N83447.AR.000636
NAS FORT WORTH
5090.3a

FINAL PHASE 4 RCRA FACILITY INVESTIGATION FOR OIL WATER SEPARATOR AT BUILDING 1655 NAS FORT WORTH TX

3/1/2002

ELLIS ENVIRONMENTAL GROUP

722 0 File: 17G D.E.

NAVAL AIR STATION FORT WORTH JRB CARSWELL FIELD TEXAS

ADMINISTRATIVE RECORD COVER SHEET

AR File Number 722

Best Available Copy

File: 17-A-90
D.E. 722 1722

FINAL

REPORT

for

Phase 4 RCRA Facility Investigation for Oil / Water Separator at Building 1655

at

Naval Air Station Fort Worth Joint Reserve Base, TX

Contract No. F41624-00-D-8032
Delivery Order No. 0109

Prepared for
AIR FORCE CENTER FOR ENVIRONMENTAL EXCELLENCE
Brooks Air Force Base, TX

Prepared by
ELLIS ENVIRONMENTAL GROUP, LC
414 SW 140th Terrace
Newberry, FL 32669
(352) 332-3888

March 2002

Review of
Draft Report for Phase 4 RCRA Facility Investigation for Oil / Water Separator at Building 1655
Naval Air Station fort Worth Joint Reserve Base, TX
(January 2002)

Review Submitted: 30 January 2002

General Comments: In general, the document adequately addresses the required report elements. However, a few specific items, as listed below, need to be addressed.

Specific Comments:

Item	Page	Section	Comments	Comment Responses
1	1-1	1.0	1st sentence. Please insert the term "(JRB)" after "Joint Reserve Base. Please begin a new sentence between the words "Texas" and "EEG".	Changed in Final RFI Report.
2	1-1	1.1	Please change "NAS Fort Worth" to NAS Fort Worth JRB Throughout the document.	Changed in Final RFI Report.
3	2-1	2.0	3rd bullet, 2nd sentence. Please change "measure" to "measures".	Changed in Final RFI Report.
4	2-1	2.0	3rd bullet, 3rd sentence. Please change the sentence to read "Deed certification is required and post-closure care may be required for cleanup under this standard".	Changed in Final RFI Report.
5	2-1	2.1	1st paragraph, 1st sentence. Please replace "was" with "is". Please insert "regulatory" between "obtain" and "closure".	Changed in Final RFI Report.
6	2-1	2.1	1st paragraph, 2nd sentence. Please specify the type of waste(s) produced from the industrial processes.	Wastes generated at the industrial processes are specified in the Final RFI Report
7	2-1	2.1	1st paragraph, 3rd sentence. Please insert the term "for this RFI" between "chosen" and "based".	Changed in Final RFI Report.

Item	Page	Section	Comments	Comment Responses
8	2-1	2.1	1st paragraph, 4th sentence. Please replace "general location" with "extent". Add the term "except for the metal manganese" to the end of the sentence.	Changed in Final RFI Report.
9	2-1	2.1	1st paragraph. Please delete the last sentence of the paragraph.	Changed in Final RFI Report.
10	2-1	2.1	2nd paragraph, 1st sentence. Please insert "soil" between "subsurface" and "contamination". Please insert "RFI" after "Phase 4" and follow a similar format throughout the report. Please replace "constituents" with "manganese".	Changed in Final RFI Report.
11	2-1	2.1	2nd paragraph, 2nd sentence. Please replace "installing" with "advancing".	Changed in Final RFI Report.
12	2-2	2.1	2nd paragraph, 3rd sentence. Insert the word "manganese" between "that' and "groundwater". Insert "RFI" after "Phase 4".	Changed in Final RFI Report.
13	3-1	3.0/3.1	Please change the format of this section so that sections 3.0 and 3.1 are combined. It is recommended that the section be broken down into subsections by RFI phase. In other words, make a section called Phase I RFI, then list the field activities and sampling results. Do the same for Phase 2, 3, and 4, including a reason why no actions were performed in Phase II	The sections have been combined and restructured in the Final Report.
14	3-1	3.0/3.1	It is recommended that when re-writing these sections that the text concentrate on discussing COCs that exceed MSCs. Also, please make it clear that the "new" MSC for manganese determined by SPLP in previous phases is not the "final" MSC and that the final MSC was determined in Phase 4 of the RFI. When discussing surface samples, please do not describe them as confirmatory as there were no manganese exceedances in the surface samples.	The text has been revised in the Final Report.

722 3

Item	Page	Section	Comments	Comment Responses
15	3-2	Figure 2	For consistency, please change "Revised MSC" to "New MSC" in the "Notes" section. Where the term "MSC" is used in the tables (here and in Tables section – especially Table 3), please indicate when the MSC was established (e.g. Phase III or Phase IV). Please show the proposed Metes and Bounds area for RRS 2 closure. It is recommended that the "blown up" view of the OWS area be eliminated and the OWS area be drawn to a larger scale. Please change "NV" to "ND" (Not Detected). Please ensure that none of the cells in the tables are empty. Either give a contaminant concentration or use "NA" or "ND". Please ensure that all items in the legend appear ion the Figure (e.g. "TOW" does not appear on the figure).	The figure has been revised in the Final Report.
16	4-1	4.0	Paragraphs 3 through 5 indicate that no surface samples were taken in Phase IV "due to 8 inches of concrete pavement". Please explain why samples were not taken from the top of the soil (starting at 8 inches below the paved surface).	Previous investigations indicated that the manganese contamination existed at the 10 foot and 10 – 12 foot interval. A discussion has been included regarding surface samples in the Final Report.
17	4-1	4.0	8th paragraph. Please change "as referenced in" to "according to methods described in".	Changed in Final RFI Report.
18	4-1	4.0	2nd paragraph, 3rd (4th) sentence. Please change "that" to "than".	Changed in Final RFI Report.
19	4-2	4.3	Please explain why this deviation was necessary.	Further explanation has been discussed in the Final Report.
20	4.3	4.4	3rd paragraph, 2nd sentence. Please revise this lengthy sentence for clarity. Also, please consider adding a brief description of the significance of 40 CFR 264 Appendix IX as it relates to this investigation.	The text has been revised and further explanation will be discussed in the Final Report.

722 4

Contents

Abbreviations & Acronyms ..... *ii*

1.0 Introduction **1-1**

1.1 Background 1-1

2.0 Regulatory Requirements **2-1**

2.1 Investigation Objectives 2-1

3.0 Previous Site Characterization Activities **3-1**

3.1 Phase 1 Sanitary Sewer System RFI Investigation 3-1
3.2 Phase 3 Sanitary Sewer System RFI Investigation 3-3

4.0 Phase 4 RFI Activities **4-1**

4.1 Analytical Results 4-2
4 2 Field Sampling 4-2
4.2 Quality Assurance 4-2
4.3 Deviations 4-2
4.4 Recommendations 4-3

5.0 References **5-1**

Figures

Figure 1 Site Location Map 1-2
Figure 2. OWS Sample Location Map 3-2

Tables

Table 1. Soil and Groundwater Background (RRS1) Inorganic Concentration NAS Fort Worth JRB
Table 2. TNRCC Risk-Reduction Standard 2 (RRS2) Media-Specific Concentrations
Table 3. Summary of Previous Sampling Results
Table 4. Phase 1 Soil Analytical Results
Table 5. Phase 1 Groundwater Analytical Results
Table 6. Phase 3 Soil and Groundwater Analytical Results
Table 7. Phase 4 Soil and Groundwater Analytical Results

Appendices

Appendix A. Soil Boring Logs
Appendix B Well Completion Information
Appendix C. Laboratory Data
Appendix D. Data Validation
Appendix E. Groundwater Sampling Data
Appendix F. Photographs

Abbreviations & Acronyms

AFCEE	Air Force Center for Environmental Excellence
DPT	direct push technology
EEG	Ellis Environmental Group, LC
EPA	Environmental Protection Agency
FSP	Field Sampling Plan
ft-bgs	feet below ground surface
IT	IT Corporation
mg/kg	milligrams per kilogram
mg/L	milligrams per Liter
MSC	media-specific concentration
NAS	Naval Air Station
OWS	oil/water separator
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RRS	Risk Reduction Standard
SPLP	Synthetic Precipitation Leaching Procedure
STL	Severn Trent Laboratories
SVOC	semivolatile organic compound
SW	solid waste
TNRCC	Texas Natural Resource Conservation Commission
VOC	volatile organic compound

1.0 Introduction

Ellis Environmental Group, LC (EEG) was contracted by the Air Force Center for Environmental Excellence (AFCEE), at Brooks Air Force Base, Texas to conduct a Phase 4 Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) to evaluate existing information, delineate the extent of contamination, and prepare a Phase 4 RFI addendum report for one oil/water separator (OWS) located at Building 1655 Naval Air Station (NAS) Fort Worth Joint Reserve Base (JRB), Texas. EEG performed this work under Contract F41624-00-D-8032, Delivery Order No. 0009.

1.1 Background

NAS Fort Worth JRB is located in north-central Texas in Tarrant County, 8 miles west of downtown Fort Worth. The base property, totaling 2,555 acres, consists of the main base and two noncontiguous parcels. The main base comprises 2,264 acres and is bordered by Lake Worth to the north, the West Fork of the Trinity River and Westworth Village to the east, Fort Worth to the northeast and southeast, White Settlement to the west and southwest, and Air Force Plant No. 4 to the west. The area surrounding NAS Fort Worth JRB is mostly suburban, including the residential areas of the cities of Fort Worth, Westworth Village, and White Settlement. The Base was home to Carswell Air Force Base prior to realignment and changed to NAS Fort Worth JRB in 1991.

The Building 1655 OWS is located adjacent to the northwest corner of Building 1655 (Figure 1). The OWS is a below ground concrete vault operated by gravity flow and connected to the Sanitary Sewer System (Solid Waste Management Unit 66). Building 1655 is used as an engine maintenance and storage facility and is currently active. The OWS unit was installed to treat wastewater collected in the building floor drains. Base personnel have not reported any problems associated with the OWS and visual observations did not indicate any apparent problems associated with the integrity of the separator unit. The separator treats wastewater from the floor drains that may contain hydraulic fluid, engine lubricating oil, and petroleum by-products.

IT Corporation (IT) collected soil and groundwater samples during the Phase 1 Sanitary Sewer System RFI (IT 1997). Additional soil and groundwater samples were collected by IT during Phase 3 of the RFI (IT personnel communication) The results of the previous sampling (Phase 1 and Phase 3) indicated that manganese was the only analyte to exceed regulatory standards in subsurface samples.

Lake Worth

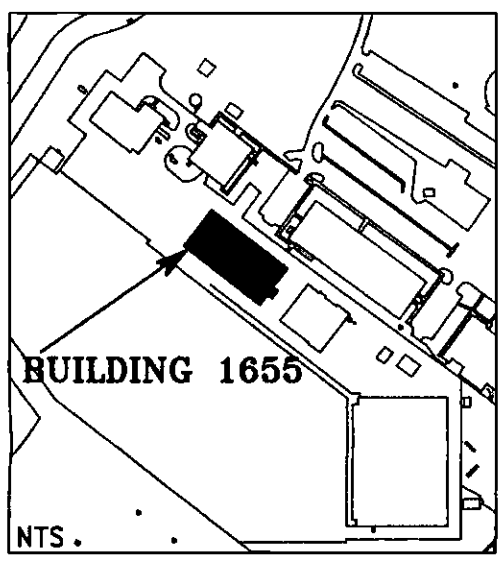
BUILDING 1655

AIR FORCE PLANT 4

NAS FORT WORTH

West Fork Trinity River

Source: HydroGeoLogic, Inc.



LEGEND

- NASFW Boundary
- Old Carswell Boundary
- Air Force Plant 4 Boundary

N

SCALE

0 1500 3000 FEET

File: 17A-90
D.E.

ELLIS ENVIRONMENTAL GROUP, LC

NAS Fort Worth JRB, Texas

Figure: 1

Site Location Map
Building 1655

Client:
U.S. Air Force Center
Environmental Excellence

2.0 Regulatory Requirements

Analytical data collected at Building 1655 OWS was evaluated and compared to the Texas Natural Resource Conservation Commission (TNRCC) Risk Reduction Standards (RRSs). The TNRCC RRSs 30, Texas Administrative Code (TAC) 335 Subchapter S specifies a consistent risk management policy to define the cleanup actions necessary to protect human health and the environment. The RRSs define the following three tiers of cleanup standards:

- RRS1 requires cleanup to laboratory nondetectable levels or site-specific levels. A site may be closed with no cleanup if there are no exceedances. Cleanup of RRS1 levels is commonly referred to as "clean closure." Deed certification on the property and post-closure care is not required under this standard.

- RRS2 requires a cleanup to default health-based levels such that any substantial threat to human health or the environment is reduced to acceptable levels. These cleanup standards are termed media-specific concentrations (MSC). Examples of MSCs for selected chemicals are tabulated in the regulations (30 TAC Section 336.568 Appendix II), and equations are prescribed for use in calculation of MSCs for chemicals not listed. Contaminant delineation may be used as an alternative to cleanup for site closure. Deed certification on the property is required. Post-closure care may be required to monitor groundwater concentrations that exceed RRS2.

- RRS3 requires a site-specific baseline risk assessment to define alternative cleanup levels based on health effects. Clean up under RRS3 standards may also require performing a corrective measures study to evaluate appropriate cleanup alternatives. Deed certification is required and post-closure care may be required for cleanup under this standard.

RRS1 concentrations have been established for soil and groundwater inorganic concentrations for NAS Fort Worth JRB during the Final Basewide Background Study, Volume 1 (Jacobs, 1998). Table 1 illustrates the surface, subsurface, and groundwater background (RRS1) inorganic concentrations. Table 2 illustrates the RRS2 (MSC) for metals, semivolatile organics, volatile organics, organochlorine pesticides and PCBs.

2.1 Investigation Objectives

The overall objective of this RFI is to obtain regulatory closure of the Building 1655 OWS site under the TNRCC RRS program. The Building 1655 OWS receives waste produced from the industrial processes conducted within Building 1655. The industrial processes generated waste materials, primarily oils, recoverable fuels, spent solvents, and cleaners. Analytical parameters were chosen for this RFI based on contamination expected from these processes. Previous phases of this RFI have identified subsurface soil contamination around the Building 1655 OWS and have characterized the nature and extent of the contamination.

Since the nature and general location of the subsurface soil contamination has been characterized, this Phase 4 RFI focused on defining the vertical and horizontal extent of manganese that exceeds background or RRS1 concentrations in site soils. This was accomplished by advancing borings using direct push technology (DPT) and collecting soil samples from selected boring intervals.

Confirmation that manganese groundwater concentrations are below MSC levels, by sampling an existing on-site monitoring well, was also an objective of this Phase 4 RFI.

3.0 Previous Site Characterization Activities

The purpose of previous RFI sampling efforts was to determine whether releases that may have occurred from the OWS at Building 1655 produced contaminant concentrations in soil and groundwater above site wide background concentrations and/or MSCs. IT collected soil samples during the Phase 1 and Phase 3 Sanitary Sewer System RFI (IT 1997, 2000). IT's Sanitary Sewer System RFI investigated 21 oil/water separators and grit/oil interceptors. The Building 1655 OWS was one of the sites investigated. IT investigated the sites during three phases. Building 1655 OWS was only investigated during Phase 1 and Phase 3.

3.1 Phase 1 Sanitary Sewer System RFI Investigation

During Phase I activities, IT collected soil samples at the Building 1655 OWS from boring SB165502 located adjacent to the west corner of the OWS unit (Figure 2). A copy of the IT soil boring log is located in Appendix A. Surface soil sample number MS1453 was collected from 0 to 2 ft-bgs. Subsurface soil sample number MS1454 was collected from 10-12 feet bgs, directly above the water table.

During the Phase 1 RFI, IT also installed and collected a groundwater sample from monitoring well WITCTA004 (Figure 2). The monitoring well was constructed adjacent to SB165502. The monitoring well was completed to a total depth of 19 ft-bgs with a screen interval from 11.3 to 18.8 ft-bgs. A copy of the IT Well Completion Information is located in Appendix B.

Surface and subsurface soil samples from boring SB165502 were analyzed for VOCs (EPA Method SW8260), SVOCs (EPA Method SW8270), inorganics (EPA Method SW6010/ 7471), and pesticides/PCBs (EPA Method SW8080). The groundwater sample from monitoring well WITCTA004 was analyzed for VOCs, SVOCs, and inorganics. Table 3 illustrates a summary of the previous sampling results collected by IT at the Building 1655 OWS.

Analytical results from the Phase 1 RFI are presented on Figure 2. No contaminant of concern was identified in the surface soils samples during the Phase 1 characterization sampling. However, one contaminant of concern was identified in the subsurface soils. Manganese was detected at a concentration of 2210 mg/kg at a depth of 10 ft-bgs. This concentration is above the background concentration of 351.7 mg/kg and the MSC of 1400 mg/kg. Table 4 presents a summary of Phase 1 soil analytical results.

After groundwater monitoring well WITCTA004 was installed and developed, a groundwater sample was collected. The results of the groundwater analysis indicate that all analytes were below MSC levels. A copy of the Building 1655 Phase 1 groundwater analytical results is located in Table 5.

WITCTA004

Method	Analyte	1997 Result mg/L	[redacted]		RRS-1 mg/L	MSC mg/L
						Phase 1
SW6010	Iron	1.47	NA	NA	0.224	EN
SW6010	Manganese	0.977	0.231	0.253	0.175	14
SW6010	Sodium	177	NA	NA	167	EN
SW8260	cis-1,2-Dichloroethene	0.0014	NA	NA	MQL(0.0012)	0.07
SW8260	Methylene Chloride	0.00056 B	NA	NA	MQL(0.0003)	0.005
SW8260	Trichloroethene	0.0046	NA	NA	MQL(0.001)	0.005

SB165507

[redacted]			
SW6010	Manganese	72.6	195
	Manganese	*98.4	

* Field Sampling Duplicate

SB165502

Method	Analyte	Result Surface	Result 10'	RRS-1 Surface	RRS-1 Subsurface	MSC
						Phase 1
SW6010	Barium	NA	136	233	128.1	200
SW6010	Iron	20100	NA	17717	17469	EN
SW6010	Manganese	NA	[redacted]	3003	351.7	1440
SW8260	Methylene Chloride	0.0024 B	NA	MQL (0.0021)	.0005	0.5
SW8270	Di-n-Butylphthalate	0.78 JB	NA	MQL (0.72)	.01	1000

SB165503

[redacted]							
							Phase 3
SW6010	Manganese	131	NS	[redacted]	849	351.7	1770
				*1230			

* Field Sampling Duplicate

SB165505

[redacted]			
SW6010	Manganese	115	90.5

SB165504

[redacted]			
			Phase 4
SW6010	Manganese	[redacted]	2660

SB165506

[redacted]			
SW6010	Manganese	84.5	516

SB165501
Not Sampled
Refusal at 2'

GROUNDWATER FLOW

Proposed
Metes and Bounds Area
for RRS2 Closure

Oil/Water Separator

BLDG 1655

LEGEND

- BUILDING 1655 INDUSTRIAL WASTE OIL/WATER SEPARATOR UNIT
- IT CORP. PHASE 1 BORING
- IT CORP. MONITORING WELL
- IT CORP. PHASE 3 BORING
- EEG'S PHASE 4 BORING
- PROPOSED METES AND BOUNDS AREA
- GROUNDWATER FLOW
- PHASE 1 RESULTS (1997)
- PHASE 3 RESULTS (2000)
- PHASE 4 RESULTS (2001)
- ANALYTE DETECTED ABOVE MSC IN SOIL, BUT DETECTED BELOW MSC IN SPLP EXTRACT

NOTES:

CONCENTRATIONS REPORTED IN MG/KG UNLESS NOTED OTHERWISE

MSC – MEDIUM-SPECIFIC CONCENTRATION.

NEW MSC – VALUE BASED ON SPLP RESULT.

NA – NOT ANALYZED

B – FOR INORGANICS, THE QUANTITATION IS AN ESTIMATED CONCENTRATION BETWEEN THE MDL AND PQL. FOR ORGANICS, THE CONSTITUENT WAS ALSO DETECTED IN THE ASSOCIATED METHOD BLANK.

J – THE ANALYTE WAS POSITIVELY IDENTIFIED, THE QUANTITATION IS AN ESTIMATION.

EN – ESSENTIAL NUTRIENT

File: 17A-90
D.E.

0 10 20

N

Source: IT CORP.

ELLIS ENVIRONMENTAL GROUP, LC

Client:
U.S. Air Force Center
Environmental Excellence

NAS Fort Worth JRB, Texas

FIGURE: 2

OWS Sample Location Map
Building 1655

3.2 Phase 3 Sanitary Sewer System RFI Investigation

Additional sampling was performed by IT during Phase 3 of the RFI in November and December 2000 to confirm manganese concentrations in the subsurface soils and resample monitoring well WITCTA004. Soil boring SB165503 was advanced adjacent to SB165502 (Figure 2). Soil samples were collected to determine manganese concentrations in surface and subsurface soils. The samples were collected from surface to 2 feet and 10 to 12 ft-bgs. Monitoring well WITCTA004 was sampled and analyzed for manganese.

During the Phase 3 RFI, boring SB165503 was advanced adjacent to SB165502 to collect manganese concentrations in the surface and subsurface soils. The results of the analysis indicated that manganese concentration in the surface soil (131 mg/kg) was detected at concentrations below RRS1 surface values. However, the subsurface concentration of manganese was detected at 1770 mg/kg, which is above the soil MSC of 1440 mg/kg. The 10- to 12-ft-bgs sample was then analyzed using the Synthetic Precipitation Leaching Procedure (SPLP). Results indicated a manganese value of 7 32 mg/L, which is lower than the existing groundwater MSC of 14 mg/L. Since the SPLP value is lower that the existing groundwater MSC, a new soil MSC of 1770 mg/kg can be established for manganese. Although a new MSC was established during Phase 3, it was not the final MSC that was established during Phase 4. In addition to conducting the SPLP analysis, a field duplicate sample was analyzed for manganese. The results of the field duplicate indicated a manganese concentration of 1230 mg/kg. This concentration is below the MSC value of 1440 mg/kg. It was recommended that this Phase 4 sampling event confirm the manganese concentration near SB165503 at 10 to 12 ft-bgs. Table 6 illustrates the results of the Phase 3 soil and groundwater analytical results.

4.0 Phase 4 RFI Activities

EEG completed four soil borings in August 2001 to delineate the lateral extent of manganese. Location and results of the Phase 4 RFI activities are shown on Figure 2. SB165504 was advanced as a confirmation soil boring. Soil borings SB165505, SB165506, and SB165507 were advanced to further delineate manganese. Photographs of the site are located in Appendix F of this report. Boring logs for each boring are included in Appendix A.

The first soil boring (SB165504) was advanced (using DPT) adjacent to SB165503 to confirm the manganese concentration identified during the Phase 3 RFI. A soil sample was collected at 10 to 12 ft-bgs. The sample results are listed on Table 7 and on page 13 of the laboratory test results found in Appendix C.

A second soil boring (SB165505) was advanced (using DPT) northeast of Building 1655 OWS to delineate the vertical and lateral extent of the manganese contamination. Samples were not collected from the surface (0 to 2 ft-bgs) due to 8 inches of concrete pavement. Samples were collected from 4.5 to 5.5 ft-bgs (SB165505-02) and from 13.5 to 14 ft-bgs (SB165505-03), which was the top of the water table. The sample results are listed on Table 7 and on pages 14 and 15 of the laboratory test results found in Appendix C.

A third soil boring (SB165506) was advanced (using DPT) southwest of Building 1655 OWS to delineate the vertical and lateral extent of the manganese contamination. Samples were not collected from the surface (0 to 2 ft-bgs) due to 8 inches of concrete pavement. Samples were collected from 7 to 8.5 ft-bgs (SB165506-02) and from 14 to 15 ft-bgs (SB165506-03), which was the top of water table. The sample results are listed on Table 7 and on pages 16 and 17 of the laboratory test results found in Appendix C.

A fourth soil boring (SB165507) was advanced (using DPT) northwest of Building 1655 OWS to delineate the vertical and lateral extent of the manganese contamination. Samples were not collected from the surface (0 to 2 ft-bgs) due to 8 inches of concrete pavement. Samples were collected from 7 to 8 ft-bgs (SB165507-02) and from 13-13.5 ft-bgs (SB165507-03), which was the top of water table. The sample results are listed on Table 7 and on pages 18 and 19 of the laboratory test results found in Appendix C. Duplicate 01 (SB165507-02) sample results are found on page 20 of the laboratory test results found in Appendix C.

All soil samples were shipped to Severn Trent Laboratories (STL) – Chicago and analyzed for manganese using EPA Method SW6010.

Monitoring well WITCTA004 was developed and sampled for manganese. The samples were shipped to STL-Chicago Laboratory and analyzed using EPA Method SW6010. The sample results are located on Table 7 and on page 13 of the laboratory test results. The groundwater field sampling data sheet is found in Appendix E.

Investigation derived wastes were disposed of according to methods described in Section 5.11 of the Field Sampling Plan (FSP) (EEG, 2001).

4.1 Analytical Results

All soil samples were shipped to Severn Trent Laboratories (STL) – Chicago and analyzed for manganese using EPA Method SW6010B. Table 7 illustrates the results of the Phase 4 RFI soil and groundwater analytical results.

The results of the analysis conducted on SB165504-03 indicated that the subsurface concentration of manganese was detected at 2660 mg/kg, which is above the subsurface soil RRS-2 of 1770 mg/kg The 10 to 12 ft-bgs sample was then analyzed using the Synthetic Precipitation Leaching Procedure (SPLP). Results indicated a manganese value of 3.75 mg/L, which is lower than the existing groundwater MSC of 14 mg/L. Since the SPLP value is lower than the existing groundwater MSC, a new soil MSC of 2660 mg/kg can be established for manganese.

The laboratory results for soil boring (SB165505) at the 4.5 to 5.5 ft-bgs interval for manganese was 115 mg/kg. The result for the sample collected at the 13.5 to 14 ft-bgs interval for manganese was 90.5 mg/kg. Both samples are below the subsurface soil RRS 2 limit of 2660 mg/kg.

The laboratory results for soil boring (SB165506) at the 7 to 8.5 ft-bgs interval for manganese was 84.4 mg/kg. The result for the sample collected at the 14 to 15 ft-bgs interval for manganese was 516 mg/kg. Both samples are below the subsurface soil RRS 2 limit of 2660 mg/kg.

The laboratory results for soil boring (SB165507) at the 7 to 8 ft-bgs interval for manganese was 72.6 mg/kg. The result for the sample collected at the 13 to 13.5 ft-bgs interval for manganese was 195 mg/kg. The laboratory result for manganese from the field duplicate (7 to 8 ft-bgs interval) was 98 4 mg/kg. All three samples are below the subsurface soil RRS 2 limit of 2660 mg/kg.

The laboratory test result for monitoring well WITCTA004 for manganese was 0.253 mg/L, which is below the MSC of 14 mg/L.

4.2 Field Sampling

All activities were conducted in accordance with the FSP. Completed field forms are included in Appendices A and E.

4.2 Quality Assurance

Project data such as groundwater level measurements, boring logs, chain of custody forms, and equipment calibration logs were reviewed by the project manager for accuracy and completeness. Laboratory data validation is included in Appendix D.

4.3 Deviations

EEG did not collect surface samples at SB165505, SB165506, or SB165507 due to difficulties in coring through the 8 inches of pavement that covered the oil/water separator area. Since the only depth of concern (depth of contamination) was at the 10-foot interval, a field decision was made by the project manager not to collect the surface sample.

4.4 Recommendations

EEG completed four soil borings in August 2001 to both confirm and delineate the Building 1655 oil and water separator site. SB165504 confirmed the manganese concentration (2210 mg/kg) identified during the Phase 1 RFI in the 10 to 12 ft-bgs interval. The laboratory results indicated that the subsurface concentration of manganese was detected at 2660 mg/kg (at the same interval), which is above the subsurface soil RRS-2 of 1770 mg/kg. The 10- to 12 ft-bgs sample was analyzed using the Synthetic Precipitation Leaching Procedure (SPLP). Results indicated a manganese value of 3.75 mg/L, which is lower than the existing groundwater MSC of 14 mg/L. Since the SPLP value is lower that the existing groundwater MSC, a new soil MSC of 2660 mg/kg can be established for manganese. The laboratory results indicated that the manganese concentrations for SB165505, SB165506, and SB165507 were all lower than the subsurface soil RRS-2 limit; therefore, the results can be used to delineate the vertical and lateral extent of the manganese contamination at the site

Pursuant with Chapter 335, Subchapter S, and Sections 335.55 through 335.560 of the TNRCC RRS, the conditions for applying RRS 2 (Closure/Remediation to Health-based Standards and Criteria) have been achieved, and closure of the oil/water separator at Building 1655 is recommended. The analyte to be included in the soil RRS 2 deed certification survey is manganese. Other analytes above RRS-1 values were not considered to be COPCs. These analytes include those that were not confirmed by subsequent sampling (barium, arsenic, chromium, and cobalt), and those that are likely to be laboratory artifacts (methylene chloride and di-n-butylphthalate), those for which no MSC has been developed or are not listed in 40 CFR 264 Appendix IX (iron). Appendix IX analytes were evaluated because the RCRA Part B Permit issued to the Air Force for Carswell AFB requires sites listed in the permit (SWMUs and AOCs) to be investigated for the full suite of analytes listed in Appendix IX unless a shorter list of analyte can be justified in order to obtain site closure.

There are no analytes to be included in the groundwater RRS 2 deed certification. All analytes were below the groundwater MSC. Any analytes detected above RRS 1 values were either:

- not considered to be COPCs, or
- not confirmed by the Phase 4 RFI sampling (manganese), or
- not confirmed in subsequent sampling (cis-1,2-Dichloroethene and trichloroethene), or
- likely to be laboratory artifacts (methylene chloride), or
- those for which no MSC has been developed, or
- not listed in 40 CFR 264 Appendix IX (sodium and iron).

Should this RFI be accepted, a letter stating that closure of the oil/water separator at Building 1655 was carried out in accordance with Section 335.555 and signed by the AFCEE representative, will be transmitted to TNRCC, along with the filing with Tarrant County of the metes and bounds description of the oil/water separator at Building 1655. A stamped and approved deed certification will be forwarded to TNRCC upon receipt by AFCEE. The proposed metes and bounds area is depicted on Figure 2.

5.0 References

Ellis Environmental Group, LC (EEG), 2001, *Work Plan Addendum for Phase 4 RCRA Facility Investigation for Oil/Water Separator at Building 1655, NAS Fort Worth Joint Reserve Base, Texas.*

HydroGeoLogic, Inc., 2000, *2000 Basewide Quality Assurance Project Plan, NAS Fort Worth JRB, Texas.*

HydroGeoLogic, Inc , 1999, *Revised Final Health and Safety Plan, RCRA Facility Investigation of Waste Accumulation Areas, NAS Fort Worth JRB, Texas.*

IT Corporation, 1997a, *Air Force Center for Environmental Excellence, NAS Fort Worth Joint Reserve Base, Fort Worth, Texas, Draft Sanitary Sewer System RCRA Facility Investigation Report,* September 1997.

IT Corporation, 1997b, *Air Force Center for Environmental Excellence, NAS Fort Worth Joint Reserve Base, Fort Worth, Texas, Sanitary Sewer System RCRA Facility Investigation Work Plan,* January 1997.

IT Corporation, 1997c, *Air Force Center for Environmental Excellence, NAS Fort Worth Joint Reserve Base, Fort Worth, Texas, Sanitary Sewer System RCRA Facility Investigation Field Sampling Plan,* January 1997.

IT Corporation, 2000, *Final Phase 3 RFI Work Plan Addendum for Oil/Water Separators, NAS Fort Worth JRB, Texas.*

Jacobs Engineering Group, Inc., 1998, NAS Fort Worth JRB, Texas (Formerly Carswell AFB, Texas), *Final Basewide Background Study, Volume 1*

TAB

TABLES

Tables

Table 1

Soil and Groundwater Background Inorganic Concentrations
NAS Fort Worth JRB, Texas

RRS-1 Levels

Analyte	Surface Soils UTL (mg/kg)	Subsurface Soils UTL (mg/kg)	Groundwater UTL (mg/L)
ALUMINUM	22035	20260	1.332
ANTIMONY	0 56	0 712	ND at 0.002
ARSENIC	5.85	6 58	ND at 0.0049
BARIUM	233	128 1	0 587
BERYLLIUM	1.02	1 13	0 0003
CALCIUM	167788	272000	266 3
CADMIUM	0.556	0 59	ND at 0.0005
CHROMIUM	25 86	16 31	0 006
COBALT	11.05	6 19	ND at 0 0009
COPPER	17.37	13 72	0.0028
IRON	17717	17469	0 224
LEAD	30 97	12 66	ND at 0 0016
MAGNESIUM	3003	2420	37 8
MANGANESE	849	351.7	0 175
MERCURY	0 14	ND at 0.035	ND at 0 0001
MOLYBDENUM	1 46	1 93	ND at 0.0144
NICKEL	14 6	19 76	0 0204
POTASSIUM	2895	1717	15 03
SELENIUM	0.907	0.3130	0 0077
SILVER	0 213	0 128	0 0002
SODIUM	37300	53200	167
THALLIUM	2.43	1.5	ND at 0 0632
VANADIUM	46 3	37 4	0 012
ZINC	38 8	31.3	0.118

Source
Jacobs Engineering Group, Inc , 1998, *NAS Fort Worth JRB, Texas (Formerly Carswell AFB, Texas), Final Basewide Background Study, Volume I*

mg/kg = Milligrams per kilogram.
mg/L = Milligrams per liter
ND = Not detected
UTL = Upper tolerance limit.

Table 2

TNRCC Risk Reduction Standard 2
Media-Specific Concentrations

Parameter	Surface Soil[a] MSC (mg/kg)	Subsurface Soil[b] MSC (mg/kg)	Groundwater[c] MSC (mg/L)
Metals			
ALUMINUM	10000	10000	100
ANTIMONY	0 6	0 6	0 006
ARSENIC	5	5	0 05
BARIUM	200	200	2
BERYLLIUM	0 4	0 4	0 004
CADMIUM	0 5	0 5	0.005
CALCIUM	Essential Nutrient	Essential Nutrient	Essential Nutrient
CHROMIUM	10	10	0.1
COBALT	610	610	6 1
COPPER	130	130	1 3
IRON	Essential Nutrient	Essential Nutrient	Essential Nutrient
LEAD	1 5	1 5	0 015
MAGNESIUM	Essential Nutrient	Essential Nutrient	Essential Nutrient
MANGANESE	1400	1400	14
MERCURY	0 2	0.2	0 002
MOLYBDENUM	51	51	0 51
NICKEL	200	200	2
POTASSIUM	Essential Nutrient	Essential Nutrient	Essential Nutrient
SELENIUM	5	5	0.05
SILVER	51	51	0 51
SODIUM	Essential Nutrient	Essential Nutrient	Essential Nutrient
THALLIUM	0 2	0 2	0 002
VANADIUM	72	72	0 72
ZINC	3100	3100	31
Semivolatile Organics			
1,2,4-TRICHLOROBENZENE	7	7	0 07
1,2-DICHLOROBENZENE	60	60	0 6
1,3-DICHLOROBENZENE[d]	60	60	0 6
1,4-DICHLOROBENZENE	7 5	7 5	0 075
2,4,5-TRICHLOROPHENOL	1000	1000	10
2,4,6-TRICHLOROPHENOL	2 6	2.5	0 025
2 4-DICHLOROPHENOL	31	31	0 31
2,4-DIMETHYLPHENOL	200	200	2
2,4-DINITROPHENOL	20	20	0 2
2 4-DINITROTOLUENE	0 042	0 042	0 00042
2,6-DINITROTOLUENE	0 042	0 042	0 00042
2-CHLORONAPHTHALENE	820	820	8.2

Table 2

TNRCC Risk Reduction Standard 2
Media-Specific Concentrations
(continued)

Parameter	Surface Soil[a] MSC (mg/kg)	Subsurface Soil[b] MSC (mg/kg)	Groundwater[c] MSC (mg/L)
2-CHLOROPHENOL	51	51	0 51
2-METHYLPHENOL	510	510	5 1
o-CRESOL	510	510	5 1
4-CHLOROANILINE	41	41	0 41
4-METHYLPHENOL	51	51	0 51
p-CRESOL			
ACENAPHTHENE	610	610	6 1
ANTHRACENE	3100	3100	31
BENZO(A)ANTHRACENE	0 039	0 039	0 00039
BENZO(A)PYRENE	0 02	0 02	0 0002
BENZO(B)FLUORANTHENE	0 039	0 039	0 00039
BENZO(K)FLUORANTHENE	0 39	0 39	0 0039
BENZOIC ACID	41000	41000	410
BIS(2-CHLOROETHYL)ETHER	0 026	0 026	0 00026
BIS(2-CHLOROISOPROPYL)ETHER	410	410	4 1
BIS(2-ETHYLHEXYL)PHTHALATE	0 6	0 6	0 006
CHRYSENE	3 9	3 9	0.039
DI-N-BUTYL PHTHALATE	1000	1000	10
DI-N-OCTYL PHTHALATE	200	200	2
DIBENZO(A,H)ANTHRACENE	0 02	0 02	0 0002
DIETHYL PHTHALATE	8200	8200	82
FLUORANTHENE	410	410	4 1
FLUORENE	410	410	4 1
HEXACHLOROBENZENE	0.1	0 1	0 001
HEXACHLOROBUTADIENE	2	2	0 02
HEXACHLOROETHANE	10	10	0 1
INDENO(1,2,3-CD)PYRENE	0 039	0 039	0 00039
N-NITROSO-DI-N-PROPYLAMINE	0 0041	0 0041	0 000041
N-NITROSODIPHENYLAMINE	5 8	5 8	0 058
NAPHTHALENE	200	200	2
NITROBENZENE	5 1	5 1	0.051
PENTACHLOROPHENOL	0 1	0 1	0 001
PHENANTHRENE	310	310	3 1
PHENOL	6100	6100	61
PYRENE	310	310	3 1
Volatile Organics			
1,1,1,2-TETRACHLOROETHANE	11	11	0 11
1,1,1-TRICHLOROETHANE	20	20	0.2
1,1,2 2-TETRACHLOROETHANE	1 4	1 4	0 014
1,1,2-TRICHLOROETHANE	0 5	0 5	0 005
1,1-DICHLOROETHANE	1000	1000	10
1,1 DICHLOROETHENE	0 0041	0 0041	0 00041
1,2,3-TRICHLOROPROPANE	0 0041	0 0041	4.10E-05
1,2 4-TRICHLOROBENZENE	7	7	0 07
1,2-DIBROMO-3-CHLOROPROPANE	0 02	0 02	0 0002
1,2-DICHLOROBENZENE	60	60	0 6

Table 2

TNRCC Risk Reduction Standard 2
Media-Specific Concentrations
(continued)

Parameter	Surface Soil[a] MSC (mg/kg)	Subsurface Soil[b] MSC (mg/kg)	Groundwater[c] MSC (mg/L)
1,2-DICHLOROETHANE	0 5	0 5	0 005
1,2-DICHLOROPROPANE	0 5	0 5	0 005
1 3,5-TRIMETHYLBENZENE	310	310	3.1
1,3-DICHLOROBENZENE	60	60	0 6
1,4-DICHLOROBENZENE	7.5	7.5	0 075
ACETONE	1000	1000	10
BENZENE	0 5	0 5	0 005
BROMODICHLOROMETHANE	10	10	0 1
BROMOFORM	10	10	0 1
BROMOMETHANE	14	14	0 14
CARBON TETRACHLORIDE	0 5	0 5	0 005
CHLOROBENZENE	10	10	0 1
CHLOROETHANE	4100	4100	41
CHLOROFORM	0 51	0 51	0 1
CIS-1,2-DICHLOROETHENE	7	7	0 07
DIBROMOCHLOROMETHANE	10	10	0 1
DICHLORODIFLUOROMETHANE	2000	2000	20
ETHYL BENZENE	70	70	0 7
HEXACHLOROBUTADIENE	2	2	0 02
ISOPROPYLBENZENE	1000	1000	10
M+P-XYLENE	1000	1000	10
METHYLENE CHLORIDE	0 5	0 5	0 005
NAPHTHALENE	200	200	2
N-BUTYLBENZENE *	102	102	1 02
N-PROPYLBENZENE *	102	102	1 02
O-XYLENE	1000	1000	10
STYRENE	10	10	0 1
TETRACHLOROETHENE	0 5	0 5	0 005
TOLUENE	100	100	1
TRANS-1,2-DICHLOROETHENE	10	10	0 1
TRICHLOROETHENE	0 5	0 5	0 005
TRICHLOROFLUOROMETHANE	3100	3100	31
VINYL CHLORIDE	0.2	0 2	0 002
Organochlorine Pesticides and PCBs			
4,4'-DDD	0 12	0 12	0 0012
4,4 -DDE	0 084	0 084	8 40E-04
4,4'-DDT	0 084	0.084	8 40E-04
ALDRIN	0 0017	0 0017	1 75E-05
ALPHA-BHC	0 0014	0 0014	4 50E-05
ALPHA-CHLORDANE	0 2	0.2	0 002
AROCLOR-1016*	0 05	0 05	5 00E-04
AROCLOR-1221*	0 05	0 05	5 00E-04
AROCLOR-1232*	0 05	0 05	5 00E-04
AROCLOR-1242*	0 05	0 05	5 00E-04
AROCLOR-1248*	0 05	0 05	5 00E-04
AROCLOR-1254*	0 05	0.05	5.00E-04
AROCLOR-1260*	0 05	0 05	5.00E-04
BETA-BHC	0 16	0 16	1 60E-03

Table 2

TNRCC Risk Reduction Standard 2
Media-Specific Concentrations
(continued)

Parameter	Surface Soil[a] MSC (mg/kg)	Subsurface Soil[b] MSC (mg/kg)	Groundwater[c] MSC (mg/L)
DELTA-BHC (technical)	0.016	0.016	1 60E-04
DIELDRIN	0 00183	0 00183	1 83E-05
ENDOSULFAN I	61	61	0 61
ENDOSULFAN II[f]	61	61	0 61
ENDOSULFAN SULFATE	61	61	0 61
ENDRIN	0 2	0.2	0 002
ENDRIN ALDEHYDE[g]	0 2	0 2	0 002
GAMMA-BHC (LINDANE)	0 02	0.02	2.00E-04
GAMMA-CHLORDANE (alpha)	0.2	0 2	0.002
HEPTACHLOR	0 04	0 04	4 00E-04
HEPTACHLOR EPOXIDE	0 02	0 02	2.00E-04
METHOXYCHLOR	4	4	0 04
TOXAPHENE	0 3	0 3	0 003

Notes.

Reference. TNRCC Risk Reduction Standards TNRCC 1993 "Final Standards. Chapter 335 Subchapter S. Risk Reduction Standards" *Texas Register* 18 3842-3872.

*Calculated MSC

[a] Surface soil is the lower MSC of soil ingestion/inhalation for industrial sites and groundwater protection for industrial sites (SAI-Ind and GWP-Ind)

[b] Subsurface soil MSC is the groundwater protection for industrial soil (GWP-Ind)

[c] Groundwater MSC is industrial groundwater (GW-Ind)

[d] 1,2-Dichlorobenzene used as surrogate

[e] PCBs used as a surrogate.

[f] Endosulfan I used as surrogate.

[g] Endrin used as surrogate.

MSC - Media-specific concentration
mg/kg - Milligrams per kilogram
mg/L - Milligrams per liter
PCB - Polychlorinated biphenyl

Table 3
Summary of Previous Sampling Results Collected at Building 1655 OWS

Sample Location	Sample Date	Sample Number	Media Affected	Constituent	Depth	Result	Units	EPA Analytical Method	RRS1 Background	Units	RRS2 MSC	Units
IT Corporation - Phase I RFI (1998)												
SB165502	12-Mar-97	MS1453	surface soil	Manganese	0-2'	158	mg/kg	SW6010	849	mg/kg	1400	mg/kg
SB165502	12-Mar-97	MS1454	subsurface soil	Manganese	10-12'	2210	mg/kg	SW6010	351.7	mg/kg	1400	mg/kg
WITCTA004	30-Apr-97	MS1572	groundwater	Manganese		0.977	mg/L	SW6010	0.175	mg/L	14	mg/L
IT Corporation - Phase 2 RFI (2000)												
No samples collected during Phase 2												
IT Corporation - Phase 3 RFI (2000)												
SB165503	30-Nov-00	BG0098	surface soil	Manganese	0-2'	131	mg/kg	SW6010B	849	mg/kg	1400	mg/kg
SB165503	30-Nov-00	BG0099	subsurface soil	Manganese	10-12'	1770	mg/kg	SW6010B	351.7	mg/kg	1400	mg/kg
SB165503	30-Nov-00	BG0099	subsurface soil	SPLP-Manganese	10-12'	7.32	mg/L	SW6010B			14	mg/L
SB165503 - FD	30-Nov-00	BG0100	subsurface soil	Manganese	10-12'	1230	mg/kg	SW6010B	351.7	mg/kg	1400	mg/kg
WITCTA004	1-Dec-00	BG3016	groundwater	Manganese		0 231	mg/L	SW6010B	0.175	mg/L	14	mg/L

Notes
Source: TNRCC Risk Reduction Standards (1993)
MSC - Media-Specific Concentrations
mg/kg - milligrams per kilogram
mg/L - milligrams per liter
SPLP - Synthetic Precipitation Leaching Procedure
FD - Field Duplicate

Table 4

Building 1656
Near Surface Soil Organics and Inorganics
Subsurface Organics and Inorganics
(Page 1 of 2)

Sample No.	Sample Location	Sample Date	Beginning Depth	End Depth	Analyte	Detection Limit	Result	Qualifier	Validation Qualifier	Units	Analytical Method
MS1453	SB165502	27-Mar-97	1	2	ALUMINUM	58.55	14300			MG/KG	SW6010
MS1453	SB165502	27-Mar-97	1	2	ARSENIC	70.26	5.3	B		MG/KG	SW6010
MS1453	SB165502	27-Mar-97	1	2	BARIUM	2.34	52.2			MG/KG	SW6010
MS1453	SB165502	27-Mar-97	1	2	BERYLLIUM	0.35	0.81			MG/KG	SW6010
MS1453	SB165502	27-Mar-97	1	2	CADMIUM	4.68	0.44	B		MG/KG	SW6010
MS1453	SB165502	27-Mar-97	1	2	CALCIUM	11.71	1440			MG/KG	SW6010
MS1453	SB165502	27-Mar-97	1	2	CHROMIUM	8.2	15.8			MG/KG	SW6010
MS1453	SB165502	27-Mar-97	1	2	COBALT	8.2	5.4	B		MG/KG	SW6010
MS1453	SB165502	27-Mar-97	1	2	COPPER	7.03	6.8	B		MG/KG	SW6010
MS1453	SB165502	27-Mar-97	1	2	IRON	8.2	20100			MG/KG	SW6010
MS1453	SB165502	27-Mar-97	1	2	LEAD	58.55	8.7	B		MG/KG	SW6010
MS1453	SB165502	27-Mar-97	1	2	MAGNESIUM	35.13	1260			MG/KG	SW6010
MS1453	SB165502	27-Mar-97	1	2	MANGANESE	2.34	158			MG/KG	SW6010
MS1453	SB165502	27-Mar-97	1	2	MOLYBDENUM	9.37	0.59	B		MG/KG	SW6010
MS1453	SB165502	27-Mar-97	1	2	NICKEL	17.56	9.2	B		MG/KG	SW6010
MS1453	SB165502	27-Mar-97	1	2	POTASSIUM	585.48	1830			MG/KG	SW6010
MS1453	SB165502	27-Mar-97	1	2	SODIUM	35.13	31.7	B		MG/KG	SW6010
MS1453	SB165502	27-Mar-97	1	2	VANADIUM	9.37	31.8			MG/KG	SW6010
MS1453	SB165502	27-Mar-97	1	2	ZINC	2.34	22.7			MG/KG	SW6010
MS1453	SB165502	27-Mar-97	1	2	MERCURY	0.12	0.004	B		MG/KG	SW7471
MS1453	SB165502	27-Mar-97	1	2	METHYLENE CHLORIDE	0.0023	0.0024	B		MG/KG	SW8260
MS1453	SB165502	27-Mar-97	1	2	TOLUENE	0.0059	0.0013	J		MG/KG	SW8260
MS1453	SB165502	27-Mar-97	1	2	DI-N-BUTYL PHTHALATE	0.82	0.78	J,B		MG/KG	SW8270
MS1453	SB165502	27-Mar-97	1	2	ETHANE, 1,1,2,2-TETRACHLORO-	0	0.33	J,B		MG/KG	SW8270
MS1453	SB165502	27-Mar-97	1	2	OXYGENATED HYDROCARBON	0	0.33	J,B		MG/KG	SW8270
MS1453	SB165502	27-Mar-97	1	2	OXYGENATED HYDROCARBON	0	0.18	J		MG/KG	SW8270
MS1454	SB165502	27-Mar-97	10	12	ALUMINUM	58.34	2180			MG/KG	SW6010
MS1454	SB165502	27-Mar-97	10	12	ARSENIC	70.01	3.6	B		MG/KG	SW6010
MS1454	SB165502	27-Mar-97	10	12	BARIUM	2.33	136			MG/KG	SW6010
MS1454	SB165502	27-Mar-97	10	12	BERYLLIUM	0.35	0.28	B		MG/KG	SW6010
MS1454	SB165502	27-Mar-97	10	12	CADMIUM	4.67	0.49	B		MG/KG	SW6010
MS1454	SB165502	27-Mar-97	10	12	CALCIUM	11.67	369			MG/KG	SW6010
MS1454	SB165502	27-Mar-97	10	12	CHROMIUM	8.17	4.3	B		MG/KG	SW6010
MS1454	SB165502	27-Mar-97	10	12	COBALT	8.17	5.7	B		MG/KG	SW6010
MS1454	SB165502	27-Mar-97	10	12	COPPER	7	5.9	B		MG/KG	SW6010

722 26

Table 4

Building 1655
Near Surface Soil Organics and Inorganics
Subsurface Organics and Inorganics
(Page 2 of 2)

Sample No.	Sample Location	Sample Date	Beginning Depth	End Depth	Analyte	Detection Limit	Result	Qualifier	Validation Qualifier	Units	Analytical Method
MS1454	SB165502	27-Mar-97	10	12	IRON	8.17	13000			MG/KG	SW6010
MS1454	SB165502	27-Mar-97	10	12	LEAD	58.34	4.9	B		MG/KG	SW6010
MS1454	SB165502	27-Mar-97	10	12	MAGNESIUM	35.01	267			MG/KG	SW6010
MS1454	SB165502	27-Mar-97	10	12	MANGANESE	2.33	2210			MG/KG	SW6010
MS1454	SB165502	27-Mar-97	10	12	MOLYBDENUM	9.33	0.64	B		MG/KG	SW6010
MS1454	SB165502	27-Mar-97	10	12	NICKEL	17.5	10.8	B		MG/KG	SW6010
MS1454	SB165502	27-Mar-97	10	12	POTASSIUM	583.43	389	B		MG/KG	SW6010
MS1454	SB165502	27-Mar-97	10	12	SODIUM	35.01	8.2	B		MG/KG	SW6010
MS1454	SB165502	27-Mar-97	10	12	VANADIUM	9.33	11.3			MG/KG	SW6010
MS1454	SB165502	27-Mar-97	10	12	ZINC	2.33	17.7			MG/KG	SW6010
MS1454	SB165502	27-Mar-97	10	12	METHYLENE CHLORIDE	0.0023	0.0015	J,B		MG/KG	SW8260
MS1454	SB165502	27-Mar-97	10	12	DI-N-BUTYL PHTHALATE	0.82	0.54	J,B		MG/KG	SW8270
MS1454	SB165502	27-Mar-97	10	12	ETHANE, 1,1,2,2-TETRACHLORO-	0	0.36	J,B		MG/KG	SW8270
MS1454	SB165502	27-Mar-97	10	12	OXYGENATED HYDROCARBON	0	0.24	J,B		MG/KG	SW8270

722 27

Table 5

Building 1655
Groundwater Organics and Inorganics

Sample No.	Sample Location	Sample Date	Analyte	Detection Limit	Result	Qualifier	Validation Qualifier	Units	Analytical Method
MS1572	WITCTA004	30-Apr-97	ALUMINUM	500	73.2	B	B	UG/L	SW6010
MS1572	WITCTA004	30-Apr-97	MANGANESE	20	977			UG/L	SW6010
MS1572	WITCTA004	30-Apr-97	POTASSIUM	5000	7400			UG/L	SW6010
MS1572	WITCTA004	30-Apr-97	BARIUM	20	153			UG/L	SW6010
MS1572	WITCTA004	30-Apr-97	CALCIUM	100	154000			UG/L	SW6010
MS1572	WITCTA004	30-Apr-97	ZINC	20	16.5	B	B	UG/L	SW6010
MS1572	WITCTA004	30-Apr-97	SODIUM	300	177000			UG/L	SW6010
MS1572	WITCTA004	30-Apr-97	IRON	70	1470			UG/L	SW6010
MS1572	WITCTA004	30-Apr-97	MAGNESIUM	300	23200			UG/L	SW6010
MS1572	WITCTA004	30-Apr-97	CIS-1,2-DICHLOROETHENE	1.2	1.4			UG/L	SW8260
MS1572	WITCTA004	30-Apr-97	TRICHLOROETHENE	1	4.6			UG/L	SW8260
MS1572	WITCTA004	30-Apr-97	METHYLENE CHLORIDE	0.3	0.56	B		UG/L	SW8260
MS1572	WITCTA004	30-Apr-97	UNSATURATED HYDROCARBON	0	2.5	J		UG/L	SW8260
MS1572	WITCTA004	30-Apr-97	2,2,3,3-TETRAMETHYLBUTANE	0	3.1	J		UG/L	SW8260
MS1572	WITCTA004	30-Apr-97	UNSATURATED HYDROCARBON	0	3.2	J		UG/L	SW8260
MS1572	WITCTA004	30-Apr-97	UNSATURATED HYDROCARBON	0	3.8	J		UG/L	SW8260
MS1572	WITCTA004	30-Apr-97	OXYGENATED HYDROCARBON	0	8.8	J		UG/L	SW8270

Table 6

Naval Air Station (NAS) F[illegible] Joint Reserve Base
Oil / Water Separators Phase 3 Soil Data Summary
Project No. 768579 Delivery Order 0039

Site	Location	Sample No.	Sample Purpose	Sample Date	Start Depth (FT)	End Depth (FT)	Parameter	CAS No	Result	Reporting Limit	Method Detection Limit	Units	Laboratory Qualifier	Validation Qualifier	User Test Panel	Sample Type	Filtered	Detect
Oil Water Separator	SB119405	BG0077	REG	1-Dec-00	7	9	Benzene	71-43-2	0 00106	0 0024	0 00044	mg/kg	F	J	BENZENE	SO	N	Y
Oil Water Separator	SB119405	BG0077	REG	1-Dec-00	7	9	Cadmium	7440-43-9	0 0765	0 12	0 032	mg/kg	F	UJ	CADMIUM	SO	N	Y
Oil Water Separator	SB119405	BG0078	FD	1-Dec-00	7	9	Benzene	71-43-2	0 0024	0 0024	0 00044	mg/kg	U	nv	BENZENE	SO	N	N
Oil Water Separator	SB119405	BG0078	FD	1-Dec-00	7	9	Cadmium	7440-43-9	0 0579	0 12	0 032	mg/kg	F	nv	CADMIUM	SO	N	Y
Oil Water Separator	SB119406	BG0079	REG	30-Nov-00	1	5	Benzene	71-43-2	0 0022	0 0022	0 00044	mg/kg	U	U	BENZENE	SO	N	N
Oil Water Separator	SB119406	BG0079	REG	30-Nov-00	1	5	Cadmium	7440-43-9	0 169	0 11	0 032	mg/kg			CADMIUM	SO	N	Y
Oil Water Separator	SB119406	BG0080	REG	30-Nov-00	7	9	Benzene	71-43-2	0 0023	0 0023	0 00044	mg/kg	R	U	BENZENE	SO	N	Y
Oil Water Separator	SB119406	BG0080	REG	30-Nov-00	7	9	Cadmium	7440-43-9	0.123	0 11	0 032	mg/kg			CADMIUM	SO	N	Y
Oil Water Separator	SB119407	BG0081	REG	30-Nov-00	3	5	Cadmium	7440-43-9	0 0913	0 11	0 032	mg/kg	F	nv	CADMIUM	SO	N	Y
Oil Water Separator	SB119407	BG0082	REG	30-Nov-00	5	7	Cadmium	7440-43-9	0 0986	0 11	0 032	mg/kg	F	nv	CADMIUM	SO	N	Y
Oil Water Separator	SB141405	BG0083	REG	1-Dec-00	10	12	Arsenic	7440-38-2	3 31	1.1	0 35	mg/kg		nv	ARSENIC	SO	N	Y
Oil Water Separator	SB141405	BG0083	REG	1-Dec-00	10	12	Cadmium	7440-43-9	0 088	0 11	0 032	mg/kg	F	nv	CADMIUM	SO	N	Y
Oil Water Separator	SB141405	BG0083	REG	1-Dec-00	10	12	Copper	7440-50-6	6 68	2 3	0 15	mg/kg		nv	COPPER	SO	N	Y
Oil Water Separator	SB141405	BG0150	REG	1-Dec-00	5	7	Arsenic	7440-38-2	3 14	1.1	0 35	mg/kg		nv	ARSENIC	SO	N	Y
Oil Water Separator	SB141405	BG0150	REG	1-Dec-00	5	7	Cadmium	7440-43-9	0.139	0 11	0 032	mg/kg		nv	CADMIUM	SO	N	Y
Oil Water Separator	SB141405	BG0150	REG	1-Dec-00	5	7	Copper	7440-50-6	6 54	2 3	0.15	mg/kg		nv	COPPER	SO	N	Y
Oil Water Separator	SB141406	BG0084	REG	1-Dec-00	10	12	Arsenic	7440-38-2	4.93	1.1	0.35	mg/kg		nv	ARSENIC	SO	N	Y
Oil Water Separator	SB141406	BG0084	REG	1-Dec-00	10	12	Cadmium	7440-43-9	0 0622	0 11	0 032	mg/kg	F	nv	CADMIUM	SO	N	Y
Oil Water Separator	SB141406	BG0084	REG	1-Dec-00	10	12	Copper	7440-50-6	6 55	2 2	0 15	mg/kg		nv	COPPER	SO	N	Y
Oil Water Separator	SB141406	BG0151	REG	1-Dec-00	1	3	Cadmium	7440-43-9	0 0732	0 12	0 032	mg/kg	F	nv	CADMIUM	SS	N	Y
Oil Water Separator	SB141406	BG0151	REG	1-Dec-00	1	3	Lead	7439-92-1	9 46	1.2	0 33	mg/kg		nv	LEAD	SS	N	Y
Oil Water Separator	SB141406	BG0152	REG	1-Dec-00	5	7	Arsenic	7440-38-2	4 44	1.2	0 35	mg/kg		nv	ARSENIC	SO	N	Y
Oil Water Separator	SB141406	BG0152	REG	1-Dec-00	5	7	Cadmium	7440-43-9	0 0722	0 12	0 032	mg/kg	F	nv	CADMIUM	SO	N	Y
Oil Water Separator	SB141406	BG0152	REG	1-Dec-00	5	7	Copper	7440-50-6	7 35	2 3	0 15	mg/kg		nv	COPPER	SO	N	Y
Oil Water Separator	SB141407	BG0085	REG	1-Dec-00	0	2	Arsenic	7440-38-2	4 85	1 3	0 35	mg/kg		nv	ARSENIC	SS	N	Y
Oil Water Separator	SB141407	BG0085	REG	1-Dec-00	0	2	Cadmium	7440-43-9	0 0698	0.13	0.032	mg/kg	F	nv	CADMIUM	SS	N	Y
Oil Water Separator	SB141407	BG0085	REG	1-Dec-00	0	2	Lead	7439-92-1	9 61	1 3	0 33	mg/kg		nv	LEAD	SS	N	Y
Oil Water Separator	SB141407	BG0153	REG	1-Dec-00	5	7	Cadmium	7440-43-9	0.155	0 12	0 032	mg/kg		nv	CADMIUM	SO	N	Y
Oil Water Separator	SB141407	BG0154	REG	1-Dec-00	10	12	Cadmium	7440-43-9	0 0976	0 11	0 032	mg/kg	F	nv	CADMIUM	SO	N	Y
Oil Water Separator	SB160204	BG0090	REG	4-Dec-00	0	2	Chromium	7440-47-3	19 6	24	0 06	mg/kg	F	J	CHROMIUM	SS	N	Y
Oil Water Separator	SB160204	BG0091	REG	4-Dec-00	14	17	Arsenic	7440-38-2	6 85	1 1	0 35	mg/kg			ARSENIC	SO	N	Y
Oil Water Separator	SB160204	BG0155	REG	4-Dec-00	6	8	Arsenic	7440-38-2	6.19	1 2	0 35	mg/kg			ARSENIC	SO	N	Y
Oil Water Separator	SB160204	BG0155	REG	4-Dec-00	6	8	Chromium	7440-47-3	18	24	0 06	mg/kg	F	J	CHRDMIUM	SO	N	Y
Oil Water Separator	SB160205	BG0092	REG	1-Dec-00	0	2	Chromium	7440-47-3	18	24	0 06	mg/kg	F	nv	CHROMIUM	SO	N	Y
Oil Water Separator	SB160205	BG0093	REG	1-Dec-00	14	17	Arsenic	7440-38-2	5 06	1 2	0 35	mg/kg		nv	ARSENIC	SO	N	Y
Oil Water Separator	SB160205	BG0156	REG	1-Dec-00	6	8	Arsenic	7440-38-2	4 72	1 2	0 35	mg/kg		U	ARSENIC	SO	N	Y
Oil Water Separator	SB160205	BG0156	REG	1-Dec-00	6	8	Chromium	7440-47-3	14 5	23	0 06	mg/kg	F	J	CHROMIUM	SO	N	Y
Oil Water Separator	SB160205	BG0157	FD	1-Dec-00	6	8	Arsenic	7440-38-2	4 88	1 2	0 35	mg/kg		nv	ARSENIC	SO	N	Y
Oil Water Separator	SB160205	BG0157	FD	1-Dec-00	6	8	Chromium	7440-47-3	15 1	23	0 06	mg/kg	F	nv	CHROMIUM	SO	N	Y
Oil Water Separator	SB160206	BG0094	REG	1-Dec-00	0	2	Chromium	7440-47-3	20 7	24	0 06	mg/kg	F	J	CHROMIUM	SO	N	Y
Oil Water Separator	SB160206	BG0095	REG	1-Dec-00	14	17	Arsenic	7440-38-2	5 92	1 2	0.35	mg/kg	U	U	ARSENIC	SO	N	Y
Oil Water Separator	SB160206	BG0158	REG	1-Dec-00	6	8	Arsenic	7440-38-2	5 7	1 2	0.35	mg/kg			ARSENIC	SO	N	Y
Oil Water Separator	SB160206	BG0158	REG	1-Dec-00	6	8	Chromium	7440-47-3	20	24	0 06	mg/kg	F	J	CHROMIUM	SO	N	Y
Oil Water Separator	SB160207	BG0096	REG	4-Dec-00	0	2	Chromium	7440-47-3	18	24	0 06	mg/kg	F	nv	CHROMIUM	SS	N	Y
Oil Water Separator	SB160207	BG0159	REG	4-Dec-00	6	8	Chromium	7440-47-3	14 6	23	0 06	mg/kg	F	nv	CHROMIUM	SO	N	Y
Oil Water Separator	SB164308	BG0097	REG	30-Nov-00	0	2	Chlorobenzene	108-90-7	0 0022	0 0022	0 00024	mg/kg	U	U	CHLOROBENZENE	SS	N	N
Oil Water Separator	SB165503	BG0098	REG	30-Nov-00	0	2	Manganese	7439-96-5	131	2 4	0 25	mg/kg		nv	MANGANESE	SS	N	Y
Oil Water Separator	SB165503	BG0099	REG	30-Nov-00	10	12	Manganese	7439-96-5	1770	2 1	0 25	mg/kg			MANGANESE	SO	N	Y
Oil Water Separator	SB165503	BG0099	REG	30-Nov-00	10	12	Manganese	7439-96-5	7320	3	1	ug/L			SPLP-MANGANESE	SO	N	Y
Oil Water Separator	SB165503	BG0100	FD	30-Nov-00	10	12	Manganese	7439-96-5	1230	2 1	0 25	mg/kg		nv	MANGANESE	SO	N	Y
Oil Water Separator	SB335809	BG0101	REG	29-Nov-00	0	2	Arsenic	7440-38-2	5 44	1.1	0 35	mg/kg		nv	ARSENIC	SS	N	Y
Oil Water Separator	SB335809	BG0101	REG	29-Nov-00	0	2	Cadmium	7440-43-9	0.11	0 11	0 032	mg/kg	U	nv	CADMIUM	SS	N	N
Oil Water Separator	SB335809	BG0101	REG	29-Nov-00	0	2	Lead	7439-92-1	9 39	1 1	0 33	mg/kg		nv	LEAD	SS	N	Y
Oil Water Separator	SB335809	BG0160	REG	29-Nov-00	5	7	Arsenic	7440-38-2	5 23	1 1	0 35	mg/kg			ARSENIC	SO	N	Y
Oil Water Separator	SB335809	BG0160	REG	29-Nov-00	5	7	Cadmium	7440-43-9	0 11	0 11	0 032	mg/kg	U	U	CADMIUM	SO	N	N
Oil Water Separator	SB335809	BG0160	REG	29-Nov-00	5	7	Lead	7439-92-1	10 3	1 1	0 33	mg/kg			LEAD	SO	N	Y
Oil Water Separator	SB335809	BG0161	FD	29-Nov-00	5	7	Arsenic	7440-38-2	5 3	1.1	0 35	mg/kg		nv	ARSENIC	SO	N	Y
Oil Water Separator	SB335809	BG0161	FD	29-Nov-00	5	7	Cadmium	7440-43-9	0 11	0 11	0 032	mg/kg	U	nv	CADMIUM	SO	N	N

TABLE 7

Ellis Environmental Group, LC
Phase 4 RCRA Facility Investigation for
Building 1655 OWS

Sample Location	Sample Date	Media	Analyte	Depth Ft- bgs	Analytical Method	Units	Result	Reporting Limit	Method Detection limit	Subsurface soil RRS-2 mg/kg	Subsurface soil New RRS-2	GW-MSC mg/L
SB165504-03	8/23/01	SS	manganese	10 to 12	6010B	mg/kg	2660	7.9	0 3	1770	2660	
SB165504-03	8/23/01	SS	manganese	10 to 12	SPLP	mg/L	3 75	0.02	0.0009			14
SB165505-02	8/23/01	SS	manganese	4.5 to 5 5	6010B	mg/kg	115	1.9	0.069	1770	2660	
SB165505-03	8/23/01	SS	manganese	13 5 to 14	6010B	mg/kg	90 5	1.6	0.061	1770	2660	
SB165506-02	8/23/01	SS	manganese	7 to 8 5	6010B	mg/kg	84.4	1	0 07	1770	2660	
SB165506-03	8/23/01	SS	manganese	14 to 15	6010B	mg/kg	516	1.8	0.067	1770	2660	
SB165507-02	8/23/01	SS	manganese	7 to 8	6010B	mg/kg	72 6	2.1	0 079	1770	2660	
Duplicate 01	8/23/01	SS	manganese	7 to 8	6010B	mg/kg	98.4	2 2	0.083	1770	2660	
SB165507-03	8/23/01	SS	manganese	13 to 13 5	6010B	mg/kg	195	1.9	0.073	1770	2660	
WITCTA004	8/24/01	GW	manganese		6010B	mg/L	0.253	0.02	0.0016			14

SS = Subsurface soil
GW = Groundwater
mg/kg = milligrams per kilogram
mg/L = milligrams per liter

Ft- bgs = feet below ground surface
RRS = Risk Reduction Standard
GW-MSC = Groundwater-Media Specific Concentration

Table 6 continued

Naval Air Station (NAS) , rth Joint Reserve Base
Oil / Water Separators Phase 3 Groundwater Data Summary
Project No 768579 Delivery Order 0039

Site	Location	Sample No	Sample Purpose	Sample Date	Start Depth (FT)	End Depth (FT)	Parameter	CAS No.	Result	Reporting Limit	Method Detection Limit	Units	Laboratory Qualifier	Validation Qualifier	User Test Panel	Sample Type	Filtered	Detect
Oil Water Separator	WITCTA004	BG3016	REG	1-Dec-00	0	0	Manganese	7439-96-5	231	3	1	ug/L		nv	MANGANESE	GW	N	Y
Oil Water Separator	WITCTA022	BG3017	REG	1-Dec-00	0	0	Antimony	7440-36-0	5	5	0 35	ug/L	U	nv	ANTIMONY	GW	N	N
Oil Water Separator	WITCTA022	BG3017	REG	1-Dec-00	0	0	Arsenic	7440-38-2	1 28	5	0 28	ug/L	F	J	ARSENIC	GW	N	Y
Oil Water Separator	WITCTA022	BG3017	REG	1-Dec-00	0	0	Cadmium	7440-43-9	0 3	1	0 17	ug/L	F	U	CADMIUM	GW	N	Y
Oil Water Separator	WITCTA032	BG3018	REG	1-Dec-00	0	0	Arsenic	7440-38-2	12 2	5	0 28	ug/L		nv	ARSENIC	GW	N	Y
Oil Water Separator	WITCTA035	BG3019	REG	1-Dec-00	0	0	Manganese	7439-96-5	454	3	1	ug/L			MANGANESE	GW	N	Y
Oil Water Separator	WITCTA035	BG3020	FD	1-Dec-00	0	0	Manganese	7439-96-5	387	3	1	ug/L		nv	MANGANESE	GW	N	Y

722 31

TAB

APPENDIX A

APPENDIX A

Soil Boring Logs

INTERNATIONAL TECHNOLOGY CORPORATION

BEST AVAILABLE COPY

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 768579	PROJECT NAME NAS FT Worth JRB		
BORING NUMBER: SB-MW 70165502	COORDINATES		DATE 3/27/97
ELEVATION:	GWL: Depth 13'	Date/Time 3 27 97	DATE STARTED 3-27-97
ENGINEER/GEOLOGIST: B. Mutz	Depth	Date/Time	DATE COMPLETED: 3-27-97
DRILLING METHODS: DPT			PAGE 1 OF 1

DEPTH (Ft.)	SAMPLE TYPE & NO. / TIME	BLOWS ON SAMPLER PER 6"	RECOVERY (In.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1013 1014	MS 1453	15/18	Brown ~~Dk red~~ silty clay, v stiff, sl. moist ↑ yellowish-	CL		5YR4/6
			2/24				
5			24/24				
	1027		24/24	Yellowish-red sandy silt, stiff, sl. moist	ML		5YR4/6
	1035		20/24	Brown mod sand w/ fine gravel, loose, ~~Dark~~ moist	SW		7.5YR 5/4 Opr
10	1040	MS 1454	24/24	Dk yellowish brown fine sand, loose, sm			10YR4/6
▽	1046		21/24				
15							

NOTES

TD @ 14'

HYDRO GeoLogic

BORING LOG

Borehole ID: SB165504
Sheet 1 of 2

722 35

Location NAS FW JRB

Project Name	Project Number	LTCCODE (IRPIMS)	Site ID	LPRCODE (IRPIMS)
Phase III	7020.460		Bldg 1655 OWS	

Drilling Company	Driller	Ground Elevation	Total Drilled Depth
ESN	John Braden		12'

Drilling Equipment	Drilling Method	Borehole Diameter	Date/Time Drilling Started	Date/Time Total Depth Reached
Stratoprobe	DPT	2"	8-23-01 1330	8-23-01 1355 12'

Type of Sampling Device	Water Level (bgs)	
Acetate liner w/ 3' split spoon	First N/A	Final

Sample Hammer	Hydrogeologist	Checked by/Date
Type Driving Wt Drop	Rick Levin	

Location Description (include sketch in field logbook)

Depth	Interval	Recovery	Blow Counts	Description (Include lithology, grain size, sorting, angularity, Munsell color name & notation, mineralogy, bedding, plasticity, density, consistency, etc., as applicable)	USCS Symbol	Lithology	Water Content	Remarks (Include all sample types & depth, odor, organic, odor measurements, etc.)
				Concrete (8")				
1				10YR 6/3 pale brown clayey gravel	GC		D	
				2.5YR 4/6 red silty clay, stiff, dry	CL		R	
2			95%				Y	
				mottling at 2.5' - 2.5YR 6/8 light red and 4/6 red silty clay, stiff, dry				
3								
4			100%	Increasing moisture from 4.5' on				
5							damp	
				5YR 5/8 yellowish red fine sand mottled in 2.5YR 4/6 red silty clay				
6								
7				5YR 5/8 and 4/6 brownish red fine sand, moist, well sorted			moist	
8								
				5YR 5/6 brownish red med-coarse sand w/ cobbles, moist, poorly sorted, increasing gravel w/ depth				
9				5YR 4/6 brownish red				
10				↓				

HYDRO Geologic

BORING LOG (cont'd)

Borchole ID SB165504
Sheet 2 of 2

722 36

Project Name	Project Number	Location
Phase III	7020.460	NAS FW JRB

Depth	Interval	Recovery	Blow Counts	Description (Include lithology, grain size, sorting angularity, Munsell color name & notation, minerology, bedding, plasticity, density, consistency, etc., as applicable)	USCS Symbol	Lithology	Water Content	Remarks (Include all sample types & depth, odor, organic vapor measurements, etc.)
				10-10.5' 7.5YR 5/6 strong brown med sand w/cobbles				
11			11 80	7.5YR 5/8 Strong brown, 4/4 brown, + 3/2 dk brown med-coarse sand, poorly sorted, dk brown increasing w/depth. at 11.5 sand is all 7.5YR 3/2 dk brown			M o i s t	Collect SB165504-03 from 10-12' at 1355
12				End boring at 12' bgs				
13								
14								
15								

HYDRO GeoLogic

BORING LOG

Borehole ID: SB165505
Sheet 1 of 2

722 37

Location NAS FW JRB

Project Name	Project Number	LTCCODE (IRPIMS)	Site ID	LPRCODE (IRPIMS)
Phase III	7020.460		Bldg 1655 OWS	

Drilling Company	Driller	Ground Elevation	Total Drilled Depth
ESN.	John Braden		15'

Drilling Equipment	Drilling Method	Borehole Diameter	Date/Time Drilling Started	Date/Time Total Depth Reached
Stratoprobe	DPT	2"	8-23-01 1150	8-23-01 15' 1230

Type of Sampling Device	Water Level (bgs) First	Final
Acetate liner in 3' split spoon	N/A	

Sample Hammer	Hydrogeologist	Checked by/Date
Type Driving Wt Drop	Rick Levin	

Location Description (include sketch in field logbook)

Depth	Interval	Recovery	Blow Counts	Description (Include lithology, grain size, texture, angularity, Munsell color name & notation, mineralogy, bedding, plasticity, density, consistency, etc., as applicable)	USCS Symbol	Lithology	Water Content	Remarks (Include all sample types & depth, odor, organic vapor measurements, etc.)
				Concrete (8")				
1			2.5' recovery	Gravel top 3" 2.5YR 6/3 pale brown	GC			PID = 0.0 ppm
				2.5YR 4/6 red silty clay, dry, stiff, 4/3% gravel (subangular - subround (2-15mm))	CL		Dry	No odor
2								
3			90% recovery	Mottled 5YR 6/8 reddish yellow and 2.5YR 4/6 red silty clay, increasing silt w/ depth, dry, med stiff, 4/3% gravel and some black specks			Dry	
4								
5								Collect SB165505-02 at 1155 from 4.5-5.5'
6				Same as above, damp			Damp	
7			50%					
8				Becoming sandy ~~towards~~ at 8' (fine sand)				
9			100%	2.5YR red sandy clay (9-10')	V			
10								

HYDRO Geologic

BORING LOG (cont'd)

Borehole ID SB165505
Sheet 2 of 2

722 38

Project Name	Project Number	Location
Phase III	7020.460	Bldg 1655 OWS

Depth	Interval	Recovery	Blow Counts	Description (Include lithology, grain size, sorting, angularity, Munsell color name & notation, mineralogy, bedding, plasticity, density, consistency, etc., as applicable)	USCS Symbol	Lithology	Water Content	Remarks (Include all sample types & depth, odor, organic vapor measurements, etc.)
				at 10' 5YR 5/6 yellowish red coarse sand, poorly sorted	SP		Moist	PID = 0.0 ppm
11			100	At 11' color darker - 5YR 3/1 v dk gray poorly sorted coarse sand (med, coarse, gravel)	SP			No odor
12				10YR 6/6 brownish yellow sand, moderately sorted sand (fine-coarse)	S			
				5YR 4/2 dark reddish gray med-coarse sand w/gravel (subround 1-6 mm)				
13				7.5YR 5/6 strong brown fine sand, moist at 13.25' dark banding (1" thick) - no odor, 7.5YR 3/3 dk brown				
14				At 13.5' Fine-med grain sand w/cobbles (1-7 mm) wet, 7.5YR 6/6 reddish yellow, med sorted				reached water table at 13.5' bgs
15				7.5YR 6/8 Fine-med sand, well sorted reddish yellow				Collect SB165505-03 from 13.5-14' at 1230
				End boring at 15' bgs				
16								

HYDRO GeoLogic
Ellis Environmental Group

BORING LOG

Borehole ID: SB165506
Sheet 1 of 2

722 39

Location NAS FW JRB

Project Name	Project Number	LTCCODE (IRPIMS)	Site ID	LPRCODE (IRPIMS)
Phase III	7020.460		OWS Bldg 1655	

Drilling Company	Driller	Ground Elevation	Total Drilled Depth
ESN	John Braden		

Drilling Equipment	Drilling Method	Borehole Diameter	Date/Time Drilling Started	Date/Time Total Depth Reached
Stratoprobe	DPT	2"	8-23-01 1410	8-23-01

Type of Sampling Device	Water Level (bgs)	
Acetate liner w/3' split spoon	First N/A	Final

Sample Hammer	Hydrogeologist	Checked by/Date
	Rick Levin	

Location Description (include sketch in field logbook)

Depth	Interval	Recovery	Blow Counts	Description (Include lithology, grain size, sorting, angularity, Munsell color name & notation, mineralogy, bedding, plasticity, density, consistency, etc., as applicable)	USCS Symbol	Lithology	Water Content	Remarks (Include all sample types & depth, odor, organic vapor measurements, etc.)
				Concrete (8")				
1				10YR 6/3 pale brown clayey gravel	GC			
				2.5YR 4/8 red silty clay, stiff, hard, dry			Dry	PID - 0.0 ppm No odor
2			90%					
3								
4			100%	Mottled 2.5YR 4/8 red and 6/8 light red silty clay, dry, stiff				PID = 0.0 ppm No odor
5				7.5YR 6/6 reddish yellow fine sand mottling within 2.5YR 4/8 red silty clay, dry, stiff				
6				Robo layer (1")	G			
				7.5YR 6/6 reddish yellow fine sand mottled w/in 2.5Y 4/8 red silty clay, moist			Moist	PID = 0.0 ppm
7			100%					Collect SB165506-02 and MS/MSD from 7-8.5' at 1425
8				5YR 5/8 yellowish red fine sand, well sorted, moist				
9				F-med sand at base (9') 5YR 5/8 yellowish red				
10			80%					

HYDRO Geologic

BORING LOG (cont'd)

Borehole ID SB165506
Sheet 6 of ___

722 40

Project Name	Project Number	Location
Phase III		NAS FW JRB Bldg 1655 OWS

Depth	Interval	Recovery	Blow Counts	Description (Include lithology, grain size, sorting angularity, Munsell color name & notation, minerology, bedding, plasticity, density, consistency, etc., as applicable)	USCS Symbol	Lithology	Water Content	Remarks (Include all sample types & depth, odor, organic vapor measurements, etc.)
				5YR 5/8 and 3/4 (yellowish red and dk reddish brown) fine - med sand	SW		M o i s t	PID = 0.0 ppm No odor
11			80	7.5YR 5/6, 4/4, and 3/3 (strong brown, dk brown) med - course sand 1" layer of vdk brown at 11.5'	S			
12				7.5YR 4/6 strong brown med-course sand, moist	S			
13				~~2" layer of silty clay~~ 10YR 6/8 brownish yellow med poorly sorted sand	SP			PID = 0.0 ppm
14			1 80	10YR 7/8 yellow fine - med sand, moderately sorted	S		▼	Water table at 13.5' Collect SB165506-03 from 14-15' at 1445
				10YR 5/6 yellowish brown med sand w/coarse sand, wet, poorly sorted	SP			
15				End boring at 15' bgs				

D:\SHARE_ALL\AFCEE_TEMPLATES\FORMS-standard ppt

HYDRO GeoLogic

BORING LOG

Borehole ID: SB165507
Sheet 1 of 2

722 41

			Location: NAS FW JCB	
Project Name: Phase III	Project Number: 7020.460	LTCCODE (IRPIMS):	Site ID: Bldg 1655 OWS	LPRCODE (IRPIMS):
Drilling Company: ESN	Driller: John Braden	Ground Elevation:	Total Drilled Depth: 15'	
Drilling Equipment: Stratoprobe / Drilling Method: DPT	Borehole Diameter: 2"	Date/Time Drilling Started: 8-23-01 1240	Date/Time Total Depth Reached: 8-23-01 1315 15'	
Type of Sampling Device: acetate liner w/3' split spoon		Water Level (bgs): First	Final	
Sample Hammer:		Hydrogeologist: Rick Levin	Checked by/Date:	

Location Description (include sketch in field logbook):

Depth	Interval	Recovery	Blow Counts	Description (Include lithology, grain size, sorting, regularity, Munsell color name & notation, mineralogy, bedding, plasticity, density, consistency, etc., as applicable)	USCS Symbol	Lithology	Water Content	Remarks (Include all sample types & depth, odor, organic vapor measurements, etc.)
				Concrete (8")				
1				10YR 6/3 pale brown clayey gravel	GC		Dry	
				2.5YR 4/6 red silty clay, stiff, dry				PID = 0.0 ppm
2			80%		CL			No odor
3				mottled w/ ~~2.5YR 6/3~~ 2.5YR 6/3 light red and 4/6 red silty clay, stiff, dry				
				sand lenses v/m the mottled silty clay (v fine grained 10YR 8/4 v pale brown). lenses are vertical, lenses from 3.5' to 4.5'	CL/SM			
4								
5			100%	mottled 5YR 4/6 yellowish red w/ 6/8 reddish yellow silty clay, dry	CL			
							damp	
6				damp towards the bottom			damp	
				5YR 4/6 and 5/8 mottled yellowish red silty sandy clay, moist			Moist	
7					CL			Collect DUP01 and SB165507-02 from 7-8' at 1300
8			100%	5YR 5/8 yellowish red fine sand, moderately sorted, moist	SM			
				5YR 4/6 yellowish red fine - coarse sand w/ some cobbles	S			
9			30%	5YR 4/6 yellowish red sandy clay, moist				
10				↓				

HYDRO Geologic

BORING LOG (cont'd)

Borehole ID SB165507
Sheet 2 of 2

722 42

Project Name	Project Number	Location
Phase III	7020.460	Bldg 1655 OWS WAS FW SRB

Depth	Interval	Recovery	Blow Counts	Description (Include lithology, grain size, sorting angularity, Munsell color name & notation, mineralogy, bedding, plasticity, density, consistency, etc., as applicable)	USCS Symbol	Lithology	Water Content	Remarks (Include all sample types & depth, odor, organic vapor measurements, etc.)
				↓	CL			
11			30%	5YR 3/4 dk reddish brown med sand, moist some cobbles	S			
12				5YR 3/2 dk reddish brown med sand w/ cobbles (1in-15mm), subround.	S			
				10YR 4/6 brownish yellow fine-med sand, moderately sorted			▽	water table at 13'
13				dark layer at 13' (1" thick). More cobbles after 13'				Collect SB165507-03 from 13-13.5' at 1320
14				10YR 5/6 yellowish brown med-coarse sand w/ pebbles, moderately sorted				
				7.5YR 5/6 strong brown fine-med sand				
15								

TAB

APPENDIX B

APPENDIX B

Well Completion Information

INTERNATIONAL TECHNOLOGY CORPORATION

Well Completion Information

prepared for:

NAS FT. Worth AFB TX (St)

Project# 768579 D.O.# 39

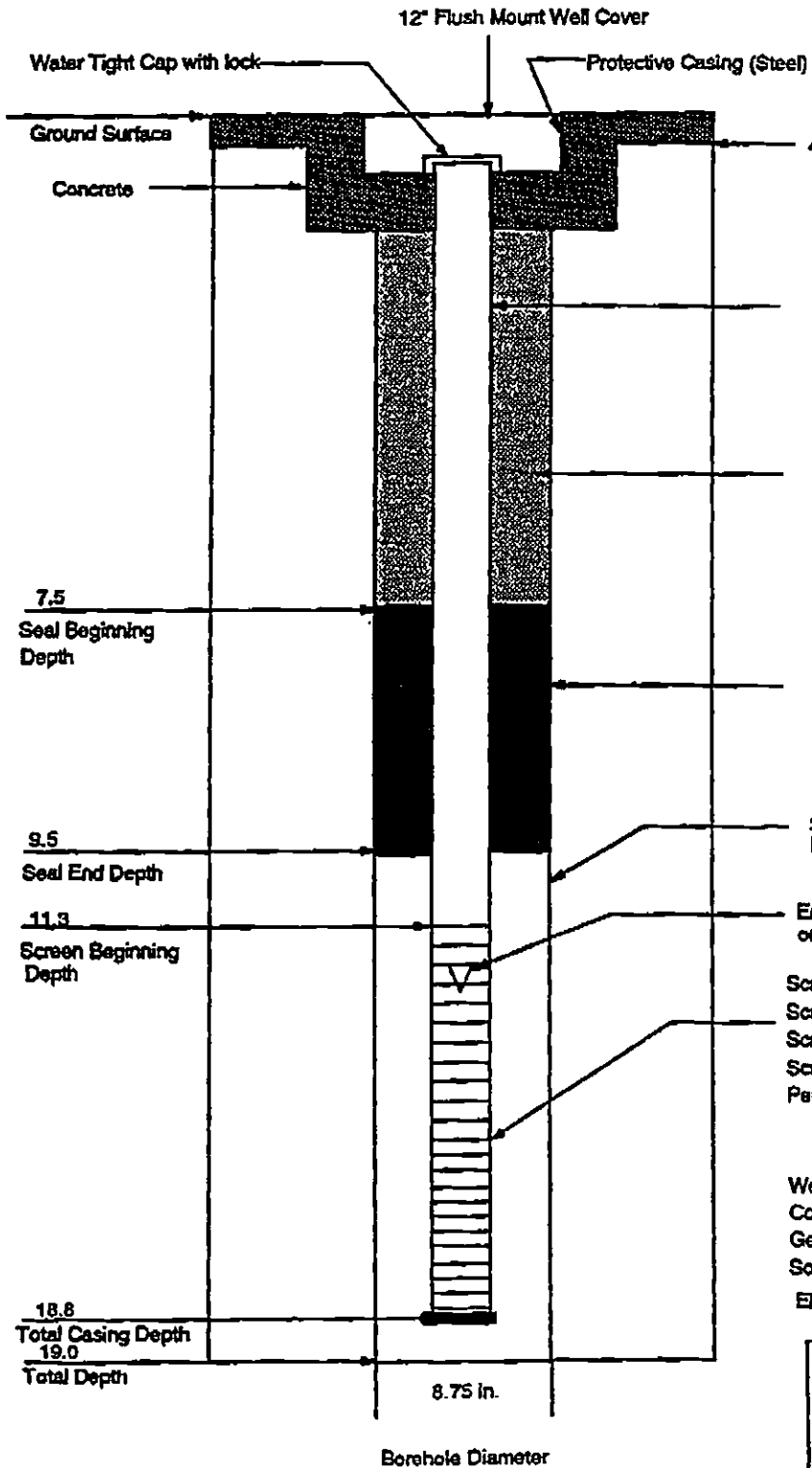
Well Owner: USAF

Location I.D.: WITCTA004

Installation Date: 4-15-97

N.T.S.

Depth (ft.): BGS



Well Type: (MNW) PZ _____ (other)

Completion Method: (SS) S P _____ (other)

Geologic Zone: A L C P S T U (W)

Sole Source Aquifer: UNK _____ (other)

Elevation Top of Casing: 606.62

SUPPLIES

20/40 Sand 280 lbs.

Grout 16.57 gal lbs.

Bentonite 52 lbs.

Other Flush Mount and Pad

A004.dwl\carswell\pc\6/23/97

TAB

APPENDIX C

APPENDIX C

Laboratory Data

STL
Committed To Your Success

Chicago Laboratory
2417 Bond Street
University Park, IL 60466
Phone. 708-534-5200
Fax 708-534-5211

Report To:
Contact: Rick Levin
Company: Ellis Environmental Group
Address: 414 SW 140th Terrace
Newberry, FL 32669-5400
Phone: (352) 333-2679
Fax: (352) 332-3222
E-Mail: rlevin@ellisenv.com

Bill To:
Contact: Rick Levin
Company: Ellis Environmental Group
Address: 414 SW 140th Terrace
Newberry, FL 32669-5400
Phone: (352) 333-2679
Fax: (352) 332-3222
PO#: ____ Quote: ____

Shaded Areas For Internal Use Only 1 of 1

Lab Lot # 205160

Package Sealed Yes No	Samples Sealed Yes No
Received on Ice Yes No	Samples Intact Yes No
Temperature °C of Cooler	
Within Hold Time Yes No	Preserv. Indicated Yes No NA
pH Check ok Yes No NA	Res. Cl_2 Check ok Yes No NA
Sample Labels and COC Agree Yes No COC not present	

Sampler Name: R Levin
Signature: [signature]
Project Name: Phase III Building 1655 OWS
Project Number: 7020.460
Project Location: NAS FW JRB
Date Required: Hard Copy: __/__/__ Fax: __/__/__
Lab PM: Donna Ingersoll

Laboratory ID	MS-MSD	Client Sample ID	Sampling Date	Sampling Time	Matrix	Comp/Grab	Sb6010B Manganese
1		SB165504-03	8-23-01	1355	S	C	X
2		SB165505-02		1155	S		X
3		SB165505-03		1230	S		X
4		SB165506-02		1425	S		X
5		SB165506-03		1445	S		X
6		SB165507-02		1300	S		X
7		SB165507-03		1320	S		X
8	✓	SB165506-02MS		1425	S		X
9	✓	SB165506-02MD		1425	S		X
8		DUP01		1200	S		X
9		EB082301		1600	W	G	X

Rating #
Cont.
Volume
Preserv

Additional Analyses / Remarks

RELINQUISHED BY	COMPANY	DATE	TIME	RECEIVED BY	COMPANY	DATE	TIME
[signature]	HydroGeologic	8-23-01	1645	Jeff Lunt	STL	8/24/01	1005
RELINQUISHED BY	COMPANY	DATE	TIME	RECEIVED BY	COMPANY	DATE	TIME

Matrix Key
WW = Wastewater
W = Water
S = Soil
SL = Sludge
MS = Miscellaneous
OL = Oil
A = Air
SE = Sediment
SO = Solid
DS = Drum Solid
DL = Drum Liquid
L = Leachate
WI = Wipe
O = ____

Container Key
1 Plastic
2 VOA Vial
3 Sterile Plastic
4 Amber Glass
5 Widemouth Glass
6 Other ____

Preservative Key
1 HCl, Cool to 4°
2 H_2SO_4 Cool to 4°
3 HNO_3, Cool to 4°
4 NaOH, Cool to 4°
5 NaOH/Zn Acetate, Cool to 4°
6 Cool to 4°
7 None

COMMENTS:

Date Received: 8, 24, 01
Courier: FX Hand Delivered ☐
Bill of Lading: See attach

STL Chicago Chain of Custody CHI-22-09-231/A 5/99

SENT BY:STL Chicago ; 8-29- 1 ; 7:47 ; 122 48

rpjsckl | Job Sample Receipt Checklist Report 08/29/2001 | V2

Job Number.....: 205160 Location.: 57222 Customer Job ID.....: Job Check List Date.: 08/24/2001
Project Number.: 20001239 Project Description.: NAS Ft. Worth Project Manager.....: dli
Customer.....: Ellis Environmental Group, LC Contact.: Rick Levin

Questions ?	(Y/N)	Comments
Chain-of-Custody Present?.....	Y	
...If "yes", completed properly?.....	Y	
Custody seal on shipping container?.....	Y	
...If "yes", custody seal intact?.....	Y	
Custody seals on sample containers?.....	N	
...If "yes", custody seal intact?.....		
Samples iced?.....	Y	
Temperature of cooler acceptable? (4 deg C +/- 2).	Y	3.0
Samples received intact (good condition)?.....	Y	
Volatile samples acceptable? (no headspace).....		
Correct containers used?.....	Y	
Adequate sample volume provided?.....	Y	
Samples preserved correctly?.....	Y	
Samples received within holding-time?.....	Y	
Agreement between COC and sample labels?.....	Y	
Radioactivity at or below background levels?.....	Y	
A Sample Discrepancy Report (SDR) was needed?.....	N	
Comments.....	N	
If samples were shipped was there an air bill #? .	Y	
Sample Custodian Signature/Date.....	Y	

SEVERN TRENT SERVICES

STL Chicago
2417 Bond Street
University Park, IL 60466
Phone 708-534-5200
Fax 708-534-5211

Report To:
Contact: Rick Levin
Company: Ellis Environmental Group
Address: 414 SW 140th Terrace
Newberry FL 32669
Phone: 352 333-2679
Fax: 352-332-3222
E-Mail: rlevin@ellisenv.com

Bill To:
Contact: Rick Levin
Company: Ellis Environmental Group
Address: 414 SW 140th Terrace
Newberry, FL 32669
Phone: 352 333-2679
Fax: 352-332-3222
PO#: Quote:

Shaded Areas For Internal Use Only 1 of 1

Lab Lot# 205184

Package Sealed (Yes) No	Sample Sealed Yes (No)
Received on Ice (Yes) No	Samples Intact (Yes) No
Temperature °C of Cooler: 3.7	
Within Hold Time (Yes) No	Preserv. Indicated (Yes) No NA
pH Check OK (Yes) No NA	Res Cl2 Check OK Yes No NA
Sample Labels and COC Agree (Yes) No	COC not present

Sampler Name: Rick Levin
Signature:
Project Name: Phase III Blk 165 OWS
Project Number: 7020.460
Project Location: NAS FW JRB
Date Required: Hard Copy: __/__/__ Fax: __/__/__
Lab PM: Donna Ingersoll

Laboratory ID	MS-MSD	Client Sample ID	Sampling Date	Sampling Time	Matrix	Comp/Grab	Sw6010B Manganese	Additional Analyses / Remarks
1		WITCTA004	8-24-01	1025	W	G	X	

RELINQUISHED BY	COMPANY CCG	DATE 8/29/01	TIME 1109
RELINQUISHED BY	COMPANY	DATE	TIME
RECEIVED BY	COMPANY SR	DATE 8/25/01	TIME 1120
RECEIVED BY	COMPANY	DATE	TIME

Matrix Key
WW = Wastewater, W = Water, S = Soil, SL = Sludge, MS = Miscellaneous, OL = Oil, A = Air, SE = Sediment, SO = Solid, DS = Drum Solid, DL = Drum Liquid, L = Leachate, Wi = Wipe, O = _____

Container Key
1. Plastic
2. VOA Vial
3. Sterile Plastic
4. Amber Glass
5. Widemouth Glass
6. Other _____

Preservative Key
1. HCl, Cool to 4°
2. H2SO4, Cool to 4
3. HNO3, Cool to 4°
4. NaOH, Cool to 4°
5. NaOH/Zn, Cool to 4°
6. Cool to 4°
7. None

COMMENTS

Date Received 8/25/01
Courier: FX Hand Delivered ___
Bill of Lading see attach

722 50

pjsckl

Job Sample Receipt Checklist Report
08/29/2001

V2

Job Number.....: 205184 Location.: 57222 Customer Job ID.....:
Project Number.: 20001239 Project Description.: NAS Ft. Worth
Customer.....: Ellis Environmental Group, LC Contact.: Rick Levin

Job Check List Date.: 08/26/2001
Project Manager.....: dli

Questions ?	(Y/N)	Comments
Chain-of-Custody Present?.....	Y	
...If "yes", completed properly?.....	Y	
Custody seal on shipping container?.....	Y	
...If "yes", custody seal intact?.....	Y	
Custody seals on sample containers?.....	N	
...If "yes", custody seal intact?.....		
Samples iced?.....	Y	
Temperature of cooler acceptable? (4 deg C +/- 2).	Y	3.7
Samples received intact (good condition)?.....	Y	
Volatile samples acceptable? (no headspace).....		
Correct containers used?.....	Y	
Adequate sample volume provided?.....	Y	
Samples preserved correctly?.....	Y	
Samples received within holding-time?.....	Y	
Agreement between COC and sample labels?.....	Y	
Radioactivity at or below background levels?.....	Y	
A Sample Discrepancy Report (SDR) was needed?.....	N	
Comments.....	N	
If samples were shipped was there an air bill #?..	Y	
Sample Custodian Signature/Date.....	Y	

SEVERN TRENT LABORATORIES
ANALYTICAL REPORT

JOB NUMBER: 206656

Prepared For:

Ellis Environmental Group, LC
414 SW 140th Terrace
Newberry, FL 32669-5400

Project: NAS Ft. Worth

Attention: Rick Levin

Date: 11/20/2001

Signature

Name: Donna L. Ingersoll

Title: Project Manager

E-Mail: dingersoll@stl-inc.com

Date

STL Chicago
2417 Bond Street
University Park, IL 60466

PHONE: (708) 534-5200
FAX..: (708) 534-5211

STL Chicago is part of Severn Trent Laboratories, Inc.

SAMPLE INFORMATION

Date: 11/20/2001

Job Number : 206656
Customer...: Ellis Environmental Group, LC
Attn.....: Rick Levin

Project Number.....: 20001239
Customer Project ID....: NAS FW 7020 460
Project Description....: NAS Ft. Worth

Laboratory Sample ID	Customer Sample ID	Sample Matrix	Date Sampled	Time Sampled	Date Received	Time Received
206656-1	SB165504-03	Soil	08/23/2001	13:55	11/14/2001	08 00

LABORATORY TEST RESULTS

Job Number: 206656

Date:11/20/2001

CUSTOMER: Ellis Environmental Group, LC

PROJECT: NAS FW 7020.460

ATTN: Rick Levin

Customer Sample ID. SB165504-03
Date Sampled... ..: 08/23/2001
Time Sampled.... . 13:55
Sample Matrix. . . Soil

Laboratory Sample ID: 206656-1
Date Received .....: 11/14/2001
Time Received.. ...: 08:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	RL	DILUTION	UNITS	BATCH	DT	DATE/TIME	TECH
6010B	Leachable, Metals Analysis (ICAP) Manganese, Leachate	3750			0.90	20.0	1	ug/L	38515		11/19/01 1250	tds

* In Description = Dry Wgt

722 54

QUALITY ASSURANCE METHODS

REFERENCES AND NOTES

Report Date: 11/20/2001

REPORT COMMENTS

1) All pages of this report are integral parts of the analytical data. Therefore, this report should be reproduced only in its entirety.
2) Soil, sediment and sludge sample results are reported on a "dry weight" basis except when analyzed for landfill disposal or incineration parameters All other solid matrix samples are reported on an "as received" basis unless noted differently.
3) Reporting limits are adjusted for sample size used, dilutions and moisture content if applicable
4) The test results for the noted analytical method(s) meet the requirements of NELAC. Lab Cert ID# 100201
5) Arizona Environmental Laboratory License number AZ0603
6) According to 40CFR Part 136.3, pH, Chloride Residual and Dissolved Oxygen analyses are to be performed immediately after aqueous sample collection. When these parameters are not indicated as field (e g. pH Field) they were not analyzed immediately, but as soon as possible on laboratory receipt

Glossary of flags, qualifiers and abbreviation

Inorganic Qualifiers (Q-Column)

U Analyte was not detected at or above the reporting limit.
< Not detected at or above the reporting limit.
J Result is less than the RL, but greater than or equal to the method detection limit
B Result is less than the CRDL/RL, but greater than or equal to the IDL/MDL
S Result was determined by the Method of Standard Additions
F AFCEE: Result is less than the RL, but greater than or equal to the method detection limit.

Inorganic Flags (Flag Column)

^ ICV,CCV,ICB,CCB,ISA,ISB,CRI,CRA,MRL· Instrument related QC exceed th upper or lower control limits
* LCS, LCD, MD: Batch QC exceeds the upper or lower control limits
+ MSA correlation coefficient is less than 0.995.
4 MS, MSD: The analyte present in the original sample is 4 times greater than the matrix spike concentration; therefore, control limits are not applicable.
E SD: Serial dilution exceeds the control limits
H MB, EB1, EB2, EB3· Batch QC is greater than reporting limit or had a negative instrument reading lower than the absolute value of the reporting limit.
N MS, MSD: Spike recovery exceeds the upper or lower control limits.
W AS(GFAA) Post-digestion spike was outside 85-115% control limits.

Organic Qualifiers (Q - Column)

U Analyte was not detected at or above the reporting limit.
ND Compound not detected.
J Result is an estimated value below the reporting limit or a tentatively identified compound (TIC).
Q Result was qualitatively confirmed, but not quantified
C Pesticide identification was confirmed by GC/MS
Y The chromatographic response resembles a typical fuel pattern.
Z The chromatographic response does not resemble a typical fuel pattern
E Result exceeded calibration range, secondary dilution required.
F AFCEE:Result is an estimated value below the reporting limit or a tentatively identified compound (TIC)

Organic Flags (Flags Column)

B MB· Batch QC is greater than reporting limit.
* LCS, LCD, ELC, ELD, CV, MS, MSD, Surrogate· Batch QC exceeds the upper or lower control limits
^ EB1, EB2, EB3, MLE· Batch QC is greater than reporting Limit
A Concentration exceeds the instrument calibration range or below the reporting limit.
B Compound was found in the blank and sample.
D Surrogate or matrix spike recoveries were not obtained because the extract was diluted for analysis; also compounds analyzed at a dilution will be flagged with a D
H Alternate peak selection upon analytical review
I Indicates the presence of an interfence, recovery is not calculated.
M Manually integrated compound
P The lower of the two values is reported when the % difference between the results of two GC columns is greater than 25%.

QUALITY ASSURANCE METHODS

REFERENCES AND NOTES

Report Date: 11/20/2001

Abbreviations

AS	Post Digestion Spike (GFAA)
Batch	Designation given to identify a specific extraction, digestion, preparation set, or analysis set
CAP	Capillary Column
CCB	Continuing Calibration Blank
CCV	Continuing Calibration Verification
CF	Confirmation Analysis (C2,C3)
CRA	Low Level Standard Check - GFAA, Mercury
CRI	Low Level Standard Check - ICP
CV	Calilbration Verification Standard
Dil Fac	Dilution Factor
DL	Secondary dilution and analysis (D2,D3)
DLFac	Detection Limit Factor
DSH	Distilled Standard - High Level
DSL	Distilled Standard - Low Level
DSM	Distilled Standard - Medium Level
EB1	Extraction Blank 1
EB2	Extraction Blank 2
EB3	DI Blank
ELC	Method Extracted LCS
ELD	Method Extracted LCD
ICAL	Initial calibration
ICB	Initial Calibration Blank
ICV	Initial Calibration Verification
IDL	Instrument Detection Limit
ISA	Interference Check Sample A
ISB	Interference Check Sample B
Job No.	The first six digits of the sample ID which refers to a specific client, project and sample group Lab ID An 8 number unique laboratory identification
LCD	Laboratory Control Standard Duplicate
LCS	Laboratory Control Standard with reagent grade water or a matrix free from the analyte of interest
MB	Method Blank or (PB) Preparation Blank
MD	Method Duplicate
MDL	Method Detection Limit
MLE	Medium Level Extraction Blank
MRL	Method Reporting Limit Standard
MSA	Method of Standard Additions
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ND	Not Detected
PACK	Packed Column
PREPF	Preparation factor used by the Laboratory's Information Management System (LIMS)
PDS	Post Digestion Spike (ICAP)
RA	Re-analysis
RE	Re-extraction and analysis
RC	Re-extraction Confirmation
RL	Reporting Limit
RPD	Relative Percent Difference of duplicate (unrounded) analyses
RRF	Relative Response Factor
RT	Retention Time
RTW	Retention Time Window SampleID A 9 digit number unique for each sample, the first six digits are referred as the job number
SCB	Seeded Control Blank
SD	Serial Dilution
UCB	Unseeded Control Blank
SSV	Second Source Verification Standard

One or a combination of these data qualifiers and abbreviations may appear in the analytical report

Bu: y 1655 ows

SEVER TRENT SERVICES

13

LABORATORY TEST RESULTS

Job Number: 205160

Date:09/25/2001

CUSTOMER: Ellis Environmental Group, LC

PROJECT: NAS FT. WORTH

ATTN: Rick Levin

Customer Sample ID: SB165504-03
Date Sampled.....: 08/23/2001
Time Sampled.....: 13:55
Sample Matrix.....: Soil

Laboratory Sample ID: 205160-1
Date Received.....: 08/24/2001
Time Received.....: 10:05

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	RL	DILUTION	UNITS	BATCH	DT	DATE/TIME	TECH
Method	% Solids Determination											
	% Solids, Solid	96.2			0.10	0.10	1	%	29722		08/25/01 1503	clb
	% Moisture, Solid	3.8			0.10	0.10	1	%	29722		08/25/01 1503	clb
6010B	Metals Analysis (ICAP Trace)											
	Manganese, Solid*	2660			0.30	7.9	5	mg/Kg	32439		09/20/01 1050	lmr

* In Description = Dry Wgt.

177 01

SEVERN TRENT SERVICES

LABORATORY TEST RESULTS

Job Number: 205160

Date:09/25/2001

CUSTOMER: Ellis Environmental Group, LC

PROJECT: NAS FT. WORTH

ATTN: Rick Levin

Customer Sample ID: SB165505-02
Date Sampled.....: 08/23/2001
Time Sampled.....: 11:55
Sample Matrix.....: Soil

Laboratory Sample ID: 205160-2
Date Received.....: 08/24/2001
Time Received.....: 10:05

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	RL	DILUTION	UNITS	BATCH	DT	DATE/TIME	TECH
Method	% Solids Determination											
	% Solids, Solid	88.1			0.10	0.10	1	%	29722		08/25/01 1503	clb
	% Moisture, Solid	11.9			0.10	0.10	1	%	29722		08/25/01 1503	clb
6010B	Metals Analysis (ICAP Trace)											
	Manganese, Solid*	115			0.069	1.9	1	mg/Kg	31785		09/13/01 2148	tds

* In Description = Dry Wgt.

TRENT SERVICES

LABORATORY TEST RESULTS

Job Number: 205160

Date:09/25/2001

CUSTOMER: Ellis Environmental Group, LC

PROJECT: NAS FT. WORTH

ATTN: Rick Levin

Customer Sample ID: SB165505-03
Date Sampled.....: 08/23/2001
Time Sampled.....: 12:30
Sample Matrix.....: Soil

Laboratory Sample ID: 205160-3
Date Received.....: 08/24/2001
Time Received.....: 10:05

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	RL	DILUTION	UNITS	BATCH	DT	DATE/TIME	TECH
Method	% Solids Determination											
	% Solids, Solid	91.0			0.10	0.10	1	%	29722		08/25/01 1503	clb
	% Moisture, Solid	9.0			0.10	0.10	1	%	29722		08/25/01 1503	clb
6010B	Metals Analysis (ICAP Trace)											
	Manganese, Solid*	90.5			0.061	1.6	1	mg/Kg	31785		09/13/01 2154	tds

* In Description = Dry Wgt.

722 59

SEVERN TRENT SERVICES

LABORATORY TEST RESULTS

Job Number: 205160

Date:09/25/2001

CUSTOMER: Ellis Environmental Group, LC

PROJECT: NAS FT. WORTH

ATTN: Rick Levin

Customer Sample ID: SB165506-02
Date Sampled.....: 08/23/2001
Time Sampled.....: 14:25
Sample Matrix.....: Soil

Laboratory Sample ID: 205160-4
Date Received.....: 08/24/2001
Time Received.....: 10:05

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	RL	DILUTION	UNITS	BATCH	DT	DATE/TIME	TECH
Method	% Solids Determination											
	% Solids, Solid	89.7			0.10	0.10	1	%	29722		08/25/01 1503	clb
	% Moisture, Solid	10.3			0.10	0.10	1	%	29722		08/25/01 1503	clb
6010B	Metals Analysis (ICAP Trace)											
	Manganese, Solid*	84.4			0.070	1.9	1	mg/Kg	31785		09/13/01 2200	tds

* In Description = Dry Wgt.

722 60

SEVERN TRENT SERVICES

17

LABORATORY TEST RESULTS

Job Number: 205160

Date:09/25/2001

CUSTOMER: Ellis Environmental Group, LC

PROJECT: NAS FT. WORTH

ATTN: Rick Levin

Customer Sample ID: SB165506-03
Date Sampled.....: 08/23/2001
Time Sampled.....: 14:45
Sample Matrix.....: Soil

Laboratory Sample ID: 205160-5
Date Received.....: 08/24/2001
Time Received.....: 10:05

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	RL	DILUTION	UNITS	BATCH	DT	DATE/TIME	TECH
Method	% Solids Determination											
	% Solids, Solid	89.9			0.10	0.10	1	%	29722		08/25/01 1503	clb
	% Moisture, Solid	10.1			0.10	0.10	1	%	29722		08/25/01 1503	clb
6010B	Metals Analysis (ICAP Trace)											
	Manganese, Solid*	516			0.067	1.8	1	mg/Kg	31785		09/13/01 2223	tds

* In Description = Dry Wgt.

722 61

SEVER TRENT SERVICES

19

LABORATORY TEST RESULTS

Job Number: 205160

Date:09/25/2001

CUSTOMER: Ellis Environmental Group, LC

PROJECT: NAS FT. WORTH

ATTN: Rick Levin

Customer Sample ID: SB165507-02
Date Sampled.....: 08/23/2001
Time Sampled.....: 13:00
Sample Matrix.....: Soil

Laboratory Sample ID: 205160-6
Date Received.....: 08/24/2001
Time Received.....: 10:05

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	RL	DILUTION	UNITS	BATCH	DT	DATE/TIME	TECH
Method	% Solids Determination											
	% Solids, Solid	89.5			0.10	0.10	1	%	29722		08/25/01 1503	clb
	% Moisture, Solid	10.5			0.10	0.10	1	%	29722		08/25/01 1503	clb
6010B	Metals Analysis (ICAP Trace)											
	Manganese, Solid*	72.6			0.079	2.1	1	mg/Kg	31785		09/13/01 2229	tds

* In Description = Dry Wgt.

722 62

SEVERN TRENT SERVICES

LABORATORY TEST RESULTS

Job Number: 205160

Date:09/25/2001

CUSTOMER: Ellis Environmental Group, LC

PROJECT: NAS FT. WORTH

ATTN: Rick Levin

Customer Sample ID: SB165507-03
Date Sampled.....: 08/23/2001
Time Sampled.....: 13:20
Sample Matrix.....: Soil

Laboratory Sample ID: 205160-7
Date Received.....: 08/24/2001
Time Received.....: 10:05

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	RL	DILUTION	UNITS	BATCH	DT	DATE/TIME	TECH
Method	% Solids Determination											
	% Solids, Solid	90.1			0.10	0.10	1	%	29722		08/25/01 1503	clb
	% Moisture, Solid	9.9			0.10	0.10	1	%	29722		08/25/01 1503	clb
6010B	Metals Analysis (ICAP Trace)											
	Manganese, Solid*	195			0.073	1.9	1	mg/Kg	31785		09/13/01 2235	tds

* In Description = Dry Wgt.

SEVERN TRENT SERVICES

LABORATORY TEST RESULTS

Job Number: 205160

Date:09/25/2001

CUSTOMER: Ellis Environmental Group, LC

PROJECT: NAS FT. WORTH

ATTN: Rick Levin

Customer Sample ID: DUP01
Date Sampled.....: 08/23/2001
Time Sampled.....: 12:00
Sample Matrix.....: Soil

Laboratory Sample ID: 205160-8
Date Received.....: 08/24/2001
Time Received.....: 10:05

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	RL	DILUTION	UNITS	BATCH	DT	DATE/TIME	TECH
Method	% Solids Determination											
	% Solids, Solid	78.0			0.10	0.10	1	%	29722		08/25/01 1503	clb
	% Moisture, Solid	22.0			0.10	0.10	1	%	29722		08/25/01 1503	clb
6010B	Metals Analysis (ICAP Trace)											
	Manganese, Solid*	98.4			0.083	2.2	1	mg/Kg	31785		09/13/01 2322	tds

* In Description = Dry Wgt.

SEVERN TRENT SERVICES

LABORATORY TEST RESULTS

Job Number: 205160

Date:09/25/2001

CUSTOMER: Ellis Environmental Group, LC

PROJECT: NAS FT. WORTH

ATTN: Rick Levin

Customer Sample ID: EB082301
Date Sampled.....: 08/23/2001
Time Sampled.....: 16:00
Sample Matrix.....: Water

Laboratory Sample ID: 205160-9
Date Received.....: 08/24/2001
Time Received.....: 10:05

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	RL	DILUTION	UNITS	BATCH	DT	DATE/TIME	TECH
6010B	Metals Analysis (ICAP Trace) Manganese	1.6	U		1.6	20.0	1	ug/L	31965		09/15/01 1816	lmr

* In Description = Dry Wgt.

722 65

SEVER TRENT SERVICES

13

LABORATORY TEST RESULTS

Job Number: 205184

Date:09/24/2001

CUSTOMER: Ellis Environmental Group, LC

PROJECT: NAS FT. WORTH

ATTN: Rick Levin

Customer Sample ID: WITCTA004
Date Sampled.....: 08/24/2001
Time Sampled.....: 10:25
Sample Matrix.....: Water

Laboratory Sample ID: 205184-1
Date Received.....: 08/25/2001
Time Received.....: 11:20

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	RL	DILUTION	UNITS	BATCH	DT	DATE/TIME	TECH
6010B	Metals Analysis (ICAP Trace) Manganese	253			1.6	20.0	1	ug/L	31965		09/15/01 1822	lmr

* In Description = Dry Wgt.

722 66

TAB

APPENDIX D

APPENDIX D

Data Validation

Data Validation for NAS Ft. Worth

The data lots listed below were 100% validated by Ellis Environmental Group:

Lot #	Analysis
205184	METALS
205160	METALS

These samples were collected from the NAS-Ft. Worth waste accumulation area during Sept. 24 and 25, 2001.

Samples were validated using the criteria given in sections 7.0 and 8.0 of the Final 2000 Basewide Quality Assurance Plan, NAS Fort Worth JRB, Texas, written by HydroLogic, Inc. A unique QC checklist was developed for each analytical method of interest. These checklists along with the sample data are included.

Findings of this validation are summarized below.

Lot 205184 was analyzed for metals in water. No MS/MSD were analyzed with this batch. There was only one water sample in this lot. The MS/MSD was done on the soil lot collected during the same sample effort. All other QC criteria are within the limits and these data are considered acceptable.

Lot 205160 was also analyzed for metals in soil. The MS/MSD were not within control limits, indicating possible matrix interference. This should be considered when evaluating the data. All other QC criteria are within the limits and these data are considered acceptable.

Karen Hatfield

Karen Hatfield
Project Chemist

METHOD 6010 B/ ICAP METALS

NAS Ft. Worth LAB LOT #205184
STL-CHICAGO

	QC PROCEDURES	ACCEPTABLE	
COC	Y	Y	
HT	Y	Y	
INT CAL	Y	Y	
CCB	<1.6, 1.8 B, 2.2 B ug/L	Y	
ICB	2.4 ug/L B	Y	
ICS	100, 100%	Y	
LCS	99%	Y	
DIL	N	x1	
PDS	N	NA	
MS/MSD	N	Y	ONLY ONE SAMPLE IN BATCH- MS/MSD DONE ON SOIL COLLECTED DURING THE SAME SAMPLE EFFORT
MDL	Y	Y	
MB	<1.6ug/L	Y	
CCV	100, 100, 101%	Y	
ICV	100%	Y	
SERIAL DIL	N	Y	DONE ON SOIL COLLECTED DURING THE SAME SAMPLE EFFORT

METHOD 6010 B/ ICAP METALS

NAS Ft Worth LAB LOT #205160
STL-CHICAGO

	QC PROCEDURES	ACCEPTABLE	
COC	Y	Y	
HT	Y	Y	
INT CAL	Y	Y	
CCB	<1.6, 1.6 B, 1.8 B ug/L	Y	
ICB	2.2 B, 2 4 B ug/L, 3.7 B ug/L	Y	
ICS	93-100%	Y	
LCS	95-99%	Y	
DIL	Y	Y 1@ 5x	
PDS	N	NA	
MS/MSD	178%, 306%, RPD=52.9	Y	THE RESULTS OF THE MS/MSD WERE NOT WITHIN CONTROL LIMITS, INDICATING POSSIBLE MATRIX INTERFERENCES
MDL	Y	Y	
MB	<0 1,<1.6 ug/L	Y	
CCV	96-101%	Y	
ICV	99-102%	Y	
SERIAL DIL	Y	Y	
FIELD DUPE	90.6, 89.7 ug/L	Y	
EQUIP BLK	<1.6 ug/L	Y	

TAB

APPENDIX E

APPENDIX E

Groundwater Sampling Data

GROUNDWATER FIELD SAMPLING DATA SHEET

Well No: WITCTA004	Location: Building 1655 OWS
Sampler(s): Johnston Levin	Project Name: Phase 3 Building 1655 OWS
Well Depth: 19'	Project #: 7020.460 Date: 8/24/01 Time: 0830
DTW (ft): 13.55 DTP (ft): N/A	Courier: X FedEx ___ UPS ___ Hand ___ Other
MP Ht. Above/Below Ground Surface:	Sampling Method: Low flow purge
Condition of Bottom of Well: good	Type of Pump: bladder
Screen Interval (ft): 11.3 - 18.3'	Weather (sun/clear, overcast/rain, wind direction, ambient temperature)
Well Diameter (in): 2"	Sunny, windy, highs in upper 90s
Placement of Pump (ft): dedicated	

Field Parameters

Time	Depth to Water (ft)	Flow Rate (L/m)	Total Volume (L)	pH	Temp. (C)	Cond. (umhos/cm)	ORP (mv)	DO (mg/L)	Turb. (NTU)	Type, Size, and Amount of Sediment Discharged
0830	13.55*	Start pump								0.0 ppm
940	*	0.2	1L	6.43	26.76	1497	355.6	5.68	7.6	
945		0.2	2	6.53	26.78	1509	222.3	5.93	3.0	
950		0.2	3	6.56	26.95	1515	173.7	5.84	5.9	
955		0.2	4	6.60	26.79	1511	131.2	7.25	4.8	
1000		0.2	5	6.64	26.59	1508	80.4	8.94	5.2	
1005		0.2	6	6.66	26.49	1508	~~16.6~~ 6.7	8.70	5.5	
1010		0.2	7	6.67	26.48	1508	~~-15.0~~ -2.8	8.01	2.0	
1015		0.2	8	6.68	26.53	1509	-4.9	7.36	7.9	
1020		0.2	9	6.70	26.63	1512	-5.3	6.81	4.0	
1025	Collect sample									

Observations

Color: (Clear) Other (describe)

Odor: None (Low) Medium High Very Strong H2S Fuel-like

Notes * pump above water so can not measure while pumping and sampling.

Signed/Sampler(s).

TAB

APPENDIX F

APPENDIX F

Photographs

Photo 1. Concrete Coring at Building 1655 OWS

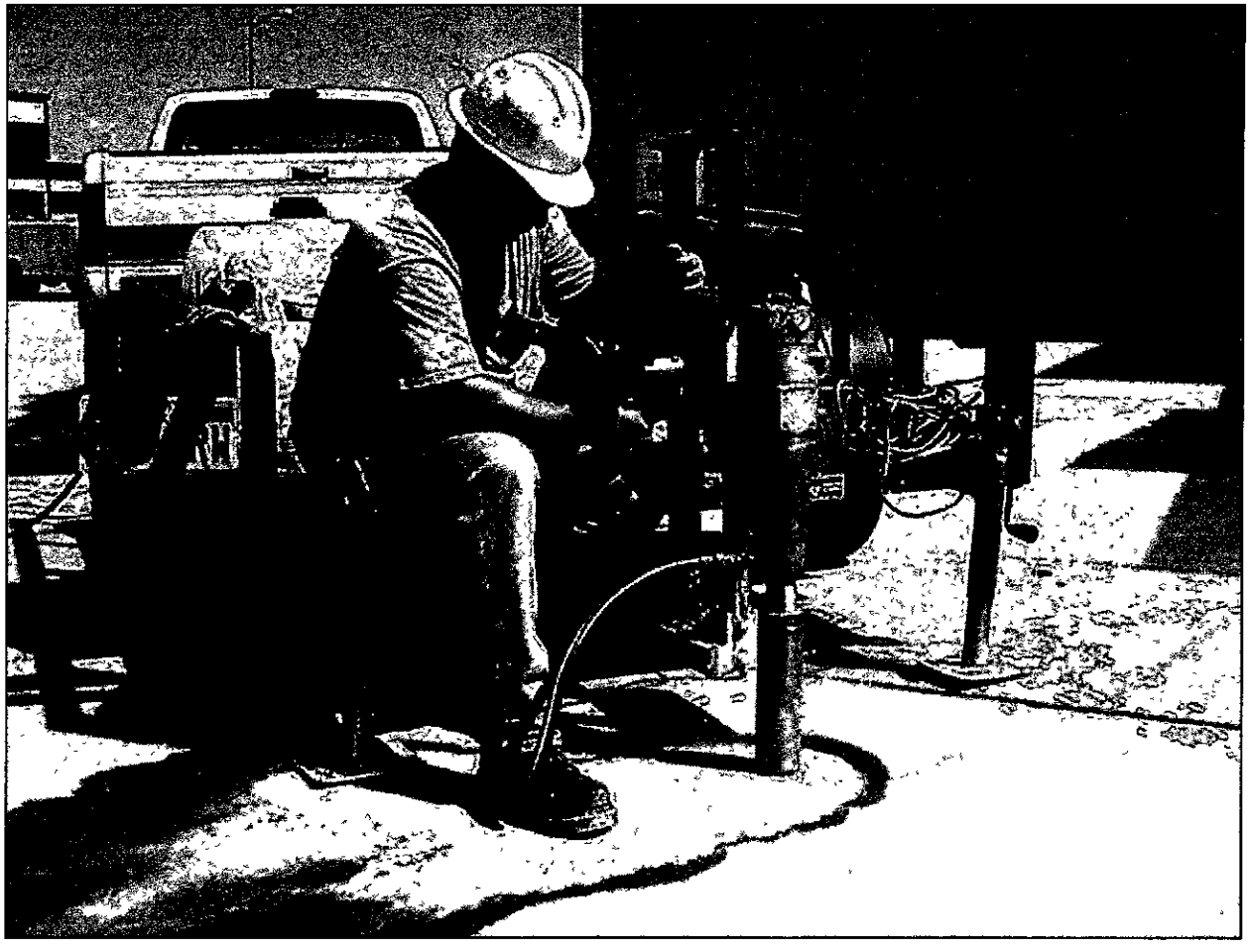


Photo 2. Direct-Push Technology, Soil Boring at Building 1655 OWS

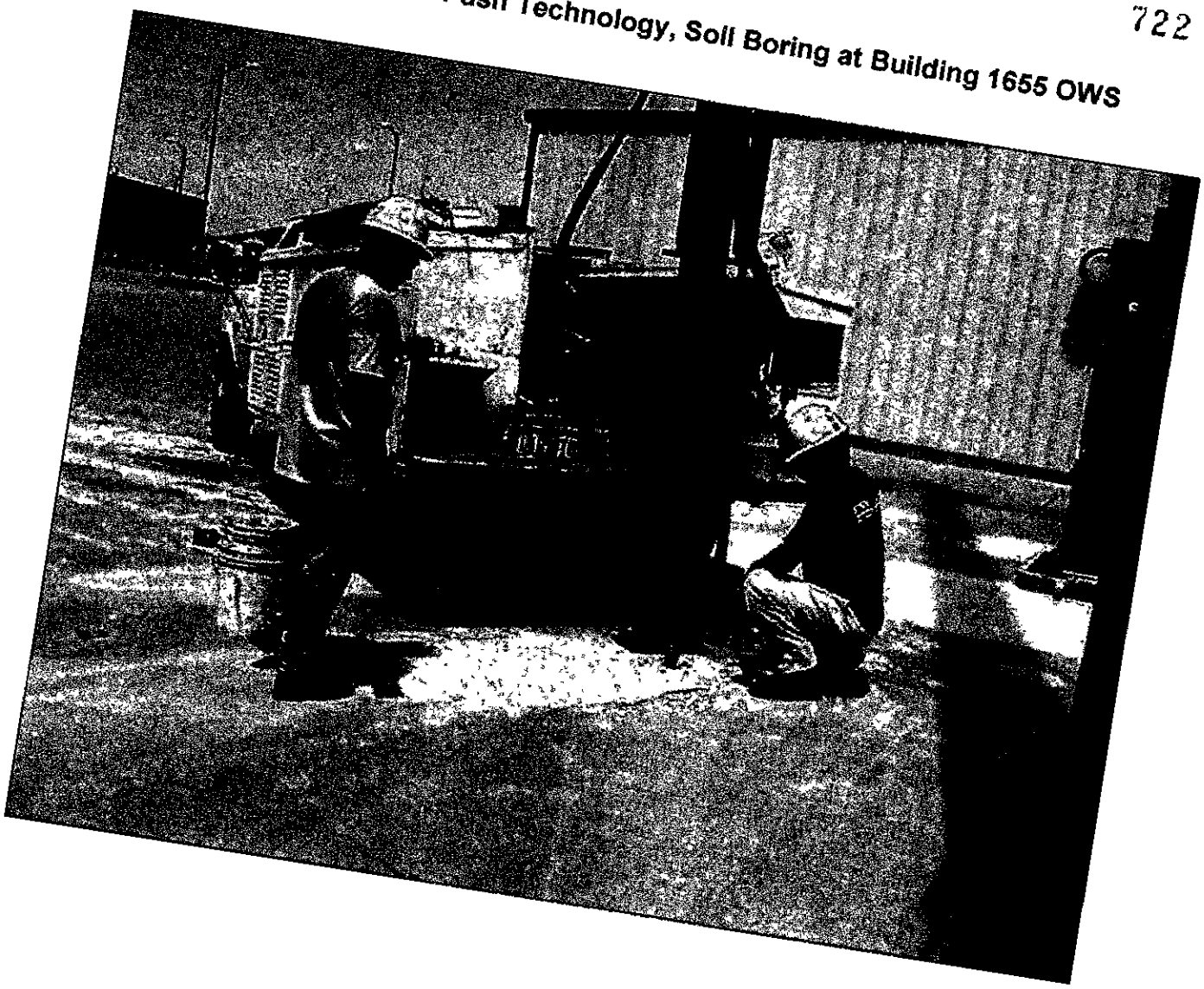
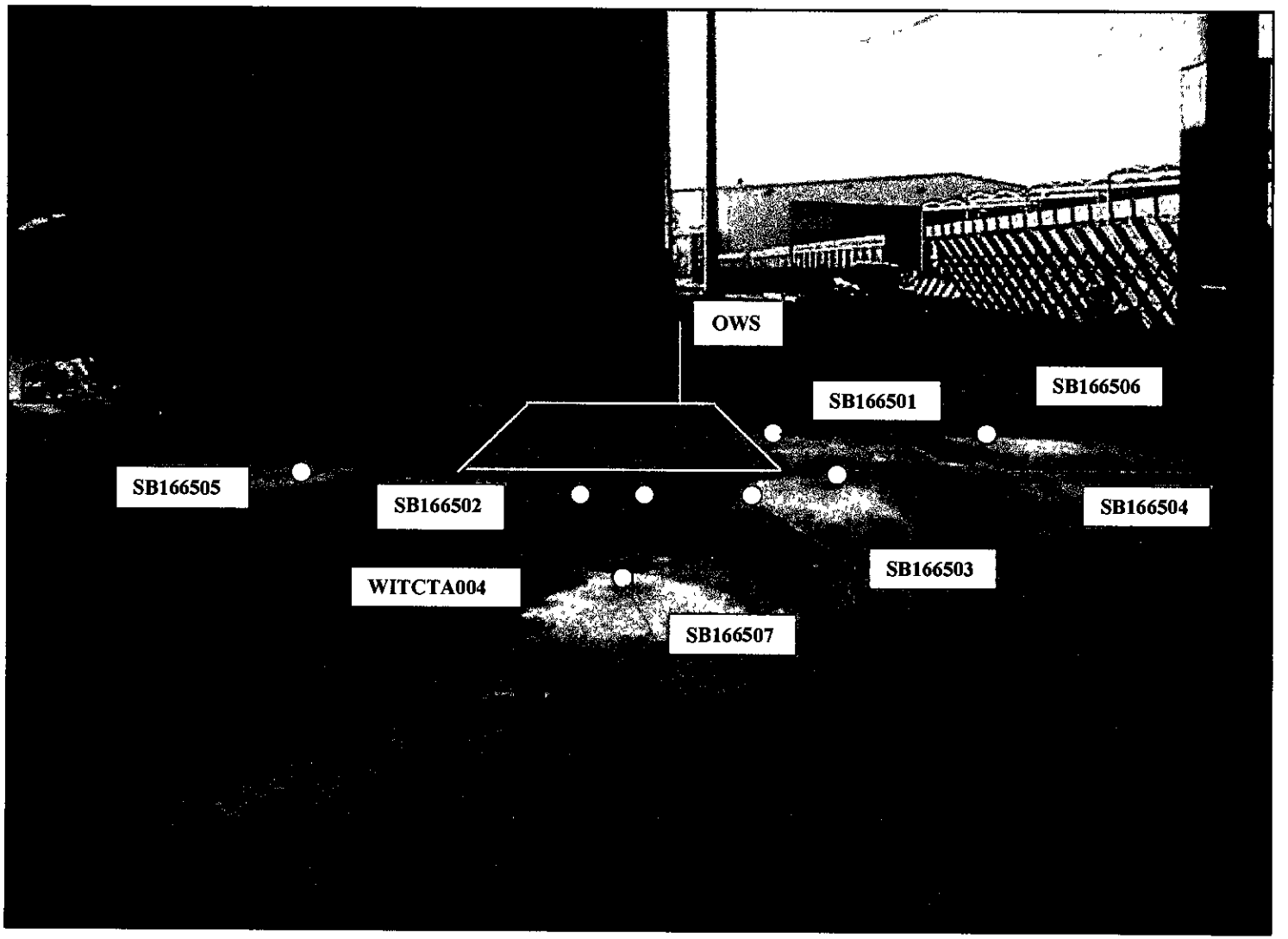


Photo 3. Groundwater Sampling

Photo 4. Site Location, Soil Borings



FINAL PAGE

ADMINISTRATIVE RECORD

FINAL PAGE