AP - 017

STAGE 1 & 2 REPORTS

DATE:

Dec 1999

ADDITIONAL SUBSURFACE INVESTIGATION REPORT
AND
STAGE 2 ABATEMENT PLAN

EOTT ENERGY CORP
TNM 97-17 RELEASE SITE
LEA COUNTY, NEW MEXICO

RECEIVED

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ENVIRONMENTAL BUREAU
OIL CONSERVATION DIVISION

Prepared For:
EOTT Energy Corp
5805 East Highway 80
Midland, Texas 79701

Environmental Technology Group, Inc. Project No. EOT1024C

Prepared By:
Environmental Technology Group, Inc.
4600 West Wall Street
Midland, Texas 79703

December 1999

A Report Prepared for:

EOTT Energy Corp
5805 East Highway 80
Midland, Texas 79701

Additional Subsurface Investigation Report
And
Stage 2 Abatement Plan

Environmental Technology Group, Inc. Project No. EOT1024C

Prepared by:

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Managing Principal

Environmental Technology Group, Inc.
4600 West Wall Street
Midland, Texas 79703

December 1999

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1.0 INTRODUCTION AND SITE BACKGROUND

The site is located approximately five miles south of the town of Monument, New Mexico in Section 21, Township 20 South, Range 37 East. A site location map is provided as Figure 1. On August 13, 1997, an estimated 170 barrels of crude oil was released at the site, 160 barrels of which were recovered during the emergency response.

Approximately 1,160 cubic yards of impacted soil was excavated from two separate areas and stockpiled on site as depicted on Figure 2, the Site Map. In November 1998, three ground water monitoring wells and one soil boring were installed at the release site as depicted on Figure 2. Data collected from the site were summarized in the Subsurface Investigation Report, dated March 9, 1999.

A review of this report indicates the following:

- Soil, impacted to above regulatory levels, was present from approximately 15 feet to 22 feet below the ground surface (bgs) in soil boring SB-1;
- Soil, impacted to above regulatory levels, was present in the interval between 20 to 22 feet bgs in monitoring well MW-3;
- The soil column consisted primarily of loose sand with silty to clay filled layers scattered throughout the section;
- Ground water at the site occurs at a depth of approximately 20 feet bgs;
- The ground water gradient at the site is to the south-southeast at a gradient of approximately 0.004 ft/ft;
- Dissolved phase hydrocarbon constituents were not detected in the ground water samples; and
- There is no evidence of phase separated hydrocarbons at the site. constituents.

The only remaining issue regarding the site activities was related to the ground water conditions near the release point. In order to resolve this question, a ground water monitoring well was installed in this position in October 1999.

2.0 RECENT FIELD ACTIVITIES

The monitoring well was installed between the release point and soil boring SB-1 on October 27, 1999. The well was drilled to a total depth of 36 feet bgs, as depicted on the soil boring log, included as Appendix A. The soil column consisted primarily brown sand with heavy dead oil stain at the surface and brown staining and odor from the interval 15 feet to 20 feet bgs. The maximum PID reading of 1166 was measured from the split spoon sample collected at 20 feet bgs. Ground water was detected at a depth of approximately 21 feet bgs during the well installation. The well was completed as prescribed by OCD requirements and in accordance with protocols outlined in Section 6 of this report. The soil laboratory data is included in Table 1. Historical and recent ground water elevation data is provided as Table 2. Historical and recent ground water chemistry is included as Table 3. A ground water gradient map, as measured on November 5, 1999 is provided as

Figure 3. Ground water chemistry data, from samples collected on that date are posted on Figure 4. Both soil and ground water laboratory reports are included in Appendix B.

3.0 ABATEMENT OPTIONS

3.1 Soil Remediation

Abatement of impacted soil at the site is technically feasible using the following technologies:

- Excavation and Disposal
- Soil Vapor Extraction
- Bioremediation
- Bioremediation/Bioventing
- Chemical Oxidation

A reasonable estimation of the volume of impacted soil at the site is not possible using the existing data. It is recommended that a geoprobe survey be conducted around monitoring well MW-4 to determine the extent. Until this data is acquired, costs associated with each remediation technology can not be estimated with any accuracy. Therefore, cost estimates for the technologies are not provided. However, given a reasonable estimate of the volume of impacted soil, the relative costs of each technology can be estimated and are provided below. In addition, operational issues associated with each technology are illustrated in order to rate the viability of the technologies.

Additional excavation of impacted soil would require the disruption of the pipeline's operations and the removal of a significant amount of clean soil to provide terracing for the excavator and the maintenance of a reasonable slope to the excavation. Given the site location and expected excavation configuration, it is estimated that the relative cost of this option is higher than the recommended option illustrated below. Therefore, due to the operational issues and the relatively high cost, this is not the recommended option for this site.

Soil Vapor Extraction (SVE) is a viable technology to remediate the unsaturated zone at the site given the soil permeability. However, these systems are more effective on more volatile constituents such as those present in refined gasoline. Given the soil conditions and contaminate of concern (COC), a reasonable estimation of the practical radius of influence for each SVE well is approximately 25 feet. The total number of wells and their distribution would depend on the additional data gathered during the recommended geoprobe survey.

The wells would be connected to the system blower by lateral PVC lines installed approximately three feet below grade. The system would require an explosion proof blower in the ten horsepower range, housed in a weatherproof shed. In addition, an electrical supply, electrical panel and associated process logic controllers would be required. An air emission permit for the system effluent and associated monitoring would be required.

Experience with the installation of these systems indicates that the installation costs can be significant. Given the soil type and COC, it is estimated that the system would require approximately two years of operation. System maintenance would include monthly system checks, air monitoring and a possible motor replacement. Electrical costs, maintenance costs and monitoring costs for the system would be approximately $1,500.00 per month. While this technology would effectively remediate the soils at the site, the costs associated with this technology are relatively higher than the recommended option below.

Bioremediation of the COCs at this site is a technically feasible option. ETGI has extensive experience with this technology and has frequently applied hydrocarbon consuming bacteria to the subsurface using the Deep Remediation Injection System (DRIS) system (see below). It is estimated that this technology would also require a remediation period of approximately two years. Total costs, including the well installation, materials cost, inoculant cost, remediation progress monitoring and environmental supervision would be significantly higher than the recommended technology below.

By adding a biovent system to the site, aerobic bio-degradation could be accelerated at the site. This could result in a more rapid bioremediation schedule for the site. However, the cost associated with the installation of the system would represent a significant additional cost.

The chemical oxidation of hydrocarbons in the unsaturated zone, utilizing catalyzed Hydrogen Peroxide (H_2O_2) injected with the DRIS system is the recommended option. This technology is described in Section 4.0.

3.2 Ground Water Remediation

The subsurface data indicate that the only documented impact to the site's ground water is the presence of PSH in monitoring well MW-4. As measured on November 5, 1999, 0.96 feet of product was present in the well. Ground water samples from the remaining wells are non-detect for petroleum constituents. Therefore, the removal of free phase crude on the ground water is the only required ground water remediation at the present time. The product can be removed utilizing a geo-vac type system, hydrophilic belt systems, skimmer pumps or hand bailing. One of these systems will be required at this site due to the presence of PSH in the release area.

Since there are no documented dissolved phase constituents in the ground water, no additional ground water remediation is recommended. If additional site activities or quarterly monitoring detect the presence of a dissolved phase plume at the site, a recommendation will be made at that time.

4.0 REMEDIAL RECOMMENDATIONS

4.1 Free Product Removal

ETGI recommends the installation of an active oil skimmer system in monitoring well MW-

4. These systems are commercially available and remove the PSH without adversely affecting the ground water gradient profile. The oil skimmers can be installed in the existing well can be operated periodically, depending on the recharge rate of the well. The PSH would be stored in a bermed tank and hauled off-site at the required intervals. The minor amount of water produced by the system would be characterized and disposed of at an off-site, permitted facility as needed.

If the geoprobe survey detects the presence of a significant thickness of PSH in areas adjacent to monitoring well MW-4, a recovery well will be installed in the area and an additional skimmer pump will be installed in the well. The cost of this type of pump and associated equipment, including compressor, storage tank, and overfill protection, is approximately $7,800.00 for the first well installed. The incremental additional cost per well is approximately $2,900.00 per well. The expected O&M costs for the skimmer system, including up to three pumps, is approximately $1,000.00 per month.

4.2 Soil Remediation

In order to remediate the petroleum impacted soil, ETGI recommends chemical oxidation of the hydrocarbons in place utilizing the injection of hydrogen peroxide ($H_2O_{2)}$, along with an iron sulfate catalyst. The soil conditions and depth of impacted soil should allow the use of the DRIS System with out the need for pilot holes. The estimated cost for soil remediation at the site using this approach is relatively less than the other viable technologies and the estimated period of soil remediation activities should be approximately six months.

The cost effectiveness of this, or any of the feasible technologies, depends on a good understanding of the vertical and horizontal extent of the impacted soil. The existing data documents the vertical extent of the impacted soil at the release point, however, the horizontal extent is not accurately defined. For this reason, ETGI recommends a geoprobe survey around monitoring well MW-4. It is anticipated that six to ten geoprobe points would be required, depending on the horizontal extent of the impacted soils. Data collected from this survey will be used to finalize the following remediation parameters.

The concentration of petroleum constituents in the stockpiled soil is unknown. ETGI recommends that representative samples of the stockpiled soil be collected such that there is one composite sample for each of the western stockpiles and two composite samples for the eastern stock pile. If these samples are above regulatory limits, it is recommended that the stockpiled soil be subject to remediation similar to that proposed to the impacted soil in place.

4.2.1 Injectate Volume and Composition

An estimate of the mass of crude oil present in the release area will be required before the injectate volume can be estimated. This will require the additional data from the recommended geoprobe survey. The volume of injectate required to remediate the soil to below the regulatory standards will then be calculated. These standards are 10 mg/Kg Benzene, 50 mg/Kg BTEX and 100 mg/Kg TPH. Given typical crude compositions at other, similar release sites, it is assumed that the 100 mg/Kg of TPH will be the limiting factor, therefore this will be considered the critical analyte.

Several published papers and the past Experience of ETGI at other similar sites indicate that a ratio of 5 lbs of a 50% solution of H_2O_2 to 1 lb of contaminant can result in the desired degradation as long as it is properly dispersed and comes into contact with a majority of the contaminant. The volume of injectate required at the site will be estimated using this ratio. In addition, a volume Iron Sulfate ($FeSO_4$), equal to 0.024%, of the amount of Hydrogen Peroxide used, will be injected in a 10 % solution with deionized water prior to the introduction of Hydrogen Peroxide.

It is also well documented that, for the optimal production of hydroxyl radicals, a soil pH of 3 to 4 is required. Prior to injection, several soil samples will be collected to determine if the natural soil pH is in this range. It is probable that the soil pH is somewhat higher than this optimal range and a pH buffering agent (dilute H_2SO_4) will be introduced with the Iron Sulfate.

The literature indicates that within two to three days after the reaction, the remaining H_2O_2 and H_2SO_4 will be below detectable limits. The process involves the conversion of ferrous iron to ferric iron and some portion of ferric iron will probably remain in the soil as a precipitate. Controlled bench scale studies indicate that approximately 20% of the total amount of iron introduced will be converted to ferric iron as a precipitate. This should not degrade permeability in the soil to any significant degree.

4.2.2 Injection Schedule and Progress Monitoring

The estimated total amount of injectate required to remediate the soil will not be applied during a single event. Approximately one-third of the total required will be injected during each of three events. Typically, the events are scheduled approximately one month apart to allow for a complete reaction and stabilization. During the period between events, representative soil samples will be collected to allow for the monitoring of progress at the site and the modification of injection locations or injectate composition as needed. In order to monitor the remedial progress between events, representative soil samples will be collected from the impacted zone at various depths. In addition, ground water samples will be collected from the monitoring wells in the treatment area between each application.

Subsequent to the last event, representative soil samples will be collected from the impacted zone at various depths. If these soil samples indicate that benzene, BTEX and/or TPH concentrations remain at levels significantly above the closure levels, subsequent injection events will be conducted.

4.2.3 Injectate Dispersion Method

The DRIS injection lance utilizes water, under pressures up to 5,000 lbs, to advance the lance into the subsurface. Once the desired depth is reached, valving on the head of the lance and at the DRIS trailer allow the water to be shut off. Subsequently the injectate is introduced to the subsurface under similar pressures. The DRIS unit also utilizes the introduction of pressurized air, in a band of small orifices (jets), located above the injectate jets. The air limits the volume of injectate allowed to escape out the pilot hole and facilitates the lateral movement of the injectate into the subsurface.

By injecting low volumes of liquid inoculates at high pressure, micro-fractures are created in the subsurface. Once the micro-fractures are opened, the inoculates are effectively dispersed into the soil. The DRIS system provides the intimate contact between the inoculate and the contaminant necessary to achieve contaminant reduction or degradation.

4.2.4 Injection Spacing

At the beginning of the first injection event, an area of the site will be selected to conduct a pilot test to determine the required spacing. Initially, a grid, on ten foot spacing, will be laid out and the lance will be advanced at each point. During injection, the movement of injectate from adjacent holes will confirm that the holes are within the radius of influence. Typically, the radius of influence is between five to fifteen feet in this type of soil. Subsequent to this estimate of the radius of influence, a grid will be laid out across the impacted portion of the site.

4.3 Ground Water Remediation

As discussed above, there is no documented dissolved phase plume at the site. However, ETGI will monitor for the presence of such a plume during the geoprobe survey and the ongoing monitoring events. If the presence of a significant plume is detected, a remedial option will be recommended at that time.

5.0 MONITORING PROGRAM

During and subsequent to the recommended activities, the ground water elevations in all site monitoring wells will be gauged and monitored for the presence of PSH on a monthly basis. All of the site monitoring wells will be sampled quarterly and the samples will be submitted for the analysis of BTEX (EPA Method 8020, 5030) and TPH (EPA Method 8015, modified for DRO and GRO). An annual report will be provided with a summary of all field activities and data results. The following developments at the site will warrant timely notification interim to the annual report:

- The detection of COCs in currently non-impacted monitoring wells for two consecutive monitoring periods;
- The detection of PSH in any well in which PSH has not been present previously;
- The recurrence of PSH in any well in which PSH was removed during remedial activities.

The monitoring plan will continue until such time that site closure is granted by the appropriate regulatory agency. Significant trends in COC concentrations or other significant developments at the site may have a bearing on the timing of a closure request.

6.0 QA/QC PROCEDURES

6.1 Soil Sampling

Samples of subsurface soils will be obtained utilizing either a split spoon sampler (air rotary drilling rig) or a two inch, continuous sampling tube with a clean polybuterate liner (geoprobe). Representative soil samples will be divided into two separate portions using clean, disposable gloves and clean sampling tools. One portion of the soil sample will be placed in a disposable sample bag. The bag will be labeled and sealed for head-space analysis using a photo-ionization detector (PID) calibrated to a 100 ppm isobutylene standard. Each sample will be allowed to volatilize for approximately thirty minutes at ambient temperature prior to conducting the analysis.

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

Soil samples will be delivered to Environmental Lab of Texas, Inc. in Midland, Texas for BTEX and TPH analyzes using the methods described below. Soil samples will be analyzed for BTEX and TPH-DRO within fourteen days following the collection date.

The soil samples will be analyzed as follows:

- BTEX concentrations in accordance with EPA Method 8020, 5030
- TPH concentrations in accordance with modified EPA Method 8015-GRO/DRO

6.2 Ground Water Sampling

Monitoring wells will be developed and purged with a clean PVC bailer. The bailer will be cleaned prior to each use with Liqui-Nox detergent and rinsed with distilled water. Monitoring wells with sufficient recharge will be purged by removing a minimum of three well volumes. Monitoring wells that do not recharge sufficiently will be purged until no additional ground water can be obtained.

After purging the wells, ground water samples will be collected with a disposable Teflon sampler and polyethylene line by personnel wearing clean, disposable gloves. Ground water sample containers will be filled in the order of decreasing volatilization sensitivity (i.e., BTEX containers will be filled first and PAH containers second).

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

Ground water samples collected for PAH analysis will be filled to capacity in sterile, 1 liter glass containers equipped with Teflon-lined caps. Ground water samples collected for metals analysis will be filled to capacity in sterile, 1 liter plastic containers equipped with Teflon-lined caps. The containers will be provided by the analytical laboratory.

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

The ground water samples will be analyzed as follows:

- BTEX concentrations in accordance with EPA Method 8020, 5030
- TPH concentrations in accordance with modified EPA Method 8015-GRO/DRO

6.3 Decontamination Of Equipment

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

6.4 Laboratory Protocol

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

7.0 SCHEDULE OF ACTIVITIES

The removal of free product at the site will be initiated within 14 days of approval of the abatement plan. Monitoring of the reduction of PSH at the site and the PSH removal system operations will be conducted on a weekly basis. The proposed geoprobe survey will be undertaken within 30 days of approval of the abatement plan. Active abatement of the impacted soil will be initiated within 15 days of the geoprobe survey. Quarterly monitoring of the site ground water monitoring wells and annual reporting will continue regardless of the status of this plan.

8.0 LIMITATIONS

Environmental Technology Group, Inc. has prepared this Additional Subsurface Investigation Report and Stage 2 Abatement Plan to the best of its ability. No other warranty, expressed or implied, is made or intended.

Environmental Technology Group, Inc. has examined and relied upon documents referenced in the report and has relied on oral statements made by certain individuals. Environmental Technology Group, Inc. has not conducted an independent examination of the facts contained in referenced materials and statements. We have presumed the genuineness of the documents and that the information provided in documents or statements is true and accurate. Environmental Technology Group, Inc. has prepared this report in a professional manner, using the degree of skill and care exercised by similar environmental consultants. Environmental Technology Group, Inc. also notes that the facts and conditions referenced in this report may change over time and the conclusions and recommendations set forth herein are applicable only to the facts and conditions as described at the time of this report.

This report has been prepared for the benefit of EOTT Energy Corp. The information contained in this report including all exhibits and attachments, may not be used by any other party without the express consent of Environmental Technology Group, Inc. and/or EOTT Energy Corp.

DISTRIBUTION

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Midland, Texas 79701

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4600 West Wall Street
Midland, Texas 79703

Copy 4 to: Environmental Technology Group, Inc.
1776 Woodstead Court
Suite 117
The Woodlands, Texas 77380

COPY NO.: 1

TABLES

TABLE 1

SOIL CHEMISTRY DATA
EOTT ENERGY CORP
TNM 97-17
ETGI JOB # 1024C

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)	GRO C6-C10 (mg/kg)	DRO >C10-C25 (mg/kg)
SB-1	11/02/98	15 – 17	5	0.72	6.72	4.91	17.35	6,900	ND	ND
SB-1	11/02/98	20 – 22	6.28	13.2	21.5	31.04	72.02	6,620	ND	ND
MW-1	11/02/98	2 – 4	ND	ND	ND	ND	ND	ND	ND	ND
MW-1	11/02/98	20 – 22	ND	ND	ND	ND	ND	ND	ND	ND
MW-2	11/03/98	0 – 2	ND	ND	ND	ND	ND	ND	ND	ND
MW-2	11/03/98	15 – 17	ND	ND	ND	ND	ND	ND	ND	ND
MW-3	11/03/98	0 – 2	ND	ND	ND	ND	ND	ND	ND	ND
MW-3	11/03/98	20 – 22	ND	ND	ND	ND	ND	451	ND	ND
MW-4	10/27/99	19 - 21	11.00	11.95	19.06	35.61	ND	8,318	2,809	5,509

NOTES:
NA = Not Analyzed
ND = Not Detected
Detection Limits = 0.1 mg/kg BTEX
10 mg/kg TPH
10 mg/kg GRO/DRO

TABLE 2

GROUNDWATER ELEVATION DATA
TNM 97-17
ETGI PROJECT# EOT1024C

WELL NUMBER	DATE MEASURED	DEPTH TO WATER FROM PVC (feet)	ELEVATION OF WATER (feet)		PSH THICKNESS (feet)
			ACTUAL	CORRECTED	
MW-1	01/07/99	22.54	3,488.36	3,488.36	ND
MW-1	03/09/99	22.40	3,488.50	3,488.50	ND
MW-1	06/01/99	22.10	3,488.80	3,488.80	ND
MW-1	11/05/99	22.60	3,488.30	3,488.30	ND
MW-2	01/07/99	21.47	3,487.76	3,487.76	ND
MW-2	03/09/99	21.11	3,488.12	3,488.12	ND
MW-2	06/01/99	21.88	3,487.35	3,487.35	ND
MW-2	11/05/99	21.51	3,487.72	3,487.72	ND
MW-3	01/07/99	21.08	3,487.74	3,487.74	ND
MW-3	03/09/99	21.00	3,487.82	3,487.82	ND
MW-3	06/01/99	20.71	3,488.11	3,488.11	ND
MW-3	11/05/99	21.10	3,487.72	3,487.72	ND
MW-4	11/05/99	21.92	3,487.23	3,488.05	0.96

TABLE 3

GROUNDWATER CHEMISTRY DATA
TNM 97-17
ETGI # EOT1024C

SAMPLE LOCATION	SAMPLE DATE	BENZENE (mg/L)	TOLUENE (mg/L)	ETHYL-BENZENE (mg/L)	XYLENES (mg/L)	TOTAL BTEX (mg/L)
MW-1	02/03/99	ND	ND	ND	ND	ND
MW-1	05/13/99	ND	ND	ND	ND	ND
MW-1	08/23/99	ND	ND	0.004	ND	ND
MW-1	11/05/99	ND	ND	ND	ND	ND
MW-2	02/03/99	ND	ND	ND	ND	ND
MW-2	05/13/99	ND	ND	ND	ND	ND
MW-2	08/23/99	ND	ND	ND	ND	ND
MW-2	11/05/99	ND	ND	ND	ND	ND
MW-3	02/03/99	ND	ND	ND	ND	ND
MW-3	05/13/99	ND	ND	ND	ND	ND
MW-3	08/23/99	ND	ND	ND	ND	ND
MW-3	11/05/99	ND	ND	ND	ND	ND

Note: Detection limit = 0.001 mg/L

FIGURES

FIGURE
1

Site Location Map

Environmental
Technology
Group, Inc.

Not To Scale

EOTT Energy Corp.
Eott Release Site 97-17
Lea County, NM

11 - 22 - 99 RS

ETGI Project # EOT 1024C

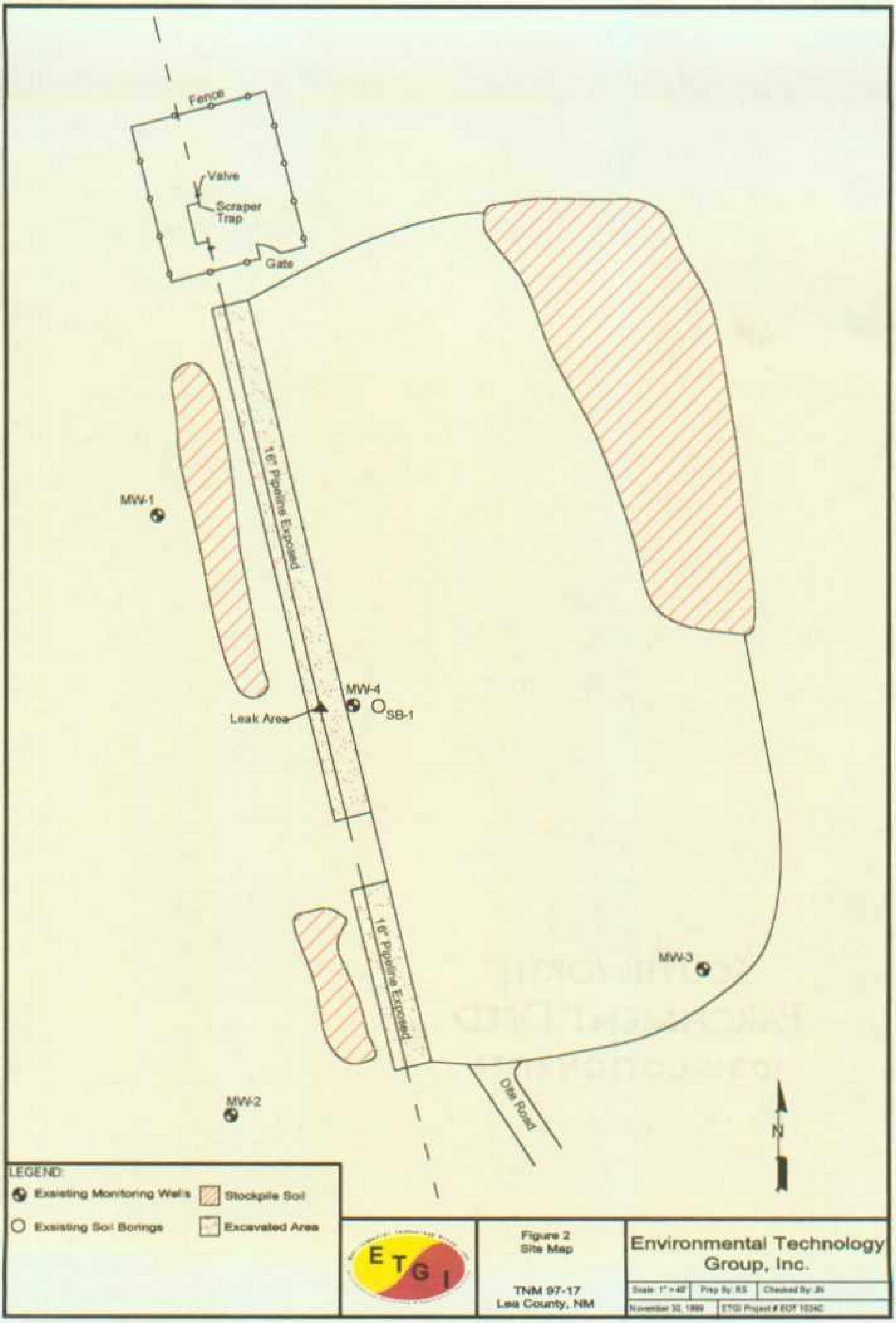


Figure 2
Site Map

TNM 97-17
Lea County, NM

Environmental Technology Group, Inc.

Scale: 1" = 40'	Prep By: RS	Checked By: JN
November 30, 1999	ETGI Project # EOT 1034C	

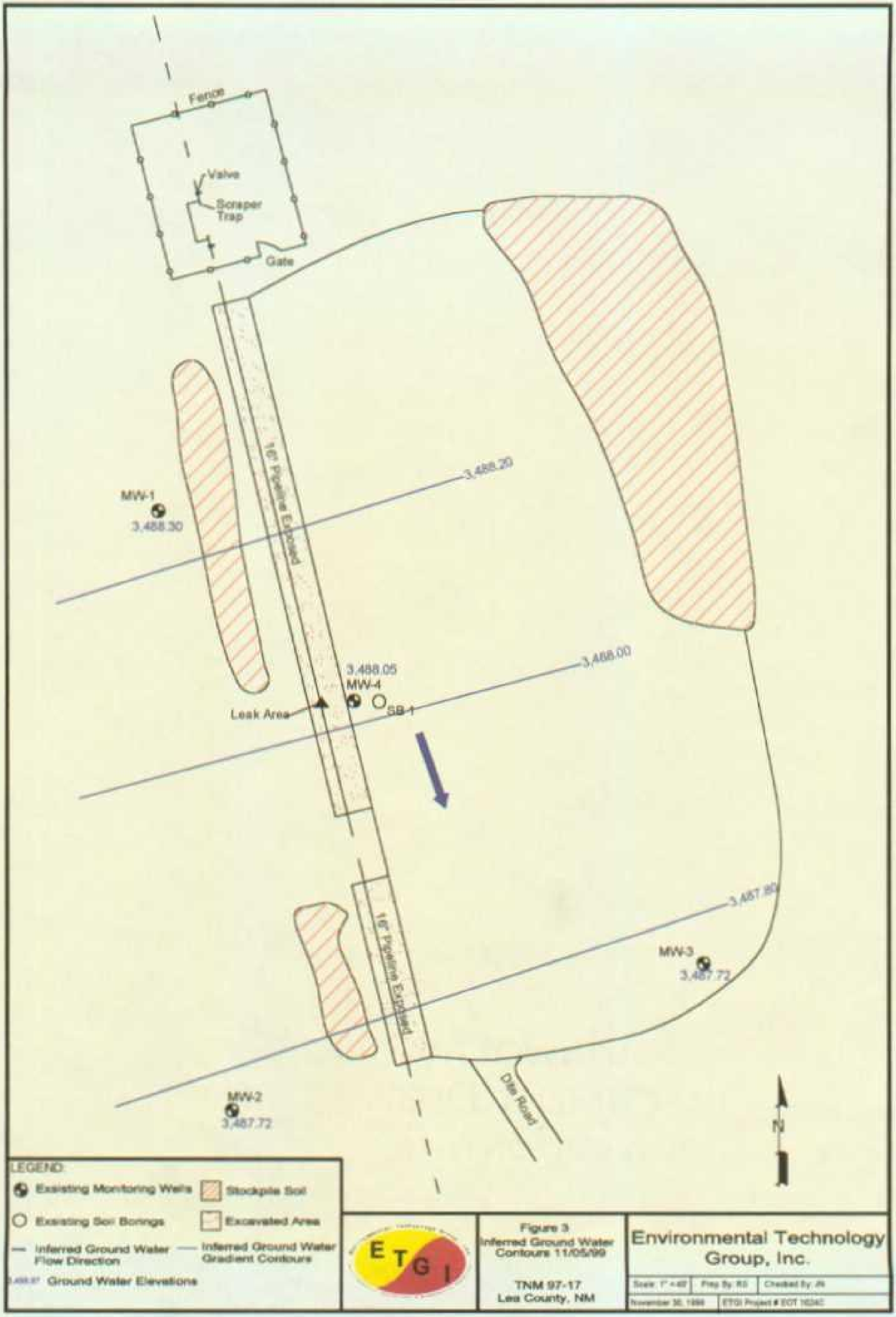


Figure 3
Inferred Ground Water Contours 11/05/99

TNM 97-17
Lea County, NM

Environmental Technology Group, Inc.

Scale: 1" = 40'
Prep By: RS
Checked By: JN
November 30, 1999
ETGI Project # EOT 1024C

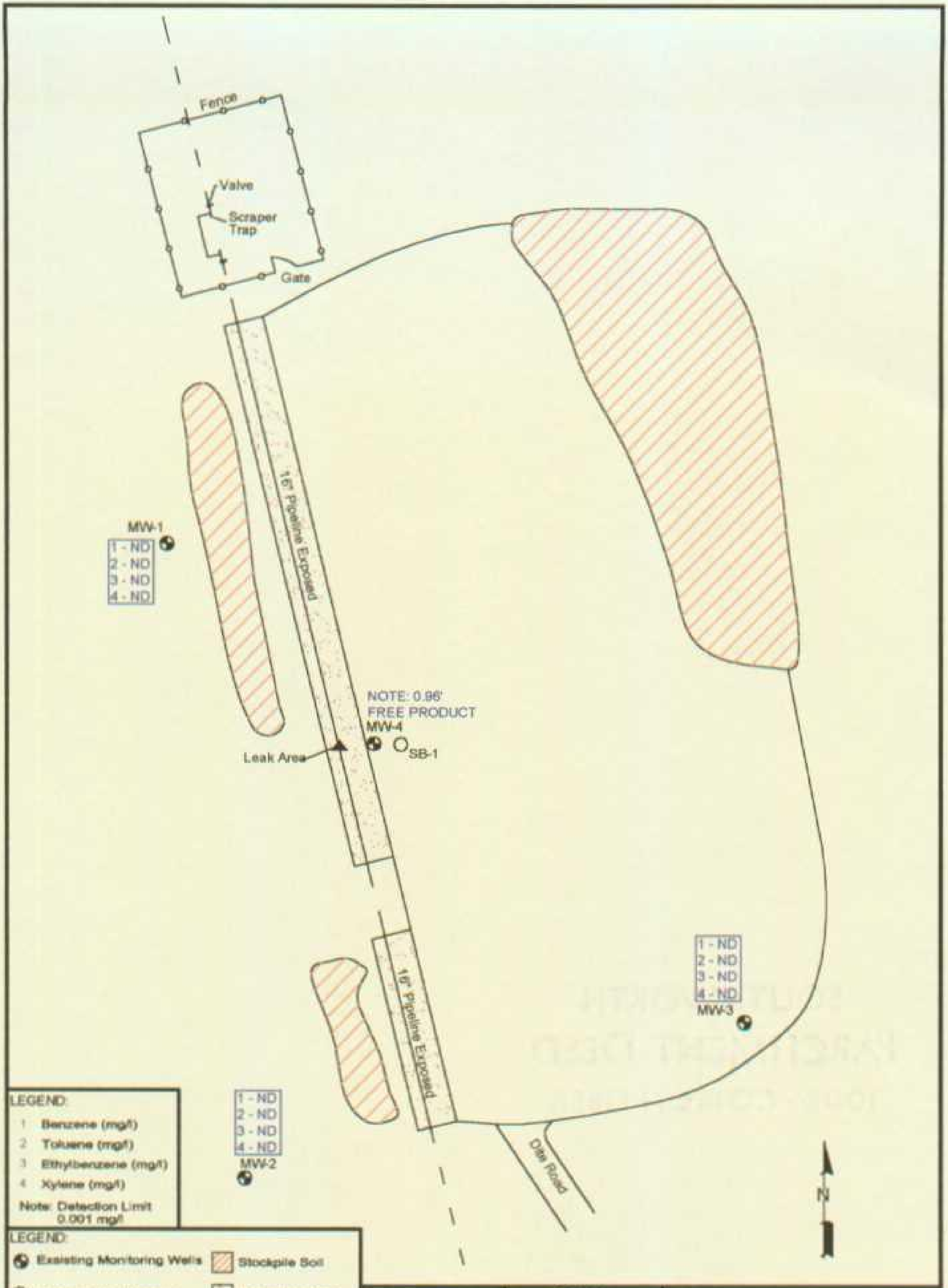


Figure 4
Ground Water Chemisrty
Map 11/06/99

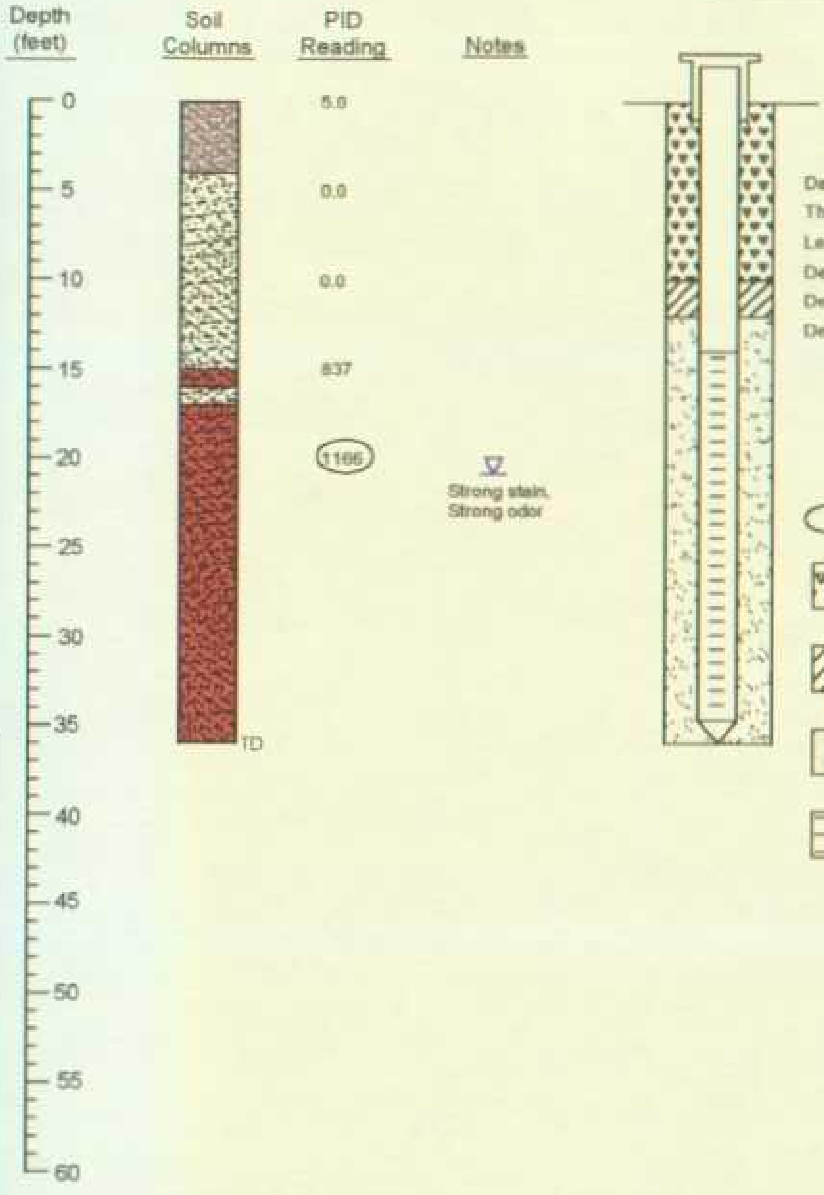
TNM 97-17
Lea County, NM

Environmental Technology Group, Inc.

Scale: 1" = 40'	Prep By: RS	Checked By: JN
November 30, 1999	ETGI Project # EOT 1024C	

APPENDIX A

Monitoring Well MW-4



Monitoring Well Details

Date Drilled	10 - 27 - 99
Thickness of Bentonite Seal	2.0 ft
Lenght of PVC Well Screen	20 ft
Depth of PVC Well	36 ft
Depth of Exploratory Well	36 ft
Depth to Ground Water	20 ft

○	Indicates samples selected for laboratory analysis.
▼	Grout Surface Seal
▨	Bentonite Pellet Seal
☐	Sand Pack
☰	Screen

Legend

▒	Sand - (SP) - Black, Grey, very fine grained, well sorted, silty, heavy stain, strong odor
🟥	Sand - (SM) - Dark Brown, very fine grained, well sorted, moderate stain, moderate to strong odor
░	Sand - (SM) - White, Tan, very fine grained, well sorted, no stain, no odor

▼	Indicates the PSH level measured on date.
∇	Indicates the ground water level measured on date.
PID	Head-space reading in ppm obtained with a photo-ionization detector.
ND	Indicates the consfluent was not detected

Legend

1. The monitoring well was installed on date using air rotary dailing techniques.
2. The well was constructed with 2" ID, 0.010 inch jactory slotted, threaded joint, schedule 40 PVC pipe.
3. The well is protected with a locked slick up steel cover and a compression cap.
4. The lines between material types shown on the profile log represent approxiate boundaries. Actual transitions may be gradual.
5. The depths indicated are referenced from the ground surface.

Boring Log And Monitoring Well Details

Monitoring Well - 4

EOTT Energy Corp. TMN 97 - 17 Lea County, NM

Environmental Technology Group, Inc.

Scale: NTS	Prep By: RS	Checked By: JT
November 11, 1999	ETGI Project # EOT 1024C	

APPENDIX B

ENVIRONMENTAL
LAB OF , INC.

"Don't Treat Your Soil Like Dirt!"

ETGI
ATTN: MR. JESSE TAYLOR
P.O. BOX 4845
MIDLAND, TEXAS 79704
FAX: 915-520-4310
FAX: 505-392-3760(Ken Dutton)

Sample Type: Soil
Sample Condition: Intact/Iced
Project #: TNM 97-17
Project Name: None Given
Project Location: Lea County, N.M.

Sampling Date: 10/27/99
Receiving Date: 10/30/99
Analysis Date: 11/01/99

ELT#	FIELD CODE	BENZENE (mg/kg)	TOLUENE (mg/kg)	ETHYLBENZENE (mg/kg)	m,p-XYLENE (mg/kg)	o-XYLENE (mg/kg)
21152	MW-4 (19'-21')	11.00	11.95	19.06	25.23	10.38
	% IA	91	89	89	89	89
	% EA	93	86	88	88	89
	BLANK	<0.100	<0.100	<0.100	<0.100	<0.100

METHODS: SW 846-8021,5030

Raland K Tuttle
Raland K. Tuttle

11-5-99
Date

ENVIRONMENTAL LAB OF , INC.

"Don't Treat Your Soil Like Dirt!"

ETGI
ATTN: MR. JESSE TAYLOR
P.O. BOX 4845
MIDLAND, TEXAS 79704
FAX: 505-392-3760 (Ken Dutton)
FAX: 915-520-4310

Sample Type: Soil
Sample Condition: Intact/Iced
Project #: TNM 97-17
Project Name: None Given
Project Location: Lea County, N.M.

Sampling Date: 10/27/99
Receiving Date: 10/30/99
Analysis Date: 11/02 & 11/03/99

ELT#	FIELD CODE	GRO C6-C10 mg/kg	DRO >C10-C25 mg/kg
21152	MW-4 (19'-21')	2809	5509
	% INSTRUMENT ACCURACY	110	100
	% EXTRACTION ACCURACY	109	100
	BLANK	<10	<10

Methods: EPA SW 846-8015M GRO/DRO

Raland K.Tuttle

11-5-99
Date

En onmental Lab of Texas, Inc. 12600 West I-20 Odessa, Texas 79763
(915) 563-1800 FAX (915) 563-1713

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST
COC: 029

Project Manager: JESSE TAYLOR
Phone #: (915) 664-9166
FAX #: (915) 520-4310
Company Name & Address: ETGI, P.O. BOX 4845
MIDLAND TX 79704
Project #: TNM 97-17
Project Name: —
Project Location: LEA COUNTY NM
Sampler Signature: Ken Dutton

ANALYSIS REQUEST

LAB # (LAB USE ONLY)	FIELD CODE	# CONTAINERS	Volume/Amount	MATRIX: WATER	SOIL	AIR	SLUDGE	OTHER	PRESERVATIVE METHOD: HCL	HNO3	ICE	NONE	OTHER	SAMPLING: DATE 1999	TIME	BTEX 8020	TPH 418.1	TCLP Metals Ag As Ba Cd Cr Pb Hg Se	Total Metals Ag As Ba Cd Cr Pb Hg Se	TCLP Volatiles	TCLP Semi Volatiles	TDS	RCI	TPH 8015 DRO/GRO
	MW-4 (19'-21')	1	4oz		X						X			10-27	1500	X								X

Relinquished by:	Date:	Time:	Received by:
Ken Dutton	30 OCT 99	1420	Rolack
Relinquished by:	Date:	Time:	Received by:
Relinquished by:	Date:	Time:	Received by Laboratory:

REMARKS
FAX Results:
K. DUTTON,
(505) 392-3760

INVOICE: LENMAN FROST PO# 7015M

ENVIRONMENTAL LAB OF , INC.

"Don't Treat Your Soil Like Dirt!"

ETGI
ATTN: MR. JESSE TAYLOR
P.O. BOX 4845
MIDLAND, TEXAS 79704
FAX: 505-392-3760(Ken Dutton)

Sample Type: Water
Sample Condition: Intact/Iced/HCl
Project #: EOT 1015C
Project Name: TNM 97-17
Project Location: Lea County, N.M.

Sampling Date: 11/05/99
Receiving Date: 11/06/99
Analysis Date: 11/06/99

ELT#	FIELD CODE	BENZENE mg/L	TOLUENE mg/L	ETHYLBENZENE mg/L	m,p-XYLENE mg/L	o-XYLENE mg/L
21395	MW-1	<0.001	<0.001	0.004	<0.001	<0.001
21396	MW-2	<0.001	<0.001	<0.001	<0.001	<0.001
21397	MW-3	<0.001	<0.001	<0.001	<0.001	<0.001
	% IA	105	101	102	103	102
	% EA	103	98	98	99	98
	BLANK	<0.001	<0.001	<0.001	<0.001	<0.001

METHODS: SW 846-8021.5030

Celey D. Keene

11/8/99
Date

Environmental Lab of Texas, Inc.

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

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

COC 38

Project Manager: Jesse Taylor

Phone #: (915) 664-9166

FAX #: (505) 392-3760

Company Name & Address: ETGI
P.O. Box 4845 Midland, TX 79704

Project #: EOT 1015 C

Project Name : TNM 97-17

Project Location: Lea County, NM

Sampler Signature: Simon Casas

ANALYSIS REQUEST

LAB # (LAB USE ONLY)	FIELD CODE	# CONTAINERS	Volume/Amount	MATRIX: WATER	MATRIX: SOIL	MATRIX: AIR	MATRIX: SLUDGE	MATRIX: OTHER	PRESERVATIVE METHOD: HCL	PRESERVATIVE METHOD: HNO3	PRESERVATIVE METHOD: ICE	PRESERVATIVE METHOD: NONE	PRESERVATIVE METHOD: OTHER	SAMPLING: DATE 1999	SAMPLING: TIME	BTEX 8020/	TPH 418.1	TCLP Metals Ag As Ba Cd Cr Pb Hg Se	Total Metals Ag As Ba Cd Cr Pb Hg Se	TCLP Volatiles	TCLP Semi Volatiles	TDS	RCI
21395	MW 1	2	V	X					X		X			11-5	1230	X							
21396	MW 2	↓	↓	↓					↓		↓			↓	1250	↓							
21397	MW 3	↓	↓	↓					↓		↓			↓	1307	↓							

Relinquished by: Simon Casas	Date: 11-6-99	Times:	Received by:
Relinquished by: Ken Dutton	Date: 11-6-99	Times: 1308	Received by: J McMurry
Relinquished by:	Date:	Times:	Received by Laboratory:

REMARKS

Mail results to K. Dutton

Invoice Lennah Frost PO #1015 M