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# REPORTS

# DATE:

1-15-1998

# SUBSURFACE INVESTIGATION REPORT

## SOIL BORINGS SB-1 AND SB-2

## TEXAS - NEW MEXICO PIPE LINE COMPANY
## TNM-96-15
## LEA COUNTY, NEW MEXICO

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# SUBSURFACE INVESTIGATION REPORT
## SOIL BORINGS SB-1 AND SB-2

## TEXAS - NEW MEXICO PIPE LINE COMPANY
## TNM-96-15
## LEA COUNTY, NEW MEXICO

PREPARED FOR:

***TEXAS - NEW MEXICO PIPE LINE COMPANY***
P. O. Box 1030
Jal, New Mexico 88252

Mr. Tony Savoie

PREPARED BY:

***KEI***

Daryl Stacey
Project Manager

Theresa Nix
Project Manager

Pat Bullinger, P.E.

KEI Job No. 610089-1-0

June 11, 1998

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## PURPOSE AND SCOPE

The purpose of the subsurface investigation was to determine the vertical extent of hydrocarbon impact at the site within the stained area. The scope consisted of collecting soil samples from the surface and at depth in the stained area. A site location map is provided on FIG. 1.

## SOIL INVESTIGATION

During the subsurface investigation, 2 soil borings (designated SB-1 and SB-2) were drilled and soil samples were collected at selected intervals from the ground surface to the bottom of the boring. The soils were classified in the field, soil samples were field screened, and selected samples were prepared and shipped to the laboratory for analysis.

The soil borings were drilled to an approximate depth of 32.5 feet without encountering groundwater. Upon completion of sampling activities, each soil boring was backfilled to the ground surface with a cement/bentonite grout.

Soil samples were also obtained from the ground surface across the stained area and submitted to the laboratory for analysis. The locations of the soil borings and surface sampling areas are presented on FIG. 2.

### SOIL DESCRIPTION

The subsurface soil profile was classified in general accordance with the Unified Soil Classification System by visually observing the soil samples obtained during the assessment. In general, 4 soil types were encountered. A general description of the soil, approximate thickness, and head-space sample results for each soil type are as follows:

*Soil Type I*

This soil type consisted of red to yellowish-red sand encountered at the surface and beneath Soil Type III at both soil boring locations. The sand was loamy, fine-grained to coarse, and dry to moist. The observed thickness of this soil type varied from 3 to 6 feet. Head-space readings from samples of this soil type ranged from 2 to 511 ppm.

*Soil Type II*

This soil type consisted of red to reddish-brown sandy clay and was encountered beneath Soil Type I at both soil boring locations. The clay was light, loamy, brittle, and dry to moist. The observed thicknesses of this soil type varied from approximately 6 to 7 feet. Head-space readings from samples of this soil type ranged from 21 to 260 ppm.

*Soil Type III*

This soil type consisted of a white hardened caliche and was encountered at both borings below Soil Type II. This soil type was approximately 6 feet thick at both boring locations. Head-space readings from samples of this soil type varied from 2 to 27 ppm.

*Soil Type IV*

This soil type consisted of red clay and was encountered beneath Soil Type I at both soil boring locations. The clay was stiff, dry, and moderately calcareous. The observed thicknesses of this soil type varied from approximately 9.5 to 10.5 feet. Head-space readings from samples of this soil type ranged from 4 to 79 ppm.

Logs indicating the typical subsurface soil profile, depths at which soil samples were obtained, head-space results, laboratory results, and generalized geologic profiles are presented on FIG. 3.

## ANALYTICAL RESULTS

Three soil samples were selected from each soil boring based on the following criteria:

- the sample at 0 to 2.5 feet
- the sample at 15 to 17.5 feet
- the sample at the bottom of each boring

Soil samples selected for analytical testing consisted of the following:

- Six soil samples from the soil borings and 4 samples from the ground surface were tested for benzene, toluene, ethylbenzene, and xylenes (BTEX) and total petroleum hydrocarbons diesel range organics (TPH-DRO).
- One soil sample from soil boring SB-1 (exhibiting the highest concentration of TPH by EPA Method 8015 DRO) was tested for SPLP volatile organic compounds (VOCs), SPLP semi-volatile organic compounds (SVOCs), and SPLP TPH.
- One sample collected from an unaffected area was submitted for determination of moisture content and fraction organic carbon (FOC).
- Laboratory results for the selected samples indicated the following concentration ranges:

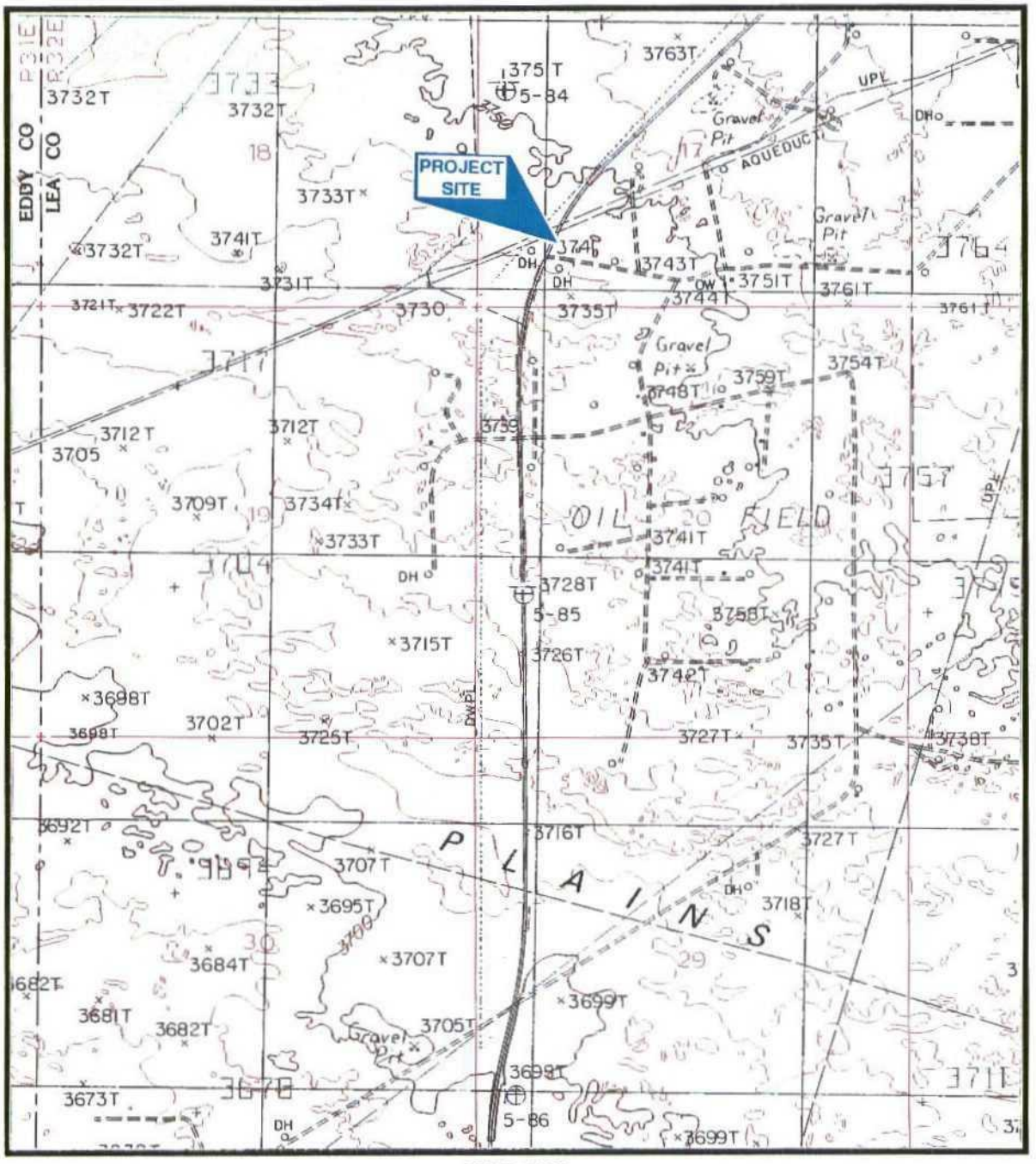
| CONSTITUENT | CONCENTRATIONS (mg/kg) |
|---|---|
| BENZENE | ND to 3.48 |
| BTEX | ND to 111.62 |
| TPH | 13.7 to 7,050 |
| o-XYLENE | 0.030 |
| SPLP TPH | 2.2 |
| Fraction Organic Carbon | 1.0 |
| Moisture Content | 11.2 |

SPLP VOC and SPLP SVOC constituents not listed above were ND. Soil laboratory results are summarized in TABLES I through III. Soil analytical laboratory reports and chain-of-custody documentation are presented in APPENDIX A.

# GREENWOOD LAKE QUADRANGLE

**NEW MEXICO**

PRINTED 1985




SCALE 1:24000

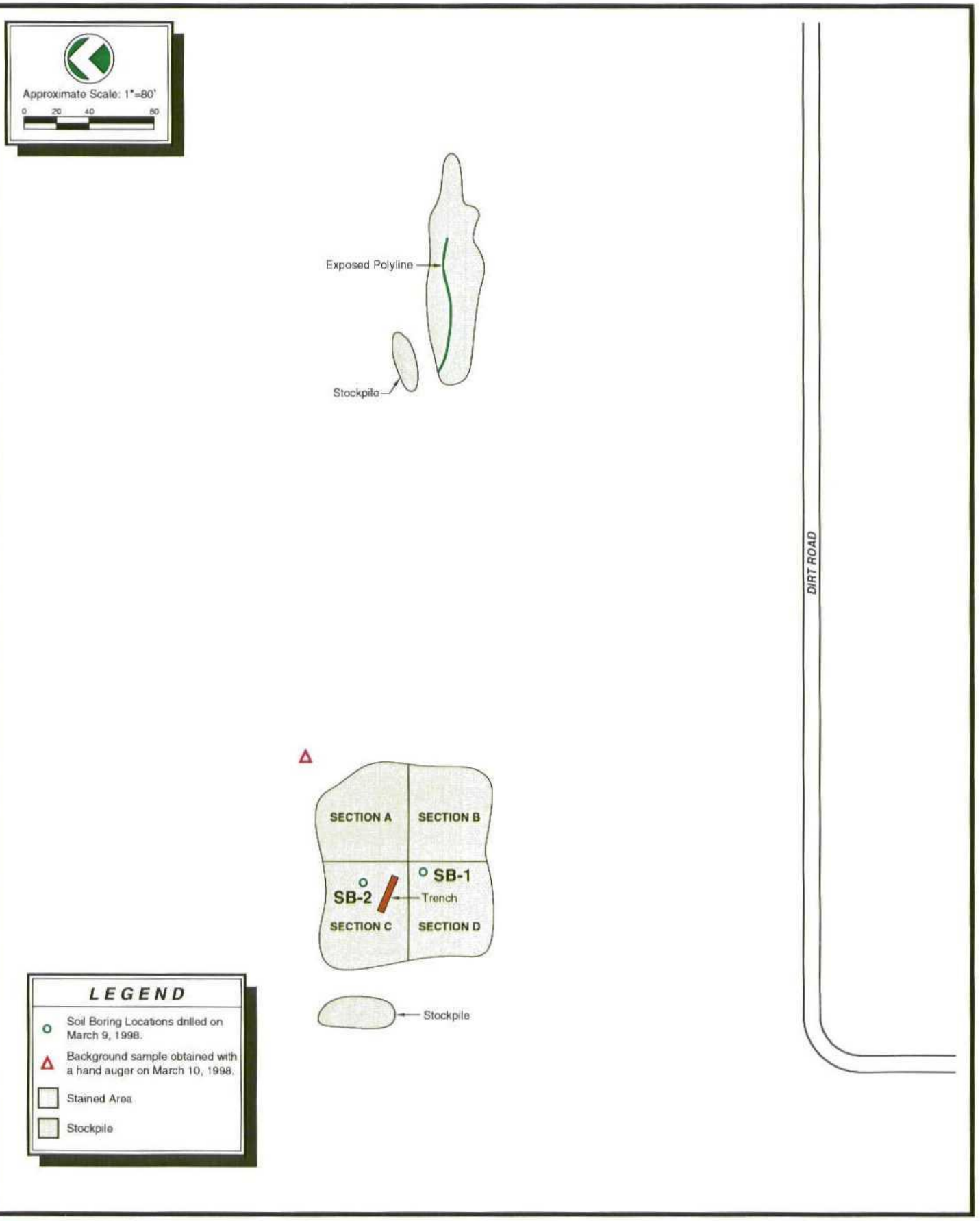
1 1/2 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 .5 0 1 KILOMETER

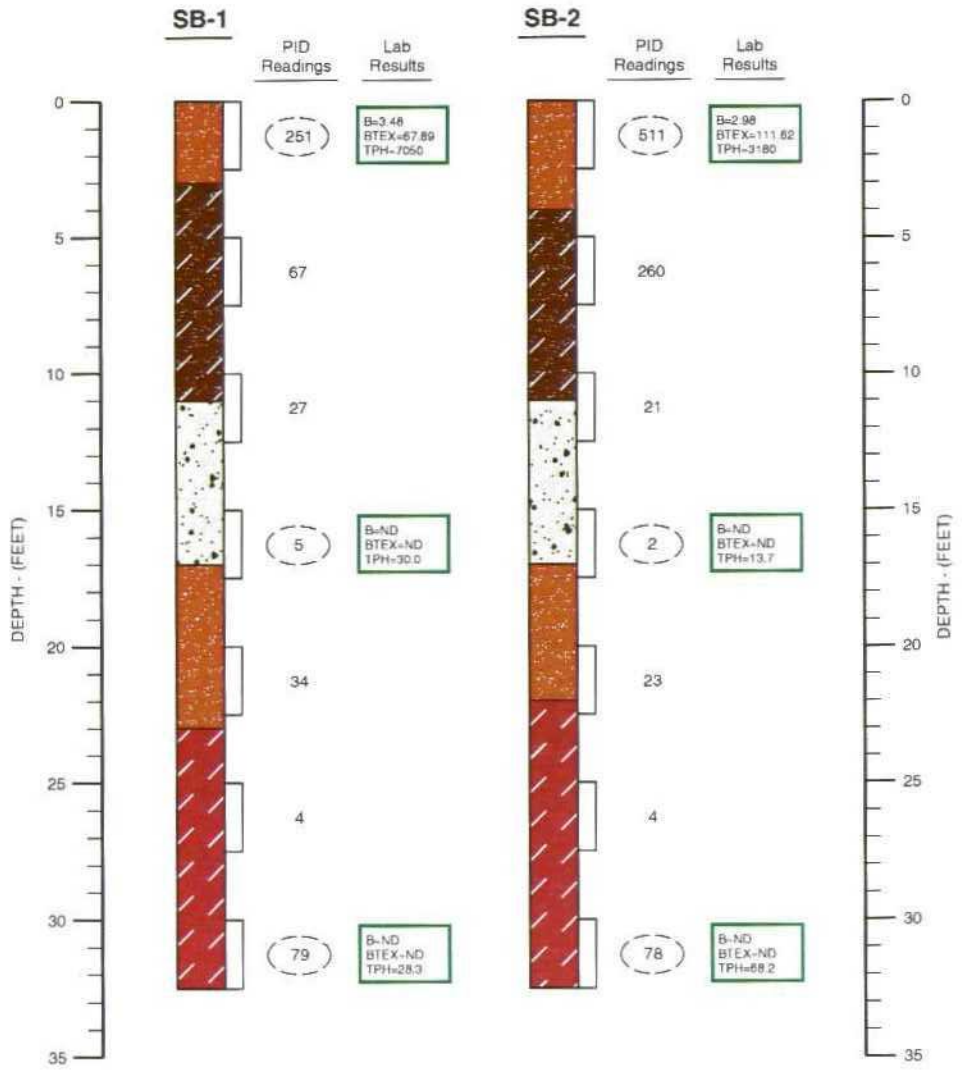
CONTOUR INTERVAL 5 FEET

| | | |
|---|---|---|
| k·e·i | ***SITE LOCATION MAP*** | 610089 |
| | **TNMPL TNM - 96 - 15 LEA COUNTY, NEW MEXICO** | **FIG 1** |




04/30/98-RM G:\SADFT\PROJECTS\TNMPL\610089\(610089)

| | | | |
|---|---|---|---|
| k·e·i | *SITE PLAN* | | 610089 |
| | TNMPL | TNM-96-15 | LEA COUNTY, NEW MEXICO | FIG 2 |




**LEGEND**

Sand (SM), loamy, fine-grained to coarse, red to yellowish-red, dry to moist.

Clay (CL), sandy, loamy, brittle, reddish-brown, dry to moist.

Caliche (GM), hardened, white.

Clay (CL), stiff, moderately calcareous, red, dry.

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. The soil borings were drilled utilizing a hydraulic drilling rig on March 9, 1998.
2. Ground water was not encountered during the field investigation.
3. The depths indicated are referenced from the ground surface.
4. The soil borings were backfilled with a cement/bentonite grout and capped at the surface with concrete.
5. The lines between material types shown on the profile log represent approximate boundaries. Actual transitions may be gradual.

k·e·i

| *LOG AND DETAILS OF SOIL BORINGS* | 610089 |
|---|---|
| TNMPL TNM-96-15 LEA COUNTY, NEW MEXICO | FIG 3 |

# GENERAL NOTES

ND - Indicates constituent was not detected above the method detection or reporting limit.

Method detection or reporting limits:

| | | |
|---|---|---|
| BTEX | - | 0.020 to 0.40 mg/kg |
| TPH | - | 10.0 to 3000 mg/kg |
| SPLP VOC | - | 0.025 to 0.050 mg/l |
| SPLP SVOC | - | 0.025 to 0.063 mg/l |
| SPLP TPH | - | 0.7 mg/kg |
| Moisture Content | - | 0.1% |
| Organic Content | - | 0.1% |

Laboratory test methods:

| | | |
|---|---|---|
| BTEX | - | EPA Method SW846-8020 |
| TPH | - | Modified EPA Method 8015 Diesel Range Organics |
| SPLP VOC | - | EPA Method 8260 |
| SPLP SVOC | - | EPA Method 1312/8270 |
| SPLP TPH | - | EPA Method 1312/418.1 |
| Moisture Content | - | ASTM 2216-71 |
| Organic Content | - | ASTM D2974 |

# TABLE I

## SUMMARY OF SOIL RESULTS - BTEX AND TPH
## TEXAS - NEW MEXICO PIPE LINE COMPANY
## TNM-96-15
## 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) |
|---|---|---|---|---|---|---|---|---|
| SB-1 | 03/09/98 | 0 - 2.5 | 3.48 | 18.9 | 15.3 | 30.21 | 67.89 | 7,050 |
| SB-1 | 03/09/98 | 15 - 17.5 | ND | ND | ND | ND | ND | 30.0 |
| SB-1 | 03/09/98 | 30 - 32.5 | ND | ND | ND | ND | ND | 28.3 |
| SB-2 | 03/09/98 | 0 - 2.5 | 2.98 | 7.9 | 43.0 | 57.74 | 111.62 | 3,180 |
| SB-2 | 03/09/98 | 15 - 17.5 | ND | ND | ND | ND | ND | 13.7 |
| SB-2 | 03/09/98 | 30 - 32.5 | ND | ND | ND | ND | ND | 68.2 |
| Section A | 03/09/98 | Surface | 0.13 | 0.37 | 0.51 | 1.27 | 2.28 | 5,510 |
| Section B | 03/09/98 | Surface | 2.02 | 9.95 | 5.22 | 16.95 | 34.14 | 5,490 |
| Section C | 03/09/98 | Surface | ND | ND | 0.12 | 0.1 | 0.22 | 3,180 |
| Section D | 03/09/98 | Surface | ND | ND | ND | ND | ND | 5,140 |

# TABLE II

## SUMMARY OF SOIL RESULTS - SPLP
## TEXAS - NEW MEXICO PIPE LINE COMPANY
## TNM-96-15
## LEA COUNTY, NEW MEXICO

| PARAMETER | CONCENTRATION (mg/l) |
|---|---|
| | |
| o-Xylenes | 0.030 |
| | |
| SPLP TPH | 2.2 |
| | |

**NOTES:**

1. The sample was collected on 03/09/98 from SB-1 at 0 to 2.5 feet.
2. Those constituents not listed were ND.

# TABLE III

## SUMMARY OF GEOTECHNICAL PARAMETER RESULTS
## TEXAS - NEW MEXICO PIPE LINE COMPANY
## TNM-96-15
## LEA COUNTY, NEW MEXICO

| PARAMETER | RESULT (%) |
|---|---|
| | |
| Fraction Organic Carbon (FOC) | 1.0 |
| Moisture Content | 11.2 |
| | |

**NOTES:**

1. The sample was obtained on 3/10/98 at an approximate depth of 5 to 6 feet below ground surface.
2. The sample location is identified on FIG. 2.

# ANALYTICAL REPORT 1-80926

for

## K.E.I. Consultants, Inc.

Project Manager: Theresa Nix

Project Name: TNM-96-15

Project Id: 610089

April 1, 1998


HOUSTON - DALLAS - SAN ANTONIO

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Houston - Dallas - San Antonio - Latin America

April 1, 1998

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

Reference: **XENCO Report No.: 1-80926**
**Project Name: TNM-96-15**
**Project ID: 610089**
**Project Address: Lea County, New Mexico**

Dear Theresa Nix:

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 1-80926. 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. 1-80926 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 Yonemoto, Ph.D.
Technical Director

XENCO Laboratories

# ANALYTICAL CHAIN OF CUSTODY REPORT
## CHRONOLOGY OF SAMPLES

**K.E.I. Consultants, Inc.**

**Project ID:** 610089
**Project Manager:** Theresa Nix
**Project Location:** Lea County, New Mexico

Project Name: TNM-96-15

**XENCO COC#: 1-80926**
**Date Received in Lab:** Mar 12, 1998 09:45 by LY
**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 | SB-1 (0-2.5) | 180926-001 | BTEX | SW-846 | ppm | Standard | Mar 9, 1998 08:10 | | Mar 13, 1998 by HL | Mar 13, 1998 12:58 by HL |
| 2 | | | TPH8015M-D | SW-846 8015 M | mg/kg | Standard | Mar 9, 1998 08:10 | | Mar 12, 1998 by OL | Mar 17, 1998 21:06 by OR |
| 3 | | | SPLP TPH | EPA | ppm | 7 days | Mar 9, 1998 08:10 | Mar20,1998 09:00 | Mar 26, 1998 by EZ | Mar 26, 1998 14:22 by EZ |
| 4 | | | VOA (8260) | EPA1312/8260 | mg/kg | 7 days | Mar 9, 1998 08:10 | Mar20,1998 09:00 | Mar 30, 1998 by CE | Mar 30, 1998 17:06 by CE |
| 5 | | | SPLP-SV(TCL) | SW846-1312/82 | ug/L | 7 days | Mar 9, 1998 08:10 | Mar20,1998 09:00 | Mar 25, 1998 by SS | Mar 26, 1998 17:26 by LC |
| 6 | SB-1 (15-17.5) | 180926-002 | BTEX | SW-846 | ppm | Standard | Mar 9, 1998 08:36 | | Mar 13, 1998 by HL | Mar 13, 1998 12:39 by HL |
| 7 | | | TPH8015M-D | SW-846 8015 M | mg/kg | Standard | Mar 9, 1998 08:36 | | Mar 12, 1998 by OL | Mar 17, 1998 21:33 by OR |
| 8 | SB-1 (30-32.5) | 180926-003 | BTEX | SW-846 | ppm | Standard | Mar 9, 1998 09:06 | | Mar 13, 1998 by HL | Mar 13, 1998 11:42 by HL |
| 9 | | | TPH8015M-D | SW-846 8015 M | mg/kg | Standard | Mar 9, 1998 09:06 | | Mar 12, 1998 by OL | Mar 17, 1998 22:00 by OR |
| 10 | SB-2 (0-2.5) | 180926-004 | BTEX | SW-846 | ppm | Standard | Mar 9, 1998 09:36 | | Mar 13, 1998 by HL | Mar 13, 1998 14:35 by HL |
| 11 | | | TPH8015M-D | SW-846 8015 M | mg/kg | Standard | Mar 9, 1998 09:36 | | Mar 12, 1998 by OL | Mar 17, 1998 23:21 by OR |
| 12 | SB-2 (15-17.5) | 180926-005 | BTEX | SW-846 | ppm | Standard | Mar 9, 1998 09:52 | | Mar 13, 1998 by HL | Mar 13, 1998 12:01 by HL |
| 13 | | | TPH8015M-D | SW-846 8015 M | mg/kg | Standard | Mar 9, 1998 09:52 | | Mar 12, 1998 by OL | Mar 17, 1998 23:48 by OR |
| 14 | SB-2 (30-32.5) | 180926-006 | BTEX | SW-846 | ppm | Standard | Mar 9, 1998 10:21 | | Mar 13, 1998 by HL | Mar 13, 1998 12:20 by HL |
| 15 | | | TPH8015M-D | SW-846 8015 M | mg/kg | Standard | Mar 9, 1998 10:21 | | Mar 12, 1998 by OL | Mar 18, 1998 00:15 by OR |
| 16 | Section A | 180926-007 | BTEX | SW-846 | ppm | Standard | Mar 9, 1998 10:48 | | Mar 13, 1998 by HL | Mar 13, 1998 13:17 by HL |
| 17 | | | TPH8015M-D | SW-846 8015 M | mg/kg | Standard | Mar 9, 1998 10:48 | | Mar 12, 1998 by OL | Mar 18, 1998 00:42 by OR |
| 18 | Section B | 180926-008 | BTEX | SW-846 | ppm | Standard | Mar 9, 1998 10:55 | | Mar 13, 1998 by HL | Mar 13, 1998 13:37 by HL |
| 19 | | | TPH8015M-D | SW-846 8015 M | mg/kg | Standard | Mar 9, 1998 10:55 | | Mar 12, 1998 by OL | Mar 18, 1998 01:09 by OR |
| 20 | Section C | 180926-009 | BTEX | SW-846 | ppm | Standard | Mar 9, 1998 11:01 | | Mar 13, 1998 by HL | Mar 13, 1998 13:56 by HL |
| 21 | | | TPH8015M-D | SW-846 8015 M | mg/kg | Standard | Mar 9, 1998 11:01 | | Mar 12, 1998 by OL | Mar 18, 1998 01:36 by OR |
| 22 | Section D | 180926-010 | BTEX | SW-846 | ppm | Standard | Mar 9, 1998 11:05 | | Mar 13, 1998 by HL | Mar 13, 1998 14:15 by HL |
| 23 | | | TPH8015M-D | SW-846 8015 M | mg/kg | Standard | Mar 9, 1998 11:05 | | Mar 12, 1998 by OL | Mar 18, 1998 02:03 by OR |
| 24 | FOC | 180926-011 | Moisture | ASTM 2216-71 | % | Standard | Mar 10, 1998 09:40 | | Mar 16, 1998 by IF | Mar 16, 1998 14:05 by IF |
| 25 | | | Org. Content | ASTM D2974 | % | Standard | Mar 10, 1998 09:40 | | Mar 16, 1998 by IF | Mar 16, 1998 14:05 by IF |

XENCO Laboratories

# CERTIFICATE OF ANALYSIS SUMMARY 1-80926

## K.E.I. Consultants, Inc.

**Project ID:** 610089 | ***Project Name: TNM-96-15*** | **Date Received in Lab :** Mar 12, 1998 09:45

**Project Manager:** Theresa Nix | **Date Report Faxed:** Apr 1, 1998

**Project Location:** Lea County, New Mexico | **XENCO contact :** Carlos Castro/Edward Yonemoto

| ***Analysis Requested*** | *Lab ID:* | 180926 001 | | 180926 002 | | 180926 003 | | 180926 004 | | 180926 005 | | 180926 006 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *Field ID:* | SB-1 | | SB-1 | | SB-1 | | SB-2 | | SB-2 | | SB-2 | |
| | *Depth:* | 0-2.5 | | 15-17.5 | | 30-32.5 | | 0-2.5 | | 15-17.5 | | 30-32.5 | |
| | *Matrix:* | Solid | | Solid | | Solid | | Solid | | Solid | | Solid | |
| | *Sampled:* | 03/09/98 08:10 | | 03/09/98 08:36 | | 03/09/98 09:06 | | 03/09/98 09:36 | | 03/09/98 09:52 | | 03/09/98 10:21 | |
| **TPH-DRO (Diesel)** **EPA 8015 M** | *Analyzed:* | 03/17/98 | R.L. | 03/17/98 | R.L. | 03/17/98 | R.L. | 03/17/98 | R.L. | 03/17/98 | R.L. | 03/18/98 | R.L. |
| | *Units:* | mg/kg | | mg/kg | | mg/kg | | mg/kg | | mg/kg | | mg/kg | |
| Total Petroleum Hydrocarbons | | 7050 | (3000) | 30.0 | (10.0) | 28.3 | (10.0) | 3180 | (3000) | 13.7 | (10.0) | 68.2 | (10.0) |
| **BTEX** **EPA 8020** | *Analyzed:* | 03/13/98 | R.L. | 03/13/98 | R.L. | 03/13/98 | R.L. | 03/13/98 | R.L. | 03/13/98 | R.L. | 03/13/98 | R.L. |
| | *Units:* | ppm | | ppm | | ppm | | ppm | | ppm | | ppm | |
| Benzene | | 3.48 | (0.10) | < 0.10 | (0.10) | < 0.020 | (0.020) | 2.98 | (0.20) | < 0.020 | (0.020) | < 0.020 | (0.020) |
| Toluene | | 18.90 | (0.10) | < 0.10 | (0.10) | < 0.020 | (0.020) | 7.90 | (0.20) | < 0.020 | (0.020) | < 0.020 | (0.020) |
| Ethylbenzene | | 15.30 | (0.10) | < 0.10 | (0.10) | < 0.020 | (0.020) | 43.00 | (0.20) | < 0.020 | (0.020) | < 0.020 | (0.020) |
| m,p-Xylenes | | 20.40 | (0.20) | < 0.20 | (0.20) | < 0.040 | (0.040) | 47.20 | (0.40) | < 0.040 | (0.040) | < 0.040 | (0.040) |
| o-Xylene | | 9.81 | (0.10) | < 0.10 | (0.10) | < 0.020 | (0.020) | 10.54 | (0.20) | < 0.020 | (0.020) | < 0.020 | (0.020) |
| Total BTEX | | 67.89 | | N.D. | | N.D. | | 111.62 | | N.D. | | N.D. | |
| **SPLP-Semivolatiles** **EPA1312/8270** | *Analyzed:* | 03/26/98 | R.L. | | | | | | | | | | |
| | *Units:* | mg/L | | | | | | | | | | | |
| Acenaphthene | | < 0.025 | (0.025) | | | | | | | | | | |
| Acenaphthylene | | < 0.025 | (0.025) | | | | | | | | | | |
| Anthracene | | < 0.025 | (0.025) | | | | | | | | | | |
| Benzo(a)anthracene | | < 0.025 | (0.025) | | | | | | | | | | |
| Benzo(a)pyrene | | < 0.025 | (0.025) | | | | | | | | | | |
| Benzo(b)fluoranthene | | < 0.025 | (0.025) | | | | | | | | | | |
| Benzo(g,h,i)perylene | | < 0.025 | (0.025) | | | | | | | | | | |
| Benzo(k)fluoranthene | | < 0.025 | (0.025) | | | | | | | | | | |
| 4-Bromophenyl-phenylether | | < 0.025 | (0.025) | | | | | | | | | | |
| Butyl benzyl phthalate | | < 0.025 | (0.025) | | | | | | | | | | |
| Carbazole | | < 0.025 | (0.025) | | | | | | | | | | |
| 4-Chloro-3-Methylphenol | | < 0.025 | (0.025) | | | | | | | | | | |



Edward H. Yonemoto, Ph.D.
Technical Director

XENCO Laboratories

# CERTIFICATE OF ANALYSIS SUMMARY 1-80926

## K.E.I. Consultants, Inc.

**Project ID:** 610089
***Project Name: TNM-96-15***
**Date Received in Lab :** Mar 12, 1998 09:45
**Project Manager:** Theresa Nix
**Date Report Faxed:** Apr 1, 1998
**Project Location:** Lea County, New Mexico
**XENCO contact :** Carlos Castro/Edward Yonemoto

| ***Analysis Requested*** | *Lab ID:* / *Field ID:* / *Depth:* / *Matrix:* / *Sampled:* | 180926 001<br>SB-1<br>0-2.5<br>Solid<br>03/09/98 08:10 | 180926 002<br>SB-1<br>15-17.5<br>Solid<br>03/09/98 08:36 | 180926 003<br>SB-1<br>30-32.5<br>Solid<br>03/09/98 09:06 | 180926 004<br>SB-2<br>0-2.5<br>Solid<br>03/09/98 09:36 | 180926 005<br>SB-2<br>15-17.5<br>Solid<br>03/09/98 09:52 | 180926 006<br>SB-2<br>30-32.5<br>Solid<br>03/09/98 10:21 |
|---|---|---|---|---|---|---|---|
| **EPA1312/8270** | *Analyzed:* / *Units:* | 03/26/98 mg/L R.L. | | | | | |
| 4-Chloroaniline | | < 0.025 (0.025) | | | | | |
| 2-Chloronaphthalene | | < 0.025 (0.025) | | | | | |
| 2-Chlorophenol | | < 0.025 (0.025) | | | | | |
| 4-Chlorophenyl-phenyl ether | | < 0.025 (0.025) | | | | | |
| Chrysene | | < 0.025 (0.025) | | | | | |
| Di-n-butyl phthalate | | < 0.025 (0.025) | | | | | |
| Di-n-octyl phthalate | | < 0.025 (0.025) | | | | | |
| Dibenzo(a,h)anthracene | | < 0.025 (0.025) | | | | | |
| Dibenzofuran | | < 0.025 (0.025) | | | | | |
| 1,2-Dichlorobenzene | | < 0.025 (0.025) | | | | | |
| 1,3-Dichlorobenzene | | < 0.025 (0.025) | | | | | |
| 1,4-Dichlorobenzene | | < 0.025 (0.025) | | | | | |
| 3,3'-Dichlorobenzidine | | < 0.025 (0.025) | | | | | |
| 2,4-Dichlorophenol | | < 0.025 (0.025) | | | | | |
| Diethyl phthalate | | < 0.025 (0.025) | | | | | |
| 2,4-Dimethylphenol | | < 0.025 (0.025) | | | | | |
| Dimethyl phthalate | | < 0.025 (0.025) | | | | | |
| 4,6-Dinitro-2-methylphenol | | < 0.063 (0.063) | | | | | |
| 2,4-Dinitrophenol | | < 0.063 (0.063) | | | | | |
| 2,4-Dinitrotoluene | | < 0.025 (0.025) | | | | | |
| 2,6-Dinitrotoluene | | < 0.025 (0.025) | | | | | |
| Fluoranthene | | < 0.025 (0.025) | | | | | |
| Fluorene | | < 0.025 (0.025) | | | | | |
| Hexachlorobenzene | | < 0.025 (0.025) | | | | | |



Edward H. Yonemoto, Ph.D.
Technical Director

XENCO Laboratories

# CERTIFICATE OF ANALYSIS SUMMARY 1-80926

## K.E.I. Consultants, Inc.

**Project ID:** 610089 | ***Project Name: TNM-96-15*** | **Date Received in Lab :** Mar 12, 1998 09:45

**Project Manager:** Theresa Nix | **Date Report Faxed:** Apr 1, 1998

**Project Location:** Lea County, New Mexico | **XENCO contact :** Carlos Castro/Edward Yonemoto

| ***Analysis Requested*** | *Lab ID:* | 180926 001 | 180926 002 | 180926 003 | 180926 004 | 180926 005 | 180926 006 |
|---|---|---|---|---|---|---|---|
| | *Field ID:* | SB-1 | SB-1 | SB-1 | SB-2 | SB-2 | SB-2 |
| | *Depth:* | 0-2.5 | 15-17.5 | 30-32.5 | 0-2.5 | 15-17.5 | 30-32.5 |
| | *Matrix:* | Solid | Solid | Solid | Solid | Solid | Solid |
| | *Sampled:* | 03/09/98 08:10 | 03/09/98 08:36 | 03/09/98 09:06 | 03/09/98 09:36 | 03/09/98 09:52 | 03/09/98 10:21 |
| **EPA1312/8270** | *Analyzed:* | 03/26/98 | | | | | |
| | *Units:* | mg/L R.L. | | | | | |
| Hexachlorobutadiene | | < 0.025 (0.025) | | | | | |
| Hexachlorocyclopentadiene | | < 0.025 (0.025) | | | | | |
| Hexachloroethane | | < 0.025 (0.025) | | | | | |
| Indeno(1,2,3-cd)pyrene | | < 0.025 (0.025) | | | | | |
| Isophorone | | < 0.025 (0.025) | | | | | |
| 2-Methylnaphthalene | | < 0.025 (0.025) | | | | | |
| 2-Methylphenol | | < 0.025 (0.025) | | | | | |
| 4-Methylphenol | | < 0.025 (0.025) | | | | | |
| N-Nitroso-di-n-propylamine | | < 0.025 (0.025) | | | | | |
| N-Nitrosodiphenylamine | | < 0.025 (0.025) | | | | | |
| Naphthalene | | < 0.025 (0.025) | | | | | |
| 2-Nitroaniline | | < 0.063 (0.063) | | | | | |
| 3-Nitroaniline | | < 0.063 (0.063) | | | | | |
| 4-Nitroaniline | | < 0.063 (0.063) | | | | | |
| Nitrobenzene | | < 0.025 (0.025) | | | | | |
| 2-Nitrophenol | | < 0.025 (0.025) | | | | | |
| 4-Nitrophenol | | < 0.025 (0.025) | | | | | |
| Pentachlorophenol | | < 0.063 (0.063) | | | | | |
| Phenanthrene | | < 0.025 (0.025) | | | | | |
| Phenol | | < 0.025 (0.025) | | | | | |
| Pyrene | | < 0.025 (0.025) | | | | | |
| 1,2,4-Trichlorobenzene | | < 0.025 (0.025) | | | | | |
| 2,4,5-Trichlorophenol | | < 0.063 (0.063) | | | | | |
| 2,4,6-Trichlorophenol | | < 0.025 (0.025) | | | | | |



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Technical Director

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# CERTIFICATE OF ANALYSIS SUMMARY 1-80926

## K.E.I. Consultants, Inc.

**Project ID:** 610089
***Project Name: TNM-96-15***
**Date Received in Lab :** Mar 12, 1998 09:45
**Project Manager:** Theresa Nix
**Date Report Faxed:** Apr 1, 1998
**Project Location:** Lea County, New Mexico
**XENCO contact :** Carlos Castro/Edward Yonemoto

| ***Analysis Requested*** | *Lab ID:* | 180926 001 | 180926 002 | 180926 003 | 180926 004 | 180926 005 | 180926 006 |
|---|---|---|---|---|---|---|---|
| | *Field ID:* | SB-1 | SB-1 | SB-1 | SB-2 | SB-2 | SB-2 |
| | *Depth:* | 0-2.5 | 15-17.5 | 30-32.5 | 0-2.5 | 15-17.5 | 30-32.5 |
| | *Matrix:* | Solid | Solid | Solid | Solid | Solid | Solid |
| | *Sampled:* | 03/09/98 08:10 | 03/09/98 08:36 | 03/09/98 09:06 | 03/09/98 09:36 | 03/09/98 09:52 | 03/09/98 10:21 |
| **EPA1312/8270** | *Analyzed:* | 03/26/98 | | | | | |
| | *Units:* | mg/L R.L. | | | | | |
| bis [2-Chloroethoxy] methane | | < 0.025 (0.025) | | | | | |
| bis [2-Chloroethyl] ether | | < 0.025 (0.025) | | | | | |
| bis [2-Chloroisopropyl] ether | | < 0.025 (0.025) | | | | | |
| bis [2-Ethylhexyl] phthalate | | < 0.025 (0.025) | | | | | |
| | | | | | | | |
| **SPLP Volatiles EPA 8260** | *Analyzed:* | 03/30/98 | | | | | |
| | *Units:* | mg/L R.L. | | | | | |
| Benzene | | < 0.025 (0.025) | | | | | |
| Bromobenzene | | < 0.025 (0.025) | | | | | |
| Bromochloromethane | | < 0.025 (0.025) | | | | | |
| Bromodichloromethane | | < 0.025 (0.025) | | | | | |
| Bromoform | | < 0.025 (0.025) | | | | | |
| Bromomethane | | < 0.025 (0.025) | | | | | |
| Carbon Tetrachloride | | < 0.025 (0.025) | | | | | |
| Chlorobenzene | | < 0.025 (0.025) | | | | | |
| Chloroethane | | < 0.050 (0.050) | | | | | |
| Chloroform | | < 0.025 (0.025) | | | | | |
| Chloromethane | | < 0.050 (0.050) | | | | | |
| 2-Chlorotoluene | | < 0.025 (0.025) | | | | | |
| 4-Chlorotoluene | | < 0.025 (0.025) | | | | | |
| 1,2-Dibromo-3-chloropropane | | < 0.025 (0.025) | | | | | |
| Dibromochloromethane | | < 0.025 (0.025) | | | | | |
| 1,2-Dibromoethane | | < 0.025 (0.025) | | | | | |
| Dibromomethane | | < 0.025 (0.025) | | | | | |



Edward H. Yonemoto, Ph.D.
Technical Director

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# CERTIFICATE OF ANALYSIS SUMMARY 1-80926

## K.E.I. Consultants, Inc.

**Project ID:** 610089
***Project Name: TNM-96-15***
**Date Received in Lab :** Mar 12, 1998 09:45
**Project Manager:** Theresa Nix
**Date Report Faxed:** Apr 1, 1998
**Project Location:** Lea County, New Mexico
**XENCO contact :** Carlos Castro/Edward Yonemoto

| ***Analysis Requested*** | *Lab ID:* | 180926 001 | 180926 002 | 180926 003 | 180926 004 | 180926 005 | 180926 006 |
|---|---|---|---|---|---|---|---|
| | *Field ID:* | SB-1 | SB-1 | SB-1 | SB-2 | SB-2 | SB-2 |
| | *Depth:* | 0-2.5 | 15-17.5 | 30-32.5 | 0-2.5 | 15-17.5 | 30-32.5 |
| | *Matrix:* | Solid | Solid | Solid | Solid | Solid | Solid |
| | *Sampled:* | 03/09/98 08:10 | 03/09/98 08:36 | 03/09/98 09:06 | 03/09/98 09:36 | 03/09/98 09:52 | 03/09/98 10:21 |
| **EPA 8260** | *Analyzed:* | 03/30/98 | | | | | |
| | *Units:* | mg/L R.L. | | | | | |
| 1,2-Dichlorobenzene | | < 0.025 (0.025) | | | | | |
| 1,3-Dichlorobenzene | | < 0.025 (0.025) | | | | | |
| 1,4-Dichlorobenzene | | < 0.025 (0.025) | | | | | |
| Dichlorodifluoromethane | | < 0.025 (0.025) | | | | | |
| 1,1-Dichloroethane | | < 0.025 (0.025) | | | | | |
| 1,2-Dichloroethane | | < 0.025 (0.025) | | | | | |
| 1,1-Dichloroethene | | < 0.025 (0.025) | | | | | |
| 1,2-Dichloropropane | | < 0.025 (0.025) | | | | | |
| 1,3-Dichloropropane | | < 0.025 (0.025) | | | | | |
| 2,2-Dichloropropane | | < 0.025 (0.025) | | | | | |
| 1,1-Dichloropropene | | < 0.025 (0.025) | | | | | |
| Ethylbenzene | | < 0.025 (0.025) | | | | | |
| Hexachlorobutadiene | | < 0.025 (0.025) | | | | | |
| Isopropylbenzene | | < 0.025 (0.025) | | | | | |
| MTBE | | < 0.050 (0.050) | | | | | |
| Methylene chloride | | < 0.050 (0.050) | | | | | |
| Naphthalene | | < 0.025 (0.025) | | | | | |
| Styrene | | < 0.025 (0.025) | | | | | |
| 1,1,1,2-Tetrachloroethane | | < 0.025 (0.025) | | | | | |
| 1,1,2,2-Tetrachloroethane | | < 0.025 (0.025) | | | | | |
| Tetrachloroethene | | < 0.025 (0.025) | | | | | |
| Toluene | | < 0.025 (0.025) | | | | | |
| 1,2,3-Trichlorobenzene | | < 0.025 (0.025) | | | | | |
| 1,2,4-Trichlorobenzene | | < 0.025 (0.025) | | | | | |



Edward H. Yonemoto, Ph.D.
Technical Director

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# CERTIFICATE OF ANALYSIS SUMMARY 1-80926

## K.E.I. Consultants, Inc.

**Project ID:** 610089
***Project Name: TNM-96-15***
**Date Received in Lab :** Mar 12, 1998 09:45
**Project Manager:** Theresa Nix
**Date Report Faxed:** Apr 1, 1998
**Project Location:** Lea County, New Mexico
**XENCO contact :** Carlos Castro/Edward Yonemoto

| ***Analysis Requested*** | *Lab ID:* / *Field ID:* / *Depth:* / *Matrix:* / *Sampled:* | 180926 001<br>SB-1<br>0-2.5<br>Solid<br>03/09/98 08:10 | 180926 002<br>SB-1<br>15-17.5<br>Solid<br>03/09/98 08:36 | 180926 003<br>SB-1<br>30-32.5<br>Solid<br>03/09/98 09:06 | 180926 004<br>SB-2<br>0-2.5<br>Solid<br>03/09/98 09:36 | 180926 005<br>SB-2<br>15-17.5<br>Solid<br>03/09/98 09:52 | 180926 006<br>SB-2<br>30-32.5<br>Solid<br>03/09/98 10:21 |
|---|---|---|---|---|---|---|---|
| **EPA 8260** | *Analyzed:* / *Units:* | 03/30/98 mg/L R.L. | | | | | |
| 1,1,1-Trichloroethane | | < 0.025 (0.025) | | | | | |
| 1,1,2-Trichloroethane | | < 0.025 (0.025) | | | | | |
| Trichloroethene | | < 0.025 (0.025) | | | | | |
| Trichlorofluoromethane | | < 0.025 (0.025) | | | | | |
| 1,2,3-Trichloropropane | | < 0.025 (0.025) | | | | | |
| 1,2,4-Trimethylbenzene | | < 0.025 (0.025) | | | | | |
| 1,3,5-Trimethylbenzene | | < 0.025 (0.025) | | | | | |
| Vinyl chloride | | < 0.025 (0.025) | | | | | |
| cis-1,2-Dichloroethene | | < 0.025 (0.025) | | | | | |
| cis-1,3-Dichloropropene | | < 0.025 (0.025) | | | | | |
| m,p-Xylenes | | < 0.025 (0.025) | | | | | |
| n-Butylbenzene | | < 0.025 (0.025) | | | | | |
| n-Propylbenzene | | < 0.025 (0.025) | | | | | |
| o-Xylene | | 0.030 (0.025) | | | | | |
| p-Isopropyltoluene | | < 0.025 (0.025) | | | | | |
| sec-Butylbenzene | | < 0.025 (0.025) | | | | | |
| tert-Butylbenzene | | < 0.025 (0.025) | | | | | |
| trans-1,2-Dichloroethene | | < 0.025 (0.025) | | | | | |
| trans-1,3-Dichloropropene | | < 0.025 (0.025) | | | | | |
| | | | | | | | |
| **SPLP TPH 1312/418.1** | *Analyzed:* / *Units:* | 03/26/98 ppm R.L. | | | | | |
| Total Petroleum Hydrocarbons | | 2.2 (0.7) | | | | | |



Edward H. Yonemoto, Ph.D.
Technical Director

XENCO Laboratories

# CERTIFICATE OF ANALYSIS SUMMARY 1-80926

## K.E.I. Consultants, Inc.

**Project ID:** 610089
***Project Name: TNM-96-15***
**Date Received in Lab :** Mar 12, 1998 09:45
**Project Manager:** Theresa Nix
**Date Report Faxed:** Apr 1, 1998
**Project Location:** Lea County, New Mexico
**XENCO contact :** Carlos Castro/Edward Yonemoto

| ***Analysis Requested*** | *Lab ID:* / *Field ID:* / *Depth:* / *Matrix:* / *Sampled:* | 180926 007<br>Section A<br>Surface<br>Solid<br>03/09/98 10:48 | 180926 008<br>Section B<br>Surface<br>Solid<br>03/09/98 10:55 | 180926 009<br>Section C<br>Surface<br>Solid<br>03/09/98 11:01 | 180926 010<br>Section D<br>Surface<br>Solid<br>03/09/98 11:05 | 180926 011<br>FOC<br>4-5<br>Solid<br>03/10/98 09:40 | |
|---|---|---|---|---|---|---|---|
| **Moisture Content**<br>**ASTM 2216-71** | *Analyzed:*<br>*Units:* | | | | | 03/16/98<br>%<br>R.L. | |
| Moisture Content | | | | | | 11.2 (0.1) | |
| **Organic Content**<br>**ASTM D2974** | *Analyzed:*<br>*Units:* | | | | | 03/16/98<br>%<br>R.L. | |
| Organic Content | | | | | | 1.0 (0.1) | |
| **TPH-DRO (Diesel)**<br>**EPA 8015 M** | *Analyzed:*<br>*Units:* | 03/18/98<br>mg/kg<br>R.L. | 03/18/98<br>mg/kg<br>R.L. | 03/18/98<br>mg/kg<br>R.L. | 03/18/98<br>mg/kg<br>R.L. | | |
| Total Petroleum Hydrocarbons | | 5510 (3000) | 5490 (3000) | 3180 (3000) | 5140 (3000) | | |
| **BTEX**<br>**EPA 8020** | *Analyzed:*<br>*Units:* | 03/13/98<br>ppm<br>R.L. | 03/13/98<br>ppm<br>R.L. | 03/13/98<br>ppm<br>R.L. | 03/13/98<br>ppm<br>R.L. | | |
| Benzene | | 0.13 (0.10) | 2.02 (0.10) | < 0.10 (0.10) | < 0.10 (0.10) | | |
| Toluene | | 0.37 (0.10) | 9.95 (0.10) | < 0.10 (0.10) | < 0.10 (0.10) | | |
| Ethylbenzene | | 0.51 (0.10) | 5.22 (0.10) | 0.12 (0.10) | < 0.10 (0.10) | | |
| m,p-Xylenes | | 0.75 (0.20) | 11.20 (0.20) | < 0.20 (0.20) | < 0.20 (0.20) | | |
| o-Xylene | | 0.52 (0.10) | 5.75 (0.10) | 0.10 (0.10) | < 0.10 (0.10) | | |
| Total BTEX | | 2.28 | 34.14 | 0.22 | N.D. | | |



Edward H. Yonemoto, Ph.D.
Technical Director

XENCO Laboratories

# Certificate Of Quality Control for Batch : 18Z99A92

## SW- 846 8015 M TPH- DRO (Diesel)

**Date Validated:** Mar 19, 1998 13:30
**Date Analyzed:** Mar 17, 1998 20:11
**QA/QC Manager:** Sunil Ajai, M.S.

**Analyst:** OR
**Matrix:** Solid

| | BLANK SPIKE ANALYSIS | | | | | | |
|---|---|---|---|---|---|---|---|
| Parameter | [A] Blank Result mg/kg | [B] Blank Spike Result mg/kg | [C] Blank Spike Amount mg/kg | [D] Detection Limit mg/kg | [E] QC Blank Spike Recovery % | [F] LIMITS Recovery Range % | [G] Qualifier |
| Total Petroleum Hydrocarbons | < 10.00 | 86.17 | 100 | 10.00 | 86.2 | 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.
Technical Director

XENCO Laboratories

# Certificate Of Quality Control for Batch : 18Z99A92

## SW- 846 8015 M TPH- DRO (Diesel)

**Date Validated:** Mar 19, 1998 13:30
**Date Analyzed:** Mar 17, 1998 22:00
**QA/QC Manager:** Sunil Ajai, M.S.

**Analyst:** OR
**Matrix:** Solid

| | MATRIX SPIKE / MATRIX SPIKE DUPLICATE AND RECOVERY | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Q.C. Sample ID 180926- 003** | [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 |
| **Parameter** | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | % | % | % | % | % | |
| Total Petroleum Hydrocarbons | 28.34 | 117 | 118 | 100 | 10.00 | 30.0 | 0.9 | 88.7 | 89.7 | 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.
Technical Director

XENCO Laboratories

# Certificate Of Quality Control for Batch : 18A25A88

## SW- 846 5030/8020 BTEX

**Date Validated:** Mar 16, 1998 11:30
**Date Analyzed:** Mar 13, 1998 11:04
**QA/QC Manager:** Sunil Ajai, M.S.

**Analyst:** HL
**Matrix:** Solid

| | BLANK SPIKE ANALYSIS | | | | | | |
|---|---|---|---|---|---|---|---|
| Parameter | [A] Blank Result ppm | [B] Blank Spike Result ppm | [C] Blank Spike Amount ppm | [D] Detection Limit ppm | [E] QC LIMITS Blank Spike Recovery % | [F] Recovery Range % | [G] Qualifier |
| Benzene | < 0.0010 | 0.0933 | 0.1000 | 0.0010 | 93.3 | 65-135 | |
| Toluene | < 0.0010 | 0.0906 | 0.1000 | 0.0010 | 90.6 | 65-135 | |
| Ethylbenzene | < 0.0010 | 0.0927 | 0.1000 | 0.0010 | 92.7 | 65-135 | |
| m,p-Xylenes | < 0.0020 | 0.1850 | 0.2000 | 0.0020 | 92.5 | 65-135 | |
| o-Xylene | < 0.0010 | 0.0920 | 0.1000 | 0.0010 | 92.0 | 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. Tonemoto, Ph.D.
Technical Director

XENCO Laboratories

# Certificate Of Quality Control for Batch : 18A25A88

## SW- 846 5030/8020 BTEX

**Date Validated:** Mar 16, 1998 11:30
**Date Analyzed:** Mar 13, 1998 14:54
**QA/QC Manager:** Sunil Ajai, M.S.

**Analyst:** HL
**Matrix:** Solid

| | MATRIX SPIKE / MATRIX SPIKE DUPLICATE AND RECOVERY | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Q.C. Sample ID 180926- 003** / **Parameter** | [A] Sample Result ppm | [B] Matrix Spike Result ppm | [C] Matrix Spike Duplicate Result ppm | [D] Matrix Spike Amount ppm | [E] 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 | 1.864 | 1.908 | 2.000 | 0.020 | 25.0 | 2.3 | 93.2 | 95.4 | 65-135 | |
| Toluene | < 0.020 | 1.830 | 1.852 | 2.000 | 0.020 | 25.0 | 1.2 | 91.5 | 92.6 | 65-135 | |
| Ethylbenzene | < 0.020 | 1.906 | 1.898 | 2.000 | 0.020 | 25.0 | 0.4 | 95.3 | 94.9 | 65-135 | |
| m,p-Xylenes | < 0.040 | 3.760 | 3.760 | 4.000 | 0.040 | 25.0 | 0.0 | 94.0 | 94.0 | 65-135 | |
| o-Xylene | < 0.020 | 1.886 | 1.892 | 2.000 | 0.020 | 25.0 | 0.3 | 94.3 | 94.6 | 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.
Technical Director

XENCO Laboratories

# Certificate Of Quality Control for Batch : 18A23A93

## EPA1312/8260 SPLP Volatiles

**Date Validated:** Mar 31, 1998 17:00
**Date Analyzed:** Mar 30, 1998 11:38
**QA/QC Manager:** Sunil Ajai, M.S.

**Analyst:** CE
**Matrix:** Solid

| | BLANK SPIKE ANALYSIS | | | | | | |
|---|---|---|---|---|---|---|---|
| Parameter | [A] Blank Result mg/L | [B] Blank Spike Result mg/L | [C] Blank Spike Amount mg/L | [D] Detection Limit mg/L | [E] QC Blank Spike Recovery % | [F] LIMITS Recovery Range % | [G] Qualifier |
| Benzene | < 0.0010 | 0.0481 | 0.0500 | 0.0010 | 96.2 | 66-142 | |
| Chlorobenzene | < 0.0010 | 0.0487 | 0.0500 | 0.0010 | 97.4 | 60-133 | |
| 1,1-Dichloroethene | < 0.0040 | 0.0486 | 0.0500 | 0.0040 | 97.2 | 59-172 | |
| Toluene | < 0.0010 | 0.0475 | 0.0500 | 0.0010 | 95.0 | 59-139 | |
| Trichloroethene | < 0.0030 | 0.0507 | 0.0500 | 0.0030 | 101.4 | 62-137 | |

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

Edward H. Yonemoto, Ph.D.
Technical Director

XENCO Laboratories

# Certificate Of Quality Control for Batch : 18A23A93

## EPA1312/8260 SPLP Volatiles

**Date Validated:** Mar 31, 1998 17:00
**Date Analyzed:** Mar 30, 1998 18:19
**QA/QC Manager:** Sunil Ajai, M.S.

**Analyst:** CE
**Matrix:** Solid

| | MATRIX SPIKE / MATRIX SPIKE DUPLICATE AND RECOVERY | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Q.C. Sample ID 180927- 001** | [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 |
| **Parameter** | mg/L | mg/L | mg/L | mg/L | mg/L | % | % | % | % | % | |
| Benzene | 0.0570 | 0.2670 | 0.2575 | 0.2500 | 0.0050 | 20.0 | 3.6 | 84.0 | 80.2 | 66-142 | |
| Chlorobenzene | < 0.0050 | 0.2305 | 0.2195 | 0.2500 | 0.0050 | 20.0 | 4.9 | 92.2 | 87.8 | 60-133 | |
| 1,1-Dichloroethene | < 0.0200 | 0.2190 | 0.2025 | 0.2500 | 0.0200 | 25.0 | 7.8 | 87.6 | 81.0 | 59-172 | |
| Toluene | 1.3645 | 1.3500 | 1.3035 | 0.2500 | 0.0050 | 20.0 | 3.5 | 5.8 | 24.4 | 59-139 | A |
| Trichloroethene | < 0.0150 | 0.2230 | 0.2140 | 0.2500 | 0.0150 | 20.0 | 4.1 | 89.2 | 85.6 | 62-137 | |

(A) Recovery affected by high analyte concentration in sample (matrix effect)
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.
Technical Director

XENCO Laboratories

# Certificate Of Quality Control for Batch : 18A34B35

## EPA 1311/8270 TCLP Semi-volatiles

**Date Validated:** Mar 26, 1998 15:10
**Date Analyzed:** Mar 26, 1998 03:54
**QA/QC Manager:** Sunil Ajai, M.S.

**Analyst:** LC
**Matrix:** Solid

**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] 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 | < 0.0050 | 0.2035 | 0.2155 | 0.2500 | 0.0050 | 19.0 | 5.7 | 81.4 | 86.2 | 46-118 | |
| 4-Chloro-3-Methylphenol | < 0.0050 | 0.1830 | 0.1610 | 0.2500 | 0.0050 | 33.0 | 12.8 | 73.2 | 64.4 | 23-97 | |
| 2-Chlorophenol | < 0.0050 | 0.1740 | 0.1510 | 0.2500 | 0.0050 | 28.7 | 14.2 | 69.6 | 60.4 | 27-123 | |
| 1,4-Dichlorobenzene | < 0.0050 | 0.2000 | 0.2055 | 0.2500 | 0.0050 | 32.1 | 2.7 | 80.0 | 82.2 | 36-97 | |
| 2,4-Dinitrotoluene | < 0.0050 | 0.1825 | 0.1955 | 0.2500 | 0.0050 | 21.8 | 6.9 | 73.0 | 78.2 | 24-96 | |
| N-Nitroso-di-n-propylamine | < 0.0050 | 0.1875 | 0.1960 | 0.2500 | 0.0050 | 55.4 | 4.4 | 75.0 | 78.4 | 41-116 | |
| 4-Nitrophenol | < 0.0100 | 0.0560 | 0.0555 | 0.2500 | 0.0100 | 47.2 | 0.9 | 22.4 | 22.2 | 10-80 | |
| Pentachlorophenol | < 0.0050 | 0.0650 | 0.0560 | 0.2500 | 0.0050 | 48.9 | 14.9 | 26.0 | 22.4 | 9-103 | |
| Phenol | < 0.0050 | 0.0910 | 0.0775 | 0.2500 | 0.0050 | 22.6 | 16.0 | 36.4 | 31.0 | 12-89 | |
| Pyrene | < 0.0100 | 0.2220 | 0.2360 | 0.2500 | 0.0100 | 25.2 | 6.1 | 88.8 | 94.4 | 26-127 | |
| 1,2,4-Trichlorobenzene | < 0.0100 | 0.2135 | 0.2245 | 0.2500 | 0.0100 | 23.0 | 5.0 | 85.4 | 89.8 | 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.
Technical Director

XENCO Laboratories

# Certificate Of Quality Control for Batch : 18A19A97

## ASTM 2216- 71 Moisture Content

**Date Validated:** Mar 17, 1998 09:00
**Date Analyzed:** Mar 16, 1998 14:05
**QA/QC Manager:** Sunil Ajai, M.S.

**Analyst:** IF
**Matrix:** Solid

| | MATRIX DUPLICATE ANALYSIS | | | | | |
|---|---|---|---|---|---|---|
| **Q.C. Sample ID 180926- 011** | [A] Sample Result | [B] Duplicate Result | [C] Detection Limit | [D] QC Relative Difference | [E] LIMITS Relative Difference | [F] Qualifier |
| **Parameter** | % | % | % | % | % | |
| Moisture Content | 11.20 | 10.70 | 0.1 | 4.6 | 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 T. Yonemoto, Ph.D.
Technical Director

XENCO Laboratories

# Certificate Of Quality Control for Batch : 18A19A98

## ASTM D2974 Organic Content

**Date Validated:** Mar 17, 1998 09:05
**Date Analyzed:** Mar 16, 1998 14:05
**QA/QC Manager:** Sunil Ajai, M.S.

**Analyst:** IF
**Matrix:** Solid

| | MATRIX DUPLICATE ANALYSIS | | | | | |
|---|---|---|---|---|---|---|
| **Q.C. Sample ID 130926- 011** | [A] Sample Result | [B] Duplicate Result | [C] | [D] QC | [E] LIMITS | [F] |
| **Parameter** | | | Detection Limit | Relative Difference | Relative Difference | Qualifier |
| | % | % | % | % | % | |
| Organic Content | 1.01 | 1.00 | 0.1 | 1.0 | 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.
Technical Director

XENCO Laboratories

# Certificate Of Quality Control for Batch : 18A07C31

## EPA 418.1 Total Petroleum Hydrocarbons

**Date Validated:** Mar 26, 1998 14:35
**Date Analyzed:** Mar 26, 1998 14:04
**QA/QC Manager:** Sunil Ajai, M.S.

**Analyst:** EZ
**Matrix:** Liquid

**BLANK SPIKE / BLANK SPIKE DUPLICATE AND RECOVERY**

| Parameter | [A] Blank Result ppm | [B] Blank Spike Result ppm | [C] Blank Spike Duplicate Result ppm | [D] Blank Spike Amount ppm | [E] Detection Limit ppm | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Petroleum Hydrocarbons | < 0.40 | 6.51 | 6.92 | 6.93 | 0.40 | 25.0 | 6.1 | 94.0 | 99.9 | 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.
Technical Director

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 # 180926-SA

Contractor: K·e·i Consultants | Phone: (210) 680-3767

Address: 5309 Wurzbach, Suite 100 San Antonio, TX 78238

Project Name: TNM-96-15 | Project Director: Mike Hawthorne

Project Location: Lea County, New Mexico | Project Manager: Theresa Nirk

Sampler Signature: Shirley Reeves | Project No.: 610089

No. coolers this shipment: | Contractor COC #

Carrier: UPS | Quote #:

Airbill No. | P.O. No.: 8821

SAMPLE CHARACTERIZATION

Preservative: Ice | Other

Unl Dies Ker Unknown | Waste Oil | PIT No: | Tank No:

Turn-around: * ASAP | * 24 hrs | 48 hrs | Standard

| | Field ID | Date | Time | Depth | Soil | Water | Comp | Grab | Container Size | Container Type P, G | Ice | Other | Sample Description | No of Containers Total | BTEX (SW8020-8021) | TPH (418.1) 2013 modified DRO | SPLP TPH 1312 | SPLP VOC's SW846-1312/8260 | SPLP SVOC's SW846-1312/8270 | Please Hold | Remarks | LAB ONLY ID # |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | SB-1 Depth 0-2.5 | 3.9.98 | 8:10 | 0 2.5 | X | | | X | | | X | | | 1 | X | X | X | X | X | | | 1 |
| 2 | SB-1 Depth 15-17.5 | | 8:36 | 15-17.5 | | | | | | | | | | | | | | | | | | 2 |
| 3 | SB-1 Depth 30-32.5 | | 9:06 | 30 32.5 | | | | | | | | | | | | | | | | | | 3 |
| 4 | SB-2 Depth 0-2.5 | | 9:36 | 0-2.5 | | | | | | | | | | | | | | | | | | 4 |
| 5 | SB-2 Depth 15-17.5 | | 9:52 | 15-17.5 | | | | | | | | | | | | | | | | | | 5 |
| 6 | SB-2 Depth 30-32.5 | | 10:21 | 30 32.5 | | | | | | | | | | | | | | | | | | 6 |
| 7 | Section A | | 10:48 | Surface | | | | | | | | | | | | | | | | | Please call Theresa Nirk for Analysis | 7 |
| 8 | Section B | | 10:55 | Surface | | | | | | | | | | | | | | | | | " | 8 |
| 9 | Section C | | 11:01 | Surface | | | | | | | | | | | | | | | | | " | 9 |
| 10 | Section D | | 11:05 | Surface | | | | | | | | | | | | | | | | | " | 10 |

| Relinquished by: (Signature) | DATE | TIME | Received by: (Signature) | DATE | TIME |
|---|---|---|---|---|---|
| Shirley Reeves | 3.11.98 | | | | |
| | | | Received For Laboratory by: UPS | | |
| | | | T Yorkey | 3/12/98 | 945 |

Remarks: Soil sample w/highest TPH value will be Analyzed for the following
- SPLP TPH = EPA 1312
- SPLP VOC's = SW846-1312/8260
- SPLP SVOC's = SW846-1312/8270

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

* Pre-scheduling is recommended

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 # 180926-SA

Contractor: K.E.I Consultants  Phone: (210) 680-3767

Address: 5309 Wurzbach, Suite 100 San Antonio, TX 78238

Project Name: TNM-96-15  Project Director: Mike Hawthorne

Project Location: Lea County, New Mexico  Project Manager: Theresa Nix

Sampler Signature: [signature]  Project No.: 610089

No. coolers this shipment:  Contractor COC #

Carrier: UPS  Quote #:

Airbill No.  P.O. No: 8821

| | 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) | FOC ASTM method D2974 | Moisture Content | Please Hold | Remarks | LAB ONLY ID # |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | FOC | 3-10-98 | 0940 | 4-5 Ft | / | | | / | | | / | | | 1 | | | / | / | | | 1 |
| 2 | | | | | | | | | | | | | | | | | | | | | 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

SAMPLE CHARACTERIZATION: Unl Dies Ker Unknown; Waste Oil; PIT No: Tank No:

| Relinquished by: (Signature) | DATE | TIME | Received by: (Signature) | DATE | TIME |
|---|---|---|---|---|---|
| [signature] | 3-11-98 | 1600 | | | |
| | | | Received For Laboratory by: UPS J Yardley | 3/12/98 | 945 |

Remarks

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

* Pre-scheduling is recommended

Precision Analytical Services

# QA/QC PROCEDURES

## DECONTAMINATION OF EQUIPMENT

Prior to drilling at each boring location, the auger bit was cleaned with Liqui-Nox detergent and rinsed with distilled water.

## SOIL SAMPLING

Samples of the subsurface soils were obtained through collection of auger cuttings of a hydraulic drilling rig at discrete intervals. 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.

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.

Soil samples were express mailed to Xenco Laboratories of San Antonio, Texas for BTEX, TPH-DRO, SPLP SVOC, SPLP VOC, SPLP TPH, FOC, and moisture content analyses using the methods described below. Soil samples were analyzed for BTEX, TPH, and SPLP concentrations within 14 days following the collection date.

The soil samples were analyzed for BTEX concentrations in accordance with EPA Method SW846-8020, for TPH concentrations in accordance with modified EPA Method 8015-DRO, for SPLP TPH concentrations in accordance with EPA Method 1312/418.1, for SPLP VOC concentrations in accordance with EPA Method SW846-1312/8260, for FOC concentrations in accordance with ASTM Method D2974, and for moisture content in accordance with ASTM 2216-71.

## 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.