2R - 23

REPORTS

DATE:

Feb. 14, 2000

IN COMING!

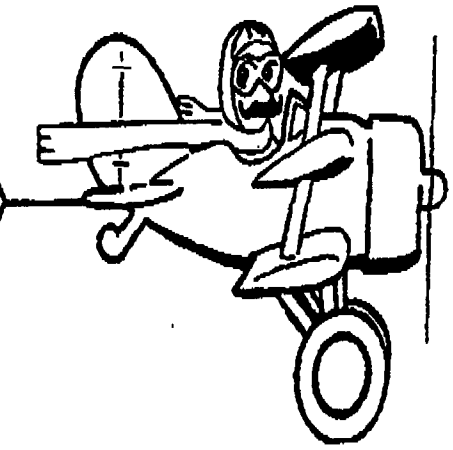
DATE: 2/14/2000

ATTENTION: Roger Anderson

FROM: Mike Stubblefield

NUMBER OF PAGES INCLUDING COVER SHEET:

26



OIL CONSERVATION DIVISION
DISTRICT II
ARTESIA, NM 88210

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FAX NUMBER: (505) 748-9720

HAVE A GREAT DAY!

EL PASO ENERGY

February 11, 2000

New Mexico Oil Conservation Division
Attn: Mr. Mike Stubblefield
811 S. First
Artesia, NM 88210

Dear Mr. Stubblefield:

As you are aware during December 1999 El Paso Field Services (EPFS) removed a natural gas pipeline from service in Eddy County. The line was located in Unit F of Section 20, Township 22 South, Range 27 East. During excavation of the pipeline, some hydrocarbon contamination was observed. Based on our subsequent investigation, EPFS believes that this hydrocarbon contamination was the result of historic crude oil gathering operations conducted at the location rather than natural gas pipeline operations. The reasons for our conclusion are as follows:

- The El Paso pipeline was under a constant pressure of 400 psig until the date it was removed. While in operation this line was under the jurisdiction of the U. S. Department of Transportation, and in order to comply with DOT regulations, EPFS conducted annual leak tests on the pipeline. No leaks were found during the annual leak surveys or during the recent removal of the pipe.

- The EPFS pipeline right of way passed through the immediate area of the crude oil tank battery. The metering station and connective piping was actually located inside the tank battery containment berm. According to adjacent landowners, that bermed area was "full of oil all the time." One land owner also informed EPFS that when the producer attempted to remove the crude oil storage tanks, "the whole bottom fell out." The crude oil gathering system was piped into the tanks with above ground piping, and long term EPFS employees have stated that they observed numerous leaks in these gathering lines outside the bermed area.

- Samples collected by Mr. Courtney Ragsdale of the EPFS Carlsbad office were analyzed by Cardinal Laboratories of Midland, Texas indicated an approximate 50%-50% mix of gasoline range organics (GRO) and diesel range organics (DRO). The Cardinal results showed very low levels of BTEX. BTEX is typically much higher in natural gas condensates.

- Of 10 core samples collected by ARCADIS Geraghty and Miller during January, only one had measurable levels of BTEX, and those levels were below NMOCD clean up guidelines. A sample for fingerprint analysis was submitted to Arthur D. Little by ARCADIS Geraghty and Miller. Their analysis identified hydrocarbons from C10 to beyond C45, the presence of PAHs, including many five and six ring compounds, and the presence of sterane and triterpane, which are associated with an oil reservoir environment. Arthur D. Little concluded that the characteristics of the sample "are typical of a highly degraded crude oil and not a condensate."

ARCADIS GERAGHTY & MILLER

El Paso Field Services, Carlsbad New Mexico Site Assessment Investigation Report

El Paso Field Services
Farmington, New Mexico

1. INTRODUCTION

The subject site is a former natural gas pipeline operated by El Paso Field Services (EPFS). Also present at the site are a plugged and abandoned oil well, a plugged and abandoned gas well and former crude oil storage tanks that were NOT owned or operated by EPFS. The site is located south of Carlsbad, New Mexico in Section 20, Township 22 South, Range 27 East (Figure 1).

2. SITE HISTORY

During the removal of a natural gas pipeline, EPFS representatives observed hydrocarbon-impacted soils in the natural gas pipeline excavation. The Carlsbad, New Mexico office of the New Mexico Oil Conservation Division (NMOCD) has requested that EPFS determine if the source of the hydrocarbon impacts is a result of the EPFS natural gas pipeline, if it is a result of the oil well and associated tanks at this location, or both (the natural gas pipeline and the oil well activities). According to landowners, oil was often present at the site in the area of the former crude oil tanks that were not operated by EPFS.

3. GEOLOGY AND HYDROGEOLOGY

Quaternary-age alluvium and the underlying Permian Carlsbad Limestone are the principal sources of groundwater in the area of the subject site. In the area south of Carlsbad, irrigation water can be obtained from the alluvium at depths ranging from approximately 20 feet below ground surface near the Pecos River to approximately 100 feet below ground surface. The water is generally not used for domestic purposes due to the high chloride and sulfate content. Water for stock and domestic use can be obtained from the alluvium in this area at depths ranging from 100 to 225 feet below ground surface.

4. FIELD ACTIVITIES AND METHODOLOGY

Site assessment field activities were conducted on January 10, 2000. Field activities included drilling and soil sampling of five boreholes at the subject site (Figure 2). Borehole locations were selected based on the extent of observed surface staining, the location of the excavated natural gas pipeline and conversations with an EPFS representative and the landowner at the site regarding the historical condition (staining, standing oil, etc.) at the site. Borehole lithology descriptions are included in Appendix A. Soil samples were screened in the field for volatile organic compounds (VOCs) using an OVM and inspected for the presence of staining or odor. Drilling and

sampling of each borehole continued to a depth where no staining or odor was observed. Two soil samples from each borehole, the sample exhibiting the highest OVM reading and the sample collected from total depth of the borehole, were submitted for analysis for benzene, toluene, ethylbenzene, and xylenes (BTEX) and total petroleum hydrocarbons (TPH) using USEPA Method 8021B and 418.1, respectively.

One sample (SB-2, 0-2 feet) was submitted to Arthur D. Little Laboratories in order to identify if the hydrocarbon impacts resembled those of condensate or crude oil hydrocarbons using hydrocarbon fingerprint analysis.

5. LABORATORY ANALYTICAL RESULTS

Soil sample analytical results are summarized in Table 1. Laboratory analytical results are included in Appendix B.

TABLE 1

SOIL SAMPLE ANALYTICAL RESULTS

Sample Location and Depth	Benzene	Toluene	Ethylbenzene	Xylene	Total BTEX	TPH
SB1 3-5'	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	23.1
SB1 13-15'	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	<10.0
SB2 0-2'	<0.1	0.442	0.268	1.3	2.1	356
SB2 15-17'	< 0.05	< 0.05	< 0.05	< 0.05	0.066	76.9
SB3 0-2'	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	<10.0
SB3 5-7'	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	<10.0
SB4 0-2'	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	<10.0
SB4 5-7'	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	<10.0
SB5 0-2'	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	<10.0
SB5 5-7'	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	<10.0

All results in milligrams per kilogram (mg/kg)

Benzene was not detected in any of the samples. Toluene, ethylbenzene and xylenes were detected in one sample (SB-2, 0-2 feet) at a concentration of 0.442 mg/kg, 0.268 mg/kg and 1.3 mg/kg, respectively. Total BTEX was detected in the sample collected from SB-2, 0-2 feet at a concentration of 2.1 mg/kg and the sample collected from SB-2, 15-17 feet at a concentration of 0.066 mg/kg. TPH was detected in three samples (SB-1, 3-5 feet; SB-2, 0-2 feet and SB-2 15-17 feet) at a concentration of 23.1 mg/kg, 356 mg/kg, and 76.9 mg/kg, respectively.

Arthur D. Little performed advanced chemical fingerprint analysis of a soil sample collected from soil boring SB-2 at a depth of 0-2 feet below ground surface. The chemical analysis consisted of Diesel Range Organics performed by gas chromatography with flame ionization detection (GC/FID), polynuclear aromatic hydrocarbons (PAHs) by gas chromatography with mass spectrometry (GC/MS), and biomarker steranes and triterpanes by GC/MS. Analytical results are included in Appendix C.

GC/FID analysis exhibits hydrocarbon distribution extending from approximately n-C10 to beyond n-C45. PAH's are present in the sample and include many five and six ring compounds. The soil sample also contains sterane and triterpane biomarkers typical of crude oils.

All boreholes were plugged to surface with a cement grout containing a minimum of 3-5% bentonite.

6. CONCLUSIONS

Based on analytical data and field screening (OVM readings, odor and staining), the vertical and horizontal extent of hydrocarbon-impacted soil has been identified. None of the concentrations detected in the soil samples exceed the NMOCD guideline of 10 mg/kg benzene or 50 mg/kg BTEX. Only one sample, SB-2, exhibited a concentration that exceeds the NMOCD guideline for TPH. The sample collected at a depth of 0-2 feet exhibited a TPH concentration of 356 mg/kg, exceeding the NMOCD guideline of 100 mg/kg. Based on conversations with two landowners at the site, the former crude oil tank was the source of the hydrocarbon staining at the site. The approximate location of the former crude oil tank was between boreholes SB-1 and SB-2.

The results of the chemical fingerprinting performed by Arthur D. Little Laboratory (Appendix C) indicate that the characteristics of the soil are typical of highly degraded crude oil and not condensate based on:

- The hydrocarbon distribution extending from approximately n-C10 to beyond n-C45;
- The presence of PAHs including many five and six ring compounds; and
- The presence of sterane and triterpane biomarkers.

EPFS did not perform any operations at this sight involving crude oil.

7. REFERENCES

Geology and Ground-Water Resources of Eddy County, New Mexico; Ground-Water Report 3; G.E. Hendrickson and R.S. Jones; New Mexico Bureau of Mines; 1952

Municipal Water Supplies and Uses, Southeastern New Mexico; Technical Report 29A, New Mexico State Engineer; 1963

New Mexico Oil Conservation Division; Guidelines for Remediation of Leaks, Spills and Releases; August 1993

New Mexico Water Quality Control Commission, Title 20 Chapter 6, Part 2, Subpart I

Arthur D Little

Arthur D. Little, Inc.
Acorn Park
Cambridge, Massachusetts
02140-2390 U.S.A.

Telephone (1) 617.498.5000
Fax (1) 617.498.7200

February 04, 2000

Sharon Hall
ARCADIS/Geraghty & Miller
1030 Andrews Highway, Suite 120
Midland, Texas
79701

Re: Carlsbad, NM

Dear Sharon,

ARCADIS/Geraghty & Miller contacted Arthur D. Little to perform advanced chemical fingerprinting analysis of one soil sample. The goal of the analysis would be to determine the possible source of the hydrocarbons present in the soil.

Background

ARCADIS/Geraghty & Miller identified two possible sources of the hydrocarbons present in the soil sample delivered to Arthur D. Little. Those sources were a condensate pipeline or a crude oil tank battery. Samples from these two sources for authentication purposes are not available as neither the pipeline nor the tank battery is still in use today. We assumed that the condensate pipeline would contain unrefined natural gas liquids being transported from a gas production well, post separation, to a refinery or tank battery. We also assumed that the crude oil tank battery would contain unrefined crude oil produced in the vicinity and typical of the reservoirs in that vicinity.

Characteristics of Condensate. Natural gas condensates are typically light hydrocarbon mixtures dominated by an abundance of normal alkanes and other aliphatic hydrocarbons. Typical API° is greater than 40°. Natural gas condensates are typically dominated by light, gasoline range hydrocarbons, those found from approximately *n*-C_4 through *n*-C_{12} boiling range with declining amounts of material with increasing molecular size and boiling point. The GC/FID chromatogram of a typical natural gas condensate is presented in Figure 1; this condensate was collected from a formation in east Texas.

Characteristics of Crude Oil. Crude oil characteristics vary widely from formation to formation; however, some typical differences from condensate can be described. Crude oils are generally heavier than condensates and have carbon ranges extending well beyond n-C50. Crude oils generally contain much more aromatic material than condensates, this characteristic is accentuated after environmental degradation removes a greater percent of the more labile aliphatic compounds. Chromatograms of crude oils, especially degraded crude oils, typically result in a large unresolved complex mixture, or hump, because of the great variety of compounds contained in crude oil. Crude oils

Arthur D Little

generally contain a group of compounds referred to as biomarkers. Most biomarkers are large (approximately C30) sterane and terpane compounds which derive their name because of their unique chemistry and their ability to withstand most environmental degradation. The sterane and triterpane biomarkers are not typically present in condensate because of their large molecular size and high boiling points. Figure 2 presents the GC/FID chromatogram of a degraded crude oil from a formation in New Mexico.

Analysis

Arthur D. Little performed three chemical analysis to provide the data necessary to reach a conclusion regarding the source of the hydrocarbon material. These methods have been proven to be effective in describing the most important and telling characteristics of petroleum hydrocarbon materials. The three analyses were:

Diesel Range Organics (DRO) was performed by gas chromatography with flame ionization detection (GC/FID). This analysis provides a general description of the carbon range of the material and some characteristic and individual compound information can also be obtained.

Polynuclear Aromatic Hydrocarbons (PAHs) were determined by gas chromatography with mass spectrometry (GC/MS) operated in the selected ion monitoring (SIM) mode. These compounds have been used to provide unique source and degradation information on petroleum hydrocarbon materials.

Biomarker steranes and triterpanes (S/T) were determined by GC/MS. These compounds are generally resistant to environmental degradation and their distribution is a reflection of unique conditions in the oil reservoir environment.

Results and Findings

The characteristics of the hydrocarbons present in the soil sample delivered to Arthur D. Little are typical of a highly degraded crude oil and not a condensate. Without a verification sample typical of the condensates and crude oils produced in the vicinity this sample was collected from it is not possible to be absolutely certain as to the origin of the hydrocarbon contamination. Crude oils and natural gas condensates are broad terms that describe a variety of source materials. The nature of crude oils and condensates, and the bio-geo-chemical processes which produce them, are similar and many of their characteristics overlap.

Arthur D Little

Sharon Hall
ARCADIS/Geraghty & Miller

Figure 1. Example Condensate

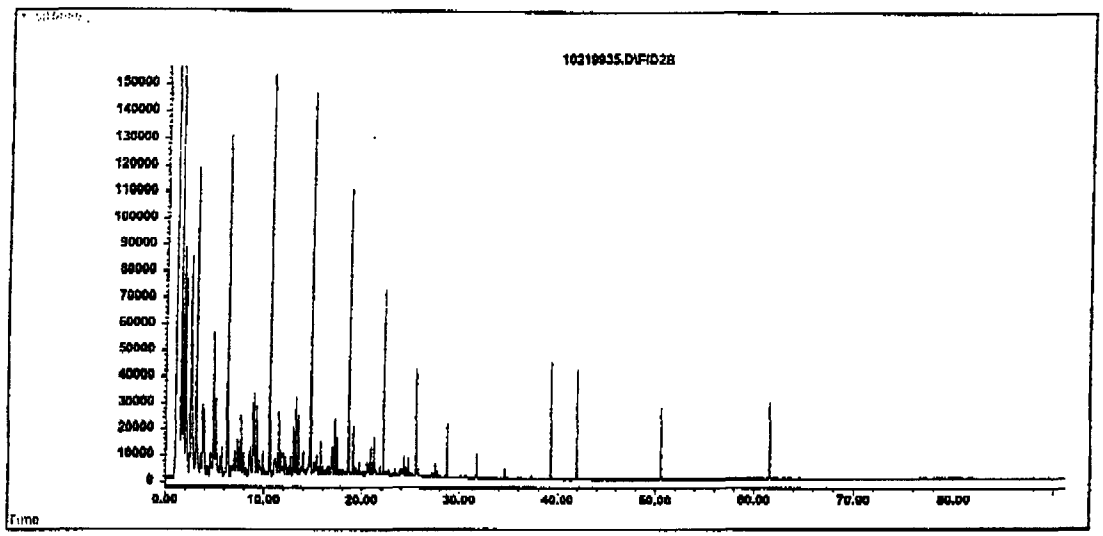
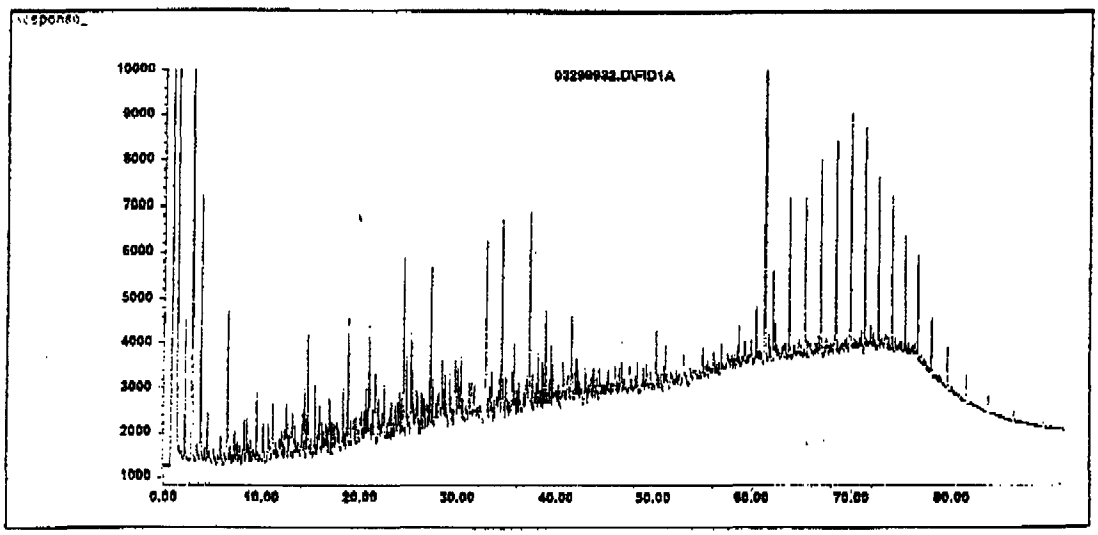


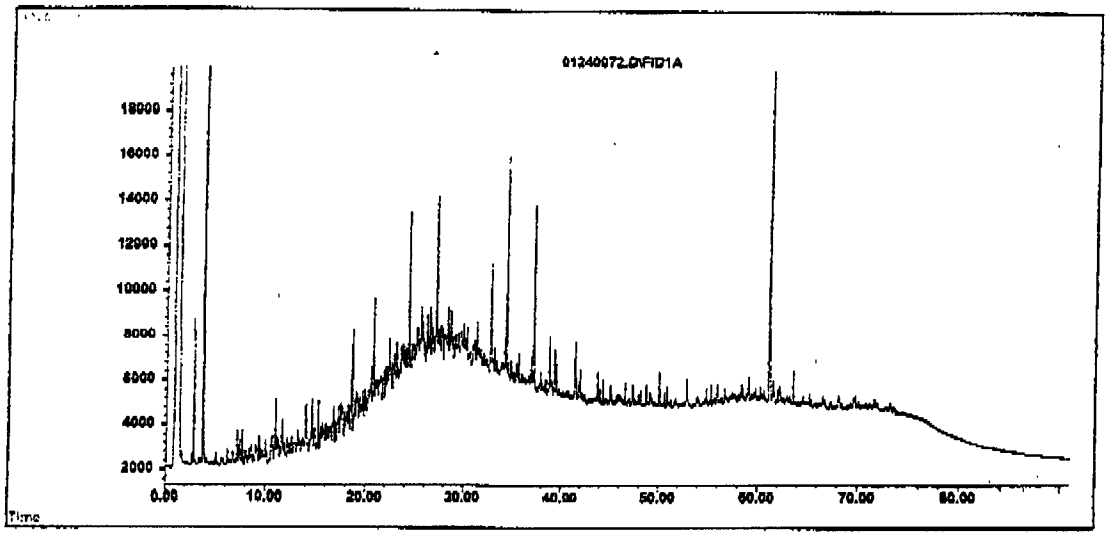
Figure 2. Example Crude Oil



Arthur D Little

Sharon Hall
ARCADIS/Geraghty & Miller

Figure 3. Carlsbad, New Mexico Soil Sample



ARCADIS

BORING LOG

BORING NO. SB-1

1030 Andrews Highway Suite 120, Midland, TX 79701-3872 Tel: 915/699-1381 Fax: 915/699-1978

PROJECT NUMBER: MT000625.0001
CLIENT NAME: EL PASO FIELD SERVICES
PROJECT NAME: CARLSBAD SITE ASSESSMENT
SITE LOCATION: EDDY COUNTY, NEW MEXICO
UNIQUE NUMBER: 31-009-00049 FILE NAME: SB-1.DAT

DRILLING CO: EADES DRILLING COMPANY
DRILLING METHOD: AIR ROTARY
DRILLER: –
LOGGER: D. McNEESE
DATE BEGUN: 01/10/2000 DATE COMPLETED: 01/10/2000

DEPTH	SAMPLED	SAMPLING METHOD	ANALYZED	MOISTURE	RECOVERY	OVM READING	U.S.C.S. CLASS	LITHOLOGY	DESCRIPTION
0									BORING DEPTH: 15 FEET
-5		Split Spoon		dry	85%	5.8	SC		CALICHE: Some hydrocarbon staining on surface SAND: 5YR 6/6; red/yellow; very fine grained; silty; some moderately plastic; dry; no odor.
-10		Split Spoon		damp	90%	2.1	SC		SAND: 5YR 6/6; red/yellow; very fine grained; silty; some moderately plastic; slightly damp.
		Split Spoon		dry	90%	0			LIMESTONE AND DOLOMITE COBBLES: 5YR 6/2; pink/gray; some boulders; some silty sand.

BORING LOG

BORING NO. SB-2

ARCADIS 1030 Andrews Highway Suite 120, Midland, TX 79701-3872 Tel: 915/699-1381 Fax: 915/699-1978

Page 1 of 1

PROJECT NUMBER: MT000625.0001
CLIENT NAME: EL PASO FIELD SERVICES
PROJECT NAME: CARLSBAD SITE ASSESSMENT
SITE LOCATION: EDDY COUNTY, NEW MEXICO
UNIQUE NUMBER: 31-009-00048 FILE NAME: SB-2.DAT

DRILLING CO: EADES DRILLING COMPANY
DRILLING METHOD: AIR ROTARY
DRILLER: -
LOGGER: D. McNEESE
DATE BEGUN: 01/10/2000 DATE COMPLETED: 01/10/2000

DEPTH	SAMPLED	SAMPLING METHOD	ANALYZED	MOISTURE	RECOVERY	OVM READING	U.S.C.S. CLASS	LITHOLOGY	DESCRIPTION
									BORING DEPTH: 17 FEET
0		Split Spoon		dry	100%	565	SC		CALICHE: surface stained brown to 8". SAND: sandy with heavy stain from 8" to 1'; heavy black to dark gray stained sand from 1' to 2'; strong hydrocarbon odor.
-5		Split Spoon		dry	100%	13	SC		SAND: 5YR 6/4; light red/brown; very fine grained; silty; moderately plastic; slight odor; no stain.
-10		Split Spoon		dry	80%	18	SC		SAND: 5YR 6/4; light red/brown; very fine grained; silty; moderately plastic; slight odor; no stain. LIMESTONE AND DOLOMITE COBBLES: gravel.
-15				dry	90%	3.2			LIMESTONE AND DOLOMITE COBBLES: as above with silty, sandy CALICHE interbedded

BORING LOG

BORING NO. SB-3

ARCADIS 1030 Andrews Highway Suite 120, Midland, TX 79701-3872 Tel: 915/699-1381 Fax: 915/699-1978

Page 1 of 1

PROJECT NUMBER: MT000625.0001
CLIENT NAME: EL PASO FIELD SERVICES
PROJECT NAME: CARLSBAD SITE ASSESSMENT
SITE LOCATION: EDDY COUNTY, NEW MEXICO
UNIQUE NUMBER: 31-009-00051 FILE NAME: SB-3.DAT

DRILLING CO: EADES DRILLING COMPANY
DRILLING METHOD: AIR ROTARY
DRILLER: –
LOGGER: D. McNEESE
DATE BEGUN: 01/10/2000 DATE COMPLETED: 01/10/2000

DEPTH	SAMPLED	SAMPLING METHOD	ANALYZED	MOISTURE	RECOVERY	OVM READING	U.S.C.S. CLASS	LITHOLOGY	DESCRIPTION
0									BORING DEPTH: 7 FEET
		Split Spoon		dry	100%	1.8	SC		SILTY SAND: 5YR 6/3; light red/brown; no staining; no odor; very fine grained; abundant roots.
-5		Split Spoon		dry	100%	1.8	SC		SILTY SAND: as above.

ARCADIS

BORING LOG

BORING NO. SB-4

1030 Andrews Highway Suite 120, Midland, TX 79701-3872 Tel: 915/699-1381 Fax: 915/699-1978

PROJECT NUMBER: MT000625.0001
CLIENT NAME: EL PASO FIELD SERVICES
PROJECT NAME: CARLSBAD SITE ASSESSMENT
SITE LOCATION: EDDY COUNTY, NEW MEXICO
UNIQUE NUMBER: 31-009-00052 FILE NAME: SB-4.DAT

DRILLING CO: EADES DRILLING COMPANY
DRILLING METHOD: AIR ROTARY
DRILLER: –
LOGGER: D. McNEESE
DATE BEGUN: 01/10/2000 DATE COMPLETED: 01/10/2000

DEPTH	SAMPLED	SAMPLING METHOD	ANALYZED	MOISTURE	RECOVERY	OVM READING	U.S.C.S. CLASS	LITHOLOGY	DESCRIPTION BORING DEPTH: 7 FEET
0		Split Spoon		dry		1.2	SM		SILTY SAND: 5YR 7/4; pink to 5YR 6/3; light red/brown; very fine grained; dry; roots; clean.
5		Split Spoon		dry		0.8	SM		SILTY SAND: as above; more plastic.

ARCADIS

BORING LOG

BORING NO. SB-5

1030 Andrews Highway Suite 120, Midland, TX 79701-3872 Tel: 915/699-1381 Fax: 915/699-1978

PROJECT NUMBER: MT000625.0001
CLIENT NAME: EL PASO FIELD SERVICES
PROJECT NAME: CARLSBAD SITE ASSESSMENT
SITE LOCATION: EDDY COUNTY, NEW MEXICO
UNIQUE NUMBER: 31-009-00053 FILE NAME: SB-5.DAT

DRILLING CO: EADES DRILLING COMPANY
DRILLING METHOD: AIR ROTARY
DRILLER: –
LOGGER: D. McNEESE
DATE BEGUN: 01/10/2000 DATE COMPLETED: 01/10/2000

DEPTH	SAMPLED	SAMPLING METHOD	ANALYZED	MOISTURE	RECOVERY	OVM READING	U.S.C.S. CLASS	LITHOLOGY	DESCRIPTION BORING DEPTH: 7 FEET
0		Split Spoon		damp		0.4	SC		SILTY SAND: 5YR 5/3; red/brown; very fine grained; moderately plastic; slightly damp; no odor; no staining; CALICHE at surface.
-5		Split Spoon		dry		0.0	SC		SILTY SAND: 5YR 5/3; red brown; very fine grained; slightly to moderately plastic, clean.

TRACEANALYSIS, INC.

6701 Aberdeen Avenue, Suite 9 Lubbock, Texas 79424 800•378•1296 806•794•1296 FAX 806•794•1298
4725 Ripley Avenue, Suite A El Paso, Texas 79922 888•588•3443 915•585•3443 FAX 915•585•4944
E-Mail: lab@traceanalysis.com

Analytical and Quality Control Report

Sharon Hall
Geraghty & Miller,Inc.
1030 Andrews Highway,Suite 120
Midland, TX 79701

JAN 24 2000

Report Date: 1/20/00

Project Number: MT000625.0001
Project Name: N/A
Project Location: El Paso Field Service

Order ID Number: A00011206

Enclosed are the Analytical Results and Quality Control Data Reports for the following samples submitted to TraceAnalysis, Inc. for analysis:

Sample Number	Sample Description	Matrix	Date Taken	Time Taken	Date Received
138581	SB-1 (3-5)	Soil	1/10/00	12:00	1/12/00
138582	SB-1 (13-15)	Soil	1/10/00	12:15	1/12/00
138583	SB-2 (0-2)	Soil	1/10/00	13:45	1/12/00
138584	SB-2 (15-17)	Soil	1/10/00	14:30	1/12/00
138585	SB-3 (0-2)	Soil	1/10/00	15:00	1/12/00
138586	SB-3 (5-7)	Soil	1/10/00	15:15	1/12/00
138587	SB-4 (0-2)	Soil	1/10/00	15:40	1/12/00
138588	SB-4 (5-7)	Soil	1/10/00	15:45	1/12/00
138589	SB-5 (0-2)	Soil	1/10/00	16:15	1/12/00
138590	SB-5 (5-7)	Soil	1/10/00	16:20	1/12/00

These results represent only the samples received in the laboratory. The Quality Control Report is generated on a batch basis. All information contained in this report is for the analytical batch(es) in which your sample(s) were analyzed.

This report consists of a total of 8 pages and shall not be reproduced except in its entirety, without written approval of TraceAnalysis, Inc.

Dr. Blair Leftwich, Director

Report Date: 1/20/00 Order ID Number: A00011206 Page Number: 2 of 8
MT000625.0001 N/A El Paso Field Service

Analytical Results Report

Sample Number: 138581
Description: SB-1 (3-5)

Param	Flag	Result	Dilution	Analytical Method	Date Prepared	Date Analyzed	Analyst	Prep Batch #	QC Batch #	RDL
BTEX (mg/Kg)										
Benzene		< 0.05	50	S 8021B	1/13/00	1/13/00	RC	PB00296	QC00387	0.001
Toluene		< 0.05	50	S 8021B	1/13/00	1/13/00	RC	PB00296	QC00387	0.001
Ethylbenzene		<0.05	50	S 8021B	1/13/00	1/13/00	RC	PB00296	QC00387	0.001
M,P,O-Xylene		<0.05	50	S 8021B	1/13/00	1/13/00	RC	PB00296	QC00387	0.001
Total BTEX		<0.05	50	S 8021B	1/13/00	1/13/00	RC	PB00296	QC00387	0.001

Surrogate (mg/Kg)	Result	Dilution	Spike Amount	% Rec.	% Rec. Limit	Analyst	Prep Batch #	QC Batch #
TFT	5.22	50	0.1	104	72 - 128	RC	PB00296	QC00387
4-BFB	4.71	50	0.1	94	72 - 128	RC	PB00296	QC00387

Param	Flag	Result	Dilution	Analytical Method	Date Prepared	Date Analyzed	Analyst	Prep Batch #	QC Batch #	RDL
TPH (mg/Kg)										
TRPHC		23.1	1	E 418.1	1/13/00	1/13/00	MA	PB00277	QC00365	10

Sample Number: 138582
Description: SB-1 (13-15)

Param	Flag	Result	Dilution	Analytical Method	Date Prepared	Date Analyzed	Analyst	Prep Batch #	QC Batch #	RDL
BTEX (mg/Kg)										
Benzene		< 0.05	50	S 8021B	1/13/00	1/13/00	RC	PB00296	QC00387	0.001
Toluene		< 0.05	50	S 8021B	1/13/00	1/13/00	RC	PB00296	QC00387	0.001
Ethylbenzene		<0.05	50	S 8021B	1/13/00	1/13/00	RC	PB00296	QC00387	0.001
M,P,O-Xylene		<0.05	50	S 8021B	1/13/00	1/13/00	RC	PB00296	QC00387	0.001
Total BTEX		<0.05	50	S 8021B	1/13/00	1/13/00	RC	PB00296	QC00387	0.001

Surrogate (mg/Kg)	Result	Dilution	Spike Amount	% Rec.	% Rec. Limit	Analyst	Prep Batch #	QC Batch #
TFT	4.98	50	0.1	100	72 - 128	RC	PB00296	QC00387
4-BFB	4.49	50	0.1	90	72 - 128	RC	PB00296	QC00387

Param	Flag	Result	Dilution	Analytical Method	Date Prepared	Date Analyzed	Analyst	Prep Batch #	QC Batch #	RDL
TPH (mg/Kg)										
TRPHC		<10.0	1	E 418.1	1/13/00	1/13/00	MA	PB00277	QC00365	10

Sample Number: 138583
Description: SB-2 (0-2)

Param	Flag	Result	Dilution	Analytical Method	Date Prepared	Date Analyzed	Analyst	Prep Batch #	QC Batch #	RDL
BTEX (mg/Kg)										
Benzene		< 0.1	100	S 8021B	1/13/00	1/13/00	RC	PB00296	QC00387	0.001
Toluene		0.442	100	S 8021B	1/13/00	1/13/00	RC	PB00296	QC00387	0.001
Ethylbenzene		0.268	100	S 8021B	1/13/00	1/13/00	RC	PB00296	QC00387	0.001
M,P,O-Xylene		1.3	100	S 8021B	1/13/00	1/13/00	RC	PB00296	QC00387	0.001
Total BTEX		2.1	100	S 8021B	1/13/00	1/13/00	RC	PB00296	QC00387	0.001

Surrogate (mg/Kg)	Result	Dilution	Spike Amount	% Rec.	% Rec. Limit	Analyst	Prep Batch #	QC Batch #
TFT	10	100	0.1	100	72 - 128	RC	PB00296	QC00387
4-BFB	11.6	100	0.1	116	72 - 128	RC	PB00296	QC00387

Report Date: 1/20/00 Order ID Number: A00011206 Page Number: 3 of 8
MT000625.0001 N/A El Paso Field Service

TPH (mg/Kg)									
TRPHC	356	1	E 418.1	1/13/00	1/13/00	MA	PB00277	QC00365	10

Sample Number: 138584
Description: SB-2 (15-17)

Param	Flag	Result	Dilution	Analytical Method	Date Prepared	Date Analyzed	Analyst	Prep Batch #	QC Batch #	RDL
BTEX (mg/Kg)										
Benzene		< 0.05	50	S 8021B	1/13/00	1/13/00	RC	PB00296	QC00387	0.001
Toluene		< 0.05	50	S 8021B	1/13/00	1/13/00	RC	PB00296	QC00387	0.001
Ethylbenzene		<0.05	50	S 8021B	1/13/00	1/13/00	RC	PB00296	QC00387	0.001
M,P,O-Xylene		<0.05	50	S 8021B	1/13/00	1/13/00	RC	PB00296	QC00387	0.001
Total BTEX		0.066	50	S 8021B	1/13/00	1/13/00	RC	PB00296	QC00387	0.001

Surrogate (mg/Kg)	Result	Dilution	Spike Amount	% Rec.	% Rec. Limit	Analyst	Prep Batch #	QC Batch #
TFT	5.29	50	0.1	106	72 - 128	RC	PB00296	QC00387
4-BFB	5.01	50	0.1	100	72 - 128	RC	PB00296	QC00387

TPH (mg/Kg)									
TRPHC	76.9	1	E 418.1	1/13/00	1/13/00	MA	PB00277	QC00365	10

Sample Number: 138585
Description: SB-3 (0-2)

Param	Flag	Result	Dilution	Analytical Method	Date Prepared	Date Analyzed	Analyst	Prep Batch #	QC Batch #	RDL
BTEX (mg/Kg)										
Benzene		< 0.05	50	S 8021B	1/13/00	1/13/00	RC	PB00296	QC00387	0.001
Toluene		< 0.05	50	S 8021B	1/13/00	1/13/00	RC	PB00296	QC00387	0.001
Ethylbenzene		<0.05	50	S 8021B	1/13/00	1/13/00	RC	PB00296	QC00387	0.001
M,P,O-Xylene		<0.05	50	S 8021B	1/13/00	1/13/00	RC	PB00296	QC00387	0.001
Total BTEX		<0.05	50	S 8021B	1/13/00	1/13/00	RC	PB00296	QC00387	0.001

Surrogate (mg/Kg)	Result	Dilution	Spike Amount	% Rec.	% Rec. Limit	Analyst	Prep Batch #	QC Batch #
TFT	5.01	50	0.1	100	72 - 128	RC	PB00296	QC00387
4-BFB	4.89	50	0.1	98	72 - 128	RC	PB00296	QC00387

TPH (mg/Kg)									
TRPHC	<10.0	1	E 418.1	1/13/00	1/13/00	MA	PB00277	QC00365	10

Sample Number: 138586
Description: SB-3 (5-7)

Param	Flag	Result	Dilution	Analytical Method	Date Prepared	Date Analyzed	Analyst	Prep Batch #	QC Batch #	RDL
BTEX (mg/Kg)										
Benzene		< 0.05	50	S 8021B	1/13/00	1/13/00	RC	PB00296	QC00387	0.001
Toluene		< 0.05	50	S 8021B	1/13/00	1/13/00	RC	PB00296	QC00387	0.001
Ethylbenzene		<0.05	50	S 8021B	1/13/00	1/13/00	RC	PB00296	QC00387	0.001
M,P,O-Xylene		<0.05	50	S 8021B	1/13/00	1/13/00	RC	PB00296	QC00387	0.001
Total BTEX		<0.05	50	S 8021B	1/13/00	1/13/00	RC	PB00296	QC00387	0.001

Surrogate (mg/Kg)	Result	Dilution	Spike Amount	% Rec.	% Rec. Limit	Analyst	Prep Batch #	QC Batch #
TFT	5.17	50	0.1	103	72 - 128	RC	PB00296	QC00387
4-BFB	4.97	50	0.1	99	72 - 128	RC	PB00296	QC00387

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TPH (mg/Kg)									
TRPHC	<10.0	1	E 418.1	1/13/00	1/13/00	MA	PB00277	QC00365	10

Sample Number: 138587
Description: SB-4 (0-2)

Param	Flag	Result	Dilution	Analytical Method	Date Prepared	Date Analyzed	Analyst	Prep Batch #	QC Batch #	RDL
BTEX (mg/Kg)										
Benzene		< 0.05	50	S 8021B	1/13/00	1/13/00	RC	PB00296	QC00387	0.001
Toluene		< 0.05	50	S 8021B	1/13/00	1/13/00	RC	PB00296	QC00387	0.001
Ethylbenzene		<0.05	50	S 8021B	1/13/00	1/13/00	RC	PB00296	QC00387	0.001
M,P,O-Xylene		<0.05	50	S 8021B	1/13/00	1/13/00	RC	PB00296	QC00387	0.001
Total BTEX		<0.05	50	S 8021B	1/13/00	1/13/00	RC	PB00296	QC00387	0.001

Surrogate (mg/Kg)	Result	Dilution	Spike Amount	% Rec.	% Rec. Limit	Analyst	Prep Batch #	QC Batch #
TFT	5.41	50	0.1	108	72 - 128	RC	PB00296	QC00387
4-BFB	5.1	50	0.1	102	72 - 128	RC	PB00296	QC00387

TPH (mg/Kg)									
TRPHC	<10.0	1	E 418.1	1/13/00	1/13/00	MA	PB00277	QC00365	10

Sample Number: 138588
Description: SB-4 (5-7)

Param	Flag	Result	Dilution	Analytical Method	Date Prepared	Date Analyzed	Analyst	Prep Batch #	QC Batch #	RDL
BTEX (mg/Kg)										
Benzene		< 0.05	50	S 8021B	1/13/00	1/13/00	RC	PB00296	QC00387	0.001
Toluene		< 0.05	50	S 8021B	1/13/00	1/13/00	RC	PB00296	QC00387	0.001
Ethylbenzene		<0.05	50	S 8021B	1/13/00	1/13/00	RC	PB00296	QC00387	0.001
M,P,O-Xylene		<0.05	50	S 8021B	1/13/00	1/13/00	RC	PB00296	QC00387	0.001
Total BTEX		<0.05	50	S 8021B	1/13/00	1/13/00	RC	PB00296	QC00387	0.001

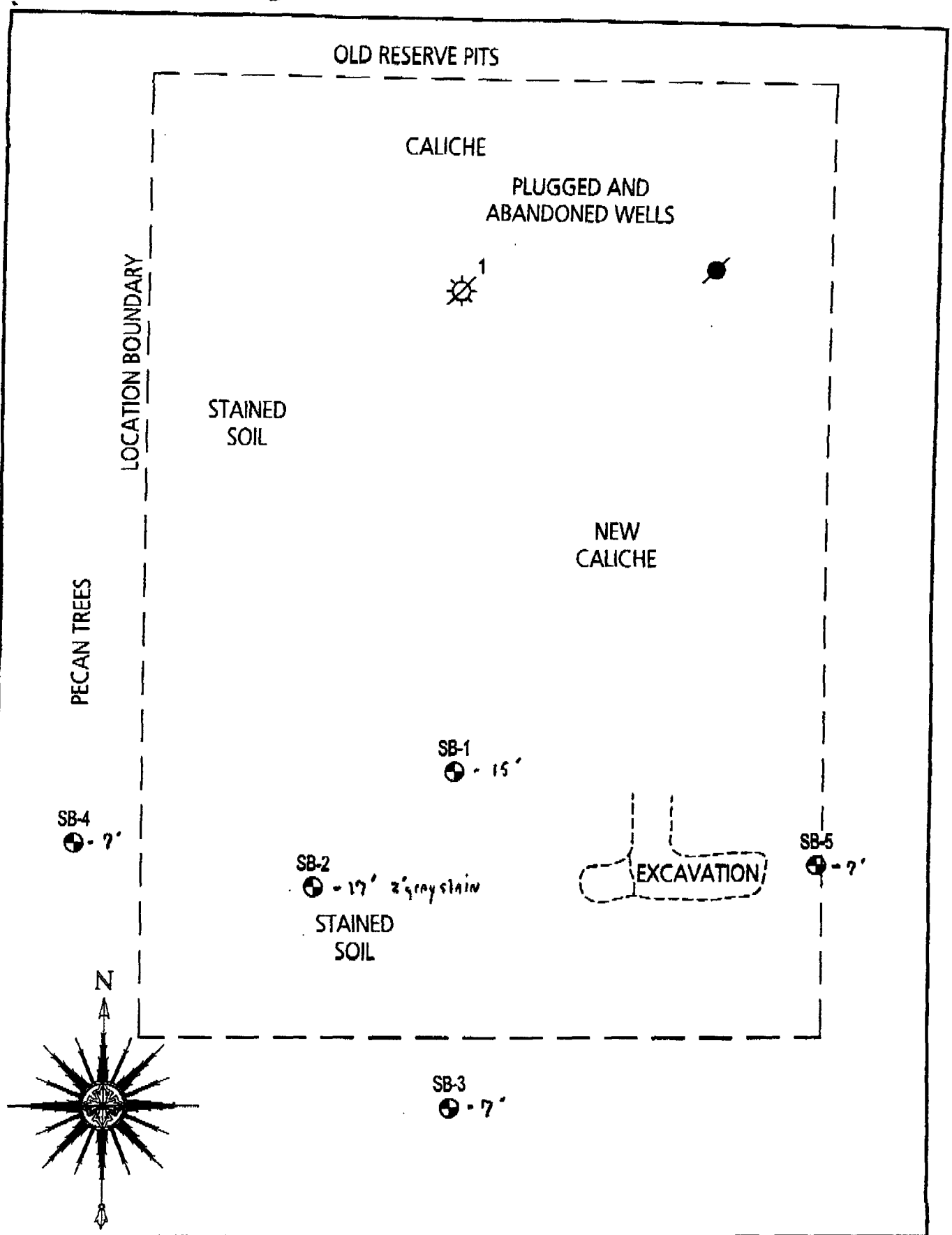
Surrogate (mg/Kg)	Result	Dilution	Spike Amount	% Rec.	% Rec. Limit	Analyst	Prep Batch #	QC Batch #
TFT	5.33	50	0.1	107	72 - 128	RC	PB00296	QC00387
4-BFB	4.99	50	0.1	100	72 - 128	RC	PB00296	QC00387

TPH (mg/Kg)									
TRPHC	<10.0	1	E 418.1	1/13/00	1/13/00	MA	PB00277	QC00365	10

Sample Number: 138589
Description: SB-5 (0-2)

Param	Flag	Result	Dilution	Analytical Method	Date Prepared	Date Analyzed	Analyst	Prep Batch #	QC Batch #	RDL
BTEX (mg/Kg)										
Benzene		< 0.05	50	S 8021B	1/13/00	1/13/00	RC	PB00296	QC00387	0.001
Toluene		< 0.05	50	S 8021B	1/13/00	1/13/00	RC	PB00296	QC00387	0.001
Ethylbenzene		<0.05	50	S 8021B	1/13/00	1/13/00	RC	PB00296	QC00387	0.001
M,P,O-Xylene		<0.05	50	S 8021B	1/13/00	1/13/00	RC	PB00296	QC00387	0.001
Total BTEX		<0.05	50	S 8021B	1/13/00	1/13/00	RC	PB00296	QC00387	0.001

Surrogate (mg/Kg)	Result	Dilution	Spike Amount	% Rec.	% Rec. Limit	Analyst	Prep Batch #	QC Batch #
TFT	5.38	50	0.1	108	72 - 128	RC	PB00296	QC00387
4-BFB	5.09	50	0.1	102	72 - 128	RC	PB00296	QC00387



ARCADIS GERAGHTY&MILLER

1030 Andrews Highway Suite 120, Midland, TX 79701-3872 Tel: 915/699-1381 Fax: 915/699-1978

DATE	COMPILER	PROJECT MANAGER	REGIONAL MANAGER
FEBRUARY 9, 2000	D. McNEESE	S. HALL	A. SCHMIDT
		FILE NAME: MT625101.DWG	UNIQUE NUMBER: 21-009-000418
		PROJECT NUMBER: MT000625.0001	FIGURE: 2

EL PASO FIELD SERVICES
CARLSBAD SITE ASSESSMENT

BOREHOLE LOCATION MAP

EDDY COUNTY, NEW MEXICO

Report Date: 1/20/00 Order ID Number: A00011206 Page Number: 5 of 8
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TPH (mg/Kg)									
TRPHC	<10.0	1	E 418.1	1/13/00	1/13/00	MA	PB00277	QC00365	10

Sample Number: 138590
Description: SB-5 (5-7)

Param	Flag	Result	Dilution	Analytical Method	Date Prepared	Date Analyzed	Analyst	Prep Batch #	QC Batch #	RDL
BTEX (mg/Kg)										
Benzene		< 0.05	50	S 8021B	1/13/00	1/13/00	RC	PB00296	QC00387	0.001
Toluene		< 0.05	50	S 8021B	1/13/00	1/13/00	RC	PB00296	QC00387	0.001
Ethylbenzene		<0.05	50	S 8021B	1/13/00	1/13/00	RC	PB00296	QC00387	0.001
M,P,O-Xylene		<0.05	50	S 8021B	1/13/00	1/13/00	RC	PB00296	QC00387	0.001
Total BTEX		<0.05	50	S 8021B	1/13/00	1/13/00	RC	PB00296	QC00387	0.001

Surrogate (mg/Kg)	Result	Dilution	Spike Amount	% Rec.	% Rec. Limit	Analyst	Prep Batch #	QC Batch #
TFT	5.17	50	0.1	103	72 - 128	RC	PB00296	QC00387
4-BFB	4.94	50	0.1	99	72 - 128	RC	PB00296	QC00387

TPH (mg/Kg)									
TRPHC	<10.0	1	E 418.1	1/13/00	1/13/00	MA	PB00277	QC00365	10

Quality Control Report
Method Blanks

Param	Flag	Blank Result	Reporting Limit	Date Analyzed	Prep Batch #	QC Batch #
Benzene (mg/Kg)		<0.05	0.05	1/13/00	PB00296	QC00387
Toluene (mg/Kg)		<0.05	0.05	1/13/00	PB00296	QC00387
Ethylbenzene (mg/Kg)		<0.05	0.05	1/13/00	PB00296	QC00387
M,P,O-Xylene (mg/Kg)		<0.05	0.05	1/13/00	PB00296	QC00387
Total BTEX (mg/Kg)		<0.05	0.05	1/13/00	PB00296	QC00387

Surrogate	Result	Spike Amount	% Rec.	% Rec. Limit	QC Batch #
TFT (mg/Kg)	5.38	0.1	108	72 - 128	QC00387
4-BFB (mg/Kg)	4.97	0.1	99	72 - 128	QC00387

Param	Flag	Blank Result	Reporting Limit	Date Analyzed	Prep Batch #	QC Batch #
TRPHC (mg/Kg)		<10.0	10	1/13/00	PB00277	QC00365

Report Date: 1/20/00 Order ID Number: A00011206 Page Number: 6 of 8
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Quality Control Report
Matrix Spike and Matrix Duplicate Spike

Standard	Param	Sample Result	Dil.	Spike Amount Added	Matrix Spike Result	% Rec.	RPD	% Rec. Limit	RPD Limit	QC Batch #
MS	TRPHC (mg/Kg)	<10.0	1	250	222	89		70 - 130	0 - 20	QC00365
MSD	TRPHC (mg/Kg)	<10.0	1	250	255	102	14	70 - 130	0 - 20	QC00365

Standard	Param	Sample Result	Dil.	Spike Amount Added	Matrix Spike Result	% Rec.	RPD	% Rec. Limit	RPD Limit	QC Batch #
MS	Benzene (mg/Kg)	0.034	50	0.1	5.18	103	5	80 - 120	0 - 20	QC00387
MS	Toluene (mg/Kg)	0.006	50	0.1	5.11	102	5	80 - 120	0 - 20	QC00387
MS	Ethylbenzene (mg/Kg)	<0.05	50	0.1	5.07	101	4	80 - 120	0 - 20	QC00387
MS	M,P,O-Xylene (mg/Kg)	<0.05	50	0.3	14.81	99	4	80 - 120	0 - 20	QC00387

Standard	Surrogate	Result	Dil.	Spike Amount	Analyst	% Rec.		% Rec. Limit	Prep Batch #	QC Batch #
MS	TFT (mg/Kg)	5.4	50	0.1	RC	108		72 - 128	PB00296	QC00387
MS	4-BFB (mg/Kg)	5.26	50	0.1	RC	105		72 - 128	PB00296	QC00387

Standard	Param	Sample Result	Dil.	Spike Amount Added	Matrix Spike Result	% Rec.	RPD	% Rec. Limit	RPD Limit	QC Batch #
MSD	Benzene (mg/Kg)	0.034	50	0.1	5.13	102	47	80 - 120	0 - 20	QC00387
MSD	Toluene (mg/Kg)	0.006	50	0.1	5.17	103	50	80 - 120	0 - 20	QC00387
MSD	Ethylbenzene (mg/Kg)	<0.05	50	0.1	5.2	104	52	80 - 120	0 - 20	QC00387
MSD	M,P,O-Xylene (mg/Kg)	<0.05	50	0.3	15.1	101	53	80 - 120	0 - 20	QC00387

Standard	Surrogate	Result	Dil.	Spike Amount	Analyst	% Rec.		% Rec. Limit	Prep Batch #	QC Batch #
MSD	TFT (mg/Kg)	5.13	50	0.1	RC	103		72 - 128	PB00296	QC00387
MSD	4-BFB (mg/Kg)	5.12	50	0.1	RC	102		72 - 128	PB00296	QC00387

Report Date: 1/20/00 Order ID Number: A00011206 Page Number: 7 of 8
MT000625.0001 N/A El Paso Field Service

Quality Control Report
Lab Control Spikes and Duplicate Spike

	Param	Blank Result	Dil.	Spike Amount Added	Matrix Spike Result	% Rec.	RPD	% Rec. Limit	RPD Limit	QC Batch #
LCS	MTBE (mg/Kg)	<0.05	50	0.1	4.8	96		80 - 120	0 - 20	QC00387
LCS	Benzene (mg/Kg)	<0.05	50	0.1	4.6	92		80 - 120	0 - 20	QC00387
LCS	Toluene (mg/Kg)	<0.05	50	0.1	4.58	92		80 - 120	0 - 20	QC00387
LCS	Ethylbenzene (mg/Kg)	<0.05	50	0.1	4.56	91		80 - 120	0 - 20	QC00387
LCS	M,P,O-Xylene (mg/Kg)	<0.05	50	0.3	13.2	88		80 - 120	0 - 20	QC00387

Standard	Surrogate	Dil.	Spike Amount	Result	% Rec.	% Rec. Limit	QC Batch #
LCS	TFT (mg/Kg)	50	0.1	4.83	97	72 - 128	QC00387
LCS	4-BFB (mg/Kg)	50	0.1	4.83	97	72 - 128	QC00387

LCSD	MTBE (mg/Kg)	<0.05	50	0.1	5.08	102	6	80 - 120	0 - 20	QC00387
LCSD	Benzene (mg/Kg)	<0.05	50	0.1	4.82	96	5	80 - 120	0 - 20	QC00387
LCSD	Toluene (mg/Kg)	<0.05	50	0.1	4.8	96	5	80 - 120	0 - 20	QC00387
LCSD	Ethylbenzene (mg/Kg)	<0.05	50	0.1	4.76	95	4	80 - 120	0 - 20	QC00387
LCSD	M,P,O-Xylene (mg/Kg)	<0.05	50	0.3	13.8	92	4	80 - 120	0 - 20	QC00387

Standard	Surrogate	Dil.	Spike Amount	Result	% Rec.	% Rec. Limit	QC Batch #
LCSD	TFT (mg/Kg)	50	0.1	4.85	97	72 - 128	QC00387
LCSD	4-BFB (mg/Kg)	50	0.1	4.75	95	72 - 128	QC00387

	Param	Blank Result	Dil.	Spike Amount Added	Matrix Spike Result	% Rec.	RPD	% Rec. Limit	RPD Limit	QC Batch #
LCS	TRPHC (mg/Kg)	<10.0	1	250	213	85		70 - 130	0 - 20	QC00365
LCSD	TRPHC (mg/Kg)	<10.0	1	250	214	86	0	70 - 130	0 - 20	QC00365

ARCADIS GERAGHTY & MILLER Laboratory Task Order No./P.O. N° _____ **CHAIN-OF-CUSTODY RECORD** Page 1 of 1

Project Number/Name MT000625.0001

Project Location El Paso Field Service

Laboratory Trace

Project Manager S. Hall

Sampler(s)/Affiliation McNeese

Sample ID/Location	Matrix	Date/~~Time~~ Sampled	Time Lab ID	ANALYSIS / METHOD / SIZE: BTEX	TPH (418.1)					Remarks	Total
SB-1 (3-5)	S	1-10-99	1200	1	1					138581	2
SB-1 (13-15)			1215	1	1					582	2
SB-2 (0-2)			1345	1	1					583	2
SB-2 (15-17)			1430	1	1					584	2
SB-3 (0-2)			1500	1	1					585	2
SB-3 (5-7)			1515	1	1					586	2
SB-4 (0-2)			1540	1	1					587	2
SB-4 (5-7)			1545	1	1					588	2
SB-5 (0-2)			1615	1	1					589	2
SB-5 (5-7)			1620	1	1					590	2

Sample Matrix: L = Liquid; S = Solid; A = Air

Total No. of Bottles/ Containers

				Seal Intact?
Relinquished by: Helen Shelton	Organization: Acton	Date 1/11/2000	Time 1315	Yes No N/A
Received by: Helen Shelton	Organization: Trace Analysis	Date 1/11/2000	Time 1315	
Relinquished by: Helen Shelton	Organization: Trace Analysis	Date 1/11/2000	Time 6:30PM	Seal Intact?
Received by: Jill Worden	Organization: TRACE Analysis	Date 1/12/00	Time 9:30A	Yes No N/A

Special Instructions/Remarks: _____

Delivery Method: ☐ In Person ☐ Common Carrier _____ SPECIFY ☒ Lab Courier ☒ Other Greyhound SPECIFY

n° Greyhound GU1-159-384-681-5

AG 05 0597 1/17

FEB-14-00 MON 2:34 PM OCD DISTRICT II FAX NO. 5057489720 P. 25

According to the plugged and abandoned well marker on the location, the producer who operated the crude oil well was Meteor Development, Inc. The adjacent natural gas well was operated by Dickson Petroleum, Inc. EPFS has no information as to the address of either company, whether the two producers were interrelated companies, or whether either company is still in existence.

List of Attachments

Tab 1 - ARCADIS Geraghty and Miller report of their site investigation.

Tab 2 - Arthur D. Little laboratory report of the fingerprint analysis.

Tab 3 - Plot plan of the soil borings taken at the site.

Tab 4 - Drilling logs from the site borings.

Tab 5 - Analytical data from the soil core samples.

If you need any additional information, please call me at (505) 599-2256.

Sincerely yours,

David Bays

David Bays, REM
Principal Environmental Scientist

cc: Mr. Ross Hughes
Mr. Courtney Ragsdale
Carlsbad Pipeline Regulatory File