ASSESSMENT REPORT

COMPREHENSIVE ASSESSMENT REPORT

TEXAS - NEW MEXICO PIPELINE COMPANY
MONUMENT SITE NO. 8
LEA COUNTY, NEW MEXICO

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COMPREHENSIVE ASSESSMENT REPORT

MONUMENT SITE NO. 8
LEA COUNTY, NEW MEXICO

PREPARED FOR:

TEXAS - NEW MEXICO PIPELINE COMPANY
P.O. Box 1030
Jal, New Mexico 88252

Mr. Tony Savoie

PREPARED BY:

KEI

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Associate Scientist

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KEI Job No. 610057

September 19, 1997

TABLE OF CONTENTS

EXECUTIVE SUMMARY

This report summarizes the results of subsurface assessment activities conducted at Monument Site No. 8, located in Lea County, New Mexico. Activities were performed in general accordance with the work plan submitted with the Phase I - Preliminary Site Characterization Report prepared for the site and approved by the State of New Mexico Oil Conservation Division.

Field activities associated with the subsurface assessment consisted of collecting composite samples from the on-site excavation and its associated stockpile and advancing 5 soil borings for the collection of soil samples for laboratory analysis. A sensitive receptor survey/migration pathway analysis was also conducted.

Results of the assessment included the following:

- Soil analytical results indicated the presence of benzene, toluene, ethylbenzene, xylenes (BTEX) and total petroleum hydrocarbons (TPH) in native soils at concentrations identified within the report.
- Ground water was not observed during the assessment.
- Observed petroleum hydrocarbon impact to soils which will require remediation extended from the ground surface to approximately 2 to 5 feet below ground surface.

Recommended remediation activities to be conducted pursuant to final site closure include:

- Excavation and off-site treatment of impacted soils to acceptable residual hydrocarbon concentrations.

INTRODUCTION

This report summarizes the results of the subsurface assessment activities conducted in response to suspected crude oil impact at Monument Site No. 8, located in Lea County, New Mexico. Site No. 8 consisted of a localized surface discoloration and an excavation approximately three feet in diameter with an associated soil stockpile.

A scope of work for the subsurface assessment was prepared based upon field observations obtained during a preliminary investigation of surface site conditions. The proposed work plan was presented in the Phase I - Preliminary Site Characterization report dated June 21, 1996, and was approved by the State of New Mexico Oil Conservation Division OCD in a letter dated August 16, 1996. The general scope of work for the subsurface assessment included:

- A sensitive receptor survey, migration pathway analysis, and registered water well search.
- Collecting composite samples from the excavation and from the stockpiled soils.
- Soil borings within and in the vicinity of the excavation and the localized surface discoloration.

SUBSURFACE INVESTIGATION

SENSITIVE RECEPTOR SURVEY/MIGRATION PATHWAY ANALYSIS

Receptor Survey

A sensitive receptor survey/migration pathway analysis was conducted at the site. Potential receptors identified within a 500-foot radius of the site consisted of an impoundment of surface drainage water approximately 200 feet southeast of the site. Adjacent properties consisted predominantly of vacant range land with a compressor station approximately 200 feet to the north and a Texaco Above-Ground Storage Tank (AST) Battery approximately 500 feet to the northwest. No off-site sources potentially contributing to observed hydrocarbon impact at the site were identified.

A search of State of New Mexico water well registrations indicated one registered water well within a 1/2-mile radius of the site. A copy of the well registration is presented in APPENDIX A. An approximate location of the water well is presented on FIG 1.

Migration Pathway Analysis

Potential manmade migration pathways identified during the survey included a TNMPL crude oil pipeline extending through the center of the site from northwest to southeast; a pipeline of undetermined ownership located adjacent to the eastern site boundary extending from north to south; and another pipeline of undetermined ownership located adjacent to the western site boundary extending northeast to southwest. Approximate locations of the identified manmade potential migration pathways are presented on FIG 2.

Surface drainage at the site is to the southeast.

FIELD ACTIVITIES

Soil Borings

On March 6, 1997, Soil Boring B8-1 was advanced utilizing direct-push hydraulic sampling methods. Sampler refusal was encountered at a depth of 2 feet below ground surface (bgs). On April 8, 1997, Soil Borings B8-1 through B8-5 were advanced utilizing air rotary drilling techniques. Each of the soil borings was advanced to a depth of approximately 12 feet bgs.

Field observations obtained during soil boring advancement included the following:

- Ground water was not observed during soil boring advancement.
- Phase-separate hydrocarbon (PSH) was not identified during soil boring advancement.
- Hydrocarbon impact was identified in soil borings advanced within the open excavation and in soils underlying the soil stockpile.
- Hydrocarbon impact to vadose zone soils appears to have been delineated to apparent background levels for the site.

Upon completion of sampling activities, each soil boring was backfilled to the ground surface with a cement/bentonite grout. Approximate locations of the soil borings are presented on FIG. 2.

Excavation Composite Samples

On February 24, 1997, a KEI field technician obtained composite samples from the excavation and its associated stockpile. Each of the samples consisted of a five-part composite collected from evenly distributed sections of the respective sample location.

SOIL ASSESSMENT

The subsurface profile was defined in general accordance with the Unified Soil Classification System by visually observing soil samples obtained during drilling. One soil type and limestone were encountered. A general description, approximate thickness, and head-space results of each soil type are discussed as follows:

Soil Type 1

This soil type consisted of a dark brown gravel encountered at the surface of all soil boring locations. This gravel was clayey with some organic material, dense to very dense and moist. Observed thicknesses of this soil type varied from approximately 2.5 to 3 feet. The head-space readings from samples of this soil type were 1,365 and 720 ppm.

Limestone

A light grey limestone was encountered beneath the upper gravel at all soil boring locations. This limestone was poorly to well cemented and interbedded with reddish-brown sandstone. The limestone was observed at the maximum depth investigated at all soil boring locations (12 feet bgs). The head-space readings from samples of the limestone were below instrument detection limits (ND).

Graphic logs indicating the subsurface soil profile, depths at which soil samples were obtained, head-space results, laboratory results, and the soil boring details are presented on FIG. 4.

LABORATORY ANALYSES

Soil samples were selected for laboratory analysis from sample intervals that, at a minimum, represented the high field screening result and the bottom of the hole of each soil boring. The selected soil samples were express mailed to Xenco Laboratories in San Antonio, Texas or Environmental Lab of Texas, Inc. in Odessa, Texas for determination of TPH concentrations by EPA METHOD 418.1 and BTEX concentrations by EPA Method SW846-8020.

Analytical results indicated the following range of constituent concentrations for the soil boring samples:

CONSTITUENT	RANGE OF CONCENTRATIONS
TPH	ND to 18,300 mg/kg
Benzene	ND to 8.2 mg/kg
BTEX	ND to 18.45 mg/kg

A complete summary of analytical results for soil samples is presented in TABLE I. Copies of the certified laboratory reports for soils are presented in APPENDIX B.

WASTE MANAGEMENT AND DISPOSITION

Air rotary cuttings generated during advancement of soil boring B8-1 through B8-5 were spread over surficial hydrocarbon-impacted soil at the site.

QA/QC PROCEDURES

DECONTAMINATION OF EQUIPMENT

Cleaning of drilling equipment was performed by the drilling company. In general, the cleaning procedures consisted of using high pressure steam to wash the drilling and sampling equipment prior to drilling and prior to starting each hole. Prior to use, the sampling equipment was cleaned with Liqui-Nox detergent and rinsed with distilled water.

SOIL SAMPLING

Samples of the subsurface soils were obtained utilizing a direct-push continuous sampling device and air rotary drilling techniques. Representative soil samples were divided into two separate portions using clean, disposable gloves and clean sampling tools. One portion of the soil sample was placed in a disposable sample bag. The bag was labeled and sealed for head-space analysis using a photo-ionization detector (PID) calibrated to a 100 ppm isobutylene standard. Each sample was allowed to volatilize for approximately 30 minutes at ambient temperature prior to conducting the analysis.

Excavation composite samples were hand collected by KEI field personnel wearing disposable neoprene gloves and utilizing clean stainless-steel hand tools. Any sampling equipment utilized was decontaminated between sampling points with a Liqui-Nox detergent wash and a distilled water rinse.

The other portion of the soil sample was placed in a sterile glass container equipped with a Teflon-lined lid furnished by the analytical laboratory. The container was filled to capacity to limit the amount of head-space present. Each container was labeled and placed on ice in an insulated cooler. Upon selection of samples for analysis, the cooler was sealed for shipment to the laboratory. Proper chain-of-custody documentation was maintained throughout the sampling process.

LABORATORY PROTOCOL

The laboratory was responsible for proper QA/QC procedures. These procedures are either transmitted with the laboratory reports or are on file at the laboratory.

CONCLUSIONS

The following conclusions are presented based on the field observations, drilling activities, and soil laboratory results:

- Petroleum hydrocarbon impact to soils above OCD closure levels extends from the ground surface to approximately 5 feet bgs based on laboratory results and field PID readings.
- Ground water was not observed during the assessment.

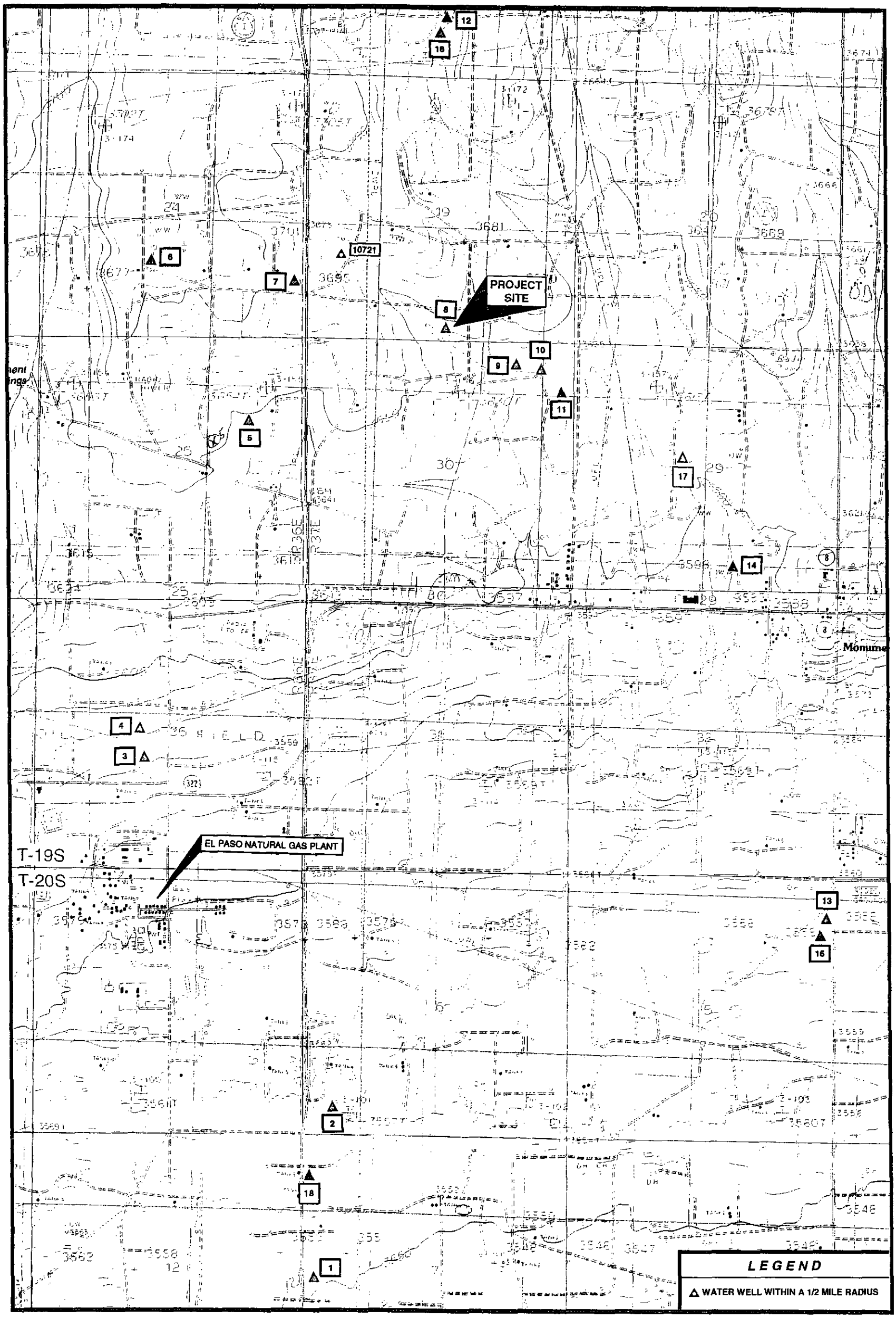
RECOMMENDATIONS

Recommendations for remediation of impacted soil at the site include the following:

- Excavate soils exceeding TPH closure concentration of 100 mg/kg.
- Conduct off-site landfarming of excavated soil.

MONUMENT NORTH QUADRANGLE
NEW MEXICO - LEA COUNTY
PRINTED 1985

MONUMENT SOUTH QUADRANGLE
NEW MEXICO - LEA COUNTY
PRINTED 1985



SCALE 1:24000

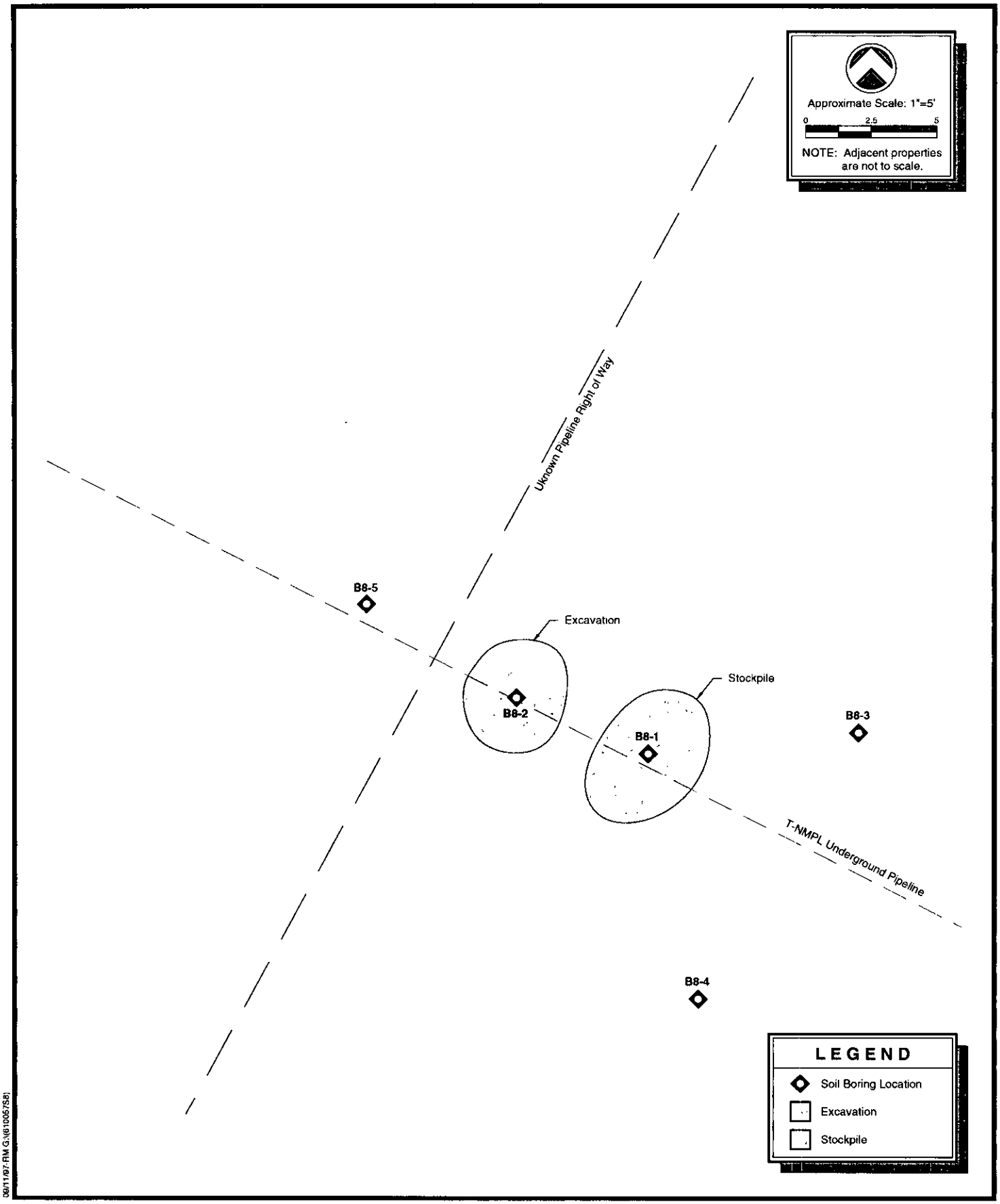
1 1/2 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 .5 0 1 KILOMETRE

CONTOUR INTERVAL 5 FEET

k·e·i	*SITE LOCATION MAP*	610057
TEXAS - NEW MEXICO PIPE LINE CO.	MONUMENT SITE No. 8	LEA COUNTY, NEW MEXICO
		FIG 1



08/11/97- RM G:\(610057S8)

k·e·i	SITE DETAILS	610057
	TEXAS - NEW MEXICO PIPE LINE CO. MONUMENT SITE No. 8 LEA COUNTY, NEW MEXICO	FIG 2

LEGEND

Gravel (GC), clayey, with some organics, dense to very dense, slightly moist, dark brown.

Limestone (LS), poorly to well cemented, interbedded with reddish-brown sandstone, hard to very hard, light grey.

Indicates the depth interval from which a soil sample was selected and prepared for field head-space and/or laboratory analysis.

Indicates sample selected for laboratory analysis.

B = benzene concentration (mg/kg)
BTEX = total BTEX concentration (mg/kg)
TPH = total petroleum hydrocarbon concentration (mg/kg)

PID = Head-space readings in ppm obtained with a photoionization detector.

ND = Indicates the concentration was below laboratory detection limits.

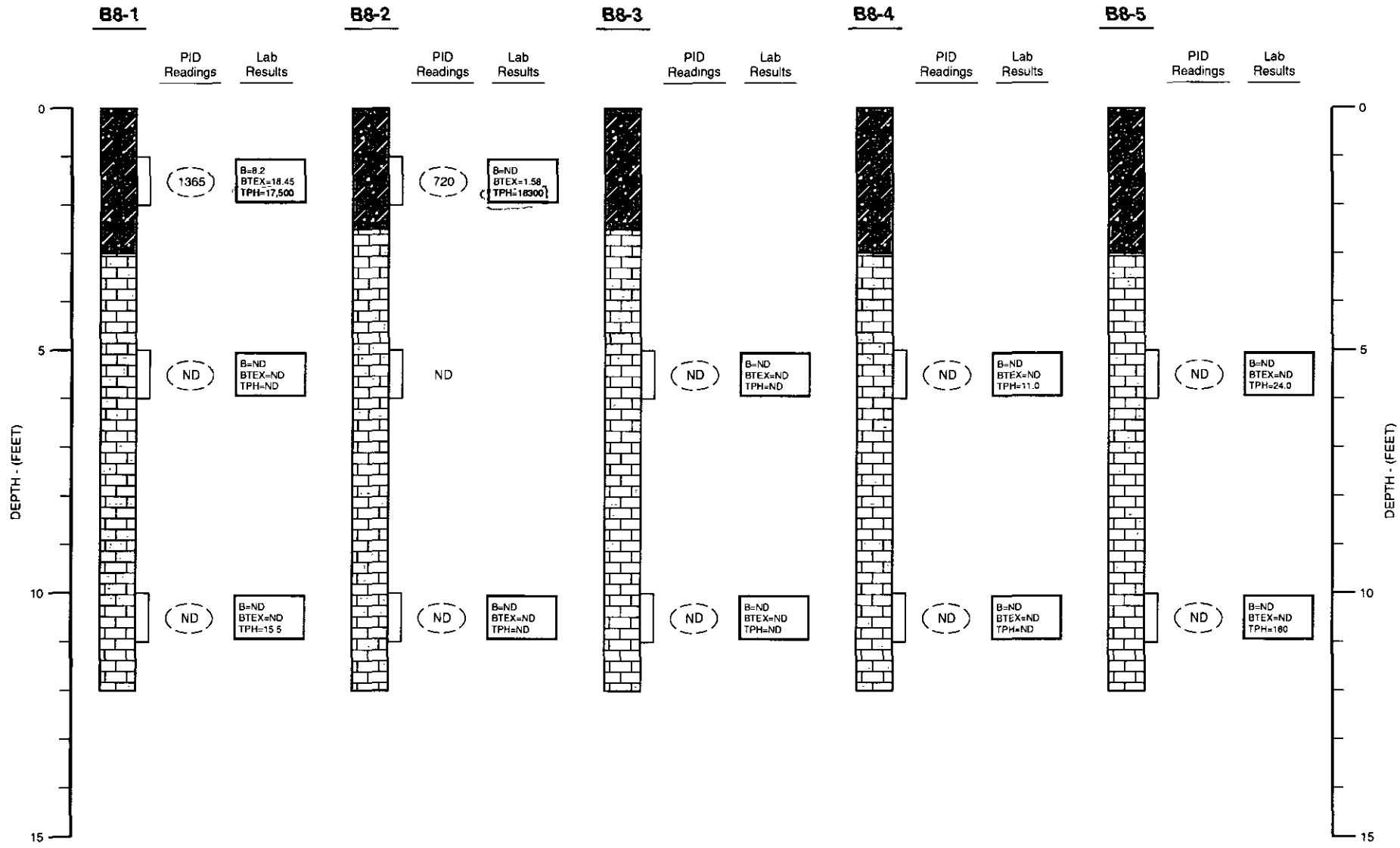
NOTES:

1. Boring B8-1 was advanced utilizing a direct-push continuous sampler to a depth of 3 feet on March 6, 1997. The Location of B8-1 was re-advanced on April 8, 1997 using air rotary techniques. Soil borings B8-2 through B8-5 were advanced utilizing an air rotary rig on April 8, 1997.
2. Ground water was not encountered in soil borings B8-1 through B8-5.
3. The lines between material types shown on the profile log represent approximate boundaries. Actual transitions may be gradual.
4. The depths indicated are referenced from the ground surface.
5. The soil borings were grouted to the ground surface with cement grout containing 5 percent bentonite.

09/11/97-RM G:\610057L8\

k·e·i	*LEGEND AND NOTES FOR SOIL BORINGS*	610057
	TEXAS - NEW MEXICO PIPE LINE CO. MONUMENT SITE No. 8 LEA COUNTY, NEW MEXICO	FIG 3

09/11/97-RM G:\(610057?8)



k·e·i	*LOG AND DETAILS OF SOIL BORINGS B8-1 THROUGH B8-5*	610057
	TEXAS - NEW MEXICO PIPE LINE CO. MONUMENT SITE No. 8 LEA COUNTY, NEW MEXICO	FIG 4

GENERAL NOTES

ND - Indicates constituent was not detected above the method detection limit.
NT - Indicates constituent was not analyzed.

Depth is referenced from ground surface

Method detection limit

Benzene	-	0.020 to 0.050 mg/kg
Toluene	-	0.020 to 0.050 mg/kg
Ethylbenzene	-	0.020 to 0.050 mg/kg
Xylene	-	0.060 to 0.150 mg/kg
TPH	-	10 mg/kg

Laboratory testing method

BTEX	-	EPA Method SW846-8020
TPH	-	EPA Method 418.1

TABLE I

SUMMARY OF LABORATORY BTEX/TPH RESULTS - SOIL
MONUMENT SITE NO. 8
LEA COUNTY, NEW MEXICO

SAMPLE LOCATION	SAMPLE DATE	DEPTH (feet)	BENZENE (mg/kg)	TOLUENE (mg/kg)	ETHYL-BENZENE (mg/kg)	XYLENES (mg/kg)	TOTAL BTEX (mg/kg)	TPH (mg/kg)
B8-1	03/06/97	1-2	8.20	3.40	1.33	5.52	18.45	17,500
B8-1	04/08/97	5-6	ND	ND	ND	ND	ND	ND
B8-1	04/08/97	10-11	ND	ND	ND	ND	ND	15.5
B8-2	04/08/97	1-2	ND	0.12	0.14	1.32	1.58	18,300
B8-2	04/08/97	10-11	ND	ND	ND	ND	ND	ND
B8-3	04/08/97	5-6	ND	ND	ND	ND	ND	ND
B8-3	04/08/97	10-11	ND	ND	ND	ND	ND	ND
B8-4	04/08/97	5-6	ND	ND	ND	ND	ND	11.0
B8-4	04/08/97	10-11	ND	ND	ND	ND	ND	ND
B8-5	04/08/97	5-6	ND	ND	ND	ND	ND	24.0
B8-5	04/08/97	10-11	ND	ND	ND	ND	ND	160

Section 18
Sites 12+16

Site 8
in Section 19

10694	L	03517			05	01	1957	PMT	OWD	19S	37E	15	110	19S	37E	15	0964	64		CACTUS ORG CO	0.00	0.00	0	
10695	L	02278			12	07	1956	PMT	NOT	19S	37E	15	130	19S	37E	15	0864	64		MAKIN ORG CO	0.00	0.00	0	
10696	L	03525			05	06	1957	PMT	OWD	19S	37E	15	320	19S	37E	15	0964	64		DENVER ORG CORP	0.00	0.00	0	
10697	L	03417			01	23	1957	PMT	OWD	19S	37E	15	309	19S	37E	15	0864	64		SHELRO ORG CO	0.00	0.00	0	
10698	L	02602			08	04	1954	PMT	OWD	19S	37E	16	110	19S	37E	16	0764	64		OSCAR SOURG ORG CO	0.00	0.00	0	
10699	L	03185			04	26	1956	PMT	OWD	19S	37E	16	240	19S	37E	16	0864	64		CARPER ORG CO	0.00	0.00	0	
10700	L	01975			02	10	1953	PMT	OWD	19S	37E	16	430	19S	37E	16	0764	64		O & W DRILLING CO	0.00	0.00	0	
10701	L	03228			06	20	1956	PMT	OWD	19S	37E	16	440	19S	37E	16	0864	64		MAKIN ORG CO	0.00	0.00	0	
10702	L	06933			04	12	1972	PMT	OWD	19S	37E	17	423	19S	37E	17	0672	64		GULF OIL CORP	0.00	0.00	0	
12791	L	10271 EXP	L	10271	07	07	1992	PMT	EXP SHA	19S	37E	18	11	19S	37E	18	0792	64		SNYDER RANCHES INC	0.00	0.00	0	THIS EXP WELL WILL BE U
SED FOR COM ST WHEN APPL L-10,271 APPROVED																								
12915	L	10271	L	10271 EXP	07	07	1992	PMT	COM SHA	19S	37E	18	11	19S	37E	18	0792	64	M	SNYDER RANCHES INC	0.00	10.00	10	THIS WELL IS EXPLORATOR
Y WELL L-10,271-EXP																								
10703	L	02033			03	02	1953	LIC	NTU	19S	37E	18	1111	19S	37E	18	0764	64		SNYDER RANCHES LTD	0.00	17.00	14	
10704	L	01277			10	18	1951	PMT	NOT	19S	37E	18	241	19S	37E	18	0564	64		GULF OIL CORP	0.00	0.00	0	
10705	L	02615	L	02612	08	09	1954	LIC	PFP	19S	37E	18	3120	19S	36E	36	0266	64		WARREN PETRO CORP	0.00	102.87	102	
10706	L	00156	L	02613	08	09	1954	LIC	PFP	19S	37E	18	3010	20S	36E	01	0364	64		WARREN PETRO CORP	0.00	0.00	0	
10707	L	00157	L	02614	06	28	1945	LIC	PFP	19S	37E	18	3020	20S	36E	01	0266	64		WARREN PETRO CORP	0.00	90.75	94	
10708	L	00061	L	00062	04	23	1937	LIC	NOT	19S	37E	18	420	19S	37E	18	0364	64		TEXAS COMPANY THE	0.00	0.00	0	
10709	L	00062	L	00061	04	23	1937	LIC	NOT	19S	37E	18	440	19S	37E	18	0364	64		TEXAS COMPANY THE	0.00	0.00	0	
10710	L	00039	L	00041	08	26	1935	PMT	NOT	19S	37E	19	110	19S	37E	19	0364	64		HOLLAND L B	0.00	0.00	0	
10711	L	00040	L	00039	08	26	1935	PMT	NOT	19S	37E	19	110	19S	37E	19	0765	64		HOLLAND L B	0.00	0.00	0	
10712	L	00041	L	00039	08	26	1935	PMT	NOT	19S	37E	19	110	19S	37E	19	0765	64		HOLLAND L B	0.00	0.00	0	
10713	L	04313			10	23	1957	PMT	OWD	19S	37E	19	110	19S	37E	19	0964	64		MCKAY & STAFFORD	0.00	0.00	0	
10714	L	01259			10	15	1951	PMT	DCM	19S	37E	19	121	19S	37E	19	0564	64		GULF OIL CORP	0.00	3.00	0	
10715	L	00042	L	00044	08	26	1935	PMT	NOT	19S	37E	19	130	19S	37E	19	0364	64		HOLLAND L B	0.00	0.00	0	
10716	L	00043	L	00039	08	26	1935	PMT	NOT	19S	37E	19	130	19S	37E	19	0765	64		HOLLAND L B	0.00	0.00	0	
10717	L	00044	L	00039	08	26	1935	PMT	NOT	19S	37E	19	130	19S	37E	19	0765	64		HOLLAND L B	0.00	0.00	0	
10718	L	01248			10	18	1951	PMT	NOT	19S	37E	19	131	19S	37E	19	0564	64		GULF OIL CORP	0.00	0.00	0	
10719	L	01251			10	18	1951	PMT	OWD	19S	37E	19	132	19S	37E	19	0765	64		GULF OIL CORP	0.00	0.00	0	
10720	L	05433			07	13	1964	CAN	NOT	19S	37E	19	140	19S	37E	19	0776	64		GULF OIL CORP	0.00	0.00	0	
Monument Site No 0 < 10721	L	06822			06	17	1971	CAN	NOT	19S	37E	19	210	19S	37E	19	0672	64		REPUBLIC FACTORS	0.00	0.00	0	

ENVIRONMENTAL LAB OF , INC.

"Don't Treat Your Soil Like Dirt!"

KEI
ATTN: MR. PAUL HARTNETT
5309 WURZBACH SUITE 100
SAN ANTONIO, TEXAS 78238
FAX: 9210-680-3763

Receiving Date: 02/25/97
Sample Type: SOIL
Project : 610057 .02.08A
Project Location: MONUMENT, NM

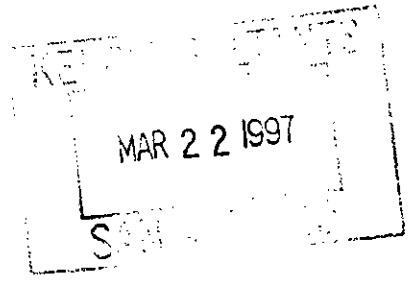
Analysis Date: TPH 02/26/97
Analysis Date: BTEX: 02/25/97
Sampling Date: 02/24/97
Sample Condition: Intact/Iced

ELT#	FIELD CODE	BENZENE mg/kg	TOLUENE mg/kg	ETHYLBENZENE mg/kg	m,p-XYLENE mg/kg	o-XYLENE mg/kg	TPH mg/kg
10293	STOCKPILE	<0.100	<0.100	<0.100	<0.100	<0.100	280
10294	HOLE	<0.100	<0.100	<0.100	<0.100	<0.100	190
	% IA	85	83	84	96	85	99
	% EA	100	94	89	100	91	102
	BLANK	<0.001	<0.001	<0.001	<0.001	<0.001	<1

METHODS: SW 846-8020,5030 , EPA 418.1

Michael R. Fowler
Michael R. Fowler

3-17-97
Date



Environmental Lab of Texas, Inc.

12600 West I-20 East Odessa, Texas 79763
(915) 563-1800 FAX (915) 563-1713

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

Project Manager: Tony Savoie

Phone #:

FAX #: 1 505 395 3336

Company Name & Address: KEI / TNMPL

Project #: 610057

Project Name: 610057.02.08A

Project Location: Monument

Sampler Signature: Gerald L Carroll

LAB # (LAB USE ONLY)	FIELD CODE	# CONTAINERS	Volume/Amount	MATRIX: WATER	SOIL	AIR	SLUDGE	OTHER	PRESERVATIVE METHOD: HCL	HNO3	ICE	NONE	OTHER	SAMPLING: DATE	TIME	BTEX 8020/5030	TPH 418.1	TCLP Metals Ag As Ba Cd Cr Pb Hg Se	Total Metals Ag As Ba Cd Cr Pb Hg Se	TCLP Volatiles	TCLP Semi Volatiles	TDS	RCI
10293	STOCKPILE	1	4oz		X						X			2/24/97	1740	X	X						
10294	HOLE	1			X						X			2/24/97	1750	X	X						

Relinquished by:	Date:	Times:	Received by:
Gerald L Carroll	2-25-97	0600	
	2-25-97	0800	Roland K Tuck
			Received by Laboratory:

REMARKS: P.O. 7186

XENCO Laboratories

CERTIFICATE OF ANALYSIS SUMMARY 1-70562

K.E.I. Consultants, Inc.

Project Name: TNMPL Monument

Project ID: 610057-2-8
Project Manager: Ann Baker
Project Location: Site 8

Date Received in Lab: Mar 7, 1997 10:10 by CB
Date Report Faxed: Mar 11, 1997
XENCO contact: Carlos Castro/Edward Yonemoto

Analysis Requested	*Lab ID:*	170562-001					
	Field ID:	B8-1					
	Depth:	1-2'					
BTEX Analyzed by EPA 8020	Date Analyzed - Analytical Results						**ppm (mg/L - mg/Kg)**
	Mar 10, 1997						
Benzene	8.20						
Toluene	3.40						
Ethylbenzene	1.33						
m,p-Xylenes	4.32						
o-Xylene	1.20						
Total BTEX	18.45						
TPH Analyzed by EPA 418.1	Date Analyzed - Analytical Results						**ppm (mg/L - mg/Kg)**
	Mar 11, 1997						
Total Petroleum Hydrocarbons	17500						

Edward H. Yonemoto, Ph.D.
QA/QC Manager

XENCO Laboratories

Certificate Of Quality Control for Batch : 17A25A73

SW- 846 5030/8020 BTEX

Date Validated: Mar 11, 1997 10:00
Date Analyzed: Mar 10, 1997 13:07
QA/QC Manager: Edward H. Yonemoto, Ph.D.

Analyst: CB
Matrix: Solid

MATRIX SPIKE / MATRIX SPIKE DUPLICATE AND RECOVERY

Q.C. Sample ID 170565- 002 / Parameter	[A] Sample Result ppm	[B] Matrix Spike Result ppm	[C] Matrix Spike Duplicate Result ppm	[D] Matrix Spike Amount ppm	[E] Method Detection Limit ppm	Matrix Limit Relative Difference %	[F] QC Spike Relative Difference %	[G] QC Matrix Spike Recovery %	[H] QC M.S.D. Recovery %	[I] Matrix Spike Recovery Range %	[J] Qualifier
Benzene	< 0.020	2.160	2.020	2.000	0.020	25.0	6.7	108.0	101.0	65-135	
Toluene	< 0.020	2.060	1.938	2.000	0.020	25.0	6.1	103.0	96.9	65-135	
Ethylbenzene	< 0.020	2.180	2.040	2.000	0.020	25.0	6.6	109.0	102.0	65-135	
m,p-Xylenes	< 0.040	4.440	4.180	4.000	0.040	25.0	6.0	111.0	104.5	65-135	
o-Xylene	< 0.020	2.180	2.040	2.000	0.020	25.0	6.6	109.0	102.0	65-135	

Spike Relative Difference [F] = 200*(B-C)/(B+C)
Matrix Spike Recovery [G] = 100*(B-A)/[D]
M.S.D. = Matrix Spike Duplicate
M.S.D. Recovery [H] = 100*(C-A)/[D]
N.D. = Below detection limit or not detected
All results are based on MDL and validated for QC purposes

Edward H. Yonemoto, Ph.D.
QA/QC Manager

XENCO Laboratories

Certificate Of Quality Control for Batch : 17A30A81

EPA 418.1 Total Petroleum Hydrocarbons

Date Validated: Mar 11, 1997 11:00
Date Analyzed: Mar 11, 1997 09:37
QA/QC Manager: Edward H. Yonemoto, Ph.D.

Analyst: HL
Matrix: Solid

	MATRIX DUPLICATE ANALYSIS					
Q.C. Sample ID 170562- 001	[A] Sample Result	[B] Duplicate Result	[C] Method Detection Limit	[D] QC LIMITS Relative Difference	[E] LIMITS Relative Difference	[F] Qualifier
Parameter	ppm	ppm	ppm	%	%	
Total Petroleum Hydrocarbons	*17500*	*17800*	*375*	*1.7*	*30.0*	

Relative Difference [D] = 200*(B-A)/(B+A)
N.C. = Not calculated, data below detection limit
N.D. = Below detection limit
All results are based on MDL and validated for QC purposes only

Edward H. Yonemoto, Ph.D.
QA/QC Manager

XENCO Laboratories

Certificate Of Quality Control for Batch : 17A30A81

EPA 418.1 Total Petroleum Hydrocarbons

Date Validated: Mar 11, 1997 11:00
Date Analyzed: Mar 11, 1997 09:21
QA/QC Manager: Edward H. Yonemoto, Ph.D.

Analyst: HL
Matrix: Solid

	BLANK SPIKE ANALYSIS						
Parameter	[A] Blank Result ppm	[B] Blank Spike Result ppm	[C] Blank Spike Amount ppm	[D] Method Detection Limit ppm	[E] QC LIMITS Blank Spike Recovery %	[F] LIMITS Recovery Range %	[G] Qualifier
Total Petroleum Hydrocarbons	< 7.50	179	198	7.50	90.6	65-135	

Blank Spike Recovery [E] = 100*(B-A)/(C)
N.C. = Not calculated, data below detection limit
N.D. = Below detection limit
All results are based on MDL and validated for QC purposes only

Edward H. Yonemoto, Ph.D.
QA/QC Manager

XENCO Laboratories

ANALYTICAL CHAIN OF CUSTODY REPORT
CHRONOLOGY OF SAMPLES

K.E.I. Consultants, Inc.

Project ID: 610057-2-8
Project Manager: Ann Baker
Project Location: Site 8

Project Name: TNMPL Monument

XENCO COC#: 1-70562
Date Received in Lab: Mar 7, 1997 10:10 by CB
XENCO contact : Carlos Castro/Edward Yonemoto

	Field ID	Lab. ID	Method Name	Method ID	Units	Turn Around	Date and Time: Sample Collected	Date and Time: Addition Requested	Date and Time: Extraction	Date and Time: Analysis
1	B8-1	170562-001	BTEX	SW-846	ppm	Standard	Mar 6, 1997 10:35		Mar 10, 1997 by CB	Mar 10, 1997 13:59 by CB
2			TPH	EPA 418.1	ppm	Standard	Mar 6, 1997 10:35		Mar 11, 1997 by HL	Mar 11, 1997 09:37 by HL

XENCO Laboratories

11381 Meadowglen Suite L Houston, Texas 77082
(713) 589-0692 Fax (713) 589-0695

CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST FORM

Page 1 of 1

Lab Batch # 170562-84

Contractor: KEI Consultant | Phone: 210 680-3767

Address: 5309 Wurzbach Ste 100, SA. TX 78238

Project Name: TNMPL Monument | Project Director: Paul Hartnett

Project Location: Site 8 | Project Manager: Ann Baker

Sampler Signature: Brian Siegfried | Project No.: 610057-2-8

No. coolers this shipment: | Contractor COC #: 0005

Carrier: | Quote #:

Airbill No. | P.O. No.: 7238

Turn-around: ASAP / 24 hrs / 48 hrs / Standard

	SAMPLE CHARACTERIZATION										Preservative		Uni Dies Ker Unknown	No of CONTAINERS Total	BTEX (5030/8020-602)	TRH (418.1)										Please Hold	Remarks	LAB ONLY ID #
	Field ID	Date	Time	DEPTH	SOIL	WATER	COMP	GRAB	Container Size	Container Type P, G	Ice	Other	Waste Oil; PIT No:; Tank No:; Sample Description															
1	B8-1 1-2'	3/6/97	1035	1-2	X				4oz	6	X		B8-1, 1-2'	1	X	X												1
2																												2
3																												3
4																												4
5																												5
6																												6
7																												7
8																												8
9																												9
10																												10

Relinquished by: (Signature)	DATE	TIME	Received by: (Signature)	DATE	TIME
Brian Siegfried	3/6/97	1610	Ann D Baker	3/7/97	1005
Ann D Baker	3/7/97	1010			
			Received For Laboratory by: Abby Brown	3/7/97	1010

Remarks

Pink (Contractor), Yellow & White (Lab).

* Pre-scheduling is recommended

Precision Analytical Services

XENCO Laboratories

CERTIFICATE OF ANALYSIS SUMMARY 1-70867

K.E.I. Consultants, Inc.

Project ID: 610057-2-8
Project Manager: Ann Baker
Project Location: Site 8

Project Name: TNMPL

Date Received in Lab : Apr 14, 1997 10:50 by CMC
Date Report Faxed: Apr 16, 1997
XENCO contact : Carlos Castro/Edward Yonemoto

Analysis Requested	*Lab ID:*	170867-001	170867-002	170867-003	170867-004	170867-005	170867-006	170867-007	170867-008	170867-009
	Field ID:	B8-1	B8-1	B8-2	B8-2	B8-3	B8-3	B8-4	B8-4	B8-5
	Depth:	5'	10'	1'	10'	5'	10'	5'	10'	5'
BTEX by EPA 8020		Date Analyzed - Analytical Results								**ppm (mg/L - mg/Kg)**
		Apr 14, 1997	Apr 14, 1997	Apr 14, 1997	Apr 14, 1997	Apr 14, 1997	Apr 14, 1997	Apr 14, 1997	Apr 14, 1997	Apr 14, 1997
Benzene		< 0.020	< 0.020	< 0.10	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Toluene		< 0.020	< 0.020	0.12	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Ethylbenzene		< 0.020	< 0.020	0.14	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
m,p-Xylenes		< 0.040	< 0.040	0.89	< 0.040	< 0.040	< 0.040	< 0.040	< 0.040	< 0.040
o-Xylene		< 0.020	< 0.020	0.43	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Total BTEX		< 0.120	< 0.120	1.58	< 0.120	< 0.120	< 0.120	< 0.120	< 0.120	< 0.120
Total Petroleum Hydrocarbons by EPA 418.1		Date Analyzed - Analytical Results								**ppm (mg/L - mg/Kg)**
		Apr 15, 1997	Apr 15, 1997	Apr 15, 1997	Apr 15, 1997	Apr 15, 1997	Apr 15, 1997	Apr 15, 1997	Apr 15, 1997	Apr 15, 1997
Total Petroleum Hydrocarbons		< 10.0	15.5	18300	< 10.0	< 10.0	< 10.0	11.0	< 10.0	24.0

Edward H. Yonemoto, Ph.D.
QA/QC Manager

XENCO Laboratories

CERTIFICATE OF ANALYSIS SUMMARY 1-70867

K.E.I. Consultants, Inc.

Project ID: 610057-2-8
Project Manager: Ann Baker
Project Location: Site 8

Project Name: TNMPL

Date Received in Lab : Apr 14, 1997 10:50 by CMC
Date Report Faxed: Apr 16, 1997
XENCO contact : Carlos Castro/Edward Yonemoto

Analysis Requested	*Lab ID:*	170867-010
	Field ID:	B8-5
	Depth:	10'
BTEX by EPA 8020	Date Analyzed	Apr 14, 1997
	Analytical Results	**ppm (mg/L - mg/Kg)**
Benzene		< 0.020
Toluene		< 0.020
Ethylbenzene		< 0.020
m,p-Xylenes		< 0.040
o-Xylene		< 0.020
Total BTEX		< 0.120
Total Petroleum Hydrocarbons by EPA 418.1	Date Analyzed	Apr 15, 1997
	Analytical Results	**ppm (mg/L - mg/Kg)**
Total Petroleum Hydrocarbons		160

Edward T. Yonemoto, Ph.D.
QA/QC Manager

XENCO Laboratories

Certificate Of Quality Control for Batch : 17A25B23

SW- 846 5030/8020 BTEX

Date Validated: Apr 15, 1997 09:30
Date Analyzed: Apr 14, 1997 13:14
QA/QC Manager: Edward H. Yonemoto, Ph.D.

Analyst: HL
Matrix: Solid

	MATRIX SPIKE / MATRIX SPIKE DUPLICATE AND RECOVERY										
Q.C. Sample ID 170852- 001	[A] Sample Result	[B] Matrix Spike Result	[C] Matrix Spike Duplicate Result	[D] Matrix Spike Amount	[E] Method Detection Limit	Matrix Limit Relative Difference	[F] QC Spike Relative Difference	[G] QC Matrix Spike Recovery	[H] QC M.S.D. Recovery	[I] Matrix Spike Recovery Range	[J] Qualifier
Parameter	ppm	ppm	ppm	ppm	ppm	%	%	%	%	%	
Benzene	< 0.020	1.946	1.870	2.000	0.020	25.0	4.0	97.3	93.5	65-135	
Toluene	< 0.020	1.960	1.912	2.000	0.020	25.0	2.5	98.0	95.6	65-135	
Ethylbenzene	< 0.020	1.962	1.944	2.000	0.020	25.0	0.9	98.1	97.2	65-135	
m,p-Xylenes	< 0.040	4.020	3.960	4.000	0.040	25.0	1.5	100.5	99.0	65-135	
o-Xylene	< 0.020	1.964	1.942	2.000	0.020	25.0	1.1	98.2	97.1	65-135	

Spike Relative Difference [F] = 200*(B-C)/(B+C)
Matrix Spike Recovery [G] = 100*(B-A)/[D]
M.S.D. = Matrix Spike Duplicate
M.S.D. Recovery [H] = 100*(C-A)/[D]
N.D. = Below detection limit or not detected
All results are based on MDL and validated for QC purposes

Edward H. Yonemoto, Ph.D.
QA/QC Manager

XENCO Laboratories

Certificate Of Quality Control for Batch : 17A25B23

SW- 846 5030/8020 BTEX

Date Validated: Apr 15, 1997 09:30
Date Analyzed: Apr 14, 1997 12:40
QA/QC Manager: Edward H. Yonemoto, Ph.D.

Analyst: HL
Matrix: Solid

BLANK SPIKE ANALYSIS

Parameter	[A] Blank Result ppm	[B] Blank Spike Result ppm	[C] Blank Spike Amount ppm	[D] Method Detection Limit ppm	[E] QC Blank Spike Recovery %	[F] LIMITS Recovery Range %	[G] Qualifier
Benzene	< 0.0010	0.1060	0.1000	0.0010	106.0	65-135	
Toluene	< 0.0010	0.1060	0.1000	0.0010	106.0	65-135	
Ethylbenzene	< 0.0010	0.1070	0.1000	0.0010	107.0	65-135	
m,p-Xylenes	< 0.0020	0.2130	0.2000	0.0020	106.5	65-135	
o-Xylene	< 0.0010	0.1060	0.1000	0.0010	106.0	65-135	

Blank Spike Recovery [E] = 100*(B-A)/(C)
N.C. = Not calculated, data below detection limit
N.D. = Below detection limit
All results are based on MDL and validated for QC purposes only

Edward H. Yonemoto, Ph.D.
QA/QC Manager

XENCO Laboratories

Certificate Of Quality Control for Batch : 17A30B41

EPA 418.1 Total Petroleum Hydrocarbons

Date Validated: Apr 15, 1997 18:00
Date Analyzed: Apr 15, 1997 14:24
QA/QC Manager: Edward H. Yonemoto, Ph.D.

Analyst: OL
Matrix: Solid

MATRIX SPIKE / MATRIX SPIKE DUPLICATE AND RECOVERY

Q.C. Sample ID 170867-008 / Parameter	[A] Sample Result ppm	[B] Matrix Spike Result ppm	[C] Matrix Spike Duplicate Result ppm	[D] Matrix Spike Amount ppm	[E] Method Detection Limit ppm	Matrix Limit Relative Difference %	[F] QC Spike Relative Difference %	[G] QC Matrix Spike Recovery %	[H] QC M.S.D. Recovery %	[I] Matrix Spike Recovery Range %	[J] Qualifier
Total Petroleum Hydrocarbons	8.50	167	174	198	7.50	30.0	4.1	80.2	83.8	65-135	

Spike Relative Difference [F] = 200*(B-C)/(B+C)
Matrix Spike Recovery [G] = 100*(B-A)/[D]
M.S.D. = Matrix Spike Duplicate
M.S.D. Recovery [H] = 100*(C-A)/[D]
N.D. = Below detection limit or not detected
All results are based on MDL and validated for QC purposes

Edward H. Yonemoto, Ph.D.
QA/QC Manager

XENCO Laboratories

Certificate Of Quality Control for Batch : 17A30B41

EPA 418.1 Total Petroleum Hydrocarbons

Date Validated: Apr 15, 1997 18:00
Date Analyzed: Apr 15, 1997 14:21
QA/QC Manager: Edward H. Yonemoto, Ph.D.

Analyst: OL
Matrix: Solid

BLANK SPIKE ANALYSIS

Parameter	[A] Blank Result ppm	[B] Blank Spike Result ppm	[C] Blank Spike Amount ppm	[D] Method Detection Limit ppm	[E] QC LIMITS Blank Spike Recovery %	[F] QC LIMITS Recovery Range %	[G] Qualifier
Total Petroleum Hydrocarbons	< 7.50	208	198	7.50	105.3	65-135	

Blank Spike Recovery [E] = 100*(B-A)/(C)
N.C. = Not calculated, data below detection limit
N.D. = Below detection limit
All results are based on MDL and validated for QC purposes only

Edward H. Yonemoto, Ph.D.
QA/QC Manager

XENCO Laboratories

Certificate Of Quality Control for Batch : 17A30B42

EPA 418.1 Total Petroleum Hydrocarbons

Date Validated: Apr 15, 1997 18:00
Date Analyzed: Apr 15, 1997 15:14
QA/QC Manager: Edward H. Yonemoto, Ph.D.

Analyst: OL
Matrix: Solid

	MATRIX SPIKE / MATRIX SPIKE DUPLICATE AND RECOVERY										
Q.C. Sample ID 170867- 009	[A] Sample Result	[B] Matrix Spike Result	[C] Matrix Spike Duplicate Result	[D] Matrix Spike Amount	[E] Method Detection Limit	Matrix Limit Relative Difference	[F] QC Spike Relative Difference	[G] QC Matrix Spike Recovery	[H] QC M.S.D. Recovery	[I] Matrix Spike Recovery Range	[J] Qualifier
Parameter	ppm	ppm	ppm	ppm	ppm	%	%	%	%	%	
Total Petroleum Hydrocarbons	24.00	185	174	198	7.50	30.0	6.1	81.5	75.9	65-135	

Spike Relative Difference [F] = 200*(B-C)/(B+C)
Matrix Spike Recovery [G] = 100*(B-A)/[D]
M.S.D. = Matrix Spike Duplicate
M.S.D. Recovery [H] = 100*(C-A)/[D]
N.D. = Below detection limit or not detected
All results are based on MDL and validated for QC purposes

Edward H. Yonemoto, Ph.D.
QA/QC Manager

XENCO Laboratories

Certificate Of Quality Control for Batch : 17A30B42

EPA 418.1 Total Petroleum Hydrocarbons

Date Validated: Apr 15, 1997 18:00
Date Analyzed: Apr 15, 1997 15:11
QA/QC Manager: Edward H. Yonemoto, Ph.D.

Analyst: OL
Matrix: Solid

BLANK SPIKE ANALYSIS

Parameter	[A] Blank Result ppm	[B] Blank Spike Result ppm	[C] Blank Spike Amount ppm	[D] Method Detection Limit ppm	[E] QC LIMITS Blank Spike Recovery %	[F] Recovery Range %	[G] Qualifier
Total Petroleum Hydrocarbons	< 7.50	182	198	7.50	92.1	65-135	

Blank Spike Recovery [E] = 100*(B-A)/(C)
N.C. = Not calculated, data below detection limit
N.D. = Below detection limit
All results are based on MDL and validated for QC purposes only

Edward H. Yonemoto, Ph.D.
QA/QC Manager

XENCO Laboratories

ANALYTICAL CHAIN OF CUSTODY REPORT
CHRONOLOGY OF SAMPLES

K.E.I. Consultants, Inc.

Project ID: 610057-2-8
Project Manager: Ann Baker
Project Location: Site 8

Project Name: TNMPL

XENCO COC#: 1-70867
Date Received in Lab: Apr 14, 1997 10:50 by CMC
XENCO contact : Carlos Castro/Edward Yonemoto

	Field ID	Lab. ID	Method Name	Method ID	Units	Turn Around	Date and Time: Sample Collected	Date and Time: Addition Requested	Date and Time: Extraction	Date and Time: Analysis
1	B8-1 (5') Soil	170867-001	BTEX	SW-846	ppm	Standard	Apr 8, 1997 12:30		Apr 14, 1997 by HL	Apr 14, 1997 14:06 by HL
2			TPH	EPA 418.1	ppm	Standard	Apr 8, 1997 12:30		Apr 15, 1997 by OL	Apr 15, 1997 14:36 by OL
3	B8-1 (10') Soil	170867-002	BTEX	SW-846	ppm	Standard	Apr 8, 1997 12:58		Apr 14, 1997 by HL	Apr 14, 1997 14:23 by HL
4			TPH	EPA 418.1	ppm	Standard	Apr 8, 1997 12:58		Apr 15, 1997 by OL	Apr 15, 1997 14:39 by OL
5	B8-2 (1') Soil	170867-003	BTEX	SW-846	ppm	Standard	Apr 8, 1997 13:27		Apr 14, 1997 by HL	Apr 14, 1997 16:57 by HL
6			TPH	EPA 418.1	ppm	Standard	Apr 8, 1997 13:27		Apr 15, 1997 by OL	Apr 15, 1997 14:42 by OL
7	B8-2 (10') Soil	170867-004	BTEX	SW-846	ppm	Standard	Apr 8, 1997 13:49		Apr 14, 1997 by HL	Apr 14, 1997 14:40 by HL
8			TPH	EPA 418.1	ppm	Standard	Apr 8, 1997 13:49		Apr 15, 1997 by OL	Apr 15, 1997 14:45 by OL
9	B8-3 (5') Soil	170867-005	BTEX	SW-846	ppm	Standard	Apr 8, 1997 14:02		Apr 14, 1997 by HL	Apr 14, 1997 14:57 by HL
10			TPH	EPA 418.1	ppm	Standard	Apr 8, 1997 14:02		Apr 15, 1997 by OL	Apr 15, 1997 14:48 by OL
11	B8-3 (10') Soil	170867-006	BTEX	SW-846	ppm	Standard	Apr 8, 1997 14:27		Apr 14, 1997 by HL	Apr 14, 1997 15:15 by HL
12			TPH	EPA 418.1	ppm	Standard	Apr 8, 1997 14:27		Apr 15, 1997 by OL	Apr 15, 1997 14:51 by OL
13	B8-4 (5') Soil	170867-007	BTEX	SW-846	ppm	Standard	Apr 8, 1997 15:06		Apr 14, 1997 by HL	Apr 14, 1997 15:32 by HL
14			TPH	EPA 418.1	ppm	Standard	Apr 8, 1997 15:06		Apr 15, 1997 by OL	Apr 15, 1997 14:54 by OL
15	B8-4 (10') Soil	170867-008	BTEX	SW-846	ppm	Standard	Apr 8, 1997 15:38		Apr 14, 1997 by HL	Apr 14, 1997 15:49 by HL
16			TPH	EPA 418.1	ppm	Standard	Apr 8, 1997 15:38		Apr 15, 1997 by OL	Apr 15, 1997 14:57 by OL
17	B8-5 (5') Soil	170867-009	BTEX	SW-846	ppm	Standard	Apr 8, 1997 15:58		Apr 14, 1997 by HL	Apr 14, 1997 16:06 by HL
18			TPH	EPA 418.1	ppm	Standard	Apr 8, 1997 15:58		Apr 15, 1997 by OL	Apr 15, 1997 15:20 by OL
19	B8-5 (10') Soil	170867-010	BTEX	SW-846	ppm	Standard	Apr 8, 1997 16:09		Apr 14, 1997 by HL	Apr 14, 1997 16:40 by HL
20			TPH	EPA 418.1	ppm	Standard	Apr 8, 1997 16:09		Apr 15, 1997 by OL	Apr 15, 1997 15:23 by OL

XENCO Laboratories

11381 Meadowglen Suite L Houston, Texas 77082
(713) 589-0692 Fax (713) 589-0695

CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST FORM

Lab. Batch #170867-SA

Contractor: KFT | Phone: (210) 680-3767

Address: 5309 WURZBACH SA TX SUITE 100

Project Name: TNMPL | Project Director: PAUL HARTNET

Project Location: SITE 8 | Project Manager: ANN BAKER

Sampler Signature: | Project No.: 610057-2-8

No. coolers this shipment: 1 | Contractor COC #

Carrier: | Quote #:

Airbill No. | P.O. No.:

SAMPLE CHARACTERIZATION

	Field ID	Date	Time	Depth	Soil	Water	Comp	Grab	Container Size	Container Type P, G	Preservative Ice	Preservative Other	Sample Description	No of Containers Total	BTEX (8020/8020-602)	TPH (418.1)	Please Hold	Remarks	LAB ONLY ID #
1	BE-1	4/8/97	1230	5'	X			X	1-4oz 1-8oz	G	X		SOIL		X	X	X	PLEASE HOLD 8oz JAR	1
2	BE-1	4/8/97	1258	10'	X			X	1-4oz 1-8oz	G	X		SOIL		X	X	X		2
3	BE-2	4/8/97	1327	1'	X			X	1-4oz 1-8oz	G	X		SOIL		X	X	X		3
4	BE-2	4/8/97	1349	10'	X			X	1-4oz 1-8oz	G	X		SOIL		X	X	X		4
5	BE-3	4/8/97	1402	5'	X			X	1-4oz 1-8oz	G	X		SOIL		X	X	X		5
6	BE-3	4/8/97	1427	10'	X			X	1-4oz 1-8oz	G	X		SOIL		X	X	X		6
7	BE-4	4/8/97	1506	5'	X			X	1-4oz 1-8oz	G	X		SOIL		X	X	X		7
8	BE-4	4/8/97	1536	10'	X			X	1-4oz 1-8oz	G	X		SOIL		X	X	X		8
9	BE-5	4/8/97	1558	5'	X			X	1-4oz 1-8oz	G	X		SOIL		X	X	X		9
10	BE-5	4/8/97	1609	10'	X			X	1-4oz 1-8oz	G	X		SOIL		X	X	X		10

Turn-around: * ASAP * 24 hrs 48 hrs (Standard)

Relinquished by: (Signature)	DATE	TIME	Received by: (Signature)	DATE	TIME
	4/14/97	1050			
			Received For Laboratory by:	4/14/97	1050

Remarks

Pink (Contractor), Yellow & White (Lab).

* Pre-scheduling is recommended

Precision Analytical Services