 feet
Borehole Diameter	: 8 inches
Sampling Equipment	: 4.25" Augers
	: CME Sampler 5' long

Depth in feet	Surf. Elev. 795.26ft	USCS	DESCRIPTION	REMARKS
0	795		Topsoil. 0.0-0.2' bgs.; weathered tan limestone.	Sample BKSB104 collected 0.0-0.5' bgs.
1	794	CL	Interbedded Silty and pebbly CLAY; 40% coarse sand to pebble sized angular to subrounded fragments; dry; moderately plastic; thin layers of 10YR8/4 very pale brown and 10YR3/2 very dark grayish brown.	
2	793			
3	792		Same as above; no pebbles; dry.	Description from soil cuttings.
4	791	CL	Same as above; weathered, tan limestone fragments; dry.	Sample BKSB105 collected 4.0-4.5' bgs.
5	790			
6	789	CL	Same as above; interbeds of limestone; dry.	
7	788		Same as above; dry.	
8	787			
9	786		Same as above; dry.	Sample BKSB106 collected 9.0-9.5' bgs.
10	785			
11	784		Same as above; except more medium to coarse sand; dry; soft; non-plastic.	
12	783			
13	782		Same as above; dry.	Description from soil cuttings.
14	781	CL	Silty CLAY; weathered limestone fragments; damp; firm; moderately plastic; mottled 10YR8/2 very pale brown and 10YR6/4 light yellowish brown.	Sample BKSB107 collected 14.0-15.0' bgs.
15	780	LS	LIMESTONE, weathered; dry; blue-gray.	
16	779			
17	778		Bottom of Boring @ 17.0' bgs.	
18	777			
19	776			
20				Soil colors from Munsell Soil Color Chart, 1992 Revised Edition.

10-20-1999 t:\gov\coe\fthood\boringlogs\fhbkg\SB103.BOR

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Fort Hood, Texas

U. S. Army Corp of Engineers
Fort Worth District
Fort Worth, Texas

Boring FHBKG-SB104

(Page 1 of 1)

FHBKG	: Background
Start Date	: 12/11/96
End Date	: 12/11/96
Northing Coord.	: 3447780.16 m
Easting Coord.	: 613523.75 m UTM 14 North
Total Depth of Boring	: 24.0 feet

Drilling Company	: Terra-Mar
Driller	: Bill Christopher
Designation of Drill	: Mobile Drill B-59
Type of Drill Rig	: Hollow Stem Auger
Geologist	: Jeff DeVaughn
Depth to Bedrock	: 24.0 feet
Depth Drilled Into Rock	: NA
Borehole Diameter	: 8 inches
Sampling Equipment	: 4.25" Augers
	: CME Sampler 5' long

Depth in feet	Surf. Elev. 896.29	USCS	GRAPHIC	Water Levels	DESCRIPTION	REMARKS
0	896				Topsoil. 0.0-1.0' bgs.; weathered tan limestone.	Sample BKSB108 collected 0.0-1.0' bgs.
1	895				Silty CLAY; trace organics; weathered limestone fragments; damp; soft; low plasticity; 2.5Y7/6 yellow.	
2	894					
3	893				Same as above.	Description from soil cuttings.
4	892				Same as above; no organics; dry; 10YR7/8 yellow mottle.	
5	891	CL				Sample BKSB109 collected 4.0-5.0' bgs.
6	890				Same as above; slightly more silty; dry; hard; brittle.	
7	889					Description from soil cuttings.
8	888					
9	887				LIMESTONE, weathered; tan.	Description from soil cuttings. Hard drilling.
10	886	LS			weathered limestone as above.	
11	885				Silty CLAY as above; dry.	Sample BKSB110 collected 11.0-11.5' bgs.
12	884	CL			Same as above; dry.	Geotechnical sample collected 12.0-13.0' bgs.
13	883				Silty CLAY and weathered LIMESTONE interbeds.	
14	882					
15	881	CL				Description from soil cuttings.
16	880					
17	879					
18	878	CL			Silty CLAY as above; dry.	Sample BKSB111 collected 18.0-18.5' bgs.
19	877				Silty CLAY and weathered LIMESTONE interbeds.	
20	876					
21	875	CL				Description from soil cuttings.
22	874					
23	873				Same as above; dry. Blue-gray weathered limestone fragments; dry.	
24	872	LS			Bottom of Boring at 24.0' bgs.	Soil colors from Munsell Soil Color Chart, 1992 Revised Edition.
25						

10-20-1999 t:\gov\coe\fthood\boringlogs\fhbkg\SB104.BOR

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Fort Worth District
Fort Worth, Texas

Boring FHBKG-SB105

(Page 1 of 1)

FHBKG	: Background
Start Date	: 12/11/96
End Date	: 12/11/96
Northing Coord.	: Not
Easting Coord.	: Surveyed
Total Depth of Boring	: 24.0 feet

Drilling Company	: Terra-Mar
Driller	: Bill Christopher
Designation of Drill	: Mobile Drill B-59
Type of Drill Rig	: Hollow Stem Auger
Geologist	: Jeff DeVaughn
Depth to Bedrock	: 24.0 feet
Depth Drilled Into Rock	: NA
Borehole Diameter	: 8 inches
Sampling Equipment	: 4.25" Augers
	: CME Sampler 5' long

Depth in feet	Surf. Elev. NS	USCS	GRAPHIC	Water Levels	DESCRIPTION	REMARKS
0	0	GP			GRAVEL (graded area).	
1	-1	CL			Silty CLAY; weathered limestone fragments; dry; firm; non-plastic; 2.5Y6/4 light yellowish brown.	Sample BKSB112 collected 1.0-1.5' bgs.
2	-2					
3	-3				Same as above; dry.	Description from soil cuttings.
4	-4	CH			CLAY, fat; dry; firm; highly plastic; mottled 2.5Y6/4 light yellowish brown and 10YR6/6 brownish yellow.	Sample BKSB113 collected 4.0-5.0' bgs.
5	-5	CL			Silty CLAY and LIMESTONE interbeds; dry; firm; 2.5Y6/4 light yellowish brown.	
6	-6					
7	-7					
8	-8					Description from soil cuttings.
9	-9					
10	-10				Same as above; dry.	
11	-11					
12	-12				Same as above; dry; moderately plastic.	Sample BKSB114 collected 11.0-12.0' bgs.
13	-13				Same as above; dry.	Description from soil cuttings.
14	-14					
15	-15	CL			Same as above; more silt; dry; hard; brittle; non-plastic.	Sample BKSB115 collected 15.0-15.5' bgs.
16	-16				Same as above with weathered limestone interbeds.	
17	-17					
18	-18					Description from soil cuttings.
19	-19					
20	-20					
21	-21					
22	-22				Same as above; dry.	Sample BKSB116 collected 22.0-22.5' bgs.
23	-23					
24	-24				Blue-gray weathered limestone; dry; hard drilling to 24.0'.	Soil colors from Munsell Soil Color Chart, 1992 Revised Edition.
25		LS			Bottom of Boring at 24.0' bgs.	

10-20-1999 t:\gov\coe\fthood\boringlogs\fhbkg\SB105.BOR

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Investigation
Fort Hood, Texas

U. S. Army Corp of Engineers
Fort Worth District
Fort Worth, Texas

Boring FHBKG-SB106

(Page 1 of 1)

FHBKG	: Background
Start Date	: 12/12/96
End Date	: 12/12/96
Northing Coord.	: Not
Easting Coord.	: Surveyed
Total Depth of Boring	: 25.5 feet

Drilling Company	: Terra-Mar
Driller	: Bill Christopher
Designation of Drill	: Mobile Drill B-59
Type of Drill Rig	: Hollow Stem Auger
Geologist	: Jeff DeVaughn
Depth to Bedrock	: 25.5 feet
Depth Drilled Into Rock	: NA
Borehole Diameter	: 8 inches
Sampling Equipment	: 4.25" Augers
	: CME Sampler 5' long

Depth in feet	Surf. Elev. NS	USCS	DESCRIPTION	REMARKS
0	0	CL	Silty CLAY; weathered limestone fragments; dry; firm; non-plastic; mottled 2.5Y7/6 yellow and 10YR6/6 brownish yellow.	Sample BKSB117 collected 0.0-1.0' bgs.
1	-1			
2	-2			
3	-3		Same as above; dry.	Geotechnical sample collected 3.0-4.0' bgs.
4	-4	CL	Same as above with weathered limestone interbeds.	
5	-5			
6	-6			Description from soil cuttings.
7	-7		Same as above with trace sand; dry.	
8	-8			
9	-9	SM	Silty SAND, fine; dry; non-plastic; carbonate (HCL fizz); 2.5Y8/4 pale yellow.	Sample BKSB118 collected 9.0-9.5' bgs.
10	-10			
11	-11		Same as above; dry.	
12	-12		Same as above except color change to 19YR8/2 very pale brown.	
13	-13			
14	-14	SP	Same as above SAND, fine; except no silt.	Sample BKSB119 collected 14.0-14.5' bgs.
15	-15			
16	-16			
17	-17		Same as above; dry.	Description from soil cuttings.
18	-18			
19	-19	SW	SAND, fine; dry; soft; non-carbonate; 2.5Y8/4 pale yellow.	Sample BKSB120 collected 19.0-20.0' bgs.
20	-20			
21	-21			
22	-22		Same as above; dry.	
23	-23	LS	LIMESTONE, weathered; dry; tan.	Description from soil cuttings.
24	-24			
25	-25			
26	-26		Blue-gray weathered limestone; dry. Bottom of Boring at 25.5' bgs.	
27	-27			
28	-28			Soil colors from Munsell Soil Color Chart, 1992 Revised Edition.
29	-29			
30				

10-20-1999 t:\gov\coe\fthood\boringlogs\fhbkg\SB106.BOR

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U. S. Army Corp of Engineers
Fort Worth District
Fort Worth, Texas

Boring FHBKG-SB107

(Page 1 of 1)

FHBKG	: Background
Start Date	: 12/12/96
End Date	: 12/12/96
Northing Coord.	: 3438421.71 m
Easting Coord.	: 612222.83 m UTM 14 North
Total Depth of Boring	: 6.0 feet

Drilling Company	: Terra-Mar
Driller	: Bill Christopher
Designation of Drill	: Mobile Drill B-59
Type of Drill Rig	: Hollow Stem Auger
Geologist	: Jeff DeVaughn
Depth to Bedrock	: 1.7 feet
Depth Drilled Into Rock	: 4.3 feet
Borehole Diameter	: 8 inches
Sampling Equipment	: 4.25" Augers
	: CME Sampler 5' long

Depth in feet	Surf. Elev. NS	USCS	GRAPHIC	Water Levels	DESCRIPTION	REMARKS
0	0	CL			Silty CLAY; weathered limestone fragments; dry; hard; non-plastic; mottled 10YR6/8 brownish yellow and 10YR6/2 light brownish gray.	Sample BKSB124 collected 0.0-1.0' bgs.
1	-1					
2	-2	LS			LIMESTONE, weathered, fossiliferous; Blue-Gray; 2.5Y6/1 gray.	
3	-3					Description from soil cuttings.
4	-4				Same as above	Sample BKSB125 collected 4.0-4.5' bgs.
5	-5					Description from soil cuttings.
					Same as above	Sample BKSB126 collected 5.5-6.0' bgs.
6	-6				Bottom of Boring at 6.0' bgs.	
7	-7					
8	-8					Soil colors from Munsell Soil Color Chart, 1992 Revised Edition.
9	-9					
10						

10-20-1999 t:\gov\coe\fthood\boringlogs\fhbkg\SB107.BOR

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Fort Hood, Texas

U. S. Army Corp of Engineers
Fort Worth District
Fort Worth, Texas

Boring FHBKG-SB108

(Page 1 of 1)

FHBKG	: Background
Start Date	: 01/14/97
End Date	: 01/14/97
Northing Coord.	: Not
Easting Coord.	: Surveyed
Total Depth of Boring	: 17.0 feet

Drilling Company	: Terra-Mar
Driller	: Bill Christopher
Designation of Drill	: Mobile Drill B-59
Type of Drill Rig	: Hollow Stem Auger
Geologist	: Jeff DeVaughn
Depth to Bedrock	: 15.0 feet
Depth Drilled Into Rock	: 2.0 feet
Borehole Diameter	: 8 inches
Sampling Equipment	: 4.25" Augers
	: CME Sampler 5' long

Depth in feet	Surf. Elev. NS	USCS	GRAPHIC	Water Levels	DESCRIPTION	REMARKS
0	0				Topsoil 0.0-0.4'	Sample BKSB135 collected 0.0-1.0' bgs.
1	-1	CL			Silty CLAY; weathered limestone fragments; dry; firm; non-plastic; 10YR6/8 brownish yellow.	
2	-2					
3	-3				Same as above; dry.	Description from soil cuttings.
4	-4					
5	-5				Same as above; dry; mottled with 2.5Y7/3 pale yellow.	Sample BKSB136 collected 5.0-5.5' bgs.
6	-6					
7	-7				Same as above; dry.	Description from soil cuttings.
8	-8					
9	-9				Same as above; dry.	Sample BKSB137 collected 9.0-9.5' bgs.
10	-10					
11	-11					
12	-12				Same as above; dry.	Description from soil cuttings.
13	-13					
14	-14				Same as above; less silty; dry.	Sample BKSB138 collected 14.0-14.5' bgs.
15	-15				Same as above; dry.	
16	-16	LS			LIMESTONE, weathered; blue-gray.	
17	-17				Same as above; dry.	Sample BKSB139 collected 16.5-17.0' bgs.
18	-18				Bottom of Boring at 17.0' bgs.	Soil colors from Munsell Soil Color Chart, 1992 Revised Edition.
19	-19					
20						

10-20-1999 t:\gov\coe\fthood\boringlogs\fhbkg\SB108.BOR

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Facilities
Investigation
Fort Hood, Texas

U. S. Army Corp of Engineers
Fort Worth District
Fort Worth, Texas

Boring FHBKG-SB109

(Page 1 of 1)

FHBKG	: Background
Start Date	: 01/15/97
End Date	: 01/15/97
Northing Coord.	: 3471041.79 m
Easting Coord.	: 626015.26 m UTM 14 North
Total Depth of Boring	: 24.0 feet

Drilling Company	: Terra-Mar
Driller	: Bill Christopher
Designation of Drill	: Mobile Drill B-59
Type of Drill Rig	: Hollow Stem Auger
Geologist	: Jeff DeVaughn
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 8 inches
Sampling Equipment	: 4.25" Augers
	: CME Sampler 5' long

Depth in feet	Surf. Elev. 730.62ft	USCS	GRAPHIC	Water Levels	DESCRIPTION	REMARKS
0	730	CL			Silty CLAY; trace roots; trace rock fragments <1cm, angular to subrounded; damp; highly plastic; 5YR2.5/1 black.	Sample BKSB140 collected 0.0-1.0' bgs.
1						
2	729				Same as above; damp.	
3	728					
4	727				Same as above; damp.	Description from soil cuttings.
5	726					Sample BKSB141 collected 4.0-5.0' bgs.
6	725					
7	724	CL			Silty CLAY; trace weathered limestone fragments; dry; stiff; non-plastic; 7.5YR6/4 light brown.	
8	723				Some sand, fine, from 8-9' bgs.	Description from soil cuttings.
9	722				Same as above; dry.	
10	721					Sample BKSB142 collected 9.0-10.0' bgs.
11	720				Same as above except rock fragments (mostly weathered limestone) up to 20% of total matrix.	
12	719					
13	718				Same as above; dry.	Description from soil cuttings.
14	717					
15	716				Same as above; with limestone fragments up to 40%; also 10% fine sand; dry.	Sample BKSB143 collected 14.5-15.0' bgs.
16	715					
17	714				Same as above; dry.	Description from soil cuttings.
18	713					
19	712				Same as above; dry.	Sample BKSB144 collected 19.0-19.3' bgs.
20	711					
21	710					Description from soil cuttings.
22	709				Same as above; dry.	
23	708					
24	707	SM			Silty SAND, fine to medium; moist; soft; moderately plastic; 7.5Y6/8 reddish yellow and 7.5 YR7/1 light gray.	Water in hole, attempted sample, no recovery in gravel at 24'
25	706	GP			Bottom of boring at 24.0' bgs. GRAVEL,angular;saturated	Soil colors from Munsell Soil Color Chart, 1992 Revised Edition.

10-20-1999 t:\gov\coe\fthood\boringlogs\fhbkg\SB109.BOR

RCRA Facilities Investigation
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U. S. Army Corp of Engineers
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Fort Worth, Texas

Boring FHBKG-SB110

(Page 1 of 1)

FHBKG	: Background
Start Date	: 12/13/96
End Date	: 12/13/96
Northing Coord.	: 3472081.13 m
Easting Coord.	: 626432.83 m UTM 14 North
Total Depth of Boring	: 34.5 feet

Drilling Company	: Terra-Mar
Driller	: Bill Christopher
Designation of Drill	: Mobile Drill B-59
Type of Drill Rig	: Hollow Stem Auger
Geologist	: Jeff DeVaughn
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 8 inches
Sampling Equipment	: 4.25" Augers
	: CME Sampler 5' long

Depth in feet	Surf. Elev. 729.66ft	USCS	DESCRIPTION	REMARKS
0	729	SM	SAND, fine to medium; some silt; damp; soft; non-plastic; 7.5YR5/6 strong brown.	Sample BKSB127 collected 0.0-1.0' bgs.
1	728		Same as above; damp to moist.	
2	727			
3	726	SC	Clayey SAND; damp; firm; moderately plastic; 2.5YR4/6 red.	
4	725		Same as above; damp.	Sample BKSB128 collected 4.0-6.0' bgs.
5	724			
6	723		Same as above; damp.	
7	722			
8	721		Same as above; damp.	Geotechnical sample collected 8.0-9.0' bgs.
9	720			
10	719		Same as above; slightly less clay; dry.	Sample BKSB129 collected 10.0-11.0' bgs.
11	718			
12	717		Same as above; dry.	
13	716			
14	715		Same as above; less clay; dry; color change 5YR5/6 yellowish red.	
15	714		Same as above; dry.	Sample BKSB130 collected 15.0-16.0' bgs.
16	713		Same as above; dry;	
17	712			
18	711		Same as above; more clay; dry.	
19	710	CL	Silty CLAY; trace sand; trace tan weathered limestone fragments; dry; hard; 7.5YR6/6 reddish yellow.	Sample BKSB131 collected 20.0-21.0' bgs.
20	709		Same as above; dry.	
21	708			
22	707		Same as above; dry.	
23	706			
24	705		Same as above; dry.	Sample BKSB132 collected 25.0-26.0' bgs.
25	704			
26	703		Same as above; dry.	
27	702			
28	701		Same as above; with more silt; moist; softer.	
29	700			
30	699		Same as above; except very silty; damp; soft.	Sample BKSB133 collected 30.0-31.0' bgs.
31	698			
32	697			
33	696	SM	Silty SAND, fine; trace gravel and coarse sand at bottom; saturated; non-plastic; 7.5Y6/6 reddish yellow.	Sample BKSB134 collected 34.0-34.5' bgs.
34	695	GW	SAND, coarse, and GRAVEL, poorly sorted, angular to round; saturated; 1.5 water in hole.	
35	694		Bottom of boring at 34.5' bgs.	
36	693			
37	692			
38	691			Soil colors from Munsell Soil Color Chart, 1992 Revised Edition.
39	690			
40				

10-20-1999 t:\gov\coe\fthood\boringlogs\fhbkg\SB110.BOR

APPENDIX F

Statistical Calculations

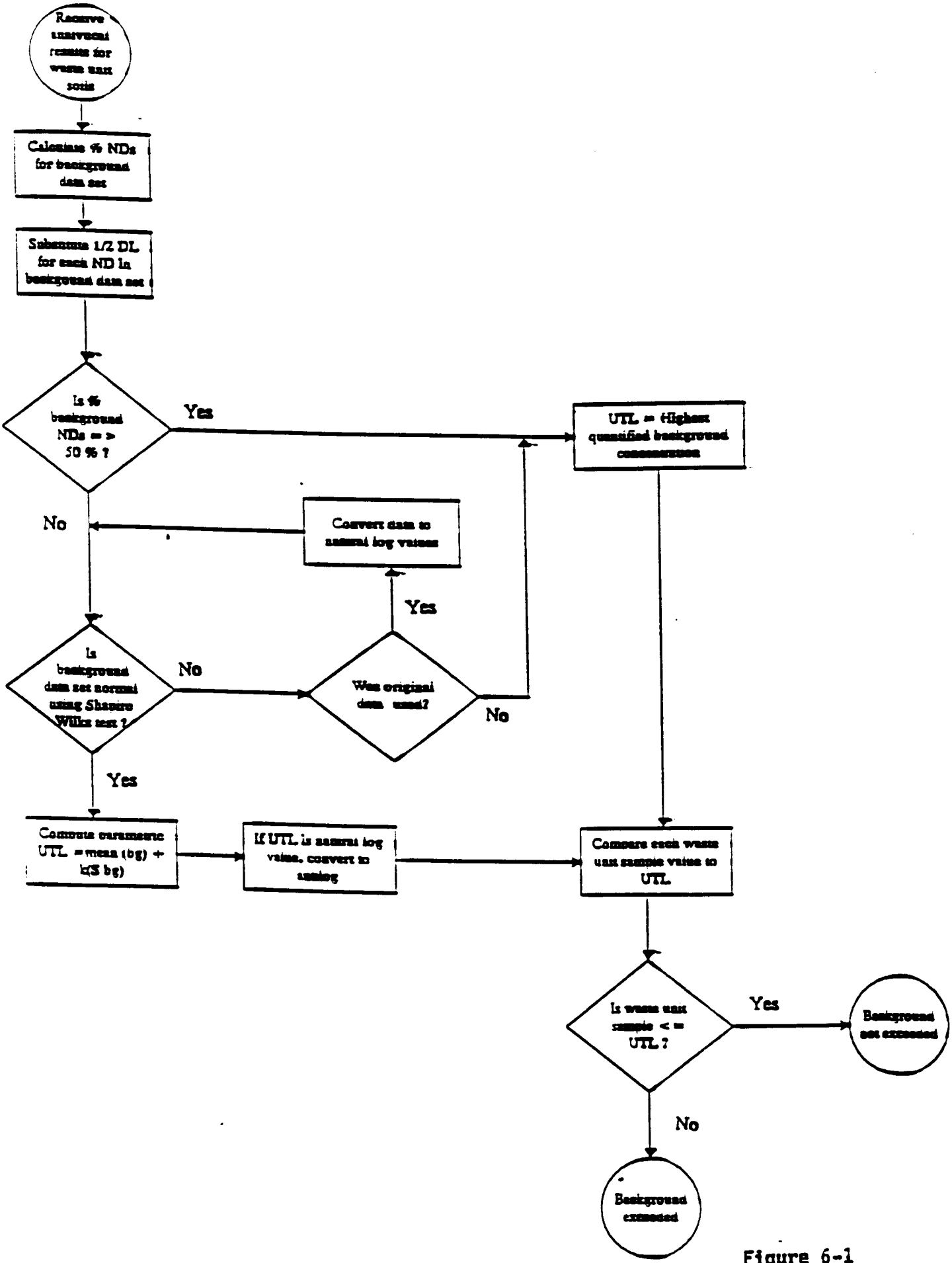
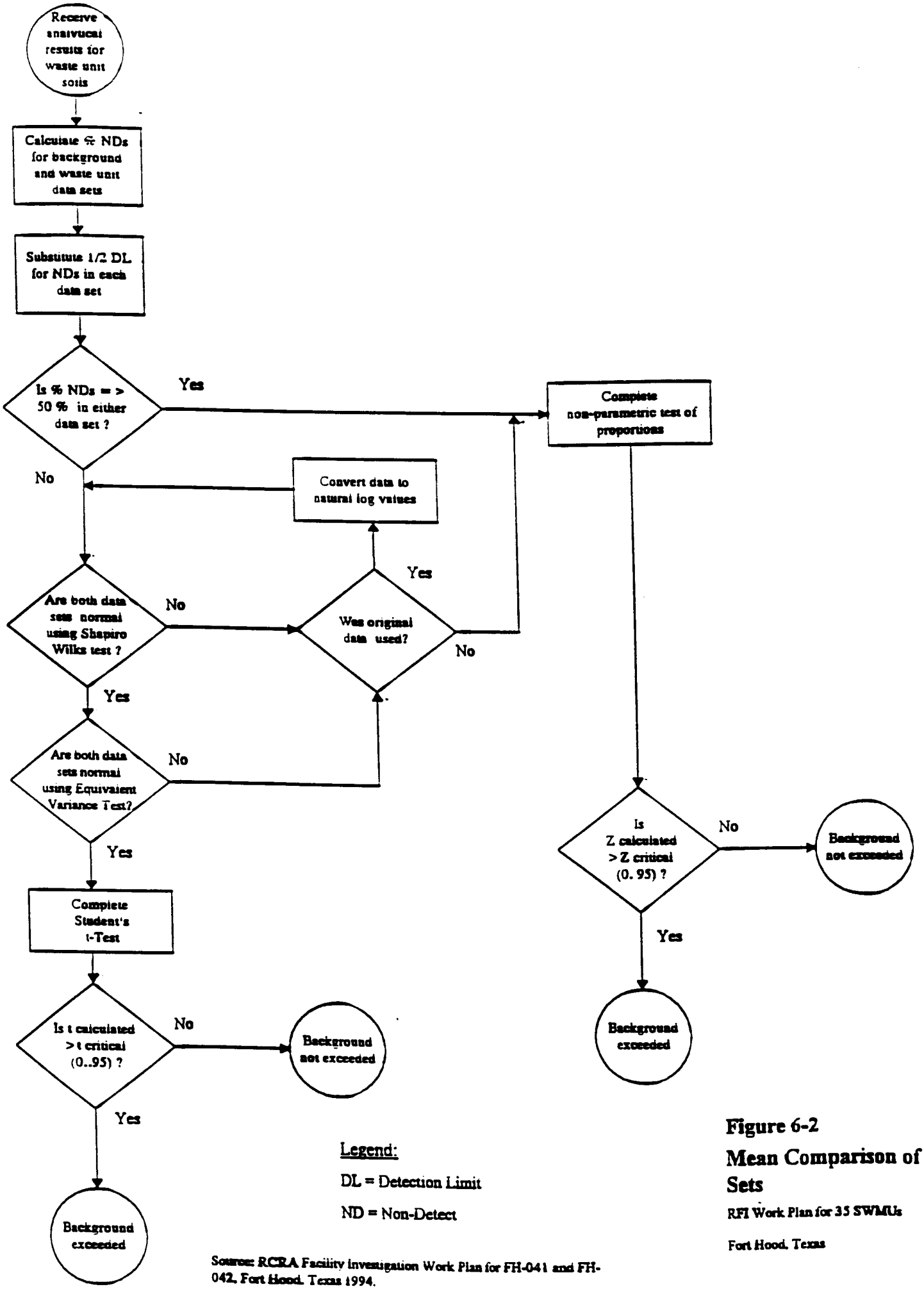


Figure 6-1
95% Upper Tolerance Limit
RFI Work Plan for 35 SWMU
Fort Hood, Texas



Legend:

DL = Detection Limit

ND = Non-Detect

Figure 6-2

Mean Comparison of Da Sets

RFI Work Plan for 35 SWMUs

Fort Hood, Texas

Source: RCRA Facility Investigation Work Plan for FH-041 and FH-042, Fort Hood, Texas 1994.

Formulas for Shapiro Wilk or W test

1. Compute the denominator *d* of the W test statistic, using the n data;

$$d=\sum_{i}^{n}(x_i-\bar{x})^2$$

2. Order the n data form smallest to largest to obtain the sample order statistics

$$x_1 \leq x_2 \leq x_3 \leq \text{etc}$$

3. Compute *k*, where *k*= n/2 if n is even or

k=(n-1)/2 if n is odd

4. Turn to Table A6 in *Statistical Methods for Environmental Pollution Monitoring*, by Richard Gilbert, and for the observed n find the coefficients $a_1, a_2, \ldots, a_k$.

5. Then compute *W*

$$W= 1/d\{\sum a_i(x_{[n-i+1]} - x_{[i]})\}^2$$

6. Reject H0 at the α significance level if W is less than the quantile given in Table A7 of *Statistical Methods for Environmental Pollution Monitoring*, by Richard Gilbert.

This procedure is used on the logrithms of data to test if distribution is lognormal.

95% UTL Calculations

1. Determine distribution. If normal use the data as is and 1/2 of the value for nondetects. If lognormal distribution calculate the 95% UTL on the log values.

2. Find the mean of the data set.

3. Find the standard deviation of data set

4. Based on the n of the data set look up the K value from *Statistical Methods for Environmental Pollution Monitoring*, by Richard Gilbert, Table A3.

5. Calculate the 95% UTL =mean+K(standard deviation)

For lognormal distribution, need to take the exponent of the 95%UTL of the log.

Soil Background 95% UTLs NO DUPLICATES						
smp_id	Mercury		Arsenic	Barium		
	Result (x)	Qual	Result (x)	Result	Qual	Ln(x)
BKSB101	0.04	U	3	21.3	J	3.058707073
BKSB102	0.04	U	2	8	J	2.079441542
BKSB103	0.04	U	9.1	14.7	J	2.687847494
BKSB105	0.04	U	4.3	23.4	J	3.152736022
BKSB106	0.04	U	4.4	43.7	J	3.777348102
BKSB107	0.04	U				
BKSB109	0.04	U	3.5	155	J	5.043425117
BKSB110	0.04	U	4.8	24.1	J	3.18221184
BKSB111	0.04	U	5.2	7.2	J	1.974081026
BKSB113	0.04	U	5.7	20.5	J	3.020424886
BKSB114	0.04	U	5.2	25.2	J	3.226843995
BKSB115	0.04	U	5.3	10.6	J	2.360854001
BKSB116	0.04	U	11.6	4.9	J	1.589235205
BKSB118	0.04	U	2.6	4.4	J	1.481604541
BKSB119	0.04	U	0.66	3		1.098612289
BKSB120	0.04	U	0.44	2		0.693147181
BKSB122	0.04	U	3.2	6.1		1.808288771
BKSB123	0.04	U	3.8	5.5		1.704748092
BKSB125	0.04	U	3.2	18.1		2.895911938
BKSB126	0.04	U	2.5	5.4		1.686398954
BKSB128	0.04		3.6	36.3		3.591817741
BKSB129	0.04	U	2.6	26.3		3.269568939
BKSB130	0.04	U	1	8.1		2.091864062
BKSB131	0.04	U	5.3	65.9		4.188138442
BKSB132	0.04	U	4.2	41.7		3.730501129
BKSB133	0.04	U	3.2	68.6		4.228292535
BKSB134	0.04	U	2.9	20.1		3.000719815
BKSB136	0.04	U	4.3	14.8	J	2.694627181
BKSB137	0.04	U	8.2	7.8	J	2.054123734
BKSB138	0.04	U	9.2	12.2	J	2.501435952
BKSB139	0.04	U	7.6	7.3	J	1.987874348
BKSB141	0.04	U	5.6	127	J	4.844187086
BKSB142	0.04	U	3.8	63	J	4.143134726
BKSB143	0.04	U	3.8	39.3	J	3.671224519
BKSB144	0.04	U	3.7	36.1	J	3.586292865
BKSB104	0.04	U	6.2	28.2	J	3.339321978
BKSB108	0.04	U	6	72.4	J	4.282206299
BKSB112	0.04	U	1.6	6.6	J	1.887069649
BKSB117	0.04	U	4.4	27.9	J	3.328626689
BKSB121	0.04	U	4.1	24		3.17805383
BKSB124	0.04	U	6	19.3		2.960105096
BKSB127	0.04	U	1.9	18.8		2.93385687
BKSB135	0.04	U	2.7	15.4	J	2.734367509
BKSB140	0.04	U	4.8	108	J	4.682131227
%nondetects=	0.04	0.957446809			0	
Distribution	D		N			L
Mean	0.04		4.353488372	30.19069767		2.917009542
std dev	0		2.299203676	33.47344231		1.018594869
n	44		43	43		43
K	2.097		2.102	2.102		2.102
UTL	0.04		**9.186414498**	100.5518734		5.058095955
UTL(ln)=exp(mean + K(std dev)						**157.2907424**

Soil Background 95							
smp_id	Cadmium				Chromium		
	Result (x)	Qual	1/2 nondetects	Ln(x)	Result (x)	Qual	Ln(x)
BKSB101	0.12		0.12	-2.120263536	5.1	J	1.62924054
BKSB102	0.05		0.05	-2.995732274	10.3	J	2.332143895
BKSB103	0.05	U	0.025	-3.688879454	10.1	J	2.312535424
BKSB105	0.11		0.11	-2.207274913	4	J	1.386294361
BKSB106	0.16		0.16	-1.832581464	7.6	J	2.028148247
BKSB107	0.35		0.35	-1.049822124	5.1	J	1.62924054
BKSB109	0.07		0.07	-2.659260037	6.5	J	1.871802177
BKSB110	0.06		0.06	-2.813410717	16.6	J	2.809402695
BKSB111	0.05		0.05	-2.995732274	6.2	J	1.824549292
BKSB113	0.07		0.07	-2.659260037	8.9	J	2.186051277
BKSB114	0.05	U	0.025	-3.688879454	20.3	J	3.010620886
BKSB115	0.06		0.06	-2.813410717	7.3	J	1.987874348
BKSB116	0.2		0.2	-1.609437912	2.7	J	0.993251773
BKSB118	0.19		0.19	-1.660731207	2.2	J	0.78845736
BKSB119	0.06		0.06	-2.813410717	2.1		0.741937345
BKSB120	0.04	U	0.02	-3.912023005	0.93		-0.072570693
BKSB122	0.06		0.06	-2.813410717	4.9		1.589235205
BKSB123	0.08		0.08	-2.525728644	4.3		1.458615023
BKSB125	0.11		0.11	-2.207274913	5.1		1.62924054
BKSB126	0.06		0.06	-2.813410717	5.5		1.704748092
BKSB128	0.05	U	0.025	-3.688879454	8.5		2.140066163
BKSB129	0.04	U	0.02	-3.912023005	4.6		1.526056303
BKSB130	0.07		0.07	-2.659260037	1.8		0.587786665
BKSB131	0.15		0.15	-1.897119985	7.7		2.041220329
BKSB132	0.04	U	0.02	-3.912023005	5.9		1.774952351
BKSB133	0.11		0.11	-2.207274913	4.9		1.589235205
BKSB134	0.08		0.08	-2.525728644	1.2		0.182321557
BKSB136	0.2	J	0.2	-1.609437912	8.3		2.116255515
BKSB137	0.18	J	0.18	-1.714798428	8.1		2.091864062
BKSB138	0.21	J	0.21	-1.560647748	11.1		2.406945108
BKSB139	0.2	J	0.2	-1.609437912	8.4		2.128231706
BKSB141	0.45	J	0.45	-0.798507696	23.6		3.161246712
BKSB142	0.29	J	0.29	-1.237874356	8.4		2.128231706
BKSB143	0.27	J	0.27	-1.30933332	12.2		2.501435952
BKSB144	0.2	J	0.2	-1.609437912	6.5		1.871802177
BKSB104	0.15		0.15	-1.897119985	3.1	J	1.131402111
BKSB108	0.2		0.2	-1.609437912	12.9	J	2.557227311
BKSB112	0.04	U	0.02	-3.912023005	4	J	1.386294361
BKSB117	0.18		0.18	-1.714798428	5.7	J	1.740466175
BKSB121	0.18		0.18	-1.714798428	6.3		1.840549633
BKSB124	0.11		0.11	-2.207274913	7.2		1.974081026
BKSB127	0.04	U	0.02	-3.912023005	3.7		1.30833282
BKSB135	0.17	J	0.17	-1.771956842	6.1		1.808288771
BKSB140	0.79	J	0.79	-0.235722334	16.1		2.778819272
%nondetects=		0.191489362				0	
Distribution				L			L
Mean	0.145454545			-2.343338046	7.318863636		1.786680257
std dev	0.134759986			0.926564755	4.781799902		0.680627117
n	44			44	44		44
K	2.097			2.097	2.097		2.097
UTL	0.428046235			-0.40033175	17.34629803		3.213955322
UTL(ln)=exp(mean				**0.670097701**			**24.87728958**

Soil Background 95							
smp_id	Lead			Selenium		Silver	
	Result (x)	Qual	Ln(x)	Result (x)	Qual	Result (x)	Qual
BKSB101	6	J	1.791759469	0.37	U	0.24	U
BKSB102	5	J	1.609437912	0.36	U	0.23	U
BKSB103	9.5	J	2.251291799	0.38	U	0.24	U
BKSB105	3.9	J	1.360976553	0.33	U	0.21	U
BKSB106	5	J	1.609437912	0.33	U	0.21	U
BKSB107	6.1	J	1.808288771	0.36	U	0.23	U
BKSB109	3.2	J	1.16315081	0.34	U	0.22	U
BKSB110	7.8	J	2.054123734	0.36	U	0.23	U
BKSB111	5.3	J	1.667706821	0.35	U	0.22	U
BKSB113	6	J	1.791759469	0.36	U	0.23	U
BKSB114	7.7	J	2.041220329	0.38	U	0.24	U
BKSB115	5.1	J	1.62924054	0.32	U	0.2	U
BKSB116	5.6	J	1.722766598	0.33	U	0.21	U
BKSB118	3.7	J	1.30833282	0.34	U	0.21	U
BKSB119	1.3	J	0.262364264	0.33	U	0.21	U
BKSB120	0.72	J	-0.328504067	0.32	U	0.2	U
BKSB122	4.1	J	1.410986974	0.33	U	0.21	U
BKSB123	3.8	J	1.335001067	0.33	U	0.21	U
BKSB125	1.7	J	0.530628251	0.36		0.2	U
BKSB126	1.5	J	0.405465108	0.44		0.21	U
BKSB128	7.5	J	2.014903021	0.35	U	0.22	U
BKSB129	4.1	J	1.410986974	0.33	U	0.21	U
BKSB130	3.1	J	1.131402111	0.32	U	0.2	U
BKSB131	10.1	J	2.312535424	0.34	U	0.22	U
BKSB132	7.8	J	2.054123734	0.34	U	0.21	U
BKSB133	6.3	J	1.840549633	0.35	U	0.22	U
BKSB134	2.3	J	0.832909123	0.33	U	0.21	U
BKSB136	3	J	1.098612289	0.32	R	0.22	U
BKSB137	2.3	J	0.832909123	0.31	R	0.21	U
BKSB138	4.1	J	1.410986974	0.32	R	0.22	U
BKSB139	3.6	J	1.280933845	0.31	R	0.21	U
BKSB141	12.1	J	2.493205453	1.8	R	0.25	U
BKSB142	5	J	1.609437912	1.9	R	0.25	U
BKSB143	6.6	J	1.887069649	0.35	R	0.24	U
BKSB144	4	J	1.386294361	0.31	R	0.21	U
BKSB104	5.3	J	1.667706821	0.32	U	0.2	U
BKSB108	9.8	J	2.282382386	0.37	U	0.23	U
BKSB112	1.5	J	0.405465108	0.32	U	0.2	U
BKSB117	8.3	J	2.116255515	0.33	U	0.21	U
BKSB121	10.2	J	2.32238772	0.34	U	0.22	U
BKSB124	4.5	J	1.504077397	0.34	U	0.21	U
BKSB127	3.8	J	1.335001067	0.33	U	0.21	U
BKSB135	2.5	J	0.916290732	1.5	R	0.21	U
BKSB140	33.2	J	3.502549876	0.35	R	0.24	U
%nondetects=		0					
Distribution			L	D		D	
Mean	5.773181818		1.52441844	0.345		0.217954545	
std dev	4.998382889		0.678101063	0.024277437		0.01390659	
n	44		44				
K	2.097		2.097				
UTL	16.25479074		2.94639637				
UTL(ln)=exp(mean			**19.03722684**				

Shapiro Wilk for Arsenic

smp_id	Arsenic				a(n-i+1)	b(i)
BKSB101	3	0.44	11.6	11.16	0.3894	4.345704
BKSB102	2	0.66	9.2	8.54	0.2684	2.292136
BKSB103	9.1	1	9.1	8.1	0.2334	1.89054
BKSB104	6.2	1.6	8.2	6.6	0.2078	1.37148
BKSB105	4.3	1.9	7.6	5.7	0.1871	1.06647
BKSB106	4.4	2	6.2	4.2	0.1695	0.7119
BKSB108	6	2.5	6	3.5	0.1539	0.53865
BKSB109	3.5	2.6	6	3.4	0.1398	0.47532
BKSB110	4.8	2.6	5.7	3.1	0.1269	0.39339
BKSB111	5.2	2.7	5.6	2.9	0.1149	0.33321
BKSB112	1.6	2.9	5.3	2.4	0.1035	0.2484
BKSB113	5.7	3	5.3	2.3	0.0927	0.21321
BKSB114	5.2	3.2	5.2	2	0.0824	0.1648
BKSB115	5.3	3.2	5.2	2	0.0724	0.1448
BKSB116	11.6	3.2	4.8	1.6	0.0628	0.10048
BKSB117	4.4	3.5	4.8	1.3	0.0534	0.06942
BKSB118	2.6	3.6	4.4	0.8	0.0442	0.03536
BKSB119	0.66	3.7	4.4	0.7	0.0352	0.02464
BKSB120	0.44	3.8	4.3	0.5	0.0263	0.01315
BKSB121	4.1	3.8	4.30	0.5	0.0175	0.00875
BKSB122	3.2	3.8	4.2	0.4	0.0087	0.00348
BKSB123	3.8	4.1	4.1	0	0	0
BKSB124	6	4.2	3.8	-0.4		
BKSB125	3.2	4.3	3.8	-0.5		
BKSB126	2.5	4.30	3.8	-0.5	sum Bi=	14.44529
BKSB127	1.9	4.4	3.7	-0.7		
BKSB128	3.6	4.4	3.6	-0.8	W(0.05,43)=	0.943
BKSB129	2.6	4.8	3.5	-1.3	W=	0.939827935
BKSB130	1	4.8	3.2	-1.6		
BKSB131	5.3	5.2	3.2	-2		
BKSB132	4.2	5.2	3.2	-2		
BKSB133	3.2	5.3	3	-2.3		
BKSB134	2.9	5.3	2.9	-2.4		
BKSB135	2.7	5.6	2.7	-2.9		
BKSB136	4.30	5.7	2.6	-3.1		
BKSB137	8.2	6	2.6	-3.4		
BKSB138	9.2	6	2.5	-3.5		
BKSB139	7.6	6.2	2	-4.2		
BKSB140	4.8	7.6	1.9	-5.7		
BKSB141	5.6	8.2	1.6	-6.6		
BKSB142	3.8	9.1	1	-8.1		
BKSB143	3.8	9.2	0.66	-8.54		
BKSB144	3.7	11.6	0.44	-11.16		
Sum of xi	187.2					
Mean	4.353488372					
n=	43					
sum of xi^2	1036.9992					
1/n=	0.023255814					
xi=(sum xi)^2	35043.84					
d=	222.0261767					
W=	0.939827935					
W(0.05,43)=	0.943					
W<W(0.5,43), the distribution is approximately normal						

Shapiro Wilk for Arsenic

	ln of ordered Conc. x(i)		ln of Reverse Order x(n-i+1)	Difference x(n-i+1)-x(i)	a(n-i+1)	b(i)
	-0.820980552	0.674009067	2.451005098	3.27198565	0.3894	1.274111212
	-0.415515444	0.172653084	2.219203484	2.634718928	0.2684	0.70715856
	0	0	2.208274414	2.208274414	0.2334	0.515411248
	0.470003629	0.220903412	2.104134154	1.634130525	0.2078	0.339572323
	0.641853886	0.411976411	2.028148247	1.386294361	0.1871	0.259375675
	0.693147181	0.480453014	1.824549292	1.131402111	0.1695	0.191772658
	0.916290732	0.839588705	1.791759469	0.875468737	0.1539	0.134734639
	0.955511445	0.913002122	1.791759469	0.836248024	0.1398	0.116907474
	0.955511445	0.913002122	1.740466175	0.78495473	0.1269	0.099610755
	0.993251773	0.986549085	1.722766598	0.729514825	0.1149	0.083821253
	1.064710737	1.133608953	1.667706821	0.602996084	0.1035	0.062410095
	1.098612289	1.206948961	1.667706821	0.569094532	0.0927	0.052755063
	1.16315081	1.352919806	1.648658626	0.485507816	0.0824	0.040005844
	1.16315081	2.781246039	1.648658626	0.485507816	0.0724	0.035150766
	1.16315081	6.007425991	1.568615918	0.405465108	0.0628	0.025463209
	1.252762968	2.195152016	1.568615918	0.315852949	0.0534	0.016866547
	1.280933845	0.913002122	1.481604541	0.200670695	0.0442	0.008869645
	1.30833282	0.172653084	1.481604541	0.173271721	0.0352	0.006099165
	1.335001067	0.674009067	1.458615023	0.123613956	0.0263	0.003251047
	1.335001067	1.99088424	1.458615023	0.123613956	0.0175	0.002163244
	1.335001067	1.352919806	1.435084525	0.100083459	0.0087	0.000870726
	1.410986974	1.782227848	1.410986974	0		0
	1.435084525	3.210401996	1.335001067	-0.100083459		0
	1.458615023	1.352919806	1.335001067	-0.123613956		0
	1.458615023	0.839588705	1.335001067	-0.123613956		
	1.481604541	0.411976411	1.30833282	-0.173271721		3.976381148
	1.481604541	1.640791516	1.280933845	-0.200670695		
	1.568615918	0.913002122	1.252762968	-0.315852949	W(0.05,43)=	0.943
	1.568615918	0	1.16315081	-0.405465108	W(ln)=	0.910616383
	1.648658626	2.781246039	1.16315081	-0.485507816		
	1.648658626	2.059467595	1.16315081	-0.485507816		
	1.667706821	1.352919806	1.098612289	-0.569094532		
	1.667706821	1.133608953	1.064710737	-0.602996084		
	1.722766598	0.986549085	0.993251773	-0.729514825		
	1.740466175	2.127557784	0.955511445	-0.78495473		
	1.791759469	4.427380539	0.955511445	-0.836248024		
	1.791759469	4.924864104	0.916290732	-0.875468737		
	1.824549292	4.113385313	0.693147181	-1.131402111		
	2.028148247	2.460555898	0.641853886	-1.386294361		
	2.104134154	2.96792475	0.470003629	-1.634130525		
	2.208274414	1.782227848	0	-2.208274414		
	2.219203484	1.782227848	-0.415515444	-2.634718928		
	2.451005098	1.711734767	-0.820980552	-3.27198565		
Sum of xi	56.26742214		56.26742214			
Mean	1.308544701					
n=	43					
sum of xi^2	90.99206827					
1/n=	0.023255814					
xi=(sum xi)^2	3166.022794					
d=	17.3636312					
W=	0.910616383					
W(0.05,43)=	0.943					
W<W(0.5,43), the distribution is not lognormal						

Shapiro Wilk for Barium

	Bkgd Conc (xi) (mg/kg)	Ordered Conc. x(i)	Reverse Ordered x(n-i+1)	Difference x(n-i+1)-x(i)	a(n-i+1)	b(i)
BKSB101	21.3	2	155	153	0.3894	59.5782
BKSB102	8	3	127	124	0.2684	33.2816
BKSB103	14.7	4.4	108	103.6	0.2334	24.18024
BKSB105	23.4	4.9	72.4	67.5	0.2078	14.0265
BKSB106	43.7	5.4	68.6	63.2	0.1871	11.82472
BKSB107		5.5	65.9	60.4	0.1695	10.2378
BKSB109	155	6.1	63	56.9	0.1539	8.75691
BKSB110	24.1	6.6	43.7	37.1	0.1398	5.18658
BKSB111	7.2	7.2	41.7	34.5	0.1269	4.37805
BKSB113	20.5	7.3	39.3	32	0.1149	3.6768
BKSB114	25.2	7.8	36.3	28.5	0.1035	2.94975
BKSB115	10.6	8	36.1	28.1	0.0927	2.60487
BKSB116	4.9	8.1	28.2	20.1	0.0824	1.65624
BKSB118	4.4	10.6	27.9	17.3	0.0724	1.25252
BKSB119	3	12.2	26.3	14.1	0.0628	0.88548
BKSB120	2	14.7	25.2	10.5	0.0534	0.5607
BKSB122	6.1	14.8	24.1	9.3	0.0442	0.41106
BKSB123	5.5	15.4	24	8.6	0.0352	0.30272
BKSB125	18.1	18.1	23.4	5.3	0.0263	0.13939
BKSB126	5.4	18.8	21.3	2.5	0.0175	0.04375
BKSB128	36.3	19.3	20.5	1.2	0.0087	0.01044
BKSB129	26.3	20.1	20.1	0	0	0
BKSB130	8.1	20.5	19.3	-1.2		0
BKSB131	65.9	21.3	18.8	-2.5		0
BKSB132	41.7	23.4	18.1	-5.3		
BKSB133	68.6	24	15.4	-8.6	sum Bi=	185.94432
BKSB134	20.1	24.1	14.8	-9.3		
BKSB136	14.8	25.2	14.7	-10.5	W(0.05,43)=	0.943
BKSB137	7.8	26.3	12.2	-14.1	W=	0.734709728
BKSB138	12.2	27.9	10.6	-17.3		
BKSB139	7.3	28.2	8.1	-20.1		
BKSB141	127	36.1	8	-28.1		
BKSB142	63	36.3	7.8	-28.5		
BKSB143	39.3	39.3	7.3	-32		
BKSB144	36.1	41.7	7.2	-34.5		
BKSB104	28.2	43.7	6.6	-37.1		
BKSB108	72.4	63	6.1	-56.9		
BKSB112	6.6	65.9	5.5	-60.4		
BKSB117	27.9	68.6	5.4	-63.2		
BKSB121	24	72.4	4.9	-67.5		
BKSB124	19.3	108	4.4	-103.6		
BKSB127	18.8	127	3	-124		
BKSB135	15.4	155	2	-153		
BKSB140	108			0		
Sum of xi	1298.2					
Mean	30.19069767					
n=	43					
sum of xi^2	86253.36					
1/n=	0.023255814					
xi=(sum xi)^2	1685323.24					
d=	47059.79628					
W=	0.734709728					
W(0.05,43)=	0.943					
W<W(0.5,43), distribution is not Normal						

Shapiro Wilk for Barium

	ln of ordered Conc. x(i)		ln of Reverse Order x(n-i+1)	Difference x(n-i+1)-x(i)	a(n-i+1)	b(i)
	0.693147181	0.480453014	5.043425117	4.350277936	0.3894	1.693998228
	1.098612289	1.206948961	4.844187086	3.745574798	0.2684	1.005312276
	1.481604541	2.195152016	4.682131227	3.200526686	0.2334	0.747002929
	1.589235205	2.525668537	4.282206299	2.692971094	0.2078	0.559599393
	1.686398954	2.843941431	4.228292535	2.541893581	0.1871	0.475588289
	1.704748092	2.906166058	4.188138442	2.483390349	0.1695	0.420934664
	1.808288771	3.26990828	4.143134726	2.334845955	0.1539	0.359332793
	1.887069649	3.56103186	3.777348102	1.890278453	0.1398	0.264260928
	1.974081026	3.896995897	3.730501129	1.756420103	0.1269	0.222889711
	1.987874348	3.951644424	3.671224519	1.683350171	0.1149	0.193416935
	2.054123734	4.219424313	3.591817741	1.537694008	0.1035	0.15915133
	2.079441542	4.324077125	3.586292865	1.506851324	0.0927	0.139685118
	2.091864062	4.375895253	3.339321978	1.247457916	0.0824	0.102790532
	2.360854001	5.573631615	3.328626689	0.967772688	0.0724	0.070066743
	2.501435952	6.257181821	3.269568939	0.768132987	0.0628	0.048238752
	2.687847494	7.22452415	3.226843995	0.538996501	0.0534	0.028782413
	2.694627181	7.261015643	3.18221184	0.48758466	0.0442	0.021551242
	2.734367509	7.476765677	3.17805383	0.443686321	0.0352	0.015617758
	2.895911938	8.386305954	3.152736022	0.256824084	0.0263	0.006754473
	2.93385687	8.607516133	3.058707073	0.124850203	0.0175	0.002184879
	2.960105096	8.762222179	3.020424886	0.06031979	0.0087	0.000524782
	3.000719815	9.004319409	3.000719815	0		0
	3.020424886	9.122966493	2.960105096	-0.06031979		0
	3.058707073	9.355688957	2.93385687	-0.124850203		0
	3.152736022	9.939744427	2.895911938	-0.256824084		
	3.17805383	10.10002615	2.734367509	-0.443686321		6.537684167
	3.18221184	10.1264722	2.694627181	-0.48758466		
	3.226843995	10.41252216	2.687847494	-0.538996501	W(0.05,43)=	0.943
	3.269568939	10.69008105	2.501435952	-0.768132987	W(ln)=	0.98083423
	3.328626689	11.07975563	2.360854001	-0.967772688		
	3.339321978	11.15107127	2.091864062	-1.247457916		
	3.586292865	12.86149652	2.079441542	-1.506851324		
	3.591817741	12.90115469	2.054123734	-1.537694008		
	3.671224519	13.47788947	1.987874348	-1.683350171		
	3.730501129	13.91663867	1.974081026	-1.756420103		
	3.777348102	14.26835868	1.887069649	-1.890278453		
	4.143134726	17.16556536	1.808288771	-2.334845955		
	4.188138442	17.54050361	1.704748092	-2.483390349		
	4.228292535	17.87845776	1.686398954	-2.541893581		
	4.282206299	18.33729079	1.589235205	-2.692971094		
	4.682131227	21.92235283	1.481604541	-3.200526686		
	4.844187086	23.46614853	1.098612289	-3.745574798		
	5.043425117	25.43613691	0.693147181	-4.350277936		
Sum of xi	125.4314103		125.4314103			
Mean	2.917009542					
n=	43					
sum of xi^2	409.4611119					
1/n=	0.023255814					
xi=(sum xi)^2	15733.03869					
d=	43.57649126					
W(ln)=	0.98083423					
W(0.05,43)=	0.943					
W>W(0.5,43), distribution is lognormal						

Shapiro Wilk for Cadmium

smp_id	Cadmium	(xi)^2	Ordered Conc. x(i)	Reverse Ordered x(n-i+1)	Difference x(n-i+1)-x(i)	a(n-i+1)	b(i)
BKSB101	0.12	0.0144	0.02	0.79	0.77	0.3872	0.298144
BKSB102	0.05	0.0025	0.02	0.45	0.43	0.2667	0.114681
BKSB103	0.025	0.000625	0.02	0.35	0.33	0.2323	0.076659
BKSB104	0.15	0.0225	0.02	0.29	0.27	0.2072	0.055944
BKSB105	0.11	0.0121	0.02	0.27	0.25	0.1868	0.0467
BKSB106	0.16	0.0256	0.025	0.21	0.185	0.1695	0.0313575
BKSB107	0.35	0.1225	0.025	0.2	0.175	0.1542	0.026985
BKSB108	0.2	0.04	0.025	0.2	0.175	0.1405	0.0245875
BKSB109	0.07	0.0049	0.05	0.2	0.15	0.1278	0.01917
BKSB110	0.06	0.0036	0.05	0.2	0.15	0.116	0.0174
BKSB111	0.05	0.0025	0.06	0.2	0.14	0.1049	0.014686
BKSB112	0.02	0.0004	0.06	0.19	0.13	0.0943	0.012259
BKSB113	0.07	0.0049	0.06	0.18	0.12	0.0842	0.010104
BKSB114	0.025	0.000625	0.06	0.18	0.12	0.0745	0.00894
BKSB115	0.06	0.0036	0.06	0.18	0.12	0.0651	0.007812
BKSB116	0.2	0.04	0.07	0.17	0.1	0.056	0.0056
BKSB117	0.18	0.0324	0.07	0.16	0.09	0.0471	0.004239
BKSB118	0.19	0.0361	0.07	0.15	0.08	0.0383	0.003064
BKSB119	0.06	0.0036	0.08	0.15	0.07	0.0296	0.002072
BKSB120	0.02	0.0004	0.08	0.12	0.04	0.0211	0.000844
BKSB121	0.18	0.0324	0.11	0.11	0	0.0126	0
BKSB122	0.06	0.0036	0.11	0.11	0	0.0042	0
BKSB123	0.08	0.0064	0.11	0.11	0	0	0
BKSB124	0.11	0.0121	0.11	0.11	0		0
BKSB125	0.11	0.0121	0.12	0.08	-0.04		
BKSB126	0.06	0.0036	0.15	0.08	-0.07	Sum of b=	0.781248
BKSB127	0.02	0.0004	0.15	0.07	-0.08		
BKSB128	0.025	0.000625	0.16	0.07	-0.09	W=	0.7448006
BKSB129	0.02	0.0004	0.17	0.07	-0.1	W(0.05,44)=	0.944
BKSB130	0.07	0.0049	0.18	0.06	-0.12		
BKSB131	0.15	0.0225	0.18	0.06	-0.12		
BKSB132	0.02	0.0004	0.18	0.06	-0.12		
BKSB133	0.11	0.0121	0.19	0.06	-0.13		
BKSB134	0.08	0.0064	0.2	0.06	-0.14		
BKSB135	0.17	0.0289	0.2	0.05	-0.15		
BKSB136	0.2	0.04	0.2	0.05	-0.15		
BKSB137	0.18	0.000625	0.2	0.025	-0.175		
BKSB138	0.21	0.0225	0.2	0.025	-0.175		
BKSB139	0.2	0.0121	0.21	0.025	-0.185		
BKSB140	0.79	0.0256	0.27	0.02	-0.25		
BKSB141	0.45	0.1225	0.29	0.02	-0.27		
BKSB142	0.29	0.04	0.35	0.02	-0.33		
BKSB143	0.27	0.0049	0.45	0.02	-0.43		
BKSB144	0.2	0.0036	0.79	0.02	-0.77		
Sum of xi	6.225						
Mean	0.141477273						
n=	44						
sum of xi^2	1.700175						
1/n=	0.022727273						
xi=(sum xi)^2	38.750625						
d=	0.819478977						
W=	0.744800604						
W(0.05,44)=	0.944						
W<W(0.5,44), the distribution is not normal							

Shapiro Wilk for Cadmium

smp_id	ln of ordered Conc. x(i)	ln(xi)^2	ln of Reverse Order x(n-i+1)	Difference x(n-i+1)-x(i)	a(n-i+1)	b(i)
BKSB101	-3.912023005	15.303924	-0.235722334	3.676300672	0.3872	1.42346362
BKSB102	-3.912023005	15.303924	-0.798507696	3.113515309	0.2667	0.830374533
BKSB103	-3.912023005	15.303924	-1.049822124	2.862200881	0.2323	0.664889265
BKSB104	-3.912023005	15.303924	-1.237874356	2.674148649	0.2072	0.5540836
BKSB105	-3.912023005	15.303924	-1.30933332	2.602689685	0.1868	0.486182433
BKSB106	-3.688879454	13.6078316	-1.560647748	2.128231706	0.1695	0.360735274
BKSB107	-3.688879454	13.6078316	-1.609437912	2.079441542	0.1542	0.320649886
BKSB108	-3.688879454	13.6078316	-1.609437912	2.079441542	0.1405	0.292161537
BKSB109	-2.995732274	8.97441185	-1.609437912	1.386294361	0.1278	0.177168419
BKSB110	-2.995732274	8.97441185	-1.609437912	1.386294361	0.116	0.160810146
BKSB111	-2.813410717	7.91527986	-1.609437912	1.203972804	0.1049	0.126296747
BKSB112	-2.813410717	7.91527986	-1.660731207	1.15267951	0.0943	0.108697678
BKSB113	-2.813410717	7.91527986	-1.714798428	1.098612289	0.0842	0.092503155
BKSB114	-2.813410717	7.91527986	-1.714798428	1.098612289	0.0745	0.081846616
BKSB115	-2.813410717	7.91527986	-1.714798428	1.098612289	0.0651	0.07151966
BKSB116	-2.659260037	7.07166394	-1.771956842	0.887303195	0.056	0.049688979
BKSB117	-2.659260037	7.07166394	-1.832581464	0.826678573	0.0471	0.038936561
BKSB118	-2.659260037	7.07166394	-1.897119985	0.762140052	0.0383	0.029189964
BKSB119	-2.525728644	6.37930518	-1.897119985	0.628608659	0.0296	0.018606816
BKSB120	-2.525728644	6.37930518	-2.120263536	0.405465108	0.0211	0.008555314
BKSB121	-2.207274913	4.87206254	-2.207274913	0	0.0126	0
BKSB122	-2.207274913	4.87206254	-2.207274913	0	0.0042	0
BKSB123	-2.207274913	4.87206254	-2.207274913	0	0	0
BKSB124	-2.207274913	4.87206254	-2.207274913	0		0
BKSB125	-2.120263536	4.49551746	-2.525728644	-0.405465108		
BKSB126	-1.897119985	3.59906424	-2.525728644	-0.628608659	Sum of b=	5.896360202
BKSB127	-1.897119985	3.59906424	-2.659260037	-0.762140052		
BKSB128	-1.832581464	3.35835482	-2.659260037	-0.826678573	W=	0.941776836
BKSB129	-1.771956842	3.13983105	-2.659260037	-0.887303195	W(0.05,44)=	0.944
BKSB130	-1.714798428	2.94053365	-2.813410717	-1.098612289		
BKSB131	-1.714798428	2.94053365	-2.813410717	-1.098612289		
BKSB132	-1.714798428	2.94053365	-2.813410717	-1.098612289		
BKSB133	-1.660731207	2.75802814	-2.813410717	-1.15267951		
BKSB134	-1.609437912	2.59029039	-2.813410717	-1.203972804		
BKSB135	-1.609437912	2.59029039	-2.995732274	-1.386294361		
BKSB136	-1.609437912	2.59029039	-2.995732274	-1.386294361		
BKSB137	-1.609437912	2.59029039	-3.688879454	-2.079441542		
BKSB138	-1.609437912	2.59029039	-3.688879454	-2.079441542		
BKSB139	-1.560647748	2.43562139	-3.688879454	-2.128231706		
BKSB140	-1.30933332	1.71435374	-3.912023005	-2.602689685		
BKSB141	-1.237874356	1.53233292	-3.912023005	-2.674148649		
BKSB142	-1.049822124	1.10212649	-3.912023005	-2.862200881		
BKSB143	-0.798507696	0.63761454	-3.912023005	-3.113515309		
BKSB144	-0.235722334	0.05556502	-3.912023005	-3.676300672		
Sum of xi	-103.106874					
Mean	-2.343338046					
n=	44					
sum of xi^2	278.5307172					
1/n=	0.022727273					
xi=(sum xi)^2	10631.02747					
d=	36.91645655					
W=	0.941776836					
W(0.05,44)=	0.944					
W<W(0.5,44), the distribution is approximately lognormal						

Shapiro Wilk Chromium

smp_id	Chromium	Ordered Conc. x(i)	Reverse Ordered x(n-i+1)	Difference x(n-i+1)-x(i)	a(n-i+1)	b(i)
BKSB101	5.1	0.93	23.6	22.67	0.3872	8.777824
BKSB102	10.3	1.2	20.3	19.1	0.2667	5.09397
BKSB103	10.1	1.8	16.6	14.8	0.2323	3.43804
BKSB104	3.1	2.1	16.1	14	0.2072	2.9008
BKSB105	4	2.2	12.9	10.7	0.1868	1.99876
BKSB106	7.6	2.7	12.2	9.5	0.1695	1.61025
BKSB107	5.1	3.1	11.1	8	0.1542	1.2336
BKSB108	12.9	3.7	10.3	6.6	0.1405	0.9273
BKSB109	6.5	4	10.1	6.1	0.1278	0.77958
BKSB110	16.6	4	8.9	4.9	0.116	0.5684
BKSB111	6.2	4.3	8.5	4.2	0.1049	0.44058
BKSB112	4	4.6	8.4	3.8	0.0943	0.35834
BKSB113	8.9	4.9	8.4	3.5	0.0842	0.2947
BKSB114	20.3	4.9	8.30	3.4	0.0745	0.2533
BKSB115	7.3	5.1	8.1	3	0.0651	0.1953
BKSB116	2.7	5.1	7.7	2.6	0.056	0.1456
BKSB117	5.7	5.1	7.6	2.5	0.0471	0.11775
BKSB118	2.2	5.5	7.3	1.8	0.0383	0.06894
BKSB119	2.1	5.7	7.2	1.5	0.0296	0.0444
BKSB120	0.93	5.9	6.5	0.6	0.0211	0.01266
BKSB121	6.3	6.1	6.5	0.4	0.0126	0.00504
BKSB122	4.9	6.2	6.3	0.1	0.0042	0.00042
BKSB123	4.3	6.3	6.2	-0.1	0	0
BKSB124	7.2	6.5	6.1	-0.4	0.0037	-0.00148
BKSB125	5.1	6.5	5.9	-0.6	Sum of b=	29.264074
BKSB126	5.5	7.2	5.7	-1.5		
BKSB127	3.7	7.3	5.5	-1.8	W=	0.87100033
BKSB128	8.5	7.6	5.1	-2.5	W(0.05,45)=	0.945
BKSB129	4.6	7.7	5.1	-2.6		
BKSB130	1.8	8.1	5.1	-3		
BKSB131	7.7	8.30	4.9	-3.4		
BKSB132	5.9	8.4	4.9	-3.5		
BKSB133	4.9	8.4	4.6	-3.8		
BKSB134	1.2	8.5	4.3	-4.2		
BKSB135	6.1	8.9	4	-4.9		
BKSB136	8.30	10.1	4	-6.1		
BKSB137	8.1	10.3	3.7	-6.6		
BKSB138	11.1	11.1	3.1	-8		
BKSB139	8.4	12.2	2.7	-9.5		
BKSB140	16.1	12.9	2.2	-10.7		
BKSB141	23.6	16.1	2.1	-14		
BKSB142	8.4	16.6	1.8	-14.8		
BKSB143	12.2	20.3	1.2	-19.1		
BKSB144	6.5	23.6	0.93	-22.67		
Sum of x_i	322.03					
Mean	7.318863636					
n=	44					
sum of x_i^2	3340.1149					
1/n=	0.022727273					
x_i-(sum xi)^2	103703.3209					
d=	983.2212432					
W=	0.87100033					
W(0.05,44)=	0.944					
W<W(0.5,45), the distribution is not normal						

smp_id	ln of ordered Conc. x(i)	ln(xi)^2	ln of Reverse Order x(n-i+1)	Difference x(n-i+1)-x(i)	a(n-i+1)	b(i)
BKSB101	-0.072570693	0.005266505	3.161246712	3.233817405	0.3872	1.252134099
BKSB102	0.182321557	0.03324115	3.010620886	2.828299329	0.2667	0.754307431
BKSB103	0.587786665	0.345493163	2.809402695	2.22161603	0.2323	0.516081404
BKSB104	0.741937345	0.550471024	2.778819272	2.036881927	0.2072	0.422041935
BKSB105	0.78845736	0.621665009	2.557227311	1.768769951	0.1868	0.330406227
BKSB106	0.993251773	0.986549085	2.501435952	1.508184179	0.1695	0.255637218
BKSB107	1.131402111	1.280070738	2.406945108	1.275542997	0.1542	0.19668873
BKSB108	1.30833282	1.711734767	2.332143895	1.023811076	0.1405	0.143845456
BKSB109	1.386294361	1.921812056	2.312535424	0.926241063	0.1278	0.118373608
BKSB110	1.386294361	1.921812056	2.186051277	0.799756916	0.116	0.092771802
BKSB111	1.458615023	2.127557784	2.140066163	0.681451141	0.1049	0.071484225
BKSB112	1.526056303	2.328847841	2.128231706	0.602175402	0.0943	0.05678514
BKSB113	1.589235205	2.525668537	2.128231706	0.538996501	0.0842	0.045383505
BKSB114	1.589235205	2.525668537	2.116255515	0.52702031	0.0745	0.039263013
BKSB115	1.62924054	2.654424736	2.091864062	0.462623522	0.0651	0.030116791
BKSB116	1.62924054	2.654424736	2.041220329	0.411979789	0.056	0.023070868
BKSB117	1.62924054	2.654424736	2.028148247	0.398907708	0.0471	0.018788553
BKSB118	1.704748092	2.906166058	1.987874348	0.283126256	0.0383	0.010843736
BKSB119	1.740466175	3.029222506	1.974081026	0.233614851	0.0296	0.006915
BKSB120	1.774952351	3.150455848	1.871802177	0.096849826	0.0211	0.002043531
BKSB121	1.808288771	3.26990828	1.871802177	0.063513406	0.0126	0.000800269
BKSB122	1.824549292	3.328980119	1.840549633	0.016000341	0.0042	6.72014E-05
BKSB123	1.840549633	3.387622953	1.824549292	-0.016000341	0	0
BKSB124	1.871802177	3.503643389	1.808288771	-0.063513406		0
BKSB125	1.871802177	3.503643389	1.774952351	-0.096849826	Sum of b=	4.387849744
BKSB126	1.974081026	3.896995897	1.740466175	-0.233614851		
BKSB127	1.987874348	3.951644424	1.704748092	-0.283126256	W=	0.96653268
BKSB128	2.028148247	4.113385313	1.62924054	-0.398907708	W(0.05,45)=	0.945
BKSB129	2.041220329	4.166580431	1.62924054	-0.411979789		
BKSB130	2.091864062	4.375895253	1.62924054	-0.462623522		
BKSB131	2.116255515	4.478537404	1.589235205	-0.52702031		
BKSB132	2.128231706	4.529370194	1.589235205	-0.538996501		
BKSB133	2.128231706	4.529370194	1.526056303	-0.602175402		
BKSB134	2.140066163	4.579883184	1.458615023	-0.681451141		
BKSB135	2.186051277	4.778820185	1.386294361	-0.799756916		
BKSB136	2.312535424	5.347820087	1.386294361	-0.926241063		
BKSB137	2.332143895	5.793384754	1.30833282	-1.023811076		
BKSB138	2.406945108	6.257181821	1.131402111	-1.275542997		
BKSB139	2.501435952	6.539411522	0.993251773	-1.508184179		
BKSB140	2.557227311	7.721836546	0.78845736	-1.768769951		
BKSB141	2.778819272	7.892743505	0.741937345	-2.036881927		
BKSB142	2.809402695	9.06383812	0.587786665	-2.22161603		
BKSB143	3.010620886	9.993480774	0.182321557	-2.828299329		
BKSB144	3.161246712	#REF!	-0.072570693	-3.233817405		
Sum of x_i	78.61393132					
Mean	1.786680257					
n=	44					
sum of x_i^2	160.3778498					
1/n=	0.022727273					
x_i-(sum xi)^2	6180.150197					
d=	19.91989073					
W=	**0.96653268**					
W(0.05,44)=	**0.944**					
W>W(0.5,44), the distribution is lognormal						

Shapiro Wilk for Lead

smp_id	Lead	Ordered Conc. x(i)	Reverse Ordered x(n-i+1)	Difference x(n-i+1)-x(i)	a(n-i+1)	b(i)
BKSB101	6	0.72	33.2	32.48	0.3872	12.576256
BKSB102	5	1.3	12.1	10.8	0.2667	2.88036
BKSB103	9.5	1.5	10.2	8.7	0.2323	2.02101
BKSB104	5.3	1.5	10.1	8.6	0.2072	1.78192
BKSB105	3.9	1.7	9.8	8.1	0.1868	1.51308
BKSB106	5	2.3	9.5	7.2	0.1695	1.2204
BKSB107	6.1	2.3	8.3	6	0.1542	0.9252
BKSB108	9.8	2.5	7.8	5.3	0.1405	0.74465
BKSB109	3.2	3.00	7.8	4.8	0.1278	0.61344
BKSB110	7.8	3.1	7.7	4.6	0.116	0.5336
BKSB111	5.3	3.2	7.5	4.3	0.1049	0.45107
BKSB112	1.5	3.6	6.6	3	0.0943	0.2829
BKSB113	6	3.7	6.3	2.6	0.0842	0.21892
BKSB114	7.7	3.8	6.1	2.3	0.0745	0.17135
BKSB115	5.1	3.8	6	2.2	0.0651	0.14322
BKSB116	5.6	3.9	6	2.1	0.056	0.1176
BKSB117	8.3	4	5.6	1.6	0.0471	0.07536
BKSB118	3.7	4.1	5.3	1.2	0.0383	0.04596
BKSB119	1.3	4.1	5.3	1.2	0.0296	0.03552
BKSB120	0.72	4.1	5.1	1	0.0211	0.0211
BKSB121	10.2	4.5	5	0.5	0.0126	0.0063
BKSB122	4.1	5	5	0	0.0042	0
BKSB123	3.8	5	5	0	0	0
BKSB124	4.5	5	4.5	-0.5		0
BKSB125	1.7	5.1	4.1	-1		
BKSB126	1.5	5.3	4.1	-1.2	Sum of b=	26.379216
BKSB127	3.8	5.3	4.1	-1.2		
BKSB128	7.5	5.6	4	-1.6	W=	0.64773337
BKSB129	4.1	6	3.9	-2.1	W(0.05,45)=	0.945
BKSB130	3.1	6	3.8	-2.2		
BKSB131	10.1	6.1	3.8	-2.3		
BKSB132	7.8	6.3	3.7	-2.6		
BKSB133	6.3	6.6	3.6	-3		
BKSB134	2.3	7.5	3.2	-4.3		
BKSB135	2.5	7.7	3.1	-4.6		
BKSB136	3.00	7.8	3.00	-4.8		
BKSB137	2.3	7.8	2.5	-5.3		
BKSB138	4.1	8.3	2.3	-6		
BKSB139	3.6	9.5	2.3	-7.2		
BKSB140	33.2	9.8	1.7	-8.1		
BKSB141	12.1	10.1	1.5	-8.6		
BKSB142	5	10.2	1.5	-8.7		
BKSB143	6.6	12.1	1.3	-10.8		
BKSB144	4	33.2	0.72	-32.48		
Sum of xi	254.02					
Mean	5.7731818					
n=	44					
sum of xi^2	2540.8084					
1/n=	0.0227273					
xi=(sum xi)^2	64526.16					
d=	1074.3048					
W=	0.6477334					
W(0.05,44)=	0.944					
W<W(0.5,44), the distribution is not normal						

Shapiro Wilk for Lead

smp_id	ln of ordered Conc. x(i)	ln(xi)^2	ln of Reverse Order x(n-i+1)	Difference x(n-i+1)-x(i)	a(n-i+1)	b(i)
BKSB101	-0.328504067	0.107914922	3.502549876	3.831053943	0.3872	1.483384087
BKSB102	0.262364264	0.068835007	2.493205453	2.230841188	0.2667	0.594965345
BKSB103	0.405465108	0.164401954	2.32238772	1.916922612	0.2323	0.445301123
BKSB104	0.405465108	0.164401954	2.312535424	1.907070316	0.2072	0.395144969
BKSB105	0.530628251	0.281566341	2.282382386	1.751754135	0.1868	0.327227672
BKSB106	0.832909123	0.693737607	2.251291799	1.418382676	0.1695	0.240415864
BKSB107	0.832909123	0.693737607	2.116255515	1.283346392	0.1542	0.197892014
BKSB108	0.916290732	0.839588705	2.054123734	1.137833002	0.1405	0.159865537
BKSB109	1.098612289	1.206948961	2.054123734	0.955511445	0.1278	0.122114363
BKSB110	1.131402111	1.280070738	2.041220329	0.909818217	0.116	0.105538913
BKSB111	1.16315081	1.352919806	2.014903021	0.851752211	0.1049	0.089348807
BKSB112	1.280933845	1.640791516	1.887069649	0.606135804	0.0943	0.057158606
BKSB113	1.30833282	1.711734767	1.840549633	0.532216814	0.0842	0.044812656
BKSB114	1.335001067	1.782227848	1.808288771	0.473287704	0.0745	0.035259934
BKSB115	1.335001067	1.782227848	1.791759469	0.456758402	0.0651	0.029734972
BKSB116	1.360976553	1.852257178	1.791759469	0.430782916	0.056	0.024123843
BKSB117	1.386294361	1.921812056	1.722766598	0.336472237	0.0471	0.015847842
BKSB118	1.410986974	1.99088424	1.667706821	0.256719847	0.0383	0.00983237
BKSB119	1.410986974	1.99088424	1.667706821	0.256719847	0.0296	0.007598907
BKSB120	1.410986974	1.99088424	1.62924054	0.218253566	0.0211	0.00460515
BKSB121	1.504077397	2.262248815	1.609437912	0.105360516	0.0126	0.001327542
BKSB122	1.609437912	2.590290394	1.609437912	0	0.0042	0
BKSB123	1.609437912	2.590290394	1.609437912	0		0
BKSB124	1.609437912	2.590290394	1.504077397	-0.105360516		0
BKSB125	1.62924054	2.654424736	1.410986974	-0.218253566		
BKSB126	1.667706821	2.781246039	1.410986974	-0.256719847	Sum of b=	4.391500517
BKSB127	1.667706821	2.781246039	1.410986974	-0.256719847		
BKSB128	1.722766598	2.96792475	1.386294361	-0.336472237	W(ln)=	0.975368151
BKSB129	1.791759469	3.210401996	1.360976553	-0.430782916		
BKSB130	1.791759469	3.210401996	1.335001067	-0.456758402	W(0.05,44)=	0.944
BKSB131	1.808288771	3.26990828	1.335001067	-0.473287704		
BKSB132	1.840549633	3.387622953	1.30833282	-0.532216814		
BKSB133	1.887069649	3.56103186	1.280933845	-0.606135804		
BKSB134	2.014903021	4.059834182	1.16315081	-0.851752211		
BKSB135	2.041220329	4.166580431	1.131402111	-0.909818217		
BKSB136	2.054123734	4.219424313	1.098612289	-0.955511445		
BKSB137	2.054123734	4.219424313	0.916290732	-1.137833002		
BKSB138	2.116255515	4.478537404	0.832909123	-1.283346392		
BKSB139	2.251291799	5.068314762	0.832909123	-1.418382676		
BKSB140	2.282382386	5.209269354	0.530628251	-1.751754135		
BKSB141	2.312535424	5.347820087	0.405465108	-1.907070316		
BKSB142	2.32238772	5.393484723	0.405465108	-1.916922612		
BKSB143	2.493205453	6.216073429	0.262364264	-2.230841188		
BKSB144	3.502549876	12.26785563	-0.328504067	-3.831053943		
Sum of xi	67.07441138					
Mean	1.52441844					
n=	44					
sum of xi^2	122.0217748					
1/n=	0.022727273					
xi=(sum xi)^2	4498.976662					
d=	19.77230523					
W(ln)=	0.975368151					
W(0.05,44)=	0.944					
W>W(0.5,44), the distribution is lognormal						

APPENDIX G

FH-038D Screening Results

Summary of Detected Analytical Results, Detection Limits and Screening Criteria for FH-038D Samples

Location	Sample ID	Depth	Parameter	Result	PQL	Units	Screening Criteria	Screening Value	Units
SB112	38SB125	1.0-2.0	Lead	4.2	0.2	mg/kg	Soil Background	19	mg/kg
	38SB126	4.0-5.0	Lead	3.7	0.2	mg/kg	Soil Background	19	mg/kg
	38SB127	9.0-10.0	Lead	4	0.21	mg/kg	Soil Background	19	mg/kg
	38SB128	33.0-34.0	Lead	2.7	0.21	mg/kg	Soil Background	19	mg/kg
SB113	38SB121	1.0-2.0	Lead	2.7	0.21	mg/kg	Soil Background	19	mg/kg
	38SB122	4.0-5.0	Lead	2.7	0.2	mg/kg	Soil Background	19	mg/kg
	38SB123	9.0-10.0	Lead	6.8	0.23	mg/kg	Soil Background	19	mg/kg
	38SB124	33.0-34.0	Lead	2.6	0.19	mg/kg	Soil Background	19	mg/kg
SB114	38SB108	1.0-2.0	Lead	4.6	0.17	mg/kg	Soil Background	19	mg/kg

Summary of Detected Analytical Results, Detection Limits and Screening Criteria for FH-038D Samples

Location	Sample ID	Depth	Parameter	Result	PQL	Units	Screening Criteria	Screening Value	Units
SB114	38SB109	4.0-4.5	Lead	4.9	0.16	mg/kg	Soil Background	19	mg/kg
	38SB110	9.0-10.0	Lead	5.7	0.21	mg/kg	Soil Background	19	mg/kg
	38SB111	34.0-35.0	Lead	2	0.2	mg/kg	Soil Background	19	mg/kg
SB115	38SB105	1.0-2.0	Lead	4.9	0.17	mg/kg	Soil Background	19	mg/kg
	38SB106	4.0-5.0	Lead	6	0.17	mg/kg	Soil Background	19	mg/kg
	38SB107	9.0-10.0	Lead	2.7	0.15	mg/kg	Soil Background	19	mg/kg
SB116	38SB171	0.0-2.0	Lead	4.5	0.16	mg/kg	Soil Background	19	mg/kg
	38SB172	2.0-4.0	Lead	4	0.16	mg/kg	Soil Background	19	mg/kg
	38SB173	4.0-6.0	Lead	4.6	0.16	mg/kg	Soil Background	19	mg/kg

Summary of Detected Analytical Results, Detection Limits and Screening Criteria for FH-038D Samples

Location	Sample ID	Depth	Parameter	Result	PQL	Units	Screening Criteria	Screening Value	Units
SB116	38SB174	6.0-8.0	Lead	7.3	0.18	mg/kg	Soil Background	19	mg/kg
	38SB175	8.0-10.0	Lead	3.7	0.18	mg/kg	Soil Background	19	mg/kg
	38SB176	10.0-11.5	Lead	2.3	0.15	mg/kg	Soil Background	19	mg/kg
SB117	38SB177	0.0-2.0	Lead	5.3	0.16	mg/kg	Soil Background	19	mg/kg
	38SB178	4.0-6.0	Lead	6.7	0.18	mg/kg	Soil Background	19	mg/kg
	38SB179	6.0-8.0	Lead	13.1	0.18	mg/kg	Soil Background	19	mg/kg
	38SB180	8.0-10.0	Lead	8.4	0.18	mg/kg	Soil Background	19	mg/kg
	38SB181	10.0-11.5	Lead	3.4	0.16	mg/kg	Soil Background	19	mg/kg
SB118	38SB198	0.0-2.0	Lead	4.4	0.16	mg/kg	Soil Background	19	mg/kg

Summary of Detected Analytical Results, Detection Limits and Screening Criteria for FH-038D Samples

Location	Sample ID	Depth	Parameter	Result	PQL	Units	Screening Criteria	Screening Value	Units
SB118	38SB199	2.0-4.0	Lead	4.7	0.16	mg/kg	Soil Background	19	mg/kg
	38SB400	4.0-6.0	Lead	4.3	0.16	mg/kg	Soil Background	19	mg/kg
	38SB401	6.0-8.0	Lead	7.8	0.18	mg/kg	Soil Background	19	mg/kg
	38SB402	8.0-10.0	Lead	3.3	0.15	mg/kg	Soil Background	19	mg/kg
	38SB403	10.0-11.5	Lead	3.9	0.15	mg/kg	Soil Background	19	mg/kg
SB119	38SB185	10.0-11.5	Lead	4.3	0.16	mg/kg	Soil Background	19	mg/kg
	38SB404	10.0-10.5	Lead	15.7	0.16	mg/kg	Soil Background	19	mg/kg
SB120	38SB405	10.0-11.1	Lead	8.9	0.17	mg/kg	Soil Background	19	mg/kg
UST	38SB167	2.0-2.5	Lead	992 J	0.15	mg/kg	Soil Background	19	mg/kg

Summary of Detected Analytical Results, Detection Limits and Screening Criteria for FH-038D Samples

Location	Sample ID	Depth	Parameter	Result	PQL	Units	Screening Criteria	Screening Value	Units
UST	38SB168	8.0-10.0	Lead	657 J	0.16	mg/kg	Soil Background	19	mg/kg
	38SB169	2.0-2.5	Lead	72.8 J	0.15	mg/kg	Soil Background	19	mg/kg
	38SB170	8.0-10.0	Lead	291 J	0.16	mg/kg	Soil Background	19	mg/kg