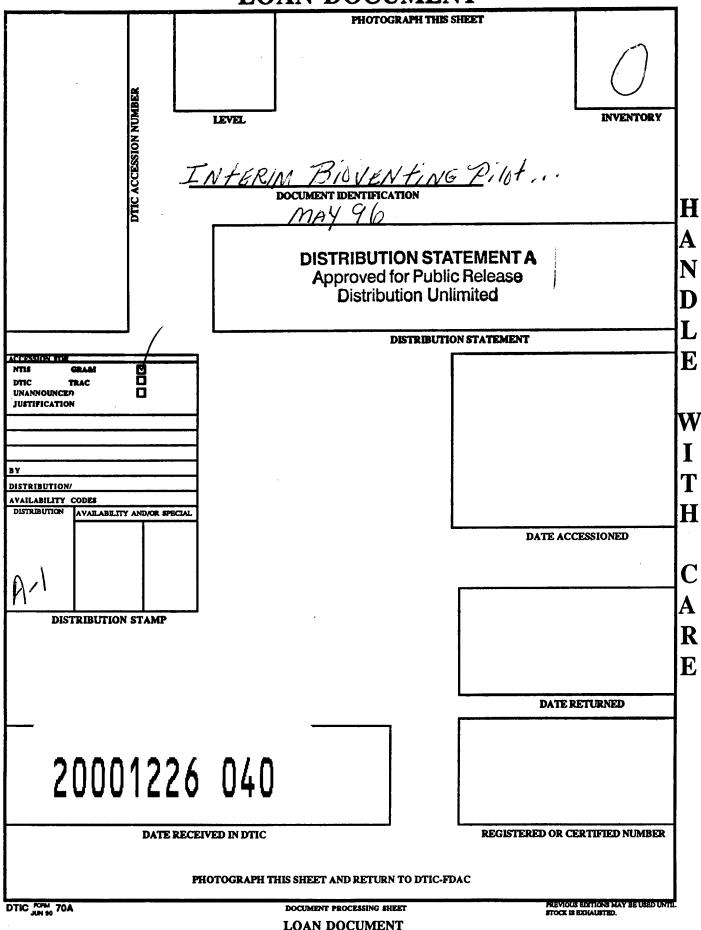
# LOAN DOCUMENT



Interim Bioventing Pilot Results Report for LPST No. 98508, Building 675 Fort Bliss, Texas

**Prepared For** 



# The US Army Environmental Center Aberdeen Proving Ground, Maryland

Fort Bliss El Paso, Texas

and



Air Force Center for Environmental Excellence Brooks Air Force Base San Antonio, Texas

May 1996



8000 Centre Park Drive, Suite 200 • Austin, Texas 78754

AQM01-03-0563

11/15/00 09:26 FAX

1

DTIC-DC AFCEE

121003 703 767 9244 P.02/02

.•

DEFENSE TECHNICAL INFORMATION CENTER REQUEST FOR SCIENTIFIC AND TECHNICAL REPORTS						
Title AFCEE Collection						
1. Report Availability (Please check ane bax) 29. Number of 2b. Forwarding Date						
<ol> <li>Keport Availability (Please check one box)</li> <li>This report is available. Complete sections 2a - 2f.</li> </ol>	2a. Number of Copies Forwarded	20. Forwarding Date				
This report is not available. Complete sections 2a - 27.		0.17-				
2c. Distribution Statement (Please check ONE Dox)						
DaD Directive 5230.24, "Distribution Statements on Technical Documents," 18 Mar 87, contains seven distribution statements, as described briefly below. Technical documents MUST be assigned a distribution statement.						
DISTRIBUTION STATEMENT A: Approved for public release. Distribution is unlimited.						
DISTRIBUTION STATEMENT B: Distribution authorized to U.S. Government Agencies only.						
DISTRIBUTION STATEMENT C: Distribution authorized to U.S. Government Agencies and their contractors.						
DISTRIBUTION STATEMENT D: Distribution authorized to U.S. Department of Defense (DoD) and U.S DoD contractors only.						
DISTRIBUTION STATEMENT E: Distribution authorized to U.S. Department of Defense (DoD) components only.						
DISTRIBUTION STATEMENT F: Further dissemination only as directed by the controlling DoD office indicated below or by higher authority.						
DISTRIBUTION STATEMENT X: Distribution authorized to U.S. Government agencies and private individuals or enterprises eligible to obtain export-controlled technical data in accordance with DoD Directive 5230.25, Withholding of Unclassified Technical Data from Public Disclosure, 6 Nov 84.						
2d. Reason For the Above Distribution Statement (in	accordance with BoD Directive 5	5230.24)				
2e. Controlling Office	2f. Date of Distr	ibution Statement				
HQAFLEE	Determination					
	15 Nov	<u>2000</u>				
<ul> <li>3. This report is NOT forwarded for the following reasons. (Plaese check appropriate box)</li> <li>It was previously forwarded to DTIC on (date) and the AD number is</li> </ul>						
	1	1 IS				
<ul> <li>It will be published at a later date. Enter approximate date if known.</li> <li>In accordance with the provisions of DoD Directive 3200.12, the requested document is not supplied because:</li> </ul>						
becausé:						
		······································				
Print or Type Name						
LAUVA Pena Saura (For DTIC Use Only a						
210-536-1431	AQ Number	1-03-0563				

# INTERIM BIOVENTING PILOT TEST RESULTS REPORT FOR LPST NO. 98508, BUILDING 675 FORT BLISS, TEXAS

**Prepared for:** 

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

> Fort Bliss El Paso, Texas

> > and

Air Force Center for Environmental Excellence Brooks Air Force Base San Antonio, Texas

May 1996

# CONTENTS

EXECUTIVE SU	MMARY	iv
SECTION 1.0 IN	TRODUCTION	1-1
	.1 SOIL GAS SURVEY	
1	.2 AIR INJECTION VENT WELL	1-1
1	.3 MONITORING POINTS	1-7
]	.4 BLOWER UNIT	1-7
SECTION 2.0 PII	LOT TEST SOIL AND SOIL GAS SAMPLING RESULTS	2-1
	2.1 SAMPLING RESULTS	
2	2.2 EXCEPTIONS TO TEST PROTOCOL PROCEDURES	2-2
SECTION 3.0 PII	LOT TEST RESULTS	3-1
3	3.1 INITIAL SOIL GAS CHEMISTRY	3-1
3	3.2 AIR PERMEABILITY	3-1
	3.3 OXYGEN INFLUENCE	
	3.4 IN SITU RESPIRATION RATES	
2	3.5 POTENTIAL AIR EMISSIONS	3-9
SECTION 4.0 RE	COMMENDATIONS	4-1
SECTION 5.0 RE	FERENCES	5-1
APPENDIX A	BORING AND DRILLING LOGS	
APPENDIX B	CHAIN-OF-CUSTODY FORMS AND ANALYTICAL DATA REPORTING SHEETS	
APPENDIX C	HYPERVENTILATE® AIR PERMEABILITY CALCULATIO CARDS	N
APPENDIX D	RESPIRATION TEST DATA AND CALCULATION SHEETS	i 1
APPENDIX E	FIELD ACTIVITY REPORT (FORM TWC-0017)	

## Page

-

- . -

# **FIGURES**

1.1 Locations of Vent Wells, Monitoring Points, and Blower System Components1-2
1.2 Hydrogeologic Cross-Section1-3
1.3 Geoprobe Soil Gas Sampling Locations1-4
1.4 As Built Vent Well Construction Details1-6
1.5 As Built MPA Monitoring Point Construction Detail1-8
1.6 As Built MPB Monitoring Point Construction Detail1-9
1.7 As Built MPC Monitoring Point Construction Detail1-10
1.8 As Built MPBG Monitoring Point Construction Detail1-11
1.9 As Built Blower System Instrumentation Diagram for Air Injection1-12
3.1 Results of In Situ Respiration Test MPA-45 and MPB-32
3.2 Results of In Situ Respiration Test MPB-45 and MPC-32

### **TABLES**

### <u>Page</u>

1.1 Geoprobe Soil Gas Survey Results	1-5
2.1 Soil Sample Chemistry Data	2-3
2.2 Soil Gas Analytical Results	2-4
3.1 Initial Soil Gas Chemistry	3-2
3.2 Building 675, Pressure Response During the Air Permeability Test	3-3
3.3 Influence of Air Injection at Vent Well on Monitoring Point Oxygen Levels, Building 675	3-5
3.4 Oxygen Utilization Rates	3-8

.

• . •

### **EXECUTIVE SUMMARY**

The purpose of this project was to assess the extent of petroleum hydrocarbon contamination, if any, present beneath LPST No. 98508, and to perform a bioventing pilot test to determine if air injection bioventing would be a feasible remedial alternative for any contamination encountered. The installed pilot test system is capable of supplying air (oxygen) to all contaminated subsurface soils located below the former tank excavation site. Biodegradation rates observed during the pilot test indicate that bioventing is a technically feasible alternative for remediation of contaminants at the site to below risk-based criteria. A Field Activity Report (FAR) has been prepared in accordance with TNRCC's Reporting Guidelines for LPST Cleanups in Texas (PST 93-01) to summarize the assessment activities and the implementation of remedial actions on standardized report forms. This FAR is included as appendix E of this report for reference.

The site assessment and bioventing pilot test were completed at Building 675 (LPST No. 98508) at Fort Bliss, Texas, during the period of April 9 through 19, 1996. The purpose of this report is to describe the results of sampling activities and the pilot test at this site and to make specific recommendations for extended testing to determine the long-term impact of bioventing on site contaminant concentrations. Descriptions of the site history, including excavation of the tanks, are contained in the Bioventing Pilot Test Work Plan for Building 675 LPST Site, Fort Bliss, Texas (Parsons ES, 1996).

An initial soil gas survey was performed at the site on April 11, 1996 to determine the probable locations containing greatest contaminant levels. Installation of an air injection vent well (VW), three vapor monitoring points (MPs), and a background monitoring point (MPBG) was completed on April 13, 1996. Drilling services were provided by Tierra Drilling and Environmental Services, Inc., of El Paso, Texas. Well installation and soil sampling were directed by Brian Vanderglas (CAPM 00758), the Parsons Engineering Science, Inc. (Parsons ES) site manager, and Dan Switek. The following sections describe the final design and installation of the bioventing pilot test system at this site.

. . .

## SECTION 1.0 INTRODUCTION

One VW, three MPs (MPA, MPB, and MPC), a background monitoring point (MPBG), and a blower unit were installed at Fort Bliss near Building 675 (LPST No. 98508). Figures 1.1 and 1.2, respectively, depict the locations of and hydrogeologic cross sections for the VW and MPs completed at Building 675. The locations of the VW and MPs were changed from those proposed in the work plan after results from the initial soil gas survey identified a north-south trend of contamination rather than the east-west orientation anticipated. Boring logs for the MPs and VW are included in appendix A. An MPBG MP was installed in clean soils, approximately 200 feet north of the VW:

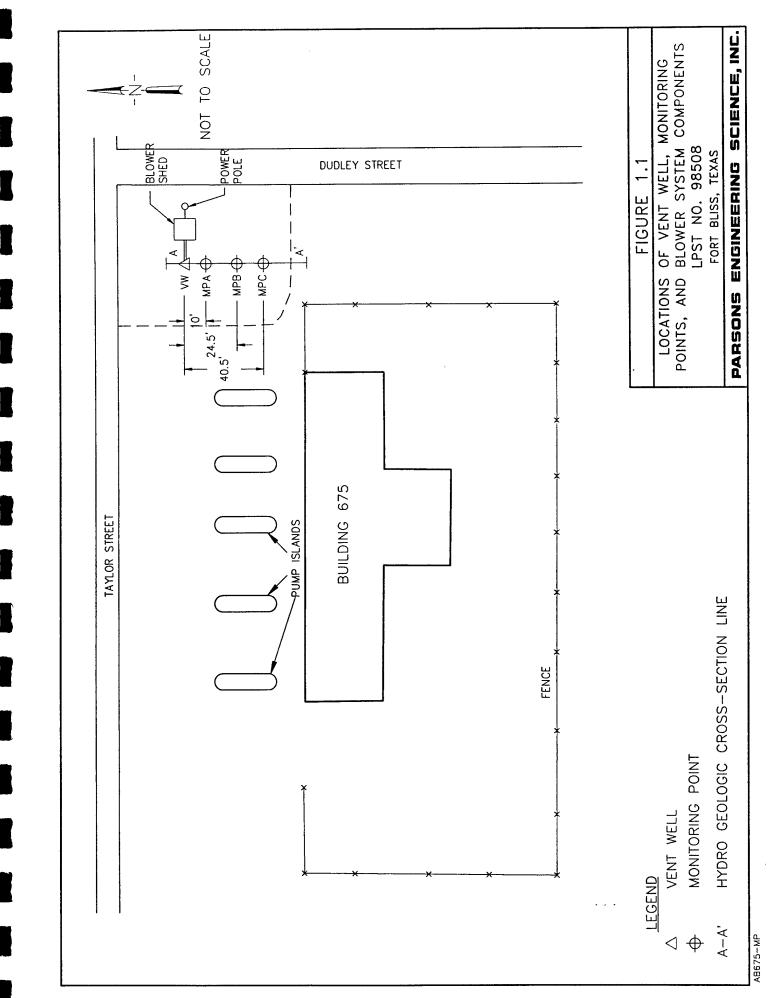
### 1.1 SOIL GAS SURVEY

An initial soil gas survey was accomplished to aid in locating the VW and MPs. A 25-foot grid was set up around the excavation site. Sampling began in the center of the grid and extended outward until the extent of contamination was reached. Sample depths ranged from 6 to 15 feet bgs, the maximum depth of the sampler. Soil gas samples were analyzed using field instruments to measure oxygen, carbon dioxide, and TVH. Sampling locations and oxygen results are illustrated in Figure 1.3. Soil gas samples were collected using a Geoprobe® hydraulic sampler. The results of the soil gas survey are provided in Table 1.1.

The VW and MPs were located based on the results of the soil gas survey. Areas with depleted levels of oxygen were confined to the excavated site. The VW was placed in the center of the excavated area, with the monitoring points placed to the south, where oxygen levels were lowest. The central placement of the VW, combined with the highly permeable sandy soils, should allow for oxygen transport throughout the entire zone of vadose soils contaminated by releases from the excavated tanks.

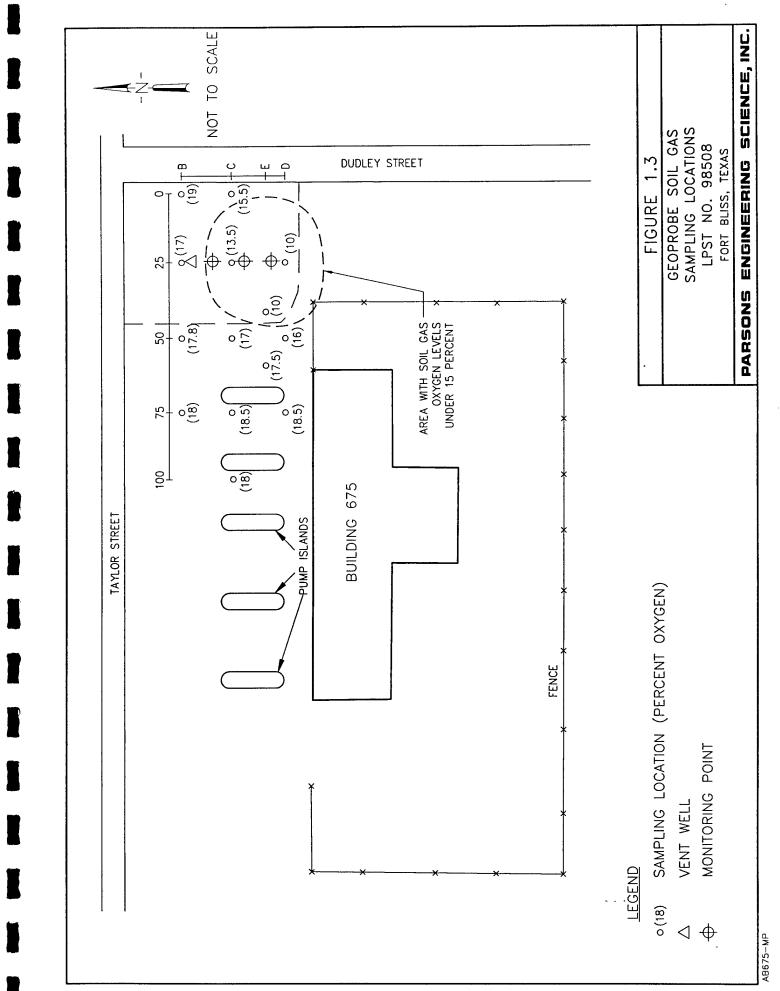
### **1.2 AIR INJECTION VENT WELL**

The air injection VW was installed following procedures described in the Air Force Center for Environmental Excellence (AFCEE) bioventing protocol document (Hinchee, et al., 1992). Figure 1.4 shows construction details for the VW. The VW was installed in dry to damp sands that contained hydrocarbon contamination at all sampling locations below the backfill material which extends to 12 feet below ground surface (bgs). Perched groundwater was encountered at approximately 48 feet bgs. The total depth drilled in the VW was 55 feet bgs. The VW was constructed using 2-inch diameter, schedule 40 polyvinyl chloride (PVC) casing, with approximately 30 feet of 0.04-inch slotted PVC screen installed from 15 to 45 feet bgs (for soil gas sampling). To accommodate future



SCIENCE, INC. . ۲۰ 30 40 50 20 9 SOUTH LPST NO. 98508 CROSS-SECTION HYDROGEOLOGIC FORT BLISS, TEXAS PARSONS ENGINEERING Approximate Horizontal Scale in Feet FIGURE 1.2 **0** 0 'n 51400 <u>=</u> = 570 ₩<sup>MPC</sup> ò FIELD SCREENING RESULTS FOR TUH IN SOIL GAS (ppmv) LAB RESULTS FOR TPRH IN SOIL GAS(mg/kg) <u>1600</u> 9900 <u>[=</u>] ⊲ 2200 -15000 - → PERCHED WATER TABLE CLAY LENSE ₩<sup>MPB</sup> FILL MATERIAL <u>E</u> ⊒ ⊿ 2000 EE ⊲ 2100 550 5200 0066 <sup>₩₽₽</sup> V LEGEND MP SCREENED INTERVAL VW SCREENED INTERVAL VENT WELL LOCATION ▲1500 1400 MONITORING POINT LOCATION AND ID  ${\bf e}_{\rm W}$ CLAY SILTY SAND ₩<sup>₽</sup>₩ DIII ⊲-∭-∰ NORTH 10 -20 -30 -40 60 -0 50 -AB675-MP  $\triangleleft$ DEPTH FEET SURFACE вегом NI

1-3



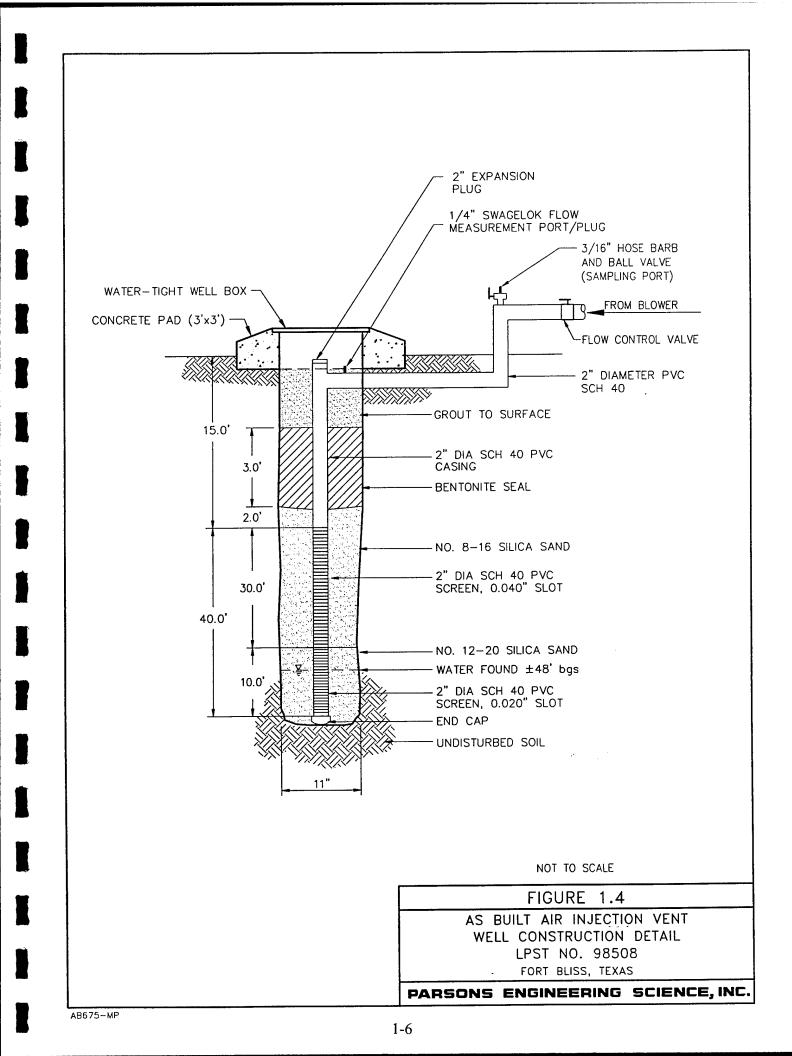
Sample Location (ft bgl)	Oxygen %	Carbon Dioxide %	TVH (ppmv)
B-000(9)	19	0.75	270
B-25(12)	17	2.5	390
B-50(9)	17.8	1.8	390
B-75(6)	18	1	290
C-000(14)	15.5	3.5	370
C-25(15)	13.5	4.5	1300
C-50(3)	19.5	1	220
C-50(6)	17	2.5	1600
C-75(6)	18.5	1	620
C-100(6)	18	1	520
D-25(12)	10	6	5800
D-50(6)	16	3	430
D-75(6)	18.5	1	1800
E-40(10)	10	6	400
E-65(9)	17.5	. 1	350

Table 1.1 Geoprobe Soil Gas Survey Results LPST No. 98508 Fort Bliss, Texas

.

• .. •

,



potential groundwater sampling needs, 10 feet of 0.02-inch slotted screen was installed across the saturated zone, from 45 to 55 feet bgs. The annular space between the well casing and borehole was filled with 8-16 silica sand from the bottom of the 0.04-inch screen to approximately 2 feet above the well screen. Filter pack for the 0.02-inch screen set as a monitoring well consists of 12-20 silica sand. Approximately 3 feet of granular bentonite was placed above the sand and hydrated in place using potable water. Concrete grout was placed above the bentonite seal and brought up to one foot below the surface. The well casing was cut off approximately 6 inches below the surface. A 2-inch PVC Tee was installed at the top of the casing, with two-inch PVC pipe connected to the blower and a 2-inch expansion plug sealing the well that allows access for groundwater sampling. To allow for air flow velocity testing, a swage lock fitting was attached to the PVC running to the blower.

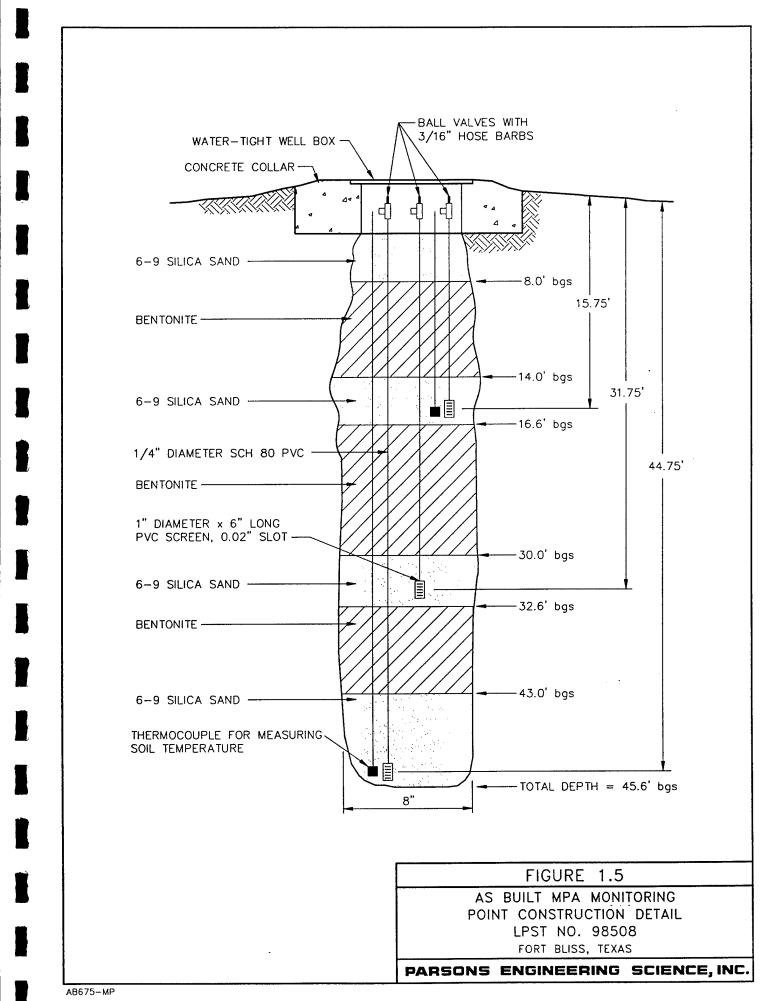
#### **1.3 MONITORING POINTS**

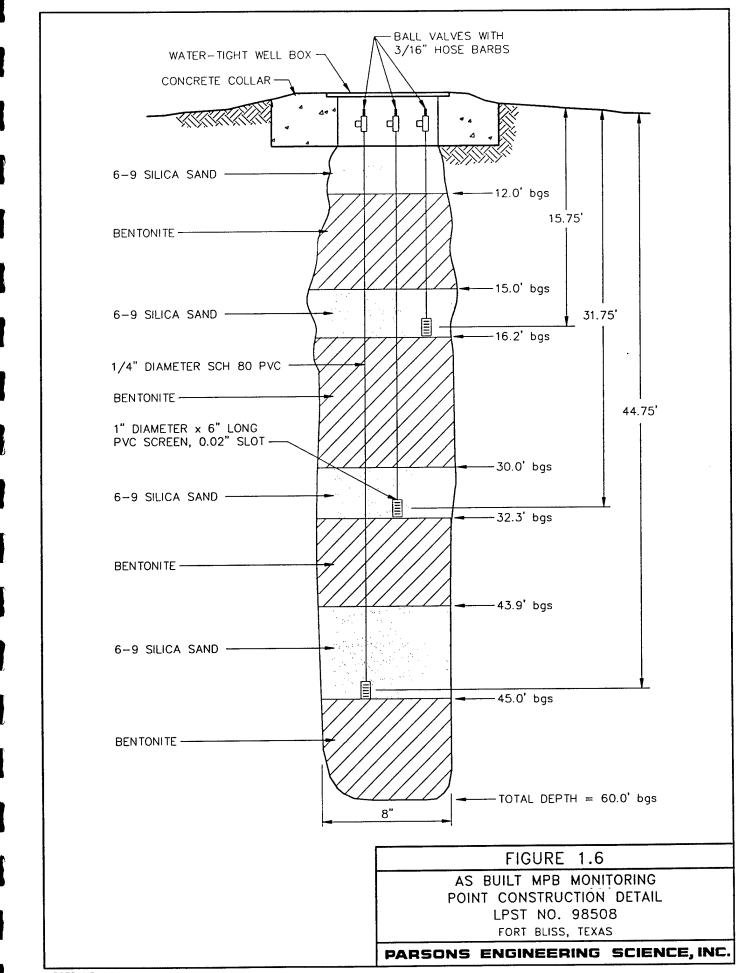
At Building 675, the MP screens were installed at three depths depending on conditions encountered in each borehole. The three MPs (MPA, MPB, and MPC) and the MPBG were constructed as shown in Figures 1.5, 1.6, and 1.7, and 1.8. Each MP monitoring interval was constructed using a 6-inch section of 1-inch-diameter PVC well screen and a 0.25-inch-diameter schedule 80 PVC riser pipe extending to the ground surface. At the top of each riser, a ball valve and a <sup>3</sup>/<sub>16</sub>-inch hose barb were installed. The top of each MP was completed with a flush-mounted metal well protector set in a concrete base. Thermocouples were installed at the 16- and 45-foot depths at MPA to measure soil temperature variations.

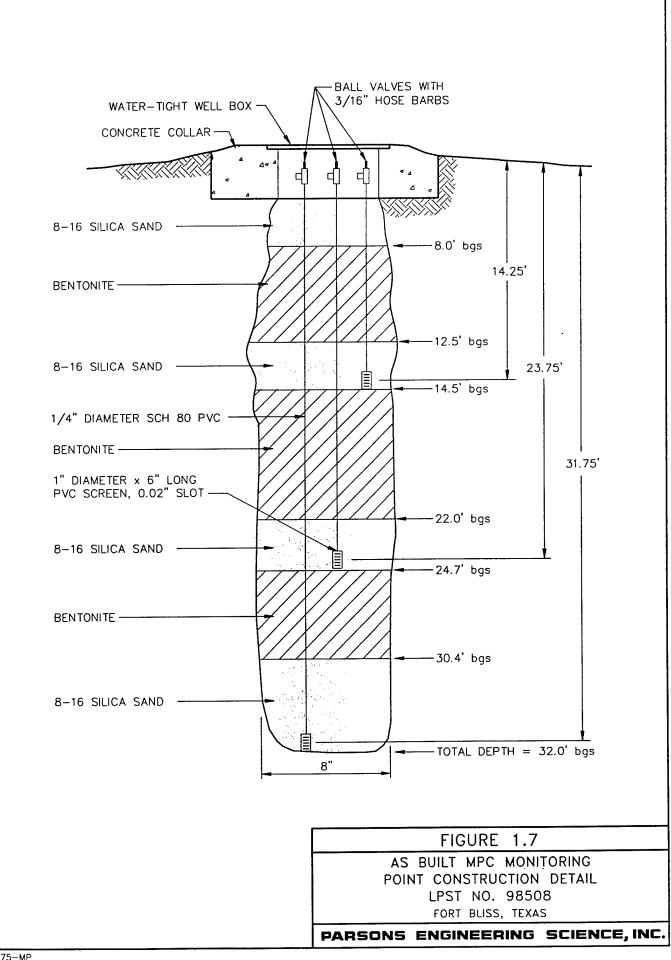
Screened intervals for the three MPs are all located beneath the primarily uncontaminated fill material, which extends approximately 12 feet bgs. The depths of screened intervals at MPA and MPB were chosen based on encountering the plastic liner to a depth of 12 feet below surface. The borehole for MPA and MPB was in primarily uncontaminated fill material until it penetrated beneath the plastic liner. The MPs were placed at 16, 32, and 45 feet bgs to provide coverage across the entire contaminated vadose zone. The MPs for MPC were located at 16, 24, and 32 feet bgs. MPBG was located approximately 200 feet north of the VW with MPs set at 16, 24, and 32 feet BGS.

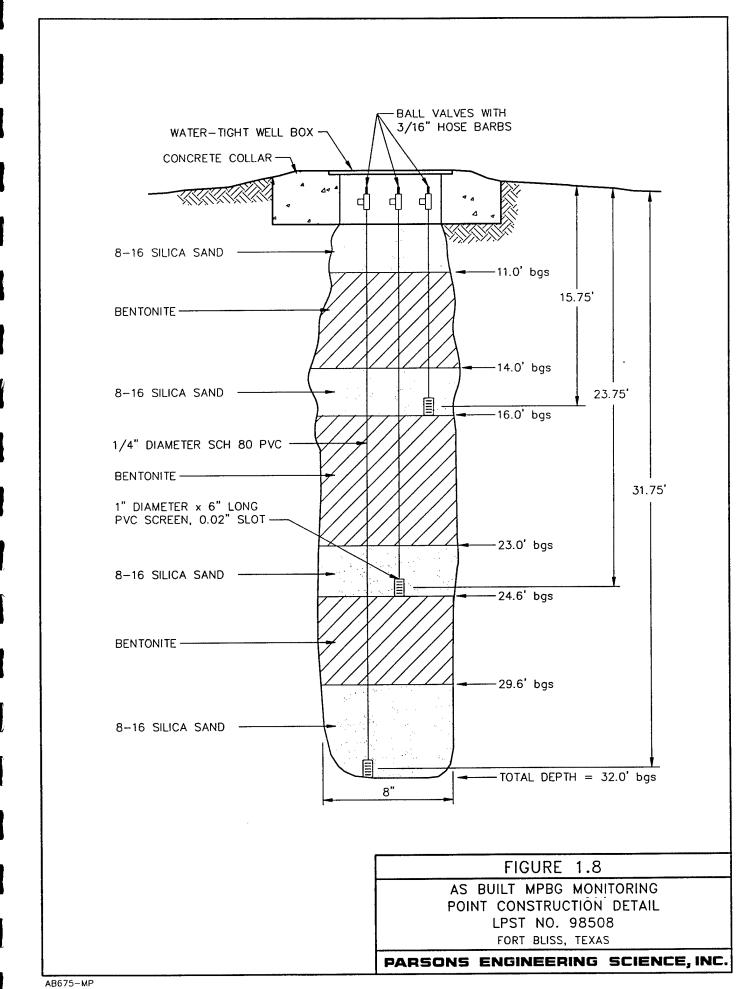
#### **1.4 BLOWER UNIT**

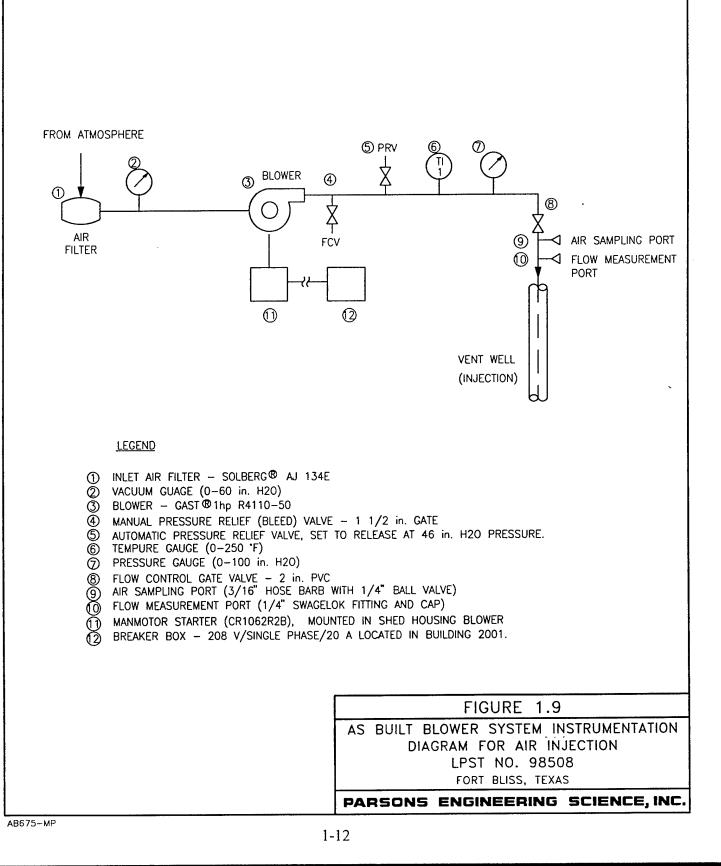
A 1.0-horsepower (hp) Gast®, regenerative blower unit was used for the initial testing and has been permanently installed for use throughout the extended pilot test. The pilot test blower is energized by 208-volt, single-phase, 30-amp line power which was installed specifically for the project. A starter/disconnect switch was set up on the inside wall of the small, portable shed which houses the blower. The configuration, instrumentation, and specifications for this blower system are shown on Figure 1.9. From anenometer readings, the blower is transporting air at a flow rate of approximately 16.5 actual cubic feet per minute (acfm) for the extended pilot test, as of readings taken on April 18, 1996. Shortly after blower installation and startup, Parsons ES engineers will provide an operation and maintenance (O&M) manual, including maintenance instructions, equipment specifications, and monitoring forms to post personnel.











### SECTION 2.0 PILOT TEST SOIL AND SOIL GAS SAMPLING RESULTS

### 2.1 SAMPLING RESULTS

Soils at this site primarily consist of dry sands and silty sands with varying amounts of gravel. The moisture content of site soils increased with depth. Clay was encountered in MPB at depths of approximately 48 to 50 feet, and in the VW at approximately 56-57 feet bgs. Soil within the backfilled excavation consist of lightly packed, fine- to medium-grained sands, with varying amounts of silts and gravels. Saturated conditions were encountered at depths of approximately 48 feet bgs in MPB and VW boreholes. More detailed hydrogeologic information regarding Building 675 can be found in the hydrogeologic cross section (Figure 1.2) and the geologic boring logs (appendix A).

Contaminated soils were identified based on visual appearance, odor, and results of total hydrocarbon analyzer field screening for volatile organic compounds (VOCs). Hydrocarbon contamination at this site appears to extend from about 18 to 55 feet bgs in the VW and all MP boreholes. Contaminant concentrations appeared to be greatest at depths of 40 to 50 feet bgs in soils directly beneath the excavation of the former underground storage tanks. In some instances, dark, hydrocarbon staining was observed in sampled cores. No evidence of contaminated soils was encountered in the background soil boring (MPBG).

Soil samples for laboratory analysis were collected from 2- or 5-foot split-spoon samplers. Soil samples were screened for VOCs using a hydrocarbon analyzer to determine the presence of contamination and to select depths for soil sampling for laboratory analysis. Soil samples for laboratory analysis were collected from MPA at depths of 37 to 38 feet bgs and 44 to 45 feet bgs, from MPB at depths of 24 to 25 feet bgs and 48 to 49 feet bgs, from MPC at depths of 23 to 24 feet bgs, and from the VW at depths of 45 to 46 feet bgs. Two background soil samples (from uncontaminated soils) were also collected from MPBG at 16 to 17 feet bgs and 31 to 32 feet bgs.

Soil gas samples were collected at VW-01, MPA (45 ft bgs), MPB (32 ft bgs), MPB (45 ft bgs), and MPC (32 ft bgs). These MP intervals were selected based on the depleted oxygen and elevated TVH in soil gas measured during initial soil gas survey activities. Initial soil gas screening results are discussed in Section 3. Soil gas samples were collected using 3-liter Tedlar® bags and vacuum chambers. After the samples were collected with Tedlar® bags, they were transferred to 1-liter SUMMA® canisters and shipped to the laboratory.

DRAFT MAY 1996 Soil samples were shipped via overnite delivery service (Federal Express) to Evergreen Analytical, Inc., for chemical and physical analysis. Soil samples were analyzed for total petroleum hydrocarbons (TPH); benzene, toluene, ethylbenzene and xylenes (BTEX) + chlorobenzene; total iron; alkalinity; total Kjeldahl nitrogen (TKN); total phosphorus, polynuclear aromatic hydrocarbons (PAH), and several physical parameters. The results of these analyses are presented in Table 2.1. Soil gas samples were shipped via to Air Toxics, Inc., in Folsom, California, for total petroleum hydrocarbons (TPH) and BTEX analysis. The TPH analyses were referenced to gasoline. The results of these analyses are provided in Table 2.2. Chain-of-custody forms are provided in appendix B.

### 2.2 EXCEPTIONS TO TEST PROTOCOL PROCEDURES

Procedures described in the protocol document (Hinchee et al., 1992) were used to complete this pilot test, with the following exception:

• Due to a faulty regulator, a helium tracer was not continuously injected into the MP screened intervals throughout the *in situ* respiration test. The helium was equilibrated at 2.9 % at the start of the test. Upon returning to check the test ten hours later, the helium tank was found to be empty. A replacement helium tank was installed, only to be found empty again 11 hours later.

. . .

Table 2.1 Soil Sample Chemistry Data Fort Bliss, Texas LPST No. 98508

MPBG (31-32) <4.7 NT NT r r r MPBG (16-17) <u>∽</u> NT r r r MPC (23-25) U (2.1) U (2.1) U (2.1) U (2.1) U (2.1) 110 180 45 3100 150 tz tz tz r r r 37 MPB (47-50) Sample Location (depth - feet below ground surface) U (2940) 190000 110000 550000 100000 260000 22000 860000 30000 78000 28000 77.69 21.19 190 J 6980 10.23 8200 2800 <5.0 208 566 1.12 7.50 MPB (24-25) 10.15 20000 6900 17000 5000 4960 89.63 J (52) 1200 600 1900 6400 4.88 <4.6 138 359 140 3.04 5.49 360 T T T MPA(44-45) U (207) 18000 27000 3100 9400 0000 310 860 980 450 430 t r r T T T MPA (37-38) J (212) 79000 2200 2600 U (350) 16000 13000 17000 47000 14000 13000 2800 1200 500 토토토 VW01 (56.5) U (11.0) U (0.1) U (0.5) 1.0 0.7 1.3 3.9 2.7 4.9 8.9 7.9 tz tz tz t z z VW01 (45-46) U (0.4) U (0.4) U (0.4) U (0.4) U (0.4) U (0.6) U (11.0) U (0.1) U (0.4) 10.18 96.09 1.0 3260 85 0.00 0.4 <5.0 9.40 269 3.94 t t t ,2,3,4-Tetramethylbenzene (µg/kg) ,2,4-Tetramethylbenzene (µg/kg) Fotal Kjeldahl Nitrogen (mg/kg) ,3,5-Trimethylbenzene (µg/kg) ,2,3-Trimethylbenzene (µg/kg) -Methylnapthalene (mg/kg) Silt and Clay (<0.75 mm) Soil physical properties Alkalinity (mg CaCO<sub>3</sub>/kg) [EH-extractable (mg/kg) Sand (%0.75-2.0 mm) henanthrene (mg/kg) Chlorobenzene (µg/kg) Ethyl Benzene (µg/kg) Total Xylenes (μg/kg) TPH-gasoline (mg/kg) Vapthalene (mg/kg) Phosphates (mg/kg) fotal Iron (mg/kg) Soil Hydrocarbons Gravel (%>2 mm) Γoluene (µg/kg) Benzene (µg/kg) **Base Neutrals** Soil Inorganics Moisture % Ηd

NT = not tested

U = compound analyzed for, but not detected. Detection limits in parenthesis. J = indicates an estimated value when the compound is detected, but is below the EPA Estimated Quantitation Limit (EQL)

J:\726876\Tab2-1.xls

J:\726876\71130\TAB2-2.DOC

•

- - -

.

Table 2.2 Soil Gas Analytical Results LPST No. 98508 Fort Bliss, Texas

F

Soil Gas Hydrocarbons (ppmv)         FBI:MPA-45         FBI:W-01         FBI:MPB-32         FBI:MPB-45         FBI:MI           Benzene         110         34         130         230         12           Benzene         110         34         130         230         12           Toluene         270         32         560         910         52           Ethyl Benzene         33         8.8         140         210         19           Total Xylenes         146         47         610         940         100           TPH (C2 + Hydrocarbons)         5200         1400         9900         15000         850			ron buss, lexas	exas		
110     34     130     230       270     32     560     910       nzene     33     8.8     140     210       ilenes     146     47     610     940       t + Hydrocarbons)     5200     1400     9900     15000	Soil Gas Hydrocarbons (ppmv)	FBI:MPA-45	FBI:VW-01	FBI:MPB-32	FBI:MPB-45	FBI:MPC-32
270       32       560       910         33       8.8       140       210         146       47       610       940         drocarbons)       5200       1400       9900       15000	Benzene	110	34	130	230	120
33         8.8         140         210           146         47         610         940           drocarbons)         5200         1400         9900         15000	Toluene	270	32	560	910	520
146         47         610         940           drocarbons)         5200         1400         9900         15000	Ethyl Benzene	33	8.8	140	210	190
5200 1400 9900 15000	Total Xylenes	146	47	610	940	1000
	TPH (C2 + Hydrocarbons)	5200	1400	0066	15000	8500

### SECTION 3.0 PILOT TEST RESULTS

#### 3.1 INITIAL SOIL GAS CHEMISTRY

Prior to initiating air injection, all MPs and the VW were purged, and initial oxygen, carbon dioxide, and TVH concentrations were sampled using portable gas analyzers, as described in the technical protocol document (Hinchee et al., 1992). Table 3.1 summarizes the initial soil gas chemistry at the Building 675 site. The results strongly indicate that biological fuel degradation has depleted the oxygen supply in the vadose zone soils. Five of the ten sampling points are under anaerobic conditions, and soil.gas at the remaining points were at low levels, ranging from 1.5 to 14.8 percent. In contrast the background MP, installed in uncontaminated soil approximately 200 feet north, contained oxygen levels ranging from 20.0 to 20.5 percent. Carbon dioxide was present at elevated concentrations, ranging from 4.5 to 13 percent, in all initial soil gas samples collected at Building 675. The background MP carbon dioxide levels ranged from 0.8 to 1.1 percent.

### 3.2 AIR PERMEABILITY

An air permeability test was performed at Building 675 according to protocol document procedures. Air was injected into the VW for two hours at a rate of approximately 45 cfm and an average pressure of 10.5 inches of water. The pressure response readings, including the pressure response measured at the end of two hours of continuous blower operation, are presented in Table 3.2. The pressure measured at each MP achieved steady state conditions after two hours. Since more than 10 minutes was required to achieve steady state conditions in all the MPs, the dynamic method of determining soil gas permeability was selected. As discussed in the technical protocol document (Hinchee et al., 1992), the dynamic method of determining soil gas permeability that is coded in the Hyperventilate® program is appropriate. Three depths from each of the MPs were used to calculate relative air permeability in the soils.

A constant injection rate of 45.8 scfm and a screened interval thickness of 33 feet were used to calculate soil gas permeabilities of 53.9, 32.5, and 26.3 darcys for the 10 foot radial distance, 64.8, 45.9, and 35.9 for the 24.5 foot radial distance and 67.8, 73.3, and 70.8 darcys for the 40.5 foot radial distance. An average of 52.4 darcys was calculated for the site. This value is typical for sandy soils, such as those encountered at this site. The Hyperventilate cards depicting these calculations are in appendix C.

. . .

Table 3.1 Initial Soil Gas Chemistry LPST No. 98508 Fort Bliss, Texas Total Xylenes (ppmv) 1000 146 610 940 NT ΓZ NT LZ Z Γ NT Γ 47 Ethyl Benzene (ppmv) 8.8 140 210 NT 190 NT Γ Γ LΖ ZJ NT NT 33 Toluene (ppmv) 560 910 520 270 NT ΝŢ ΓŢ NT NT NT NT ĽZ 32 Benzene (vmqq) 110 130 230 NT 120 Γ NT ΓN Ľ ΓZ NT NT 34 Lab TPH (vmqq) 1400 9900 1500 8500 NT 5200 NT NT Ľ ΓZ ΓZ ΓZ NT Field TPH (vmqq) 1500 1600 1400 2000 2100 2200 1500 550 450 570 250 290 360 CO<sub>2</sub> (%) 11.5 12.0 13.0 12.5 12.0 11.1 6.0 8.0 0.8 1.0 4.5 6.5 1.1 O<sub>2</sub> (%) 20.5 20.0 20.0 14.8 11.0 11.5 0.0 0.0 7.2 1.5 0.0 0.0 0.0 Depth (ft) 15-45 24 32 16 24 32 32 16 32 45 16 16 45 MPBG MPBG MPBG MPA MPC MPC MPA MPA MPB MPB MPC MPB WΛ МР

J:\726876\71130\TAB3-1.DOC

Table 3.2 Building 675, Pressure Response During the Air Permeability Test LPST No. 98508 Fort Bliss, Texas

0.56 0.68 0.20 0.44 0.78 0.84 0.94 0.98 1.0 1.0 1.0 1.0 32 ı 1.0 I.1 ı. [] [.] ŧ MPC 0.15 0.38 0.45 0.60 0.64 0.68 0.80 0.84 0.840.90 0.98 ı 1.0 1.0 1.0 24 ŧ 1.0 1.0 1.0 1.0 I. ı 0.960 0.28 0.46 0.68 0.70 0.700.760.840.860.880.90 0.90 0.90 0.98 0.08 0.35 0.52 0.60 ı. 16 t Pressure Response in MP (inches of water) 0.75 1.65 1.75 0.9 0.6 0.7 1.6 1.85 1.5 1.7 45 0.1 0.3 1.1 1.1 1.2 1.3 1.4 1.9 ı ı I MPB 1.15 0.2 0.6 0.8 0.7 1.01.3 1.3 **1**.4 1.5 1.5 1.6 1.6 1.6 1.1 1.6 [.] 32 5 1 ı ł 0.95 0.9 0.6 0.6 0.7 0.8 0.8 0.8 1.0 1.0 1.0 16 0.3 0.4 0.5 1.0 1.1 ı I. 1 1.1 0 2.50 2.55 2.55 2.60 2.80 2.40 2.90 2.95 3.10 3.10 2.25 2.2 3.2 3.25 3.30 1.9 0.9 1.4 1.6 45 1.2 2.1 MPA 2.55 2.60 3.15 1.9 2.3 2.3 2.45 2.7 2.8 2.8 2.9 3.0 3.0 3.2 3.2 3.15 3.1 3.2 32 1.0 1.6 3.2 2.05 1.8 1.9 2.0 2.0 2.0 2.0 2.05 2.10 2.10 0.9 4. 1.5 1.6 l.6 <u>8.</u> 1.8 0.1 [.3 16 5 <u>∞</u> Depth (feet) Elapsed Time (minutes) 0.5 15 20 25 30 40 50 60 90 120 10 12 N 6 6 4

J:\726876\71130\TAB3-2.DOC

### 3.3 OXYGEN INFLUENCE

The depth and radius of oxygen influence in the subsurface resulting from air injection into the central VW during pilot testing is the primary design parameter for full-scale bioventing systems. Optimization of full-scale and multiple VW systems requires pilot testing to determine the volume of soil that can be oxygenated at a given flow rate and VW screen configuration.

Table 3.3 describes the change in soil gas oxygen levels that occurred during the first 24-hours of air injection at the site. This air injection period at approximately 16.5 scfm produced changes in soil gas oxygen levels at a distance of at least 40.5 feet from the central VW at all monitored depth intervals. Increases in the oxygen concentration were measured at each MP interval. Based on measured pressure response, which is an indicator of long-term oxygen transport, it is anticipated that the radius of influence for a long-term bioventing system at this site will exceed 50 feet. Monitoring during the extended pilot test at this site will better define the effective treatment radius.

### 3.4 IN SITU RESPIRATION RATES

In situ respiration testing was performed with a slight deviation from the protocol document. Air was injected into MPA-45, MPB-32, MPB-45, and MPC-32 for 22 hours at a rate of approximately 1 acfm per screened interval to deliver oxygen to contaminated soils. Injection of a continuous and uniform mixture of helium was attempted during the test, but was not successful due to a faulty regulator as described in Section 2.2. At the end of the 22 hour period, air injection ceased, and changes in soil gas composition were monitored over time. Oxygen, TVH, helium and carbon dioxide were measured over a period of 72 hours following the air injection period. The observed rates of oxygen utilization were then used to estimate the aerobic fuel degradation rates at Building 675. Respiration test data collection sheets are presented in appendix D. Figures 3.1 and 3.2 represent the results of *in situ* respiration testing at the site, and Table 3.4 is a summary of the observed oxygen utilization rates.

Based on these observed oxygen utilization rates, an estimated 1150 to 1699 milligrams (mg) of fuel per kilogram (kg) of soil can be degraded each year. This value is the range of the fuel consumption rates calculated for every point at which a respiration test was conducted. The point-specific fuel consumption rates were calculated using observed oxygen utilization rates, estimated air-filled porosities, and a conservative ratio of 3.5 mg of oxygen consumed for every 1 mg of fuel biodegraded. Oxygen loss was approximately linear during the first 2200 minutes of the test. The observed oxygen utilization rates ranged from 0.0035 percent per minute (%/min) to 0.0039 percent/min (Table 3.4), demonstrating that hydrocarbon contamination and biological activity is probably uniformly spread throughout the pilot test area. The air-filled porosity calculated for each sampling point ranged from 0.15 to 0.28 liters of air per kilogram of soil. Data and data calculation sheets to determine fuel degradation rates are included in appendix D.

DRAFT MAY 1996

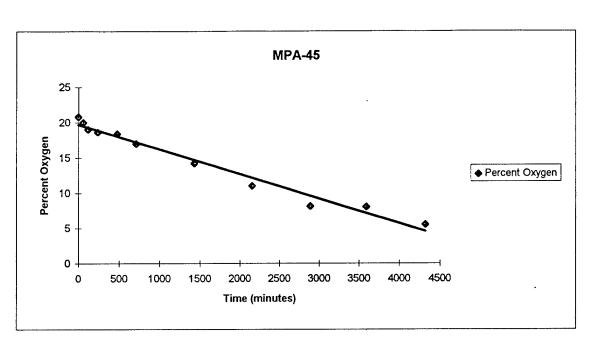
MP	Distance	Depth	Initial Oxygen (%)	Oxygen <sup>1</sup> (%)	Oxygen <sup>2</sup> (%)	Oxygen <sup>3</sup> (%)
A	10.0	16	9.0	19.9	20.5	NT
А	10.0	32	2.9	20.5	20.6	NT
А	10.0	45	5.5	19.5	20.0	ŊŢ
В	24.5	16	8.0	5.9	10.2	19.0
В	24.5	32	5.1	15.2	14.5	20.0
В	24.5	45	5.9	6.4	5.8	12.0
С	40.5	16	5.5	5.0	4.2	7.0
С	40.5	24	2.0	4.9	3.8	15.0
С	40.5	32	4.0	3.8	8.6	17.5

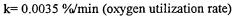
Table 3.3
Influence of Air Injection at Vent Well on Monitoring Point
Oxygen Levels, Building 675
LPST No. 98508
Fort Bliss, Texas

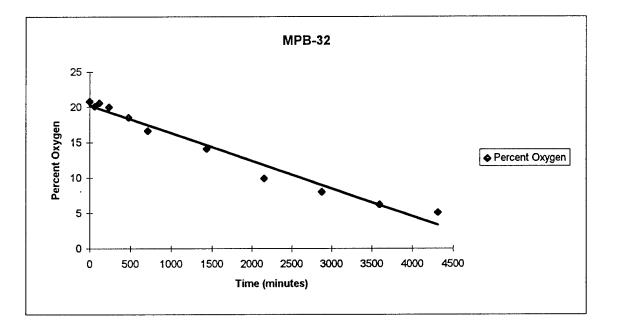
Duration of air injection = 2 hours at 45.8 cfm.
 Duration of air injection = 2 hours at 45.8 cfm, and 3.5 hours at 16.5 cfm.
 Duration of air injection = 2 hours at 45.8 cfm, and 22 hours at 16.5 cfm.

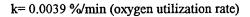
NT = not tested

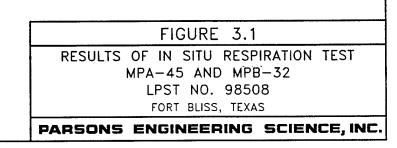
. . .

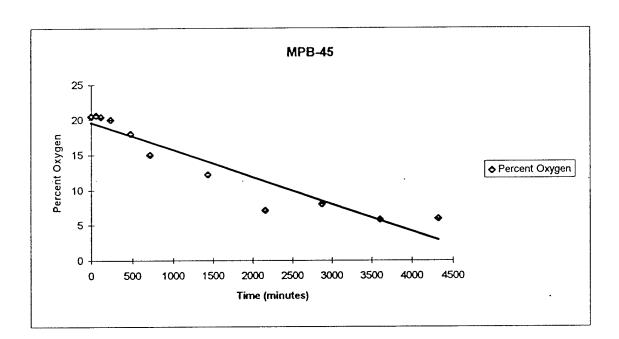


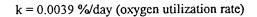


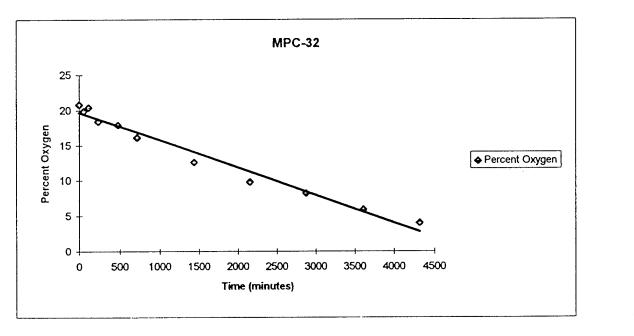


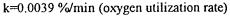


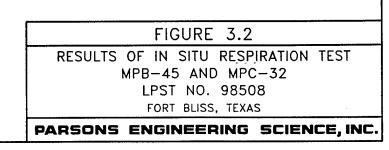












### Table 3.4 Oxygen Utilization Rates LPST No. 98508 Fort Bliss, Texas

MP	Oxygen Loss* (%)	Test Duration (min)	Oxygen Utilization Rate (%/min)
MPA-45	15.1	4323	0.0035
MPB-32	16.8	4317	0.0039
MPB-45	16.9	4323	0.0039
MPC-32	16.8	4319	0.0039 ·

\* Values based on linear regression (Figures 3.1 and 3.2).

- .. -

Based on a rate of 1150 to 1699 mg of fuel per kg of soil degraded each year, most of the volatile hydrocarbons in the soil will be removed at the end of a year. However, this rate will probably decrease as the soil moisture decreases and the concentrations of hydrocarbons in the soil decrease.

#### 3.5 POTENTIAL AIR EMISSIONS

Soil concentrations of BTEX compounds detected were less than five mg/kg. Thus, the long-term potential for air emissions from full-scale bioventing operations at this site is low. Initial emissions should be minimal because accumulated vapors will move slowly outward from the air injection point and will be at least partially biodegraded as they move horizontally through the soil. The flow rate of the operating 1 hp blower at completion of the test was 0.5 cfm per foot of screened interval. At this flow rate, and assuming an air filled porosity of 0.15 (bulk density of 1.8 g/cm<sup>3</sup>), it would take approximately 72 hours to replace one pore volume of soil gas over a 50-foot radial influence.

## SECTION 4.0 RECOMMENDATIONS

Initial bioventing tests at this site indicate that oxygen had been depleted in the contaminated soils, and that air injection is an effective method of stimulating aerobic fuel biodegradation. It is recommended that air injection continue at this site to determine the long term radius of oxygen influence and the effect of time, available nutrients, and changing temperatures and moisture contents on fuel biodegradation rates. It appears that contamination at the site is limited to soils above the saturated interval encountered at approximately 48 feet, and does not laterally extend significantly beyond the initial tank excavation limits. With a radius of influence of at least 50 feet from the VW, the 1 hp blower installed for the extended testing will probably be sufficient to remediate, over time, all contaminated soils associated with LPST No. 98508.

In May 1997, a final respiration test will be conducted, and soil gas samples will be collected from the site to assess the degree of remediation achieved during the first year of *in situ* treatment and to determine if significant changes to the system are necessary.

Based on the results of the first year of pilot-scale bioventing, one the following options will be recommended:

- 1. If one-year soil gas sampling and respiration testing indicates significant contaminant removal has occurred, confirmatory soil sampling may be recommended to verify that risk-based cleanup criteria have been achieved.
- 2. If significant contaminant removal is indicated, but additional treatment is still necessary to assure attainment of risk-based cleanup criteria, one additional year of air injection may be recommended.

J:\726876\71130\FBRPT.DOC

DRAFT MAY 1996

- .. -

## SECTION 5.0 REFERENCES

Hinchee, et al., 1992. Test Plan and Technical Protocol for a Field Treatability Test for Bioventing. January.

Parsons ES, 1996. Bioventing Pilot Test Work Plan for Building 675 LPST Site, Fort Bliss, Texas. February.

- · ·

# APPENDIX A BORING AND DRILLING LOGS

. . .

Page 1 of 3 Parsons Engineering Science Drilling Log - Fort Bliss BORING NO .: VENT WELL PROJECT: FORT BLISS BIOVENTING DRILLING METHOD: 6-INCH ID HOLLOW STEM AUGER SITE LOCATION: BUILDING 675, LPST 98508 SAMPLING METHOD: 2.5-FOOT SPLIT SPOON LOGGED BY: DAN SWITEK DRILLING CONTRACTOR: TIERRA DRILLING BOREHOLE DIAMETER: 11 INCHES REF. LOGBOOK: 1 DRILLER: JOHN McDUFFEY TOTAL DEPTH (FT BGSL): 57.5 DRILLING RIG: CME 75 WATER FOUND: 47.5 DRILLING START: 4/12/96 DATE COMPLETED: 4/12/96 DRILLING END: 4/12/96 ANALYTICAL SAMPLE (FT) HNU SCAN (ppm) GRAPHIC LOG HNU O DEPTH HDSP (ppm) COMMENTS LITHOLOGIC DESCRIPTION FILL MATERIAL, consisting of sand, some clay, grayish-orange (IOYR 7/4), fine-grained, moderately sorted, soft, dry. No description. 5. 10-No samples 0-10' FILL MATERIAL, as above. 0 Fill ends 10.9; SAND, some GRAVEL, pinkish-gray (5YR 8/1), sand sampling every 2.5 is medium-grained, gravel up to 0.9 inches, poorly ft. sorted, soft, damp. Not sampled. 15-SAND, as above. 0 SAND, pinkish-gray (5YR 8/1), medium-grained, moderate sorting, soft, damp. Not sampled. 20-CLAY, some SAND, dark gray (N3), sand is very 84 fine-grained, medium plastic, soft, damp. 0 SAND, little GRAVEL, light gray (N7), sand is medium-grained, gravel up to 2 inches, poorly 87

sorted, some organic laminae, hydrocarbon staining,

soft, damp. No recovery. Not sampled.

25

Page 2 of 3

Î

Edg     X 6 25     X 6 26     LLTHOLOGIC DESCRIPTION     Egg     HOSP (ppm)     COMMENTS       130     SAND, pinkish-gray (5YR 8/l), medium grained, poorly sorted, soft, damp.     0     0     0     0       175     SAND, pinkish-gray (5YR 8/l), medium grained, poorly sorted, soft, damp.     0     0     0       30-     76     SAND, some SRAVEL, pinkish-gray (5YR 8/l), sand is coarse-grained, gravel up to 0.6 inches, poorly sorted, subangular, soft, damp.     0       30-     76     SAND, some SILT, pinkish-gray (5YR 8/l), coarse- to very coarse-grained, poorly sorted, soft, dry.     0       30     25     Not sampled.     0       30     25     Not sampled, soft, damp.     0       31     SAND, some SILT, pinkish-gray (5YR 8/l), very fine-grained, poorly sorted, soft, dry.     0       32     SAND, some SILT, pinkish-gray (5YR 8/l), very fine-grained, poorly sorted, firm, damp.     0       340     SAND, some SILT, pinkish gray (5YR 8/l), very fine-grained, soft, damp.     17       340     SAND, pinkish-gray, (5YR 8/l), very fine-grained, moderately sorted, soft, damp.     17       340     SAND, pinkish-gray, (5YR 8/l), very fine-grained, moderately sorted, soft, damp.     17       340     SAND, pinkish-gray, (5YR 8/l), very fine-grained, moderately sorted, soft, damp.     17       340     SAND, pinkish-gray, (5YR 8/l), very fine-grained, moderately sorted, soft, damp.	rsons	s Engin	eering S		<u> </u>			Page 2 of 3
STE LOCATION:     BUILDING 675, LPST 98506     DRILLING METHOD:     C-INCH ID HOLLOW STEM AUGE       LOGGED BY:     DAN SMITEK     SAMPLING METHOD:     2.5-FOOT SPLIT SPOON       DRILLING CONTRACTOR:     TIERA DRILLING     BOREHOLE DIAMETER:     II INCHES       DRILLING CONTRACTOR:     TIERA DRILLING     BOREHOLE DIAMETER:     II INCHES       DRILLING START:     4/12/96     MATER FOUND:     4.7.5       DRILLING START:     4/12/96     DATE COMPLETE:     4/12/96       DRILLING START:     4/12/96     DATE COMPLETE:     4/12/96       DILLING START:     SAND, pinkish-gray (SYR 8/1), medium grained, or sorted, soft, damp.     0     0       30     SAND, some SILT, pinkish-gray (SYR 8/1), very fine-grained, moderately sort								
SAND. Some SILT. pinkish-gray (SYR 8/I), very fine-grained, poorly sorted, soft, damp.     SAMD, some SILT. pinkish-gray (SYR 8/I), very fine-grained, moderately sorted, soft, damp.     O       10-     55     SAND, pinkish-gray (SYR 8/I), very fine-grained, moderately sorted, soft, damp.     0     Analytical sampled.								
DRILLING     EOREHOLE DIAMETER: 11 INCHES       DRILLER: JOHN HOUPFEY     REF. (JOBRON: 1       DRILLING RIG: CME 75     TOTAL DEPTH (FT BGSL): 57.5       DRILLING RIG: CME 75     TOTAL DEPTH (FT BGSL): 57.5       DRILLING START: 4//2/96     DATE COMPLETED: 4//2/96       DRILLING END: 4//2/96     DATE COMPLETED: 4//2/96       ISD     X       DRILLING END: 4//2/96     DATE COMPLETED: 4//2/96       ISD     SAND, pinkish-gray (SYR 8/I), medium grained, poorly sorted, soft, damp.       SAND, some GRAVEL, pinkish-gray (SYR 8/I), sand is coarse-grained, gravel up to 0.6 inches, poorly sorted, soft, damp.       SAND, some SILT, pinkish-gray (SYR 8/I), coarse-to very coarse-grained, poorly sorted, soft, dry.       0       25       130       SAND, some SILT, pinkish-gray (SYR 8/I), very fine-grained, poorly sorted, soft, dry.       0       25       130       26       130       27       130       301       28       302       29       303       29       304       29       305       305       306       307       308       309       309       300       300       301								
DRILLING RIG: CHE 75     REF. LOGBOOK: 1       DRILLING RIG: CHE 75     TOTAL DEPTH (FT DESL): 57.5       DRILLING START: 4/12/86     WATER FOUND: 47.5       DRILLING ATG.     A/12/96       DRILLING ATG.     A/12/96       DATE COMPLETED: 4/12/96     DATE COMPLETED: 4/12/96       DATE COMPLETED: 4/12/96     DATE COMPLETED: 4/12/96       DETUNDE MC.     A/12/96       DATE COMPLETED: 4/12/96     DATE COMPLETED: 4/12/96       DATE COMPLETED: 4/12/96     DATE COMPLETED: 4/12/96       DETUNDE MC.     A/12/96       DETUNDE MC.     SAND, pinkish-gray (5YR 8/1), medium grained, poorly sorted, soft, dry.       SAND, some SILT, pinkish-gray (5YR 8/1), very time-grained, poorly sorted, soft, dry.     0       30     SAND, some SILT, pinkish-gray (5YR 8/1), very time-grained, poorly sorted, soft, drp.     0       310     SAND, some SILT, pinkish gray (SYR 8/1), very time-grained, moderately sorted, soft, damp.     17       310								
DRILLING RIG: CME 75     TOTAL DEPTH (FT BGSL): 57.5       DRILLING START: 4/12/96     WATER FOUND: 47.5       DRILLING END: 4/12/96     DATE COMPLETED: 4/12/96       (Eg)     SAND, pinkish-gray (5YR 8/I), medium grained, poorly sorted, soft, damp.     HOSP (pom)       130     SAND, pinkish-gray (5YR 8/I), medium grained, poorly sorted, soft, damp.     0       130     SAND, some GRAVEL, pinkish-gray (5YR 8/I), coarse-to very coarse-grained, poorly sorted, soft, damp.     0       30-     76     SAND, some SILT, pinkish-gray (5YR 8/I), coarse-to very coarse-grained, poorly sorted, soft, dry.     0       30     25     Not sampled.     0       30-     55     SAND, some SILT, pinkish-gray (5YR 8/I), very fine-grained, poorly sorted, soft, dry.     0       35-     0     SAND, some SILT, pinkish-gray (5YR 8/I), very fine-grained, poorly sorted, soft, dry.     0       36-     55     SAND, some SILT, pinkish-gray (5YR 8/I), very fine-grained, poorly sorted, firm, damp.     17       40-     55     SAND, some SILT, pinkish gray (5YR 8/I), very fine-grained, moderately sorted, soft, damp.     17       40-     55     SAND, some SILT, pinkish gray (5YR 8/I), very fine-grained, moderately sorted, soft, damp.     17       40-     55     SAND, pinkish-gray (5YR 8/I), very fine-grained, moderately sorted, soft, damp.     17       40-     56     SAND, pinkish-gray (5YR 8/I), very fine-grained, moderate	DRIL	LING	CONTRAC	CTOR: TIERRA DRILLING			: 11 INC	HES
DRLLING START:     4/12/96     WATER FOUND:     47.5       DRLLING END:     4/12/96     DATE COMPLETED:     4/12/96       DRLLING END:     4/12/96     DATE COMPLETED:     4/12/96       Image: Stress of the stress of								
DIRLLING UNIX: 14:000     DATE COMPLETED: 4/12/96       DENLLING END: 4/12/96     DATE COMPLETED: 4/12/96       DENLLING END: 4/12/96     LITHOLOGIC DESCRIPTION     Q g g g (pm)       COMMENTS       25     130     SAND, pinkish-gray (5YR 8/1), medium grained, poorly sorted, soft, damp.       SAND, some GRAVEL, pinkish-gray (SYR 8/1), sand is coarse-grained, gravel up to 0.6 inches, poorly sorted, subangular, soft, damp.     0       30     SAND, some GRAVEL, pinkish-gray (SYR 8/1), sand is coarse-grained, gravel up to 0.6 inches, poorly sorted, soft, dry.     0       30     SAND, some SILT, pinkish-gray (SYR 8/1), coarse- to very coarse-grained, poorly sorted, soft, dry.     0       30     SAND, some SILT, pinkish-gray (SYR 8/1), very fine-grained, poorly sorted, soft, dry.     0       31     SAND, some SILT, pinkish-gray (SYR 8/1), very fine-grained, poorly sorted, soft, dry.     0       32     SAND, some SILT, pinkish-gray (SYR 8/1), very fine-grained, moderately sorted, soft, damp.     0       40     SAND, some SILT, pinkish-gray (SYR 8/1), very fine-grained, moderately sorted, soft, damp.     17       40     SAND, pinkish-gray (SYR 8/1), very fine-grained, moderately sorted, soft, damp.     47       41     SAND, pinkish-gray (SYR 8/1), very fine-grained, moderately sorted, soft, damp.     47       45     SAND, pinkish-gray (SYR 8/1), fine-grained, moderately sorted, soft, damp.     47       45     SAND, pinkish-gray (SYR 8/1), fine-graine							55L): 5/	σ.
Litthologic DESCRIPTION     Discretion       130     SAND, pinkish-gray (SYR 8/I), medium grained, poorly sorted, soft, damp.     0       130     SAND, pinkish-gray (SYR 8/I), medium grained, poorly sorted, soft, damp.     0       130     SAND, some GRAVEL, pinkish-gray (SYR 8/I), sand is coarse-grained, gavel up to 0.6 inches, poorly sorted, subangular, soft, damp.     0       190     Not sampled.     0       30     25     Not sampled.       35-     0     SAND, some SILT, pinkish-gray (SYR 8/I), very fine-grained, poorly sorted, soft, dry.     0       36-     5     SAND, some CLAY, light brown (SYR 6/6), very fine-grained, poorly sorted, soft, damp.     0       40-     55     SAND, some SILT, pinkish gray (SYR 8/I), very fine-grained, soft, damp.     17       340     SAND, pinkish-gray (SYR 8/I), very fine-grained, moderately sorted, soft, damp.     17       45     360     SAND, pinkish-gray (SYR 8/I), very fine-grained, moderately sorted, soft, damp.     14.7       45     SAND, pinkish-gray (SYR 8/I), fine-grained, moderately sorted, soft, damp.     14.7							/10/00	
<ul> <li>SAND, pinkish-gray (SYR 8/I), medium grained, poorly sorted, soft, damp.</li> <li>SAND, some GRUEL, pinkish-gray (SYR 8/I), sand is coarse-grained, gravel up to 0.6 inches, poorly sorted, soft, damp.</li> <li>Not sampled.</li> <li>SAND, some SILT, pinkish-gray (SYR 8/I), coarse-to very coarse-grained, poorly sorted, soft, dry.</li> <li>SAND, some SILT, pinkish-gray (SYR 8/I), coarse-to very coarse-grained, poorly sorted, soft, dry.</li> <li>Not sampled.</li> <li>SAND, some SILT, pinkish-gray (SYR 8/I), very fine-grained, poorly sorted, soft, dry.</li> <li>SAND, some SILT, pinkish-gray (SYR 8/I), very fine-grained, poorly sorted, soft, dry.</li> <li>SAND, some SILT, pinkish-gray (SYR 8/I), very fine-grained, poorly sorted, soft, dry.</li> <li>SAND, some SILT, pinkish-gray (SYR 8/I), very fine-grained, poorly sorted, firm, damp.</li> <li>Not sampled.</li> <li>SAND, pinkish-gray (SYR 8/I), very fine-grained, moderately sorted, soft, damp.</li> <li>Not sampled.</li> <li>SAND, pinkish-gray (SYR 8/I), very fine-grained, moderately sorted, soft, damp.</li> <li>Not sampled.</li> <li>SAND, pinkish-gray (SYR 8/I), fine-grained, moderately sorted, soft, damp.</li> <li>Not sampled.</li> <li>SAND, pinkish-gray (SYR 8/I), fine-grained, moderately sorted, soft, damp.</li> <li>Not sampled.</li> <li>Mot sampled.</li> <li>SAND, pinkish-gray (SYR 8/I), fine-grained, moderately sorted, soft, damp.</li> <li>Not sampled.</li> <li>Mot sampled</li></ul>		T	END: 4/	12/96	UATE COMPLE		112/96	
130       SAND, pinkish-gray (SYR 8/I), medulin grained, or	COEPTH (FT)	ANALYTICAL SAMPLE	HNU SCAN (ppm)			GRAPHIC LOG	HDSP	COMMENTS
175     is coarse-grained, gravel up to 0.6 inches, poorly sorted, subangular, soft, damp.     0       190     Not sampled.       30-     76     SAND, some SILT, pinkish-gray (5YR 8/I), coarse- to very coarse-grained, poorly sorted, soft, dry.     0       30     25     Not sampled.     0       30     25     Not sampled.     0       30     25     Not sampled.     0       31     22     SAND, some SILT, pinkish-gray (5YR 8/I), very fine-grained, poorly sorted, soft, dry.     0       22     SAND, some CLAY, light brown (5YR 6/6), very fine-grained, poorly sorted, firm, damp.     0       40     55     SAND, some SILT, pinkish gray (5YR 8/I), very fine-grained, soft, damp.     17       40     55     SAND, some SILT, pinkish gray (5YR 8/I), very fine-grained, soft, damp.     17       40     56     SAND, pinkish-gray, (5YR 8/I), very fine-grained, moderately sorted, soft, damp.     17       41     360     SAND, pinkish-gray (5YR 8/I), fine-grained, moderately sorted, soft, damp.     14,7	20		130	poorly sorted, soft, damp.		0.00	0	
30-     76     SAND, some SILT, pinkish-gray (SYR 8/I), coarse- to very coarse-grained, poorly sorted, soft, dry.     0       30     25     Not sampled.     0       35-     0     SAND, some SILT, pinkish-gray (SYR 8/I), very fine-grained, poorly sorted, soft, dry.     0       35-     0     SAND, some SILT, pinkish-gray (SYR 8/I), very fine-grained, poorly sorted, soft, dry.     0       22     SAND, some CLAY, light brown (SYR 6/6), very fine-grained, poorly sorted, firm, damp.     0       40-     55     SAND, some SILT, pinkish gray (SYR 8/I), very fine-grained, soft, damp.     17       A0-     55     SAND, pinkish-gray, (SYR 8/I), very fine-grained, moderately sorted, soft, damp.     17       45     360 316 10     SAND, pinkish-gray (SYR 8/I), fine-grained, moderately sorted, soft, damp.     14.7       45     80 316 10     SAND, pinkish-gray (SYR 8/I), fine-grained, moderately sorted, soft, damp.     14.7	-		175	is coarse-grained, gravel up to 0.6 inc	hes, poorly			
36     SAND, some SILT, pinkish-gray (SYR 8/I), coarse- to very coarse-grained, poorly sorted, soft, dry.     0       30     25     Not sampled.       35     0     SAND, some SILT, pinkish-gray (SYR 8/I), very fine-grained, poorly sorted, soft, dry.     0       22     SAND, some CLAY, light brown (SYR 6/6), very fine-grained, poorly sorted, firm, damp.     0       40     55     SAND, some SILT, pinkish gray (SYR 8/I), very fine-grained, poorly sorted, firm, damp.     17       40     55     SAND, some SILT, pinkish gray (SYR 8/I), very fine-grained, soft, damp.     17       40     55     SAND, pinkish-gray (SYR 8/I), very fine-grained, moderately sorted, soft, damp.     17       45     360     SAND, pinkish-gray (SYR 8/I), fine-grained, moderately sorted, soft, damp.     14,7       45     360     SAND, pinkish-gray (SYR 8/I), fine-grained, moderately sorted, soft, damp.     14,7			190	Not sampled.				
30     30       35     0       35     0       35     0       36     SAND, some SILT, pinkish-gray (5YR 8/1), very fine-grained, poorly sorted, soft, dry.       22     SAND, some CLAY, light brown (5YR 6/6), very fine-grained, poorly sorted, firm, damp.       40     55       340     SAND, some SILT, pinkish gray (5YR 8/1), very fine-grained, soft, damp.       40     55       340     SAND, some SILT, pinkish gray (5YR 8/1), very fine-grained, moderately sorted, soft, damp.       41     Not sampled.       45     360       315     SAND, pinkish-gray (5YR 8/1), fine-grained, moderately sorted, soft, damp.       45     SAND, pinkish-gray (5YR 8/1), fine-grained, moderately sorted, soft, damp.       45     Met at 47.5-50'	30-		76	SAND, some SILT, pinkish-gray(5YR 8 to very coarse-grained, poorly sorted,	3/1), coarse- , soft, dry.		0	
35-     0     SAND, some SILT, pinkish-gray (5YR 8/1), very fine-grained, poorly sorted, soft, dry.     0       22     SAND, some CLAY, light brown (SYR 6/6), very fine-grained, poorly sorted, firm, damp.     0       40-     55     SAND, some SILT, pinkish gray (5YR 8/1), very fine-grained, soft, damp.     17       40-     55     SAND, some SILT, pinkish gray (5YR 8/1), very fine-grained, soft, damp.     17       40-     55     SAND, pinkish-gray, (5YR 8/1), very fine-grained, moderately sorted, soft, damp.     17       45     360     SAND, pinkish-gray (5YR 8/1), fine-grained, moderately sorted, soft, damp.     14.7       45     360     SAND, pinkish-gray (5YR 8/1), fine-grained, moderately sorted, soft, damp.     14.7			30					
0       SAND, some SILT, pinkish-gray (SYR 8/I), very fine-grained, poorly sorted, soft, dry.       0         22       SAND, some CLAY, light brown (SYR 6/6), very fine-grained, poorly sorted, firm, damp.       0         40       55       SAND, some SILT, pinkish gray (SYR 8/I), very fine-grained, soft, damp.       17         54       SAND, pinkish-gray, (SYR 8/I), very fine-grained, moderately sorted, soft, damp.       17         45       SAND, pinkish-gray (SYR 8/I), very fine-grained, moderately sorted, soft, damp.       17         45       SAND, pinkish-gray (SYR 8/I), fine-grained, moderately sorted, soft, damp.       14.7         45       SAND, pinkish-gray (SYR 8/I), fine-grained, moderately sorted, soft, damp.       45-46'	4		25	Not sampled.				
40     52     SAND, some CLAY, light brown (5YR 6/6), very fine-grained, poorly sorted, firm, damp.     0       40     55     SAND, some SILT, pinkish gray (5YR 8/1), very fine-grained, soft, damp.     17       54     SAND, pinkish-gray, (5YR 8/1), very fine-grained, moderately sorted, soft, damp.     17       45     360     SAND, pinkish-gray (5YR 8/1), fine-grained, moderately sorted, soft, damp.     14.7       45     360     SAND, pinkish-gray (5YR 8/1), fine-grained, moderately sorted, soft, damp.     14.7	35-		0	SAND, some SILT, pinkish-gray(5YR 8 fine-grained, poorly sorted, soft, dry.	3/1), very			
40-       55       SAND, some SILT, pinkish gray (5YR 8/1), very fine-grained, soft, damp.       17         340       SAND, pinkish-gray, (5YR 8/1), very fine-grained, moderately sorted, soft, damp.       17         45       360       SAND, pinkish-gray (5YR 8/1), fine-grained, moderately sorted, soft, damp.       Analytical sample 45-46'         45       360       SAND, pinkish-gray (5YR 8/1), fine-grained, moderately sorted, soft, damp.       Mot sample 45-46'         45       360       SAND, pinkish-gray (5YR 8/1), fine-grained, moderately sorted, soft, damp.       Mot sample 45-46'	-		22	SAND, some CLAY, light brown (5YR 6/	6), very		υ	
55       SAND, some SILT, pinkish gray (5YR 8/1), very fine-grained, soft, damp.       17         340       SAND, pinkish-gray, (5YR 8/1), very fine-grained, moderately sorted, soft, damp.       17         45       360       SAND, pinkish-gray (5YR 8/1), fine-grained, moderately sorted, soft, damp.       Analytical sample 45-46'         45       360       SAND, pinkish-gray (5YR 8/1), fine-grained, moderately sorted, soft, damp.       45-46'         45       Wet at 47.5-50'       Wet at 47.5-50'				Not sampled.				
45 340 170 SAND, pinkish-gray, (5YR 8/1), very fine-grained, moderately sorted, soft, damp. 45 360 315 180 SAND, pinkish-gray (5YR 8/1), fine-grained, moderately sorted, soft, damp. 45 45 45 45 45 45 45 45 45 45	40-		55		/1), very			
45 360 315 180 SAND, pinkish-gray (5YR 8/1), fine-grained, moderately sorted, soft, damp. 45 45 45 45 45 45 Wet at 47.5–50'				SAND, pinkish-gray, (5YR 8/1), very fir	ne-grained,			
360     360       315     moderately sorted, soft, damp.       180     14.7				Not sampled.				
180	45				ained,		14.7	-
	-							Wet at 47.5-50'
	-			Not sampled.				÷ · ·

E

#### Page 3 of 3

		ieering S	Drilling Log -	- Fort Blis	S S		
PRC	JECT:	FORT BL	ISS BIOVENTING	BORING NO .:		ELL	······································
SIT	E LOCA	TION: B	BUILDING 675, LPST 98508	DRILLING ME	ETHOD: 6	-INCH I	ID HOLLOW STEM AUGER
LOG	GED B	C DAN S	SWITEK	SAMPLING M	ETHOD: 2	2.5-F00	T SPLIT SPOON
DRI	LLING (	CONTRAC	CTOR: TIERRA DRILLING	BOREHOLE D	DIAMETER	: 11 INC	HES
DRI	LLER:	JOHN Mc	DUFFEY	REF. LOGBO	ОК: 1		····
DRI	LLING F	RIG: CME	E 75	TOTAL DEPT	ГН (ГТВО	GSL): 57	7.5
DRI	LLING	START:	4/12/96	WATER FOUN	ND: 47.5		
DRI	LLING	END: 4/1	12/96	DATE COMPL	ETED: 4	/12/96	
о ости (FT)	ANALYTICAL SAMPLE	HNU SCAN (ppm)	LITHOLOGIC DESCRIPT	ION	GRAPHIC LOG	HNU HDSP (ppm)	COMMENTS
-00		0	SAND, pinkish-gray (5YR 8/1), coarse- moderately sorted, soft, damp. Not sampled.	grained,		0	
55			SAND, pale, yellowish-brown (10YR 6/2 fine-grained, moderatley sorted, soft, r CLAY, some GRAVEL, pale, yellowish-br 6/2), gravel up to 1.5 inches, moderate firm, dry. Total depth = 57.5.	vet. own (10YR		37	
65-							
- 70-							
75							

			Drilling Log				
PRO	JECT: I	FORT BL	ISS BIOVENTING	BORING NO.			e · · · · · · · · · · · · · · · · · · ·
SIT	E LOCA	TION: B	UILDING 675, LPST 98508	DRILLING M	ETHOD: 3	-INCH I	D HOLLOW STEM AUGER
LOG	GED BY	: DAN S	WITEK	SAMPLING N	HETHOD: 5	-FOOT	SPLIT SPOON
DRI	LLING C	ONTRAC	TOR: TIERRA DRILLING	BOREHOLE	DIAMETER	: 8 INC	HES
ORI	LLER: J	IOHN Mc[	DUFFEY	REF. LOGBO	ОК: 1		
DRI	LLING R	IG: CME	75	TOTAL DEP	TH (FT BO	SL): 4	5
DRI	LLING S	TART:	4/12/96 (0830)	WATER FOU	ND: NA		
DRI		ND: 4/1	2/96 (1045)	DATE COMP	LETED: 4	/12/96	
DEPTH (FT)	ANALYTICAL SAMPLE	HNU SCAN (ppm)	LITHOLOGIC DESCRIPT	ION	GRAPHIC LOG	HNU HDSP (ppm)	COMMENTS
0			FILL MATERIAL, SAND, some CLAY and SYR 6/4, very fine-grained, soft, damp		10 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		•
10		0	FILL MATERIAL, as above. SILT, some SAND and GRAVEL, 10YR 8. fine-grained, soft, dry. No recovery.	/6, very			Liner at 9.4'
15		1	SILT, as above. SAND, some GRAVEL, 5YR 6/4, very coarse-grained, moderate sorting, sof No recovery.	t, damp.		188	ά.
20-		32 27 265	SAND, as above. CLAY, 5YR 3/4), very stiff, low plastici SAND, N7, very fine-grained to fine-g				Contamination
		400	some staining (hydrocarbons), damp.			174	starts at approx. 19.8'
1			No recovery.		$\mathbb{N}$		
-		220 180	SAND, 5YR 8/1, coarse-grained, little g bottom, moderately sorted, soft, sub-r damp.			75	

Ì

Ĵ

ļ

Į

Parsons Engin	eering S	Science				Page 2 of 2
		Drilling Log -	Fort Bliss	5		
PROJECT:	FORT B	LISS BIOVENTING	BORING NO .: N			
		BUILDING 675, LPST 98508	DRILLING MET	HOD: 3	-INCH I	D HOLLOW STEM AUGER
LOGGED B			SAMPLING MET	THOD: \$	5-F00T :	SPLIT SPOON
		CTOR: TIERRA DRILLING	BOREHOLE DI	AMETER	R: 8 INCH	IES
DRILLER:			REF. LOGBOOK			
DRILLING F			TOTAL DEPTH		GSL): 45	
		4/12/96 (0830)	WATER FOUND			
		/12/96 (1045)	DATE COMPLE	TED: 4	/12/96	
22 DEPTH (FT) ANALYTICAL SAMPLE	HNU SCAN (ppm)	LITHOLOGIC DESCRIPTI	ON	GRAPHIC LOG	HNU HDSP (ppm)	COMMENTS
		No recovery.			75	
-	120	SAND, little GRAVEL, 5YR 8/1, very coar poorly sorted, soft, well rounded, damp.	se-grained,	0.00		
	70			0.00		
30-	26	· ·		0.0	43	
		No recovery.			1 ~	
-				$\mathbb{N}$		
	240	SAND, as above.			1	
-	600				1	
35-	430	CLAY, some SILT, 10R 6/6, low plasticity damp.	/, soft, /			
	430	SAND, some SILT, 10R 6/0, sand is very fine-grained, little GRAVEL limestone up inches in diameter, moderately sorted, s	to 1.5			
	550	Π		$\Lambda$		
	610 570	No recovery.	]	$ X\rangle$		
	570	SAND, fine grained, some SILT, 10R 6/6 sorted, soft, damp.	, moderately	VV		
1	520			1.1.		
40-		CLAY, some SAND, 5YR 4/4, very fine-s low plasticity, damp.	grained, firm,	4.	575	
1		SAND, very fine-grained, 10YR 6/2, poo soft, damp.	rly sorted,			
	510	No recovery.		$\Lambda$	ļ	
	520	SAND, as above.			420	
45				<u> :-:-</u>	┇	
45	520	Total depth = 45 feet.				
						• • •
. ]						
50-L	L			1	.11	

Page 1 of 3

rsons	Engin	eering S	Science	· · · · · · · · · · · · · · · · · · ·			Page 1 of 3
			Drilling Log -	Fort Bliss			
PROJ	ECT:	FORT B	LISS BIOVENTING	BORING NO .: M			
SITE	LOCA	TION: I	BUILDING 675, LPST 98508				D HOLLOW STEM AUGER
			SWITEK				T SPLIT SPOON
			CTOR: TIERRA DRILLING	BOREHOLE DIA		: 8 INC	HES
				REF. LOGBOOK			7.5
		RIG: CM		TOTAL DEPTH WATER FOUND:		53L): 51	
		START: END: 4/	4/11/96 (1210)	DATE COMPLET		/12/96	
	ANALYTICAL SAMPLE	HNU SCAN (ppm)	LITHOLOGIC DESCRIPTI		GRAPHIC LOG	HNU HDSP (ppm)	COMMENTS
5-		0	SAND, some CLAY, sand is fine-grained, moderately plastic, 10R 4/6, soft, damp.				0−14.2' fill
10-		0 5	SAND, as above. SAND, as above. SAND, 5YR 8/1, coarse- to very coarse moderately sorted, sub-rounded, soft, o			15.5	
15-		40 20 37	CLAY, some fine SAND, 10R 4/6, soft, pl SAND, some GRAVEL, 5YR 8/1, sand is v coarse-grained, gravel up to 0.2 inch ir poorly sorted, well rounded. SAND, 5YR 8/1, medium-grained, well sor	ery Miameter,			
		0	rounded, soft, damp.	/			
		30 15	SAND, as above. SAND and GRAVEL, 5YR 8/1, sand is coarse-grained, gravel up to 1.0 inch in poorly sorted, sub-angular, soft, damp.	diameter,	0.0	140	

Page 2 of 3

Ì

ļ

		eering S	Drilling Log -	- Fort Blis	S		
PRO	JECT:	FORT BI	ISS BIOVENTING	BORING NO .:			
SIT	E LOCA	TION: E	BUILDING 675, LPST 98508	DRILLING ME	THOD: 3	-INCH I	D HOLLOW STEM AUGER
LOG	GED BY	: DAN S	SWITEK	SAMPLING M	ETHOD: 2	2.5 <b>-</b> F00	T SPLIT SPOON
DRI	LLING C	CONTRAC	CTOR: TIERRA DRILLING	BOREHOLE D	IAMETER	: 8 INCI	HES
DRI	LLER:	JOHN Mc	DUFFEY	REF. LOGBOO	ОК: 1		
DRI	LLING F	RIG: CM	E 75	TOTAL DEPT	H (FT BO	GSL): 57	.5
DRI	LLING S	START:	4/11/96 (1210)	WATER FOUN	ID: 48		
ORIL	LLING E	END: 4/	11/96	DATE COMPL	ETED: 4	/12/96	
DEPTH (FT)	ANALYTICAL SAMPLE	HNU SCAN (ppm)	LITHOLOGIC DESCRIPT	ION	GRAPHIC LOG	HNU HDSP (ppm)	COMMENTS
20		460 33 130 510 315 450	SAND, as above. SAND, 5YR 8/1, medium-grained, modera CLAY, 5G 2/1, hard, low plasticity, dry. CLAY, as above. SAND, trace GRAVEL, 5YR 8/1, sand is coarse-grained, gravel up to 0.2 inch i sub-rounded, moderate sorting, damp, SAND, 5YR 8/1, medium-grained, well so well rounded, damp. No recovery.	very n diameter, soft.		140	Contamination starts at approx. 21.8'
		610	SAND, as above. SAND, some GRAVEL, 5YR 8/1, sand is coarse-grained, gravel up to 0.3 inch i poorly sorted, sub-rounded, soft, damp		0.00	210	
30-		6	No recovery.				
		530 620 300	SAND, some GRAVEL, as above. SAND, little GRAVEL, sand is very coar gravel up to 0.2 inch in diameter, soft, sorted, well rounded, damp. No recovery.			520	
-		517	SAND as above, moist. SAND, some GRAVEL, 5YR 8/2, sand is coarse-grained, poorly sorted, soft, da No recovery.				
35-		550	SAND, some GRAVEL, 10G 6/2, sand is coarse-grained, gravel up to 0.4 inch i poorly sorted, soft, damp, some green (glauconite). CLAY, 10R 6/6, some very fine SAND, fi	n diameter, mineral	0.000	620	
1		515 310	plasticity, damp. CLAY, as above.				
40		405					-

F

Í

Page 3 of 3

rsons Eng	gineering S	Science				Page 3 of 3
		Drilling Log -	- Fort Bliss			
PROJECT	: FORT B	LISS BIOVENTING	BORING NO .: MI	P-B		
SITE LO	CATION: E	BUILDING 675, LPST 98508	DRILLING METH	IOD: 3	-INCH I	D HOLLOW STEM AUGER
LOGGED	BY: DAN	SWITEK	SAMPLING METH	HOD: 2	.5-F00	T SPLIT SPOON
DRILLIN	G CONTRA	CTOR: TIERRA DRILLING	BOREHOLE DIA	METER	: 8 INCI	HES
DRILLER	JOHN Mc	DUFFEY	REF. LOGBOOK:	1		
DRILLIN	S RIG: CM	E 75	TOTAL DEPTH	(FT BC	SSL): 57	.5
DRILLING	START:	4/11/96 (1210)	WATER FOUND:	48		
	5 END: 4/	/11/96	DATE COMPLET	ED: 4/	/12/96	
CDEPTH (FT)	HNU SCAN (ppm)	LITHOLOGIC DESCRIPT	ION	GRAPHIC LOG	HNU HDSP (ppm)	COMMENTS
40		CLAY, as above (increasing sand).				8
		CLAY, as above (increasing sand). SAND, 10YR 6/2, sand is very fine-grain moderate sorting, sub-rounded, some of laminae, soft, damp.			340	
45-		SAND as above, but fine-grained.				
		SAND, as above. SAND, 5GY 4/1, coarse-grained, well so sub-rounded, soft, wet.	rted,	///		Water found at 48'
50-	210 510 660 650 610 660 600	CLAY, 5YR 3/4, firm, low plasticity, dry. SAND, as above. CLAY, as above. SAND, some CLAY, 5YR 5/6, sand is ver fine-grained, low plasticity, well sorted,	y soft, wet.			
	200 270 610	SAND, little SILT, N2, sand is very coar moderate to poor sorting, well rounded, SAND, as above with some gravel up to diameter. SAND, 5GY 2/1, coarse-grained, poorly rounded, loose, wet.	soft. 0.2 inch in		340	
55-	650 610	Sand, as above. SAND, 10YR 5/4, very coarse-grained, sorted, well rounded, wet.	poorly		690	
-		Total depth = 57.5 feet.				<b>.</b>

Page 1 of 3

Parson	s Engin	eering S	Science				Page 1 of 3
			Drilling Log -	Fort Bliss	5		
PRO	JECT:	FORT B	LISS BIOVENTING	BORING NO .: I			
SIT	E LOCA	TION: E	BUILDING 675, LPST 98508	DRILLING MET	HOD: 3	-INCH I	D HOLLOW STEM AUGER
LOG	GED BY	: DAN S	SWITEK	SAMPLING MET	THOD: 2	2.5-F00	T SPLIT SPOON
DRI	LLING (	CONTRA	CTOR: TIERRA DRILLING	BOREHOLE DI	AMETER	: 8 INC	HES
DRI	LLER:	JOHN Mc	DUFFEY	REF. LOGBOOK	(: 1		
DRI	LLING F	RIG: CM	E 75	TOTAL DEPTH	(FT BC	SSL): 32	2.5
DRI	LLING S	START:	4/11/96 (0755)	WATER FOUND	: NA		
DRI	LLING E	END: 4/	11/96 (0935)	DATE COMPLE	TED: 4	/11/96	
о осертн (FT)	ANALYTICAL SAMPLE	HNU SCAN (ppm)	LITHOLOGIC DESCRIPTI	ON	GRAPHIC LOG	HNU HDSP (ppm)	COMMENTS
0		0	SAND, some CLAY, 10YR 6/2, trace calic medium-grained, trace of gravel, soft, d				
-		0	SAND, little CLAY, 10YR 6/2, some 1-inch caliche, clay is medium plastic, damp, medium-grained sand. No recovery, moist.	zones of			Soil is very soft preventing good recovery (probably fill).
5		0	CLAY, some SAND, 10YR 6/8, sand is fine medium plastic, soft, moist. CLAY, little SAND, 10YR 6/2, very plastic moist. No recovery.				
-		0	SAND, some CLAY, 10YR 6/2, sand is fine well sorted, damp, quartz gravel at 8.2. No recovery.	e-grained,			
10-		0	SAND, some CLAY, 10YR 6/2, sand is fine medium-grained, clay is medium plastic, i sorting, soft, damp.				
		-	CLAY, little SAND, sand is medium-graine plasticity, damp.	ed, firm, Iow			Natural - 11.7'

Page 2 of 3

ľ

Parson	s Engin	eering S					Page 2 of 3
			Drilling Log	- Fort Blis	SS		
			LISS BIOVENTING	BORING NO .:			
SIT	E LOCA	TION: E	BUILDING 675, LPST 98508				D HOLLOW STEM AUGER
LOG	GED BY	: DAN S	SWITEK				T SPLIT SPOON
DRI	LLING (	CONTRAC	CTOR: TIERRA DRILLING	BOREHOLE D	DIAMETER	: 8 INC	HES
DRI	LLER:	JOHN Mc	DUFFEY	REF. LOGBO			
DRI	LLING F	RIG: CM	E 75	TOTAL DEPT	H (FT BC	SSL): 32	
DRI	LLING	START:	4/11/96 (0755)	WATER FOUN			
DRI		END: 4/	11/96 (0935)	DATE COMPL	ETED: 4	/11/96	
<b>(L1)</b> 12.5-	ANALYTICAL SAMPLE	HNU SCAN (ppm)	LITHOLOGIC DESCRIPT	ION	GRAPHIC LOG	HNU HDSP (ppm)	COMMENTS
12.5			SAND, 5YR 8/1, sand is coarse- to ver				
		0	coarse-grained, poorly sorted, soft, d	amp.			
			CLAY, little SAND, 10YR 6/2, sand is fin soft, low plastic, damp. CLAY, little GRAVEL, little SAND, 5YR 5 medium-grained, gravel up to .2 inch in	/2, sand is			
-		2.5	SAND, little GRAVEL, 5YR 8/1, sand is coarse-grained, poorly sorted, soft, d			2.4	
17.5-			SAND, some GRAVEL, 5YR 8/1, sand is very coarse-grained and moderately s up to .3 inch in diameter, soft, damp. No recovery.	sorted, gravel	0.00.0 0.00.0 0 0.00.0 0		
			GRAVEL, some SAND, 5YR 8/1, gravel u in diameter, sand is very coarse-grain sorted, soft, damp.	p to 1.1 inches ed and poorly	000 000 000 000 000 000 000		
			SAND, trace GRAVEL, sand is medium t coarse-grained, gravel up to .3 inch in soft, poorly sorted.	diameter,	0.000		
		4.5	SAND, little GRAVEL, 10YR 6/2, sand is coarse-grained, gravel up to .5-inch in moderate sorting, well rounded, soft, d	n diameter,			
22.5-		3.5	SAND, trace SILT, 10YR 6/2, sand is	200			
		170	medium-grained, poorly sorted, soft, d	ապ,			No odor; analytical sample at 23–24' (BTEX).
-		260					
		230					
-		480					

Page 3 of 3

Parsons Engir	ieering S	Science				Page 3 of 3
·····		Drilling Log -	- Fort Blis	S		
PROJECT:	FORT B	LISS BIOVENTING	BORING NO .:			
SITE LOCA	TION: E	BUILDING 675, LPST 98508	DRILLING ME	THOD: 3	-INCH	D HOLLOW STEM AUGER
LOGGED B	r: DAN S	SWITEK	SAMPLING M	ETHOD: 2	2.5-F00	T SPLIT SPOON
DRILLING	CONTRAC	CTOR: TIERRA DRILLING	BOREHOLE D	IAMETER	: 8 INC	HES
DRILLER:	JOHN Mc	DUFFEY	REF. LOGBO	<u> ж. 1</u>		
DRILLING	RIG: CM	E 75	TOTAL DEPT	н (FT B(	SSL): 3	2.5
DRILLING	START:	4/11/96 (0755)	WATER FOUN	ID: NA		
DRILLING	END: 4/	11/96 (0935)	DATE COMPL	ETED: 4	/11/96	,
52 DEPTH (FT) ANALYTICAL SAMPLE	HNU SCAN (ppm)	LITHOLOGIC DESCRIPT	(ON	GRAPHIC LOG	HNU HDSP (ppm)	COMMENTS
-	170	SAND, trace SILT, 10YR 6/2, sand is me coarse-grained, sub-rounded, soft, por damp.				
20		SAND, as above, GRAVEL lens at 28.4- up to .6 inch in diameter.	28.6', grave!		190	
30-		SAND, some GRAVEL, sand is medium- t coarse-grained, gravel up to .2 inch in sand coarsens down to very coarse-gr poorly sorted, damp.	diameter,			
35-		Total depth = 32.5 feet.				

Page 1 of 2

arson	s Engin	eering S	icience				Page 1 of 2
			Drilling Log -	Fort Blis	S		
PRO	JECT:	FORT BL	ISS BIOVENTING	BORING NO .:	MPBG		
SITE	E LOCA	TION: E	BUILDING 675, LPST 98508	DRILLING ME	THOD: 3	-INCH I	D HOLLOW STEM AUGER
LOG	GED BY	C DAN S	SWITEK	SAMPLING ME	THOD: 2	2.5-F00	T SPLIT SPOON
DRI	LLING (	CONTRAC	CTOR: TIERRA DRILLING	BOREHOLE DI	IAMETER	: 8 INC	HES
DRI	LLER:	JOHN Mc	DUFFEY	REF. LOGBOO	<u>K: 1</u>		
DRI	LLING F	RIG: CM	E 75	TOTAL DEPTH	I (FT BO	SSL): 32	2
DRI	LLING S	START:	4/13/96	WATER FOUND	D: NA		
DRI		END: 4/	13/96 (1025)	DATE COMPLE	ETED: 4	/13/96	····
OEPTH (FT)	ANALYTICAL SAMPLE	HNU SCAN (ppm)	LITHOLOGIC DESCRIPTI	ON	GRAPHIC LOG	HNU HDSP (ppm)	COMMENTS
		0	SAND, some CLAY, some GRAVEL, grayis (10YR 7/4), sand is fine-grained, grave inches, low plasticity, moderately sorted	lup to 0.5	E C		Gravel probably from surface.
		0	No recovery. SAND, some SILT, fine-grained, poorly s dry.	sorted, firm,			
5-			SAND, same as above.				
			SAND, little GRAVEL, grayish-orange (1 coarse-grained, poorly sorted, sub-ang dry.		0.0.0 0.0.0		
10-		0	No recovery. SAND, grayish-orange pink (5YR 7/4), o very coarse-grained at top, fines towal poorly sorted at top, moderately sorted	rds bottom,			
•			soft, dry. No recovery.				
15-		1.8	SAND, some GRAVEL, grayish-orange pi 7/4), sand is coarse- to very coarse-g gravel up to 0.4 inches, poorly sorted, t	rained,	0.0.1.0.0		Analytical sample.
			SAND, some CLAY, grayish-orange pink coarse-grained, poorly sorted, dense, t		0.00		Very hard drilling; Cement-like from 15.9-16.3'
			SAND, some GRAVEL, grayish-orange( poorly sorted, soft, dry.	IOYR 7/4),	$\left \right\rangle$		
			No recovery.		VV		
20-		0	SAND, grayish-orange pink (5YR 7/4), poorly sorted, sub-rounded, soft, damp.				
-		0	SAND, trace GRAVEL, grayish-orange p 7/4), medium- to coarse-grained, poort sub-rounded.		• • • • •		
-	1				יאן		

SITE LOCATION: LOGGED BY: DAN	Drilling Log - BLISS BIOVENTING BUILDING 675, LPST 98508 I SWITEK ACTOR: TIERRA DRILLING MCDUFFEY ME 75 4/13/96 (1025) LITHOLOGIC DESCRIPTI SAND, some GRAVEL, 5YR 7/2, coarse- coarse-grained, some gravel up to 1 incl diameter, poorly sorted, sub-angular, so hornblende, soft, dry. SAND, some GRAVEL, 5YR 7/2, sand is medium-grained, poorly sorted, subangu	BORING NO.: DRILLING MET SAMPLING ME BOREHOLE DI REF. LOGBOOH TOTAL DEPTH WATER FOUND DATE COMPLE	MPBG THOD: 3-INCH THOD: 2.5-FC IAMETER: 8 IN K: 1 H (FT BGSL):	32
SITE LOCATION: LOGGED BY: DAN DRILLING CONTRA DRILLER: JOHN M DRILLING RIG: CN DRILLING START: DRILLING END: 4	BUILDING 675, LPST 98508 SWITEK ACTOR: TIERRA DRILLING MCDUFFEY ME 75 4/13/96 1/13/96 (1025) LITHOLOGIC DESCRIPTI SAND, some GRAVEL, 5YR 7/2, coarse- coarse-grained, some gravel up to 1 incl diameter, poorly sorted, sub-angular, so hornblende, soft, dry. SAND, some GRAVEL, 5YR 7/2, sand is medium-grained, poorly sorted, subangu	DRILLING MET SAMPLING ME BOREHOLE DI REF. LOGBOON TOTAL DEPTH WATER FOUND DATE COMPLE	THOD: 3-INCH THOD: 2.5-FC IAMETER: 8 IN K: 1 H (FT BGSL): D: NA ETED: 4/13/96 HNU HDSF (ppm	ICHES
SITE LOCATION: LOGGED BY: DAN DRILLING CONTRA DRILLER: JOHN M DRILLING RIG: CN DRILLING START: DRILLING END: 4	BUILDING 675, LPST 98508 SWITEK ACTOR: TIERRA DRILLING MCDUFFEY ME 75 4/13/96 1/13/96 (1025) LITHOLOGIC DESCRIPTI SAND, some GRAVEL, 5YR 7/2, coarse- coarse-grained, some gravel up to 1 incl diameter, poorly sorted, sub-angular, so hornblende, soft, dry. SAND, some GRAVEL, 5YR 7/2, sand is medium-grained, poorly sorted, subangu	SAMPLING ME BOREHOLE DI REF. LOGBOOH TOTAL DEPTH WATER FOUND DATE COMPLE	THOD:       2.5-FC         IAMETER:       8 IN         K:       1         H       (FT BGSL):         D:       NA         ETED:       4/13/96         H       HNU         HDSF         (ppm         0: N0	ICHES
LOGGED BY: DAN DRILLING CONTRA DRILLER: JOHN M DRILLING RIG: CN DRILLING START: DRILLING END: 4	ACTOR: TIERRA DRILLING ACTOR: TIERRA DRILLING ACDUFFEY ME 75 : 4/13/96 1/13/96 (1025) LITHOLOGIC DESCRIPTI SAND, some GRAVEL, 5YR 7/2, coarse- coarse-grained, some gravel up to 1 incl diameter, poorly sorted, sub-angular, so hornblende, soft, dry. SAND, some GRAVEL, 5YR 7/2, sand is medium-grained, poorly sorted, subangu	BOREHOLE DI REF. LOGBOOI TOTAL DEPTH WATER FOUNE DATE COMPLE	IAMETER: 8 IN K: 1 H (FT BGSL): D: NA ETED: 4/13/96 HNU HDSF (ppm	32 32
DRILLING CONTRA DRILLER: JOHN M DRILLING RIG: CM DRILLING START: DRILLING END: 4	ACTOR: TIERRA DRILLING ICDUFFEY ME 75 : 4/13/96 1/13/96 (1025) LITHOLOGIC DESCRIPTI SAND, some GRAVEL, 5YR 7/2, coarse- coarse-grained, some gravel up to 1 incl diameter, poorly sorted, sub-angular, so hornblende, soft, dry. SAND, some GRAVEL, 5YR 7/2, sand is medium-grained, poorly sorted, subangu	REF. LOGBOOH TOTAL DEPTH WATER FOUND DATE COMPLE	K: 1 H (FT BGSL): D: NA ETED: 4/13/96 HNU HDSF (ppm	32
DRILLER: JOHN M DRILLING RIG: CM DRILLING START: DRILLING END: 4	ACDUFFEY ME 75 : 4/13/96 (1025) LITHOLOGIC DESCRIPTI SAND, some GRAVEL, 5YR 7/2, coarse- coarse-grained, some gravel up to 1 incl diameter, poorly sorted, sub-angular, so hornblende, soft, dry. SAND, some GRAVEL, 5YR 7/2, sand is medium-grained, poorly sorted, subangu	TOTAL DEPTH WATER FOUND DATE COMPLE ON to very h in	H (FT BGSL): D: NA ETED: 4/13/96 UIHAY BD HNU HDSF (ppm	
DRILLING RIG: CM DRILLING START: DRILLING END: 4	ME 75 4/13/96 1/13/96 (1025) LITHOLOGIC DESCRIPTI SAND, some GRAVEL, 5YR 7/2, coarse- coarse-grained, some gravel up to 1 incl diameter, poorly sorted, sub-angular, so hornblende, soft, dry. SAND, some GRAVEL, 5YR 7/2, sand is medium-grained, poorly sorted, subangu	TOTAL DEPTH WATER FOUND DATE COMPLE ON to very h in	H (FT BGSL): D: NA ETED: 4/13/96 UIHAY BD HNU HDSF (ppm	
DRILLING START: DRILLING END: 4	LITHOLOGIC DESCRIPTI SAND, some GRAVEL, 5YR 7/2, coarse- coarse-grained, some gravel up to 1 incl diameter, poorly sorted, sub-angular, so hornblende, soft, dry. SAND, some GRAVEL, 5YR 7/2, sand is medium-grained, poorly sorted, subangu	DATE COMPLE ON to very h in	ATED: 4/13/96 DI HAU HDSF (ppm	
	LITHOLOGIC DESCRIPTI SAND, some GRAVEL, 5YR 7/2, coarse- coarse-grained, some gravel up to 1 incl diameter, poorly sorted, sub-angular, so hornblende, soft, dry. SAND, some GRAVEL, 5YR 7/2, sand is medium-grained, poorly sorted, subangu	ON to very h in		
(FT) (FT) E E	LITHOLOGIC DESCRIPTI SAND, some GRAVEL, 5YR 7/2, coarse- coarse-grained, some gravel up to 1 incl diameter, poorly sorted, sub-angular, so hornblende, soft, dry. SAND, some GRAVEL, 5YR 7/2, sand is medium-grained, poorly sorted, subangu	to very h in	0.0.	
25	coarse-grained, some gravel up to 1 incl diameter, poorly sorted, sub-angular, so hornblende, soft, dry. SAND, some GRAVEL, 5YR 7/2, sand is medium-grained, poorly sorted, subangu	h in		
30	dry. No recovery. SAND, some GRAVEL, very coarse-grain up to 1 inch in diameter, poorly sorted, s damp. SAND, 5Y 7/2, medium-grained, poorly s subangular, damp. Total depth = 32 feet.	ned, gravel subangular,		Analytical sample.
40				
50				

nd original copy by certified mail to: TNRCC		of Texas	Please use Texas Water	Well Drillers Advis	ory Council
ATTENTION OWNER: Confidentiality Privilege Notice on Reverse Side Mon	itor/Vapor Well <sup>WELL</sup>		Au	P.O. Box 13087 Istin, TX 78711-308 512-239-0530	7
) OWNER CDR., USAADA		SS Fort Blise		6 (State)	(Zip)
2) ADDRESS OF WELL: County Paso	Bldg. 675 Fort B (Street, RFD or other)	liss Texas 79		RID # 49-13-	-5
TYPE OF WORK (Check):     New Well     Deepening     Reconditioning     Plugging	4) PROPOSED USE (Check): X Industrial Irrigation In If Public Supply well, were plans so		] De-watering [] Testwell	ic <b>5)</b>	
5) WELL LOG: Date Drilling: Started <u>Apr.12</u> 1996 Completed <u>Apr.13</u> 1996	DIAMETER OF HOLE           Dia. (in.)         From (ft.)         To (ft.)           12         Surface         55		Aud Rotary XX Bored Cable Tool   Jetted		ف
0 to 10ft., Fill, 10 to 20, Sand, br		If Gravel Packed give	Gravel Packed	other <b>SIO2 8</b> ft. to 55	/all -16 ft.
20 to 25, Clay, so 25 to 55, Sand, so sorted, 30-32ft.	me silt, poorly	New Steel, Pla Dia. or Perf., Slo		Setting (ft.) From To	Gage Castir Scree
35-37ft.	clay, brown, damp s encountered	2 N PVC.	Mfg., Screen Mfg. Screen Mfg.	0 15 15 45 45 55	B1k. 0.04 0.02
(Use reverse side	) if necessary)	Cemented from Bentonite Method used Cemented by	11 ft. to 15 ft. Iand Mix/ Gra Lerra Drillin	g	2 ceđ
13) TYPE PUMP: N/X Turbine Jet Submers Other	ible 🗌 Cylinder	Method of verification	n of above distance <b>V18U</b>	al LUST	site
Depth to pump bowls, cylinder, jet, etc., 14) WELL TESTS: N/A Type test: Pump Bailer Yield: gpm with	Jetted Estimated	Specified Steel SI Pitless Adapter U	Slab Installed [Rule 338.44 eeve Installed [Rule 338.44 sed [Rule 338.44(3)(b)] tive Procedure Used [Rule 3	4(3)(A)] 38.71]	
15) WATER QUALITY: Did you knowingly penetrate any strata constituents?		Artesian flow		Date	1 12-9
X Yes D No If yes, submit "REF Type of water? Natural Was a chemical analysis made?	PORT OF UNDESIRABLE WATER* Depth of strata				
t hereby certify that this well was drilled by m understand that failure to complete items 1 th <b>Tierra Dri</b> Company NAME <b>BINY FORMENTAL</b> (Typ	hru 15 will result in the log(s) being returne <b>11ing and</b> be or print) <b>Services</b> INC	WELL DRILLER'S LI	CENSE NO		ief. I
ADDRESS	rRFD)	aso, Texas 79 (City) (Signed)	(Sta	•	(Zip)
	ease attach electric log, chemical analys	iis, and other pertinent info			

nd original copy by certified mail to: TNRCC, P.O. Box 13087, Austin, TX 78711-308	7				Ple	ase use blac	k ink.	
	of Te	ODT	and	2	Texa	P.C Austin	l Drillers Advis D. Box 13087 I, TX 78711-308 12-239-0530	•
OWNER CDR., USAADACENSB ADDRI		For		88,	Texas	<b>79906</b> (City)	(State	) (Zip)
(Name) ADDRESS OF WELL: County <u><b>B1 Paso</b></u> (Street, RFD or other)	<b>1188</b> ((	```			(Zip)		(Sidle	
		Publ		🗌 De-v		Domestic Testwell	5)	
WELL LOG:       DIAMETER OF HOLE         Date Drilling:       Dia. (in.)       From (ft.)       To (ft.)         Started Apr.12 19 96       8       Surface       46         Completed Apr.13 19 96       96       96       96		🗌 Air R 🗌 Air H		] Mud Ro	otary XX Bo Tool 🔲 Je	red		Ň
rom (ft.) To (ft.) Description and color of formation material to 10ft., Fill, sand, brown, moist. 0 to 20, Sand, brown, moist.	-	🗌 Unde	le Comple erreamed I Packed g	G	eck): 🗌 C ravel Packed al from		Straight V     SEE	Vall <b>B belo</b> ft.
0 to 25, Clay, soft, brown, moist. 5 to 46, Sand, some silt and gravel,		SING, BL			ELL SCREEN		<u>.</u>	·
poorly sorted, tan, dry, clay seems at 34 and 39ft.	Dia. (in.)	New or Used <b>N</b>	Perf., S Screer	_			Setting (ft.) rom To	Gage Castin Screer
Hydrocarbons encountered.	1*	N	PVC	Scre	en Mfg	1. 15.	1 16.	0 0.02
X #8 Borehale Completion	•5	N N			STG-2 en Mfg	0		
13 to 16ft, SIO2 8-16 16 to 30ft. Bentonite 30 to 32ft, SIO2 8-16	Ben	CEMEN Cemente iton	TING DAT ed from Lte	rA [Rule 0 8	338.44(1)] ft. to1 ft. to1	tt. No.	of sacks used	2
		Method (			a Dril			
(Use reverse side if necessary)         ,           3) TYPE PUMP:         N/A           □ Turbine         □ Jet         □ Submersible         □ Cylinder	_	Distance Method	e to septic of verificat	ion of abo	eld lines or oth ove distance	er concentra 1 sua 1	ated contamina	tion 0 ft Site
Other Depth to pump bowls, cylinder, jet, etc.,ft.	X			ice Slab li	nstalled (Rui			
4) WELL TESTS: N/A Type test: Pump Bailer Jetted Estimated		Pitles Appre	ss Adapter oved Alter	r Used [ mative Pro	Rule 338.44(3 ocedure Used	)(b)]		
Yield: gpm with ft. drawdown after hrs. 5) WATER QUALITY: Did you knowingly penetrate any strata which contained undesirable	11)	WATER Static lev Artesian	LEVEL: vel flow	0 <sup>ft</sup>	. below land su	nface 1.	Apr. Date	12-96
constituents?	12)	PACKE	RS: 1	N/A		Туре	D	epth
Was a chemical analysis made? Yes No hereby certify that this well was drilled by me (or under my supervision) and that each inderstand that failure to complete items 1 thru 15 will result in the log(s) being returne <b>Tierra Drilling and</b> <b>Environmental</b> (Type or print) <b>Services Inc</b> <b>Sage Mace St., Suite A-1, E1</b> (Street or RFQ)		WELL DF	AILLER'S	Ticensi	299 ENO. 32	24W		ief. l (Zip)
Signed) (Licensed Well Driller)	(	(Signed)	<del></del>		(Regist	ered Driller 1	Frainee)	
Please attach electric log, chemical analys	is, and	other pe	rtinent in	formatio	n, if available	•		

riginal copy by certified mail to: TNRCC	, P.O. Box	13087, Austin, '	TX 78711-3	087			Please	use black ink.		
ATTENTION OWNER: Confidentiality Privilege Notice on Reverse Side		two of String	Ctal		xas ORT		Texas Wa	ter Well Dril P.O. Bo Austin, TX 512-23	x 13087 78711-3087	y Council
1) OWNER CDR., USAADA (National Control Contro	CENSB	1g. 675	ADE	RESS E	ort	(Street or RFD)	<u>Texas 799</u> (City <b>906</b>	/}	(State) <b>49-13-</b>	(Zip)
	(	(Street, RFD or o	other)	(1	City)	(Stat	e) (Zip)		5)	
3) TYPE OF WORK (Check): New Well Deepening Reconditioning Plugging			rigation 🗌	Injection	🗌 Pub	lic Supply 📋 🛙	De-watering 🔲 Testv		-,	
6) WELL LOG: Date Drilling: Started Apr • 12 19 96 Completed Apr • 13 19 96	Dia. (in.) 8	AMETER OF H From (ft.) Surface	OLE To (ft.) 46		🗋 Air F 🗋 Air F	lammer 🔲 C	check):  Driven d Rotary XX Bored iable Tool			* N
SEE PAGE ON	E PLE		n material		🔲 Und	erreamed [	(Check): Open ] Gravel Packed	Other S		below
X #8 Borehole Com 32 to 43ft. Benton 43 to 46ft. SIO2	aite	on		CAS	New or	ANK PIPE, AN Steel. Plasti Perf., Slotte		Setti	ng (ft.)	Gage Casting
				(in.) •5 1 •	Used N N	Plasti	, if commercial C Stg- 3 reen Mfg.	From 0 44.2		Screen B1K. 0.02
		······								
(Use reverse side 13) TYPE PUMP: N/A Turbine Jet Submers Other		ץ) Cylinder			Cemen Method Cemen Distanc Method	used	tt. to	ft. No. of se	acks used acks used	
Depth to pump bowls, cylinder, jet, etc.,         14) WELL TESTS:         Type test:       Pump         Bailer         Yield:      gpm with	_ Jetteo	d [] Estima			Spe	cified Surface SI cified Steel Slee ss Adapter Used roved Alternative	ab Installed [Rule 33 ve Installed [Rule 338 d [Rule 338.44(3)(b)] e Procedure Used [Rul	8. <b>44(3)(A)]</b>		
15) WATER QUALITY:       See       pg         Did you knowingly penetrate any strata constituents?	which conta	NDESIRABLEV	VATER"	12)	Artesia		ft. below land surfac gpm.		Dept	
Type of water? Was a chemical analysis made?			=							
I hereby certify that this well was drilled by n understand that failure to complete items 1 t Tierra Dri Environmental (Type 5309 Mace St	hru 15 will re Lling De or print)	esult in the log(s and Servi	i) being retu CCB I	ned for co	mpletion	and resubmitta	NSE NO	f my knowled	ge and belief.	. I
ADDRESS (Street o	r RFD	11-			(City)	)		(State) Driller Train		ip)
	ease attach	electric log, ch	nemical ana	alysis, and	other p	ertinent inform	ation, if available.			

Send original copy by certified mail to: TNRC	C, P.O. Box 13087, Austi	n, TX 78711-3087	7				Please	use black ink	с	
ATTENTION OWNER: Confidentiality Privilege Notice on Reverse Side	MP-B page <b>one</b> (	State WELL	of Te REP	ORT	1 an	ið 2	Texas Wa	P.O. Bo Austin, TX	llers Advisory 5x 13087 78711-3087 39-0530	Council
1) OWNER CDR., USAAD				Fort		58, 1	exas 79 (Cit	906 v)	(State)	(Zip)
2) ADDRESS OF WELL: County <u>E1 Paso</u>	Bldg. 67! (Street, RFD of			City)	lexas	<b>799(</b> (State)	) <b>6</b> (Zip)	GRID #	49-13-	5
3) TYPE OF WORK (Check): X New Well Deepening Reconditioning Plugging	4) PROPOSED USE	Irrigation 🔲 Inj	jection	🗋 Pub	lic Supply	🗋 De-wa	tering 🔲 Test	1	5)	
6) WELL LOG: Date Drilling: Started Apr. 11 19 96 Completed Apr. 13 19 96	DIAMETER OF Dia. (in.) From (ft. 8 Surface	) To (ft.)	7)	📋 Air F 🗋 Air H	lotary [ lammer		ary <b>X</b> Bored		1	i N
From (ft.) To (ft.) Descrip 0 to 10ft., Fill ( 10 to 20ft. Sand,		moist.		🔲 Und	erreamed		ck):  Oper vel Packed from	Other S		
		poorly	CAS Dia. (in.)	New or	Steel, Perf.,	E, AND WE Plastic, etc. Slotted, etc. n Mfg., if co			ing (ft.) Tọ	Gage Casting Screen
35-37	clay, brow clay, brow	n, damp n, mo.	.5 1* .5 1*	N N N N	PVC P1a	Scree	STG-1 n mfg. STG-2 n mfg.	0 15.2 0 31.2	31.2	B1k. 0.02 B1k. 0.02
X #8 Borehole Comp 15 to 17ft. SIO2 8- 17 to 31ft. Benton 31 to 32ft. SIO2 8- (Use reverse side 13) TYPE PUMP: N/A	-16 lte -16		9)	CEMEN Cement Sentc Method Cement Distanc	ITING DA ied from ied from ist te ist te i	IA [Rule 3 0 13 Hand Ticz	338.44(1)] ft. to <b>13</b>	ft. No. of s ravit. ling	y Plac:	ed
<ul> <li>Turbine ] Jet ] Submers</li> <li>Other</li> <li>Depth to pump bowls, cylinder, jet, etc.</li> <li>14) WELL TESTS: N/A</li> <li>Type test: ] Pump ] Bailer</li> <li>Yield:gpm with</li> </ul>	ft.			Spec	cified Stee ss Adapte roved Alter	ace Slab Ins i Sleeve Ins r Used [Ri	talled [Rule 33 talled [Rule 33 ule 338.44(3)(b)] edure Used [Rul	8.44(3)(A)]		
15) WATER QUALITY: Did you knowingly penetrate any strata constituents?				Static le Artesiar	flow	17 0 ft. t	elow land surfac	Date		
XX Yes No If yes, submit "REF Type of water? Natural Was a chemical analysis made?	PORT OF UNDESIRABLE	WATER*	12)	PACKE	RS: 1	-/ A		Туре	Depth	
	hru 15 will result in the log 111ing and e or print) Servi	(s) being returned	d tor co	WELL D	and resut	LICENSE	2004		lge and belief.	
ADDRESS 5309 Mace St (Street o (Signed) 0 m (License	r RED) C )			(City) (Signed)		9932		(State) I Driller Train	(Ziç ee)	-
, Ple	ase attach electric log, c	chemical analys	is, and	other pe	ertinent in	formation,	if available.			
NRCC-0199 (Rev. 11-01-94)										

iend criginal concentration mail to: TNRCC, P.O. Box 13087, Austin, TX 78711-3087	Please use black ink.
ATTENTION OWNER: Confidentiality MP-B State	of Texas Water Well Drillers Advisory Council P.O. Box 13087 REPORT Austin, TX 78711-3087
1) OWNER CDR., USAADACENSE ADDRE (Name)	SS Fort P1198, Texas 79906 (Street or RFD) (City) (State) (Zip)
2) ADDRESS OF WELL: County <u>E1 Paso</u> (Street, RFD or other)	Iss, Texas         79906         GRID #         49-13-5           (City)         (State)         (Zip)         GRID #         49-13-5
Reconditioning Plugging     If Public Supply well, were plans su     DIAMETER OF HOLE     Dis (in) From (tt) To (tt)	iection  Public Supply  De-watering  Testwell ibmitted to the TNRCC?  Yes  No
Date Drilling:     Dia. (iii.)     Prom (ii)     room       Started     ADr.11     19     96     8     Surface     58       Completed     ADr.13     19     96     96     96	Air Rotary Mud Rotary A Bored  Air Hammer Cable Tool Jetted  Other
From (ft.) To (ft.) Description and color of formation material SEE PAGE ONE PLEASE	Borehole Completion (Check):      Open Hole     Straight Wall     Underreamed     Gravel Packed     K     Other     SEE     SEE     Selov     If Gravel Packed give interval from     ft. to     ft.
X #8 Borehole completion	CASING, BLANK PIPE, AND WELL SCREEN DATA: New Steel, Plastic, etc. Setting (ft.) Gage Dia. or Perf., Slotted, etc. Casting (in) Llsed Screen Min., if commercial From To Screen
32 to 43ft. Bentonite 43 to 46ft. SIO2 8-16 46 to 58ft. Bentonite	(in.)UsedScreen Mfg., if commercialFromToScreen.5NPlastic STG-3044.2Blk.1*NPVC Screen mfg.44.245.0C.02
	9) CEMENTING DATA [Rule 338.44(1)] See page one
(Use reverse side if necessary)  13) TYPE PUMP: N/A  TurbineJet Submersible Cylinder	Cemented fromft. toft. No. of sacks used ft. toft. No. of sacks used Method used Cemented by Distance to septic system field lines or other concentrated contaminationft. Method of verification of above distance
Other Depth to pump bowls, cylinder, jet, etc.,ft.  14) WELL TESTS: N/A  Type test: Pump Bailer Jetted Estimated	10) SURFACE COMPLETION         Specified Surface Slab Installed [Rule 338.44(2)(A)]         Specified Steel Sleeve Installed [Rule 338.44(3)(A)]         Pitless Adapter Used [Rule 338.44(3)(b)]         Approved Alternative Procedure Used [Rule 338.71]
Yield:      ft. drawdown afterhrs.         15) WATER QUALITY:       See page one         Did you knowingly penetrate any strata which contained undesirable	11) WATERLEVEL:       See page one         Static levelft. below land surface       Date         Artesian flowgpm.       Date
constituents?          Yes       No       If yes, submit "REPORT OF UNDESIRABLE WATER"         Type of water?       Depth of strata         Was a chemical analysis made?       Yes       No	12) PACKERS: N/A Type Depth
I hereby certify that this well was drilled by me (or under my supervision) and that each understand that farure to complete items 1 thru 15 will result in the log(s) being returne COMPANY NAME Tierra Drilling and Environmental (Type or print) Services In ADDRESS 5309 Mace St., Suite A-1 E1 P	WELL DRILLER'S LICENSE NO. 2994W
ADDRESS	(City) (State) (Zip) (Signed) (Registered Driller Trainee)
	sis, and other pertinent information, if available.

original copy by certified mail to: TNRCC	. P.O. Box 13087, Austir	n, TX 78711-308	7				Please u	se black ink.		
ATTENTION OWNER: Confidentiality Privilege Notice on Reverse Side	MP-C	State WELL	of Te REP	ORT				ter Well Drill P.O. Bo Austin, TX 512-23	<b>78711-3</b> 087	Council
	page_one_(	of two	- 5	tri.	<del>ng 1 a</del> i	nd 2				
OWNER <u>CDR.</u> USAADA (Nar	CENSB						<b>.s 799</b> (City	<b>06</b>	(State)	(Zip)
ADDRESS OF WELL: County <u><b>R1</b></u> <b>Paso</b>	Bldg. 671 (Street, RFD c						(ip)	GRID # 4	9-13-5	
TYPE OF WORK (Check):  New Well  Reconditioning  Plugging	4) PROPOSED USE	Irrigation 🗌 In	jection	🗌 Pub	lic Supply	De-watering			5)	
) WELL LOG: Date Drilling:	DIAMETER OF Dia. (in.) From (ft.	) To (ft.)		🗋 Air F	NG METHOD lotary 🔲 M lammer 🔲	lud Rotary	🐒 Bored			4
Started <u>Apr. 11</u> 19 <u>96</u> Completed <u>Apr. 13</u> 19 <u>96</u>	8 Sunace		1		er				,	Ń
rom (ft.) To (ft.) Descript	ion and color of formati			🔲 Und		🗌 Gravel Pa	acked 🛛 🕱	Other SE	Straight Wall	
10 to 20 Sand, bro	t, brown, I		ļ		ANK PIPE, A				to	K.
dry.	orly sorted	, tan,	Dia. (in.)	New or Used	Steel, Plas Perf., Slot Screen Mi		rcial	Settin From	ng (ft.) To	Gage Casting Screen
Hydrocarbons encou	intered		•5 1*	N N		tic ST creen		0 14.7	14.7 15.5	BLK. 0.02
X #8 Borehole Comp1 12.5 to 15.5 SIO2 6	1-16		.5 1*	N N		tic ST creen		0 23.2	23.2 24.0	BLK. 0.02
15.5 to 22.0 Benton 22.0 to 24.7 SIO2 & (Use reverse side 3) TYPE PUMP: N/A	3–16 if necessary)		Ben	Cement ton: Method	used Han used Han redby	D ft. to B ft. to nd Mix erra D	8 12.5 / Gra prilli	ft. No. of se vity ng	acks used Placed contamination	<u> </u>
Turbine Jet Submersi Other Depth to pump bowls, cylinder, jet, etc.,				🗱 Spe	CE COMPLE	Slab Installed				
	Jetted Estim			Pitle	cified Steel Sle ss Adapter Us roved Alternat	ed [Rule 33	38.44(3)(b)]			
Yield: gpm with 5) WATER QUALITY:	<u> </u>		11)	Static le	R LEVEL:	•	land surface		Apr.1	
Type of water? None	which contained undesira ORT OF UNDESIRABLE Depth of strata 201 Yes 2 No	WATER"	12)	PACKE	RS: <b>N/</b> /	A		Гуре	Depth	
Environmental (Typ	illing and or print) Servic		• 101 COI	WELL, D	RILLER'S LIC	CENSE NO.			ge and belief.	
Signed) 5309 Mace St (Street or Signed)	RFD in the			(City)				(State) Driller Train	(Zip	>}
	ase attach electric log,	chemical analys	ais, and		ertinent infor					

end original copy by certified mail to: TNRC	C, P.O. Box 13087, Austin, T	X 76711-3087	,				Please L	ise black ir	nk.	
ATTENTION OWNER: Confidentiality Privilege Notice on Reverse Side	MP-C page two of	State	of Te		g 3		Texas Wa	P.O. E Austin, T	rillers Advisor 30x 13087 X 78711-3087 239-0530	y Council
1) OWNER <u>CDR USAAD</u> (Na 2) ADDRESS <u>OF WELL</u> :	ame)				(Street or	RFU)	(00)	0	(State)	(Zip)
County El Paso	Bldg. 675 (Street, RFD or ot			B 🤊 🤉 City)	rexas	(State)	(Zip)	GRID #	49-13-5	· · · · · · · · · · · · · · · · · · ·
3) TYPE OF WORK (Check): XX New Well Deepening Reconditioning Plugging	4) PROPOSED USE (Ch Industrial Inrig If Public Supply well, v	neck): An Inj gation Inj were plans su	Monitor ection	r 🗌 Pub	lic Supply	ental Soil Bori De-water	ng [] Dom ring [] Testv		5)	
6) WELL LOG: Date Drilling: Started Apr.11 19 96 Completed Apr.13 19 96	DIAMETER OF HO Dia. (in.) From (ft.)   B Surface	To (ft.) 33		<ul> <li>Air F</li> <li>Air F</li> <li>Othe</li> </ul>	Rotary [ lammer er		Jetted			• N
	otion and color of formation i	material			le Comple erreamed	etion (Check)	: COpen	Hole [ Other	Straight Wall	below
SEE PAGE ON	E PLEASE			_		_			t. to	
			CAS	ING, BL	ANK PIPI	E, AND WELL	SCREEN DA	TA:		
X #8 Borehole Co	mpletion	<u></u>	Dia.	New		Plastic, etc. Slotted, etc.		Se	tting (ft.)	Gage Casting
24.7 to 30.4 Ben	tonite		(in.)	Used	Scree	n Mfg., if comr		From	To <b>31.2</b>	Screen BIK.
30.4 to 23.0 SIO	2 6-8		•5 1*	N N	1	Lastic Screen		31.		0.02
								Saa	page or	
(Use reverse sid	e if necessary)			Cement Method Cement	ted from used ted by	ft.	to to	ft. No. of ft. No. of	sacks used sacks used d contamination	
13) TYPE PUMP:       N/A            Turbine         Jet         Submers         Other         Depth to pump bowls, cylinder, jet, etc			10)		CE COMP	ace Slab Insta	lied [Rule 334			. <u></u>
14) WELL TESTS: N/A Type test:	Jetted     Estimate       ft. drawdown after			Pitle	ess Adapte	rnative Procee	338.44(3)(b)] dure Used [Rul page 01	e 338.71]		
15) WATER QUALITY: Did you knowingly penetrate any strate	a which contained undesirable			Static le	evel		ow land surfac	e Da	te	
constituents?			12)	PACKE	RS: N	/እ		Туре	Dept	h
Type of water? Was a chemical analysis made?	PORT OF UNDESIRABLE WA Depth of strata									
Environmental (T)	thru 15 will result in the log(s) t	being returned	d for cor <b>ne .</b> \	mpletion WELL D	RILLER'S	S LICENSE NO	e to the best of 2994 D	AW	edge and belief.	
ADDRESS				(City)				(State)	(Zi	p)
					)		(Registered	Duller Tra	inee)	
PI	ease attach electric log, che	mical analys	is, and	other p	ertinent ir	nformation, if	available.			
TNRCC-0199 (Rev. 11-01-94)				C C O D'	~					

original copy by certiled mainto. This	C, P.O. Box 13087, Austin, TX 78711-308	<i>.</i>			use black ink.		
TENTION OWNER: Confidentiality ivilege Notice on Reverse Side	MP-D State page one of two	of Texas REPOR	ng 1 and		eter Well Drilie P.O. Box Austin, TX 78 512-239-	13087 9711-3087	Council
OWNER CDR., USAADA	CENSB	ESS For	t Bliss	Texas 7990	06		
(Na	ame)		(Street or RFD)	(City	y)	(State)	(Zip)
ADDRESS OF WELL Paso	Bldg. 675 Fort	Blise,			GRID # 49	-13-5	
	(Street, RFD or other)	(City)	(Sta				
TYPE OF WORK (Check):         New Well       Deepening         Reconditioning       Plugging	4) PROPOSED USE (Check):	njection 🔲 F		De-watering 🔲 Testv		1	
WELL LOG:	DIAMETER OF HOLE	7) DRIL	LING METHOD (C				
Date Drilling: Apr.13 96	Dia. (in.)         From (ft.)         To (ft.)           8         Surface         33		r Rotary 🔲 Mu	• =	. 1		٥
Started	Surface 33	7 -	rHammer 📋 C her	Cable Tool 🛛 Jetted			•
Completed19							Ń
m (ft.) To (ft.) Descrip	tion and color of formation material	8) Bore	hole Completion	(Check): 🗌 Open	Hole 🛛 S	traight Wall	
urface to 33ft. 5				Gravel Packed			
silt and gr	avel, dense, tan,	lf Gra	vel Packed give in	iterval from	ft. to		ft.
dry.		CASING,	BLANK PIPE, AN	D WELL SCREEN DA	TA:		
		Ne			Setting	(ft.)	Gage
	<b>__</b>	Dia. or (in.) Use		d, etc. ., if commercial	From	То	Casting Screen
		.5 N		tic STG-1	0	15.2	BIK.
X#8 Borehole Com	pletion	1" N	1	reen mfg. tic STG-2	15.2		).02 3LK.
13 to 16ft. 16 to 23	SIOQ 6-16 Bentonite	•5 N		reen mfg.	1 7 1	24.0	
-23 to 25	SIO2 8-16	<u> -  -</u>			<u> </u>		
	····	9) CEM	ENTING DATA	Rule 338.44(1)] 8			2
	and a second					keurod	
		Bento		Rule 338.44(1)] 8	ft. No. of sac	ks used	
· · · · · · · · · · · · · · · · · · ·	······································	1	<del>- Ha</del>	<del>ne</del> Mi <del>x/ Gi</del>	avity		
// Ico rovorso sid	e if necessary)	- Meth - Cem	dused <b>Tte</b>	nd Mlx/ Gr rra Drilli	ng	Praced	200
(Use reverse side	e if necessary)	- Meth - Cem Dista	He od used The inted by nce to septic syste	md-mark/ Gr rra Drilli m field lines or other	ng	Praced	
TYPE PUMP: N/A		- Meth Cem Dista Meth	He ented by nce to septic syste od of verification of	mt Int Cr	ng	Praced	
TYPE PUMP: N/A	sible 📋 Cylinder	Meth Cem Dista Meth	He ented by noce to septic syste and of verification of ACE COMPLETIN	mt mtx/ Cr rra Drilli m field lines or other t above distance ON		Praced	
TYPE PUMP: N/A	sible 📋 Cylinder	Meth Cem Dista Meth	Ha anted by mee to septic system od of verification of FACE COMPLETIN recified Surface SI	nd TAX/ Gr TRA Dr1111 m field lines or other above distance ON ab Installed [Rule 334	ncentrated co permitted co and and and and and and and and and and	Praced	
TYPE PUMP: N/A Turbine Jet Submers Other Depth to pump bowts, cylinder, jet, etc.	sible 📋 Cylinder	Meth Cem Dista Meth	Adused Inted by Tie Tie Tie Tie Tie Tie Tie Tie	nt     nt     ct       rra     Drilli       om field lines or other       i above distance       i above distance       ON       ab Installed     [Rule 338]       ve Installed     [Rule 338]	B.44(2)(A)]	Praced	
TYPE PUMP: N/A Turbine Jet Submers Other Depth to pump bowts, cylinder, jet, etc. WELL TESTS: N/A	sible  Cylinder	Meth Cem Dista Meth 10, SUR S S S S S	Ha and used med by mee to septic system od of verification of ACE COMPLETIN vecified Surface Si vecified Steel Siee cless Adapter Used	nd TAX/ Gr TRA Dr1111 m field lines or other above distance ON ab Installed [Rule 334	3.44(3)(A)]	Praced	
TYPE PUMP:       N/A         □ Turbine       □ Jet       □ Submers         □ Other	sible  Cylinder	Meth Cem Dista Meth 10, SUR S S S S S S S S C S	Ha and used med by mee to septic system od of verification of ACE COMPLETIN vecified Surface SI vecified Steel Slee cless Adapter Used proved Alternative	nt       nt       ct         rra       Drilli         om field lines or other of above distance         (above distance         ON         ab Installed       [Rule 338 (Rule 338.44(3)(b)]	3.44(2)(A)] e 338.71]		200 ft.
TYPE PUMP:       N/A         □ Turbine       □ Jet       □ Submers         □ Other	sible  Cylinder	Meth Cem Dista Meth 10) SUR S S S P A 11) WAT	Ha and used anted by face to septic system and of verification of ACE COMPLETIN becified Surface Sh becified Steel Sleen cless Adapter User approved Alternative ER LEVEL:	nc nA Drill m field lines or other above distance oN ab Installed [Rule 338 ve Installed [Rule 338 d [Rule 338.44(3)(b)] e Procedure Used [Rule N/A	B.44(2)(A)] B.44(3)(A)] e 338.71]	Praced	200 ft.
N/A         Turbine       Jet       Submers         Other       Depth to pump bowts, cylinder, jet, etc.         WELL TESTS:       N/A         Type test:       Pump       Bailer         Yield:      gorn with          WATER QUALITY:       Yield:	sible  Cylinder	Meth Cem Dista Meth 10, SUR S S S P A 11) WAT Statio	Ha and used med by mee to septic system od of verification of ACE COMPLETIN recified Surface Si recified Steel Size less Adapter User proved Alternative ER LEVEL: level	nt IIX/ CI TRA DELLA m field lines or other above distance ON ab Installed [Rule 338 ve Installed [Rule 338 d [Rule 338.44(3)(b)] e Procedure Used [Rule	B.44(2)(A)] B.44(3)(A)] e 338.71] e Date	Apr.13	200 ft.
N/A         Turbine       Jet       Submers         Other       Depth to pump bowts, cylinder, jet, etc.         WELL TESTS:       N/A         Type test:       Pump       Bailer         Yield:      gorn with          WATER QUALITY:       Did you knowingly penetrate any strata	sible  Cylinder	Meth Cem Dista Meth 10, SUR S S S P A 11) WAT Static Artes	Ha and used Inted by Tie Tie Tie Tie Tie Tie Tie Tie	nt       nt       nt       field lines or other of above distance         above distance	B.44(2)(A)] B.44(3)(A)] e 338.71] e Date	Apr.13	200 ft.
N/A         Turbine       Jet       Submers         Other       Depth to pump bowts, cylinder, jet, etc.         WELL TESTS:       N/A         Type test:       Pump       Bailer         Yield:      gorn with          WATER QUALITY:       Did you knowingly penetrate any strata constituents?	sible  Cylinder	Meth Cem Dista Meth 10, SUR S S S P A 11) WAT Statio	Ha and used Inted by Tie Tie Tie Tie Tie Tie Tie Tie	nt       nt       nt       field lines or other of above distance         above distance	B.44(2)(A)] B.44(3)(A)] e 338.71] e Date	Apr.13	200 ft.
TYPE PUMP:       N/A         Turbine       Jet       Submers         Other	sible Cylinder	Meth Cem Dista Meth 10, SUR S S S P A 11) WAT Static Artes	Ha and used Inted by Tie Tie Tie Tie Tie Tie Tie Tie	nt       nt       nt       field lines or other of above distance         above distance	B.44(2)(A)] B.44(3)(A)] e 338.71] e Date	Apr.13	200 ft.
TYPE PUMP:       N/A         Turbine       Jet       Submers         Other	sible Cylinder	Meth Cem Dista Meth 10, SUR S S S P A 11) WAT Static Artes	Ha and used Inted by Tie Tie Tie Tie Tie Tie Tie Tie	nt       nt       nt       field lines or other of above distance         above distance	B.44(2)(A)] B.44(3)(A)] e 338.71] e Date	Apr.13	200 ft.
TYPE PUMP:       N/A         Turbine       Jet       Submers         Other       Depth to pump bowts, cylinder, jet, etc.         WELL TESTS:       N/A         Type test:       Pump       Bailer         Yield:      gom with          WATER QUALITY:       Did you knowingly penetrate any strata constituents?       Yes       No       If yes, submit "REF         Type of water?	sible Cylinderftftftftftfthrs	Meth Cem Dista Meth 10) SUR S S S P A 11) WAT Static Artes	Ha anted by mee to septic system and of verification of ACE COMPLETIN vecified Surface SI vecified Steel Slee cless Adapter Used proved Alternative ER LEVEL: level an flow XERS:	nd nHX/ Gr rra Drilli m field lines or other of above distance on ab Installed [Rule 334 ve Installed [Rule 338 d [Rule 338.44(3)(b)] e Procedure Used [Rule N/A  	B.44(2)(A)] B.44(2)(A)] B.44(3)(A)] e 338.71] e Date	Apr.13	200 ft.
TYPE PUMP:       N/A         Turbine       Jet       Submers         Other	sible Cylinder	Meth Cem Dista Meth 10, SUR S S S P A 11) WAT Static Artes 12) PACI	Ha and used Tie Tie Tie Tie Tie Tie Tie Tie	nc       nt       nt       Gt         print       Drilli       dt         above distance	ng           ng           pncentrated co           permission           8.44(2)(A)]           3.44(3)(A)]           e         Date	Apr.13	200 ft.
TYPE PUMP:       N/A         Turbine       Jet       Submers         Other	sible Cylinder	Meth Cem Dista Meth 10, SUR S S P 11) WAT Static Artes 12) PACI	Ha and used <u>T1e</u> anted by <u>T1e</u> ance to septic syste and of verification of ACE COMPLETI becified Surface SI becified Steel Slee cless Adapter Used proved Alternative ER LEVEL: level an flow ERS: <u>N/A</u> statements herein on and resubmittal DRILLER'S LICE	nct       ntill       fill         im field lines or other       im         oN       above distance         oN       above distance         in are line 338.44(3)(b)]       im         in are true to the best of       im         in are true to the best of       2994W         NSE NO.	ng           ng           pncentrated co           permission           8.44(2)(A)]           3.44(3)(A)]           e         Date	Apr.13	200 ft.
TYPE PUMP:       N/A         Turbine       Jet       Submers         Other	sible Cylinder	Meth Cem Dista Meth 10, SUR S S P 11) WAT Static Artes 12) PACI	Ha and used <u>T1e</u> anted by <u>T1e</u> ance to septic syste and of verification of ACE COMPLETI becified Surface SI becified Steel Slee cless Adapter Used proved Alternative ER LEVEL: level an flow ERS: <u>N/A</u> statements herein on and resubmittal DRILLER'S LICE	nct       ntill       fill         im field lines or other       im         oN       above distance         oN       above distance         in are line 338.44(3)(b)]       im         in are true to the best of       im         in are true to the best of       2994W         NSE NO.	ng           ng           pncentrated co           permission           8.44(2)(A)]           3.44(3)(A)]           e         Date	Apr.13	200 ft.
TYPE PUMP:       N/A         Turbine       Jet       Submers         Other	sible Cylinderftftftftftftfthrs	Meth Cem Dista Meth 10, SUR S S P 11) WAT Static Artes 12) PACI	Ha and used <u>T1e</u> anted by <u>T1e</u> ance to septic syste and of verification of ACE COMPLETI becified Surface SI becified Steel Slee cless Adapter Used proved Alternative ER LEVEL: level an flow ERS: <u>N/A</u> statements herein on and resubmittal DRILLER'S LICE	nct       nticl         rra       Drilli         in field lines or other game         iabove distance         iabove distance         ON         ab Installed       [Rule 338         ve Installed       [Rule 338         d       [Rule 338.44(3)(b)]         e Procedure Used [Rule         N/A	ng           ng           pncentrated co           permission           8.44(2)(A)]           3.44(3)(A)]           e         Date	Apr.13	96
TYPE PUMP:       N/A         Turbine       Jet       Submers         Other	sible Cylinderftftftftftftfthrs	Meth Cem Dista Meth 10) SUR S S P A 11) WAT Static Artes 12) PACI	Ha anted by race to septic system and of verification of ACE COMPLETIN secified Surface SI secified Steel Slee cless Adapter Used proved Alternative ER LEVEL: level an flow Statements herein on and resubmittal DRILLER'S LICE Cas 7993	nct       ntic/       Gt         rra       Drilli         im field lines or other g         iabove distance	Ing           pncentrated co           B.44(2)(A)]           B.44(3)(A)]           e 338.71]           e Date	Placed ntamination Apr.13 Depth and belief. I	96
TYPE PUMP:       N/A         Turbine       Jet       Submers         Other	sible Cylinderftftftftftftfthrs	Meth Cem Dista Meth 10, SUR S S S P A A 11) WAT Static Artes 12) PACI	Ha anted by race to septic system and of verification of ACE COMPLETIN secified Surface SI secified Steel Slee cless Adapter Used proved Alternative ER LEVEL: level an flow Statements herein on and resubmittal DRILLER'S LICE Cas 7993	nct       nticl         rra       Drilli         in field lines or other game         iabove distance         iabove distance         ON         ab Installed       [Rule 338         ve Installed       [Rule 338         d       [Rule 338.44(3)(b)]         e Procedure Used [Rule         N/A	Ing           pncentrated co           B.44(2)(A)]           B.44(3)(A)]           e 338.71]           e Date	Placed ntamination Apr.13 Depth and belief. I	96

Joriginal copy by certified mail to: TNRC	C, P.O. Box 13087	Austin, T	K 78711-308	7				Please	use black ir	ik.	
ATTENTION OWNER: Confidentiality Privilege Notice on Reverse Side	NP-D page tw	ro of	State			Stri	ng 3	Texas Wa	P.O. E Austin, T	rillers Advisor 30x 13087 X 78711-3087 239-0530	y Council
1) OWNER CDR., USAADAG	CENSB me)		ADDRE	ESS _	For	t Blin (Street or F		Texas 79 (Cit		(State)	(Zip)
2) ADDRESS OF WELL: County <u>El Paso</u>		675 J			City)		<b>799</b> (State)	06 (Zip)	GRID # _	49-13-	5
3) TYPE OF WORK (Check): XX New Well Deepening Reconditioning Plugging		al 🗌 Irrig		jection	🗌 Put	lic Supply	🗋 De-w	atering 📋 Testv		5)	
6) WELL LOG: Date Drilling: Started Apr • 13 19 96 Completed Apr • 13 19 96	Dia. (in.) Fi	ER OF HO	LE To (ft.) <b>33</b>	<b>1</b> '	🗌 Air F 🗋 Air H	lammer [	Mud Rot	k):  Driven tary Bored Tool Jetted	-		¢ Ň
From (ft.) To (ft.) Descript SEE PAGE ONE	tion and color of for PLEASE	ormation n	nateriał	8)	📋 Und	erreamed	🗌 Gra	eck):	Other		<u>belo</u> w
X#8 Borehole Com	lation			Dia.	New or Used	Steel, P Perf., S	Plastic, etc lotted, etc		1	ting (ft.)	Gage Casting Screen
25 to 32ft. 32 to 33				•5 1 "	N N	P13	asti	c STG-3 en mfg.	0 32	32 32.8	B1k. 0.02
(Use reverse side 13) TYPE PUMP: N/A □ Turbine □ Jet □ Submersi					Cement Method Cement Distance	used from used ed by e to septic s	system fie	338.44(1)] Se _ft. to _ft. to Id lines or other ca /e distance	ft. No. of s ft. No. of s oncentrated	sacks used sacks used	
Conter Depth to pump bowls, cylinder, jet, etc.,  WELL TESTS: N/A Type test: Pump Bailer Yield:gpm with	Jetted	Estimated			Spec	cified Steel S ss Adapter I	ce Slab In: Sleeve Ins Used (R ative Pro	stalled [Rule 338 stalled [Rule 338 sule 338.44(3)(b)] cedure Used [Ruk e Page 'O	8.44(3)(A)] e 338.71]		
15) WATER QUALITY:       See page         Did you knowingly penetrate any strate constituents?	which contained un ORT OF UNDESIF Depth of strata	ABLE WAT				flow		pelow land surface		9 9 Depth	
I hereby certify that this well was drilled by m understand that failure to complete items 1 th <b>Tierra</b> Dr <b>CEMPANY NAME</b> <b>5309 Mace</b> St ADDRESS	iru 15 will result in t 1111103 a or print)	he log(s) be nd <del>rv1ce</del>	eing returned Es Inc	l for con	npletion WELL DI	and resubm	nittal. ICENSE	rue to the best of 2994	•	dge and belief. I	
(Signed)		)	1-	<del>(</del>	City) Signed)			(Registered	State) Driller Train	(Zip ee)	)
Plea	ase attach electric	log, chem	ical analysi	s, and o	other pe	rtinent info	ormation	, if available.			

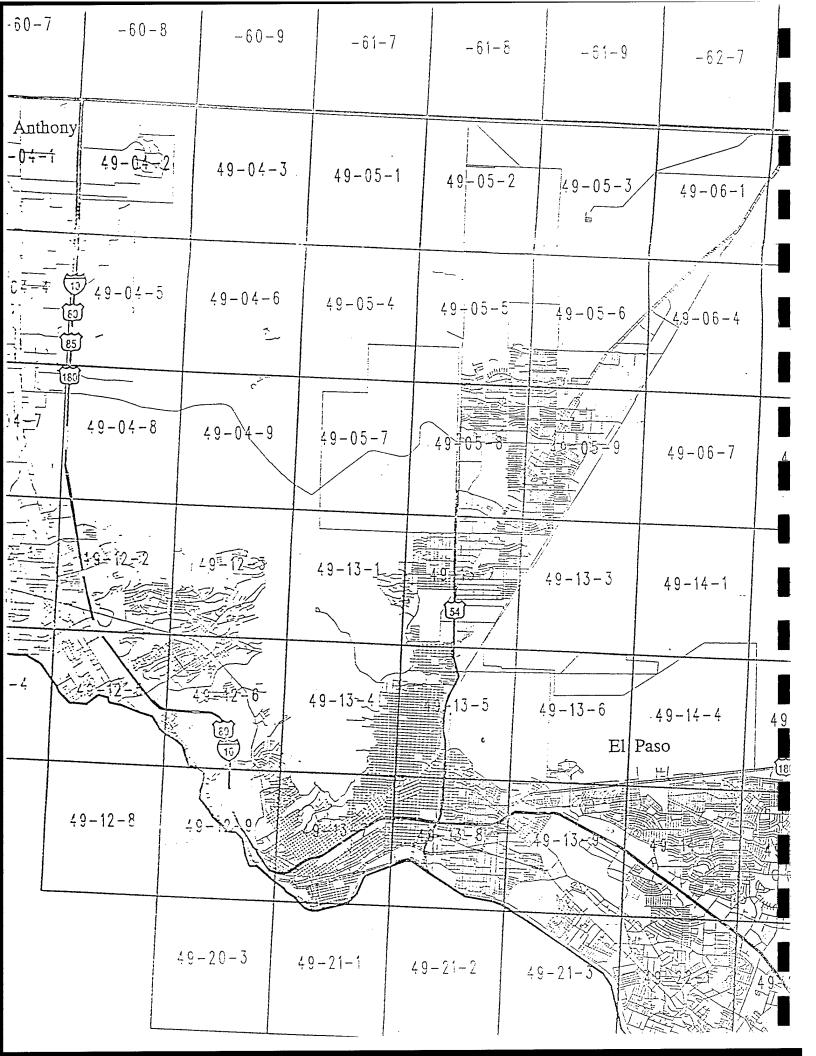
### State of Texas

and the second secon

# REPORT OF UNDESIRABLE WATER OR CONSTITUENTS

Company Na	ame:	ierra I	Drilli	ng and	Enviro	nmental	Serv	ices In
Address:	SOLO Mac	<u> </u>	Snite tor BED)	<u>A-1 F1</u>	Paso.		79029	(State)
		(0000						(2.2.2.)
Landowner o	or Person Havin	g Well Drill	ed: <u>CIR</u>	., USAP	DACENS	<u>P</u>	<u></u>	
Address:	Rent This	se, Ter		906				(State)
		(Stree	of RFD)			(City)		(State)
Location of V	Vell: Count	y <u>El F</u>	Paso		_ To See	e attached m	ap	
League				A	ostract No.			
NW⁴, NE⁴, S¹	N⁴, SE⁴, of Sec	tion	·····		B	lock		•
Survey	······································						<del></del>	
		miles in					di	irection.
from				(Town)				
Reason why	Report was sub	omitted:						
-	Report was sub occurring, poor		oundwater	encountered	l;			
Naturally-		-quality gro				tc.);		
☐ Naturally ☐ Hydrocar	occurring, poor	-quality gro ion encoun	tered (inclu	udes gasolir	e, diesel, e	tc.);		
<ul> <li>□ Naturally</li> <li>□ Hydrocart</li> <li>□ Hazardou</li> </ul>	occurring, poor oon contaminat	-quality gro ion encoun ardous wast	tered (inclu te contamin	udes gasolir nation enco	e, diesel, e untered;			
<ul> <li>□ Naturally</li> <li>□ Hydrocart</li> <li>□ Hazardou</li> </ul>	occurring, poor oon contaminati Is material/haza	-quality gro ion encoun ardous wast	tered (inclu te contamin	udes gasolir nation enco	e, diesel, e untered;			
<ul> <li>□ Naturally</li> <li>□ Hydrocart</li> <li>□ Hazardou</li> </ul>	occurring, poor oon contaminati Is material/haza	-quality gro ion encoun ardous wast	tered (inclu te contamin	udes gasolir nation enco	e, diesel, e untered;			
<ul> <li>Naturally-</li> <li>Hydrocarl</li> <li>Hazardou</li> <li>Other; de</li> </ul>	occurring, poor oon contaminat is material/haza scribe	-quality gro ion encoun ardous wast	tered (inclu le contamin	udes gasolir nation enco	e, diesel, e untered;			Vapor W
<ul> <li>Naturally-</li> <li>Hydrocarl</li> <li>Hazardou</li> <li>Other; de</li> <li>Date Well Dr</li> </ul>	occurring, poor oon contaminati is material/haza scribe	-quality gro ion encoun ardous wast	tered (inclu te contamin 	udes gasolir nation enco 96 Type W	e, diesel, e untered; ell: <u>2"</u> .5"	<u>PVC Mon</u> Flasti	<u>itor/</u> c Mon	-
<ul> <li>Naturally-</li> <li>Hydrocard</li> <li>Hazardou</li> <li>Other; de</li> <li>Date Well Dr</li> <li>Has a Water</li> </ul>	occurring, poor oon contaminat is material/haza scribe	-quality gro ion encoun ardous wast	tered (inclu te contamin 13 , 190 no this well	udes gasolir nation enco 96 Type W been forwa	e, diesel, e untered; ell: <u>2 "</u> 5 " rded to the	<u>PVC Mon</u> Flasti Texas Water	<u>itor/</u> c Mon	-
<ul> <li>Naturally-</li> <li>Hydrocarl</li> <li>Hazardou</li> <li>Other; de</li> <li>Date Well Dr</li> </ul>	occurring, poor oon contaminati is material/haza scribe	-quality gro ion encoun ardous wast	tered (inclu te contamin 13 , 190 no this well	udes gasolir nation enco 96 Type W	e, diesel, e untered; ell: <u>2 "</u> 5 " rded to the	<u>PVC Mon</u> Flasti Texas Water	<u>itor/</u> c Mon	-
<ul> <li>Naturally-</li> <li>Hydrocarl</li> <li>Hazardou</li> <li>Other; de</li> <li>Date Well Dr</li> <li>Has a Water</li> <li>Yes</li> </ul>	occurring, poor pon contaminati is material/haza scribe illed: <u>Accia</u> Well Report for No	-quality gro ion encount ardous wast	tered (inclu te contamin <u>13,19</u> to this well D	96 Type W been forwa	e, diesel, e untered; ell: $\frac{2^n}{.5^n}$ ded to the	<u>PVC Mon</u> Flasti Texas Water	<u>itor/</u> c Mon Commis	sion?
<ul> <li>Naturally-</li> <li>Hydrocarl</li> <li>Hazardou</li> <li>Other; de</li> <li>Date Well Dr</li> <li>Has a Water</li> <li>Yes</li> <li>I do hereby constituents</li> </ul>	occurring, poor oon contaminations material/haza scribe illed: <u>Attacta</u> Well Report for ☐ No ertify that in drilling has been encourt	-quality gro ion encoun ardous wast 11 to m relating t ing, deeper untered and	tered (inclu te contamin 	96 Type W been forwa ate <u>Persi</u>	e, diesel, e untered; ell: <u>2 "</u> ded to the <u>1 20</u> ng the abov son having	<u>PVC Mon</u> Flasti Texas Water <u>1606</u> /e described the well drill	itor/ c Mon Commis well, und led has b	sion? esirable wate een informed
<ul> <li>Naturally-</li> <li>Hydrocarl</li> <li>Hazardou</li> <li>Other; de</li> <li>Date Well Dr</li> <li>Has a Water</li> <li>Yes</li> <li>I do hereby constituents</li> </ul>	occurring, poor oon contaminati is material/haza scribe illed: <u>Accid</u> Well Report for No ertify that in drill	-quality gro ion encoun ardous wast 11 to m relating t ing, deeper untered and	tered (inclu te contamin 	96 Type W been forwa ate <u>Persi</u>	e, diesel, e untered; ell: <u>2 "</u> ded to the <u>1 20</u> ng the abov son having	<u>PVC Mon</u> Flasti Texas Water <u>1606</u> /e described the well drill	itor/ c Mon Commis well, und led has b	sion? esirable wate een informed
<ul> <li>Naturally-</li> <li>Hydrocarl</li> <li>Hazardou</li> <li>Other; de</li> <li>Date Well Dr</li> <li>Has a Water</li> <li>Yes</li> <li>I do hereby constituents is certified mail</li> <li>Date</li> </ul>	occurring, poor         pon contamination         is material/haza         scribe         illed: <u>Accela</u> Well Report for         No         ertify that in drilling         has been encound         that such well not such well	-quality gro ion encount ardous wast <u>11 to</u> m relating t ing, deeper untered and nust be cor	tered (inclu te contamin <u>13,19</u> to this well Di ning, or oth d the lando npleted or	udes gasolir nation enco 96 Type W been forwa ate <u>Apris</u> erwise alter plugged in s	e, diesel, e untered; ell: $\frac{2}{5}$ " rded to the $\frac{3}{5}$ C ng the above son having such a man	<u>PVC Mon</u> Plasti Texas Water <u>1005</u> /e described the well drill ner as to avo	itor/ c Mon Commis well, und ed has b	sion? esirable wate een informed or pollution.
<ul> <li>Naturally-</li> <li>Hydrocarl</li> <li>Hazardou</li> <li>Other; de</li> <li>Date Well Dr</li> <li>Has a Water</li> <li>Yes</li> <li>I do hereby constituents is certified mail</li> <li>Date</li> </ul>	occurring, poor oon contaminations material/haza scribe illed: <u>Attacta</u> Well Report for ☐ No ertify that in drilling has been encourt	-quality gro ion encount ardous wast <u>11 to</u> m relating t ing, deeper untered and nust be cor	tered (inclu te contamin <u>13,19</u> to this well Di ning, or oth d the lando npleted or	udes gasolir nation enco 96 Type W been forwa ate <u>Apris</u> erwise alter plugged in s	e, diesel, e untered; ell: $\frac{2}{5}$ " rded to the $\frac{3}{5}$ C ng the above son having such a man	<u>PVC Mon</u> Plasti Texas Water <u>1005</u> /e described the well drill ner as to avo	itor/ c Mon Commis well, und ed has b	sion? esirable wate een informed or pollution.

-



# **APPENDIX B**

# CHAIN-OF CUSTODY FORMS AND ANALYTICAL DATA REPORTING SHEETS

. ......

180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA 95630-4719 (916) 985-1000 FAX: (916) 985-1020 N・	Turn Around Time: Mormal Rush Specify	Canister Pressure / Vacuum Initial Final Receipt								<i>₹</i> .	B.R.V	als Intact? ※ ***********************************	
F-CUSTODY RECORD	n e. - State 12 Zip 7台754 Project Name E. 4 Blus Evicon	Analyses Requested / Charlest /		(PTEX + TPH- out all	- gueshind //	10-5(BTEXITI'I - 04000001/ 9451 TO-3(BTEX + TPH - 001000) /94921	$\leq 1$			VENCLE (glas Notes: DaterTime (glas High TVH (cod))52 1 all S DaterTime (duving schultier		Date/Time Temp. (°C) Condition Custody Seals Intact?	
AIR TOXICS LTD. an environmental analytical laboratory CHAIN-OF	1 2010 0 AULIN 512/7	Date & Time			4/14/6 01/35	4/11/14/06 01/14	4/41/41 Pri- 0917			Print Name Crien Viu 12.11.1010 Crien Viu Received By: (Signature) Date/T	Received By: (Signature) Date/Time	Air Bill # Opened By:	
AIR TO AN ENVIRONMENTAL	Contact Person <u>Exict Vor Arian</u> Company <u>Fortacine Experience</u> Address <u>(XYD) (Crital Rik</u> City Phone <u>V/17 to CD</u> FAX Phone <u>V/17 to CD</u> FAX Collected By: Signature <u>Man Van Ar</u>	Lab Field Sample I.D.	-A11945 P.CV	FUL: MPA-45	FULL WW-01	201 . N. P. L. M.				Relinquished By: (Signature) Date/Time / //////////////////////////////////	Relinquished By: (Signature) Date/Time	Lab Use	Only

1

Form 1293 rev. 06

CHAIN OF CUSTODY RECORD PARSONS ENGINEERING SCIENCE, INC. 8000 CENTRE PARK DRIVE SUITE 200 AUSTIN, TEXAS 78754

838M 1084M 107015			Poler Leller (187	cč/ RE	014	Heo	JUM C3						Dale T.m.e		Date	
ATIVE		X YUEIS				1 ] ] (										
PRESERVATIVE		ANALYSIS REQUIRED								· · · · · · · · · · · · · · · · · · ·	-		 Reinquished by:	(Signature)	Received by	(Signature)
and the second s	ONTAINER SONTAINER		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1		>							Time	•	lime	
			NUN		> -	1 <							Date		Date	
CARRIER A Federal Express UPS	AIRBILL OR CARRIER ID # 7751747006			Matrix Method Depth Depth	grade the								Relinquished by	(protection)	Received by.	(Signature)
				Sample Type	Ñ	NI	•	 					Time R	<u></u>		WHI OTIC "
ROJECT NAMELLOCATION For + Bliss BIONENTING/Bldg675	OJECT NUMBER いろしんでアレ、フリ30	1	Brian Vanaergus	Time Sample ID/Desc.	d W								Date	Non When the 1500		TAN/1 monto AVVD
PROJECT NAME/LOCATION For + Biss B	PROJECT NUMBER	AMPLER(S)	reportine )	Date		0101 95K1/H		 	 				Relinquished by	month them		Signature) W C

Chain.cdr

	2020 000 00 00 00 00 00 00 00 00 00		in Bions Marine Marin	CS REMAR		Heo -	dwm, C3					Date :	Date	
	PRESERVATIVE		Condition Black	I Junoigury		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1								
ų			ANALYSIS REQUIRED									Reinquisted by	(Siynahua) Received by	(Signahur)
ENGINEERING SCIENCE, INC. 0 CENTRE PARK DRIVE SUITE 200 AUSTIN, TEXAS 78754		SONTAINERS	C SO S S S WINN			>						Date <sup>1</sup> Time	Date Inne	
ERING S RK DRIVE SL TEXAS 78754	0000-61 /	٩_		h End Depth		32 1		 				ŏ		
CENTRE PA AUSTIN, 7	(512) ederal Express	RRIER ID # 74 700 b		Sampling Begin Method Depth	at days	grap 31		 			 			
PARSONS 1 8000	(512, CARRIER Kederal Express	AIRBILL OR CARRIER ID #		Matrix	51							Reinquished by	(september) Received by	(Signature)
PAF				Sample Type	N	N		 				 	Ţ,	1496 0916 1mm
	ROLECT NAMELLOCATION For POLISS BIONEWING/BIDG65	71130	SAMPLER(Sprian Vanderglas	) Sample ID/Desc.	MPD (16-17)	(rE-12)0m						Love time	h durk	JAN 1/ WW
	PROJECT NAMELLOCATION For + Biss B	PROJECT NUMBER 726876.71130	SAMPLER(Shi I an V	Date Time	4/13/46 0915 1	0101 94K1/H						 ierrouspee by	L' VOI / V O	10/11/D

Chain cdr

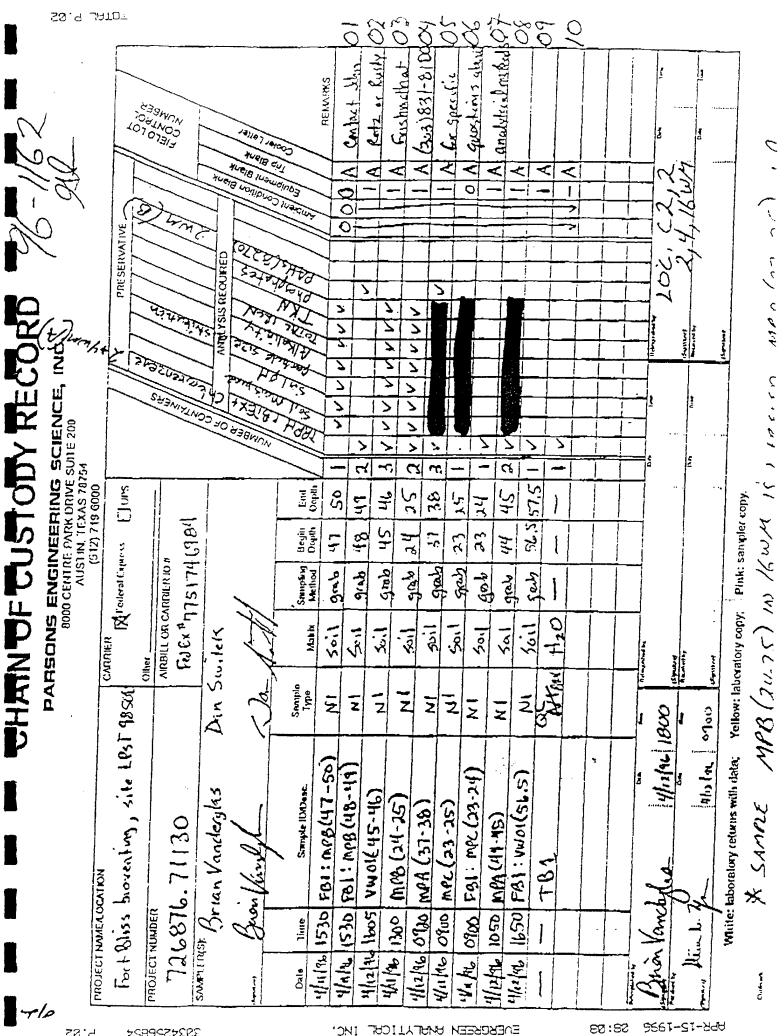
50.9 JA	LO. <u>.</u>				ō	7		<u> </u>	auf of		200	2				1	
CUSTODY RECORD R-1/62 VGINEERING SCIENCE, INDER AUSTIN, TEXAS 78754 (512) 719 6000	Contraction of the service	20 1 2 2 1 2 2 1 2 2 2 2 2 2 2 2 2 2 2 2	Martiss acounted		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		· · · · · · · · · · · · · · · · · · ·	1		2 V Analytic Article					50 12 102, CZ, Z 24		
CHAIN OF CUSTOD PARSONS ENGINEERING SU AUSTIN TEXAS 70754 (512) 719 6000	CATRIER [A roderal Express [] (J) 5 Olher	AMBILL OR CARRER 10 " Frd Ext # 775174 6961	Switch	Mathin Method Doubly Condi	Soil gab 47	2011 Orab 48 49	40h 34	1.5 dag	71 55 July 1105	the day	5611	HzO		Advertised by the second se	Primasi	for the second se	Plak: sanpler copy.
HAI	13566		Din S	Sanipla	īz.	zz	z	ž	2 Z	- v	ž	N.		-			c Yellow: la
	PROJECT NUMER OCATION Fort Bliss broventing, site LPST 98500 PROJECT MILLIED	726876.71130	swortenest Brian Vanderglas	e	4/4/4 1530 FB1: AP6(47-50)	H12 11 1002 VWOK 45-46)		1/11/16 01/20 MPA (37-38)		1050	4/14/41 1650 FB1 : WOI(56.5)	- T61	EØ : 5	the second se	1 Inin Vanch Le Minter 1800	ciono Minuli 70	White: taboratory returns with data

3034556854 P.02

			YUER UC		19/2 / Jain 19/2	000 A Contact Ihn	1 A Retz in Rusty	1 A Enshauthat		1 A Gx Specific	O A questions april	1   A analytic nichels.		i A	<u> </u>		Dute		Date	
International Control	5 2 A	CONTAINER SAL	ANOLYSIS RE	-15 PP 	इ र में सी ही सि क		× > >	3 < 7 < 7 < 7 < 7	2 1 1 1 1 1 1 1 1 1 2	3 < < < < < < < < < < < < < < < < < < <		>	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	>	>		Date Time Beinquished by	(Signature)	Date Time Received by:	(Signature)
<b>4</b> 8	CARRIER KFederal Express UPS Other	AIRBILL OR CARRIER 10 # Fed Ex #7751746984		the second se	Matrix Method Depth	50'1 grab 47 50	48 49	suil grab 45 46	24 25	grab 37 38	501 gay 23 35	501 gab 23 34	St 45	5011 geb 56.557.5	H20		4 p.			
	5 1 98 508 Other	AIRBI	Dan Switels	< 2-1	Sample	NI NI	V Z	12	- N	ž	Z	N Z	- 2		t restra		Time Reinquished by	1800 (Signature)		0400 (Signature)
-	PROJECT NAME/LOCATION Fort Bliss bioventing, site LPST 98508	PROJECT NUMBER 726876.71130	SAMPLER(S): Brian Vanderglas	comments Buen Hundy	Date Time Sample ID/Desc.	4/11/96 1530 FB1: MPB(47-So)	4/11/46 (530 FOI: MPB (48-49)	4/12/34 1605 VW 01645-46)	4/11/46 1300 more (24-25)	4/12/46 0920 mpA (37-38)	4/11/46 0400 mPC (23-25)	4/11/46 0900 FB1: MPC (23-24)	4/12/96 1050 MPA (44-45)	4/12/46 1650 FB1: VW01(56.5)	781			Brin Vanchyles 14/12/46 1800	02	121 (1) H - L - month (annules)

Chain rdr

C	CHAIN OF C	N OF	C C	IST		۲ ۲	RE(	0	RD	Ū	$\mathcal{H}$				
	PARS	PARSONS ENGINEERING SCIEN 8000 CENTRE PARK DRIVE SUITE 200 AUSTIN. TEXAS 78754 (512) 719-6000	CENTRE AUSTI AUSTI (5	PARK C PARK C N. TEX/ 12) 719-1	RIVE SI 5 78754 5000	SCIED JITE 200	SCIENCE, INCA Suite 200	Z	(+)		)	E C			
PROJECT NAME/LOCATION Fort Bliss broventing, site LPST 98508	CARRI 98506	CARRIER K	Federal Express	ss s	urs			4	1	PRESERVATIVE			107 07 107 07	LEOL ABER	
PROJECT NUMBER 726876.71130	AIR	AIRBILL OR CARRIER 10# Fed Ex#7751746784	RRIER 10#	184			ONTAINERS	CUT CALL	1274714J14		True:		EIE	WOAL .	
SAMPLER(S): Brian Vanderylas	Din Switers	.tels				50 83				REQUIRED		YUEIZ UC	v. \		
ment Prov Vinder	Z Da-	1 - Th				NUNS		15 PM	Lecy .	et al	227				
Date linue Sample ID/Desc.	Sample Type	Matrix	Sampling Method	Begin Depth	End Depth	FOR	1 47.5 1 73c	T-JAL		HU		163 Jaio		REMARKS	
4/11/92 1530 FB1: MPB(47-50)	NI	Soil	grab				7 7 7	7	>		0-	V O O	Contact	act Jhn	$\overline{0}$
4/11/4 (530 F61: MPB (48-49)	2	1.1.1	٩. م			> .				<u>}</u>		A .	1	z er kusty	<u>10</u>
1	z z	1:2	9 an 2	345	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	> > > >	> >	77	77 77			<b>∀ Ⅰ</b>		Fushmithat (2.2)831-8100	<u>5'0</u> 81
4/12/96 0920 mpA (37-38)	N	suil			38 3	>	>	くく	>	2			1	Lx speculic	$\frac{1}{2}$
0900	z	1105	- 1	23	35	>	>	7 7	7 7			0		questions at	ahu OG
0100	Z	201	quip			7								analytic Inthe \$0	C-17
4/12/96 1650 FB1: VW01(56.5)	iz iz	Sal	grab	56.56	45 2	> > >	7	7	7 7			<b>∀</b>	<b>∀</b> ▼		$\frac{1}{200}$
781	arten	1 1			2	2					~	< < -			
	^														
Remained by Inter Variable 4/112/96 1800		Relativished by (Signature)				Date	line	. Relarquest	à.	7 C	1	22	10 0316		
issonny dur L. Z. HII 11, 196 0		ived by hurc)				Date	lime	Received by [Signature]	la la la			   	Oate		
White' laboratory returns with data;	Yellow: laboratory copy; $O_{\mathcal{R}} \left( \begin{array}{c} & & \\ & & $	atory copy;	Pink: sa	Pink: sampler copy	ر ر ر	07 (	ר אין ער א	c c	000	66)			0		]
							777								



53.9

3034526854

#### Methods 602/8020 and 5030/8015 Modified Data Report

) )	Client Sample Number Lab Sample Number Date Sampled Date Received Date Prepared FID Dilution Factor	::	FB1:MPB(48-49) 96-1162-02 4/11/96 4/13/96 4/15/96 6250	Client Project Number Lab Project Number Matrix Lab File Number(s) Method Blank Soil Extracted?	: : : : :	726876.71130 96-1162 SOIL TVB10417021 MEB1041596 YES
	PID Dilution Factor PID Dilution Factor		6250	Soil Moisture	:	14.97%

		Analysis	Sample		
Compound Name	Cas Number	Date	Concentration	RL	Units
TVH-Gasoline		4/17/96	8200	735	mg/kg
Benzene	71-43-2	4/17/96	U	2940	ug/kg
Toluene	108-88-3	4/17/96	190000	2940	ug/kg
Chlorobenzene	108-90-7	4/17/96	22000	2940	ug/kg
Ethyl Benzene	100-41-4	4/17/96	110000	2940	ug/kg
Total Xylenes (m,p,o)	1330-20-7	4/17/96	550000	2940	ug/kg
1,3,5-Trimethylbenzene	108-67-8	4/17/96	100000	2940	ug/kg
1,2,4-Trimethylbenzene	95-63-6	4/17/96	260000	2940	ug/kg
1,2,3-Trimethylbenzene	526-73-8	4/17/96	86000	2940	ug/kg
1,2,3,4-Tetramethylbenzene	488-23-3	4/17/96	78000	3675	ug/kg
FID Surrogate Recovery:		103%	1	65%-129%	(Limits)
PID Surrogate Recovery:	•••••••••••••••••••••••••••••••••••••••	94%		65%-129%	(Limits)

Notes: Total Xylenes consist of three isomers, two of which co-elute. The Xylene RL is for a single peak.

\_\_\_\_\_

Comments:

#### **QUALIFIERS and DEFINITIONS:**

- E = Extrapolated value. Value exceeds calibration range.
- U = Compound analyzed for, but not detected.
- B = Compound also found in the blank.
- J = Indicates an estimated value when the compound is detected, but is below the Reporting Limit.
- **RL** = Reporting Limit.
- **NA** = Not Available/Not Applicable.
- **PID** = Photoionization detector.
- FID = Flame ionization detector.
- **TVH** = Total Volatile Hydrocarbons.

lectra

Approved

TUDY 1162 VIC. 4/18/06. 2

### Methods 602/8020 and 5030/8015 Modified Data Report

Client Sample Number	: VW01(45-46)	Client Project Number	::	726876.71130
Lab Sample Number	: 96-1162-03	Lab Project Number		96-1162
Date Sampled	: 4/12/96	Matrix		SOIL
Date Received	: 4/13/96	Lab File Number(s)		TVB10417018
Date Prepared	: 4/17/96	Method Blank		MB1041796
FID Dilution Factor	: 1.0	Soil Extracted?		NO
PID Dilution Factor	: 1.0	Soil Moisture	:	9.40%

		Analysis	Sample		
Compound Name	Cas Number	Date	Concentration	RL	Units
TVH-Gasoline		4/17/96	U	0.1	. mg/kg
Benzene	71-43-2	4/17/96	U	0.4	ug/kg
Toluene	108-88-3	4/17/96	U	0.4	ug/kg
Chlorobenzene	108-90-7	4/17/96	U	.0.4	ug/kg
Ethyl Benzene	100-41-4	4/17/96	U	0.4	ug/kg
Total Xylenes (m,p,o)	1330-20-7	4/17/96	U	0.4	ug/kg
1,3,5-Trimethylbenzene	108-67-8	4/17/96	1.0	0.4	ug/kg
1,2,4-Trimethylbenzene	95-63-6	4/17/96	U	0.4	ug/kg
1,2,3-Trimethylbenzene	526-73-8	4/17/96	0.4	0.4	ug/kg
1,2,3,4-Tetramethylbenzene	488-23-3	4/17/96	U	0.6	ug/kg
FID Surrogate Recovery:		104%		50%-132%	(Limits)
PID Surrogate Recovery:		96%		72%-118%	(Limits)

Notes: Total Xylenes consist of three isomers, two of which co-elute. The Xylene RL is for a single peak.

Comments:

#### **QUALIFIERS and DEFINITIONS:**

**E** = Extrapolated value. Value exceeds calibration range.

**U** = Compound analyzed for, but not detected.

B = Compound also found in the blank.

J = Indicates an estimated value when the compound is detected, but is below the Reporting Limit.

**RL** = Reporting Limit.

**NA** = Not Available/Not Applicable.

**PID** = Photoionization detector.

**FID** = Flame ionization detector.

**TVH** = Total Volatile Hydrocarbons.

Analyst

Approved

TV/8X1162 XLS: 4/19/96: 3

#### Methods 602/8020 and 5030/8015 Modified Data Report

Client Sample Number	: MPB(24-25)	Client Project Number	:	726876.71130
Lab Sample Number	: 96-1162-04	Lab Project Number	:	96-1162
Date Sampled	: 4/11/96	Matrix	:	SOIL
Date Received	: 4/13/96	Lab File Number(s)	:	TVB10417022
Date Prepared	: 4/15/96	Method Blank	:	MEB1041596
FID Dilution Factor	: 125	Soil Extracted?	:	YES
PID Dilution Factor	: 125	Soil Moisture	:	3.04%

		Analysis	Sample		
Compound Name	Cas Number	Date	Concentration	RL	Units
TVH-Gasoline		4/17/96	360	13	mg/kg
Benzene	71-43-2	4/17/96	U	52	ug/kg
Toluene	108-88-3	4/17/96	1200	52	ug/kg
Chlorobenzene	108-90-7	4/17/96	600	52	ug/kg
Ethyl Benzene	100-41-4	4/17/96	1900	52	ug/kg
Total Xylenes (m,p,o)	1330-20-7	4/17/96	20000	52	ug/kg
1,3,5-Trimethylbenzene	108-67-8	4/17/96	6900	52	ug/kg
1,2,4-Trimethylbenzene	95-63-6	4/17/96	17000	52	ug/kg
1,2,3-Trimethylbenzene	526-73-8	4/17/96	5000	52	ug/kg
1,2,3,4-Tetramethylbenzene	488-23-3	4/17/96	6400	64	ug/kg
			<u> </u>		
FID Surrogate Recovery:		103%		65%-129%	(Limits)
PID Surrogate Recovery:		92%		65%-129%	(Limits)

Notes: Total Xylenes consist of three isomers, two of which co-elute. The Xylene RL is for a single peak.

Comments:

#### **QUALIFIERS and DEFINITIONS:**

- E = Extrapolated value. Value exceeds calibration range.
- $\mathbf{U}$  = Compound analyzed for, but not detected.
- B = Compound also found in the blank.
- J = Indicates an estimated value when the compound is detected, but is below the Reporting Limit.
- **RL** = Reporting Limit.

**NA** = Not Available/Not Applicable.

- **PID** = Photoionization detector.
- **FID** = Flame ionization detector.

**TVH** = Total Volatile Hydrocarbons.

leaka Analyst

Approved

# Methods 602/8020 and 5030/8015 Modified Data Report

Date Prepared: 4/15/96Method Blank: MEB1041596FID Dilution Factor: 500Soil Extracted?: YESPID Dilution Factor: 500Soil Moisture: 5.83%	•	: 500		:	
--	---	-------	--	---	--

		Analysis	Sample		
Compound Name	Cas Number	Date	Concentration	RL	Units
TVH-Gasoline		4/17/96	1200	53	mg/kg
Benzene	71-43-2	4/17/96	U	212	ug/kg
Toluene	108-88-3	4/17/96	16000	212	ug/kg
Chlorobenzene	108-90-7	4/17/96	2800	212	ug/kg
Ethyl Benzene	100-41-4	4/17/96	13000	212	ug/kg
Total Xylenes (m,p,o)	1330-20-7	4/17/96	79000	212	ug/kg
1,3,5-Trimethylbenzene	108-67-8	4/17/96	17000	212	ug/kg
1,2,4-Trimethylbenzene	95-63-6	4/17/96	47000	212	ug/kg
1,2,3-Trimethylbenzene	526-73-8	4/17/96	14000	212	ug/kg
1,2,3,4-Tetramethylbenzene	488-23-3	4/17/96	13000	265	ug/kg
				05.0/ 1.20.0/	(limita)
FID Surrogate Recovery:		101%		65%-129%	(Limits)
PID Surrogate Recovery:		94%		65%-129%	(Limits)

Notes: Total Xylenes consist of three isomers, two of which co-elute. The Xylene RL is for a single peak.

Comments:

### QUALIFIERS and DEFINITIONS:

- E = Extrapolated value. Value exceeds calibration range.
- U = Compound analyzed for, but not detected.
- B = Compound also found in the blank.
- J = Indicates an estimated value when the compound is detected, but is below the Reporting Limit.
- **RL** = Reporting Limit.
- NA = Not Available/Not Applicable.
- **PID** = Photoionization detector.
- **FID** = Flame ionization detector.
- **TVH** = Total Volatile Hydrocarbons.

hlert

Approved

### Methods 602/8020 and 5030/8015 Modified Data Report

Client Sample Number	: FB1:MPC(23-24)	Client Project Number	:	726876.71130
Lab Sample Number	: 96-1162-07	Lab Project Number	:	96-1162
Date Sampled	: 4/11/96	Matrix	:	SOIL
Date Received	: 4/13/96	Lab File Number(s)	:	TVB10417038,40
Date Prepared	: 4/15,18/96	Method Blank	:	MB1041796*
FID Dilution Factor	: 5.0	Soil Extracted?	:	YES
PID Dilution Factor	: 5.0,125	Soil Moisture	:	2.83%

		Analysis	Sample		
Compound Name	Cas Number	Date	Concentration	RL	Units
TVH-Gasoline		4/18/96	37	· 0.5	mg/kg
Benzene	71-43-2	4/18/96	U	2.1	ug/kg
Toluene	108-88-3	4/18/96	U	2.1	ug/kg
Chlorobenzene	108-90-7	4/18/96	U	2.1	ug/kg
Ethyl Benzene	100-41-4	4/18/96	U	2.1	ug/kg
Total Xylenes (m,p,o)	1330-20-7	4/18/96	U	2.1	ug/kg
1,3,5-Trimethylbenzene	108-67-8	4/18/96	110	2.1	ug/kg
1,2,4-Trimethylbenzene	95-63-6	4/18/96	180	51	ug/kg
1,2,3-Trimethylbenzene	526-73-8	4/18/96	45	2.1	ug/kg
1,2,3,4-Tetramethylbenzene	488-23-3	4/18/96	3100	64	ug/kg
FID Surrogate Recovery:	<u> </u>		65%-129%	Limits)	
PID Surrogate Recovery:		HI**,91%		65%-129%	(Limits)

Notes: Total Xylenes consist of three isomers, two of which co-elute. The Xylene RL is for a single peak.

**Comments:** \* = MEB1041596; \*\* = Hydrocarbon Interference

#### **QUALIFIERS and DEFINITIONS:**

- E = Extrapolated value. Value exceeds calibration range.
- U = Compound analyzed for, but not detected.
- B = Compound also found in the blank.
- J = Indicates an estimated value when the compound is detected, but is below the Reporting Limit.
- **RL** = Reporting Limit.

**NA** = Not Available/Not Applicable.

- **PID** = Photoionization detector.
- FID = Flame ionization detector.

**TVH** = Total Volatile Hydrocarbons.

Derla

Approved

### EVERGREEN ANALYTICAL, INC. 4036 Youngfield St. Wheat Ridge, CO 80033 (303) 425-6021

### Methods 602/8020 and 5030/8015 Modified Data Report

Client Sample Number Lab Sample Number Date Sampled Date Received Date Prepared FID Dilution Factor	: MPA(44-45) : 96-1162-08 : 4/12/96 : 4/13/96 : 4/15/96 : 500	Client Project Number Lab Project Number Matrix Lab File Number(s) Method Blank Soil Extracted?	::	726876.71130 96-1162 SOIL TVB10417024 MEB1041596 YES 2.44%
PID Dilution Factor	: 500	Soil Moisture	:	3.44%

		Analysis	Sample		
Compound Name	Cas Number	Date	Concentration	RL	Units
TVH-Gasoline		4/17/96	450	52	mg/kg
Benzene	71-43-2	4/17/96	U	207	ug/kg
Toluene	108-88-3	4/17/96	310	207	ug/kg
Chlorobenzene	108-90-7	4/17/96	980	207	ug/kg
Ethyl Benzene	100-41-4	4/17/96	3100	207	ug/kg
Total Xylenes (m,p,o)	1330-20-7	4/17/96	18000	207	ug/kg
1,3,5-Trimethylbenzene	108-67-8	4/17/96	9400	207	ug/kg
1,2,4-Trimethylbenzene	95-63-6	4/17/96	27000	207	ug/kg
1,2,3-Trimethylbenzene	526-73-8	4/17/96	860	207	ug/kg
1,2,3,4-Tetramethylbenzene	488-23-3	4/17/96	10000	259	ug/kg
FID Surrogate Recovery:		102%	<u> </u>	65%-129%	(Limits)
PID Surrogate Recovery:		91%		65%-129%	(Limits)

Notes: Total Xylenes consist of three isomers, two of which co-elute. The Xylene RL is for a single peak.

Comments:

•••

### QUALIFIERS and DEFINITIONS:

- E = Extrapolated value. Value exceeds calibration range.
- U = Compound analyzed for, but not detected.
- B = Compound also found in the blank.
- J = Indicates an estimated value when the compound is detected, but is below the Reporting Limit.
- **RL** = Reporting Limit.
- NA = Not Available/Not Applicable.
- **PID** = Photoionization detector.
- FID = Flame ionization detector.
- **TVH** = Total Volatile Hydrocarbons.

1. Slecka

Analyst

Approved

# EVERGREEN ANALYTICAL, INC. 4036 Youngfield St. Wheat Ridge, CO 80033 (303) 425-6021

#### Methods 602/8020 and 5030/8015 Modified Data Report

Client Sample Number	: FB1:VW01(56.5)	Client Project Number	:	726876.71130
Lab Sample Number	: 96-1162-09	Lab Project Number	:	96-1162
Date Sampled	: 4/12/96	Matrix	:	SOIL
Date Received	: 4/13/96	Lab File Number(s)	:	TVB10417020
Date Prepared	: 4/17/96	Method Blank	:	MB1041796
FID Dilution Factor	: 1.0	Soil Extracted?	:	NO
PID Dilution Factor	: 1.0	Soil Moisture	:	12.26%

		Analysis	Sample		
Compound Name	Cas Number	Date	Concentration	RL	Units
TVH-Gasoline		4/17/96	· U	0.1	mg/kg
Benzene	71-43-2	4/17/96	U	0.5	ug/kg
Toluene	108-88-3	4/17/96	1.0	0.5	ug/kg
Chlorobenzene	108-90-7	4/17/96	0.7	0.5	ug/kg
Ethyl Benzene	100-41-4	4/17/96	1.3	0.5	ug/kg
Total Xylenes (m,p,o)	1330-20-7	4/17/96	3.9	0.5	ug/kg
1,3,5-Trimethylbenzene	108-67-8	4/17/96	2.7	0.5	ug/kg
1,2,4-Trimethylbenzene	95-63-6	4/17/96	4.9	0.5	ug/kg
1,2,3-Trimethylbenzene	526-73-8	4/17/96	8.9	0.5	ug/kg
1,2,3,4-Tetramethylbenzene	488-23-3	4/17/96	7.9	0.6	ug/kg
FID Surrogate Recovery:		95%	<u> </u>	50%-132%	L (Limits)
PID Surrogate Recovery:		88%		72%-118%	(Limits)

Notes: Total Xylenes consist of three isomers, two of which co-elute. The Xylene RL is for a single peak.

#### Comments:

#### **QUALIFIERS and DEFINITIONS:**

- E = Extrapolated value. Value exceeds calibration range.
- U = Compound analyzed for, but not detected.
- B = Compound also found in the blank.
- J = Indicates an estimated value when the compound is detected, but is below the Reporting Limit.
- RL = Reporting Limit.

NA = Not Available/Not Applicable.

- **PID** = Photoionization detector.
- FID = Flame ionization detector.

TVH = Total Volatile Hydrocarbons.

Approved

# EVERGREEN ANALYTICAL, INC. 4036 Youngfield, Wheat Ridge, CO 80033 (303) 425-6021

# TOTAL EXTRACTABLE HYDROCARBONS (TEH-DIESEL) C11-C28 Boiling Range

Date Sampled Date Received Date Prepared	:	: 4/11,12/96 : 4/13/96 : 4/16/96		Client Projec Lab Project M Method Num	Number	: 726876.71 : 96-1162 : EPA 3500/8		ed
Evergreen Sample #	Dilution Factor	Client Sample #	Matrix	Analysis Date	Surrogate Recovery	Sample * Result	RL *	Units
SB041696	1	Soil Method Blank	Soil	4/16/96	96%	U	10.0	mg/kg
96-1162-02	10	FB1:MPB(48-49)	Soil	4/17/96	[1]	2800	. 120.0	mg/kg
96-1162-03	1	VW01(45-46)	Soil	4/17/96	80%	U	11.0	mg/kg
<u>9</u> 6-1162-04	· 1	MPB(24-25)	Soil	4/17/96	[1]	140	10.0	mg/kg
96-1162-05	1	MPA(37-38)	Soil	4/17/96	[1]	500	11.0	mg/kg
96-1162-07	1	FB1:MPC(23-24)	Soil	4/17/96	90%	150	10.0	mg/kg
96-1162-08	1	MPA(44-45)	Soil	4/17/96	[1]	430	10.0	mg/kg
96-1162-09	1	FB1:VW01(56.5)	Soil	4/17/96	89%	U	11.0	mg/kg

\* = Based on dry weight.

[1] = Unable to separate surrogate from analyte.

#### QUALIFIERS

- U = TEH analyzed for, but not detected.
- B = TEH-Diesel also found in blank.
- E = Extrapolated value. Value exceeds calibration range.

A Call 0

Analyst

<u>NOTES</u> Surrogate = TBB RL = Reporting Limit.

Approved

# EVERGREEN ANALYTICAL, Inc. 4036 Youngfield St. Wheat Ridge, CO 80033 (303) 425-6021

# **Analysis Report**

Date Sampled Date Received Date Prepared Date Analyzed	: 4/13/96 : 4/16,18/96	Client Project ID. : 726876.71130 Fort Bliss Lab Project Number : 96-1162 Matrix : Soil Method : EPA 160.3
Evergreen Sample #	Client Sample ID.	Moisture (%)
96-1162-01	FB1: MPB (47-50)	. 7.50
96-1162-03	VW01 (45-46)	9.40
96-1162-04	MPB (24-25)	3.04

Approved

L Analyst

EVERGREEN ANALYTICAL, Inc. 4036 Youngfield St. Wheat Ridge, CO 80033 (303) 425-6021

# Analysis Report

Date Sampled Date Received Date Prepared Date Analyzed	: 4/11,12/96 : 4/13/96 : 4/18/96 : 4/18/96	Client Project ID.: 726876.71130 Fort BlissLab Project Number: 96-1162Matrix: SoilMethod: SW846 9045C
Evergreen Sample #	Client Sample ID.	pH
96-1162-01	FB1: MPB (47-50)	10.23
96-1162-03	VW01 (45-46)	10.18
96-1162-04	MPB (24-25)	10.15

Analyst

......

; · Approved

.



Hazen Research, Inc. 4601 Indiana St. - Golden, Colo 80403 Tel: (303) 279-4501 - Telex 45-860 FAX: (303) 278-1528

Date	April 23 19	96
HRI Project	009-93	
HRI Series No.	D384/96	
Date Rec'd.	04/16/96	
Cust. P.O. #		

1 - 1 - 1 - 1

.

Evergreen Analytical Inc. Carl Smits 4036 Youngfield Wheat Ridge CO 80033

### SCREEN ANALYSIS REPORT

Mesh Size	Direct	Direct	Cum Weight %	Cum Weight %
Pass-Retained	Weight.g	Weight.%	Retained	Pass
- 4 4 - 6 6 - 8 8 - 10 10 - 14 - 14 - 20 20 - 28 28 - 35 35 - 48 48 - 65 65 - 100 100 - 150 150 - 200 200 - 270 270 - 325 325 - PAN Tota	· 3.9 2.8 3.4 2.4 3.6 6.8 11.1 24.4 33.7 53.2 61.0 40.9 18.9 8.8 2.4 71.5 348.8	$\begin{array}{c} 1.12\\ 0.80\\ 0.97\\ 0.69\\ 1.03\\ 1.95\\ 3.18\\ 7.00\\ 9.66\\ 15.25\\ 17.49\\ 11.73\\ 5.42\\ 2.52\\ 0.69\\ 20.50\\ 100.00\\ \end{array}$	$\begin{array}{c} 1.12\\ 1.92\\ 2.89\\ 3.58\\ 4.61\\ 6.56\\ 9.74\\ 16.74\\ 26.40\\ 41.65\\ 59.14\\ 70.87\\ 76.29\\ 78.81\\ 79.50\\ 100.00\\ \end{array}$	98.88 98.08 97.11 96.42 95.39 93.44 90.26 83.26 73.60 58.35 40.86 29.13 23.71 21.19 20.50 0.00

By:

Robert Rostad Laboratory Manager

.

Screen sizes are in Tyler Mesh.



Hazen Research, Inc. 4601 Indiana St. · Golden, Colo. 80403 Tel: (303) 279-4501 • Telex 45-860 FAX: (303) 278-1528

Date	April 23	1996
HRI Project		
HRI Series No.	D384/96	
Date Rec'd.	04/16/96	
Cust. P.O. #		

Evergreen Analytical Inc. Carl Smits 4036 Youngfield Wheat Ridge CO 80033

### SCREEN ANALYSIS REPORT

Sample Number: Sample Identifi	D384/96-2 cation: 96-1162 VW	01(45-46) 04/12/9	96 @ 1605	
Mesh Size Pass-Retained	Direct Weight,g	Direct Weight,%	Cum Weight % Retained	Cum Weight % Pass
$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	$\begin{array}{c} 0.0\\ 0.0\\ 0.0\\ 0.0\\ 0.0\\ 0.0\\ 0.0\\ 0.8\\ 1.8\\ 10.8\\ 68.6\\ 96.3\\ 41.2\\ 10.1\\ 10.1\\ \end{array}$	$\begin{array}{c} 0.00\\ 0.00\\ 0.00\\ 0.00\\ 0.00\\ 0.00\\ 0.33\\ 0.74\\ 4.45\\ 28.27\\ 39.68\\ 16.98\\ 4.16\end{array}$	$\begin{array}{c} 0.00\\ 0.00\\ 0.00\\ 0.00\\ 0.00\\ 0.00\\ 0.00\\ 0.33\\ 1.07\\ 5.52\\ 33.79\\ 73.47\\ 90.45\\ 94.61\\ 94.61\end{array}$	$\begin{array}{c} 100.00\\ 100.00\\ 100.00\\ 100.00\\ 100.00\\ 100.00\\ 99.67\\ 98.93\\ 94.48\\ 66.21\\ 26.53\\ 9.55\\ 5.39\\ \end{array}$
200 - 270 270 - 325 325 DAN	3.6 0.9	1.48 0.37	96.09 96.46	3.91 3.54

3.54

100.00

8.6

242.7

By:

0.00

100.00

Robert Rostad Laboratory Manager

. .

Screen sizes are in Tyler Mesh.

-

Total

325

- PAN



Hazen Research, Inc. 4601 Indiana St. • Golden. Colo. 80403 Tel: (303) 279-4501 • Telex 45-860 FAX: (303) 278-1528 Date April 23 1996 HRI Project 009-93 HRI Series No. D384/96 Date Rec'd. 04/16/96 Cust. P.O. # 0

Evergreen Analytical Inc. Carl Smits 4036 Youngfield Wheat Ridge CO 80033

# SCREEN ANALYSIS REPORT

Sample Number: Sample Identifi	D384/96-3 cation: 96-1162 MP	B (24-25) 04/11/9	96 @ 1300	
Mesh Size Pass-Retained	Direct Weight,g	Direct Weight,%	Cum Weight % Retained	Cum Weight % Pass
- 4 4 - 6 6 - 8 8 - 10 10 - 14 14 - 20 20 - 28 28 - 35 35 - 48 48 - 65 65 - 100 100 - 150 150 - 200 200 - 270 270 - 325 325 - PAN Tota	13.0 10.2 12.3 12.7 14.6 15.4 16.6 24.9 37.5 54.7 23.4 8.8 4.3 3.1 1.0 13.6 1 266.1	$\begin{array}{r} 4.88\\ 3.83\\ 4.62\\ 4.77\\ 5.49\\ 5.79\\ 6.24\\ 9.36\\ 14.09\\ 20.56\\ 8.79\\ 3.31\\ 1.62\\ 1.16\\ 0.38\\ 5.11\\ 100.00\\ \end{array}$	$\begin{array}{r} 4.88\\ 8.71\\ 13.33\\ 18.10\\ 23.59\\ 29.38\\ 35.62\\ 44.98\\ 59.07\\ 79.63\\ 88.42\\ 91.73\\ 93.35\\ 94.51\\ 94.89\\ 100.00\\ \end{array}$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$

By: Robert Rostad Laboratory Manager

Screen sizes are in Tyler Mesh.

# EVERGREEN ANALYTICAL, Inc.

4036 Youngfield St. Wheat Ridge, CO 80033 (303) 425-6021

# Analysis Report

Date Sampled	: 4/11,12/96	Client Project ID. : 726876.71130 Fort Bliss
Date Received	: 4/13/96	Lab Project Number : 96-1162
Date Prepared	: 4/17/96	Matrix : Soil
Date Analyzed	: 4/17/96	Method : EPA 310.1
Evergreen Sample #	Client Sample ID.	Total Alkalinity * (mgCaCO <sub>3</sub> /Kg)
96-1162-01	FB1: MPB (47-50)	566
96-1162-03	VW01 (45-46)	269
96-1162-04	MPB (24-25)	359

\* Results reported on a dry weight basis

. . .

L

Analyst

Approved

# EVERGREEN ANALYTICAL, Inc.

4036 Youngfield St. Wheat Ridge, CO 80033 (303) 425-6021

# Analysis Report

Date Sampled Date Received Date Prepared Date Analyzed	: 4/13/96 : 4/18/96	Client Project ID. : 726876.71130 Fort Bliss Lab Project Number : 96-1162 Matrix : Soil Method : EPA 351.3	S
Everareen	Client	Total Kjeldahl *	

Evergreen Sample #	Sample ID.	Nitrogen (mg/Kg)
96-1162-01	FB1: MPB (47-50)	<5.0
96-1162-03	VW01 (45-46)	<5.0
96-1162-04	MPB (24-25)	<4.6

\* Results reported on a dry weight basis.

Analyst

Approved

EVERGREEN ANALYTICAL, INC.

4036 Youngfield St. Wheat Ridge, CO 80033 (303) 425-6021

# INORGANIC ANALYSIS DATA SHEET

Date Sampled : Date Received : Date Prepared : Date Analyzed : Units:	4/11-12/96 4/13/96 4/25/96 4/25-29/96 mg/Kg		Client Project Lab Project No. Method Matrix Basis: Dr	:	726876.7113 Fort Bliss 96-1162 SW-846 Soil Yeight	0
Client Sample#	FB1:MPB (47-50)	VW01 (45-46)	MPB (24-25)			
Evergreen Sample#	01A	03B	04B		Reagent Blank	Reporting Limits
Fe/6010 P/6010	6980 208	3260 85.0	4960 138	< <	1.8 6.1	1.8 6.1

C

. . . . .

Annround

#### EVERGREEN ANALYTICAL, INC. 4036 Youngfied Wheat Ridge CO 80033 (303)425-6021 POLYNUCLEAR AROMATICS ANALYSIS DATA REPORT

Client Sample Number Lab Sample Number Date Sampled Date Received Date Extracted/Prepared Date Analyzed Percent Loss on Drying	:::::::::::::::::::::::::::::::::::::::	FB1:MPB(48-49) 96-1162-02 04/11/96 04/13/96 04/16/96 04/25/96 14.97			726876.71130 96-1162 5.42 8270B SOIL >30969 SB041696
--	---	---	--	--	--

#### BASE/NEUTRALS

Compound Name	Cas Number	Conc. ug/Kg	EQL* ug/Kg
Naphthalene 2-Methylnaphthalene Acenaphthylene Acenaphthene Dibenzofuran Fluorene Phenanthrene Anthracene Fluoranthene Pyrene Benzo(a)Anthracene Chrysene Benzo(b)Fluoranthene Benzo(k)Fluoranthene Benzo(a)Pyrene Indeno(1,2,3-cd)Pyrene Dibenz(a,h)Anthracene Benzo(g,h,i)Perylene	91-20-3 91-57-6 208-96-8 83-32-9 132-64-9 86-73-7 85-01-8 120-12-7 206-44-0 129-00-0 56-55-3 218-01-9 205-99-2 207-08-9 50-32-8 193-39-5 53-70-3 191-24-2	28,000 30,000 U U U U U U U U U U U U U U U U U	1,800 1,800 1,800 1,800 1,800 1,800 1,800 1,800 1,800 1,800 1,800 1,800 1,800 1,800 1,800 1,800 1,800 1,800 1,800

Expected Surrogate Recoveries:		Actual Recove	eries:	QC Limits	
Nitrobenzene-d5	100	ug/Kg	66%	(23-95)	1
2-Fluorobiphenyl	100	ug/Kg	89%	(32-95)	
Terphenyl-d14	100	ug/Kg	79%	(18-131)	

OUALIFIERS: U = Compound analyzed for, but not detected above reporting limits. Reporting limits are roughly the method detection limits for reagent wate J = Indicates an estimated value when the compound is detected, but is below the EPA Estimated Quantitation Limit (EQL). B = Compound found in blank and sample. Compare blank and sample data. E = Compound is detected at a concentration outside the calibration limits. \* = Estimated Quantitation Limits listed in EPA SW846, Vol. 1B, Part II, pa. 8270B-8. The minimum instrument detection limits are less than the numbers shown in this column. Analyst Approved

#### EVERGREEN ANALYTICAL, INC. 4036 Youngfied Wheat Ridge CO 80033 (303)425-6021 POLYNUCLEAR AROMATICS ANALYSIS DATA REPORT

POLYNUCLEAR AROMATICS ANALYSIS DATA REPORT					
Client Sample Number Lab Sample Number Date Sampled Date Received Date Extracted/Prepared Date Analyzed Percent Loss on Drying	: 04/25/96	Effective Dilution Method Matrix Lab File No.	726876.71130 96-1162 1.06 8270B SOIL >30960 SB041696		
BASE/NEUTRALS					
Compound Name	Cas Number	Conc. ug/Kg	EQL* ug/Kg		
Naphthalene 2-Methylnaphthalene Acenaphthylene Acenaphthene Dibenzofuran Fluorene Phenanthrene Anthracene Fluoranthene Pyrene Benzo(a)Anthracene Chrysene Benzo(b)Fluoranthene Benzo(c)Pyrene Indeno(1,2,3-cd)Pyrene Dibenz(a,h)Anthracene Benzo(g,h,i)Perylene	$\begin{array}{r} 91-20-3\\ 91-57-6\\ 208-96-8\\ 83-32-9\\ 132-64-9\\ 86-73-7\\ 85-01-8\\ 120-12-7\\ 206-44-0\\ 129-00-0\\ 56-55-3\\ 218-01-9\\ 205-99-2\\ 205-99-2\\ 205-99-2\\ 207-08-9\\ 50-32-8\\ 193-39-5\\ 53-70-3\\ 191-24-2\end{array}$	2;600 2;600 U U U U U U U U U U U U U U U U U U	350 350 350 350 350 350 350 350 350 350		
Expected Surrogate Recov	veries:	Actual Recoveries:	QC Limits		
Nitrobenzene-d5 2-Fluorobiphenyl Terphenyl-d14	100 100 100	นต์/หตุ้ 3	8% (23-95) 2% (32-95) 3% (18-131)		
QUALIFIERS: U = Compound analyzed f Reporting limits an J = Indicates an estima below the EPA Estima below the cound in the	e roughly the me ted value when t	cted above reporting thod detection limits he compound is detect n Limit (EQL). Compare blank and s	ed, but is		

below the EPA Estimated Quantitation Limit (EQL). = Compound found in blank and sample. Compare blank and sample data. = Compound is detected at a concentration outside the calibration limits. = Estimated Quantitation Limits listed in EPA SW846, Vol. 1B, Part II, pa. 8270B-8. The minimum instrument detection limits are less than the numbers shown in this column.

Approved

B E

τ

### EVERGREEN ANALYTICAL, INC. 4036 Youngfield Wheat Ridge CO 80033 (303)425-6021 POLYNUCLEAR AROMATICS ANALYSIS DATA REPORT Method Blank Report

Method Blank Number Date Extracted/Prepared Date Analyzed	: SB041696 : 04/16/96 : 04/24/96		: 726876.71130 : 96-1162 : 1.00 : 8270B : >30956
---	--	--	--

BASE/NEUTRALS	_		
Compound Name	Cas Number	Conc. ug/Kg	EQL* ug/Kg
Naphthalene 2-Methylnaphthalene Acenaphthylene Acenaphthene Dibenzofuran Fluorene Phenanthrene Anthracene Fluoranthene Pyrene Benzo(a)Anthracene Chrysene Benzo(b)Fluoranthene Benzo(b)Fluoranthene Benzo(a)Pyrene Indeno(1,2,3-cd)Pyrene Dibenz(a,h)Anthracene Benzo(g,h,i)Perylene	91-20-3 91-57-6 208-96-8 83-32-9 132-64-9 86-73-7 85-01-8 120-12-7 206-44-0 129-00-0 56-55-3 218-01-9 205-99-2 207-08-9 50-32-8 193-39-5 53-70-3 191-24-2		330 330 330 330 330 330 330 330 330 330

Expected Surrogate Recoveries:		Actual Recov	veries:	QC Limits
Nitrobenzene-d5	100	ug/Kg	72%	(23-95)
2-Fluorobiphenyl	100	ug/Kg	75%	(32-95)
Terphenyl-d14	100	ug/Kg	88%	(18-131)

Ũ J	AIFIERS: Compound analyzed for, but not detected above reporting limits. Reporting limits are roughly the method detection limits for reagent Indicates an estimated value when the compound is detected, but is below the EPA Estimated Quantitation Limit (EQL). Compound found in blank and sample. Compare blank and sample data. Compound is detected at a concentration outside the calibration limit Estimated Quantitation Limits listed in EPA SW846, Vol. 1B, Part II, pa. 82/0B-8. The minimum instrument detection limits are less than th numbers shown in this column.	5.
	Analyst Approved	

# EVERGREEN ANALYTICAL, Inc.

4036 Youngfield St. Wheat Ridge, CO 80033 (303) 425-6021

# **Analysis Report**

Date Sampled	: 4/13/96	Client Project ID.	: 726876.71130 Fort Bliss
Date Received	: 4/16/96	Lab Project Number	: 96-1184
Date Prepared	: 4/16/96	Matrix	: Soil
Date Analyzed	: 4/16/96	Method	: EPA 160.3

Evergreen Sample #	Client Sample ID.	Moisture (%)
96-1184-01	MPD (16-17)	10.2
96-1184-02	MPD (31-32)	1.47

Approved

an

.....

Analyst

# EVERGREEN ANALYTICAL, Inc.

4036 Youngfield St. Wheat Ridge, CO 80033 (303) 425-6021

# Analysis Report

Date Sampled Date Received Date Prepared Date Analyzed	: 4/13/96 : 4/16/96 : 4/18/96 : 4/18/96	Gliofit (Tojout )= (	: 726876.71130 Fort Bliss : 96-1184 : Soil : EPA 351.3
Evergreen Sample #	Client Sample ID.	Total Kjeldahl * Nitrogen	(mg/Kg)
96-1184-01	MPD (16-17)	<5.1	
96-1184-02	MPD (31-32)	<4.7	

\* Results reported on a dry weight basis.

Approved

Analyst

SAMPLE NAME: FB1:MPA-45 ID#: 9604151-01A

# EPA METHOD TO-3

(Aromatic Volatile Organics in Air)

### GC/PID

File Name:	6041819 5720		Date of Collection: Date of Analysis:	4/14/96 1/18/96
	Det. Limit	Det. Limit	Атоцпt	Amount
Compound	(ppmv)	(uG/L)	(ppmv)	(uG/L)
Benzene	5.7	19	110	360
Toluene	5.7	22	270	. 1000
Ethyl Benzene	5.7	25	33	140
Total Xylenes	5.7	25	146	640

### TOTAL PETROLEUM HYDROCARBONS GC/FID

(Quantitated as Gasoline)

File Name: 6041811			Date of Collection: Date of Analysis	4/14/95 //18/96
	Det. Limit	Det, Limit	Amount	Amount
Compound	(ppmv)	(uG/L)	(ppmv)	(uG/L)
TPH* (C2+ Hydrocarbons)	57	240	5200	22000

\*TPH referenced to Gasoline (MW=100)

. ----

Container Type: 1 Liter Summa Canister

Y.U4

# AIR TOXICS LTD.

SAMPLE NAME: FB1;VW-01 ID#: 9604151-02A

### EPA METHOD TO-3

(Aromatic Volatile Organics in Air)

### GC/PID

File Name:	6041820		Date of Collection,	4/14/96
LILIFACIO	Det. Limit	Det. Limit	Аточл	Amount
Compound	(ppmv)	(uG/L)	(ppmv)	(uG/L)
Benzene	0.055	0.18	34	110
Toluene	0.055	0.21	32	. 120
Ethyl Benzene	0,055	0.24	8.8	39
Total Xylenes	0.055	0.24	47	210

. --

# TOTAL PETROLEUM HYDROCARBONS GC/FID (Quantitated as Gasoline)

File Name: 5941820 Dif Factor: 55.0			Date of Collection: Date of Analysis	-4/14/96 4/18/96
	Det. Limit	Det. Limit	Amount	Amount
Compound	(ppmv)	(uG/L)	(ppmv)	(uG/L)
TPH* (C2+ Hydrocarbons)	0.55	2.3	1400	5800

\*TPH referenced to Gasoline (MW=100)

Container Type: 1 Liter Summa Canister

SAMPLE NAME: FB1:MPB-32 ID#: 9604151-03A

#### EPA METHOD TO-3

(Aromatic Volatile Organics in Air)

### GC/PID

File Nama:	6041823		Date of Collection:	. <b>4/14/96</b>
Dil: Factor:	Det. Limit	Det. Limit	Amount	Amount
Compound	(ppmv)	(uG/L)	(ppmv)	(uG/L)
Benzene	2.2	7.3	130	420
Toluene	2.2	8.6	560	. 2100
Ethyl Benzene	2.2	9.9	140	620
Total Xylenes	2.2	9.9	610	2700

# TOTAL PETROLEUM HYDROCARBONS GC/FID

(Quantitated as Gasoline)

File Name:604182 Dil:Factor:224	9		Date of Collection! Date of Analysis	4/14/98 4/18/96
Compound	Det, Limit (ppmv)	Det. Limit (uG/L)	Amount (ppmv)	Amount (uG/L)
TPH* (C2+ Hydrocarbons)	22	93	9900	41000

21

\*TPH referenced to Gasoline (MW=100)

- - -

Container Type: 1 Liter Summa Canister

.

SAMPLE NAME: FB1:MPB-45 ID#: 9604151-04A

### EPA METHOD TO-3

(Aromatic Volatile Organics in Air)

#### GC/PID

File Name: 6041822 Dif Factor 2330			Date of Collection: Date of Analysis: 4	4/14/96 1/18/96
DILTACON	Det. Limit	Det. Limit	Amount	Amount
Compound	(ppmv)	(uG/L)	(ppmv)	(uG/L)
Benzene	2.3	7.6	230	750
Toluene	2.3	8.9	910	. 3500
	2.3	10	210 ·	930
Ethyl Benzene Total Xylenes	2.3	10	940	4100

. ....

# TOTAL PETROLEUM HYDROCARBONS GC/FID (Quantitated as Gasoline)

File Name: 60418	22 30	COMPANY AND A 1000 A 100 A	Date of Collection: Date of Analysis; 4	
C	Det. Limit (ppmv)	Det. Limit (uG/L)	Amount (ppm∨)	Amount (uG/L)
Compound TPH* (C2+ Hydrocarbons)	23	97	15000	62000

\*TPH referenced to Gasoline (MW=100)

# Container Type: 1 Liter Summa Canister

SAMPLE NAME: FB1:MPC-32 ID#: 9604151-05A

## EPA METHOD TO-3

(Aromatic Volatile Organics in Air)

### GC/PID

Dil. Factor:	1400		Date of Analysis	¥18/96
	Det. Limit	Det. Limit	Amount	Amount (uG/L)
Compound	(ppmv)	(uG/L)	(ppmv)	
Benzene	1.4	4.5	120	390
Toluene	1.4	5.4	520	. 2000
Ethyl Benzene	1.4	6.2	190	840
Total Xylenes	1,4	6.2	1000	4400

### TOTAL PETROLEUM HYDROCARBONS GC/FID (Quantitated as Gasoline)

File Name 5041824 Dil. Factor 1400			Date of Collection Date of Analysis:	4/14/96 4/18/96
	Det. Limit	Det. Limit	Amount	Amount
Compound	(ppmv)	(uG/L)	(ppmv)	(uG/L)
TPH* (C2+ Hydrocarbons)	14	58	8500	35000
			<i>C</i>	

\*TPH referenced to Gasoline (MW=100)

. . . .

Container Type: 1 Liter Summa Canister

SAMPLE NAME: Lab Blank ID#: 9604151-06A

# EPA METHOD TO-3

(Aromatic Volatile Organics in Air)

### GC/PID

Fije Name:	6041809		Date of Collection: Date of Analysis: 4	COLOR STORY SHOP OF THE OCCURATION
	Det. Limit	Det. Limit	Amount	Amount
Compound	(ppmv)	(uG/L)	(ppmv)	(uG/L)
Benzene	0.001	0.003	Not Detected	Not Detected
Toluene	0.001	0.004	Not Detected	Not Detected
Ethyl Benzene	0.001	0.004	Not Detected	Not Detected
Total Xylenes	0.001	0.004	Not Detected	Not Detected

### TOTAL PETROLEUM HYDROCARBONS GC/FID (Quantitated as Gasoline)

File Name: 8041809 Dil Factor: 1.00			Date of Collection Date of Analysis: 4	NA /18/96
	Det. Limit	Det. Limit	Amount	Amount
Compound	(ppmv)	(uG/L)	(ppmv)	(uG/L)
TPH* (C2+ Hydrocarbons)	0.010	0.042	Not Detected	Not Detected

\*TPH referenced to Gasoline (MW=100)

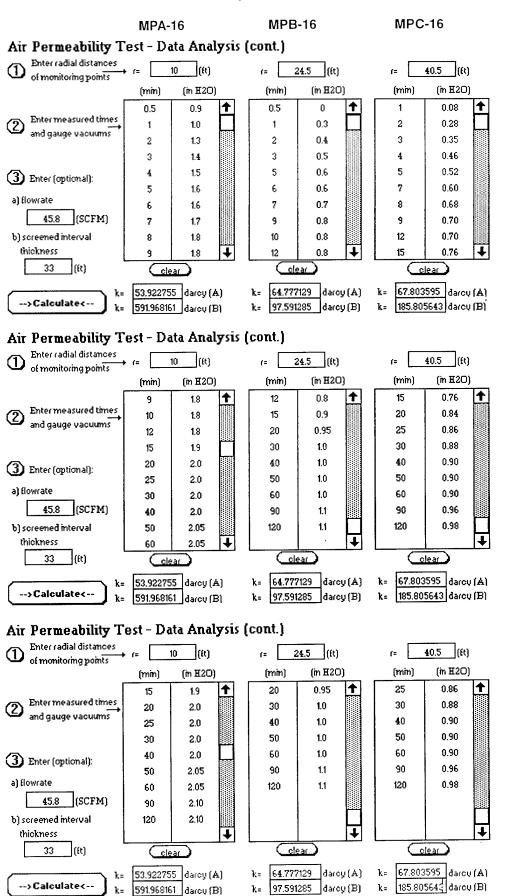
Container Type: NA

# **APPENDIX C**

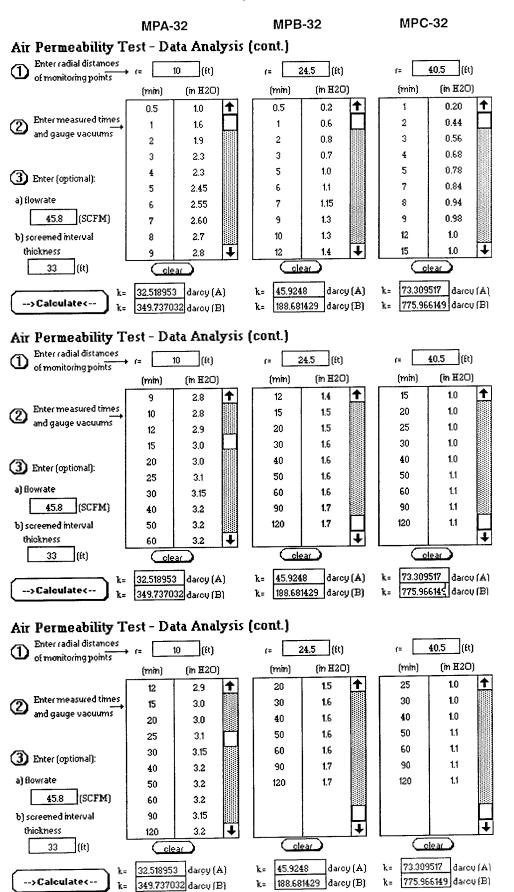
# HYPERVENTILATE® AIR PERMEABILITY CALCULATION CARDS

.

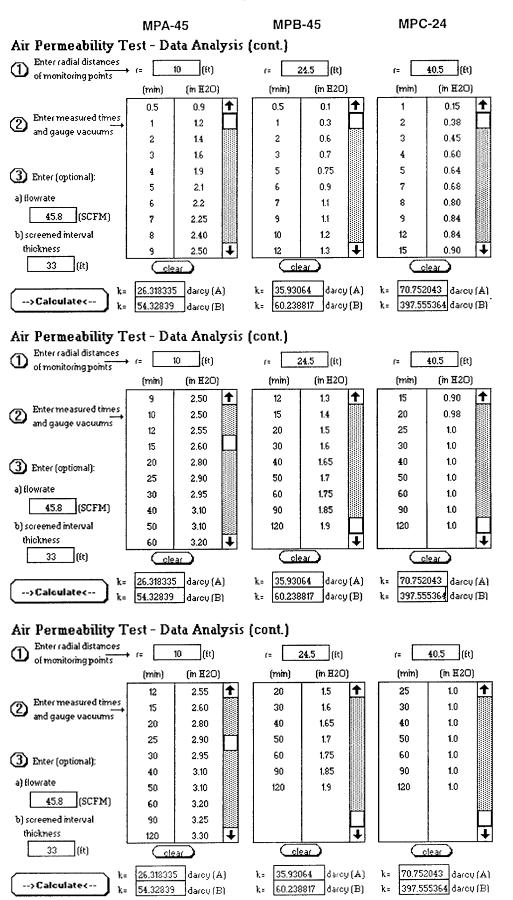
# Fort Bliss Air Permeability Test Calculations



# Fort Bliss Air Permeability Test Calculations



# Fort Bliss Air Permeability Test Calculations



# **APPENDIX D**

# **RESPIRATION TEST DATA AND CALCULATION SHEETS**

.

-

FORT BLISS BUILDING 675 MPA-45

$$K_{\rm b} = \frac{K_{\rm O} * A * D_{\rm o} c}{100}$$

	Variable	Description	Units	Constants
where:	K₀=	Biodegradation rate	mg/kg/day	
	K <sub>o</sub> =	Oxygen utilization rate	%/day	
	A=	Volume of air/kg soil	1/kg	
	D <sub>o</sub> =	Density of Oxygen	mg/L	1330mg/L
	c=	mass ratio of hydrocarbon to	dimensionless	1/3.5
	SG	Oxygen for mineralization for quartz (to calculate porosity)	dimensionless	2.65

MPA-45

K <sub>o</sub> = moisture=	5.05 % per day 9.4 %	•	piration test results) sture content from sampling)
C=	0.286	(1/3.5)	sure content from sampling)
		(1/3.5)	
D <sub>o</sub> =	1330 mg/L		
bulk density = bd =	1.6 kg/L	sand	
porosity =	0.396	1.0-(bd/2	.65) dimensionless
water wt=	0.150 kg water/l	iter soil	(moisture*bd/100)
water vol=	0.150 liters		
air filled vol=	0.246 liters air/li	ters soil	(porosity-water volume)
A=	0.154 liters air/k	g soil	(air filled volume/bd)
κ <sub>b</sub> = <u>(</u>	5.05*0.154*1330*0.2		
	100	kg soil*da	зу
K <sub>b</sub> =	2.95 mg hydrod	carbon/kg s	soil/day
K <sub>b</sub> =	1076.2 mg hydro	ocarbon/kg	g soil/year

-

.

# $K_{b} = \frac{K_{0} * A * D_{o}c}{100}$

	Variable	Description	Units	Constants
where:	K <sub>b</sub> =	Biodegradation rate	mg/kg/day	
	K=	Oxygen utilization rate	%/day	
	-	Volume of air/kg soil	1/kg	
	D <sub>o</sub> =	Density of Oxygen	mg/L	1330mg/L
	c=	mass ratio of hydrocarbon to	dimensionless	1/3.5
		Oxygen for mineralization		
	SG	for quartz (to calculate porosity)	dimensionless	2.65

### MPB-32

K <sub>o</sub> = moisture=	5.63 % per da 3.04 % 0.286		iration test results) ture content from sampling)
c= D <sub>o</sub> =	1330 mg/L	(1/3.3)	
bulk density = bd =	1.6 kg/L 0.396	sand	65) dimensionless
porosity = water wt=		•	-
water vol= air filled vol=	0.049 liters 0.348 liters air/l	iters soil	(porosity-water volume)
A=	0.217 liters air/l		(air filled volume/bd)
$K_{b} = (5)$	.63*0.217*1330*0.	2 mg hydroc	carbon
	100	kg soil*day	ý
K <sub>b</sub> =	4.65 mg hydro	carbon/kg so	bil/day
K <sub>b</sub> =	1696.4 mg hydr	ocarbon/kg	soil/year

- . .

FORT BLISS BUILDING 675 MPB-45

 $K_{\rm b} = \underline{K_{\rm O}^*A^*D_{\rm o}c}$ 100

	Variable	Description	Units	Constants
where:	-	odegradation rate kygen utilization rate	mg/kg/day %/day	
		olume of air/kg soil ensity of Oxygen	1/kg mg/L	1330mg/L
	c= m	ass ratio of hydrocarbon to kygen for mineralization	dimensionless	1/3.5
	SG for	quartz (to calculate porosity)	dimensionless	2.65
MPB-45				

Ko=	5.56 % per	day (from res	spiration test results)
moisture=	7.5 %	(soil moi	sture content from sampling)
с=	0.286	(1/3.5)	
D <sub>o</sub> =	1330 mg/L		
bulk density = bd =	1.6 kg/L	sand	
porosity =	0.396	1.0-(bd/2	2.65) dimensionless
water wt=	0.120 kg wat	ter/liter soil	(moisture*bd/100)
water vol=	0.120 liters		
air filled vol=	0.276 liters a	air/liters soil	(porosity-water volume)
A=	0.173 liters a	air/kg soil	(air filled volume/bd)
$K_b = (5)$	5.56*0.173*1330	*0.2 mg hydro	ocarbon
	100	kg soil*d	ау
K <sub>b</sub> =	3.65 mg hy	drocarbon/kg	soil/day

K<sub>b</sub>= 1331.4 mg hydrocarbon/kg soil/year

.

.

# $K_{\rm b} = \frac{K_{\rm O}^* A^* D_{\rm o} c}{100}$

	Variable	Description	Units	Constants
where:	K <sub>b</sub> = Bi	odegradation rate	mg/kg/day	
	K <sub>o</sub> = 0:	xygen utilization rate	%/day	
		olume of air/kg soil	1/kg	
	D <sub>o</sub> = Do	ensity of Oxygen	mg/L	1330mg/L
		ass ratio of hydrocarbon to	dimensionless	1/3.5
		xygen for mineralization r quartz (to calculate porosity)	dimensionless	2.65

### MPC-32

Ko=			piration test results)
moisture=	3.04 %	(soil mois	sture content from sampling)
C=	0.286	(1/3.5)	
D <sub>o</sub> =	1330 mg/L		
bulk density = bd =	1.6 kg/L	sand	
porosity =	0.396	1.0-(bd/2	.65) dimensionless
water wt=	0.049 kg water/	liter soil	(moisture*bd/100)
water vol=	0.049 liters		
air filled vol=	0.348 liters air/l	iters soil	(porosity-water volume)
A=	0.217 liters air/k	g soil	(air filled volume/bd)
K <sub>b</sub> = <u>(5</u>	.63*0.217*1330*0.2		
	100	kg soil*da	ау
K <sub>b</sub> =	4.65 mg hydro	carbon/kg s	soil/day
K <sub>b</sub> =	1696.4 mg hydro	ocarbon/kg	g soil/year

MONITORING POINTS MPB-32 O2 METER NO. 9304035 CO2 METER NO. 7304035 HYDROCARBON METER NO. 9304032 SHUT DOWN DATE 4/15/44 TIME 0700	Comments Time CO <sub>2</sub> K O <sub>2</sub> K Hydrocarbon Hellum Comments												meter Kunchau	
 *	Hollum	- Initial	0,00	0,43	0.84	1.50	1.20	2.50	2.20	1, 20	08.1	1,3	1.3 CO2 moter	 
675 is, Dan Switch	Total Hydrocarbon H	1600	තින ව	1180 0	0 0091	2000	5400 l	nacr 2	7200 \$	2/0,000	8000	>10,000	7800	-
Fort Bliss, Blog675 4/15/96 N EI Pase TX IISI Brnarvandergius,	0,X	0'0	30.E	1.96	20.6	20.06	ھ.ح	19.9	14, 1	9.9	8. <b>Ø</b>	b.2	S.1	
rt Bliss, 4/15/96 El Paso Brian Vey	co,*		0.6	0.4	oiţ	5,0	0.6	6.7	0.8	3.4	3.5	4.4	{	
SITE Fort Bliss Rlag6 DATE 4/15/96 LOCATION EI Pass TX SAMPLER(S) Brian Vandergius	Datu/ Time	74/14/17	4/12/2410 12/2410	60.30	0906	9011	1507	[962	4/12/26	1402	4/1/1/4 0706	1405	LOLD Ah/31/4	

Figure 8-1. Typical Record Sh ior In Situ Respiration Test.

.

	35			Commente														
	. 9304035			iutum			,											
	CO <sub>2</sub> METER NO.	ALV JUE	1 1	Total Hydrocarbon														
MPC-32		304		0,X											·			
1.	9304035	ER NO. 4/15/96	. 1 1	<b>X</b> 100														
IG POINTS	NO. 93	(BON MET) N nate		Date/ Time														J
MONITORING POINTS	O <sub>2</sub> METER NO.	HYDROCARBON METER NO. SHIFT DOWN DATE $\frac{d}{d5}$		Commente	NITIAL											CC2 meter malknehin		
		101	-	Heltum		0.04	1,40	3.0	4.5	רויש	4.8	3.6	2.6	3.5		9.1		
JS	•	Dan CJok		Total Hydrocarbon	1500	970	1400	200	280	590	940	iboo	3400	3800	4400	Hbud		
For + Bliss RIDG 675		El taso, IX Roin Vanderski		% <sup>5</sup> 0	Q' D	20.5	R.9	20.4	18.4	17.9	16.1	12.6	9.8	8.2	5.1	4.0		
Bliss	Hris lab		1 8	¥ <sup>1</sup> 00	12.S	0,2	0,2	b.d	6.4	9.0	ہ،2	مان	2.0	2.5	4,2	Nykedy		
Fo.+	DATE 4/	LOCATION		Deta/ Time	114/14/108 28	4/15126 0707	6 030	6903	i102	1503	1901	4/11/46 0701	1902	4/2/02 07	ا دار ک	Hursitte	-	

Figure 8-1. Typical Record Sh 'or In Situ Respiration Test. MONITORING POINTS MAPA - 45	035	HYDROCARBON METER NO. 930 4032	where SHUT DOWN DATE 4/15/14/6 TIME 0700	Commanda Date/	- initial	0,83	2. So	3.8	4.0	4.3	4.9	3.7	3,4			1,7 CU2 meter malherchèn	
espiration M P A -			-11/2														
i Situ Ro Te	24035	ETER NO		8													
UN CN	NO. 93	<b>RBON MI</b>	VN DATE	Det I													
ypical Record Sh MONITORI	0, METER	HYDROCA	SHUT DOW	Comments	וחירוינו	-										.CC2 uncler malkurchim	
re 8-1. T			, tek		1	0,83	2. So	3.8	4.0	4.3	Ч.9	3.7	3.4	6'1	3.3		
	,		115, Dan Switch	Total	> 10,000 550 Rev	500	21000	UBCO	5900	5100	007L	>10,000	7 (0,000	>10,000	> 10000	>lo'aco	
		- 1			0	3. X.	20,02	19.0	18.6	18,4	17.0	14.2	11.D	8.0	8.0	5.5	
RIG 675		150, TX	Vanders	<b>X</b>	0.0	\$	2								3		
	$\left  \right $	EI PASO, TX	SAMMER(S) Bran Vanderglis,	CO.X 0.X		0.4 20	0.5 2C	50.0	0.8	0.5	2.6 2.8	2.0	3,8	5.9 00	5.2	ļ	

Comments 2204035 Hallon CO<sub>2</sub> METER NO.\_ TIME 0700 Hydrocarbon Total HYDROCARBON METER NO. 7304033 MONITORING POINTS MPB-45 ×.0 SHUT DOWN DATE 4/15/96 0, METER NO. 9304035 ד83 Dete/ mis reading suspend \* Leaking but t malfunction Commente Initial CC2 meter OHS 3.20 0.57 3.00 Den Switch 3.00 Ň 0.17 1:30 0.36 0.61 2.10 Parting. ١ Hydrocerbon 210,000 Jerv 3800 > 10,000 UU0 012 (UD) 0 < 210,000 2000/012 Qaa'al~ 29100 4 000 Total 7600 Furt Bluss Blog 675 SAMPLER(S) Bingn Vandergles LOCATION EI PASO, TX 204 20.0 18.0 5.0 5.8 205 12.2 0 0 X.0 0'0 5. S Do.le e.S 0.17 199901 0.0 %"8 4.0 13.0 s S و. ق 0.6 **و.** 00 00 1 و د 4/15/46 ь С NIT THE THE 1908 3939 4/18/46 1070 1905 6909 01-30 1405 Q 19:1+11/h Martin States Data/ Time 101 1510 96)71/14 H/ns like DATE SITE\_\_

Figure 8-1. Typical Record Sh ior in Situ Respiration Test.

# APPENDIX E FIELD ACTIVITY REPORT (FORM TWC-0017)

# Texas Water Commission PRODUCT STORAGE TANK FIELD ACTIVITY REPORT

Complete All Applicable Blanks.

Date:\_\_\_5-28-96

# **GENERAL INFORMATION**

IST ID No.: 98508

Assigned TWC Coordinator: \_\_\_\_\_\_unassigned

Facility ID No.: 05147

sponsible Party: Dr. James Hartman

Facility Name: Commander USAA - DACENFB

cility Address: Directorate of Environment, Attn. ATZC-DOE-M

Facility City: Fort Bliss, TX 79916-6816 County: Fort BLiss

tivity: 
☐ Assessment ☐ RAP Implementation ☐ RAP Addendum ☐ Abatement (check appropriate box)

# ASSESSMENT

How many borings and/or monitor wells have been installed? One vent well/monitoring well

and four monitoring points each containing three 0.5' screened intervals have been installed.

Has the extent of assessment directed/authorized by the TWC been completed? 🖾 YES or 🗆 NO (check one) If no, explain:\_\_\_\_\_\_

Are any assessment activities ongoing? VES or NO (check one) If yes, directed by whom:\_\_\_\_

Brian Vanderglas, Parsons Engineering Science (CAPM 00758)

Describe activities: A one-horsepower blower is currently injecting air at a rate

of approximately 16.5 acfm. Radius of influence extends over 50 feet

-

Air injection will continue until April, 1997.

-

# ASSESSMENT (continued)

Are there any proposed or necessary assessment activities?  $\Box$  YES or  $\varepsilon$  NO (check one) If yes, explain:

If any additional monitor wells or soil borings are necessary, please indicate the proposed locations on a site map.

RAP IMPLEMENTATION
Date Remedial Action Plan was submitted to TWC:
Was the RAP approved by the TWC? I YES or BNO (check one) If yes, by whom:
If yes, date of approval:
Date RAP installation was completed:
Type of remedial system installed: Bioventing system consisting of a one-horsepower
blower and vent well. Three monitoring points each containing 3
0.5' screened intervals were installed to collect soil gas samples.
Screened intervals are 16, 32, and 45 for two monitoring points and
16, 24, and 32 feet bgs for the third monitoring point.
Provide a brief description of the completed remedial actions: <u>A 1.0 horsepower blower has</u>
been installed to inject air into a newly installed vent well. Air
injection started on April 18, 1996. Air injection has been proven
to increase hydrocarbon biodegradation rates.

•

. .

E

# RAP IMPLEMENTATION (continued)

Indicate the operating parameters of the remedial system (pumping rates, air flow rates, etc.):

The one-horsepower blower is injecting air at 16.5 acfm. Injected

air pressure is 4 inches of water. Discharged air temperature = 95

degrees farenheit (ambient air temperature = 82 degrees farenheit.

Vacuum inlet air pressure = -4 inches of water.

With 33 feet of screened interval, the estimated flow rate for

injection is 0.5 cfm per foot of screened interval.

Was the remedial system installed in the time frame originally outlined in the RAP? **U**YES or **X** NO the pursuing reimbursement, so no RAP

was submitted. The bioventing pilot test was included with the

site assessment to determine if bioventing is feasable in the arid

conditions encountered at Fort Bliss.

Was the cost of the remedial system installation equal to or less than the projected cost itemized in the AP?  $\Box$  YES or  $x\Box$  NO (check one) If no, explain: NO costs were proposed because Fort

Bliss is not pursuing reimbursement.

oposed installation cost of the remedial system: <u>none-client not pursuing reimbursement</u>.

Actual installation cost of the remedial system: \$25 000

Complete All Applicable Blanks.

LPST ID No.: 98508

REMEDIAL ACTION PLAN ADDENDUM		
Reason for the RAP addendum:		
	···	
Was the RAP addendum requested by the TWC? □ YES or ∞ NO (check one) and when:	If yes, indicate	by whom
Discuss the proposed changes:		
	•	
Projected cost of addendum:		
ABATEMENT MEASURES		
Provide a brief description of the situation requiring abatement measures:		, <b></b>
Provide a brief description of the situation requiring deatonicity in the situation requiring deatonicity is the situation requiring de		
Have all potential threats to human health and safety been abated? The YES or the describe:	□ NO (check one	e) If no,
	·.	.*

ABATEMENT MEASURES (continued)
Aethod of abatement:
Provide a brief description of equipment installed or utilized:
·
Are there any proposed additional abatement measures?  VES or NO (check one) If yes, describe:
WASTE DISPOSITION
Discuss the method of treatment and/or disposal for all wastes generated: <u>Twelve 55 gallon</u>
drums containing soil cuttings will be disposed of at the Camino
Real landfill in New Mexico.

Complete All Applicable Bl	anks. LPST ID No.:_98508	Date: 5-28-96
2	REPORT PREPARATION	
Prepared by: Brian V.	anderglas (CAPM 00758)	
Company: Parsons	Engineering Science	
Date prepared: 5-28-96		
Telephone No.: 512-719	-6000	
Fax No.:512-719	-6099	-
Signature: Rhon //	-6099 anderad	
Name of Responsible Party	y contact: Dr. James Hartman	
Telephone No.:		
Fax No.:		·
Date:		
Signature:		
Provide The Following Attacl	A hydrocarbon distribution map/groundwater gra all installed wells. Include any proposed boring/n Copies of soil boring logs/well construction dia borings/monitoring wells Cost breakdown sheet(s) for any proposed activiti	dient map with analytical results on nonitoring well locations grams for the newly installed so
RAP IMPLEMENTATION	Photographic documentation of the installed reme As-built construction details of the entire remedia Cost breakdown sheet(s) of the installed remediati	tion system
RAP ADDENDUM		
	Supporting field test data for RAP addendum if a Cost breakdown sheet(s) for any proposed activiti	ies
ABATEMENT MEASURES		
ADATEMENT MEASURES		