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REPORTS

DATE:

4-14-1998

5309 Wurzbach, Suite 100
San Antonio, Texas 78238
(210) 680-3767
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GROUND WATER MONITORING REPORT

TEXAS - NEW MEXICO PIPE LINE COMPANY
MONUMENT SITE NO. 18
MONUMENT, NEW MEXICO

PREPARED FOR:

TEXAS - NEW MEXICO PIPE LINE COMPANY
P. O. BOX 1030
JAL, NEW MEXICO 88252

MR. TONY SAVOIE

PREPARED BY:

KEI

Theresa Nix
Theresa Nix
Project Manager

J. Michael Hawthorne, P.G., REM

KEI Job No. 610057-6-18

April 14, 1998

TABLE OF CONTENTS

INTRODUCTION

This binder presents results of ground water monitoring events conducted for Texas - New Mexico Pipe Line Company (TNMPL) Monument Site No. 18 located near Monument, New Mexico from the second quarter of 1997 to present. Ground water monitoring is conducted to assess the concentrations and extent of petroleum hydrocarbon constituents in ground water. The monitoring events consist of some or all of the following:

- measuring static water levels in the monitoring wells
- checking for the presence of phase-separate hydrocarbons (PSH)
- purging and sampling each well exhibiting sufficient recharge

PURPOSE AND SCOPE

This binder presents results of ground water events conducted for TNMPL Site No. 18. The scope of this binder includes all sampling events conducted at this site since the second quarter of 1997, and historical ground water levels and PSH thicknesses. Site details are presented on FIG. 1.

FIELD AND REPORTING PROTOCOLS

GROUND WATER MONITORING AND SAMPLING

During sampling events, monitoring wells that do not contain PSH are purged of approximately three well volumes of water. Purging equipment is cleaned prior to each use with Liqui-Nox detergent and rinsed with water. After purging the wells, ground water sample containers are filled in the order of decreasing volatility (i.e., benzene, toluene, ethylbenzene, and xylenes (BTEX) containers are filled first and other containers which may be required are filled second).

Ground water samples collected for BTEX analyses are placed in sterile, 40 ml glass VOA vials equipped with Teflon-lined caps. The containers are typically provided by the analytical laboratory. The vials are filled to a positive meniscus, sealed, and visually checked for the presence of air bubbles.

The filled containers are labeled and placed on ice in an insulated cooler. The cooler is sealed for transportation to the analytical laboratory. Proper chain-of-custody documentation is maintained throughout the sampling process.

Purged water collected during each event is stored in drums on-site pending disposal.

LABORATORY RESULTS

Laboratory results for ground water samples obtained during each event are delivered to a qualified environmental analytical laboratory for determination of BTEX concentrations by EPA Method SW846-8020. The ground water samples obtained during the second quarter

of 1997 were also submitted for determination of metals concentrations by EPA Method 6010, polycyclic aromatic hydrocarbon (PAH) concentrations by EPA Method 8100, Total Dissolved Solids (TDS) concentrations by EPA Method 160.1, bicarbonate and carbonate concentrations by SM4500CO2D, anions concentrations by EPA Method 300.0, and total inorganic carbon (TIC) concentrations by Modified EPA Method 415.1.

Laboratory BTEX results for each event are summarized in TABLE I and graphically presented on FIG. 1. Copies of certified laboratory reports and chain-of-custody documentation are also attached. TABLE I is presented behind the TABLES tab. The figures and the certified laboratory reports and chain-of-custody documentation for each event are presented behind the corresponding dated tabs.

GROUND WATER GRADIENT

Ground water elevation contours generated from the water level measurements collected from each event are presented on FIG. 1. Historical ground water measurements are summarized in TABLE II. TABLE II is presented behind the TABLES tab and FIG. 1 is presented behind the corresponding dated tab.

PSH MONITORING

PSH thickness is gauged regularly. PSH thickness across the site for each gauging event is graphically presented on FIG. 2.

GENERAL NOTES

ND - Indicates constituent was not detected above the method detection limit.
PSH - Phase-separated hydrocarbons.
SHEEN - Indicates a visible phase separation with a thickness less than 0.01 feet.

Depth to water is referenced from the top of PVC elevation.

Ground water elevations in monitoring wells containing PSH have been corrected for PSH density. (Correction Factor = 0.85 prior to October of 1997, Correction Factor = 0.882 beginning October of 1997)

Method detection limits: BTEX - 0.001 to 0.006 mg/l

Laboratory test methods: BTEX - EPA Method SW846-8020, 5030

TABLE I

SUMMARY OF LABORATORY RESULTS - GROUND WATER
TEXAS - NEW MEXICO PIPE LINE COMPANY
MONUMENT SITE NO. 18
LEA COUNTY, NEW MEXICO

MONITORING WELL NO.	DATE SAMPLED	BENZENE (mg/l)	TOLUENE (mg/l)	ETHYLBENZENE (mg/l)	XYLENES (mg/l)	BTEX (mg/l)
MW18-2	05/02/97	0.010	ND	0.060	0.022	0.092
MW18-2	08/15/97	ND	ND	ND	ND	ND
MW18-2	11/02/97	0.002	ND	0.004	ND	0.006
MW18-2	02/19/98	0.003	ND	0.004	ND	0.007
MW18-3	05/02/97	0.006	ND	ND	ND	0.006
MW18-5	09/19/97	ND	ND	ND	ND	ND
MW18-5	11/02/97	ND	ND	ND	ND	ND
MW18-5	02/19/98	ND	ND	ND	ND	ND
MW18-6	09/19/97	ND	ND	ND	ND	ND
MW18-6	11/02/97	ND	ND	ND	ND	ND
MW18-6	02/19/98	ND	ND	ND	ND	ND

TABLE II

MONITORING WELL MW18-1
SUMMARY OF GROUND WATER MONITORING
TEXAS - NEW MEXICO PIPE LINE COMPANY
MONUMENT SITE NO. 18
LEA COUNTY, NEW MEXICO

DATE MEASURED	PVC ELEVATION (feet)	DEPTH TO WATER (feet)	GROUND WATER ELEVATION		DEPTH TO PSH (feet)	PSH ELEVATION (feet)	PSH THICKNESS (feet)
			Actual	Corrected			
04/30/97	3,557.59	32.07	3525.52	3526.10	31.39	3526.20	0.68
07/23/97	3,557.59	19.99	3537.60	---		---	---
08/15/97	3,557.59	33.86	3523.73	3525.96	31.24	3526.35	2.62
10/23/97	3,558.71	34.47	3524.24	3527.04	31.29	3527.42	3.18
11/02/97	3,558.71	34.55	3524.16	3527.02	31.31	3527.40	3.24
12/09/97	3,558.71	34.02	3524.69	3526.99	31.41	3527.30	2.61
12/17/97	3,558.71	33.97	3524.74	3527.00	31.41	3527.30	2.56
01/02/98	3,558.71	31.37	3527.34	3528.53	30.02	3528.69	1.35
01/30/98	3,558.71	33.90	3524.81	3527.03	31.38	3527.33	2.52
02/06/98	3,558.71	33.76	3524.95	3527.03	31.40	3527.31	2.36
02/13/98	3,558.71	33.66	3525.05	3527.03	31.41	3527.30	2.25
02/21/98	3,558.71	33.62	3525.09	3527.03	31.42	3527.29	2.20
02/25/98	3,558.71	33.40	3525.31	3527.05	31.43	3527.28	1.97
03/04/98	3,558.71	33.36	3525.35	3527.04	31.44	3527.27	1.92
03/13/98	3,558.71	33.51	3525.20	3527.02	31.44	3527.27	2.07
03/17/98	3,558.71	33.11	3525.60	3527.05	31.46	3527.25	1.65
03/24/98	3,558.71	33.20	3525.51	3526.95	31.56	3527.15	1.64
03/31/98	3,558.71	33.33	3525.38	3527.03	31.46	3527.25	1.87
04/07/98	3,558.71	33.11	3525.60	3527.03	31.49	3527.22	1.62

TABLE II
(continued)

MONITORING WELL MW18-2
SUMMARY OF GROUND WATER MONITORING
TEXAS - NEW MEXICO PIPE LINE COMPANY
MONUMENT SITE NO. 18
LEA COUNTY, NEW MEXICO

DATE MEASURED	PVC ELEVATION (feet)	DEPTH TO WATER (feet)	GROUND WATER ELEVATION		PSH THICKNESS (feet)
			Actual	Corrected	
04/30/97	3,558.54	32.67	3525.87	---	---
07/23/97	3,558.54	21.60	3536.94	---	---
08/15/97	3,558.54	32.52	3526.02	---	---
10/23/97	3,559.64	32.60	3527.04	---	---
11/02/97	3,559.64	32.63	3527.01	---	---
12/03/97	3,559.64	32.63	3527.01	---	---
01/02/98	3,559.64	32.62	3527.02	---	---
02/06/98	3,559.64	32.61	3527.03	---	---
02/19/98	3,559.64	32.62	3527.02	---	---
03/04/98	3,559.64	32.59	3527.05	---	---
04/07/98	3,559.64	32.63	3527.01	---	---

TABLE II
(continued)

MONITORING WELL MW18-3
SUMMARY OF GROUND WATER MONITORING
TEXAS - NEW MEXICO PIPE LINE COMPANY
MONUMENT SITE NO. 18
LEA COUNTY, NEW MEXICO

DATE MEASURED	PVC ELEVATION (feet)	DEPTH TO WATER (feet)	GROUND WATER ELEVATION		DEPTH TO PSH (feet)	PSH ELEVATION (feet)	PSH THICKNESS (feet)
			Actual	Corrected			
04/30/97	3,557.43	31.26	3526.17	3526.36	31.04	3526.39	0.22
07/23/97	3,557.43	21.78	3535.65	3535.66	21.77	3535.66	0.01
08/15/97	3,557.43	33.65	3523.78	3526.08	30.95	3526.48	2.70
10/23/97	3,558.53	33.80	3524.73	3527.15	31.05	3527.48	2.75
11/02/97	3,558.53	33.80	3524.73	3527.13	31.07	3527.46	2.73
12/03/97	3,558.53	33.81	3524.72	3527.13	31.07	3527.46	2.74
12/09/97	3,558.53	33.52	3525.01	3527.12	31.12	3527.41	2.40
12/17/97	3,558.53	33.58	3524.95	3527.13	31.10	3527.43	2.48
01/02/98	3,558.53	33.60	3524.93	3527.13	31.10	3527.43	2.50
01/30/98	3,558.53	33.49	3525.04	3527.15	31.09	3527.44	2.40
02/06/98	3,558.53	33.38	3525.15	3527.14	31.12	3527.41	2.26
02/13/98	3,558.53	33.36	3525.17	3527.14	31.12	3527.41	2.24
02/21/98	3,558.53	33.35	3525.18	3527.22	31.03	3527.50	2.32
02/25/98	3,558.53	33.26	3525.27	3527.15	31.12	3527.41	2.14
03/04/98	3,558.53	33.32	3525.21	3527.15	31.11	3527.42	2.21
03/13/98	3,558.53	33.41	3525.12	3527.13	31.12	3527.41	2.29
03/17/98	3,558.53	33.18	3525.35	3527.16	31.12	3527.41	2.06
03/24/98	3,558.53	33.24	3525.29	3527.17	31.10	3527.43	2.14
03/31/98	3,558.53	33.38	3525.15	3527.16	31.10	3527.43	2.28
04/07/98	3,558.53	33.37	3525.16	3527.13	31.13	3527.40	2.24

TABLE II
(continued)

MONITORING WELL MW18-4
SUMMARY OF GROUND WATER MONITORING
TEXAS - NEW MEXICO PIPE LINE COMPANY
MONUMENT SITE NO. 18
LEA COUNTY, NEW MEXICO

DATE MEASURED	PVC ELEVATION (feet)	DEPTH TO WATER (feet)	GROUND WATER ELEVATION		DEPTH TO PSH (feet)	PSH ELEVATION (feet)	PSH THICKNESS (feet)
			Actual	Corrected			
09/19/97	3,558.14	30.90	3527.24	3527.25	30.89	3527.25	0.01
10/23/97	3,558.14	30.92	3527.22	---		---	---
11/02/97	3,558.14	30.94	3527.20	3527.21	30.93	3527.21	0.01
12/03/97	3,558.14	30.95	3527.19	---	30.95	3527.19	sheen
12/09/97	3,558.14	30.95	3527.19	---	30.95	3527.19	sheen
12/17/97	3,558.14	30.94	3527.20	---	30.94	3527.20	sheen
01/02/98	3,558.14	30.96	3527.18	---	30.96	3527.18	sheen
01/30/98	3,558.14	30.94	3527.20	---	30.94	3527.20	sheen
02/06/98	3,558.14	30.95	3527.19	---		---	---
02/13/98	3,558.14	30.95	3527.19	---	30.95	3527.19	sheen
02/19/98	3,558.14	30.93	3527.21	---	30.93	3527.21	sheen
02/25/98	3,558.14	30.93	3527.21	---	30.93	3527.21	sheen
03/04/98	3,558.14	30.94	3527.20	---	30.94	3527.20	sheen
03/13/98	3,558.14	30.96	3527.18	---	30.95	3527.19	0.01
03/17/98	3,558.14	30.93	3527.21	---	30.93	3527.21	sheen
03/24/98	3,558.14	30.94	3527.20	---	30.94	3527.20	sheen
03/31/98	3,558.14	30.94	3527.20	---	30.94	3527.20	sheen
04/07/98	3,558.14	30.95	3527.19	---	30.95	3527.19	sheen

TABLE II
(continued)

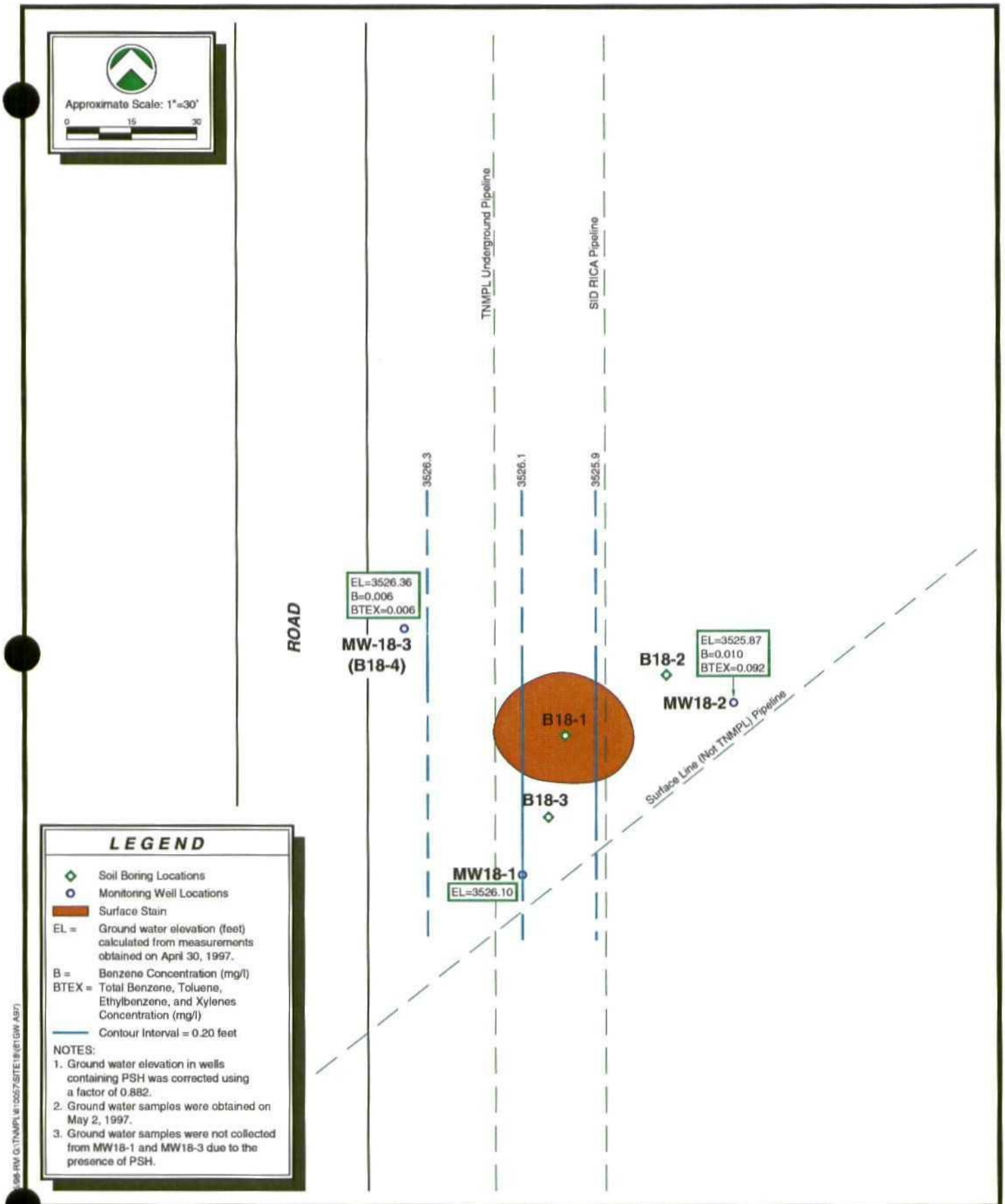
MONITORING WELL MW18-5
SUMMARY OF GROUND WATER MONITORING
TEXAS - NEW MEXICO PIPE LINE COMPANY
MONUMENT SITE NO. 18
LEA COUNTY, NEW MEXICO

DATE MEASURED	PVC ELEVATION (feet)	DEPTH TO WATER (feet)	GROUND WATER ELEVATION		PSH THICKNESS (feet)
			Actual	Corrected	
09/19/97	3,560.07	33.19	3526.88	---	---
10/23/97	3,560.07	33.20	3526.87	---	---
11/02/97	3,560.07	33.23	3526.84	---	---
12/03/97	3,560.07	33.23	3526.84	---	---
01/02/98	3,560.07	33.23	3526.84	---	---
02/06/98	3,560.07	33.22	3526.85	---	---
02/19/98	3,560.07	33.22	3526.85	---	---
03/04/98	3,560.07	33.20	3526.87	---	---
04/07/98	3,560.07	33.23	3526.84	---	---

TABLE II
(continued)

MONITORING WELL MW18-6
SUMMARY OF GROUND WATER MONITORING
TEXAS - NEW MEXICO PIPE LINE COMPANY
MONUMENT SITE 18
LEA COUNTY, NEW MEXICO

DATE MEASURED	PVC ELEVATION (feet)	DEPTH TO WATER (feet)	GROUND WATER ELEVATION		PSH THICKNESS (feet)
			Actual	Corrected	
09/19/97	3,557.64	30.41	3527.23	---	---
10/23/97	3,557.64	30.44	3527.20	---	---
11/02/97	3,557.64	30.46	3527.18	---	---
12/03/97	3,557.64	30.47	3527.17	---	---
01/02/98	3,557.64	30.47	3527.17	---	---
02/06/98	3,557.64	30.45	3527.19	---	---
02/19/98	3,557.64	30.45	3527.19	---	---
03/04/98	3,557.64	30.43	3527.21	---	---
04/07/98	3,557.64	30.46	3527.18	---	---



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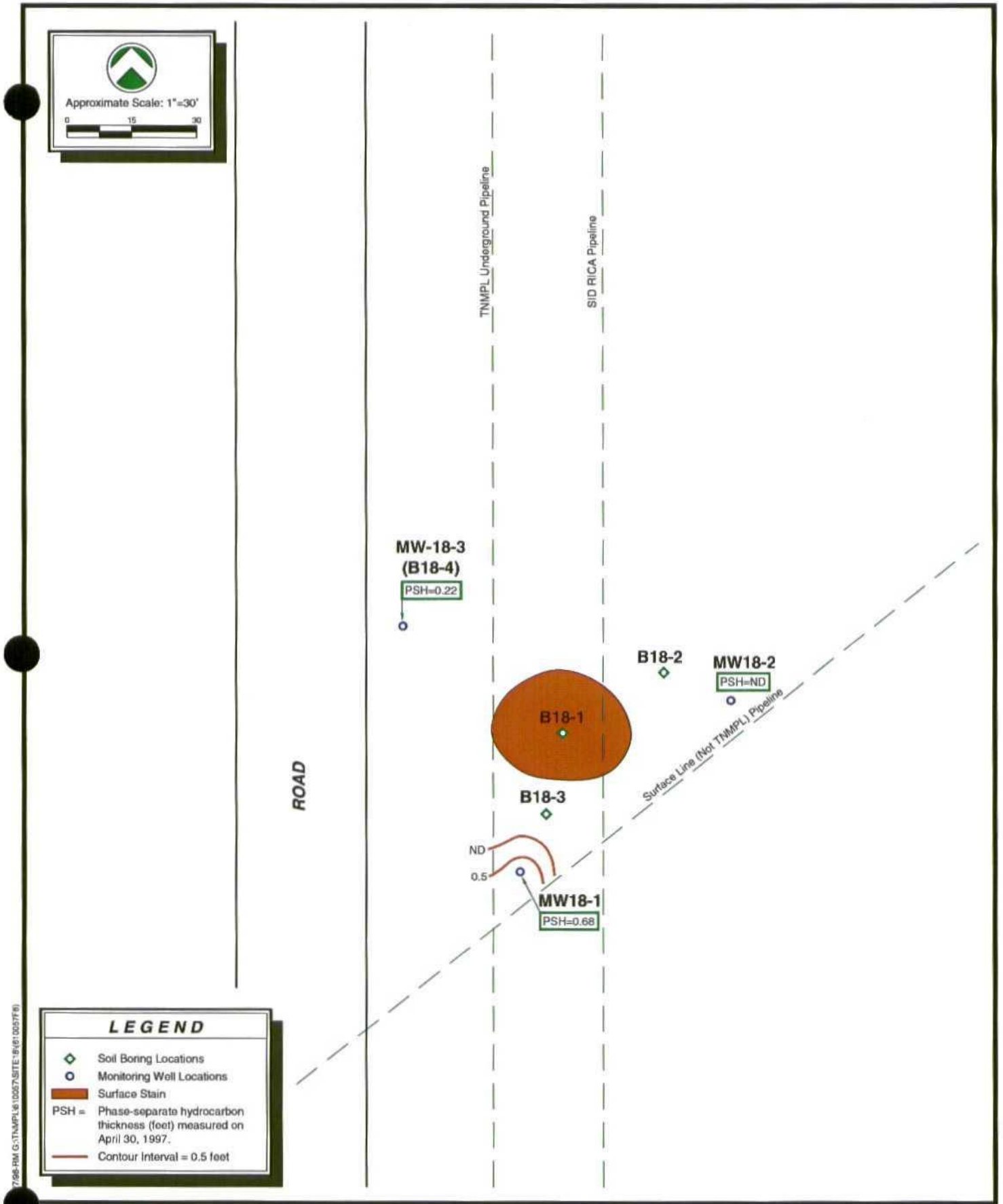
GROUND WATER CONTOURS / CONCENTRATION MAP - APRIL AND MAY 1997

TEXAS - NEW MEXICO PIPE LINE CO. MONUMENT SITE NO. 18 LEA COUNTY, NEW MEXICO

610057

FIG 1



7/98-RM G:\TNMPL\610057\SITE\fig610057.ai

k·e·i

PSH THICKNESS MAP - APRIL 1997	610057
TEXAS - NEW MEXICO PIPE LINE CO. MONUMENT SITE NO. 18 LEA COUNTY, NEW MEXICO	FIG 2

XENCO Laboratories

CERTIFICATE OF ANALYSIS SUMMARY 1-71050

K.E.I. Consultants, Inc.

Project Name: Monument

Project ID: 610057 Site #18
Project Manager: Ann Baker
Project Location: Site #18

Date Received in Lab: May 6, 1997 10:00 by RT
Date Report Faxed: May 22, 1997
XENCO contact: Carlos Castro/Edward Yonemoto

Analysis Requested	*Lab ID:*	171050-001	171050-002				
	Field ID:	MW-2	MW-3				
	Depth:						
Metals (ICP) Analyzed by EPA 6010		Date Analyzed - Analytical Results ppm (mg/L - mg/Kg)					
		May 13, 1997	May 13, 1997				
Aluminum		2.67	48.6				
Arsenic		< 0.05	< 0.05				
Barium		0.30	3.33				
Beryllium		< 0.005	< 0.005				
Cadmium		< 0.01	< 0.01				
Calcium		1000	3600				
Chromium		< 0.05	< 0.05				
Cobalt		< 0.10	< 0.10				
Iron		0.88	26.7				
Lead		< 0.05	< 0.05				
Magnesium		627	1070				
Manganese		< 0.20	0.91				
Molybdenum		< 0.20	< 0.20				
Potassium		36.3	63.4				
Silver		< 0.02	< 0.02				
Sodium		2150	2390				
Tin		0.25	10.2				
Vanadium		< 0.05	0.35				
Zinc		< 0.25	< 0.25				
Nickel		< 0.10	< 0.10				
Copper		< 0.25	< 0.25				
Boron		0.57	0.70				
Silicon		26.0	8.24				
Strontium		16.0	16.0				

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

XENCO Laboratories

CERTIFICATE OF ANALYSIS SUMMARY 1-71050

K.E.I. Consultants, Inc.

Project Name: Monument

Project ID: 610057 Site #18
Project Manager: Ann Baker
Project Location: Site #18

Date Received in Lab: May 6, 1997 10:00 by RT
Date Report Faxed: May 22, 1997
XENCO contact: Carlos Castro/Edward Yonemoto

Analysis Requested	*Lab ID:*	171050-001	171050-002				
	Field ID:	MW-2	MW-3				
	Depth:						
Mercury, Tot Analyzed by EPA 7470		Date Analyzed - Analytical Results					ppm (mg/L - mg/Kg)
		May 12, 1997	May 12, 1997				
Mercury		< 0.0010	< 0.0010				
BTEX Analyzed by EPA 8020		Date Analyzed - Analytical Results					ppm (mg/L - mg/Kg)
		May 9, 1997	May 9, 1997				
Benzene		0.010	0.006				
Toluene		< 0.001	< 0.001				
Ethylbenzene		0.060	< 0.001				
m,p-Xylenes		0.022	< 0.002				
o-Xylene		< 0.001	< 0.001				
Total BTEX		0.092	0.006				
PAH Analyzed by EPA 8100		Date Analyzed - Analytical Results					ppm (mg/L - mg/Kg)
		May 15, 1997					
Acenaphthene		< 0.002					
Acenaphthylene		< 0.002					
Anthracene		< 0.002					
Benzo(a)anthracene		< 0.002					
Benzo(a)pyrene		< 0.002					
Benzo(b)fluoranthene		< 0.002					
Benzo(g,h,i)perylene		< 0.002					
Benzo(k)fluoranthene		< 0.002					
Chrysene		< 0.002					
Dibenzo(a,e)pyrene		< 0.002					
Dibenzo(a,h)anthracene		< 0.002					
Dibenz(a,j)acridine		< 0.002					
Fluoranthene		< 0.002					
Fluorene		< 0.002					

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

XENCO Laboratories

CERTIFICATE OF ANALYSIS SUMMARY 1-71050

K.E.I. Consultants, Inc.

Project Name: Monument

Project ID: 610057 Site #18
Project Manager: Ann Baker
Project Location: Site #18

Date Received in Lab: May 6, 1997 10:00 by RT
Date Report Faxed: May 22, 1997
XENCO contact: Carlos Castro/Edward Yonemoto

Analysis Requested	*Lab ID:*	171050-001	171050-002				
	Field ID:	MW-2	MW-3				
	Depth:						
Indeno(1,2,3-cd)pyrene		< 0.002					
3-Methylcholanthrene		< 0.002					
Naphthalene		< 0.002					
Phenanthrene		< 0.002					
Pyrene		< 0.002					
Dibenz(a,h)acridine		< 0.002					
Benzo(j)fluoranthene		< 0.002					
7H-Dibenzo(c,g)carbazole		< 0.002					
Dibenzo(a,h)pyrene		< 0.002					
Dibenzo(a,i)pyrene		< 0.002					
Bicarbonate Analyzed by SM 4500CO2D		Date Analyzed	- Analytical Results				ppm (mg/L - mg/Kg)
		May 10, 1997	May 10, 1997				
Bicarbonate		271	279				
Carbonate Analyzed by SM4500CO2D		Date Analyzed	- Analytical Results				ppm (mg/L - mg/Kg)
		May 10, 1997	May 10, 1997				
Carbonate		< 1.0	< 1.0				
TDS Analyzed by EPA 160.1		Date Analyzed	- Analytical Results				ppm (mg/L - mg/Kg)
		May 9, 1997	May 9, 1997				
Total Dissolved Solids		16300	17200				
Anions Analyzed by EPA 300.0		Date Analyzed	- Analytical Results				ppm (mg/L - mg/Kg)
		May 8, 1997	May 8, 1997				
Sulfate		368	356				
Chloride		757	7680				
TIC Mod. Analyzed by Mod. 415.1		Date Analyzed	- Analytical Results				ppm (mg/L - mg/Kg)
		May 14, 1997	May 14, 1997				

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

XENCO Laboratories

CERTIFICATE OF ANALYSIS SUMMARY 1-71050

K.E.I. Consultants, Inc.

Project Name: Monument

Project ID: 610057 Site #18
Project Manager: Ann Baker
Project Location: Site #18

Date Received in Lab: May 6, 1997 10:00 by RT
Date Report Faxed: May 22, 1997
XENCO contact: Carlos Castro/Edward Yonemoto

Analysis Requested	*Lab ID:*	171050-001	171050-002				
	Field ID:	MW-2	MW-3				
	Depth:						
Total Inorganic Carbon		46.7	44.8				

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

XENCO Laboratories

Certificate Of Quality Control for Batch : 17A18C05

EPA 6010 Metals by ICP

Date Validated: May 15, 1997 09:00
Date Analyzed: May 13, 1997 11:30
QA/QC Manager: Edward H. Yonemoto, Ph.D.

Analyst: SA
Matrix: Liquid

	BLANK SPIKE ANALYSIS						
Parameter	[A] Blank Result mg/L	[B] Blank Spike Result mg/L	[C] Blank Spike Amount mg/L	[D] Method Detection Limit mg/L	[E] QC Blank Spike Recovery %	[F] LIMITS Recovery Range %	[G] Qualifier
Aluminum	< 0.01	0.72	1.00	0.01	72.0	70-125	
Arsenic	< 0.050	0.869	1.000	0.050	86.9	70-125	
Barium	< 0.002	0.429	0.500	0.002	85.8	70-125	
Beryllium	< 0.0050	0.1808	0.2000	0.0050	90.4	70-125	
Boron	< 0.03	1.20	1.56	0.03	76.9	70-125	
Cadmium	< 0.010	0.162	0.200	0.010	81.0	70-125	
Calcium	< 0.01	1.82	2.00	0.01	91.0	70-125	
Chromium	< 0.013	0.433	0.500	0.013	86.6	70-125	
Cobalt	< 0.003	0.423	0.500	0.003	84.6	70-125	
Copper	< 0.008	0.443	0.500	0.008	88.6	70-125	
Iron	< 0.006	0.814	1.000	0.006	81.4	70-125	
Lead	< 0.03	0.85	1.00	0.03	85.0	70-125	
Magnesium	< 0.01	1.79	2.00	0.01	89.5	70-125	
Nickel	< 0.03	0.46	0.50	0.03	92.0	70-125	
Potassium	< 0.0250	2.1275	2.0000	0.0250	106.4	70-125	
Silver	< 0.010	0.334	0.400	0.010	83.5	70-125	
Sodium	< 0.0250	1.8363	2.0000	0.0250	91.8	70-125	
Strontium	< 0.025	1.171	1.560	0.025	75.1	70-125	
Vanadium	< 0.00	0.44	0.50	0.00	88.0	70-125	
Zinc	< 0.008	0.431	0.500	0.008	86.2	70-125	

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 : 17A18C05

EPA 6010 Metals by ICP

Date Validated: May 15, 1997 09:00
Date Analyzed: May 13, 1997 19:46
QA/QC Manager: Edward H. Yonemoto, Ph.D.

Analyst: SA
Matrix: Liquid

	MATRIX DUPLICATE ANALYSIS					
Q.C. Sample ID 171051- 001	[A] Sample Result	[B] Duplicate Result	[C] Method Detection Limit	[D] QC LIMITS Relative Difference	[E] LIMITS Relative Difference	[F] Qualifier
Parameter	mg/L	mg/L	mg/L	%	%	
Aluminum	21.16	16.94	0.01	22.2	25.0	
Arsenic	< 0.050	< 0.050	0.050	N.C	25.0	
Barium	0.746	0.766	0.002	2.6	25.0	
Beryllium	< 0.0050	< 0.0050	0.0050	N.C	25.0	
Boron	0.148	0.139	0.025	6.3	25.0	
Cadmium	< 0.010	< 0.010	0.010	N.C	25.0	
Calcium	1170	1110	0.01	5.3	25.0	
Chromium	0.039	0.039	0.013	0.0	25.0	
Cobalt	0.011	0.013	0.003	16.7	25.0	
Copper	0.014	0.014	0.008	0.0	25.0	
Iron	13.43	13.26	0.01	1.3	25.0	
Lead	< 0.025	< 0.025	0.025	N.C	25.0	
Magnesium	39.95	37.77	0.01	5.6	25.0	
Manganese	0.291	0.300	0.006	3.0	25.0	
Molybdenum	< 0.025	< 0.025	0.025	N.C	25.0	
Nickel	< 0.025	0.157	0.025	N.C	25.0	
Potassium	7.841	7.730	0.025	1.4	25.0	
Silicon	24.49	16.18	0.03	40.9	25.0	A
Silver	< 0.010	< 0.010	0.010	N.C	25.0	

(A) Variability in duplicate measurement attributed to sample non-homogeneity.
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 : 17A18C05

EPA 6010 Metals by ICP

Date Validated: May 15, 1997 09:00
Date Analyzed: May 13, 1997 19:46
QA/QC Manager: Edward H. Yonemoto, Ph.D.

Analyst: SA
Matrix: Liquid

	MATRIX DUPLICATE ANALYSIS					
Q.C. Sample ID 171051- 001	[A] Sample Result	[B] Duplicate Result	[C] Method Detection Limit	[D] QC Relative Difference	[E] LIMITS Relative Difference	[F] Qualifier
Parameter	mg/L	mg/L	mg/L	%	%	
Sodium	80.69	76.85	0.03	4.9	25.0	
Strontium	2.164	2.036	0.025	6.1	25.0	
Tin	5.533	5.160	0.025	7.0	25.0	
Vanadium	0.054	0.058	0.003	7.1	25.0	
Zinc	0.090	0.087	0.008	3.4	25.0	

(A) Variability in duplicate measurement attributed to sample non-homogeneity.
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 : 17A18C05

EPA 6010 Metals by ICP

Date Validated: May 15, 1997 09:00
Date Analyzed: May 13, 1997 11:30
QA/QC Manager: Edward H. Yonemoto, Ph.D.

Analyst: SA
Matrix: Liquid

	MATRIX DUPLICATE ANALYSIS					MATRIX SPIKE ANALYSIS				
Q.C. Sample ID 171046- 001	[A] Sample Result	[B] Duplicate Result	[C] Method Detection Limit	[D] QC Relative Difference	[E] LIMITS Relative Difference	[F] Matrix Spike Result	[G] Matrix Spike Amount	[H] QC Matrix Spike Recovery	[I] LIMITS Recovery Range	[G] Qualifier
Parameter	mg/L	mg/L	mg/L	%	%	mg/L	mg/L	%	%	
Aluminum	30.68	30.75	0.01	0.2	25.0	40.7	12.5	79.8	70-125	
Arsenic	< 0.050	< 0.050	0.050	N.C	25.0	0.89	1.00	88.7	70-125	
Barium	1.031	1.233	0.002	17.8	25.0	1.25	0.50	44.6	70-125	B
Beryllium	< 0.0050	< 0.0050	0.0050	N.C	25.0	0.179	0.200	89.3	70-125	
Boron	0.173	0.178	0.025	2.8	25.0	2.51	3.13	74.8	70-125	
Cadmium	< 0.010	< 0.010	0.010	N.C	25.0	0.16	0.20	79.5	70-125	
Calcium	114	134	0.01	16.1	25.0	133	12.5	152.0	70-125	A,B
Chromium	0.031	0.030	0.013	3.3	25.0	0.44	0.50	81.0	70-125	
Cobalt	0.037	0.032	0.003	14.5	25.0	0.39	0.50	69.8	70-125	B
Copper	0.026	0.030	0.008	14.3	25.0	0.46	0.50	86.8	70-125	
Iron	38.92	37.58	0.01	3.5	25.0	45.1	12.5	49.5	70-125	A,B
Lead	< 0.025	< 0.025	0.025	N.C	25.0	0.80	1.00	80.2	70-125	
Magnesium	21.29	23.91	0.01	11.6	25.0	31.9	12.5	85.0	70-125	

(A) High analyte concentration affects spike recovery.
(B) Post-digestion spike within acceptance limits.
Relative Difference [D] = 200*(B-A)/(B+A)
Matrix Spike Recovery [H] = 100*(F-A)/[G]
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 : 17A18C05

EPA 6010 Metals by ICP

Date Validated: May 15, 1997 09:00
Date Analyzed: May 13, 1997 11:30
QA/QC Manager: Edward H. Yonemoto, Ph.D.

Analyst: SA
Matrix: Liquid

Q.C. Sample ID 171046- 001	MATRIX DUPLICATE ANALYSIS					MATRIX SPIKE ANALYSIS				
	[A]	[B]	[C]	[D]	[E]	[F]	[G]	[H]	[I]	[G]
				QC	LIMITS			QC	LIMITS	
Parameter	Sample Result	Duplicate Result	Method Detection Limit	Relative Difference	Relative Difference	Matrix Spike Result	Matrix Spike Amount	Matrix Spike Recovery	Recovery Range	Qualifier
	mg/L	mg/L	mg/L	%	%	mg/L	mg/L	%	%	
Manganese	1.263	1.503	0.006	17.4	25.0	12.16	12.50	87.2	70-125	
Molybdenum	< 0.025	< 0.025	0.025	N.C	25.0	0.55	0.63	88.6	70-125	
Nickel	< 0.025	< 0.025	0.025	N.C	25.0	0.40	0.50	80.2	70-125	
Potassium	7.715	8.064	0.025	4.4	25.0	19.08	12.50	90.9	70-125	
Silver	< 0.010	< 0.010	0.010	N.C	25.0	0.33	0.40	81.3	70-125	
Sodium	56.80	67.17	0.03	16.7	25.0	72.3	12.5	123.7	70-125	
Strontium	0.921	1.095	0.025	17.3	25.0	3.05	3.13	68.1	70-125	B
Vanadium	0.128	0.142	0.003	10.4	25.0	0.51	0.50	77.2	70-125	
Zinc	0.180	0.201	0.008	11.0	25.0	0.57	0.50	78.6	70-125	

(A) High analyte concentration affects spike recovery.
(B) Post-digestion spike within acceptance limits.
Relative Difference [D] = 200*(B-A)/(B+A)
Matrix Spike Recovery [H] = 100*(F-A)/[G]
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 : 17A05B25

SW846- 7470 Total Mercury

Date Validated: May 15, 1997 14:15
Date Analyzed: May 12, 1997 13:22
QA/QC Manager: Edward H. Yonemoto, Ph.D.

Analyst: EZ
Matrix: Liquid

	MATRIX DUPLICATE ANALYSIS					MATRIX SPIKE ANALYSIS				
Q.C. Sample ID 171051- 002	[A] Sample Result	[B] Duplicate Result	[C] Method Detection Limit	[D] QC Relative Difference	[E] LIMITS Relative Difference	[F] Matrix Spike Result	[G] Matrix Spike Amount	[H] QC Matrix Spike Recovery	[I] LIMITS Recovery Range	[G] Qualifier
Parameter	mg/L	mg/L	mg/L	%	%	mg/L	mg/L	%	%	
Mercury	< 0.0010	< 0.0010	0.0010	N.C	25.0	0.0025	0.0025	100.0	70-125	

Relative Difference [D] = 200*(B-A)/(B+A)
Matrix Spike Recovery [H] = 100*(F-A)/[G]
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 : 17A05B25

SW846- 7470 Total Mercury

Date Validated: May 15, 1997 14:15
Date Analyzed: May 12, 1997 12:58
QA/QC Manager: Edward H. Yonemoto, Ph.D.

Analyst: EZ
Matrix: Liquid

	MATRIX DUPLICATE ANALYSIS					MATRIX SPIKE ANALYSIS				
Q.C. Sample ID 171047- 001	[A] Sample Result	[B] Duplicate Result	[C] Method Detection Limit	[D] QC Relative Difference	[E] LIMITS Relative Difference	[F] Matrix Spike Result	[G] Matrix Spike Amount	[H] QC Matrix Spike Recovery	[I] LIMITS Recovery Range	[G] Qualifier
Parameter	mg/L	mg/L	mg/L	%	%	mg/L	mg/L	%	%	
Mercury	< 0.0010	< 0.0010	0.0010	N.C	25.0	0.0026	0.0025	104.0	70-125	

Relative Difference [D] = 200*(B-A)/(B+A)
Matrix Spike Recovery [H] = 100*(F-A)/[G]
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.
for QA/QC Manager

XENCO Laboratories

Certificate Of Quality Control for Batch : 17A05B25

SW846- 7470 Total Mercury

Date Validated: May 15, 1997 14:15
Date Analyzed: May 12, 1997 12:55
QA/QC Manager: Edward H. Yonemoto, Ph.D.

Analyst: EZ
Matrix: Liquid

	BLANK SPIKE ANALYSIS						
Parameter	[A] Blank Result mg/L	[B] Blank Spike Result mg/L	[C] Blank Spike Amount mg/L	[D] Method Detection Limit mg/L	[E] QC LIMITS Blank Spike Recovery %	[F] Recovery Range %	[G] Qualifier
Mercury	< 0.0010	0.0022	0.0025	0.0010	88.0	70-125	

Blank Spike Recovery [E] = 100*(B-A)/(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 : 17A04B61

SW- 846 5030/8020 BTEX

Date Validated: May 12, 1997 14:50
Date Analyzed: May 9, 1997 10:17
QA/QC Manager: Edward H. Yonemoto, Ph.D.

Analyst: IF
Matrix: Liquid

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	0.1130	0.1000	0.0010	113.0	65-135	
Toluene	< 0.0010	0.1160	0.1000	0.0010	116.0	65-135	
Ethylbenzene	< 0.0010	0.1170	0.1000	0.0010	117.0	65-135	
m,p-Xylenes	< 0.0020	0.2410	0.2000	0.0020	120.5	65-135	
o-Xylene	< 0.0010	0.1150	0.1000	0.0010	115.0	65-135	

k Spike Recovery [E] = 100*(B-A)/(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 : 17A04B61

SW- 846 5030/8020 BTEX

Date Validated: May 12, 1997 14:50
Date Analyzed: May 9, 1997 13:42
QA/QC Manager: Edward H. Yonemoto, Ph.D.

Analyst: IF
Matrix: Liquid

MATRIX SPIKE / MATRIX SPIKE DUPLICATE AND RECOVERY

Q.C. Sample ID 171048- 001 / 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	< 0.0010	0.0868	0.0864	0.1000	0.0010	25.0	0.5	86.8	86.4	65-135	
Toluene	< 0.0010	0.1160	0.1120	0.1000	0.0010	25.0	3.5	116.0	112.0	65-135	
Ethylbenzene	< 0.0010	0.1180	0.1130	0.1000	0.0010	25.0	4.3	118.0	113.0	65-135	
m,p-Xylenes	< 0.0020	0.2420	0.2330	0.2000	0.0020	25.0	3.8	121.0	116.5	65-135	
o-Xylene	< 0.0010	0.1160	0.1120	0.1000	0.0010	25.0	3.5	116.0	112.0	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 : 17A34B35

SW-846 8100 PAHs by GC-MS

Date Validated: May 15, 1997 17:56
Date Analyzed: May 14, 1997 22:20
QA/QC Manager: Edward H. Yonemoto, Ph.D.

Analyst: MM
Matrix: Liquid

BLANK SPIKE / BLANK SPIKE DUPLICATE AND RECOVERY

Parameter	[A] Blank Result mg/L	[B] Blank Spike Result mg/L	[C] Blank Spike Duplicate Result mg/L	[D] Blank Spike Amount mg/L	[E] Method Detection Limit mg/L	Blank Limit Relative Difference %	[F] QC Spike Relative Difference %	[G] QC Blank Spike Recovery %	[H] QC B.S.D. Recovery %	[I] Blank Spike Recovery Range %	[J] Qualifier
Acenaphthene	< 0.0020	0.0658	0.0670	0.1000	0.0020	31.0	1.8	65.8	67.0	46-118	
4-Chloro-3-Methylphenol	< 0.0020	0.0398	0.0332	0.1000	0.0020	42.0	18.1	39.8	33.2	23-97	
2-Chlorophenol	< 0.0020	0.0630	0.0644	0.1000	0.0020	40.0	2.2	63.0	64.4	27-123	
1,4-Dichlorobenzene	< 0.0020	0.0702	0.0724	0.1000	0.0020	28.0	3.1	70.2	72.4	36-97	
2,4-Dinitrotoluene	< 0.0020	0.0628	0.0632	0.1000	0.0020	38.0	0.6	62.8	63.2	24-96	
N-Nitroso-di-n-propylamine	< 0.0040	0.0742	0.0738	0.1000	0.0040	38.0	0.5	74.2	73.8	41-116	
4-Nitrophenol	< 0.0040	0.0250	0.0248	0.1000	0.0040	50.5	0.8	25.0	24.8	10-80	
Pentachlorophenol	< 0.0010	0.0738	0.0706	0.1000	0.0010	50.0	4.4	73.8	70.6	9-103	
Phenol	< 0.0010	0.0222	0.0224	0.1000	0.0010	42.0	0.9	22.2	22.4	12-89	
Pyrene	< 0.0020	0.0852	0.0840	0.1000	0.0020	31.0	1.4	85.2	84.0	26-127	
1,2,4-Trichlorobenzene	< 0.0010	0.0736	0.0714	0.1000	0.0010	28.0	3.0	73.6	71.4	39-98	

Spike Relative Difference [F] = 200*(B-C)/(B+C)
Blank Spike Recovery [G] = 100*(B-A)/[D]
B.S.D. = Blank Spike Duplicate
B.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 : 17A20A24

SM4500C02D Carbonate

Date Validated: May 14, 1997 15:30
Date Analyzed: May 10, 1997 09:20
QA/QC Manager: Edward H. Yonemoto, Ph.D.

Analyst: CG
Matrix: Liquid

	MATRIX DUPLICATE ANALYSIS					
Q.C. Sample ID 171047- 001	[A] Sample Result	[B] Duplicate Result	[C] Method Detection Limit	[D] QC Relative Difference	[E] LIMITS Relative Difference	[F] Qualifier
Parameter	ppm	ppm	ppm	%	%	
Carbonate	< 1.00	< 1.00	1.00	N.C	25.0	

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 : 17A20A22

SM 4500CO2D Bicarbonate

Date Validated: May 14, 1997 15:30
Date Analyzed: May 10, 1997 09:20
QA/QC Manager: Edward H. Yonemoto, Ph.D.

Analyst: CG
Matrix: Liquid

	MATRIX DUPLICATE ANALYSIS					
Q.C. Sample ID 171047- 001	[A] Sample Result	[B] Duplicate Result	[C] Method Detection Limit	[D] QC Relative Difference	[E] LIMITS Relative Difference	[F] Qualifier
Parameter	mg/L	mg/L	mg/L	%	%	
Bicarbonate	127	127	0.5	0.0	25.0	

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 : 17A19A95

EPA 160.1 Total Dissolved Solids

Date Validated: May 9, 1997 13:45
Date Analyzed: May 9, 1997 09:40
QA/QC Manager: Edward H. Yonemoto, Ph.D.

Analyst: CG
Matrix: Liquid

	MATRIX DUPLICATE ANALYSIS					
Q.C. Sample ID 171046- 001	[A] Sample Result	[B] Duplicate Result	[C] Method Detection Limit	[D] QC Relative Difference	[E] LIMITS Relative Difference	[F] Qualifier
Parameter	mg/L	mg/L	mg/L	%	%	
Total Dissolved Solids	526	504	4.0	4.3	25.0	

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 : 17A10A40

EPA 300.0 Anions by Ion Chromatography

Date Validated: May 9, 1997 12:00
Date Analyzed: May 8, 1997 12:55
QA/QC Manager: Edward H. Yonemoto, Ph.D.

Analyst: JS
Matrix: Liquid

	MATRIX DUPLICATE ANALYSIS					
Q.C. Sample ID 171046- 001	[A] Sample Result	[B] Duplicate Result	[C] Method Detection Limit	[D] QC LIMITS Relative Difference	[E] LIMITS Relative Difference	[F] Qualifier
Parameter	mg/L	mg/L	mg/L	%	%	
Chloride	72.400	75.900	0.050	4.7	20.0	
Sulfate	59.60	62.30	0.10	4.4	20.0	

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 : 17Z99A23

MOD. 415.1 Total Inorganic Carbon

Date Validated: May 19, 1997 09:00
Date Analyzed: May 14, 1997 09:22
QA/QC Manager: Edward H. Yonemoto, Ph.D.

Analyst: IF
Matrix: Liquid

	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 Inorganic Carbon	< 1.0	20.6	20.0	1.0	103.0	70-120	

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 : 17A10A40

EPA 300.0 Anions by Ion Chromatography

Date Validated: May 9, 1997 12:00
Date Analyzed: May 8, 1997 12:23
QA/QC Manager: Edward H. Yonemoto, Ph.D.

Analyst: JS
Matrix: Liquid

	BLANK SPIKE / BLANK SPIKE DUPLICATE AND RECOVERY										
Parameter	[A] Blank Result	[B] Blank Spike Result	[C] Blank Spike Duplicate Result	[D] Blank Spike Amount	[E] Method Detection Limit	Blank Limit Relative Difference	[F] QC Spike Relative Difference	[G] QC Blank Spike Recovery	[H] QC B.S.D. Recovery	[I] Blank Spike Recovery Range	[J] Qualifier
	mg/L	mg/L	mg/L	mg/L	mg/L	%	%	%	%	%	
Chloride	< 0.050	5.070	5.090	5.000	0.050	20.0	0.4	101.4	101.8	70-125	
Sulfate	< 0.10	4.97	5.06	5.00	0.10	20.0	1.8	99.4	101.2	70-125	

Spike Relative Difference [F] = 200*(B-C)/(B+C)
Blank Spike Recovery [G] = 100*(B-A)/[D]
B.S.D. = Blank Spike Duplicate
B.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 : 17Z99A23

MOD. 415.1 Total Inorganic Carbon

Date Validated: May 19, 1997 09:00
Date Analyzed: May 14, 1997 11:41
QA/QC Manager: Edward H. Yonemoto, Ph.D.

Analyst: IF
Matrix: Liquid

	MATRIX DUPLICATE ANALYSIS					MATRIX SPIKE ANALYSIS				
Q.C. Sample ID 171049- 002	[A] Sample Result	[B] Duplicate Result	[C] Method Detection Limit	[D] QC	[E] LIMITS	[F] Matrix Spike Result	[G] Matrix Spike Amount	[H] QC	[I] LIMITS	[G]
Parameter				Relative Difference	Relative Difference			Matrix Spike Recovery	Recovery Range	Qualifier
	ppm	ppm	ppm	%	%	ppm	ppm	%	%	
Total Inorganic Carbon	56.61	55.44	1.00	2.1	20.0	74.6	20.0	90.0	70-120	

Relative Difference [D] = 200*(B-A)/(B+A)
Matrix Spike Recovery [H] = 100*(F-A)/[G]
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 CUSTODY REPORT
CHRONOLOGY OF SAMPLES

K.E.I. Consultants, Inc.

Project ID: 610057 Site #18
Project Manager: Ann Baker
Project Location: Site #18

Project Name: Monument

XENCO COC#: 1-71050
Date Received in Lab: May 6, 1997 10:00 by RT
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	MW-2	171050-001	BTEX	SW-846	ppm	Standard	May 2, 1997 18:45		May 9, 1997 by IF	May 9, 1997 15:27 by IF
2			PAH	SW-846 8100	mg/L	Standard	May 2, 1997 18:45		May 9, 1997 by CY	May 15, 1997 06:51 by MM
3			TDS	EPA 160.1	mg/L	Standard	May 2, 1997 18:45		May 8, 1997 by CG	May 9, 1997 10:20 by CG
4			Anions	EPA 300.0	mg/L	Standard	May 2, 1997 18:45		May 8, 1997 by JS	May 8, 1997 15:06 by JS
5			Carbonate	SM4500CO2D	ppm	Standard	May 2, 1997 18:45		May 10, 1997 by CG	May 10, 1997 09:55 by CG
6			Bicarbonate	SM 4500CO2D	mg/L	Standard	May 2, 1997 18:45		May 10, 1997 by CG	May 10, 1997 09:55 by CG
7			Metals (ICP)	EPA 6010	mg/L	Standard	May 2, 1997 18:45		May 9, 1997 by EZ	May 13, 1997 19:33 by SA
8			Mercury, Tot	SW846-7470	mg/L	Standard	May 2, 1997 18:45		May 9, 1997 by EZ	May 12, 1997 13:18 by EZ
9			TIC Mod.	MOD. 415.1	ppm	Standard	May 2, 1997 18:45		May 14, 1997 by IF	May 14, 1997 12:38 by IF
10	MW-3	171050-002	BTEX	SW-846	ppm	Standard	May 2, 1997 18:05		May 9, 1997 by IF	May 9, 1997 15:46 by IF
11			TDS	EPA 160.1	mg/L	Standard	May 2, 1997 18:05		May 8, 1997 by CG	May 9, 1997 10:25 by CG
12			Anions	EPA 300.0	mg/L	Standard	May 2, 1997 18:05		May 8, 1997 by JS	May 8, 1997 15:30 by JS
13			Carbonate	SM4500CO2D	ppm	Standard	May 2, 1997 18:05		May 10, 1997 by CG	May 10, 1997 10:00 by CG
14			Bicarbonate	SM 4500CO2D	mg/L	Standard	May 2, 1997 18:05		May 10, 1997 by CG	May 10, 1997 10:00 by CG
15			Metals (ICP)	EPA 6010	mg/L	Standard	May 2, 1997 18:05		May 9, 1997 by EZ	May 13, 1997 19:40 by SA
16			Mercury, Tot	SW846-7470	mg/L	Standard	May 2, 1997 18:05		May 9, 1997 by EZ	May 12, 1997 13:19 by EZ
17			TIC Mod.	MOD. 415.1	ppm	Standard	May 2, 1997 18:05		May 14, 1997 by IF	May 14, 1997 13:41 by IF

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

17105O-N Lab. Batch #

Contractor: KET Consultants Phone (800) 253-0507

Address: 4800 Wurzbach Drive Suite 100 San Antonio, Tx

Project Name: Monument Project Director: Paul Hartnet

Project Location: site #18 Project Manager: Ann Baker

Sampler Signature: Project No.: 610057 site #18

No. coolers this shipment: Contractor COC #

Carrier: UPS 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 (5030/8020-602)	TPH (418.1)	Heavy Metals	PAH (8100)	TDS (160.1)	CATIONS/ANIONS	Please Hold	LAB ONLY ID #
1	MW-2	5-2-97	1845			/					/	/		7	/	/	/	/	/	/		1
2	MW-3	5-2-97	1805			/					/	/		6	/	/	/	/	/	/		2
3																						3
4																						4
5																						5
6																						6
7																						7
8																						8
9																						9
10																						10

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

Unl Dies Ker Unknown

Waste Oil

PIT No: Tank No:

Remarks

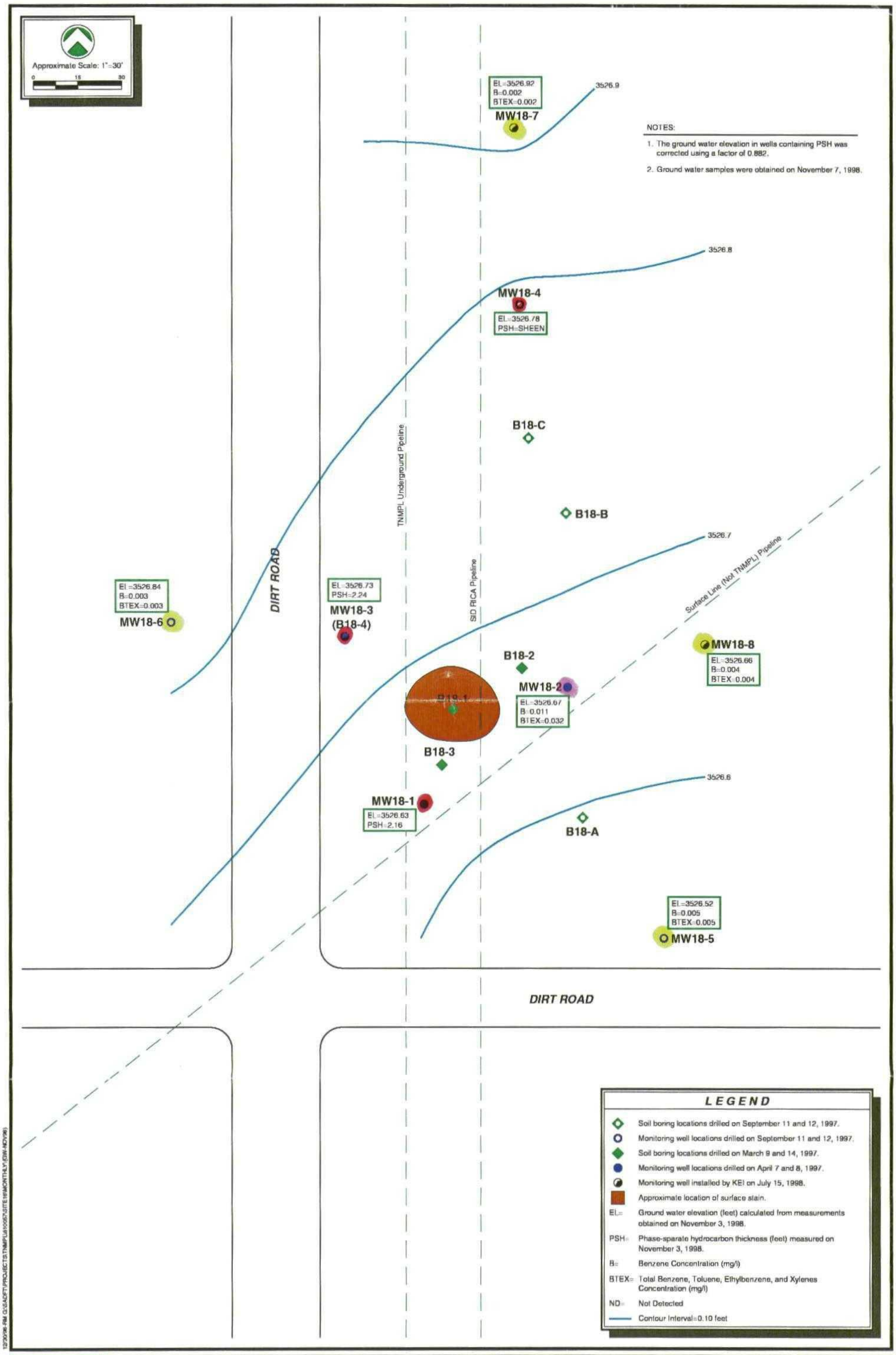
Relinquished by: (Signature)	DATE	TIME	Received by: (Signature)	DATE	TIME
	5-5-97	0600			
			Received For Laboratory by	5-6-97	1000

Remarks

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

* Pre-scheduling is recommended

Precision Analytical Services



12/30/98-RM G:\SADFT\PROJECTS\TNMPL\610057\SITE18\MONTHLY\(DW-NOV98)

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GROUND WATER CONTOURS / CONCENTRATION MAP - NOVEMBER 1998

TEXAS - NEW MEXICO PIPE LINE CO. MONUMENT SITE NO. 18 LEA COUNTY, NEW MEXICO

610057-6-18

FIG 1

MW18-7
PSH=ND

ND
MW18-4
PSH=0.01

B18-C

B18-B

TNMPL Underground Pipeline

SID RICA Pipeline

Surface Line (Not TNMPL) Pipeline

DIRT ROAD

PSH=2.24
MW18-3
(B18-4)

MW18-6
PSH=ND

B18-2

MW18-8
PSH=ND

MW18-2
PSH=ND

B18-1

2.0

B18-3

MW18-1
PSH=2.16

ND

B18-A

MW18-5
PSH=ND

DIRT ROAD

LEGEND

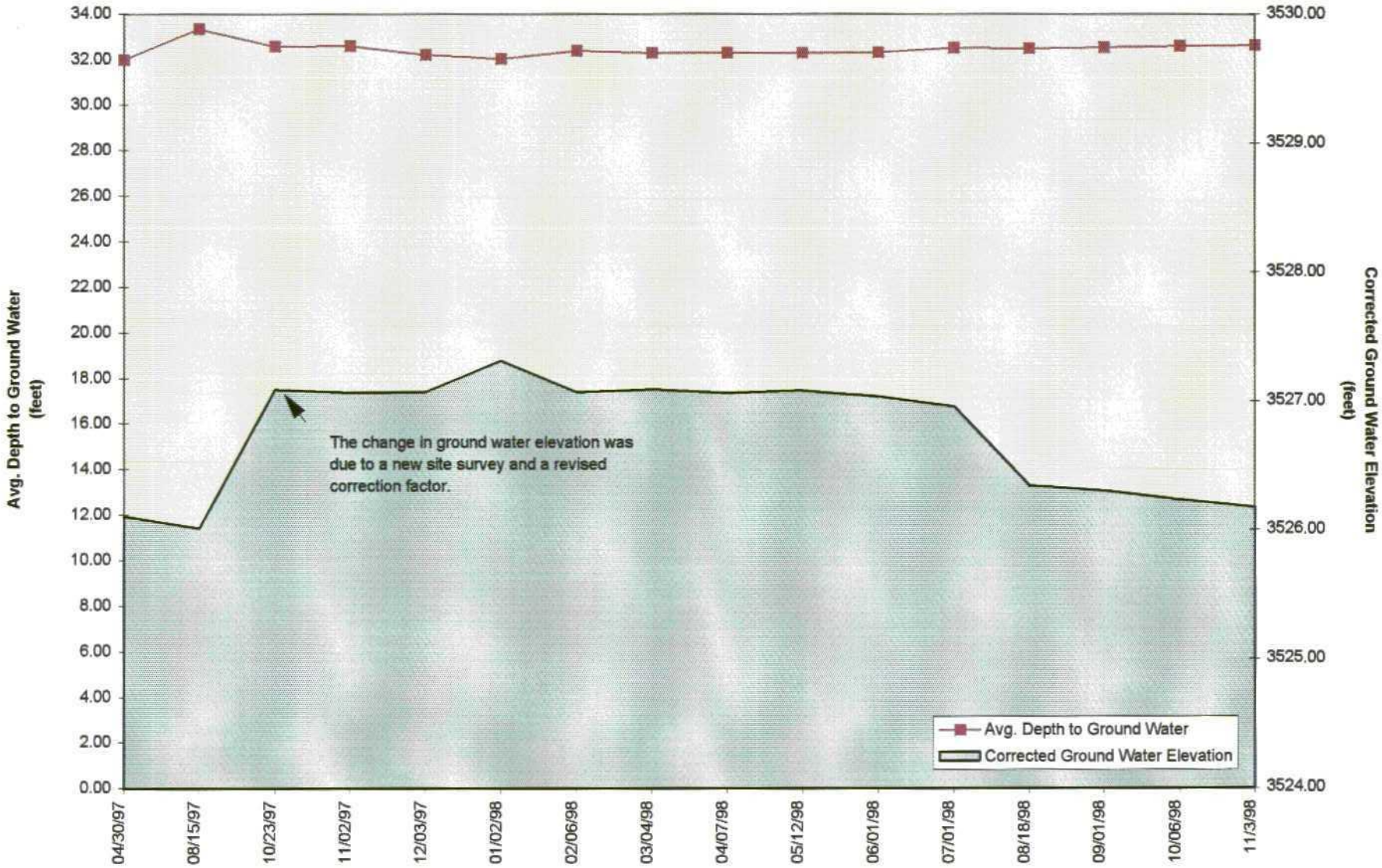
- Soil boring locations drilled on September 11 and 12, 1997.
- Monitoring well locations drilled on September 11 and 12, 1997.
- Soil boring locations drilled on March 9 and 14, 1997.
- Monitoring well locations drilled on April 7 and 8, 1997.
- Monitoring well installed by KEI on July 15, 1998.
- Approximate location of surface stain.
- PSH= Phase-sparate hydrocarbon thickness (feet) measured on November 3, 1998.
- Contour Interval= 2 FT

12/21/98-RM G:\SADFT\PROJECT\TNMPL\610057-SITE 18\MONTHLY\PSH-NOV98

k·e·i

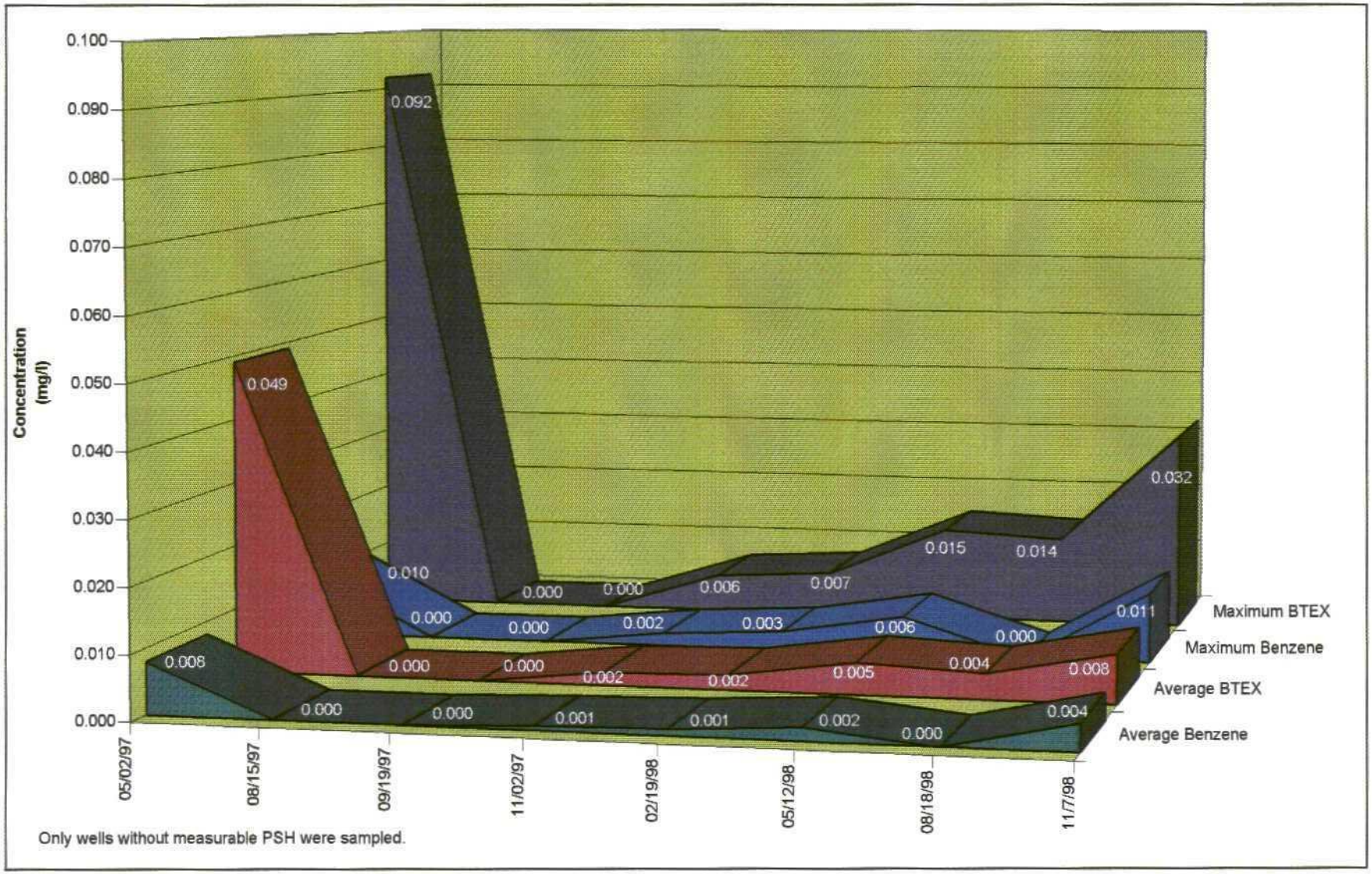
PSH THICKNESS MAP - NOVEMBER 1998	610057-6-18
TEXAS - NEW MEXICO PIPE LINE CO. MONUMENT SITE NO. 18 LEA COUNTY, NEW MEXICO	FIG 2

FIGURE 3
AVERAGE GROUND WATER DATA



Site No. 18
Lea County, New Mexico
KEI Job No. 610057-6-18
p:\tnmpl\610057\site18\monitor\sumaverg.xls

FIGURE 4
DISSOLVED PHASE CONCENTRATIONS



Site No. 18
Lea County, New Mexico
KEI Job No. 610057-6-18
p:\tnmpl\610057\monitor\sumaverg.xls

ANALYTICAL REPORT 1-84334

for

K.E.I. Consultants, Inc.

Project Manager: S.Grover

Project Name: Monument Site 18

Project Id: 610057-6-18

November 17, 1998

HOUSTON · DALLAS · SAN ANTONIO

11381 Meadowglen Lane Suite L * Houston, Texas 77082-2647
Phone (281) 589-0692 Fax (281) 589-0695

11381 Meadowglen Suite L
Houston, Texas 77082-2647
(281) 589-0692 Fax: (281) 589-0695
Houston - Dallas - San Antonio - Latin America

November 17, 1998

Project Manager: S.Grover
K.E.I. Consultants, Inc.
5309 Wurzbach Rd. Suite 100
San Antonio, TX 78238

Reference: **XENCO Report No.: 1-84334**
Project Name: Monument Site 18
Project ID: 610057-6-18
Project Address: Monument,NM.

Dear S.Grover:

We are reporting to you the results of the analyses performed on the samples received under the project name referenced above and identified with XENCO Chain of Custody Number 1-84334. All results being reported to you apply only to the samples analyzed, properly identified with a Laboratory ID number. This letter documents the official transmission of the contents of the report and validates the information contained within.

All the results for the quality control samples passed thorough examination. Also, all parameters for data reduction and validation checked satisfactorily. In view of this, we are able to release the analytical data for this report within acceptance criteria for accuracy, precision, completeness or properly flagged.

The validity and integrity of this report will remain intact as long as it is accompanied by this letter and reproduced in full, unless written approval is granted by XENCO Laboratories. This report will be filed for at least 3 years in our archives and after that time it will be destroyed without further notice, unless otherwise arranged with you. The samples received, and described as recorded in COC No. 1-84334 will be filed for 60 days, and after that time they will be properly disposed of without further notice, unless otherwise arranged with you. We reserve the right to return to you any unused samples, extracts or solutions related to them if we consider so necessary (e.g., samples identified as hazardous waste, sample sizes exceeding analytical standard practices, controlled substances under regulated protocols, etc).

XENCO operates under the A2LA guidelines. Our Quality System meets ISO/IEC Guide 25 requirements which is strictly implemented and enforced through our standard QA/QC procedures.

We thank you for selecting XENCO Laboratories to serve your analytical needs. If you have any questions concerning this report, please feel free to contact us at any time.

Sincerely,

Eddie L. Clemons, II
QA/QC Manager

XENCO Laboratories

CERTIFICATE OF ANALYSIS SUMMARY 1-84334

K.E.I. Consultants, Inc.

Project ID: 610057-6-18
Project Manager: S.Grover
Project Location: Monument,NM.

Project Name: Monument Site 18

Date Received in Lab : Nov 10, 1998 10:40
Date Report Faxed: Nov 17, 1998
XENCO contact : Carlos Castro/Karen Olson

Analysis Requested	*Lab ID:*	184334 001	184334 002	184334 003	184334 004	184334 005	
	Field ID:	MW-2	MW-5	MW-6	MW-7	MW-8	
	Depth:						
	Matrix:	Liquid	Liquid	Liquid	Liquid	Liquid	
	Sampled:	11/07/98 11:00	11/07/98 10:15	11/07/98 11:15	11/07/98 10:45	11/07/98 10:30	
BTEX EPA 8021B	*Analyzed:* *Units:*	11/11/98 R.L. ppm	11/11/98 R.L. ppm	11/11/98 R.L. ppm	11/11/98 R.L. ppm	11/11/98 R.L. ppm	
Benzene		0.011 (0.004)	0.005 (0.001)	0.003 (0.001)	0.002 (0.001)	0.004 (0.001)	
Toluene		< 0.004 (0.004)	< 0.001 (0.001)	< 0.001 (0.001)	< 0.001 (0.001)	< 0.001 (0.001)	
Ethylbenzene		0.021 (0.004)	< 0.001 (0.001)	< 0.001 (0.001)	< 0.001 (0.001)	< 0.001 (0.001)	
m,p-Xylene		< 0.008 (0.008)	< 0.002 (0.002)	< 0.002 (0.002)	< 0.002 (0.002)	< 0.002 (0.002)	
o-Xylene		< 0.004 (0.004)	< 0.001 (0.001)	< 0.001 (0.001)	< 0.001 (0.001)	< 0.001 (0.001)	
Total BTEX		0.032	0.005	0.003	0.002	0.004	

Eddie L. Clemons, II
QA/QC Manager

XENCO Laboratories

Certificate Of Quality Control for Batch : 18A25D99

SW- 846 5030/8021B BTEX

Date Validated: Nov 11, 1998 12:00
Date Analyzed: Nov 11, 1998 10:04

Analyst: HL
Matrix: Liquid

	BLANK SPIKE ANALYSIS						
Parameter	[A] Blank Result ppm	[B] Blank Spike Result ppm	[C] Blank Spike Amount ppm	[D] Detection Limit ppm	[E] QC Blank Spike Recovery %	[F] LIMITS Recovery Range %	[G] Qualifier
Benzene	< 0.0010	0.1100	0.1000	0.0010	110.0	65-135	
Toluene	< 0.0010	0.1080	0.1000	0.0010	108.0	65-135	
Ethylbenzene	< 0.0010	0.1080	0.1000	0.0010	108.0	65-135	
m,p-Xylene	< 0.0020	0.2170	0.2000	0.0020	108.5	65-135	
o-Xylene	< 0.0010	0.1090	0.1000	0.0010	109.0	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

Eddie L. Clemons, II
QA/QC Manager

XENCO Laboratories

Certificate Of Quality Control for Batch : 18A25D99

SW- 846 5030/8021B BTEX

Date Validated: Nov 11, 1998 12:00
Date Analyzed: Nov 11, 1998 10:42

Analyst: HL
Matrix: Liquid

Q.C. Sample ID 18-1350- 006	MATRIX SPIKE / MATRIX SPIKE DUPLICATE AND RECOVERY										
Parameter	[A] Sample Result	[B] Matrix Spike Result	[C] Matrix Spike Duplicate Result	[D] Matrix Spike Amount	[E] 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
	ppm	ppm	ppm	ppm	ppm	%	%	%	%	%	
Benzene	< 0.0010	0.1060	0.1050	0.1000	0.0010	20.0	0.9	106.0	105.0	65-135	
Toluene	< 0.0010	0.1040	0.1030	0.1000	0.0010	20.0	1.0	104.0	103.0	65-135	
Ethylbenzene	< 0.0010	0.1040	0.1030	0.1000	0.0010	20.0	1.0	104.0	103.0	65-135	
m,p-Xylene	< 0.0020	0.2090	0.2070	0.2000	0.0020	20.0	1.0	104.5	103.5	65-135	
o-Xylene	< 0.0010	0.1040	0.1020	0.1000	0.0010	20.0	1.9	104.0	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

Eddie L. Clemons, II
QA/QC Manager

ANALYTICAL CHAIN OF CUSTODY REPORT
CHRONOLOGY OF SAMPLES

K.E.I. Consultants, Inc.

Project ID: 610057-6-18
Project Manager: S.Grover
Project Location: Monument,NM.

Project Name: Monument Site 18

XENCO COC#: 1-84334
Date Received in Lab: Nov 10, 1998 10:40 by JO
XENCO contact : Carlos Castro/Karen Olson

	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	MW-2	184334-001	BTEX	SW-846	ppm	10 days	Nov 7, 1998 11:00		Nov 11, 1998 by HL	Nov 11, 1998 13:11 by HL
2	MW-5	184334-002	BTEX	SW-846	ppm	10 days	Nov 7, 1998 10:15		Nov 11, 1998 by HL	Nov 11, 1998 12:52 by HL
3	MW-6	184334-003	BTEX	SW-846	ppm	10 days	Nov 7, 1998 11:15		Nov 11, 1998 by HL	Nov 11, 1998 11:56 by HL
4	MW-7	184334-004	BTEX	SW-846	ppm	10 days	Nov 7, 1998 10:45		Nov 11, 1998 by HL	Nov 11, 1998 12:15 by HL
5	MW-8	184334-005	BTEX	SW-846	ppm	10 days	Nov 7, 1998 10:30		Nov 11, 1998 by HL	Nov 11, 1998 12:34 by HL

XENCO Laboratories

☐ 11381 Meadowglen, Suite L, Houston TX 77082 281-589-0692
☒ 5309 Wurzbach Road, Suite 104, San Antonio, TX 78238 210-509-3334
☐ 11078 Morrison Road, Suite D, Dallas, TX 75229 972-481-9999

ANALYSIS REQUEST & CHAIN OF CUSTODY RECORD

On-LINE Help & Technical Services at XENCO.com

447

Company COC No: 216 Work Order No: 610057-6-18 Page 1 of 1

Company: KEI	Phone: (210) 680-3767
Project Name: MONUMENT SITE 18 ☒ Previously done at XENCO	Project ID: 610057-6-18
Location: MONUMENT NM	
Project Manager (PM): S. GROVER	Project Director (PD): M. HAWTHORNE
Fax Results to ☒ PM and / or	Fax: (210) 680-3763
Invoice to ☐ Accounting ☐ Include Invoice with Final Report Attn PM ☐ Invoice must have a P.O Bill to:	
Quote No.	P.O No 610057-6-18 ☐ Call for a P.O.
Special DLs (RRI RRII DW QAPP See Lab PM Call Proj. PM)	
Specifications	
Sampler Name: Ken Dutton	Signature: Ken Dutton

Lab Only: 184334 -SA

TAT: 5h 12h 20h 24h 48h 3d 5d 7d 14d 21d (Standard) TAT is 10 Working Days unless otherwise agreed in writing. But often reported in 5-7 Working Days

Lab Only Additions: From: / Rcv by: / Date

	Sample ID	Sampling Date	Time	Depth (ft" in" m)	Matrix (A P S W)	Composite	Grab	# Containers	Container Size	Type	Preservatives	BTEX by 8020	BTEX-MTBE by 8020 8021	TPH by TX1005 418.1 8015GRO 8015DRO 8015JetF	PAHs by 8270 8100 8310	METALS by 6010 8RCRA Tot Pb TCLP8 13PP 23TAL See List	VOAs by 8260 624 BTEX MTBE PPs TCL See List Call PM	SVOAs by 8270 625 PAHs BN&A TCL PPs See List Call PM	TAT 5h 12h 20h 24h 48h 3d 5d 7d 10d 14d 21d	Addn: PAH above mg/L W. mg/Kg S Highest Hit	Hold Analysis
1	MW-2	07 Nov-18	1100				X	2	V	G-A	H,C4	X									
2	MW-5		1016																		
3	MW-6		1115																		
4	MW-7		1045																		
5	MW-8		1030																		
6																					
7																					
8																					
9																					
10																					

Remarks: QUESTIONS? S. GROVER @ (210) 680-3767

N031 906 757 9

EXPORT 1

Relinquished by (Initials and Signature)	Relinquished to (Initials and Signature)	Date & Time
1 KD Ken Dutton		07 Nov 18 1500 Via U.P.S.
2		
3	Lab: Johnny Orona	11/10/18 10:40

Total Containers per COC: 10

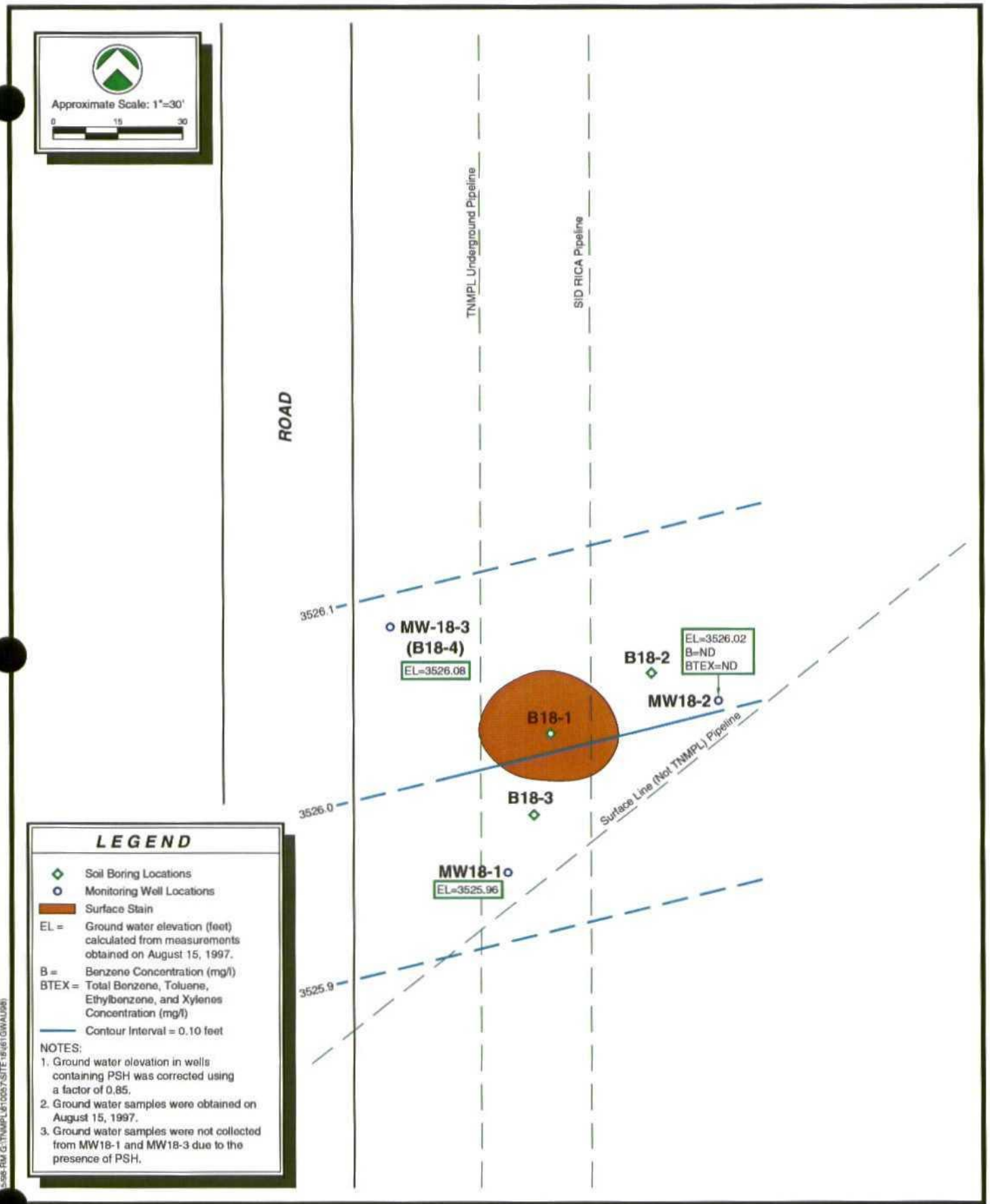
Rush TATs Fax Due: Final Fax Due:

Final Report Data Package Due Date:

Rush Charges are Pre-Approved upon Requesting them. All Terms Apply

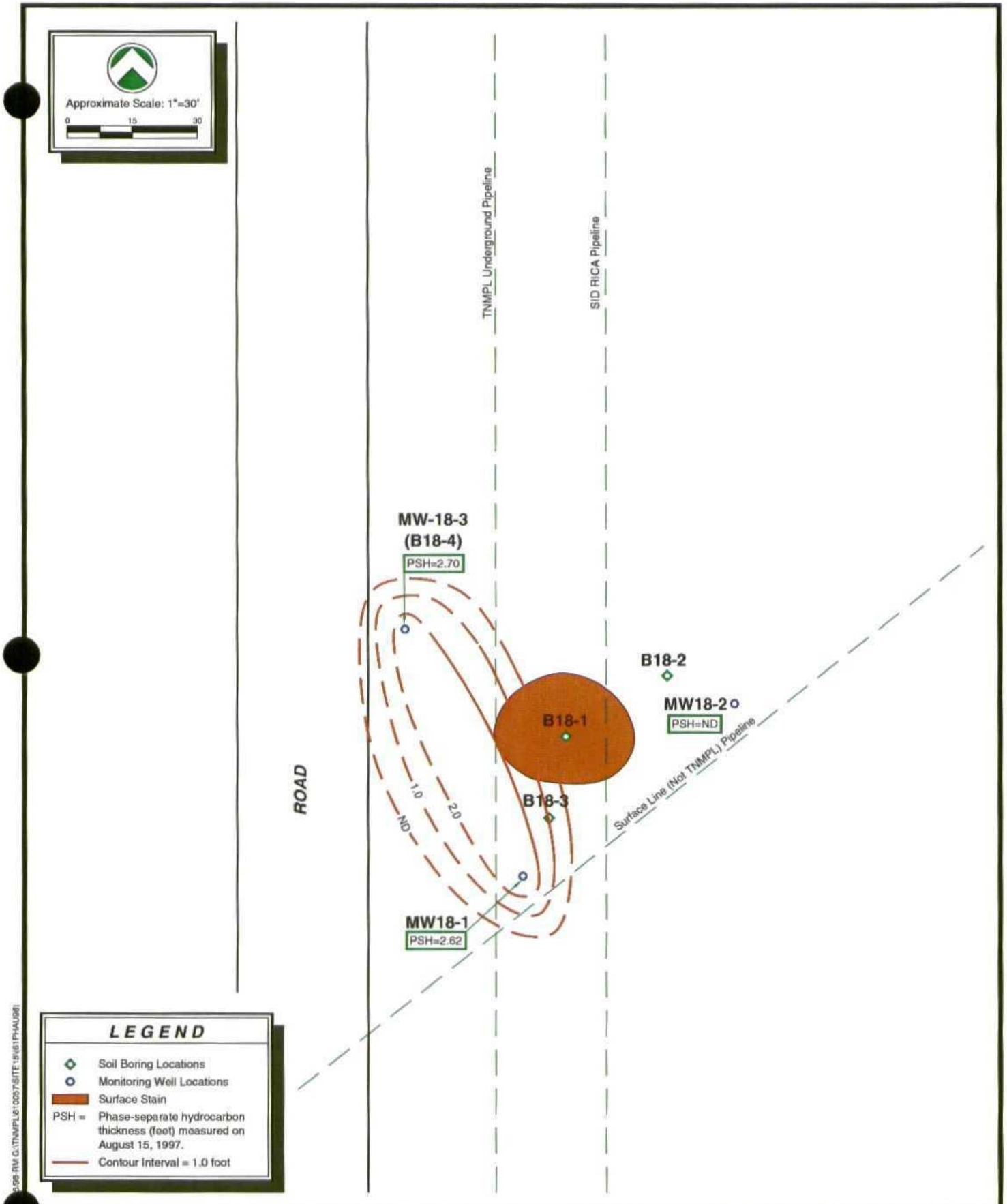
Preservatives - Various (**V**), HCl pH<2 (**H**), H2SO4 pH<2 (**S**), HNO4 pH<2 (**N**), NaOH+Asbc Acid (**NAA**), ZnAc+NaOH (**ZA**), (Cool,<4C) (**C4**), None (**N**), See Label (**SL**), Other (**O**) _____

SIZE: 4oz (**4**), 8oz (**8**), 32oz (**32**), 40ml VOA (**V**), 1L (1), 500ml (**.5**), Tedlar Bag (**B**), Wipe (**W**), Other _____ **TYPE** Glass Amb (**GA**), Glass Clear (**GC**), Plastic (**P**), Other (**O**) _____



k·e·i

GROUND WATER CONTOURS / CONCENTRATION MAP - AUGUST 1997	610057
TEXAS - NEW MEXICO PIPE LINE CO. MONUMENT SITE NO. 18 LEA COUNTY, NEW MEXICO	FIG 1



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PSH THICKNESS MAP - AUGUST 1997			610057
TEXAS - NEW MEXICO PIPE LINE CO.	MONUMENT SITE NO. 18	LEA COUNTY, NEW MEXICO	FIG 2