

**3R - 386**

**2011 AGWMR**

**02 / 01 / 2012**



February 1, 2012

Mr. Glenn Von Gonten  
New Mexico Oil Conservation Division  
1220 South St. Francis Drive  
Santa Fe, New Mexico 87505  
(505) 476-3488

**RE: OH Randel #7 – 2011 Annual Groundwater Report  
OCD Case File No. – 3RP-386**

Mr. Von Gonten,

Please find attached the *2011 Annual Groundwater Report* for the OH Randel #7 well site, located in Unit D, Section 15, Township 26N, Range 11W, San Juan County, New Mexico. If you have any questions or comments, please feel free to contact me at your convenience.

A handwritten signature in black ink, appearing to read 'J. McDaniel'.

James McDaniel  
EH&S Supervisor, CHMM #15676  
XTO Energy, Inc.  
(505) 333-3701



CC: Steve Austin, NNEPA  
Brandon Powell, NMOCD Aztec Division  
Bill Freeman, NNEPA



February 1, 2012

Mr. Steve Austin  
Navajo Nation Environmental Protection  
PO Box 1999  
Shiprock, New Mexico 87420

**RE: OH Randel #7 – 2011 Annual Groundwater Report  
OCD Case File No. – 3RP-386**

Mr. Austin,

Please find attached the *2011 Annual Groundwater Report* for the OH Randel #7 well site, located in Unit D, Section 15, Township 26N, Range 11W, San Juan County, New Mexico. If you have any questions or comments, please feel free to contact me at your convenience.

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James McDaniel  
EH&S Supervisor, CHMM #15676  
XTO Energy, Inc.  
(505) 333-3701



CC: Glen VonGoten, NMOCD Santa Fe  
Brandon Powell, NMOCD Aztec Division  
Bill Freeman, NNEPA



**2011 ANNUAL GROUNDWATER REPORT**

**OH Randel #7**

**3RP-386**

**Unit D, Section 15, Township 26N, Range 11W  
San Juan County, New Mexico**

**PREPARED FOR:**

**Mr. Glenn Von Gonten  
New Mexico Oil Conservation Division  
1220 South St. Francis Drive  
Santa Fe, New Mexico 87505**

**January 2012**

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# 2011 XTO GROUNDWATER REPORT

## OH RANDEL #007 3RP-386

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### SITE DETAILS

LEGALS - TWN: 26N  
OCD HAZARD RANKING: 20  
LATITUDE: 36.49194

RNG: 11W

SEC: 15                      UNIT: D  
LAND TYPE: NAVAJO  
LONGITUDE: 107.99572

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### INTRODUCTION

XTO Energy Inc. (XTO) acquired the OH Randel #007 well site from Amoco Production Company (Amoco) in January 1998. This is a gas producing well in the Dakota Sandstone and Gallegos Gallup formations and is currently active. This location is located near an irrigated field owned and operated by Navajo Agricultural Products Inc. (NAPI). A topographic map is included as **Figure 1**.

### HISTORY

In March 2002 during equipment upgrades XTO encountered hydrocarbon impacted soil that was assumed to be an abandoned earthen separator pit. The submitted Pit Closure report is included as **Attachment 1**. Soil samples were collected and a groundwater monitoring well MW-1 was installed to determine impact to groundwater. The Completion Diagram and Borehole Log is presented **Figure 3**. Groundwater was encountered at 16 feet below ground surface. After installation of the monitoring well, 3.84 inches of free phase product was discovered at a depth of 16.36 feet below ground surface. Additional monitoring wells (MW-2, MW-3, MW-4, MW-5 & MW-6) were installed near the source area; upgradient, downgradient and crossgradient of the source area. Completion Diagrams and Borehole Logs for the monitoring wells installed in April 2002 are presented in **Figures 4-8**.

Phase separated hydrocarbons (PSH) were observed in monitoring wells MW-1, MW-2 and MW-6 during 2002-2004 sampling events. A total of approximately 22 gallons of product was recovered by hand bailing the PSH as of January 2006.

The 2005 annual groundwater report was submitted to the New Mexico Oil Conservation Division (OCD) in January 2006 proposing excavation of soil impacted by the former separator pit and the installation of additional groundwater monitoring wells to further delineate hydrocarbon impact to groundwater.

XTO submitted a remediation work plan to Mr. Steve Austin with the Navajo Nation EPA (NNEPA) in August of 2006. A copy of this work plan, written by Lodestar Services, Inc. (Lodestar), is included as **Attachment 2**. This work plan was approved in October of 2006. The first phase of the work plan was excavation of the earthen separator pit to beneath the water table and backfilling with clean soil, which was completed in November of 2006. Approximately 9,000 cubic yards of hydrocarbon impacted soil was removed and transported offsite to an approved landfarm. No PSH was observed during the November 2006 excavation work. Monitoring wells MW-1, MW-2 and MW-6 were removed during the excavation. The US EPA Region 9 and NNEPA approved the closure of the excavation as described in the Lodestar Report of Excavation and Sampling, which is

## 2011 XTO GROUNDWATER REPORT

included as **Attachment 3**. Following the excavation work, groundwater from monitoring wells MW-3, MW-4, and MW-5 revealed no detectable concentrations or trace concentrations of dissolved hydrocarbons all beneath New Mexico Water Quality Control Commission (WQCC) standards.

The 2006 annual groundwater report was submitted to the OCD in February 2007 proposing installation of additional groundwater monitoring wells (MW-7 & MW-8) to the north and east of the former source area and quarterly sampling.

Monitoring wells MW-7 and MW-8 were installed to the north and the east of the former pit in May 2007. Completion Diagrams and Borehole Logs are presented in **Figures 9-10**. It appeared that groundwater impact throughout the excavated area had been adequately delineated with the exception of the far northwest edge (MW-7). XTO proposed to evaluate other potential sources of groundwater impact in this area and screen appropriate remediation methods.

The 2007 annual groundwater report was submitted to the OCD in February of 2008 proposing to discontinue sampling of monitoring wells MW-3, MW-4, and MW-5, and to begin sampling of monitoring wells MW-7 and MW-8 on a semi-annual basis.

The 2008 annual groundwater report was submitted to the OCD in April 2009 proposing installation of two (2) additional monitoring wells, (MW-9 & MW-10), the addition of a chemical oxygenate to monitoring well MW-7, and the beginning of quarterly sampling.

Monitoring wells MW-9 and MW-10 were installed in July 2009. The water bearing unit that supplies the existing groundwater monitoring wells was practically dry. The existing monitoring wells are completed in low hydraulically conducting clay. Monitoring wells MW-9 and MW-10 were complete when drilling encountered the same impermeable clay bed. After allowing 24 hours for the new wells to fill in with water MW-9 contained only 1 ½ feet of water and did not recharge after purging dry while MW-10 never filled with water and was ultimately plugged. The completion diagrams and borehole logs are presented at **Figures 11-13**. Monitoring well MW-9 was sampled after development.

The 2009 Annual Groundwater report was submitted to Mr. Glenn Von Gonten in March of 2010. The report recommended the continued use of chemical oxygenate in monitoring well MW-7 to enhance the bioremediation of the hydrocarbon constituents found in the groundwater aquifer. The 2009 Annual Groundwater Report also recommended the continued quarterly sampling of monitoring wells MW-7 and MW-9, as well as to discontinue sampling of monitoring well MW-8 due to four (4) consecutive sampling events returning results below the WQCC standards.

The 2010 Annual Groundwater report was submitted to Mr. Glenn Von Gonten of NMOCD and Mr. Steve Austin with NNEPA in March of 2011. The report recommended continued quarterly monitoring of monitoring well MW-7, as well as to discontinue monitoring of monitoring well MW-9 due to four (4) consecutive sampling events returning results below the WQCC standards for all BTEX constituents. XTO also proposed the addition of hydrogen peroxide into the groundwater aquifer at this site, using monitoring well MW-7 as a conduit.

The report summary of water level data and laboratory results from historical and current groundwater monitoring is included as **Table 1** and **Table 2**. Copies of the laboratory

## 2011 XTO GROUNDWATER REPORT

data sheets and associated quality assurance/quality control data for 2011 are included as **Attachment 4**.

### **METHODOLOGY**

Monitoring well MW-7 was sampled quarterly during 2011 for benzene, toluene, ethyl benzene and total xylene (BTEX).

#### *Water Level Measurements*

Static groundwater level monitoring includes recording depth to groundwater measurements with a Keck oil/water interface probe. The interface probe is decontaminated with Alconox™ soap and rinsed with de-ionized water prior to each measurement. A summary of water level data is included in **Table 1**.

#### *Groundwater Sampling*

Prior to sampling groundwater, depth to groundwater and total depth of wells is measured with a Keck oil/water interface probe. Presence of any free-phase crude oil is also investigated using the interface probe. The interface probe is decontaminated with Alconox™ soap and rinsed with de-ionized water prior to each measurement. The volume of water in the wells is calculated, and a minimum of three casing volumes of water is purged from each well using a disposable bailer or a permanent decontaminated PVC bailer. As water is extracted, pH, electric conductivity and temperature are monitored. Wells are purged until these properties stabilize, indicating that the purge water is representative of aquifer conditions. Stabilization is defined as three consecutive stable readings for each water property ( $\pm 0.4$  units for pH,  $\pm 10$  percent for electric conductivity and  $\pm 2^\circ$  C for temperature). All purge water is disposed of into tanks on site.

Once each monitoring well is properly purged, groundwater samples are collected by filling at least two 40-milliliter (ml) glass vials. The pre-cleaned, non-preserved vials are filled and capped with no air inside to prevent degradation of the sample. Samples are labeled with the date and time of collection, well designation, project name, collector's name and parameters to be analyzed. They are immediately sealed and packed on ice. The samples are shipped to Environmental Science Corporation (ESC) based in Mt. Juliet, Tennessee. Samples were packaged with ice in a cooler and shipped to ESC via Fed-ex overnight to ensure samples were cold and did not exceed their holding time. Proper chain-of-custody (COC) procedures are followed with logs documenting the date and time sampled, sample number, type of sample, sampler's name, preservative used, analyses required and sampler's signature. Field Notes are included as **Attachment 5**.

#### *Groundwater Contour Maps*

Top of casing well elevations are surveyed using a surveyor's level; and groundwater elevations obtained from monitoring wells during site visits are used to draft groundwater contour maps. Contours are inferred based on groundwater elevations obtained and observation of physical characteristics at the site (topography, proximity to irrigation ditches, etc.).

### **RESULTS**

Laboratory results from MW-7 showed decreasing concentrations of BTEX when compared to concentrations detected in 2010. Benzene concentrations declined from a maximum of 2,200 micrograms per liter ( $\mu\text{g/l}$ ) in February 2011 to a minimum of 26  $\mu\text{g/l}$  in November 2011. Toluene concentrations declined from a maximum of 1,000  $\mu\text{g/l}$  in February 2011 to a minimum of 16  $\mu\text{g/l}$  in November 2011. Ethylbenzene concentrations



## 2011 XTO GROUNDWATER REPORT

declined from a maximum of less than 120 µg/l in February 2011 to a minimum of 2.3 µg/l in November 2011. Total xylenes concentrations declined from a maximum of 1,800 µg/l in February 2011 to a minimum of 20 µg/l in November 2011. Laboratory reports are included in **Attachment 4**.

Field data collected during site monitoring activities indicate the groundwater flow direction varies from north to northeast with a gradient ranging from 0.12 feet per foot to 0.2 feet per foot. Groundwater at this site may be influenced by irrigation of a field adjacent to the location. Additionally, it is possible the groundwater at this site is a shallow water table created by irrigation water from this field. The tendency of the monitoring wells to bail dry indicate that the aquifer is tight, and most likely could not be used for beneficial use. **Figure 2** illustrates the estimated groundwater gradients for 2011.

### **CONCLUSIONS**

Laboratory results from groundwater monitoring in 2011 indicate that benzene concentrations in monitoring well MW-7 remain over the WQCC limits, however, toluene, ethylbenzene, and total xylenes concentrations were below the WQCC standards for three of the past four monitoring events dating back to February 2011. BTEX concentrations in MW-7 are declining steadily. Based on the historical groundwater results for this area, and the shallow groundwater gradient, it seems that the benzene and xylene impact is confined to a small area surrounding monitoring well MW-7, and is not migrating off site.

### **RECOMMENDATIONS**

XTO contracted LT Environmental, Inc. (LTE) analyze beneficial use of groundwater at the Site (**Attachment 6**). This analysis concluded that attenuation of BTEX in groundwater is an ongoing process that will continue through natural processes and migration of any residual BTEX will be restricted by the subsurface lithology and hydrologic properties of the aquifer. Groundwater at the Site is not a current source of beneficial use. Based on the poor background water quality of the aquifer, legal restrictions on its source for uses other than irrigation, and low productivity, the aquifer is not a viable source for any beneficial use in the future. As such, XTO is requesting Site closure from the NMOCD based on the lack of present and reasonably foreseeable beneficial use of the impacted groundwater (**Attachment 6**).

Following NMOCD and NNEPA approval for closure, all monitoring well locations will be abandoned in accordance with the monitoring well abandonment plan.

# **Table 1**

## **Water Level Summary Table**

**TABLE 5**

**GROUNDWATER ELEVATION SUMMARY  
O H RANDEL #007  
XTO ENERGY, INC.**

<b>Well ID</b>	<b>Date</b>	<b>Depth to Product (feet BTOC)</b>	<b>Depth to Water (feet BTOC)</b>	<b>Groundwater Elevation (feet AMSL)</b>
MW-1	4/22/2002	16.30	16.63	No Survey Data
MW-1	4/24/2002	NM	NM	No Survey Data
MW-1	8/27/2002	16.19	16.49	No Survey Data
MW-1	10/08/2002	15.79	16.16	No Survey Data
MW-1	5/23/2003	15.73	16.04	No Survey Data
MW-1	5/28/2003	15.81	15.99	No Survey Data
MW-1	6/6/2003	15.93	16.04	No Survey Data
MW-1	6/18/2003	15.97	16.04	No Survey Data
MW-1	6/26/2003	17.85	17.93	No Survey Data
MW-1	7/31/2003	16.18	16.19	No Survey Data
MW-1	8/29/2003	NM	16.29	No Survey Data
MW-1	6/21/2004	16.28	17.09	No Survey Data
MW-1	9/20/2006	0.00	22.28	No Survey Data
MW-1	12/5/2006 *	NM	NM	No Survey Data

MW-2	4/22/2002	NM	18.32	No Survey Data
MW-2	4/24/2002	18.35	18.38	No Survey Data
MW-2	8/27/2002	18.92	19.86	No Survey Data
MW-2	10/08/2002	17.50	18.02	No Survey Data
MW-2	5/23/2003	17.30	17.83	No Survey Data
MW-2	5/28/2003	17.62	17.78	No Survey Data
MW-2	6/6/2003	17.71	17.83	No Survey Data
MW-2	6/18/2003	17.79	17.88	No Survey Data
MW-2	6/26/2003	16.05	16.09	No Survey Data
MW-2	7/31/2003	NM	15.86	No Survey Data
MW-2	8/29/2003	NM	15.99	No Survey Data
MW-2	6/21/2004	16.10	16.83	No Survey Data
MW-2	9/20/2006	0.00	17.15	No Survey Data
MW-2	12/5/2006 *	NM	NM	No Survey Data

MW-3	4/22/2002	0.00	16.26	6312.95
MW-3	4/24/2002	0.00	16.25	6312.96
MW-3	8/27/2002	0.00	15.28	6313.93



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MW-3	10/8/2002	0.00	14.74	6314.47
MW-3	3/3/2003	0.00	15.17	6314.04
MW-3	6/18/2003	0.00	15.16	6314.05
MW-3	8/29/2003	0.00	15.39	6313.82
MW-3	9/20/2006	NM	NM	NM
MW-3	12/5/2006	0.00	13.85	6315.36
MW-3	3/8/2007	0.00	13.40	6315.81
MW-3	5/17/2007	0.00	12.87	6316.34
MW-3	8/9/2007	0.00	12.37	6316.84
MW-3	5/12/2008	0.00	14.83	6314.38
MW-3	11/7/2008	0.00	13.92	6315.29
MW-3	7/8/2009	0.00	14.14	6315.07
MW-3	11/5/2009	0.00	14.53	6314.68
MW-3	5/25/2010	0.00	14.21	6315.00
MW-3	8/12/2010	0.00	NM	NM
MW-3	11/17/2010	0.00	15.30	6313.91
MW-3	2/14/2011	NM	NM	NM
MW-3	5/17/2011	0.00	15.74	6313.47
MW-3	8/9/2011	0.00	15.87	6313.34
MW-3	11/9/2011	0.00	16.21	6313.00

MW-4	4/22/2002	0.00	16.63	6311.45
MW-4	4/24/2002	0.00	16.66	6311.42
MW-4	8/27/2002	0.00	16.47	6311.61
MW-4	10/8/2002	0.00	16.03	6312.05
MW-4	3/3/2003	0.00	15.94	6312.14
MW-4	6/18/2003	0.00	16.03	6312.05
MW-4	8/29/2003	0.00	16.29	6311.79
MW-4	9/20/2006	NM	NM	NM
MW-4	12/5/2006	0.00	13.75	6314.33
MW-4	3/8/2007	0.00	12.55	6315.53
MW-4	5/17/2007	0.00	13.03	6315.05
MW-4	8/9/2007	0.00	12.59	6315.49



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XTO ENERGY, INC.**

<b>Well ID</b>	<b>Date</b>	<b>Depth to Product (feet BTOC)</b>	<b>Depth to Water (feet BTOC)</b>	<b>Groundwater Elevation (feet AMSL)</b>
MW-4	5/12/2008	0.00	12.57	6315.51
MW-4	11/7/2008	0.00	13.68	6314.40
MW-4	7/8/2009	0.00	13.72	6314.36
MW-4	11/5/2009	0.00	14.12	6313.96
MW-4	5/25/2010	0.00	13.86	6314.22
MW-4	8/12/2010	0.00	14.39	6313.69
MW-4	11/17/2010	0.00	14.60	6313.48
MW-4	2/14/2011	0.00	15.55	6312.53
MW-4	5/17/2011	0.00	14.95	6313.13
MW-4	8/9/2011	0.00	15.11	6312.97
MW-4	11/9/2011	0.00	15.38	6312.70

MW-5	4/22/2002	0.00	19.11	6314.12
MW-5	4/24/2002	0.00	19.14	6314.09
MW-5	8/10/2002	0.00	19.10	6314.13
MW-5	6/18/2003	0.00	18.86	6314.37
MW-5	6/21/2004	0.00	19.64	6313.59
MW-5	6/28/2005	0.00	17.30	6315.93
MW-5	9/20/2006	NM	NM	NM
MW-5	12/5/2006	0.00	18.65	6314.58
MW-5	3/8/2007	0.00	18.15	6315.08
MW-5	5/17/2007	0.00	17.78	6315.45
MW-5	8/9/2007	0.00	NM	NM
MW-5	5/12/2008	0.00	18.82	6314.41
MW-5	11/7/2008	0.00	18.90	6314.33
MW-5	7/8/2009	0.00	20.08	6313.15
MW-5	11/5/2009	0.00	20.44	6312.79
MW-5	5/25/2010	0.00	20.33	6312.90
MW-5	8/12/2010	0.00	20.51	6312.72
MW-5	11/17/2010	0.00	20.93	6312.30
MW-5	2/14/2011	0.00	20.97	6312.26
MW-5	5/17/2011	0.00	21.20	6312.03
MW-5	8/9/2011	0.00	21.47	6311.76



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<b>Well ID</b>	<b>Date</b>	<b>Depth to Product (feet BTOC)</b>	<b>Depth to Water (feet BTOC)</b>	<b>Groundwater Elevation (feet AMSL)</b>
MW-5	11/9/2011	0.00	21.69	6311.54

MW-6	4/22/2002	0.00	18.31	No Survey Data
MW-6	4/24/2002	0.00	18.32	No Survey Data
MW-6	8/27/2002	NM	NM	No Survey Data
MW-6	10/8/2002	16.84	18.13	No Survey Data
MW-6	5/23/2003	16.62	17.95	No Survey Data
MW-6	5/28/2003	16.68	17.90	No Survey Data
MW-6	6/6/2003	16.80	18.00	No Survey Data
MW-6	6/18/2003	16.78	18.02	No Survey Data
MW-6	6/26/2003	16.88	18.10	No Survey Data
MW-6	7/31/2003	17.77	19.13	No Survey Data
MW-6	8/29/2003	16.88	18.34	No Survey Data
MW-6	6/21/2004	17.78	18.95	No Survey Data
MW-6	9/20/2006	15.79	16.87	No Survey Data
MW-6	12/5/2006 *	NM	NM	No Survey Data

MW-7	5/17/2007	0.00	15.46	6315.90
MW-7	8/9/2007	0.00	14.72	6316.64
MW-7	11/27/2007	0.00	14.91	6316.45
MW-7	5/12/2008	0.00	15.12	6316.24
MW-7	11/7/2008	0.00	15.82	6315.54
MW-7	7/8/2009	0.00	16.44	6314.92
MW-7	11/5/2009	0.00	16.76	6314.60
MW-7	5/25/2010	0.00	16.63	6314.73
MW-7	8/12/2010	0.00	16.82	6314.54
MW-7	11/17/2010	0.00	17.65	6313.71
MW-7	2/14/2011	0.00	17.74	6313.62
MW-7	5/17/2011	0.00	17.92	6313.44
MW-7	8/9/2011	0.00	18.11	6313.25
MW-7	11/9/2011	0.00	18.46	6312.90

MW-8	5/17/2007	0.00	19.64	6314.86
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**TABLE 5**

**GROUNDWATER ELEVATION SUMMARY**

**O H RANDEL #007**

**XTO ENERGY, INC.**

<b>Well ID</b>	<b>Date</b>	<b>Depth to Product (feet BTOC)</b>	<b>Depth to Water (feet BTOC)</b>	<b>Groundwater Elevation (feet AMSL)</b>
MW-8	8/9/2007	0.00	18.94	6315.56
MW-8	11/27/2007	0.00	19.20	6315.30
MW-8	5/12/2008	0.00	19.97	6314.53
MW-8	11/7/2008	0.00	19.55	6314.95
MW-8	7/8/2009	0.00	20.01	6314.49
MW-8	11/5/2009	0.00	20.41	6314.09
MW-8	5/25/2010	0.00	20.31	6314.19
MW-8	8/12/2010	0.00	20.41	6314.09
MW-8	11/17/2010	0.00	20.63	6313.87
MW-8	2/14/2011	0.00	20.35	6314.15
MW-8	5/17/2011	0.00	20.30	6314.20
MW-8	8/9/2011	0.00	20.83	6313.67
MW-8	11/9/2011	0.00	21.00	6313.50

MW-9	7/8/2009	0.00	35.26	6295.10
MW-9	11/5/2009	0.00	33.08	6297.28
MW-9	5/25/2010	0.00	29.28	6301.08
MW-9	8/12/2010	0.00	31.12	6299.24
MW-9	5/25/2010	0.00	20.31	6310.05
MW-9	8/12/2010	0.00	20.41	6309.95
MW-9	11/17/2010	0.00	30.49	6299.87
MW-9	2/14/2011	0.00	31.60	6298.76
MW-9	5/17/2011	0.00	30.39	6299.97
MW-9	8/9/2011	0.00	29.84	6300.52
MW-9	11/9/2011	0.00	28.76	6301.60

**Notes:**

BTOC - Below Top of Casing

NM - Not Measured

AMSL - Above Mean Sea Level

\* - Well was destroyed



## **Table 2**

# **Groundwater Analytical Results Summary Table**



TABLE 6

GROUNDWATER ANALYTICAL RESULTS  
O H RANDEL #007  
XTO ENERGY, INC.

Well ID	Date	Benzene (ug/L)	Toluene (ug/L)	Ethylbenzene (ug/L)	Total Xylenes (ug/L)
<b>NMWQCC Groundwater Standard</b>		<b>10 ug/L</b>	<b>750 ug/L</b>	<b>750 ug/L</b>	<b>620 ug/L</b>
MW-3	4/24/2002	24	2.4	0.58	200
MW-3	8/27/2002	9.4	ND	ND	150
MW-3	10/8/2002	NA	NA	NA	NA
MW-3	3/3/2003	5.5	ND	ND	43
MW-3	6/18/2003	6.1	0.97	ND	43
MW-3	8/29/2003	3.2	0.53	ND	24
MW-3	12/5/2006	<1	<1	<1	<3
MW-3	5/17/2007	<1	<1	<1	<2
MW-3	8/9/2007	<1	<1	<1	<2

MW-4	4/24/2002	ND	0.59	ND	2.1
MW-4	8/27/2002	1.3	ND	ND	3.5
MW-4	3/3/2003	4.2	ND	ND	5
MW-4	6/18/2003	6.2	ND	ND	4.5
MW-4	8/29/2003	8.3	ND	ND	4.3
MW-4	12/5/2006	<1	<1	<1	<3
MW-4	5/17/2007	<1	<1	<1	<2
MW-4	8/9/2007	<1	<1	<1	<2

MW-5	4/24/2002	<b>510</b>	0.64	8.9	240.0
MW-5	8/10/2002	NA	NA	NA	NA
MW-5	6/18/2003	<b>1,100</b>	20	ND	<b>660.0</b>
MW-5	6/21/2004	<b>2,000</b>	ND	ND	260.0
MW-5	6/28/2005	<b>1,100</b>	15	ND	160.0
MW-5	12/5/2006	<b>37</b>	<1	<1	4.1
MW-5	5/17/2007	<1	<1	<1	<2

MW-6	4/24/2002	<b>6,100</b>	<b>4,800</b>	<b>920</b>	<b>6,600</b>
------	-----------	--------------	--------------	------------	--------------

MW-7	5/17/2007	<b>8,500</b>	<b>17,000</b>	<b>980</b>	<b>16,000</b>
MW-7	8/9/2007	<b>9,800</b>	<b>11,000</b>	<b>770</b>	<b>12,000</b>
MW-7	11/27/2007	<b>12,000</b>	<b>9,000</b>	<b>940</b>	<b>13,000</b>
MW-7	5/12/2008	<b>7,900</b>	<b>11,000</b>	<b>830</b>	<b>12,000</b>
MW-7	11/7/2008	<b>12,000</b>	<b>16,000</b>	<b>1,100</b>	<b>17,000</b>



TABLE 6

GROUNDWATER ANALYTICAL RESULTS  
O H RANDEL #007  
XTO ENERGY, INC.

Well ID	Date	Benzene (ug/L)	Toluene (ug/L)	Ethylbenzene (ug/L)	Total Xylenes (ug/L)
<b>NMWQCC Groundwater Standard</b>		<b>10 ug/L</b>	<b>750 ug/L</b>	<b>750 ug/L</b>	<b>620 ug/L</b>
MW-7	7/8/2009	<b>9,800</b>	<b>8,200</b>	<100	<b>12,000</b>
MW-7	11/5/2009	<b>9,800</b>	<b>7,900</b>	570	<b>13,000</b>
MW-7	5/25/2010	<b>7,200</b>	<b>3,800</b>	440	<b>11,000</b>
MW-7	8/12/2010	<b>82</b>	58	9.2	200
MW-7	11/17/2010	<b>5,200</b>	<b>5,500</b>	76.0	<b>3,400</b>
MW-7	2/14/2011	<b>2,200</b>	<b>1,000</b>	<120	<b>1,800</b>
MW-7	5/17/2011	<b>500</b>	190	16	180
MW-7	8/9/2011	<b>81.3</b>	36.9	5.3	39.4
MW-7	11/9/2011	<b>26</b>	16	2.3	20

MW-8	5/17/2007	<1.0	1.9	<1.0	3.7
MW-8	8/9/2007	<1.0	<1.0	<1.0	<2.0
MW-8	11/27/2007	<b>21.0</b>	<1.0	<1.0	<2.0
MW-8	5/12/2008	1.4	<1.0	<1.0	<2.0
MW-8	11/7/2008	1.2	<1.0	<1.0	<2.0
MW-8	7/8/2009	<1.0	<1.0	<1.0	<2.0
MW-8	11/5/2009	1.1	<1.0	<1.0	<2.0

MW-9	7/8/2009	<b>91</b>	160	6.9	100
MW-9	11/30/2009	<1	<1	<1	<2
MW-9	5/25/2010	<1.0	<1.0	<1.0	<2.0
MW-9	8/12/2010	<0.5	<5.0	<0.5	<1.5
MW-9	11/17/2010	2.4	<5.0	<0.5	<1.5

Notes:

ug/l - micrograms per liter

< indicates result is less than the stated laboratory method detection limit

NMWQCC - New Mexico Water Quality Control Commission

NS - Not Sampled

\* - Well was Destroyed

**BOLD** indicates the result exceeds the NMWQCC Standard

Benzene, toluene, ethylbenzene, and total xylenes analyzed by EPA Method 8021B



# **Figure 1**

## **Topographic Map**

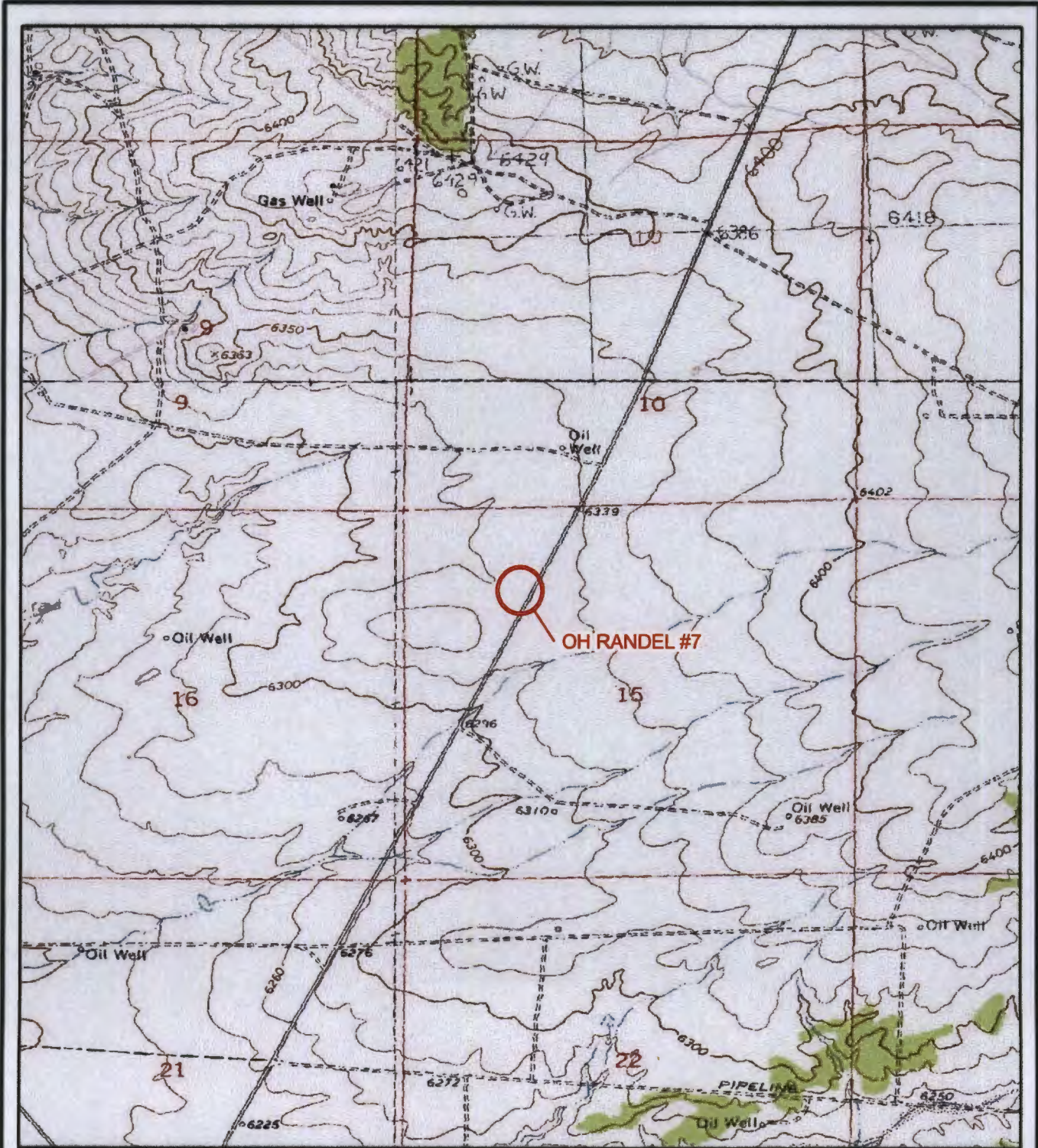

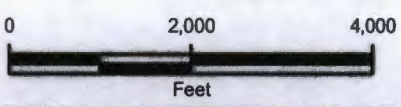


IMAGE COURTESY OF USDA/NRCS, VARIOUS DATES

**LEGEND**

 SITE LOCATION



**FIGURE 1**  
**SITE LOCATION MAP**  
**OH RANDEL #7**  
 NWNW SEC 15 T26N R11W  
 SAN JUAN COUNTY, NEW MEXICO  
 XTO ENERGY, INC.

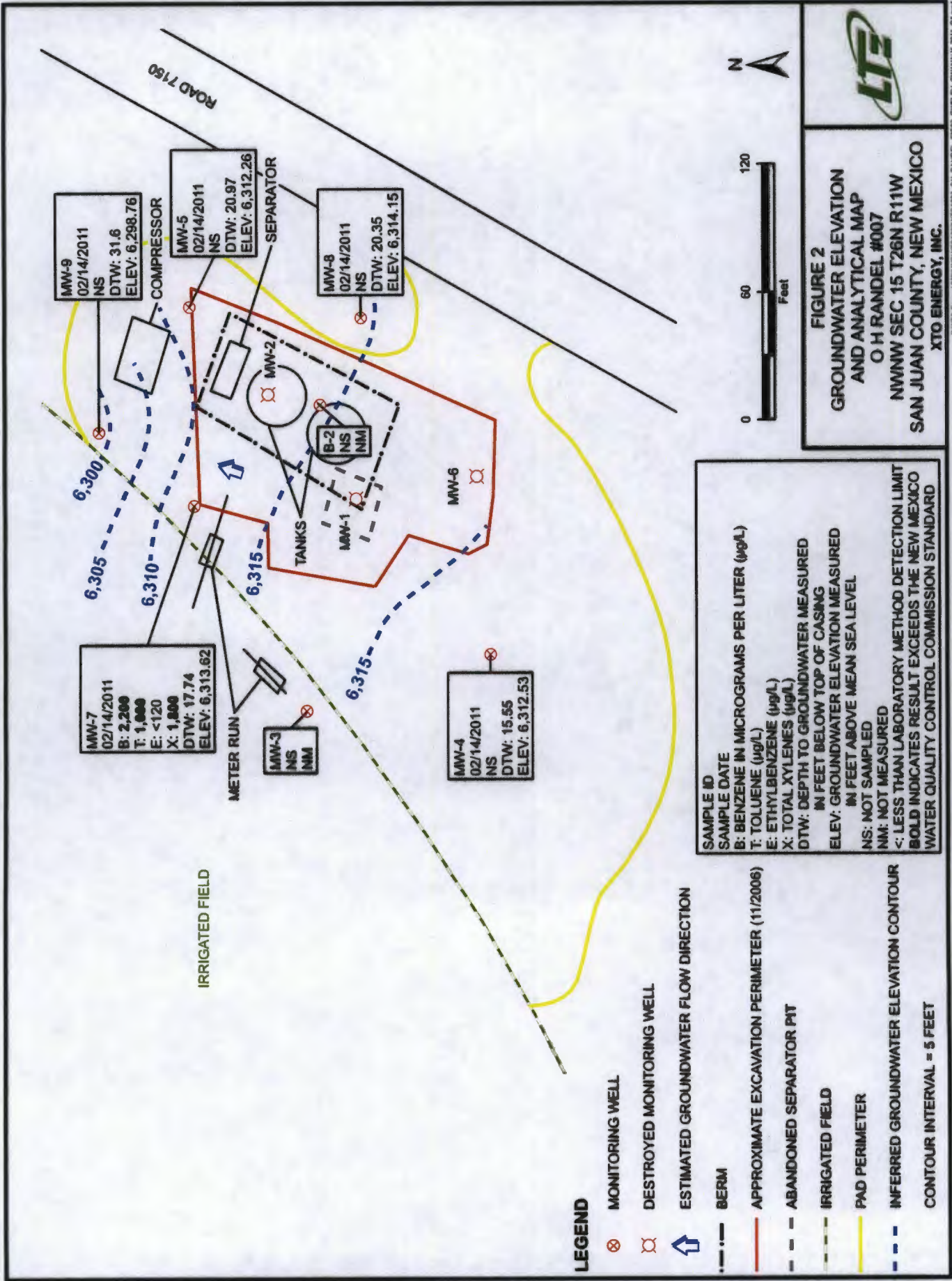


\\XTO\_Energy\GIS\NMX\XTO1502\XTO1502\_OH\_RANDEL\_F1021\_S1.mxd



**Figure 2**

**Potentiometric Surface  
Diagrams**



IRRIGATED FIELD

ROAD 7150

MW-9  
02/14/2011  
NS  
DTW: 31.6  
ELEV: 6,298.76

MW-5  
02/14/2011  
NS  
DTW: 20.97  
ELEV: 6,312.26

MW-8  
02/14/2011  
NS  
DTW: 20.35  
ELEV: 6,314.15

MW-7  
02/14/2011  
B: 2,200  
T: 1,000  
E: <120  
X: 1,800  
DTW: 17.74  
ELEV: 6,313.62

MW-3  
NS  
NM

MW-4  
02/14/2011  
NS  
DTW: 15.55  
ELEV: 6,312.53

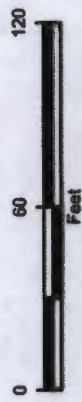
MW-2  
NS  
NM

MW-1  
NS  
NM

MW-6  
NS  
NM

- LEGEND**
- ⊗ MONITORING WELL
  - ⊗ DESTROYED MONITORING WELL
  - ➔ ESTIMATED GROUNDWATER FLOW DIRECTION
  - · - · - BERM
  - - - - - APPROXIMATE EXCAVATION PERIMETER (11/2006)
  - - - - - ABANDONED SEPARATOR PIT
  - · - · - IRRIGATED FIELD
  - - - - - PAD PERIMETER
  - - - - - INFERRED GROUNDWATER ELEVATION CONTOUR
  - CONTOUR INTERVAL = 5 FEET

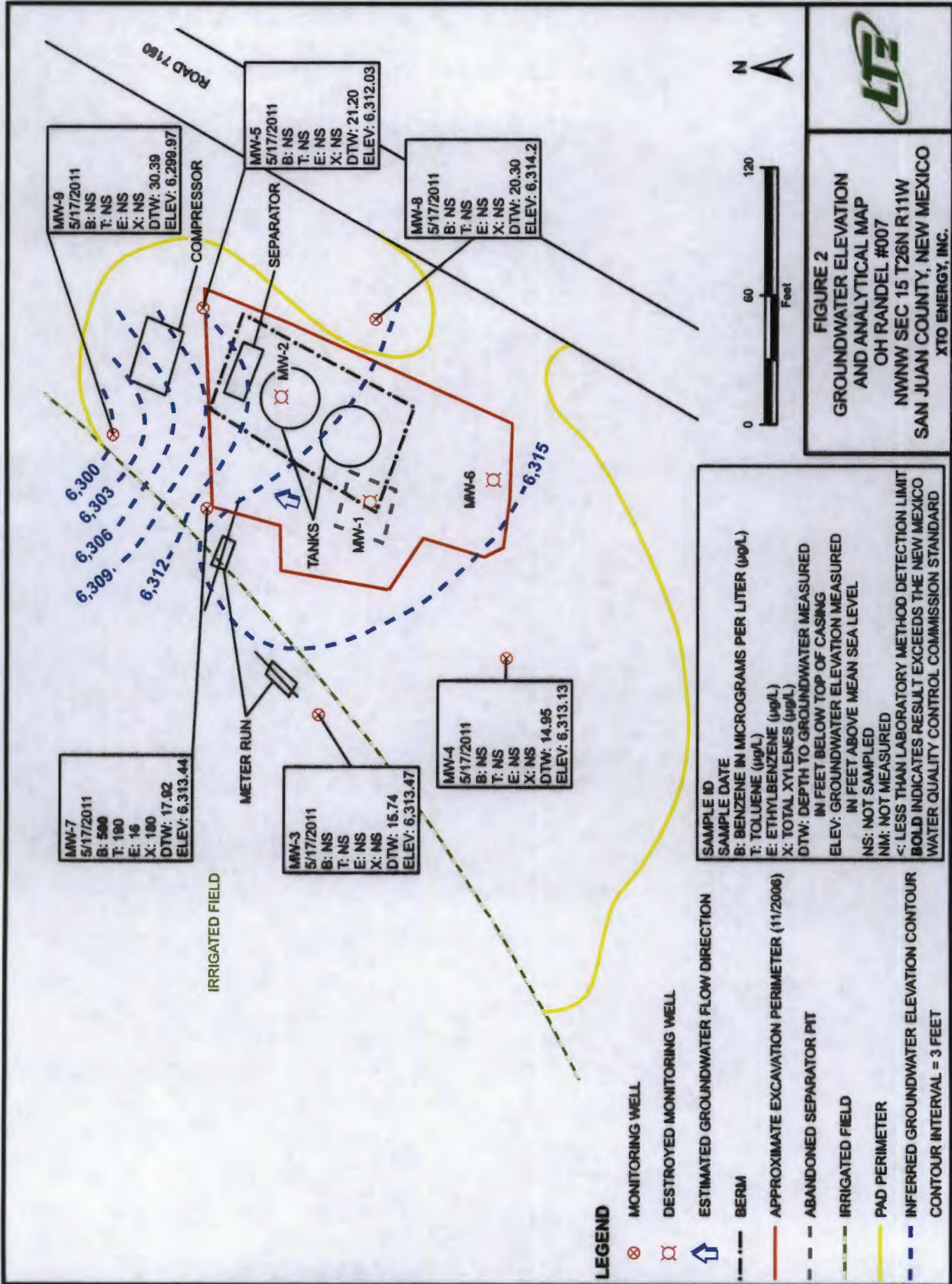
**SAMPLE ID**  
**SAMPLE DATE**  
**B:** BENZENE IN MICROGRAMS PER LITER (µg/L)  
**T:** TOLUENE (µg/L)  
**E:** ETHYLBENZENE (µg/L)  
**X:** TOTAL XYLENES (µg/L)  
**DTW:** DEPTH TO GROUNDWATER MEASURED IN FEET BELOW TOP OF CASING  
**ELEV:** GROUNDWATER ELEVATION MEASURED IN FEET ABOVE MEAN SEA LEVEL  
**NS:** NOT SAMPLED  
**NM:** NOT MEASURED  
**<:** LESS THAN LABORATORY METHOD DETECTION LIMIT  
**BOLD** INDICATES RESULT EXCEEDS THE NEW MEXICO WATER QUALITY CONTROL COMMISSION STANDARD



**LFE**

**FIGURE 2**  
**GROUNDWATER ELEVATION AND ANALYTICAL MAP**  
**O H RANDEL #007**  
**NWNW SEC 15 T26N R11W**  
**SAN JUAN COUNTY, NEW MEXICO**  
**XTO ENERGY, INC.**





**SAMPLE ID**

**SAMPLE DATE**

B: BENZENE IN MICROGRAMS PER LITER (µg/L)

T: TOLUENE (µg/L)

E: ETHYLBENZENE (µg/L)

X: TOTAL XYLENES (µg/L)

DTW: DEPTH TO GROUNDWATER MEASURED IN FEET BELOW TOP OF CASING

ELEV: GROUNDWATER ELEVATION MEASURED IN FEET ABOVE MEAN SEA LEVEL

NS: NOT SAMPLED

NM: NOT MEASURED

**BOLD INDICATES RESULT EXCEEDS THE NEW MEXICO WATER QUALITY CONTROL COMMISSION STANDARD**



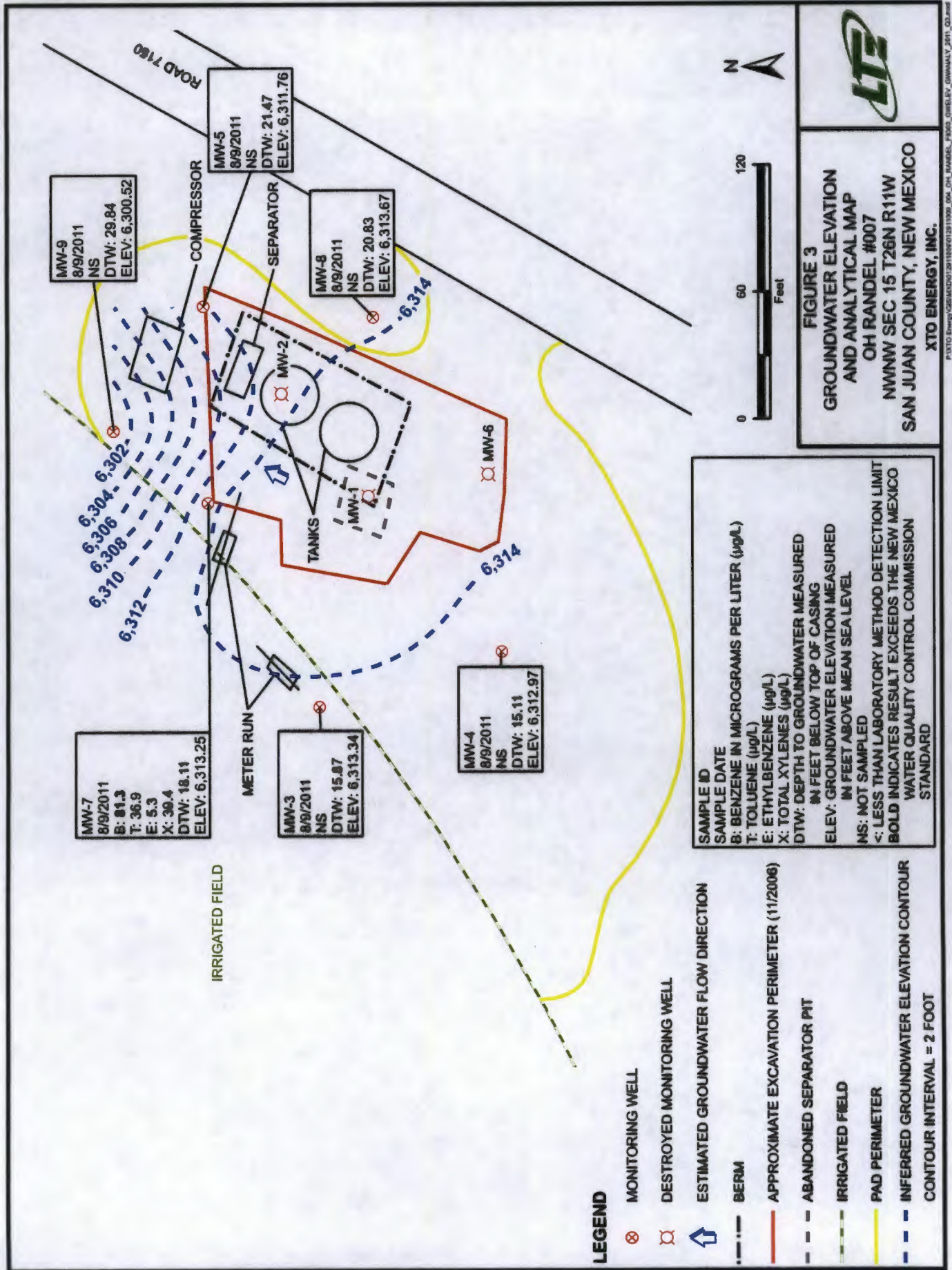
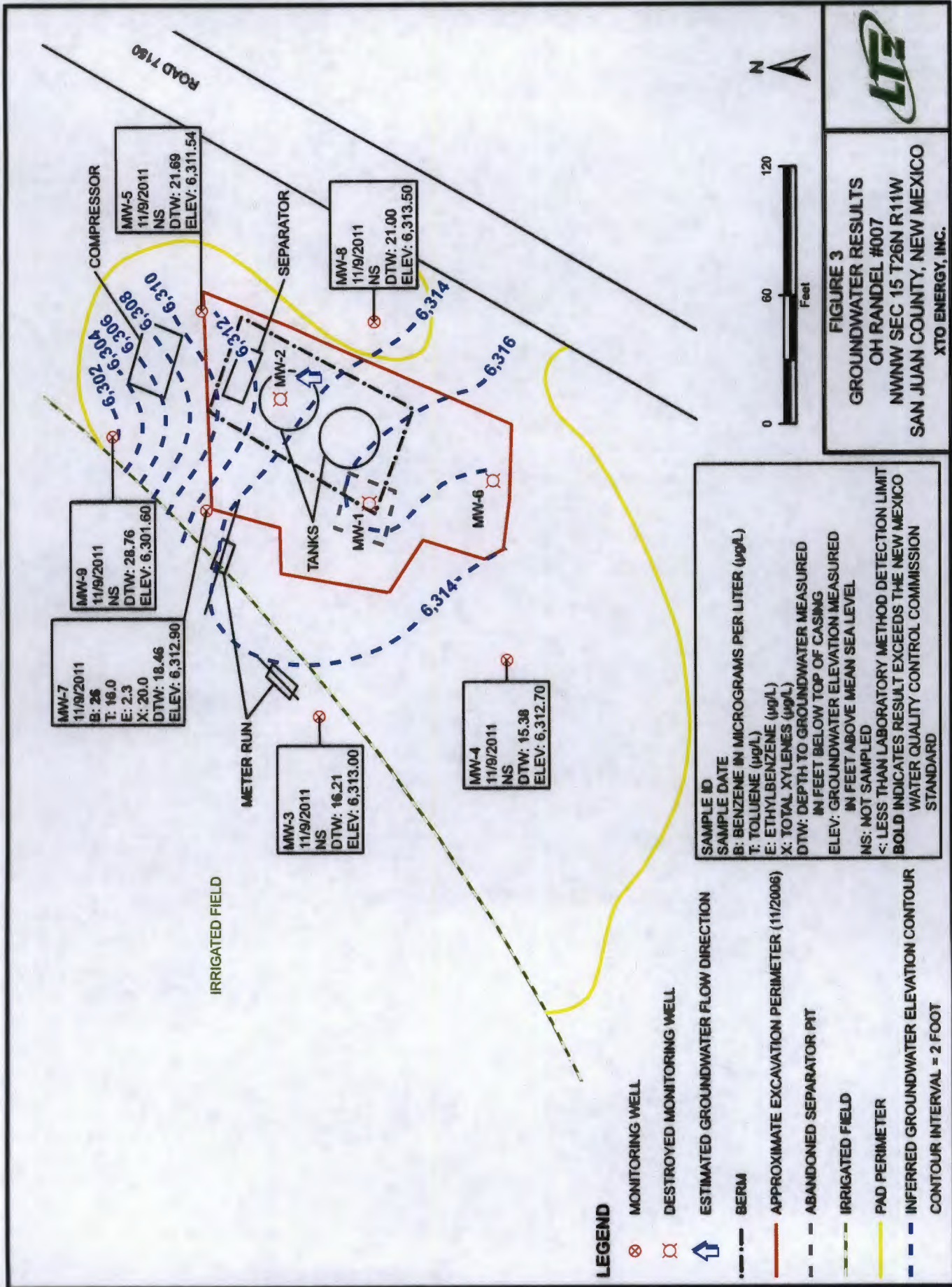


FIGURE 3: GROUNDWATER ELEVATION AND ANALYTICAL MAP OH RANDEL #007 NWNW SEC 15 T26N R11W SAN JUAN COUNTY, NEW MEXICO XTO ENERGY, INC.





**FIGURE 3**  
**GROUNDWATER RESULTS**  
 OH RANDEL #007  
 NWNW SEC 15 T26N R11W  
 SAN JUAN COUNTY, NEW MEXICO  
 XTO ENERGY, INC.



**SAMPLE ID**  
**SAMPLE DATE**  
**B:** BENZENE IN MICROGRAMS PER LITER (µg/L)  
**T:** TOLUENE (µg/L)  
**E:** ETHYLBENZENE (µg/L)  
**X:** TOTAL XYLENES (µg/L)  
**DTW:** DEPTH TO GROUNDWATER MEASURED IN FEET BELOW TOP OF CASING  
**ELEV:** GROUNDWATER ELEVATION MEASURED IN FEET ABOVE MEAN SEA LEVEL  
**NS:** NOT SAMPLED  
**<:** LESS THAN LABORATORY METHOD DETECTION LIMIT  
**BOLD** INDICATES RESULT EXCEEDS THE NEW MEXICO WATER QUALITY CONTROL COMMISSION STANDARD

**Figure 3-13**

**Completion Diagrams  
And  
Borehole Logs**



**FIGURE 8**

**BLAGG ENGINEERING, INC.**

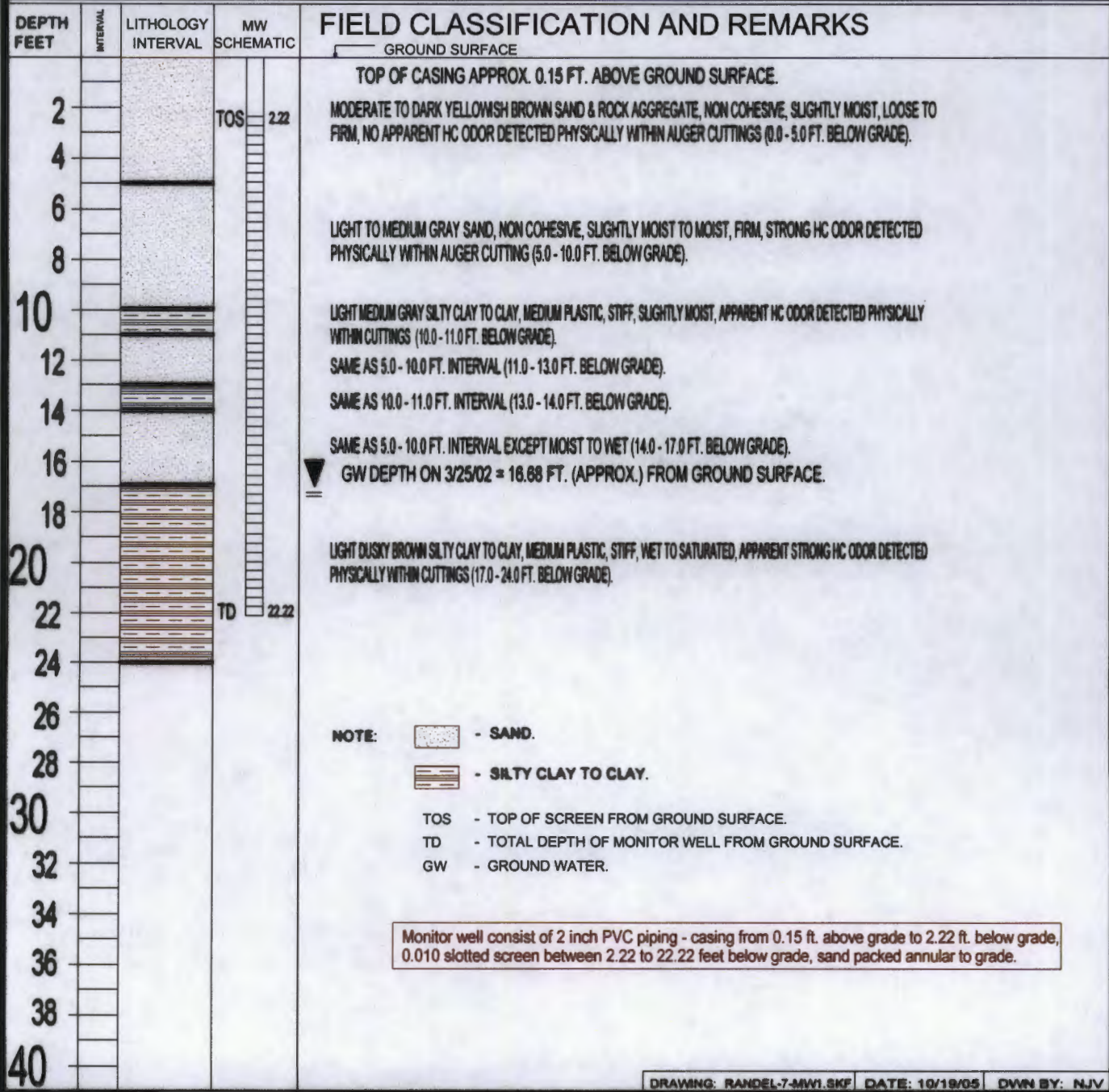
P.O. BOX 87  
BLOOMFIELD, NM 87413

(505) 632-1199

**BORE / TEST HOLE REPORT**

BORING #..... BH - 1  
 MW #..... 1  
 PAGE #..... 1  
 DATE STARTED 3/22/02  
 DATE FINISHED 3/22/02  
 OPERATOR..... JCB  
 PREPARED BY NJV

CLIENT: XTO ENERGY INC.  
 LOCATION NAME: RANDEL, O.H. #7 - SEP. PIT. UNIT D, SEC. 15, T26N, R11W  
 CONTRACTOR: BLAGG ENGINEERING, INC.  
 EQUIPMENT USED: MOBILE DRILL RIG ( EARTHPROBE )  
 BORING LOCATION: 240 FT., S76.5E FEET FROM WELL HEAD.





# FIGURE 9

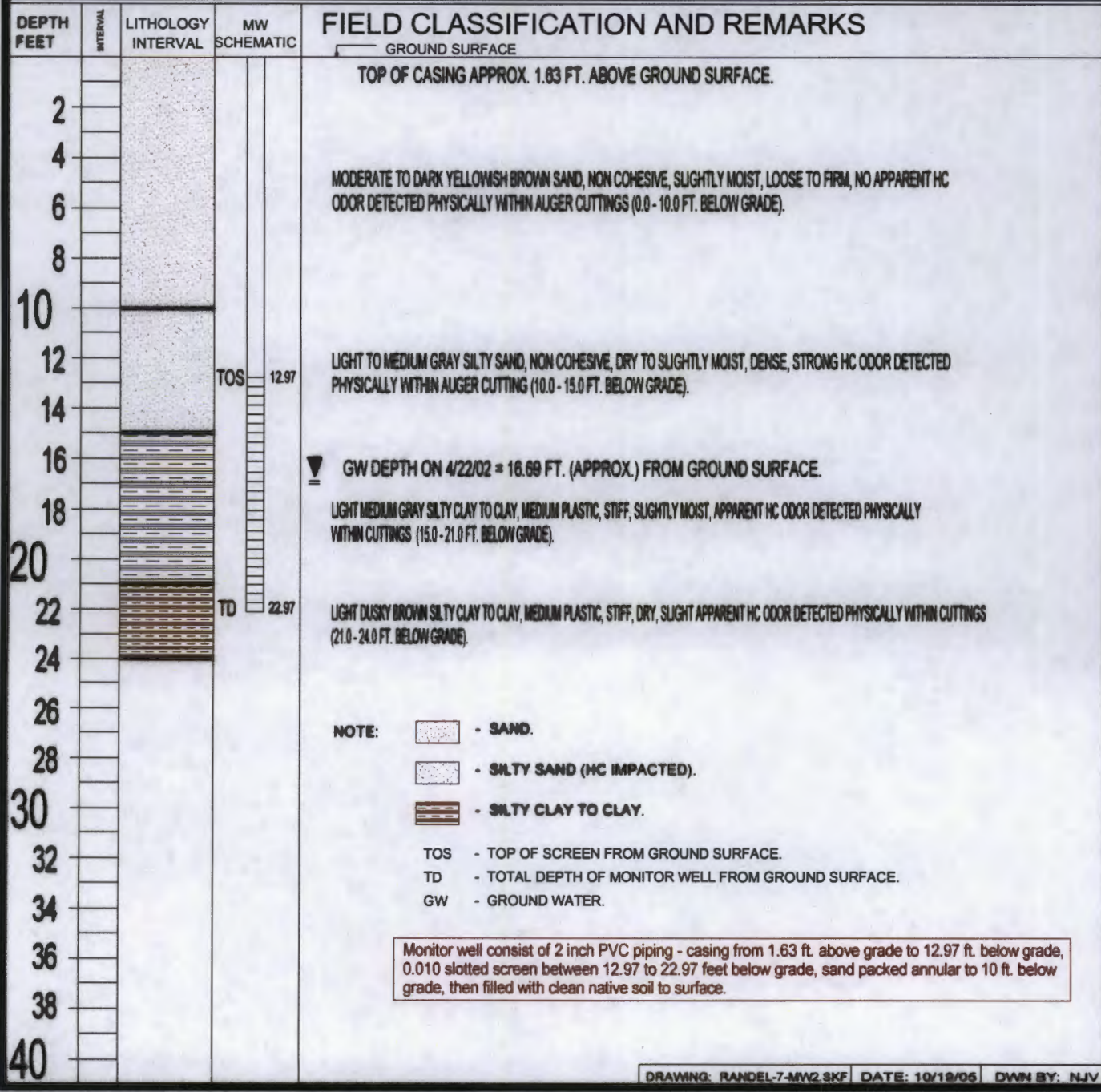
## BLAGG ENGINEERING, INC.

P.O. BOX 87  
BLOOMFIELD, NM 87413  
(505) 632-1199

# BORE / TEST HOLE REPORT

BORING #.....	<u>BH - 2</u>
MW #.....	<u>2</u>
PAGE #.....	<u>2</u>
DATE STARTED	<u>4/09/02</u>
DATE FINISHED	<u>4/09/02</u>
OPERATOR.....	<u>JCB</u>
PREPARED BY	<u>NJV</u>

CLIENT:	<u>XTO ENERGY INC.</u>
LOCATION NAME:	<u>RANDEL, O.H. #7 - SEP. PIT, UNIT D, SEC. 15, T26N, R11W</u>
CONTRACTOR:	<u>BLAGG ENGINEERING, INC.</u>
EQUIPMENT USED:	<u>MOBILE DRILL RIG ( EARTHPROBE )</u>
BORING LOCATION:	<u>274 FT., S87.5E FEET FROM WELL HEAD.</u>





**FIGURE 10**

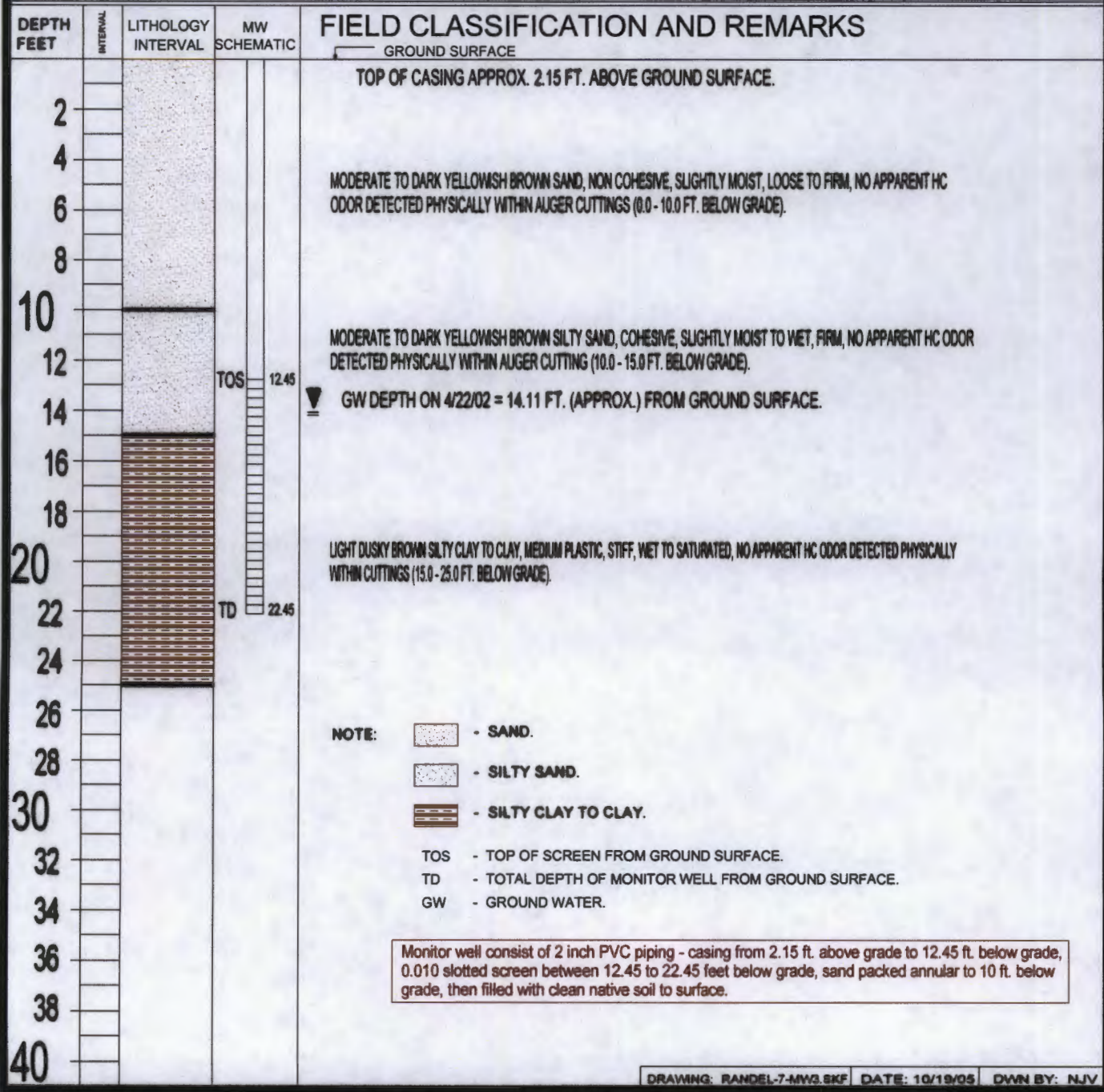
**BLAGG ENGINEERING, INC.**

P.O. BOX 87  
 BLOOMFIELD, NM 87413  
 (505) 632-1199

**BORE / TEST HOLE REPORT**

BORING #..... BH - 3  
 MW #..... 3  
 PAGE #..... 3  
 DATE STARTED 4/09/02  
 DATE FINISHED 4/09/02  
 OPERATOR..... JCB  
 PREPARED BY NJV

CLIENT: XTO ENERGY INC.  
 LOCATION NAME: RANDEL, O.H. #7 - SEP. PIT, UNIT D, SEC. 15, T26N, R11W  
 CONTRACTOR: BLAGG ENGINEERING, INC.  
 EQUIPMENT USED: MOBILE DRILL RIG ( EARTHPROBE )  
 BORING LOCATION: 158 FT., S80.5E FEET FROM WELL HEAD.





# FIGURE 11

## BLAGG ENGINEERING, INC.

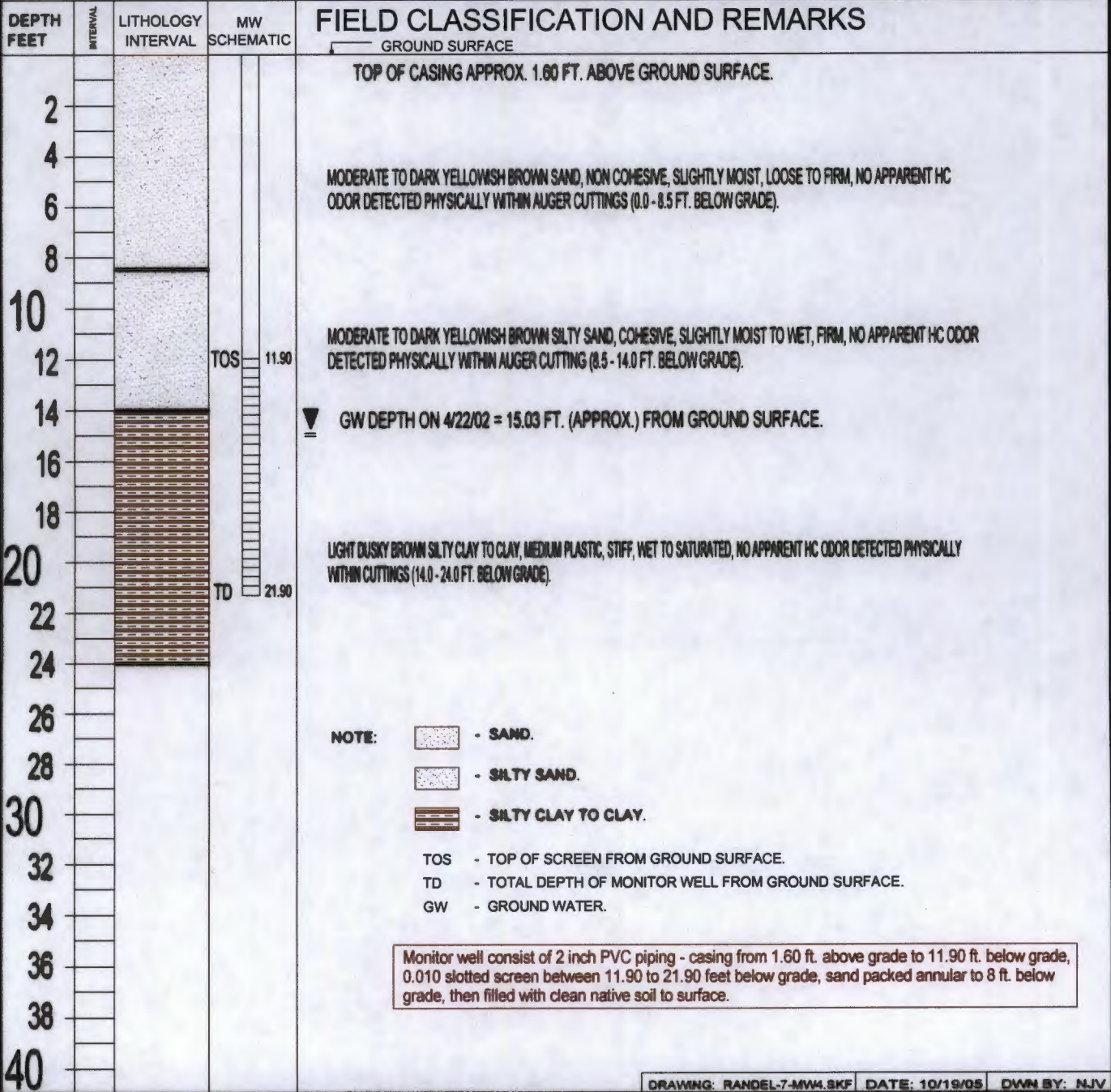
P.O. BOX 87  
BLOOMFIELD, NM 87413

(505) 632-1199

# BORE / TEST HOLE REPORT

BORING #.....	BH - 4
MW #.....	4
PAGE #.....	4
DATE STARTED	4/09/02
DATE FINISHED	4/09/02
OPERATOR.....	JCB
PREPARED BY	NJV

CLIENT:	XTO ENERGY INC.
LOCATION NAME:	RANDEL, O.H. #7 - SEP. PIT, UNIT D. SEC. 15, T26N, R11W
CONTRACTOR:	BLAGG ENGINEERING, INC.
EQUIPMENT USED:	MOBILE DRILL RIG ( EARTHPROBE )
BORING LOCATION:	210 FT., S56E FEET FROM WELL HEAD.





**FIGURE 12**

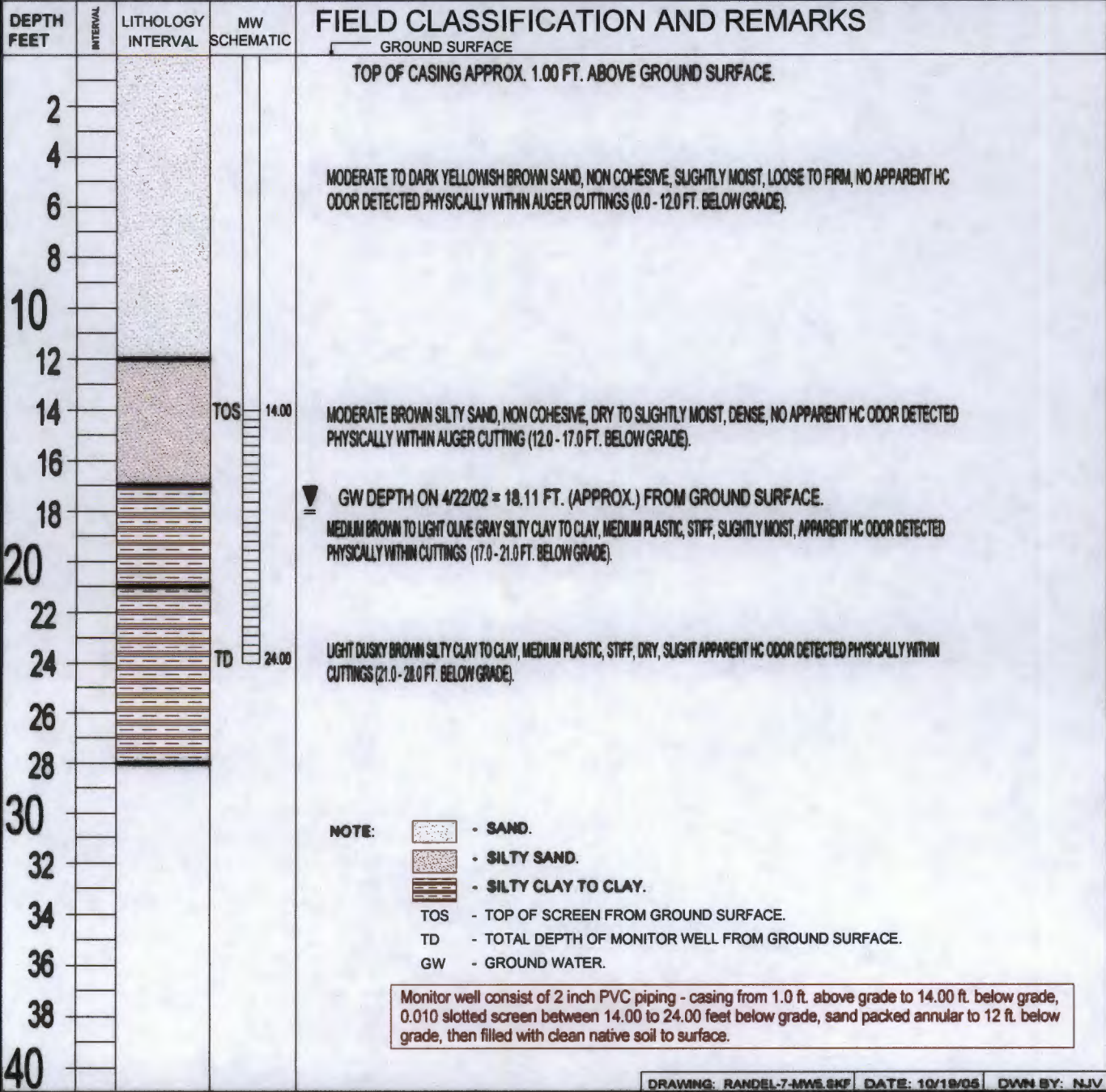
**BLAGG ENGINEERING, INC.**

P.O. BOX 87  
 BLOOMFIELD, NM 87413  
 (505) 632-1199

**BORE / TEST HOLE REPORT**

BORING #..... **BH - 5**  
 MW #..... **5**  
 PAGE #..... **5**  
 DATE STARTED **4/19/02**  
 DATE FINISHED **4/19/02**  
 OPERATOR..... **JCB**  
 PREPARED BY **NJV**

CLIENT: **XTO ENERGY INC.**  
 LOCATION NAME: **RANDEL, O.H. #7 - SEP. PIT, UNIT D, SEC. 15, T26N, R11W**  
 CONTRACTOR: **BLAGG ENGINEERING, INC.**  
 EQUIPMENT USED: **MOBILE DRILL RIG ( EARTHPROBE )**  
 BORING LOCATION: **312 FT., N86E FEET FROM WELL HEAD.**





**FIGURE 13**

**BLAGG ENGINEERING, INC.**

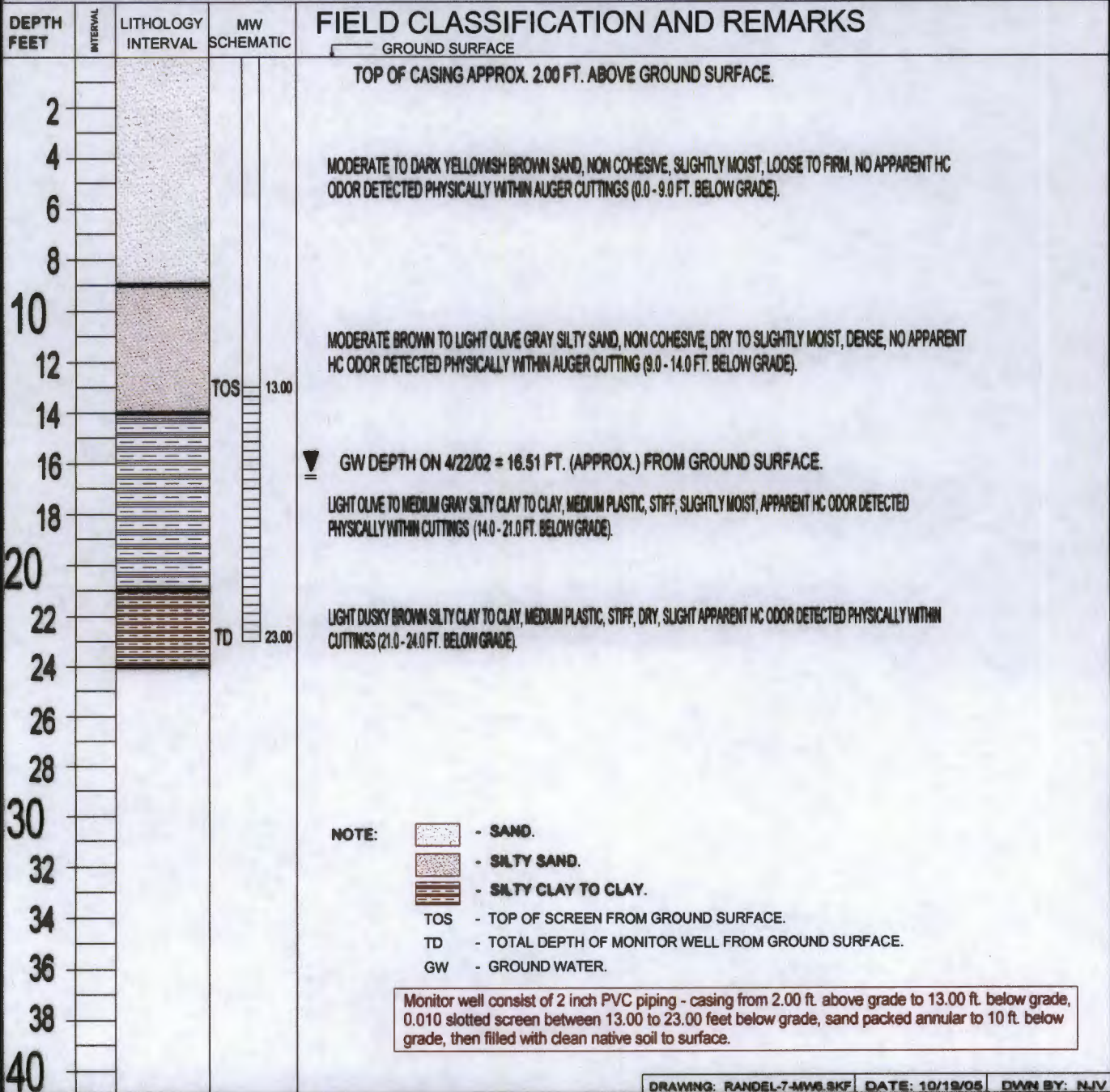
P.O. BOX 87  
BLOOMFIELD, NM 87413

(505) 632-1199

**BORE / TEST HOLE REPORT**

BORING #..... **BH - 6**  
 MW #..... **6**  
 PAGE #..... **6**  
 DATE STARTED **4/19/02**  
 DATE FINISHED **4/19/02**  
 OPERATOR..... **JCB**  
 PREPARED BY **NJV**

CLIENT: **XTO ENERGY INC.**  
 LOCATION NAME: **RANDEL, O.H. #7 - SEP. PIT. UNIT D, SEC. 15, T26N, R11W**  
 CONTRACTOR: **BLAGG ENGINEERING, INC.**  
 EQUIPMENT USED: **MOBILE DRILL RIG ( EARTHPROBE )**  
 BORING LOCATION: **266 FT., S65.5E FEET FROM WELL HEAD.**





# RECORD OF SUBSURFACE EXPLORATION

LodeStar Services  
P.O. Box 4465  
Durango, CO 81302  
303-917-6288

Borehole #: 1  
Well #: MW-7  
Page: 1 of 2

Project Number: \_\_\_\_\_  
Project Name: XTO Ground Water  
Project Location: OH Randel #7

Borehole Location: 36° 29.508' N, 107° 59.720' W  
GWL Depth: 19'  
Drilled By: Enviro-Drill  
Well Logged By: Ashley Ager  
Date Started: 05/01/07  
Date Completed: 05/01/07

Drilling Method: Hollow Stem Auger  
Air Monitoring Method: PID

Depth (feet)	Sample Number	Sample Interval	Sample Type & Recovery (inches)	Sample Description	Air Monitoring	Drilling Conditions
0						
	1	0-5'	cuttings	brown, unconsolidated, poorly sorted sand and gravel, damp	0	Easy
5	2	5-7'	split spoon	brown, unconsolidated, poorly sorted sand and gravel, damp	0	Easy
10	3	10-12	split spoon	10-10.5: brown, unconsolidated, poorly sorted sand and gravel, damp 10.5-12: whitish-brown medium sand, well sorted, unconsolidated, dry	0 0	Easy
15	4	15-17	split spoon	15-15.5: reddish brown coarse sand, poorly sorted, damp 15.5-16.5: brown clay with white chalkish material on top 16.5-17: reddish brown silty sand, coarse, poorly sorted, damp	7.2 0 0	Easy
20						

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Geologist Signature Ashley L. Ager

# RECORD OF SUBSURFACE EXPLORATION

LodeStar Services  
P.O. Box 4465  
Durango, CO 81302  
303-917-6288

Borehole #: 1  
Well #: MW-7  
Page: 2 of 2

Project Number: \_\_\_\_\_  
Project Name: XTO Ground Water  
Project Location: OH Randel #7

Borehole Location: 36° 29.522' N, 107° 59.736' W  
GWL Depth: 16.5  
Drilled By: Enviro-Drill  
Well Logged By: Ashley Ager  
Date Started: 05/01/07  
Date Completed: 05/01/07

Drilling Method: Hollow Stem Auger  
Air Monitoring Method: PID

Depth (feet)	Sample Number	Sample Interval	Sample Type & Recovery (inches)	Sample Description	Air Monitoring	Drilling Conditions
20	5	20-22	split spoon	20-20.4: reddish brown, coarse sand, poorly sorted, damp	1.3	Easy
				20.4-20.8: gray coarse sand, moist, poorly sorted	1.0	
				20.8-21: saturated gray coarse sand, poorly sorted	0.5	
25	6	25-16	split spoon	21-22: reddish gray clay	0	Easy
				Variegated reddish brown clay, dry	0	
30	7	30-32	split spoon	Variegated reddish brown clay, dry	0	Easy
35						
40						

Comments: Very thin saturated layer at approximately 20'. Stiff clay is present below that.  
Wet layer probably represents a small perched aquifer atop the clay.

Geologist Signature Ashley L. Ager

# RECORD OF SUBSURFACE EXPLORATION

LodeStar Services  
 P.O. Box 4465  
 Durango, CO 81302  
 303-917-6288

Borehole #: 1  
 Well #: MW-8  
 Page: 1 of 2

Project Number: \_\_\_\_\_  
 Project Name: XTO Ground Water  
 Project Location: OH Randel #7

Borehole Location: 36° 29.522' N, 107° 59.736' W  
 GWL Depth: 16.5  
 Drilled By: Enviro-Drill  
 Well Logged By: Ashley Ager  
 Date Started: 05/01/07  
 Date Completed: 05/01/07

Drilling Method: Hollow Stem Auger  
 Air Monitoring Method: PID

Depth (feet)	Sample Number	Sample Interval	Sample Type & Recovery (inches)	Sample Description	Air Monitoring	Drilling Conditions
0						
	1	0-5'	cuttings	brown, unconsolidated, poorly sorted sand and gravel, damp	0	Easy
5	2	5-7'	split spoon	brown, unconsolidated, poorly sorted sand and gravel, damp	0	Easy
10	3	10-11.8	split spoon	brown, unconsolidated, poorly sorted sand and gravel, damp	0	Easy
15	4	15-16.9	split spoon	15-15.8: brown, unconsolidated, poorly sorted sand and gravel 15.8-16.4: moist, grayish brown sandy silt 16.4-16.9: coarse, poorly sorted, grayish brown sand, wet, some HC odor	0 52.8 319	Easy Easy Easy
20						

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Geologist Signature Ashley L. Ager

# RECORD OF SUBSURFACE EXPLORATION

LodeStar Services  
P.O. Box 4465  
Durango, CO 81302  
303-917-6288

Borehole #: 1  
Well #: MW-8  
Page: 2 of 2

Project Number: \_\_\_\_\_  
Project Name: XTO Ground Water  
Project Location: OH Randel #7

Borehole Location: 36° 29.522' N, 107° 59.736' W  
GWL Depth: 16.5  
Drilled By: Enviro-Drill  
Well Logged By: Ashley Ager  
Date Started: 05/01/07  
Date Completed: 05/01/07

Drilling Method: Hollow Stem Auger  
Air Monitoring Method: PID

Depth (feet)	Sample Number	Sample Interval	Sample Type & Recovery (inches)	Sample Description	Air Monitoring	Drilling Conditions
20	5	20-21.8	split spoon	20-20.4: reddish brown sand, coarse, poorly sorted, some gravel content, moist	78.9	Easy
				20.4-21.8: variegated reddish gray stiff clay, moist	0.2	Easy
25	6	25-27	split spoon	Variegated reddish brown clay wet at top, dry at bottom	0	Easy
30	7	30-32	split spoon	30-30.7: variegated reddish brown clay	0	Steady
				30.7-31.8: greenish gray silty sand, coarse, poorly sorted, consolidated, dry	0	
35						
40						

Comments: Very thin saturated layer at approximately 16.5'. Stiff clay is present below that.  
Wet layer probably represents a small perched aquifer atop the clay.

Geologist Signature Ashley L. Ager

# RECORD OF SUBSURFACE EXPLORATION

LodeStar Services  
P.O. Box 4465  
Durango, CO 81302  
303-917-6288

Borehole #: B-1  
Well #: MW-9  
Page: 1 of 2

Project Number: \_\_\_\_\_  
Project Name: XTO Ground Water  
Project Location: OH Randel #7

Borehole Location: 36° 29.531' N, 107° 59.731' W  
GWL Depth: 16'  
Drilled By: Kelly Padilla  
Well Logged By: Ashley Ager  
Date Started: 07/07/09  
Date Completed: 07/07/09

Drilling Method: Hollow Stem Auger  
Air Monitoring Method: PID

Depth (feet)	Sample Number	Sample Interval	Sample Type & Recovery (inches)	Sample Description	Air Monitoring	Drilling Conditions
0		0-5	cuttings	brown, poorly sorted coarse sand and gravel, road base		easy
5	1	5-7'	split spoon, 17"	0-13.5": 7.5 YR 5/6 strong brown sp, poorly sorted coarse sand, sub angular, dry, unconsolidated 13.5 - 17": 10YR 6/1 gray, sandy shale, crumbly	0	34 Blows
10	2	10-12	split spoon, 22"	10 YR 5/3 brown sp, poorly sorted, coarse sand, sub angular, dry	0	30 Blows
15	3	15-17	split spoon, 18"	0-2": same as above 2 - 16": 10 YR 5/3 brown sm, poorly sorted, medium sand w/ higher silt content, damp	0	25 Blows
20						

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Geologist Signature: Ashley L. Ager

# RECORD OF SUBSURFACE EXPLORATION

LodeStar Services  
P.O. Box 4465  
Durango, CO 81302  
303-917-6288

Borehole #: B-1  
Well #: MW-9  
Page: 2 of 2

Project Number: \_\_\_\_\_  
Project Name: XTO Ground Water  
Project Location: OH Randel #7

Borehole Location: 36° 29.531' N, 107° 59.731' W  
GWL Depth: 16'  
Drilled By: Kelly Padilla  
Well Logged By: Ashley Ager  
Date Started: 07/07/09  
Date Completed: 07/07/09

Drilling Method: Hollow Stem Auger  
Air Monitoring Method: PID

Depth (feet)	Sample Number	Sample Interval	Sample Type & Recovery (inches)	Sample Description	Air Monitoring	Drilling Conditions
20	4	20-22	split spoon, 20"	10 YR 3/2 v. dark grayish brown CL, clay some coarse sand at top, damp	0.1	68 Blows rod Wet
25	5	25-27	split spoon, 18"	10 YR 7/2 light gray CL, clay interbedded with 10 yr 4/2 dark grayish brown clays, iron discoloration, dry	0	58 Blows
30	6	30-32	split spoon, 18"	same as above, dry	0	76 Blows
35	7	35-37'	split spoon, 15"	same as above, dry	0	41 Blows
40						

Comments: Drilling stopped at 35' based on previous knowledge of depth in existing monitoring wells.  
Identified damp sandy layer at 16', and hole is dry after drilling to 37'.  
Will let sit and see if water fills in. 3" of water in hole after 30 mins. Set well.

Geologist Signature: Ashley L. Ager

# RECORD OF SUBSURFACE EXPLORATION

LodeStar Services  
P.O. Box 4465  
Durango, CO 81302  
303-917-6288

Borehole #: B-2  
Well #: \_\_\_\_\_  
Page: 1 of 2

Project Number: \_\_\_\_\_  
Project Name: XTO Ground Water  
Project Location: OH Randel #7

Borehole Location: 36° 29' 30.46" N, 107° 59' 44.2" W  
GWL Depth: Dry Hole  
Drilled By: Kelly Padilla  
Well Logged By: Ashley Ager  
Date Started: 07/07/09  
Date Completed: 07/08/09

Drilling Method: Hollow Stem Auger  
Air Monitoring Method: PID

Depth (feet)	Sample Number	Sample Interval	Sample Type & Recovery (inches)	Sample Description	Air Monitoring	Drilling Conditions
0		0-5'	cuttings	brown poorly sorted coarse sand and gravel - road base		easy
5	1	5-7'	split spoon, 11"	2.5 Y 6/1 Gray coarse sand sp, subrounded, backfill	0	Easy, 26 Blows
10	2	10-12	split spoon, 16"	2.5 Y 4/2 dark grayish brown, fine sand, poorly sorted, lots of fines	0	25 Blows
15	3	15-17	split spoon, 10"	2.5 Y 4/1 Dark Gray, fine silty sand, about 5% c. content, damp, backfill	0	12 Blows rod Wet
20						

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Geologist Signature: Ashley L. Ager

# RECORD OF SUBSURFACE EXPLORATION

LodeStar Services  
 P.O. Box 4465  
 Durango, CO 81302  
 303-917-6288

Borehole #: B-2  
 Well #: \_\_\_\_\_  
 Page: 2 of 2

Project Number: \_\_\_\_\_  
 Project Name: XTO Ground Water  
 Project Location: OH Randel #7

Borehole Location: 36° 29' 30.46" N, 107° 59' 44.2" W  
 GWL Depth: dry hole  
 Drilled By: Kelly Padilla  
 Well Logged By: Ashley Ager  
 Date Started: 07/07/09  
 Date Completed: 07/08/09

Drilling Method: Hollow Stem Auger  
 Air Monitoring Method: PID

Depth (feet)	Sample Number	Sample Interval	Sample Type & Recovery (inches)	Sample Description	Air Monitoring	Drilling Conditions
20	4	20-22	split spoon, 19"	5 YR 3/2 Dark reddish brown CL, Clay, damp	0.1	59 Blows
25	5	25-27	split spoon, 16.5"	0 - 2": same as above 2-16.5": 10YR 6/2 light brownish gray, silty clay, dry	0	66 Blows
30	6	30-32	split spoon, 14"	same as above, damp	0	48 Blows
35	7	35-37'	split spoon, 9"	same as above, dry Stop to see if it fills	11.2	45 Blows
40						

Comments: Drilling stopped at 35' based on previous knowledge of depth in existing monitoring wells. Identified damp sandy layer at ~16' and hole is dry after drilling to 37'. Let sit for 2 hours and did not fill in. Let sit overnight. At 11:15 am on 07/08/09, hole is still dry. Plug.

Geologist Signature: Ashley L. Ager



# **Attachment 1**

## **Blagg Engineering, Inc. Pit Closure Report (2002)**

3004524749

36.49193/107.99632

CLIENT: <u>KTO</u>	BLAGG ENGINEERING, INC. P.O. BOX 87, BLOOMFIELD, NM 87413 (505) 632-1199	LOCATION NO: _____ COC NO: <u>7776</u>
--------------------	--	---

FIELD REPORT: PIT CLOSURE VERIFICATION	PAGE No: <u>1</u> of <u>1</u>
--	-------------------------------

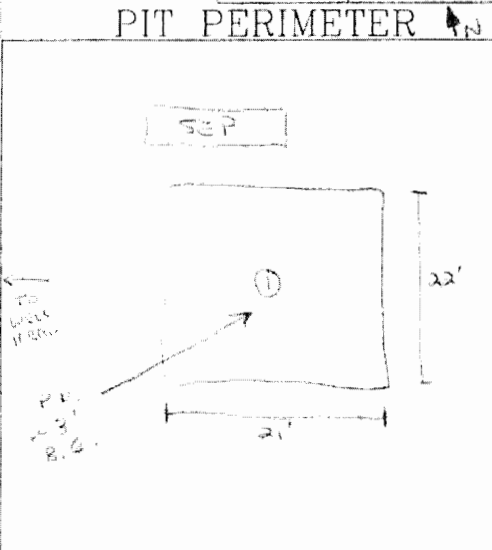
LOCATION: NAME: <u>O.H. RANDEL</u> WELL #: <u>7</u> TYPE: <u>HEAVY SEP.</u>	DATE STARTED: <u>3/12/02</u> DATE FINISHED: _____
QUAD/UNIT: <u>D</u> SEC: <u>15</u> TWP: <u>26N</u> RNG: <u>11W</u> PM: <u>NM</u> CNTY: <u>ST</u> ST: <u>NM</u>	ENVIRONMENTAL SPECIALIST: <u>MV</u>
RIR/FOOTAGE: <u>1150/1150W</u> CONTRACTOR: _____	

EXCAVATION APPROX. <u>NA</u> FT. x <u>NA</u> FT. x <u>NA</u> FT. DEEP. CUBIC YARDAGE: <u>NA</u>
DISPOSAL FACILITY: <u>ON-SITE</u> REMEDIATION METHOD: _____
LAND USE: <u>RANGE - BURN</u> LEASE: _____ FORMATION: <u>DK</u>

FIELD NOTES & REMARKS: PIT LOCATED APPROXIMATELY <u>239</u> FT. <u>S75E</u> FROM WELLHEAD
DEPTH TO GROUNDWATER: <u>&gt;100'</u> NEAREST WATER SOURCE: <u>&gt;1000'</u> NEAREST SURFACE WATER: <u>&gt;1000'</u>
NMDCD RANKING SCORE: <u>0</u> NMDCD TPH CLOSURE STD: <u>5000</u> PPM

SOIL AND EXCAVATION DESCRIPTION:	DVM CALIB. READ: <u>52.7</u> ppm DVM CALIB. GAS = <u>100</u> ppm PF = <u>0.52</u> TIME: <u>11:48</u> AM DATE <u>3/12/02</u>
SOIL TYPE: <u>(SAND)</u> / SILTY SAND / SILT / SILTY CLAY / CLAY / GRAVEL / OTHER _____	
SOIL COLOR: <u>MED. GRAY</u>	
COHESION (ALL OTHERS): <u>NON COHESIVE</u> / SLIGHTLY COHESIVE / COHESIVE / HIGHLY COHESIVE	
CONSISTENCY (NON COHESIVE SOILS): <u>(LOOSE)</u> / FIRM / DENSE / VERY DENSE	
PLASTICITY (CLAYS): <u>NON PLASTIC</u> / SLIGHTLY PLASTIC / COHESIVE / MEDIUM PLASTIC / HIGHLY PLASTIC	
DENSITY (COHESIVE CLAYS & SILTS): <u>SOFT</u> / FIRM / STIFF / VERY STIFF / HARD	
MOISTURE: <u>DRY</u> / SLIGHTLY MOIST / <u>(MOIST)</u> / WET / SATURATED / SUPER SATURATED	
DISCOLORATION/STAINING OBSERVED: <u>(YES)</u> / NO EXPLANATION - <u>SET. 4-6' BELOW GROUND</u>	
HC LIBOR DETECTED: <u>(YES)</u> / NO EXPLANATION - <u>MED. CHRY SAND (SILTY)</u>	
SAMPLE TYPE: <u>(GRAB)</u> / COMPOSITE - # OF PTS: <u>-</u>	
ADDITIONAL COMMENTS: <u>22-QUARTER SAMPLES WITH HAND SHOVEL.</u>	

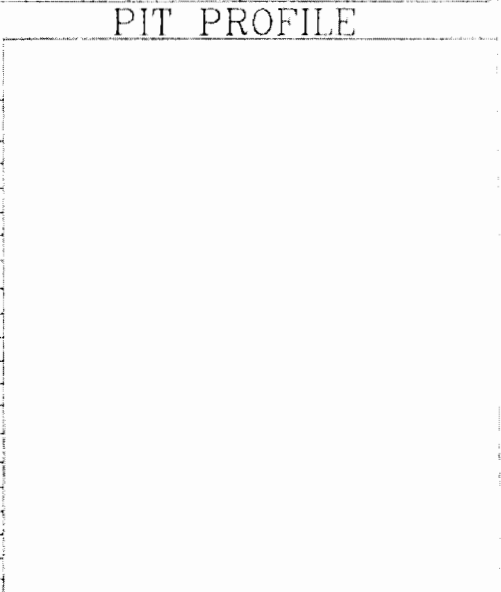
FIELD 418.1 CALCULATIONS								
SCALE	SAMP. TIME	SAMPLE I.D.	LAB No:	WEIGHT (g)	mL. FREON	DILUTION	READING	CALC. ppm
0 FT								



OVM RESULTS		
SAMPLE ID	FIELD HEADSPACE	PIB (ppm)
1 (B)	6'	1,015
2 (B)		
3 (B)		
4 (B)		
5 (B)		

LAB SAMPLES		
SAMPLE ID	ANALYSIS	TIME
DEL	TPH (S&IB)	11:50
"	BTEX (S&IB)	"



P.D. = PIT DEPRESSION; B.G. = BELOW GRADE  
T.H. = TEST HOLE; ~ = APPROX.; B = BELOW

TRAVEL NOTES: CALLOUT: 3/12/02 - MORNING ONSITE: 3/12/02 - MORNING

## **Attachment 2**

# **Lodestar Services Remediation Work Plan (2006)**



**Lodestar Services, Inc.**

P.O. Box 3861, Farmington, NM 87499-3861, 505-334-2791

August 15, 2006

Mr. Steve Austin  
Navajo Nation EPA  
PO Box 1999  
Shiprock, NM 87420

**CERTIFIED MAIL: 7004 1160 0007 4952 1517**

**RE: OH Randel #7**

Dear Mr. Austin,

XTO Energy Inc. (XTO) has contracted Lodestar Services, Incorporated (Lodestar) to oversee groundwater monitoring and remedial activities at the OH Randel #7 natural gas production well. It has come to our attention that the well is located on land regulated by the Navajo Nation Environmental Protection Agency (NNEPA). Previous regulatory correspondence has been with the New Mexico Oil Conservation Division (NMOCD). An annual comprehensive report was submitted to the NMOCD in January 2006 and is included for your review.

The OH Randel #7 is located in Unit D of Section 16 of Township 26N, Range 11W, and includes a former oil-water-separator pit that may have affected shallow groundwater. Six groundwater monitoring wells were previously installed on the site to investigate groundwater quality. One of the wells, MW-6, contains free-phase hydrocarbons. Previously MW-1 and MW-2 contained free-phase hydrocarbons. MW-1 is located in the center of the former pit. MW-2 is directly adjacent to the pit, and MW-6 is located down gradient of the pit. The annual report included herein has several groundwater contour maps provided by Blagg Engineering that indicate varying groundwater flow directions. Navajo Agricultural Products Incorporated (NAPI) conducts irrigation adjacent to the site and may influence groundwater flow direction.

The following steps are proposed remove impacted soil and free-phase hydrocarbons:

1. Excavate affected soil associated with historical operations from the former pit. Impacted soil will be disposed at a local land farm permitted by the NMOCD. Soil headspace gas will be monitored with a photo-ionization detector (PID) to determine extent of impacted soil during excavation according to the NMOCD Guidelines for headspace analysis. Soil above 10 milligrams per kilogram (mg/kg) benzene, 50 mg/kg total benzene, toluene, ethylbenzene, and xylenes (BTEX), and 100 mg/kg total petroleum hydrocarbons will be removed. Laboratory analyses of composite samples collected from the sidewalls of the excavation will be used to document that impacted soil has been removed.
2. Erect temporary fencing around the excavated site and remove impacted water and free-phase hydrocarbons from the pit.

Mr. Steve Austin  
August 15, 2006  
Page 2 of 2

3. Once the free-phase hydrocarbons have been removed, backfill the excavation site with clean soil.
4. Replace groundwater-monitoring wells as necessary.
5. Install additional down gradient monitoring wells as necessary to characterize impacted groundwater.
6. Remove free phase hydrocarbons from groundwater, then sample groundwater-monitoring wells for benzene, toluene, ethylbenzene and total xylenes (BTEX) on a quarterly basis to monitor progress at the site.

Following completion of the above tasks, XTO will provide a letter report describing onsite activities and analytical results. XTO wishes to complete this work as soon as practical and will contact you to schedule activities. Should you have any questions or require additional information, please do not hesitate to contact Lisa Winn of XTO at (505) 324-1090 or you can call me at (505) 334 2791.

Sincerely,  
**LODESTAR SERVICES, INC**



Martin Nee

Cc: Lisa Winn, XTO, w/o enclosures  
Kim Champlin, XTO, w/o enclosures  
Ashley Ager, LSI, w/o enclosures  
Glenn Von Gonten, NMOCD  
File

Attachments: Annual Report

cc Mr Jim Walker USEPA



**Lodestar Services, Inc.**

P.O. Box 3861, Farmington, NM 87499-3861, 505-334-2791

## **Attachment 3**

# **Lodestar Services Report of Excavation and Sampling (2007)**



PO Box 3861 Farmington, NM 87499-3861 Office (505) 334-2791

January 29, 2007

Mr. William Freeman  
Navajo Nation Environmental Protection Agency  
PO Box 1999  
Shiprock, NM 87420

**RE: Report of Excavation and Sampling at OH Randel #7**

Dear Mr. Freeman:

XTO Energy Inc. (XTO) operates the OH Randel #7 natural gas production well located in Unit D of Section 16 of Township 26N, Range 11W, San Juan County, New Mexico. A former oil-water-separator pit may have impacted soil and shallow groundwater at the site. On August 15, 2006, XTO submitted a work plan to the Navajo Nation Environmental Protection Agency (NNEPA) describing planned remedial activities to investigate and remove impacted soil. XTO contracted Lodestar Services, Incorporated (Lodestar) to direct excavation activities according to the August 15 work plan. Core Oilfield Services completed the excavation, backfilling, and transportation of impacted soil to Envirotech Inc.'s land farm. Clean backfill was purchased from Moss Excavation's gravel pit located on highway 550 in Bloomfield, NM.

On November 13-27, 2006, a geologist from Lodestar was present during excavation of impacted soil at the OH Randel #7. During excavation, field screening according to the New Mexico Oil Conservation Division's (NMOCD) guidelines for headspace analysis was conducted to determine extent of impacted soil by collecting samples from the sidewalls and floor of the excavated pit. Following headspace screening and excavation, composite samples from the sidewalls and floor of the excavation were collected for laboratory analysis. Samples were collected where field screening indicated the highest concentrations of hydrocarbons. Compositing included placing four aliquots of soil from a given wall or floor into a one-gallon plastic bag. The soil within the bag was thoroughly mixed before filling a four-ounce glass jar. The sample was immediately placed on ice, and maintained under strict chain-of-custody until delivered to Envirotech Laboratories in Farmington, NM. Envirotech Laboratories analyzed the samples for benzene, toluene, ethylbenzene, and xylenes (BTEX) and total petroleum hydrocarbons (TPH) by United States Environmental Protection Agency (USEPA) methods 8021 and 8015, respectively. The results of sample analyses are as follows:

	GRO (ppm)	DRO (ppm)	TPH (ppm)	Benzene (ppb)	Toluene (ppb)	Ethyl benzene (ppb)	P&M Xylenes (ppb)	O Xylenes (ppb)	Total BTEX (ppb)
<b>NMOCD Standard</b>			100	10,000					50,000
<b>North Excavation North Wall</b>	2.6	3.6	6.2	2.2	20.3	39.1	374	64.8	500
<b>North Excavation East Wall</b>	1080	266	1350	518	3230	3290	9590	3610	20240

Mr. William Freeman  
January 29, 2007  
Page 2 of 2

	GRO (ppm)	DRO (ppm)	TPH (ppm)	Benzene (ppb)	Toluene (ppb)	Ethyl benzene (ppb)	P&M Xylenes (ppb)	O Xylenes (ppb)	Total BTEX (ppb)
<b>NMOCD Standard</b>			100	10,000					50,000
<b>North Excavation West Wall</b>	8.0	ND	8.0	2.0	746	889	2170	979	4790
<b>North Excavation Floor</b>	3.6	ND	3.6	10.5	65.9	119	619	202	1020
<b>South Excavation East Wall</b>	5.2	15.0	20.2	7.4	50.7	16.7	78.6	37.0	190
<b>South Excavation West Wall</b>	0.5	0.4	0.9	3.3	9.1	19.6	84.7	28.4	145
<b>South Excavation Floor</b>	ND	ND	ND	ND	4.4	7.7	24.5	5.3	41.9
<b>South Excavation South Wall</b>	ND	ND	ND	ND	1.9	7.9	24.8	8.7	43.3

GRO: Gasoline Range Organics; DRO: Diesel Range Organics;  
ND: Not Detected in sample; ppm: parts per million; ppb: parts per billion

Approximately six thousand eight hundred and eighty two cubic yards of soil were removed for treatment to the land farm. Lodestar and XTO met with the USEPA and the NNEPA on November 27, 2006 at the job site and received permission to backfill the excavation based on the above results.

Six groundwater monitoring wells were previously installed on the site to investigate groundwater quality. Three of the wells, MW-1, MW-2, and MW-6 were removed during excavation activities.

Laboratory reports and Bill-of-Lading copies are attached. Please contact Lisa Winn of XTO at (505) 324-1090 with any questions that may arise.

Sincerely,  
Lodestar Services, Inc.



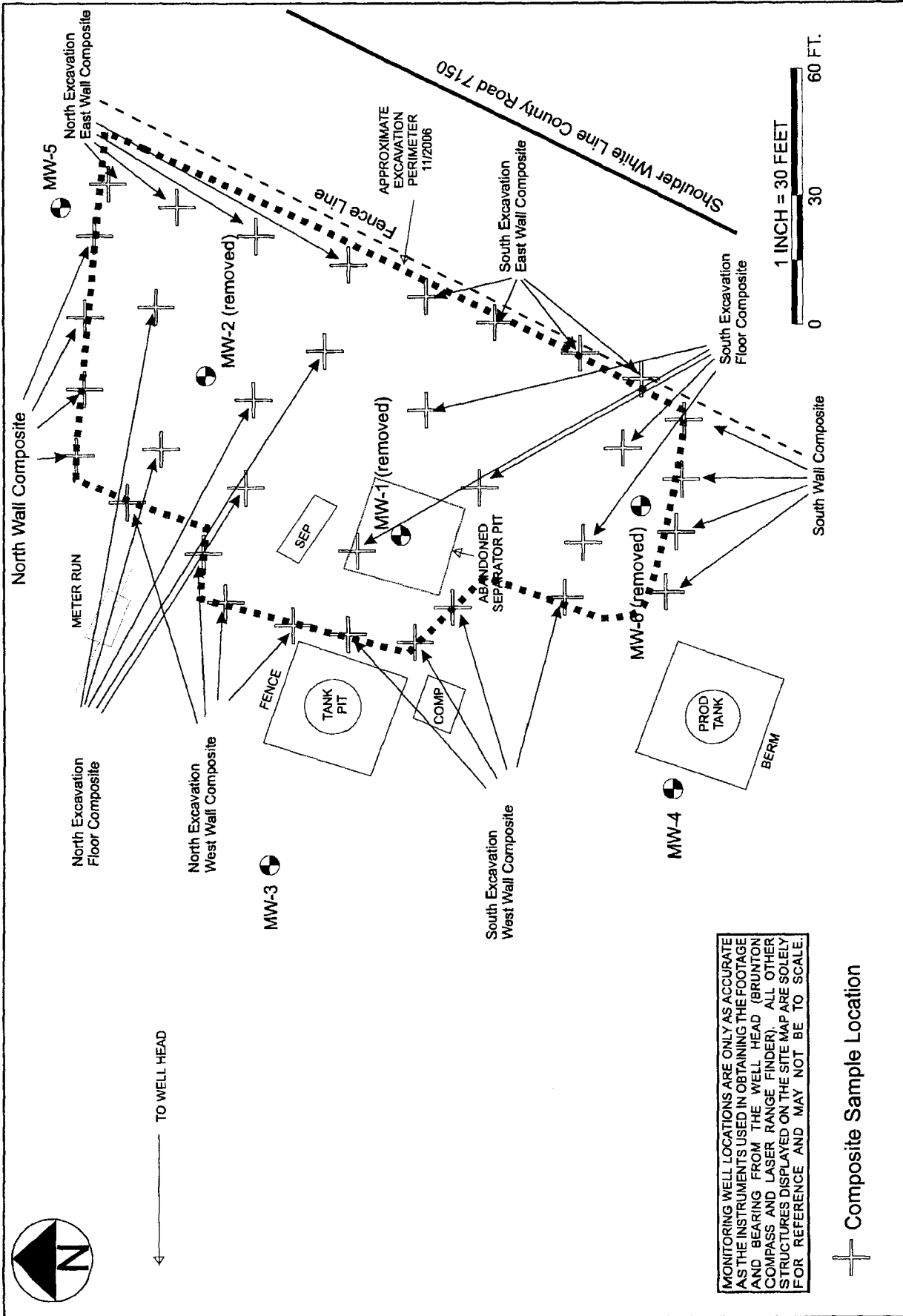
Martin Nee

Cc: Jim Walker, USEPA  
Lisa Winn, XTO Energy  
Kim Champlin, XTO Energy  
Ashley Ager, Lodestar Services



Lodestar Services, Incorporated PO Box 3861 Farmington, NM 87499 (505) 334-2791





MONITORING WELL LOCATIONS ARE ONLY AS ACCURATE AS THE INSTRUMENTS USED IN OBTAINING THE FOOTAGE AND BEARING FROM THE WELL HEAD (BRUNTON COMPASS AND LASER RANGE FINDER). ALL OTHER STRUCTURES DISPLAYED ON THE SITE MAP ARE SOLELY FOR REFERENCE AND MAY NOT BE TO SCALE.

⊕ Composite Sample Location

Lodestar Services, Inc  
 PO Box 3861  
 Farmington, NM 87499

OH RANDEL #7  
 NW/4 NW/4 SEC. 15, T26N, R11W  
 SAN JUAN COUNTY, NEW MEXICO

PROJECT: XTO Excavation  
 DRAWN BY: MJN  
 REVISED: 01/29/07

Composite Sample Location Map  
 1/29/2007

# **Attachment 4**

## **2011 Laboratory Reports**



YOUR LAB OF CHOICE

12065 Lebanon Rd.  
Mt. Juliet, TN 37122  
(615) 758-5858  
1-800-767-5859  
Fax (615) 758-5859

Tax I.D. 62-0814289

Est. 1970

James McDaniel  
XTO Energy - San Juan Division  
382 Road 3100  
Aztec, NM 87410

### Report Summary

Thursday February 17, 2011

Report Number: L501726

Samples Received: 02/15/11

Client Project:

Description: OH Randel 7

The analytical results in this report are based upon information supplied by you, the client, and are for your exclusive use. If you have any questions regarding this data package, please do not hesitate to call.

Entire Report Reviewed By:

Daphne Richards , ESC Representative

### Laboratory Certification Numbers

A2LA - 1461-01, AIHA - 100789, AL - 40660, CA - I-2327, CT - PH-0197, FL - E87487  
GA - 923, IN - C-TN-01, KY - 90010, KYUST - 0016, NC - ENV375/DW21704, ND - R-140  
NJ - TN002, NJ NELAP - TN002, SC - 84004, TN - 2006, VA - 00109, WV - 233  
AZ - 0612, MN - 047-999-395, NY - 11742, WI - 998093910, NV - TN000032008A,  
TX - T104704245, OK-9915

Accreditation is only applicable to the test methods specified on each scope of accreditation held by ESC Lab Sciences.

Note: The use of the preparatory EPA Method 3511 is not approved or endorsed by the CA ELAP.

This report may not be reproduced, except in full, without written approval from ESC Lab Sciences. Where applicable, sampling conducted by ESC is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.



YOUR LAB OF CHOICE

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Mt. Juliet, TN 37122  
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1-800-767-5859  
Fax (615) 758-5859

Tax I.D. 62-0814289

Est. 1970

REPORT OF ANALYSIS

James McDaniel  
XTO Energy - San Juan Division  
382 Road 3100  
Aztec, NM 87410

February 17, 2011

Date Received : February 15, 2011  
Description : OH Randel 7  
Sample ID : RANDEL MW-7  
Collected By :  
Collection Date : 02/14/11 15:42

ESC Sample # : L501726-01

Site ID : OH RANDEL 7

Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Benzene	2.2	0.012	mg/l	8021B	02/16/11	25
Toluene	1.0	0.12	mg/l	8021B	02/16/11	25
Ethylbenzene	BDL	0.012	mg/l	8021B	02/16/11	25
Total Xylene	1.8	0.038	mg/l	8021B	02/16/11	25
Surrogate Recovery(%) a,a,a-Trifluorotoluene(PID)	98.7		% Rec.	8021B	02/16/11	25

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit(PQL)

Note:

The reported analytical results relate only to the sample submitted.

This report shall not be reproduced, except in full, without the written approval from ESC.

Reported: 02/17/11 15:36 Printed: 02/17/11 15:37

Summary of Remarks For Samples Printed  
02/17/11 at 15:37:10

TSR Signing Reports: 288  
R5 - Desired TAT

drywt

Sample: L501726-01 Account: XTORNM Received: 02/15/11 08:30 Due Date: 02/22/11 00:00 RPT Date: 02/17/11 15:36



**YOUR LAB OF CHOICE**

XTO Energy - San Juan Division  
James McDaniel  
382 Road 3100

Aztec, NM 87410

Quality Assurance Report  
Level II

L501726

12065 Lebanon Rd.  
Mt. Juliet, TN 37122  
(615) 758-5858  
1-800-767-5859  
Fax (615) 758-5859

Tax I.D. 62-0814289

Est. 1970

February 17, 2011

Analyte	Result	Laboratory Blank		Limit	Batch	Date Analyzed
		Units	% Rec			
Benzene	< .0005	mg/l			WG521811	02/16/11 14:47
Ethylbenzene	< .0005	mg/l			WG521811	02/16/11 14:47
Toluene	< .005	mg/l			WG521811	02/16/11 14:47
Total Xylene	< .0015	mg/l			WG521811	02/16/11 14:47
a,a,a-Trifluorotoluene (PID)			% Rec. 99.86	55-122	WG521811	02/16/11 14:47

Analyte	Units	Laboratory Control Sample		% Rec	Limit	Batch
		Known Val	Result			
Benzene	mg/l	.05	0.0500	100.	79-114	WG521811
Ethylbenzene	mg/l	.05	0.0494	98.7	80-116	WG521811
Toluene	mg/l	.05	0.0503	101.	79-112	WG521811
Total Xylene	mg/l	.15	0.149	99.2	84-118	WG521811
a,a,a-Trifluorotoluene (PID)				99.27	55-122	WG521811

Analyte	Units	Laboratory Control Sample Duplicate			Limit	RPD	Limit	Batch
		Result	Ref	%Rec				
Benzene	mg/l	0.0540	0.0500	108.	79-114	7.53	20	WG521811
Ethylbenzene	mg/l	0.0533	0.0494	106.	80-116	7.63	20	WG521811
Toluene	mg/l	0.0537	0.0503	107.	79-112	6.40	20	WG521811
Total Xylene	mg/l	0.161	0.149	107.	84-118	7.58	20	WG521811
a,a,a-Trifluorotoluene (PID)				99.22	55-122			WG521811

Analyte	Units	Matrix Spike				Limit	Ref Samp	Batch
		MS Res	Ref Res	TV	% Rec			
Benzene	mg/l	0.119	0.0740	.05	90.8	35-147	L501758-02	WG521811
Ethylbenzene	mg/l	0.0723	0.0250	.05	94.6	39-141	L501758-02	WG521811
Toluene	mg/l	0.0562	0.00520	.05	102.	35-148	L501758-02	WG521811
Total Xylene	mg/l	0.164	0.0120	.15	102.	33-151	L501758-02	WG521811
a,a,a-Trifluorotoluene (PID)					100.5	55-122		WG521811

Analyte	Units	Matrix Spike Duplicate			Limit	RPD	Limit	Ref Samp	Batch
		MSD	Ref	%Rec					
Benzene	mg/l	0.120	0.119	92.7	35-147	0.780	20	L501758-02	WG521811
Ethylbenzene	mg/l	0.0722	0.0723	94.5	39-141	0.0500	20	L501758-02	WG521811
Toluene	mg/l	0.0553	0.0562	100.	35-148	1.73	20	L501758-02	WG521811
Total Xylene	mg/l	0.161	0.164	99.5	33-151	1.82	20	L501758-02	WG521811
a,a,a-Trifluorotoluene (PID)				100.2	55-122				WG521811

Batch number / Run number / Sample number cross reference

WG521811: R1578029: L501726-01

\* \* Calculations are performed prior to rounding of reported values.  
\* Performance of this Analyte is outside of established criteria.  
For additional information, please see Attachment A 'List of Analytes with QC Qualifiers.'



**YOUR LAB OF CHOICE**

XTO Energy - San Juan Division  
James McDaniel  
382 Road 3100

Aztec, NM 87410

Quality Assurance Report  
Level II

L501726

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Est. 1970

February 17, 2011

The data package includes a summary of the analytic results of the quality control samples required by the SW-846 or CWA methods. The quality control samples include a method blank, a laboratory control sample, and the matrix spike/matrix spike duplicate analysis. If a target parameter is outside the method limits, every sample that is effected is flagged with the appropriate qualifier in Appendix B of the analytic report.

Method Blank - an aliquot of reagent water carried through the entire analytic process. The method blank results indicate if any possible contamination exposure during the sample handling, digestion or extraction process, and analysis. Concentrations of target analytes above the reporting limit in the method blank are qualified with the "B" qualifier.

Laboratory Control Sample - is a sample of known concentration that is carried through the digestion/extraction and analysis process. The percent recovery, expressed as a percentage of the theoretical concentration, has statistical control limits indicating that the analytic process is "in control". If a target analyte is outside the control limits for the laboratory control sample or any other control sample, the parameter is flagged with a "J4" qualifier for all effected samples.

Matrix Spike and Matrix Spike Duplicate - is two aliquots of an environmental sample that is spiked with known concentrations of target analytes. The percent recovery of the target analytes also has statistical control limits. If any recoveries that are outside the method control limits, the sample that was selected for matrix spike/matrix spike duplicate analysis is flagged with either a "J5" or a "J6". The relative percent difference (%RPD) between the matrix spike and the matrix spike duplicate recoveries is all calculated. If the RPD is above the method limit, the effected samples are flagged with a "J3" qualifier.

\* ONLY 1 COG PER SITE \*

D061

<b>Company Name/Address</b> XTO Energy, Inc. 382 County Road 3100 Aztec, NM 87410		<b>Alternate Billing</b> XTORN140348406 XTORN140819105 Report to: James McDaniel E-mail to: James_McDaniel@xtoenergy.com		<b>Analysis/Container/Preservative</b>		<b>Chain of Custody</b> Page 1 of 1	
<b>Client Project No.</b> OH RANDEL #7		<b>City/State Collected</b> Bloomfield, NM		<b>Prepared by:</b> ENVIRONMENTAL Science corp 12065 Lebanon Road Mt. Juliet TN 37122 Phone (615)758-5858 Phone (800) 767-5859 FAX (615)758-5859		<b>CoCode:</b> XTORN14 <b>Temperatures:</b> (lab use only)	
<b>Signature:</b> [Signature]		<b>Signature:</b> [Signature]		<b>Shipped via:</b> FedEx		<b>Remarks/contaminant</b> 1501726-01	
<b>Rush?</b> <input type="checkbox"/> (Lab MUST be notified) Next Day ..... 100% Two Day ..... 50% Three Day ..... 25%		<b>Date Results Needed</b> Email? <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes FAX? <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes		<b>Comp/Grab</b> GRAB		<b>Sample # (lab only)</b>	
<b>Collected by:</b> James McDaniel [Signature]		<b>Signature:</b> [Signature]		<b>Date</b> 2/14/11		<b>Time</b> 15:12	
<b>Collected by (signature):</b> [Signature]		<b>Depth</b> N/A		<b>Matrix</b> GW		<b>Chits</b> 3	
<b>Packed on ice</b> N <input type="checkbox"/> Y <input checked="" type="checkbox"/>		<b>Sample ID</b> RANDEL MW-7		[Empty]		[Empty]	
[Empty]		[Empty]		[Empty]		[Empty]	
[Empty]		[Empty]		[Empty]		[Empty]	
[Empty]		[Empty]		[Empty]		[Empty]	
[Empty]		[Empty]		[Empty]		[Empty]	
[Empty]		[Empty]		[Empty]		[Empty]	
[Empty]		[Empty]		[Empty]		[Empty]	
[Empty]		[Empty]		[Empty]		[Empty]	
[Empty]		[Empty]		[Empty]		[Empty]	

Matrix: SS-Soil/Solid GW-Groundwater WW-Wastewater DW-Drinking Water OT-Other

pH \_\_\_\_\_ Temp \_\_\_\_\_ Flow \_\_\_\_\_ Other \_\_\_\_\_

<b>Reinquirer by (Signature)</b> [Signature]		<b>Received by (Signature)</b> [Signature]	
<b>Date:</b> 2/14/11 <b>Time:</b> 15:12		<b>Date:</b> 2/14/11 <b>Time:</b> 15:12	
<b>Reinquirer by (Signature)</b> [Signature]		<b>Received by (Signature)</b> [Signature]	
<b>Date:</b>		<b>Date:</b>	
<b>Reinquirer by (Signature)</b> [Signature]		<b>Received by (Signature)</b> [Signature]	
<b>Date:</b>		<b>Date:</b>	
<b>Condition</b> Samples returned via: FedEx X, UPS, Other 872600527162		<b>pH Checked:</b> OK	



D061

\* ONLY 1 CAG PE. SITE \*

Company Name/Address  
**XTO Energy, Inc.**  
 382 County Road 3100  
 Aztec, NM 87410

Alternate Billing  
 XTORNMM0319406  
 XTORNMG819105  
 Report to: James McDaniel  
 E-mail to: James\_McDaniel@xtoenergy.com

Project Description: **OH RANDEL #7**  
 PHONE: 505-333-3701  
 FAX:

City/State Collected: **Bloomfield, NM**  
 Lab Project #

Site/Facility ID# **(well name) DH RANDEL #7**  
 P.O.#  
 (Lab MUST be Notified)  
 Rush?  
 Next Day ..... 100%  
 Two Day ..... 50%  
 Three Day ..... 25%

Client Project No.  
 Date Results Needed  
 Email?  No  Yes  
 FAX?  No  Yes

Collected by: **James McDaniel**  
 Collected by (signature):

Sample ID  
**RANDEL MW-7**

Comp/Grab  
**GRAB**

Matrix  
**GW**

Depth  
**N/A**

Date  
 Time

No of Cntrs  
**3**

Analysis/Container/Preservative  
**BTEX (802) Non-Preserved**

Prepared by:  
**ENVIRONMENTAL Science corp**  
 12065 Lebanon Road  
 Mt. Juliet TN 37122  
 Phone (615)758-5858  
 Phone (800) 767-5859  
 FAX (615)758-5859

Chain of Custody  
 Page \_\_\_ of \_\_\_

CoCode  
**XTORNM**  
 Template/Prelogin

Shipped Via: Fed Ex

Remarks/contaminant  
**L Sol 72691**

Sample # (lab only)

Matrix: SS-Soil/Solid GW-Groundwater WW-Wastewater DW-Drinking Water OT-Other \_\_\_\_\_

pH \_\_\_\_\_ Temp \_\_\_\_\_ Flow \_\_\_\_\_ Other \_\_\_\_\_

Remarks:

Relinquisher by (Signature) *[Signature]*  
 Date: **2/1/11** Time: **6:42**

Relinquisher by (Signature) *[Signature]*  
 Date: \_\_\_\_\_ Time: \_\_\_\_\_

Relinquisher by (Signature) *[Signature]*  
 Date: \_\_\_\_\_ Time: \_\_\_\_\_

Received by (Signature) *[Signature]*  
 Received by (Signature) *[Signature]*  
 Received for lab by (Signature) *[Signature]*

Samples returned via: FedEx\_X\_UPS\_Other\_  
**873600527162**

Temp: **3.1** Bottles Received: **3V**

Date: **2/15/11** Time: **0831**

Condition (lab use only) **OK**

pH Checked: \_\_\_\_\_ NCF: \_\_\_\_\_

**Susan Peach**

---

**From:** Daphne Richards  
**Sent:** Tuesday, February 15, 2011 1:26 PM  
**To:** Reporting  
**Subject:** FW: Water samples from 2/14/11

**Attachments:** Randel and McCoy COCs.pdf

Please scan these CoC's for L501725 for McCoy and L501726-Randel. The original CoC's were not signed and did not have sample date/time

thanks

---

**From:** Julie Linn [mailto:jlinn@ltenv.com]  
**Sent:** Tuesday, February 15, 2011 12:00 PM  
**To:** Daphne Richards  
**Cc:** 'Ashley Ager'  
**Subject:** RE: Water samples from 2/14/11

*Daphne*

*These are the corrected COCS – that have the sample date and time and samplers name and signature. Please use these in the final report to be given to James and please disregard the erroneous COCs.*

*thanks*

*Julie Linn, P.G.  
Senior Geologist  
LT Environmental, Inc.  
2243 Main Avenue, Suite 3  
Durango, Colorado 81301  
(970) 385-1096  
(970) 903-9197 cell  
jlinn@ltenv.com*



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2/15/2011

**From:** Daphne Richards [mailto:DRichards@esclabsciences.com]  
**Sent:** Tuesday, February 15, 2011 10:16 AM  
**To:** Julie Linn  
**Subject:** RE: Water samples from 2/14/11

Hi Julie

Here you go.

Thanks!  
Daphne

---

**From:** Julie Linn [mailto:jlinn@ltenv.com]  
**Sent:** Tuesday, February 15, 2011 10:31 AM  
**To:** Daphne Richards  
**Subject:** Water samples from 2/14/11

Hi Daphne

We sent you two sets of water samples yesterday for BTEX. They should be on two separate COCs; one for McCoy and one for OH Randel. Our sampler accidentally sent you both copies of the COC. Could you scan and email me a copy of both COCs?

Thanks  
julie

Julie Linn, P.G.  
Senior Geologist  
LT Environmental, Inc.  
2243 Main Avenue, Suite 3  
Durango, Colorado 81301  
(970) 385-1096  
(970) 903-9197 cell  
jlinn@ltenv.com



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2/15/2011

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Tax I.D. 62-0814289  
  
Est. 1970

James McDaniel  
XTO Energy - San Juan Division  
382 Road 3100  
Aztec, NM 87410

<p style="text-align: center;"><b>Report Summary</b></p> <p style="text-align: center;">Friday May 20, 2011</p> <p style="text-align: center;">Report Number: L516629</p> <p style="text-align: center;">Samples Received: 05/18/11</p> <p style="text-align: center;">Client Project:</p> <p style="text-align: center;">Description: OH Randel 007</p>
--

The analytical results in this report are based upon information supplied by you, the client, and are for your exclusive use. If you have any questions regarding this data package, please do not hesitate to call.

Entire Report Reviewed By:

Daphne Richards , ESC Representative

*Laboratory Certification Numbers*

A2LA - 1461-01, AIHA - 100789, AL - 40660, CA - I-2327, CT - PH-0197, FL - E87487  
GA - 923, IN - C-TN-01, KY - 90010, KYUST - 0016, NC - ENV375/DW21704, ND - R-140  
NJ - TN002, NJ NELAP - TN002, SC - 84004, TN - 2006, VA - 00109, WV - 233  
AZ - 0612, MN - 047-999-395, NY - 11742, WI - 998093910, NV - TN000032008A,  
TX - T104704245, OK-9915

Accreditation is only applicable to the test methods specified on each scope of accreditation held by ESC Lab Sciences.

Note: The use of the preparatory EPA Method 3511 is not approved or endorsed by the CA ELAP.

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REPORT OF ANALYSIS

James McDaniel  
XTO Energy - San Juan Division  
382 Road 3100  
Aztec, NM 87410

May 20, 2011

Date Received : May 18, 2011  
Description : OH Randel 007  
Sample ID : MW-7  
Collected By : Brooke Herb  
Collection Date : 05/17/11 14:45

ESC Sample # : L516629-01  
Site ID : OH RANDEL 007  
Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Benzene	0.50	0.0050	mg/l	8021B	05/20/11	10
Toluene	0.19	0.050	mg/l	8021B	05/20/11	10
Ethylbenzene	0.016	0.00050	mg/l	8021B	05/19/11	1
Total Xylene	0.18	0.015	mg/l	8021B	05/20/11	10
Surrogate Recovery(%) a,a,a-Trifluorotoluene(PID)	97.2		% Rec.	8021B	05/19/11	1

BDL - Below Detection Limit  
Det. Limit - Practical Quantitation Limit(PQL)  
Note:  
The reported analytical results relate only to the sample submitted.  
This report shall not be reproduced, except in full, without the written approval from ESC.  
Reported: 05/20/11 14:39 Printed: 05/20/11 14:40

Summary of Remarks For Samples Printed  
05/20/11 at 14:40:15

TSR Signing Reports: 288  
R5 - Desired TAT

drywt

Sample: L516629-01 Account: XTORNM Received: 05/18/11 09:00 Due Date: 05/25/11 00:00 RPT Date: 05/20/11 14:39



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XTO Energy - San Juan Division  
James McDaniel  
382 Road 3100

Aztec, NM 87410

Quality Assurance Report  
Level II

L516629

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Mt. Juliet, TN 37122  
(615) 758-5858  
1-800-767-5859  
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May 20, 2011

Analyte	Result	Laboratory Blank		Limit	Batch	Date Analyzed
		Units	% Rec			
Ethylbenzene	< .0005	mg/l			WG536391	05/19/11 07:51
a,a,a-Trifluorotoluene (PID)		% Rec.	102.7	55-122	WG536391	05/19/11 07:51
Benzene	< .0005	mg/l			WG536606	05/20/11 01:19
Toluene	< .005	mg/l			WG536606	05/20/11 01:19
Total Xylene	< .0015	mg/l			WG536606	05/20/11 01:19
a,a,a-Trifluorotoluene (PID)		% Rec.	102.2	55-122	WG536606	05/20/11 01:19

Analyte	Units	Laboratory Control Sample		% Rec	Limit	Batch
		Known Val	Result			
Ethylbenzene	mg/l	.05	0.0497	99.3	80-116	WG536391
a,a,a-Trifluorotoluene (PID)				101.8	55-122	WG536391
Benzene	mg/l	.05	0.0527	105.	79-114	WG536606
Toluene	mg/l	.05	0.0555	111.	79-112	WG536606
Total Xylene	mg/l	.15	0.163	109.	84-118	WG536606
a,a,a-Trifluorotoluene (PID)				102.9	55-122	WG536606

Analyte	Units	Laboratory Control Sample Duplicate			Limit	RPD	Limit	Batch
		Result	Ref	%Rec				
Ethylbenzene	mg/l	0.0545	0.0497	109.	80-116	9.35	20	WG536391
a,a,a-Trifluorotoluene (PID)				103.2	55-122			WG536391
Benzene	mg/l	0.0527	0.0527	105.	79-114	0.0800	20	WG536606
Toluene	mg/l	0.0551	0.0555	110.	79-112	0.620	20	WG536606
Total Xylene	mg/l	0.158	0.163	105.	84-118	3.19	20	WG536606
a,a,a-Trifluorotoluene (PID)				103.1	55-122			WG536606

Analyte	Units	Matrix Spike				Limit	Ref Samp	Batch
		MS Res	Ref Res	TV	% Rec			
Ethylbenzene	mg/l	0.0512	0.000820	.05	101.	39-141	L516480-09	WG536391
a,a,a-Trifluorotoluene (PID)					102.8	55-122		WG536391
Benzene	mg/l	0.0511	0	.05	102.	35-147	L516357-01	WG536606
Toluene	mg/l	0.0534	0	.05	107.	35-148	L516357-01	WG536606
Total Xylene	mg/l	0.154	0	.15	102.	33-151	L516357-01	WG536606
a,a,a-Trifluorotoluene (PID)					101.9	55-122		WG536606

Analyte	Units	Matrix Spike Duplicate			Limit	RPD	Limit	Ref Samp	Batch
		MSD	Ref	%Rec					
Ethylbenzene	mg/l	0.0486	0.0512	95.5	39-141	5.20	20	L516480-09	WG536391
a,a,a-Trifluorotoluene (PID)				101.3	55-122				WG536391
Benzene	mg/l	0.0511	0.0511	102.	35-147	0.0100	20	L516357-01	WG536606
Toluene	mg/l	0.0534	0.0534	107.	35-148	0.0700	20	L516357-01	WG536606
Total Xylene	mg/l	0.150	0.154	100.	33-151	2.52	20	L516357-01	WG536606
a,a,a-Trifluorotoluene (PID)				102.6	55-122				WG536606

\* Performance of this Analyte is outside of established criteria.  
For additional information, please see Attachment A 'List of Analytes with QC Qualifiers.'





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XTO Energy - San Juan Division  
James McDaniel  
382 Road 3100

Aztec, NM 87410

Quality Assurance Report  
Level II

L516629

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1-800-767-5859  
Fax (615) 758-5859

Tax I.D. 62-0814289

Est. 1970

May 20, 2011

---

Batch number / Run number / Sample number cross reference

WG536391: R1693849: L516629-01  
WG536606: R1694649: L516629-01

- \* \* Calculations are performed prior to rounding of reported values.
  - \* Performance of this Analyte is outside of established criteria.
- For additional information, please see Attachment A 'List of Analytes with QC Qualifiers.'



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Est. 1970

May 20, 2011

The data package includes a summary of the analytic results of the quality control samples required by the SW-846 or CWA methods. The quality control samples include a method blank, a laboratory control sample, and the matrix spike/matrix spike duplicate analysis. If a target parameter is outside the method limits, every sample that is effected is flagged with the appropriate qualifier in Appendix B of the analytic report.

Method Blank - an aliquot of reagent water carried through the entire analytic process. The method blank results indicate if any possible contamination exposure during the sample handling, digestion or extraction process, and analysis. Concentrations of target analytes above the reporting limit in the method blank are qualified with the "B" qualifier.

Laboratory Control Sample - is a sample of known concentration that is carried through the digestion/extraction and analysis process. The percent recovery, expressed as a percentage of the theoretical concentration, has statistical control limits indicating that the analytic process is "in control". If a target analyte is outside the control limits for the laboratory control sample or any other control sample, the parameter is flagged with a "J4" qualifier for all effected samples.

Matrix Spike and Matrix Spike Duplicate - is two aliquots of an environmental sample that is spiked with known concentrations of target analytes. The percent recovery of the target analytes also has statistical control limits. If any recoveries that are outside the method control limits, the sample that was selected for matrix spike/matrix spike duplicate analysis is flagged with either a "J5" or a "J6". The relative percent difference (%RPD) between the matrix spike and the matrix spike duplicate recoveries is all calculated. If the RPD is above the method limit, the effected samples are flagged with a "J3" qualifier.

Company Name/Address

XTO Energy, Inc.  
382 County Road 3100  
Aztec, NM 87410

Alternate Billing

XTORNM031810S

Report to: James McDaniel  
E-mail to: james\_mcdaniel@xtoenergy.com

OH Rande! #007

Project Description: ~~XTO Groundwater Monitoring~~

Client Project No.

City/State Collected:  
San Juan city, NM

Lab Project #

Collected by:

Brooke Hero

Site/Facility ID#

OH Rande! #007

Collected by (Signature):

*Brooke Hero*

Rush?  (Lab MUST be Notified)

Next Day .....100%  
Two Day .....50%  
Three Day .....25%

Date Results Needed

No \_\_\_\_\_ of \_\_\_\_\_  
Email? No X Yes  
FAX? No Yes

No

Cntrs

Time

Date

Depth

Matrix

Comp/Grab

Sample ID

MW-7

GENB

GW

5/17/11

1445

3

Packed on ice N Y X

BTEX (8021)

Analysis/Container/Preservative

Chain of Custody  
Page 1 of 1

E250

Prepared by:



12065 Lebanon Road

Mt. Juliet TN 37122

Phone (615)758-5858

Phone (800) 767-5859

FAX (615)758-5859

CoCode

XTORNM

Template/Prelogin

Shipped Via: Fed Ex

(lab use only)

Remarks/contaminant

Sample # (lab only)

LS16629-01

Matrix: SS-Soil/Solid GW-Groundwater WW-Wastewater DW-Drinking Water OT-Other

pH \_\_\_\_\_ Temp \_\_\_\_\_

Flow \_\_\_\_\_ Other \_\_\_\_\_

Remarks: "ONLY 1 COC Per Site!"

Relinquisher by (Signature) <i>Brooke Hero</i>	Date: 5/17/11 Time: 1100	Received by (Signature) 	Received via: FedEx_X_UPS_Other 5135593173645	Condition (lab use only) <i>OK</i>
Relinquisher by (Signature)	Date: _____ Time: _____	Received by (Signature)	Bottles Received: 34	
Relinquisher by (Signature)	Date: _____ Time: _____	Received for lab by (Signature) <i>James McDaniel</i>	Time: 0900	pH Checked: _____ NCF: _____



08/24/11



## Technical Report for

---

### LT Environmental

LT: XTO Energy

OH Randel #7, San Juan County NM

Accutest Job Number: T83906

Sampling Date: 08/09/11

---

#### Report to:

LT Environmental  
2243 Main Ave S.  
Durango, CO 87301  
jlinn@ltenv.com

ATTN: Julie Linn

Total number of pages in report: 13



Test results contained within this data package meet the requirements of the National Environmental Laboratory Accreditation Conference and/or state specific certification programs as applicable.

Paul Canevaro  
Laboratory Director

Client Service contact: Georgia Jones 713-271-4700

Certifications: TX (T104704220-10-3) AR (88-0756) AZ (AZ0769) FL (E87628) KS (E-10366)  
LA (85695/04004) OK (9103)

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Test results relate only to samples analyzed.

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## Sample Summary

LT Environmental

Job No: T83906

LT: XTO Energy

Project No: OH Randel #7, San Juan County NM

Sample Number	Collected Date	Time By	Received	Matrix Code Type	Client Sample ID
T83906-1	08/09/11	12:24	08/10/11	AQ Ground Water	MW-7



Sample Results

---

Report of Analysis

---

## Report of Analysis

<b>Client Sample ID:</b> MW-7	<b>Date Sampled:</b> 08/09/11
<b>Lab Sample ID:</b> T83906-1	<b>Date Received:</b> 08/10/11
<b>Matrix:</b> AQ - Ground Water	<b>Percent Solids:</b> n/a
<b>Method:</b> SW846 8021B	
<b>Project:</b> LT: XTO Energy	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	TT000925.D	1	08/12/11	WV	n/a	n/a	GTT39
Run #2							

Run #	Purge Volume
Run #1	5.0 ml
Run #2	

### Purgeable Aromatics

CAS No.	Compound	Result	RL	Units	Q
71-43-2	Benzene	81.3	1.0	ug/l	
108-88-3	Toluene	36.9	1.0	ug/l	
100-41-4	Ethylbenzene	5.3	1.0	ug/l	
1330-20-7	Xylenes (total)	39.4	3.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
460-00-4	4-Bromofluorobenzene	98%		58-125%
98-08-8	aaa-Trifluorotoluene	99%		73-139%

ND = Not detected  
 RL = Reporting Limit  
 E = Indicates value exceeds calibration range

J = Indicates an estimated value  
 B = Indicates analyte found in associated method blank  
 N = Indicates presumptive evidence of a compound





Misc. Forms

---

Custody Documents and Other Forms

---

Includes the following where applicable:

- Chain of Custody

T83906

Company Name/Address <b>XTO Energy, Inc.</b> 382 County Road 3100 Aztec, NM 87410		Alternate Billing XTORNM031810S Report to: James McDaniel E-mail to: james_mcdaniel@xtoenergy.com		Analysis/Container/Preservative			Chain of Custody Page 1 of 1	
Project Description: <b>OH Randal #7</b>		Client Project No.		City/State Collected: <b>San Juan County, NM</b>		Prepared by: <b>ENVIRONMENTAL Science corp</b> 12065 Lebanon Road Mt. Juliet TN 37122 Phone (615)758-5858 Phone (800) 767-5859 FAX (615)758-5859		
PHONE: 505-333-3701	Lab Project #		P.O.#		CoCode (lab use only)			
FAX:	Site/Facility ID# <b>OH Randal #7</b>		Date Results Needed		No of			
Collected by: <b>Brooke Herb</b>	Rush? (Lab MUST be Notified)		Email? No X Yes		of			
Collected by (signature): <b>Brooketta</b>	Next Day.....100%		FAX? No Yes		Shipped Via: Fed Ex			
Packed on ice N <b>Y</b>	Two Day.....50%				Remarks/contaminant			
Three Day.....25%				Sample # (lab only)				
Sample ID	Comp/Grab	Matrix	Depth	Date	Time	Cntrs		
<b>MW-7</b>	<b>Grab</b>	<b>GW</b>	<b>-</b>	<b>8/9/11</b>	<b>1227</b>	<b>3</b>	<b>X BTEX 8021</b>	

Matrix: SS-Soil/Solid GW-Groundwater WW-Wastewater DW-Drinking Water OT-Other \_\_\_\_\_ pH \_\_\_\_\_ Temp **5.1**  
 Remarks: "ONLY 1 COC/Per Site!!" Flow \_\_\_\_\_ Other \_\_\_\_\_

Relinquisher by (Signature): <b>[Signature]</b>	Date: <b>8/9/11</b>	Time: <b>1700</b>	Received by (Signature): <b>[Signature]</b>	Samples returned via: FedEx X UPS Other _____	Condition (lab use only)
Relinquisher by (Signature): <b>[Signature]</b>	Date: <b>8/10</b>	Time: <b>915</b>	Received by (Signature): <b>[Signature]</b>	Temp:	Bottles Received:
Relinquisher by (Signature): <b>[Signature]</b>	Date:	Time:	Received for lab by (Signature):	Date:	Time:
				pH Checked:	NCF:

T83906: Chain of Custody  
Page 1 of 3

Accutest Job Number: T83906 Client: XTO ENERGY Project: OH RANDEL #7  
 Date / Time Received: 8/10/2011 Delivery Method: \_\_\_\_\_ Airbill #'s: 854263473292  
 No. Coolers: 1 Therm ID: IRGUN4; Temp Adjustment Factor: -0.1;  
 Cooler Temps (Initial/Adjusted): #1: (5.2/5.1);

3.1  
3

**Cooler Security**

	<u>Y</u>	<u>or</u>	<u>N</u>		<u>Y</u>	<u>or</u>	<u>N</u>
1. Custody Seals Present:	<input checked="" type="checkbox"/>		<input type="checkbox"/>	3. COC Present:	<input checked="" type="checkbox"/>		<input type="checkbox"/>
2. Custody Seals Intact:	<input checked="" type="checkbox"/>		<input type="checkbox"/>	4. Smpl Dates/Time OK	<input checked="" type="checkbox"/>		<input type="checkbox"/>

**Cooler Temperature**

	<u>Y</u>	<u>or</u>	<u>N</u>
1. Temp criteria achieved:	<input checked="" type="checkbox"/>		<input type="checkbox"/>
2. Cooler temp verification:	<u>IR Gun</u>		
3. Cooler media:	<u>Ice (Bag)</u>		

**Quality Control Preservation**

	<u>Y</u>	<u>or</u>	<u>N</u>	<u>N/A</u>	<u>WTB</u>	<u>STB</u>
1. Trip Blank present / cooler:	<input type="checkbox"/>		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Trip Blank listed on COC:	<input type="checkbox"/>		<input checked="" type="checkbox"/>	<input type="checkbox"/>		
3. Samples preserved properly:	<input checked="" type="checkbox"/>		<input type="checkbox"/>			
4. VOCs headspace free:	<input checked="" type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>		

**Sample Integrity - Documentation**

	<u>Y</u>	<u>or</u>	<u>N</u>
1. Sample labels present on bottles:	<input checked="" type="checkbox"/>		<input type="checkbox"/>
2. Container labeling complete:	<input checked="" type="checkbox"/>		<input type="checkbox"/>
3. Sample container label / COC agree:	<input checked="" type="checkbox"/>		<input type="checkbox"/>

**Sample Integrity - Condition**

	<u>Y</u>	<u>or</u>	<u>N</u>
1. Sample recvd within HT:	<input checked="" type="checkbox"/>		<input type="checkbox"/>
2. All containers accounted for:	<input checked="" type="checkbox"/>		<input type="checkbox"/>
3. Condition of sample:	<u>Intact</u>		

**Sample Integrity - Instructions**

	<u>Y</u>	<u>or</u>	<u>N</u>	<u>N/A</u>
1. Analysis requested is clear:	<input checked="" type="checkbox"/>		<input type="checkbox"/>	
2. Bottles received for unspecified tests	<input type="checkbox"/>		<input checked="" type="checkbox"/>	
3. Sufficient volume recvd for analysis:	<input checked="" type="checkbox"/>		<input type="checkbox"/>	
4. Compositing instructions clear:	<input type="checkbox"/>		<input type="checkbox"/>	<input checked="" type="checkbox"/>
5. Filtering instructions clear:	<input type="checkbox"/>		<input type="checkbox"/>	<input checked="" type="checkbox"/>

Comments

*Charmaine Thompson*

Job #: T83906

Date / Time Received: 8/10/2011 9:15:00 AM

Initials: VG

Client: XTO ENERGY

Cooler #	Sample ID:	Vol	Bot #	Location	Pres	pH	Therm ID	Initial Temp	Therm CF	Corrected Temp
1	T83906-1	40 ml	1	VR	N/P	Note #2 - Preservative check not applicable.	IRGUN4	5.2	-0.1	5.1
1	T83906-1	40 ml	2	VR	N/P	Note #2 - Preservative check not applicable.	IRGUN4	5.2	-0.1	5.1
1	T83906-1	40 ml	3	VR	N/P	Note #2 - Preservative check not applicable.	IRGUN4	5.2	-0.1	5.1

T83906: Chain of Custody

Page 3 of 3



GC Volatiles

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QC Data Summaries

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Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries

# Method Blank Summary

**Job Number:** T83906  
**Account:** LTENCOD LT Environmental  
**Project:** LT: XTO Energy

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
GTT39-MB	TT000905.D	1	08/12/11	WV	n/a	n/a	GTT39

4.1.1  
4

The QC reported here applies to the following samples:

Method: SW846 8021B

T83906-1

CAS No.	Compound	Result	RL	Units	Q
71-43-2	Benzene	ND	1.0	ug/l	
100-41-4	Ethylbenzene	ND	1.0	ug/l	
108-88-3	Toluene	ND	1.0	ug/l	
1330-20-7	Xylenes (total)	ND	3.0	ug/l	

CAS No.	Surrogate Recoveries		Limits
460-00-4	4-Bromofluorobenzene	90%	58-125%
98-08-8	aaa-Trifluorotoluene	93%	73-139%

# Blank Spike Summary

**Job Number:** T83906  
**Account:** LTENCOD LT Environmental  
**Project:** LT: XTO Energy

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
GTT39-BS	TT000904.D	1	08/12/11	WV	n/a	n/a	GTT39

4.2.1  
4

The QC reported here applies to the following samples:

Method: SW846 8021B

T83906-1

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
71-43-2	Benzene	20	18.0	90	86-121
100-41-4	Ethylbenzene	20	18.2	91	81-116
108-88-3	Toluene	20	18.2	91	87-117
1330-20-7	Xylenes (total)	60	55.0	92	85-115

CAS No.	Surrogate Recoveries	BSP	Limits
460-00-4	4-Bromofluorobenzene	91%	58-125%
98-08-8	aaa-Trifluorotoluene	93%	73-139%

# Matrix Spike/Matrix Spike Duplicate Summary

**Job Number:** T83906  
**Account:** LTENCOD LT Environmental  
**Project:** LT: XTO Energy

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
T83996-4MS	TT000910.D	1	08/12/11	WV	n/a	n/a	GTT39
T83996-4MSD	TT000911.D	1	08/12/11	WV	n/a	n/a	GTT39
T83996-4	TT000912.D	1	08/12/11	WV	n/a	n/a	GTT39
T83996-4	TT000931.D	20	08/12/11	WV	n/a	n/a	GTT39

The QC reported here applies to the following samples:

Method: SW846 8021B

T83906-1

CAS No.	Compound	T83996-4 ug/l	Spike Q ug/l	MS ug/l	MS %	MSD ug/l	MSD %	RPD	Limits Rec/RPD
71-43-2	Benzene	40.2	20	58.3	91	58.3	91	0	86-121/19
100-41-4	Ethylbenzene	1150 <sup>b</sup>	20	1170	100	1180	150* <sup>a</sup>	1	81-116/14
108-88-3	Toluene	29.7	20	49.0	97	49.3	98	1	87-117/16
1330-20-7	Xylenes (total)	556 <sup>b</sup>	60	637	135* <sup>a</sup>	643	145* <sup>a</sup>	1	85-115/12

CAS No.	Surrogate Recoveries	MS	MSD	T83996-4	T83996-4	Limits
460-00-4	4-Bromofluorobenzene	499%*	503%*	515%* <sup>c</sup>	111%	58-125%
98-08-8	aaa-Trifluorotoluene	283%*	279%*	274%* <sup>c</sup>	103%	73-139%

- (a) Outside control limits due to high level in sample relative to spike amount.
- (b) Result is from Run #2.
- (c) Outside control limits due to matrix interference. Confirmed by reanalysis.

4.3.1  
4





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Est. 1970

James McDaniel  
XTO Energy - San Juan Division  
382 Road 3100  
Aztec, NM 87410

### Report Summary

Tuesday November 15, 2011

Report Number: L546128

Samples Received: 11/10/11

Client Project:

Description: OH RANDEL 007

The analytical results in this report are based upon information supplied by you, the client, and are for your exclusive use. If you have any questions regarding this data package, please do not hesitate to call.

Entire Report Reviewed By:

Daphne Richards , ESC Representative

#### Laboratory Certification Numbers

A2LA - 1461-01, AIHA - 100789, AL - 40660, CA - I-2327, CT - PH-0197, FL - E87487  
GA - 923, IN - C-TN-01, KY - 90010, KYUST - 0016, NC - ENV375/DW21704, ND - R-140  
NJ - TN002, NJ NELAP - TN002, SC - 84004, TN - 2006, VA - 00109, WV - 233  
AZ - 0612, MN - 047-999-395, NY - 11742, WI - 998093910, NV - TN000032008A,  
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Note: The use of the preparatory EPA Method 3511 is not approved or endorsed by the CA ELAP.

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REPORT OF ANALYSIS

James McDaniel
XTO Energy - San Juan Division
382 Road 3100
Aztec, NM 87410

November 15, 2011

Date Received : November 10, 2011
Description : OH RANDEL 007
Sample ID : MW-7
Collected By : Brooke Herb
Collection Date : 11/09/11 11:30

ESC Sample # : L546128-01

Site ID : OH RANDEL 007

Project # :

Table with 7 columns: Parameter, Result, Det. Limit, Units, Method, Date, Dil. Rows include Benzene, Toluene, Ethylbenzene, Total Xylene, and Surrogate Recovery(a,a,a-Trifluorotoluene(PID)).

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
Note:
The reported analytical results relate only to the sample submitted.
This report shall not be reproduced, except in full, without the written approval from ESC.

Reported: 11/15/11 12:41 Printed: 11/15/11 12:42

Attachment A  
List of Analytes with QC Qualifiers

Sample Number	Work Group	Sample Type	Analyte	Run ID	Qualifier
L546128-01	WG565205	SAMP	Benzene	R1931252	J6

Attachment B  
Explanation of QC Qualifier Codes

Qualifier	Meaning
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low

Qualifier Report Information

ESC utilizes sample and result qualifiers as set forth by the EPA Contract Laboratory Program and as required by most certifying bodies including NELAC. In addition to the EPA qualifiers adopted by ESC, we have implemented ESC qualifiers to provide more information pertaining to our analytical results. Each qualifier is designated in the qualifier explanation as either EPA or ESC. Data qualifiers are intended to provide the ESC client with more detailed information concerning the potential bias of reported data. Because of the wide range of constituents and variety of matrices incorporated by most EPA methods, it is common for some compounds to fall outside of established ranges. These exceptions are evaluated and all reported data is valid and useable "unless qualified as 'R' (Rejected)."

Definitions

- Accuracy - The relationship of the observed value of a known sample to the true value of a known sample. Represented by percent recovery and relevant to samples such as: control samples, matrix spike recoveries, surrogate recoveries, etc.
- Precision - The agreement between a set of samples or between duplicate samples. Relates to how close together the results are and is represented by Relative Percent Difference.
- Surrogate - Organic compounds that are similar in chemical composition, extraction, and chromatography to analytes of interest. The surrogates are used to determine the probable response of the group of analytes that are chemically related to the surrogate compound. Surrogates are added to the sample and carried through all stages of preparation and analyses.
- TIC - Tentatively Identified Compound: Compounds detected in samples that are not target compounds, internal standards, system monitoring compounds, or surrogates.

Summary of Remarks For Samples Printed  
11/15/11 at 12:42:08

TSR Signing Reports: 288  
R5 - Desired TAT

drywt

Sample: L546128-01 Account: XTORNM Received: 11/10/11 09:00 Due Date: 11/17/11 00:00 RPT Date: 11/15/11 12:41  
Non-Preserved



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XTO Energy - San Juan Division  
James McDaniel  
382 Road 3100

Aztec, NM 87410

Quality Assurance Report  
Level II

L546128

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November 15, 2011

Analyte	Result	Laboratory Blank		Limit	Batch	Date Analyzed
		Units	% Rec			
Benzene	< .0005	mg/l			WG565205	11/11/11 22:37
Ethylbenzene	< .0005	mg/l			WG565205	11/11/11 22:37
Toluene	< .005	mg/l			WG565205	11/11/11 22:37
Total Xylene	< .0015	mg/l			WG565205	11/11/11 22:37
a,a,a-Trifluorotoluene (PID)		% Rec.	94.33	55-122	WG565205	11/11/11 22:37

Analyte	Units	Laboratory Control Sample		% Rec	Limit	Batch
		Known Val	Result			
Benzene	mg/l	.05	0.0428	85.5	79-114	WG565205
Ethylbenzene	mg/l	.05	0.0468	93.6	80-116	WG565205
Toluene	mg/l	.05	0.0460	91.9	79-112	WG565205
Total Xylene	mg/l	.15	0.139	92.7	84-118	WG565205
a,a,a-Trifluorotoluene (PID)				91.58	55-122	WG565205

Analyte	Units	Laboratory Control Sample Duplicate			Limit	RPD	Limit	Batch
		Result	Ref	%Rec				
Benzene	mg/l	0.0436	0.0428	87.0	79-114	2.03	20	WG565205
Ethylbenzene	mg/l	0.0485	0.0468	97.0	80-116	3.61	20	WG565205
Toluene	mg/l	0.0465	0.0460	93.0	79-112	1.15	20	WG565205
Total Xylene	mg/l	0.143	0.139	95.0	84-118	2.70	20	WG565205
a,a,a-Trifluorotoluene (PID)				91.83	55-122			WG565205

Analyte	Units	Matrix Spike				Limit	Ref Samp	Batch
		MS Res	Ref Res	TV	% Rec			
Benzene	mg/l	0.0443	0.0260	.05	36.6	35-147	L546128-01	WG565205
Ethylbenzene	mg/l	0.0492	0.00230	.05	93.8	39-141	L546128-01	WG565205
Toluene	mg/l	0.0474	0.0160	.05	62.9	35-148	L546128-01	WG565205
Total Xylene	mg/l	0.148	0.0200	.15	85.1	33-151	L546128-01	WG565205
a,a,a-Trifluorotoluene (PID)					94.16	55-122		WG565205

Analyte	Units	Matrix Spike Duplicate			Limit	RPD	Limit	Ref Samp	Batch
		MSD	Ref	%Rec					
Benzene	mg/l	0.0420	0.0443	32.0*	35-147	5.34	20	L546128-01	WG565205
Ethylbenzene	mg/l	0.0465	0.0492	88.5	39-141	5.57	20	L546128-01	WG565205
Toluene	mg/l	0.0444	0.0474	56.8	35-148	6.60	20	L546128-01	WG565205
Total Xylene	mg/l	0.139	0.148	79.1	33-151	6.21	20	L546128-01	WG565205
a,a,a-Trifluorotoluene (PID)				92.47	55-122				WG565205

Batch number /Run number / Sample number cross reference

WG565205: R1931252: L546128-01

\* \* Calculations are performed prior to rounding of reported values.  
\* Performance of this Analyte is outside of established criteria.  
For additional information, please see Attachment A 'List of Analytes with QC Qualifiers.'



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Quality Assurance Report  
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November 15, 2011

The data package includes a summary of the analytic results of the quality control samples required by the SW-846 or CWA methods. The quality control samples include a method blank, a laboratory control sample, and the matrix spike/matrix spike duplicate analysis. If a target parameter is outside the method limits, every sample that is effected is flagged with the appropriate qualifier in Appendix B of the analytic report.

Method Blank - an aliquot of reagent water carried through the entire analytic process. The method blank results indicate if any possible contamination exposure during the sample handling, digestion or extraction process, and analysis. Concentrations of target analytes above the reporting limit in the method blank are qualified with the "B" qualifier.

Laboratory Control Sample - is a sample of known concentration that is carried through the digestion/extraction and analysis process. The percent recovery, expressed as a percentage of the theoretical concentration, has statistical control limits indicating that the analytic process is "in control". If a target analyte is outside the control limits for the laboratory control sample or any other control sample, the parameter is flagged with a "J4" qualifier for all effected samples.

Matrix Spike and Matrix Spike Duplicate - is two aliquots of an environmental sample that is spiked with known concentrations of target analytes. The percent recovery of the target analytes also has statistical control limits. If any recoveries that are outside the method control limits, the sample that was selected for matrix spike/matrix spike duplicate analysis is flagged with either a "J5" or a "J6". The relative percent difference (%RPD) between the matrix spike and the matrix spike duplicate recoveries is all calculated. If the RPD is above the method limit, the effected samples are flagged with a "J3" qualifier.

F225

Chain of Custody  
Page 1 of 1

<b>Company Name/Address</b> <b>XTO Energy, Inc.</b> <b>382 County Road 3100</b> <b>Aztec, NM 87410</b>		<b>Alternate Billing</b> XTORNMM031810S Report to: James McDaniel E-mail to: james_mcdaniel@xtoenergy.com		<b>Analysis/Container/Preservative</b>	
<b>Project Description:</b> OH Randel #007 PHONE: 505-333-3701 FAX:		City/State Collected: <u>SAN JUAN COUNTY, NM</u> Lab Project #		CoCode (lab use only) <b>XTORNIM</b> Template/Prelogin	
Collected by: <u>Broke Herb</u> Site/Facility ID#: <u>CH Randel #007</u> (Lab MUST be Notified) Rush? <input type="checkbox"/> Next Day .....100% <input type="checkbox"/> Two Day .....50% <input type="checkbox"/> Three Day .....25%		P.O.# Date Results Needed Email? <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes FAX? <input type="checkbox"/> No <input type="checkbox"/> Yes		Shipped Via: Fed Ex Remarks/contaminant Sample # (lab only)	
Packed on Ice N <u>Y</u>		Date Time 11/9/11 11:30		001 - preserved 154628-01 1546128	
Sample ID MW-7		Comp/Grab Matrix Depth G GW		(Grid for analysis results)	

Prepared by:  
  
**ENVIRONMENTAL Science corp**  
 12065 Lebanon Road  
 Mt. Juliet TN 37122  
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 Phone (800) 767-5859  
 FAX (615)758-5859

BTEX 800

Matrix: SS-Soil/Solid GW-Groundwater WW-Wastewater DW-Drinking Water OT-Other \_\_\_\_\_

pH \_\_\_\_\_ Temp \_\_\_\_\_ Flow \_\_\_\_\_ Other \_\_\_\_\_

Remarks: "ONLY 1 COC Per Site!"

Relinquisher by: (Signature) <u>[Signature]</u>	Date: 11/9/11	Time: 16:00	Received by: (Signature) 	Samples returned via: FedEx_X UPS_Other_	Condition
Relinquisher by: (Signature)	Date:	Time:	Received by: (Signature)	Temp: 21°C	Bottles Received: 3V
Relinquisher by: (Signature)	Date:	Time:	Received for lab by: (Signature) <u>[Signature]</u>	Date: 11/10/11	Time: 09:00
					pH Checked: NCF



# **Attachment 5**

## **Field Notes**

**SAMPLING PURGE LOG**

Project Name: <u>XTO Groundwater</u>	Location: <u>OH Randel #7</u>	Well No: <u>MW-7</u>
Client: <u>XTO Energy, Inc.</u>	Date: <u>2/14/2011</u>	Time: <u>13:35</u>
Project Manager: <u>Julie Linn</u>	Sampler's Name: <u>Sam LaRue</u>	

Measuring Point: <u>TOC</u>	Depth to Water: <u>17.74</u> ft	Depth to Product: <u>NA</u> ft
Well Diameter: <u>2"</u>	Total Depth: <u>32.06</u> ft	Product Thickness: <u>NA</u> ft
Water Column Height: <u>14.32</u> ft		

Sampling Method:  Submersible Pump     Centrifugal Pump     Peristaltic Pump     Other \_\_\_\_\_

Bottom Valve Bailer     Double Check Valve Bailer

Criteria:  3 to 5 Casing Volumes of Water Removal     Stabilization of Indicator Parameters     Other \_\_\_\_\_

Water Volume in Well			
Gallons of water per foot	Feet of water in well	Gallons of water in well	3 casing volumes to be removed
0.1631	14.32	2.335592	7.01

Time (military)	pH (su)	EC (us)	Temp (°C)	ORP (millivolts)	D.O. (mg/L)	Turbidity (NTU)	Vol Evac. Gallons	Comments/Flow Rate
13:40	8.39	1265	15.3				0.25	clear, no odor
13:42	8.43	1295	14.9				0.5	no change
13:44	8.51	1292	14.8				0.75	no change
13:46	8.35	1280	14.4				1	slightly cloudy, clear, no odor
13:49	8.17	1267	14.6				2	no change
13:52	8.40	1281	14.8				3	no change
13:56	8.43	1270	14.8				4	no change
14:00	8.84	1281	14.7				5	slightly cloudy, clear, slight HC odor
14:03	8.98	1314	15.3				6	no change
14:05	9.00	1280	15.1				6.25	no change
14:06	9.00	1298	15.1				6.5	no change
14:07	9.04	1295	15.1				6.75	no change
14:08	9.10	1305	15.1				7	slightly silty, slight yellow/clear
14:10	9.11	1301	14.8				7.25	slight odor
<b>Final:</b>	9.11	1301	14.8				7.25	

COMMENTS: ORC Socks removed on 2/7/11; Dissolved Oxygen 0.56 mg/l on 2/7/11; ORC Socks replaced on 2/14/11

Instrumentation:  pH Meter     DO Monitor     Conductivity Meter     Temperature Meter     Other \_\_\_\_\_

Water Disposal: on site sump

Sample ID: Randel MW-7                      Sample Time: 14:16

Analysis Requested:  BTEX     VOC:     Alkalinity     TDS     Cations     Anions     Nitrate     Nitrite     Metals

Other \_\_\_\_\_

Trip Blank: No                                      Duplicate Sample: No



**SAMPLING PURGE LOG**

Project Name: <u>XTO Groundwater</u>	Location: <u>O H Randel #007</u>	Well No: <u>MW-7</u>
Client: <u>XTO Energy, Inc.</u>	Date: <u>5/17/2011</u>	Time: <u>14:07</u>
Project Manager: <u>Julie Linn</u>	Sampler's Name: <u>Brooke Herb</u>	

Measuring Point: <u>TOC</u>	Depth to Water: <u>17.92</u> ft	Depth to Product: <u>NA</u> ft
Well Diameter: <u>2"</u>	Total Depth: <u>32.07</u> ft	Product Thickness: <u>NA</u> ft
Water Column Height: <u>14.15</u> ft		

Sampling Method:  Submersible Pump    Centrifugal Pump    Peristaltic Pump    Other \_\_\_\_\_

Bottom Valve Bailer    Double Check Valve Bailer

Criteria:  3 to 5 Casing Volumes of Water Removal    Stabilization of Indicator Parameters    Other \_\_\_\_\_

Water Volume in Well			
Gallons of water per foot	Feet of water in well	Gallons of water in well	3 casing volumes to be removed
0.1631	14.15	2.307865	6.92

Time (military)	pH (su)	EC (ms)	Temp (°C)	ORP (millivolts)	D.O. (mg/L)	Turbidity (NTU)	Vol Evac. Gallons	Comments/Flow Rate
14:12	8.56	725	14.6				0.25	clearish yellow, slight HC odor
	8.43	912	14.1				0.5	no change
	8.64	1033	13.6				0.75	no change
	8.49	1058	14.2				1	no change
	7.9	1126	13.7				2	no change
	7.84	1134	13.9				3	Cloudy, slightly turbid
	8.95	1097	14				4	more silt, minor odor, light brown
	9.45	1145	14.5				5	no change
	9.66	1195	14.7				6	no change
	9.84	1203	14.5				6.25	light brown, silty, no odor
	9.83	1208	14.5				6.5	no change
	9.85	1187	14.6				6.75	no change
<b>Final:</b> 14:40	9.83	1197	14.5				7	no change

COMMENTS:      ORC Socks removed on 5/11/11; Dissolved Oxygen 8.74 mg/l on 5/11/11; 9 ORC socks replaced on 5/17/11.

Instrumentation:  pH Meter    DO Monitor    Conductivity Meter    Temperature Meter    Other \_\_\_\_\_

Water Disposal: on site sump

Sample ID: MW-7      Sample Time: 14:45

Analysis Requested:  BTEX    VOCs    Alkalinity    TDS    Cations    Anions    Nitrate    Nitrite    Metals

Other \_\_\_\_\_

Trip Blank: No      Duplicate Sample: No



### SAMPLING PURGE LOG

Project Name: <u>XTO Groundwater</u>	Location: <u>OH Randel</u>	Well No: <u>MW-7</u>
Client: <u>XTO Energy, Inc.</u>	Date: <u>8/9/2011</u>	Time: <u>11:30</u>
Project Manager: <u>Julie Linn</u>	Sampler's Name: <u>Brooke Herb</u>	

Measuring Point: <u>TOC</u>	Depth to Water: <u>18.11</u> ft	Depth to Product: <u>NA</u> ft
Well Diameter: <u>2"</u>	Total Depth: <u>32.07</u> ft	Product Thickness: <u>NA</u> ft
Water Column Height: <u>13.96</u> ft		

Sampling Method:  Submersible Pump  Centrifugal Pump  Peristaltic Pump  Other \_\_\_\_\_

Bottom Valve Bailer  Double Check Valve Bailer

Criteria:  3 to 5 Casing Volumes of Water Removal  Stabilization of Indicator Parameters  Other \_\_\_\_\_

Water Volume in Well			
Gallons of water per foot	Feet of water in well	Gallons of water in well	3 casing volumes to be removed
0.1631	13.96	2.276876	6.83

Time (military)	pH (su)	EC (ms)	Temp (°C)	ORP (millivolts)	D.O. (mg/L)	Turbidity (NTU)	Vol Evac. Gallons	Comments/Flow Rate
11:40	9.57	1047	16.7				0.25	clear with a yellowish tint, no odor, no sheen
11:42	9.60	1049	16.8				0.50	no change
11:45	9.66	1047	16.3				0.75	no change
11:47	9.72	1067	15.5				1.00	no change
11:50	9.38	1061	16.5				2.00	slightly cloudier
11:53	9.46	1104	16.2				3.00	no change
11:57	9.51	1151	16.1				4.00	no change
12:00	9.47	1164	16.5				5.00	no change
12:04	9.90	1198	16.4				6.00	no change
12:07	9.91	1209	16.4				6.25	more silt, light brown
12:12	9.92	1215	15.9				6.50	no change
12:17	9.90	1212	16.3				6.75	no change
12:20	9.91	1220	16.4				7.00	no change
12:25	9.92	1221	16.4				7.25	no change
<b>Final:</b>	9.92	1221	16.4				7.25	

COMMENTS: Calibrate water quality meter at 11:30.

Instrumentation:  pH Meter  DO Monitor  Conductivity Meter  Temperature Meter  Other \_\_\_\_\_

Water Disposal: on site sump

Sample ID: MW-7 Sample Time: 12:27

Analysis Requested:  BTEX  VOCs  Alkalinity  TDS  Cations  Anions  Nitrate  Nitrite  Metals

Other \_\_\_\_\_

Trip Blank: No Duplicate Sample: No



### SAMPLING PURGE LOG

Project Name: <u>XTO Groundwater</u>	Location: <u>OH Randel</u>	Well No: <u>MW-7</u>
Client: <u>XTO Energy, Inc.</u>	Date: <u>11/9/2011</u>	Time: <u>10:49</u>
Project Manager: <u>Julie Linn</u>	Sampler's Name: <u>Brooke Herb</u>	

Measuring Point: <u>TOC</u>	Depth to Water: <u>18.46</u> ft	Depth to Product: <u>NA</u> ft
Well Diameter: <u>2"</u>	Total Depth: <u>32.14</u> ft	Product Thickness: <u>NA</u> ft
Water Column Height: <u>13.68</u> ft		

Sampling Method:  Submersible Pump  Centrifugal Pump  Peristaltic Pump  Other \_\_\_\_\_  
 Bottom Valve Bailer  Double Check Valve Bailer

Criteria:  3 to 5 Casing Volumes of Water Removal  Stabilization of Indicator Parameters  Other \_\_\_\_\_

Water Volume in Well			
Gallons of water per foot	Feet of water in well	Gallons of water in well	3 casing volumes to be removed
0.1631	13.68	2.231208	6.69

Time (military)	pH (su)	EC (us)	Temp (°C)	ORP (millivolts)	D.O. (mg/L)	Turbidity (NTU)	Vol Evac. Gallons	Comments/Flow Rate
10:51	9.36	1197	15.9				0.25	clear, no silt
10:53	9.58	1258	15.4				0.50	re-calibrate pH meter
10:55	9.76	1295	15.2				0.75	clear very minor silt
10:57	9.81	1320	15.2				1.00	no change
11:01	9.48	1309	15.0				2.00	slightly cloudier
11:07	9.37	1333	14.8				3.00	no change
11:11	10.30	1354	14.1				4.00	no change
11:15	10.55	1371	13.8				5.00	no change
11:17	10.71	1402	13.9				5.50	no change
11:20	10.71	1391	13.9				5.75	no change
11:22	10.75	1428	13.9				6.00	no change
11:24	10.89	1448	13.9				6.25	no change
11:26	10.89	1449	13.9				6.50	no change
<b>Final:</b>								
11:29	10.9	1446	13.9				6.75	no change

COMMENTS: Calibrate water quality meter at 7:00 AM

Instrumentation:  pH Meter  DO Monitor  Conductivity Meter  Temperature Meter  Other \_\_\_\_\_

Water Disposal: on site sump

Sample ID: MW-7 Sample Time: 11:30

Analysis Requested:  BTEX  VOCs  Alkalinity  TDS  Cations  Anions  Nitrate  Nitrite  Metals  
 Other \_\_\_\_\_

Trip Blank: No

Duplicate Sample: No



# **Attachment 6**

## **LT Environmental Beneficial Use Analysis January 2012**

January 30, 2012

Mr. James McDaniel  
XTO Energy, Inc.  
382 CR 3100  
Aztec, New Mexico 87410

**RE: Request for Closure  
OH Randel #007  
XTO Energy, Inc.  
San Juan County, New Mexico**

Dear Mr. McDaniel:

LT Environmental, Inc. (LTE) presents to XTO Energy, Inc. (XTO) the following recommendation for site closure at the OH Randel #007 natural gas production well (Site). A former earthen separator pit impacted soil and shallow groundwater at the Site. XTO initially conducted product recovery and monitored groundwater quality, and eventually excavated as much of the source material as was practical. Subsequently, XTO has selected natural attenuation to remediate residual groundwater impacts by use of oxygen releasing compound (ORC) socks to enhance *in-situ* aerobic biodegradation of the petroleum hydrocarbons dissolved in groundwater. LTE has reviewed the history and assessed hydrogeologic characteristics at the Site. XTO's previous source removal efforts, ongoing natural attenuation, and the limited extent of remaining impacts make additional remediation impractical. Due to the aquifer's irrigation-induced origin and associated usage restrictions, naturally poor water quality, and overall low productivity, LTE recommends XTO request closure of the Site from the New Mexico Oil Conservation Division (NMOCD) based on the lack of any present or foreseeable beneficial use of the impacted aquifer at the Site.

#### **SITE SETTING**

The Site is located in Unit D of Section 15 of Township 26N, Range 11W, San Juan County, New Mexico, within the Bisti Region of the San Juan Basin on the Navajo Indian Reservation (Figure 1). Surrounding land use consists of cropland irrigated by the Navajo Indian Irrigation Project (NIIP) operated by the Navajo Agricultural Products Industry (NAPI).

#### **Regional Geology and Hydrology**

The predominant geologic formation is the Nacimiento Formation of Tertiary age, which underlies surface soils and is often exposed. Drainage is primarily by the San Juan River, the only permanent stream in the Navajo Section of the Colorado Plateau. The San Juan River is a tributary of the Colorado River and its flow is regulated by the Navajo Dam, located approximately 30 miles northeast of Farmington, New Mexico.



Cretaceous and Tertiary sandstones, as well as Quaternary Alluvial deposits, serve as the primary aquifers in the San Juan Basin (Stone et al., 1983). In the Bisti Region, the primary useable aquifer exists within the coarser and continuous sandstone bodies of the Nacimiento Formation. Depth to groundwater within these aquifers is 200 feet below ground surface (bgs) and greater.

### **Navajo Indian Irrigation Project (NIIP)**

The Site is part of a large area of land farmed by NAPI for growing a variety of crops, including corn, potatoes, alfalfa, and pinto beans. In 1960, the United States Congress authorized construction of the NIIP to provide a water delivery system from the Navajo Dam reservoir to 110,630 acres of irrigable land in the Bisti Region. The NAPI was created to manage and maintain the croplands and water delivery system. Irrigation water is released from the San Juan River at Navajo Dam through a diversion headworks and travels through a series of concrete- and membrane-lined open canals. Irrigation in the Bisti Region produces shallow discontinuous perched aquifers, such as the one present at the Site, that are not defined in published literature.

### **Land and Water Use**

Land use surrounding the Site consists of cropland, natural gas development, unused land, and occasional residences. The Site is located 580 feet southeast of a center-pivot irrigated agricultural field operated by NAPI. A second field is located 2,100 feet north of the Site. Three natural gas production wells exist within a half-mile radius of the Site. The San Juan River is the closest continuously flowing surface water and is 14.3 miles north of the Site. Gallegos Canyon, considered the closest significant watercourse, is 3.5 miles to the west.

The irrigation-induced aquifer at the Site is not currently used for any beneficial purposes. The nearest permitted water supply well is a single-use domestic water well located 0.9 miles southwest of the Site. The well is completed in a bedrock aquifer to a total depth of 255 bgs. Depth to groundwater in the well is 200 feet bgs. The nearest residences are 0.6 miles southeast of the Site and 0.9 miles southwest of the Site. A small cluster of homes exists 1 mile south of the Site as part of a tribal chapter community. While the source of domestic water for these residences is unknown, the distance between the residences and the Site is sufficient that it is highly unlikely the residents would be affected by any groundwater at the Site. Irrigation water is supplied from the San Juan River by the NIIP. No stock ponds are evident within one mile of the Site.

### **SITE HISTORY**

The OH Randel #007 natural gas production well was spudded on February 2, 1981, by Energy Reserves Group, Inc. It was sold to Amoco Production Corporation in 1985 and then to Cross Timbers Oil (currently XTO) in 1998.

The former earthen separator pit was identified during site upgrades in March of 2002. As a result, XTO installed 6 monitoring wells (MW-1, MW-2, MW-3, MW-4, MW-5, and MW-6) to





investigate groundwater impact (Figure 2). Phase separated hydrocarbons (PSH) were detected in MW-1, MW-2, and MW-6. Between 2002 and 2006, XTO monitored groundwater quality by sampling the groundwater in monitoring wells quarterly and recovering an estimated 22 gallons of product.

From November 13 through 27, 2006, XTO excavated approximately 6,882 cubic yards of impacted soil. The extent of the excavation is depicted on Figure 3. Most of the impacted soil was removed and the excavation was dewatered using vacuum trucks. Laboratory analytical results from all but one confirmation soil sample were in compliance with NMOCD standards for total petroleum hydrocarbons (TPH) and benzene, toluene, ethylbenzene, and total xylenes (BTEX) concentrations. A composite soil sample of the northeast wall of the excavation contained 1,350 milligrams per kilogram (mg/kg) of TPH and 20.24 mg/kg of BTEX indicating some impacted soil remained. The Navajo Nation Environmental Protection Agency (NNEPA) approved closure of the excavation pending installation of additional monitoring wells after backfilling.

Monitoring wells MW-1, MW-2, and MW-6 were removed during the excavation. In May 2007, XTO installed MW-7 and MW-8 to evaluate any remaining groundwater impact. BTEX concentrations were elevated in MW-7, and XTO installed MW-9 and MW-10 in July 2009 to further delineate groundwater impact. MW-10 never generated groundwater and was plugged. Subsequent groundwater sampling results indicated the elevated BTEX concentrations were limited to MW-7. In July 2010, XTO added ORC socks to the groundwater in MW-7 to enhance natural biodegradation.

## **CURRENT CONDITIONS**

### **Water Quality**

Laboratory analytical results from groundwater samples collected at the Site are presented in Tables 1 and 2. Currently, groundwater at the Site does not contain BTEX concentrations exceeding the New Mexico Water Quality Control Commission (NMWQCC) groundwater standards, except for groundwater sampled from MW-7. BTEX concentrations in MW-7 have been declining steadily since November 2010, when benzene was present at a concentration of 5,200 micrograms per liter ( $\mu\text{g/L}$ ), toluene was present at a concentration of 5,500  $\mu\text{g/L}$ , ethylbenzene was present at a concentration of 76  $\mu\text{g/L}$ , and total xylenes were present at a concentration of 3,400  $\mu\text{g/L}$ . During the most recent sampling event for MW-7 in November 2011, benzene was the only constituent exceeding NMWQCC standards with a concentration of 26  $\mu\text{g/L}$ . The decreasing BTEX concentrations in MW-7 are most likely the result of installation of ORC socks emplaced and maintained in the saturated interval of MW-7.

On January 4, 2012, LTE collected a groundwater sample from background monitoring well MW-3, which was analyzed for general chemistry parameters. Laboratory analytical results (Appendix A) indicate the background water at the Site contains 21 milligrams per liter (mg/l) of nitrate, which exceeds the NMWQCC human health standard for groundwater of 10 mg/l. Additionally, the laboratory analytical results indicate background groundwater at the Site



contains 320 mg/l of iron and 1,100 mg/l of total dissolved solids (TDS), which exceed the NMWQCC groundwater standards for domestic water supply of 1.0 mg/l and 1,000 mg/l, respectively (Table 2).

### **Hydrology and Remaining Groundwater Impact**

Lithology at the Site, as determined from borehole lithologic logs, consists of poorly sorted sand with minor to no fines from the ground surface to approximately 12 feet to 15 feet bgs where the silt content increases to a depth of 20 feet bgs. A tight clay layer is present at a depth of approximately 20 feet or 21 feet bgs and extends to at least to 37 feet bgs. The primary water bearing unit is a perched aquifer encountered at a depth of approximately 15 feet bgs and extending approximately one foot into the top of the clay layer (approximately 21 feet or 22 feet bgs). Based on Fetter (1988), a default value for hydraulic conductivity of the sandy silt or silty sand is assigned to be  $10^{-6}$  to  $10^{-4}$  centimeters per second (cm/s), which is equivalent to 2.84 feet per day.

Historical groundwater elevations measured at the Site are presented in Table 3. Quarterly potentiometric surface diagrams for 2011 are depicted in Figures 3-6. Groundwater flow direction varies from north to northeast with a gradient ranging from 0.12 feet per foot to 0.2 feet per foot.

Lateral and vertical migration of BTEX impacted groundwater is limited by properties of the aquifer and fluctuations in depth to groundwater. Lateral migration of BTEX impacted groundwater is also limited by the hydraulic conductivity of the aquifer bearing unit. Assuming a hydraulic conductivity of  $10^{-4}$  cm/s and a saturated thickness of 7 feet for the aquifer, a transmissivity of 14.84 gallons per day per foot is assumed. The hydraulic conductivity of the underlying clay ranges from  $10^{-9}$  to  $10^{-6}$  cm/s assuming default values (Fetter, 1988). The low conductivity clay layer acts as a barrier to the downward vertical migration of BTEX impacted groundwater. Additionally, the specific gravity of BTEX is less dense than water and dissolved BTEX in groundwater is not likely to migrate vertically downward. Upward vertical migration of BTEX impacted groundwater is limited by depth to groundwater fluctuations in MW-7, which did not exceed 3.74 feet between May 2007 and November 2011. This value is for advection of uncontaminated groundwater and does not consider dispersion or diffusion of the dissolved BTEX in groundwater; which is discussed below.

### **Natural Attenuation**

Natural attenuation is an ongoing process that will continue at the Site. Aerobic biodegradation is currently being enhanced by the use of ORC socks in MW-7. Benzene concentrations in groundwater in MW-7 have decreased approximately 200 percent (%) from a maximum of 12,000  $\mu\text{g/L}$  to a minimum of 26  $\mu\text{g/L}$  since installation of ORC socks in the monitoring well. Given the low concentrations of BTEX remaining in the groundwater at the Site, enhanced aerobic biodegradation and other forms of natural attenuation will likely continue.



Additional natural attenuation processes acting on the dissolved phase BTEX in groundwater include sorption, dispersion, dilution, and volatilization. Each of these processes has a different rate of effectiveness for attenuating the dissolved phase BTEX at the Site. The rate of sorption of BTEX to the soil particles depends both on the physical and chemical characteristics of the soil particles and BTEX. The organic carbon content of the silty sand and sandy silt water bearing unit is likely to be moderate to moderately high, which will enhance the sorption of benzene molecules to the soil particles via adsorption. Sorption of toluene and o-xylene is likely more effective than benzene, and sorption of m-xylene, p-xylene, and ethylbenzene is likely a very effective natural attenuation process at the Site. While dispersion, dilution, and volatilization do act on the dissolved phase BTEX in the groundwater at the Site, the relatively low conductivity of the aquifer and underlying clay barrier indicates these natural attenuation processes have a minimal effect on the degradation of the dissolved phase BTEX in groundwater at the Site.

### **BENEFICIAL USE ANALYSIS**

According to the New Mexico Office of the State Engineer (NMOSE), all underground water with less than 10,000 mg/L of TDS must be protected, except any water with no present or reasonably foreseeable future beneficial use. The reasonably foreseeable future is generally assumed to be between 200 and 1,000 years. Beneficial uses are defined as domestic, municipal, irrigation, livestock, industrial, power development, and recreational purposes.

Laboratory analysis of a background groundwater sample indicates the aquifer is not fit for human consumption or domestic water supply use based on elevated concentrations of nitrate, iron, and TDS. The aquifer cannot be used in the future for domestic use.

Impacted groundwater at the Site is part of a thin perched aquifer sourced primarily by infiltration of irrigation water applied to the adjacent NAPI field. The application of water to this field is directly connected to implementation of the NIIP, which is in turn dependent on the management of water resources for the Colorado River Basin. The development of NIIP created a large municipal and industrial water use in the San Juan Basin and can supply water for beneficial uses in addition to irrigation; however, separate contracts for such uses must first be executed and approved by the United States Congress. This stipulation alone restricts future beneficial use of NIIP-sourced water for uses other than irrigation.

The aquifer at the Site is not likely capable of producing sufficient quantities of groundwater to supply any of the beneficial uses described by the NMOSE. The hydraulic conductivity of the aquifer is approximately  $10^{-4}$  cm/s, which is equivalent to 2.12 gallons per day per square foot. The aquifer has an estimated transmissivity of only 14.84 gallons per foot. The primary source of recharge for the aquifer is infiltration of irrigation water from the adjacent agricultural field. Without this source of recharge, the aquifer at the Site is likely to be smaller in volume and possibly non-existent.



## CONCLUSIONS

Most of the soil and groundwater impacted by a former earthen separator pit was removed by XTO during excavation activities in 2006. The remaining BTEX impact to groundwater at the Site is limited in concentration and extent due to source removal and enhanced biodegradation. Attenuation is an ongoing process that will continue through natural processes and migration of any residual BTEX will be restricted by the subsurface lithology and hydrologic properties of the aquifer.

Groundwater at the Site is not a current source of beneficial use. Based on the poor water quality of the aquifer, legal restrictions on its source for uses other than irrigation, and low productivity, the aquifer is not a viable source for any beneficial use in the future. As such, LTE recommends XTO request site closure from the NMOCDD based on the lack of present and reasonably foreseeable beneficial use of the impacted groundwater.

If you have any additional questions or comments, do not hesitate to contact me at (970)-385-1096 or via email at [aager@ltenv.com](mailto:aager@ltenv.com).

Sincerely,

LT ENVIRONMENTAL, INC.

A handwritten signature in black ink that reads 'Ashley L. Ager'.

Ashley L. Ager, M.S.  
Senior Geologist

### Attachments (8)

Figure 1 – Site Location Map

Figure 2 – Site Map

Figure 3 – Potentiometric Map, February 2011

Figure 4 – Potentiometric Map, May 2011

Figure 5 – Potentiometric Map, August 2011

Figure 6 – Potentiometric Map, November 2011

Table 1 – Groundwater Analytical Results – BTEX

Table 2 – Groundwater Analytical Results – General Chemistry

Table 3 – Groundwater Elevation Summary

Appendix A – General Chemistry Analytical Laboratory Report, January 4, 2012

Appendix B – References

**FIGURES**





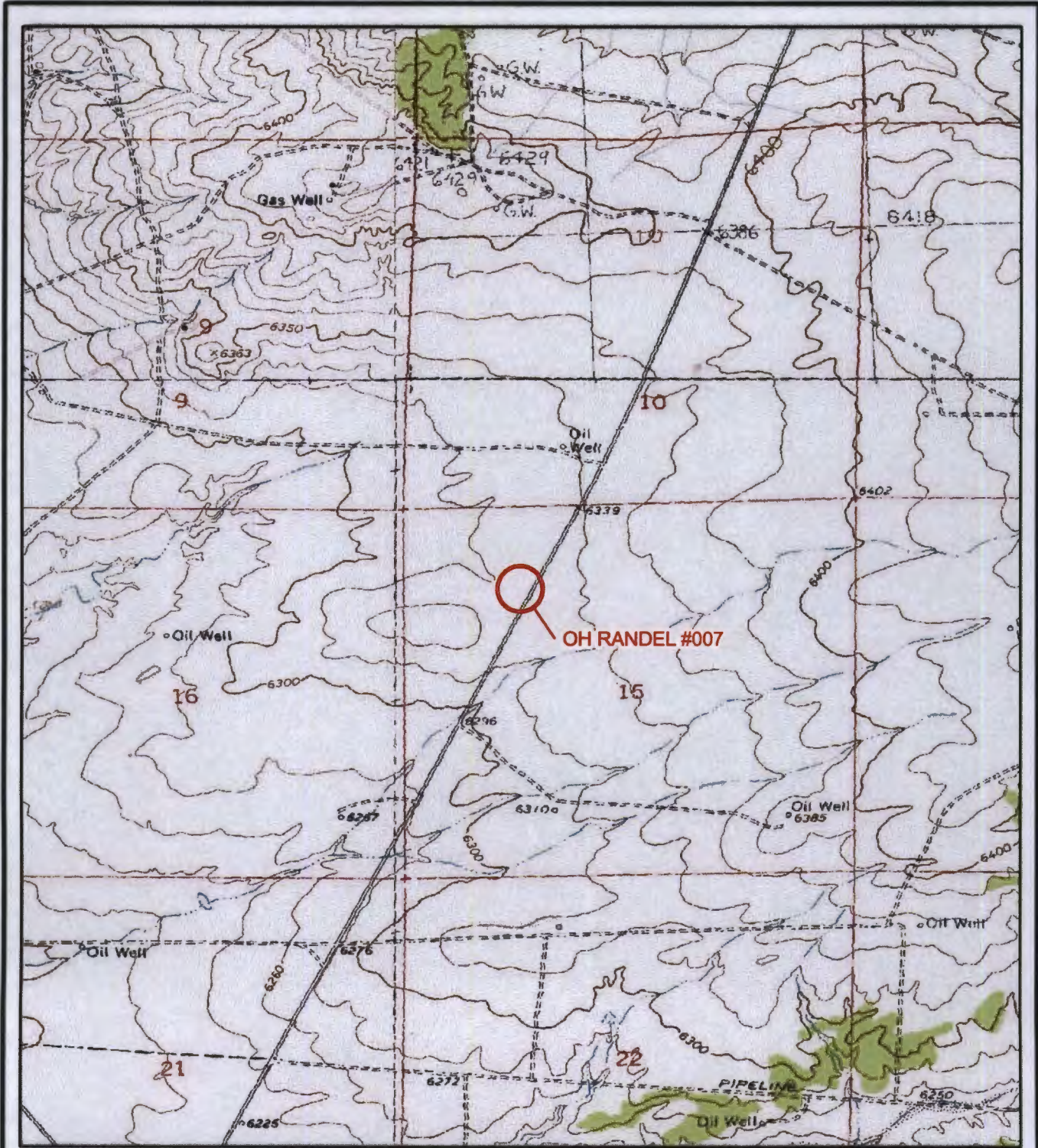
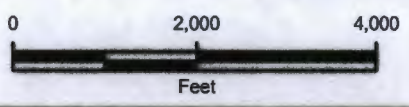


IMAGE COURTESY OF USDA/NRCS, VARIOUS DATES

**LEGEND**

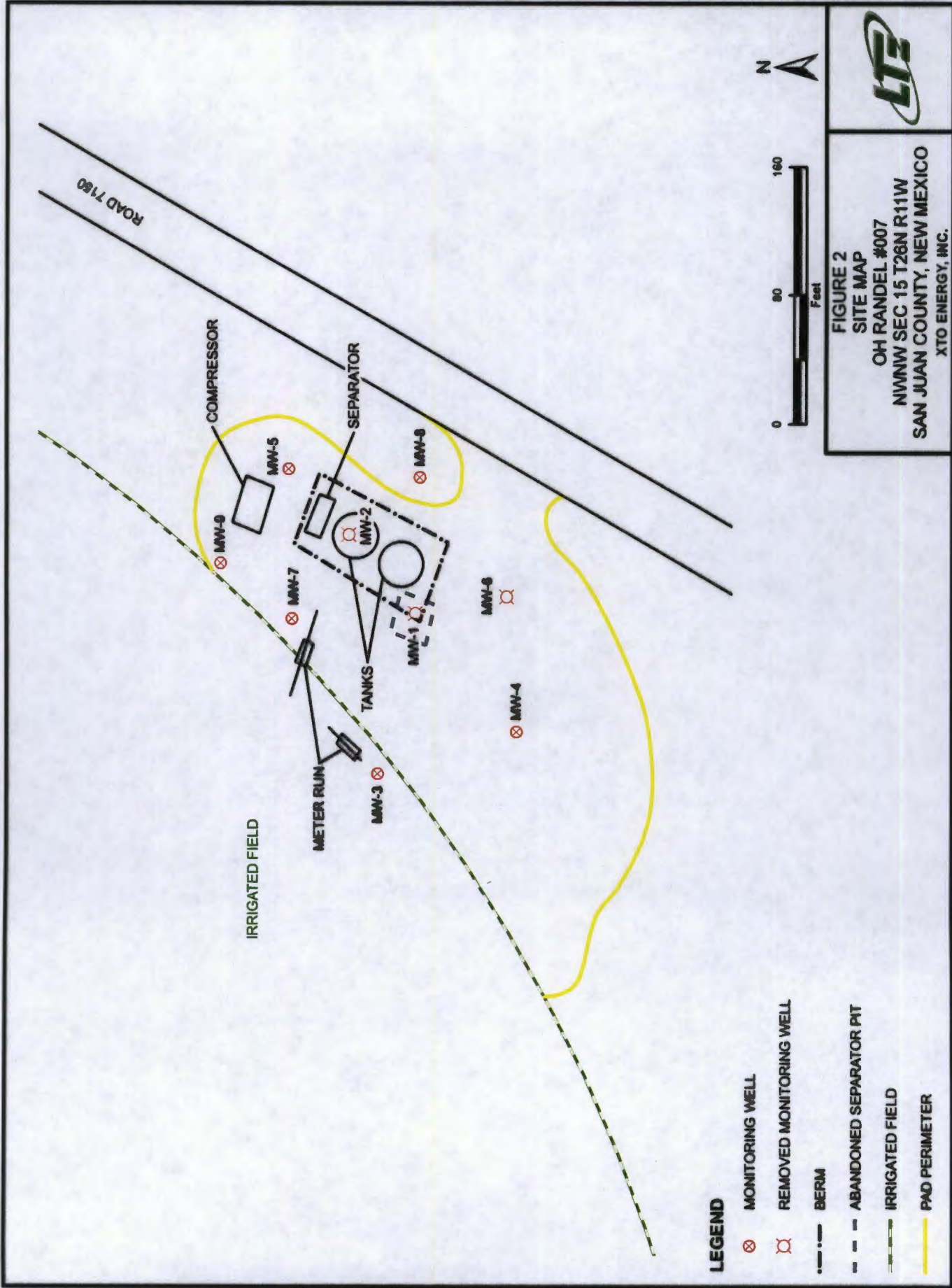
 SITE LOCATION



**FIGURE 1**  
**SITE LOCATION MAP**  
**OH RANDEL #007**  
**NWNW SEC 15 T26N R11W**  
**SAN JUAN COUNTY, NEW MEXICO**  
**XTO ENERGY, INC.**









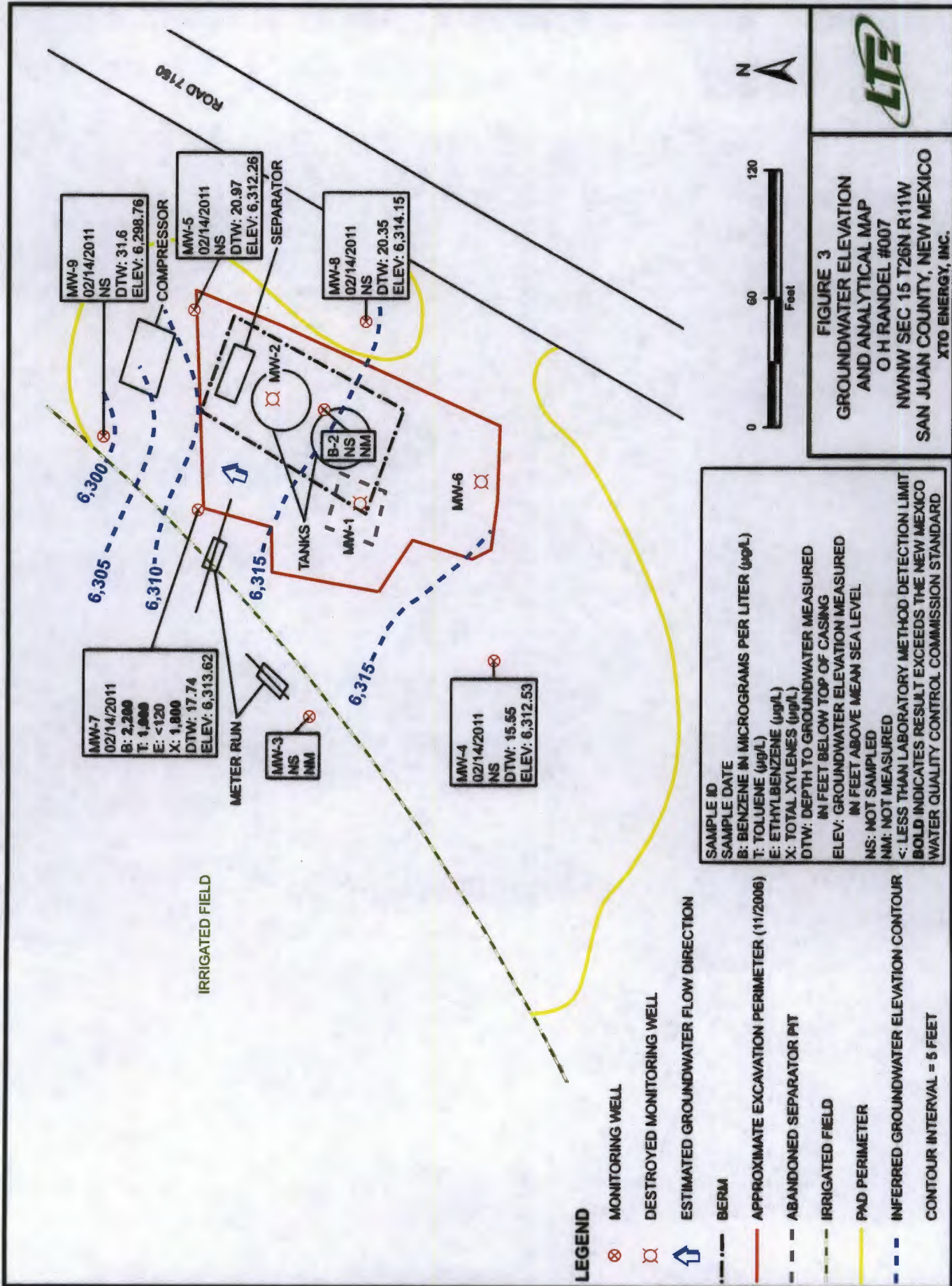


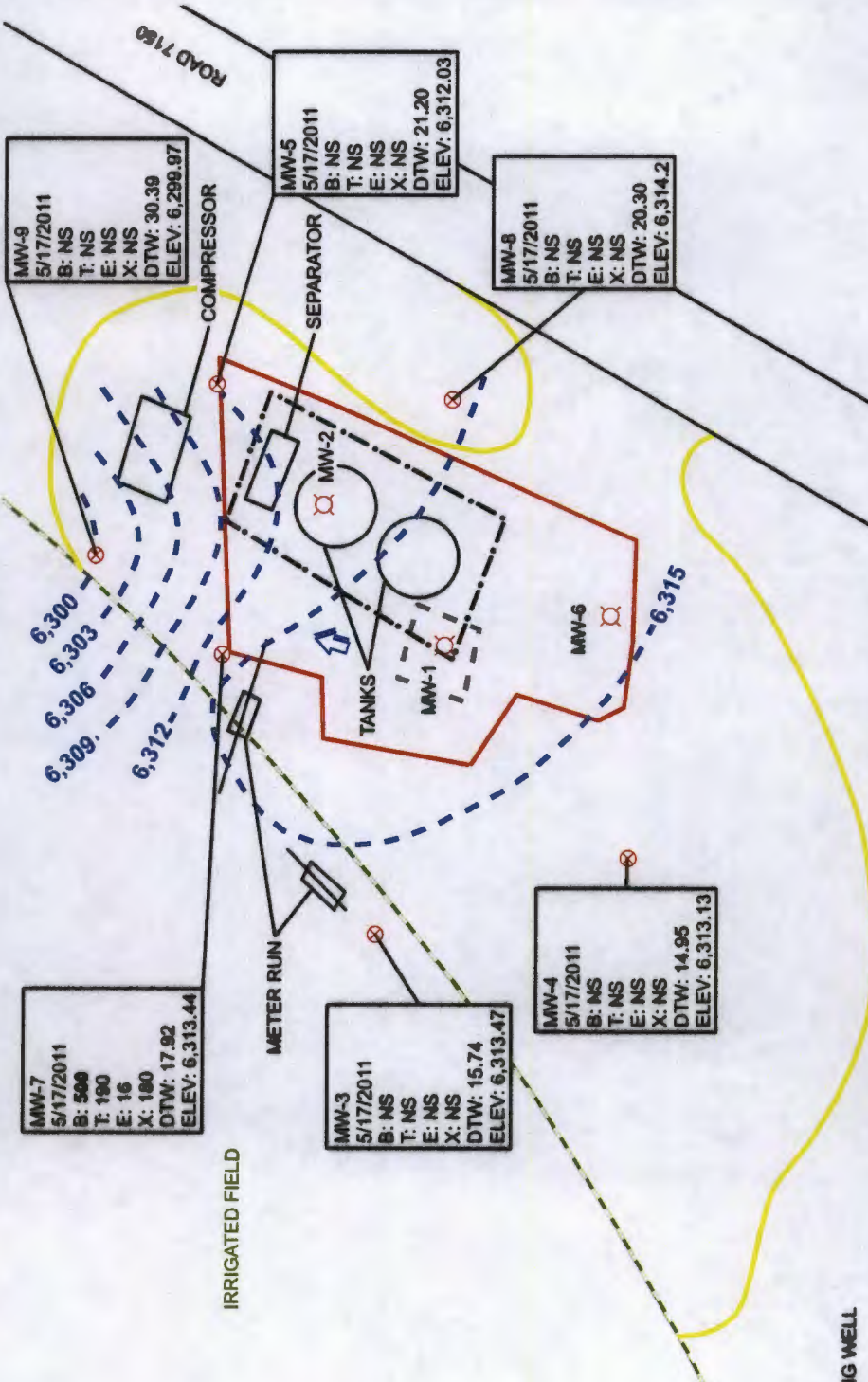
FIGURE 3  
GROUNDWATER ELEVATION  
AND ANALYTICAL MAP  
O H RADEL #007  
NWNW SEC 15 T26N R11W  
SAN JUAN COUNTY, NEW MEXICO  
XTO ENERGY, INC.

**SAMPLE ID**  
**SAMPLE DATE**  
**B:** BENZENE IN MICROGRAMS PER LITER (µg/L)  
**T:** TOLUENE (µg/L)  
**E:** ETHYLBENZENE (µg/L)  
**X:** TOTAL XYLENES (µg/L)  
**DTW:** DEPTH TO GROUNDWATER MEASURED IN FEET BELOW TOP OF CASING  
**ELEV:** GROUNDWATER ELEVATION MEASURED IN FEET ABOVE MEAN SEA LEVEL  
**NS:** NOT SAMPLED  
**NM:** NOT MEASURED  
**<:** LESS THAN LABORATORY METHOD DETECTION LIMIT  
**BOLD** INDICATES RESULT EXCEEDS THE NEW MEXICO WATER QUALITY CONTROL COMMISSION STANDARD





**FIGURE 4**  
**GROUNDWATER ELEVATION**  
**AND ANALYTICAL MAP**  
**OH RADEL #007**  
**NWNW SEC 15 T26N R11W**  
**SAN JUAN COUNTY, NEW MEXICO**  
**XTO ENERGY, INC.**



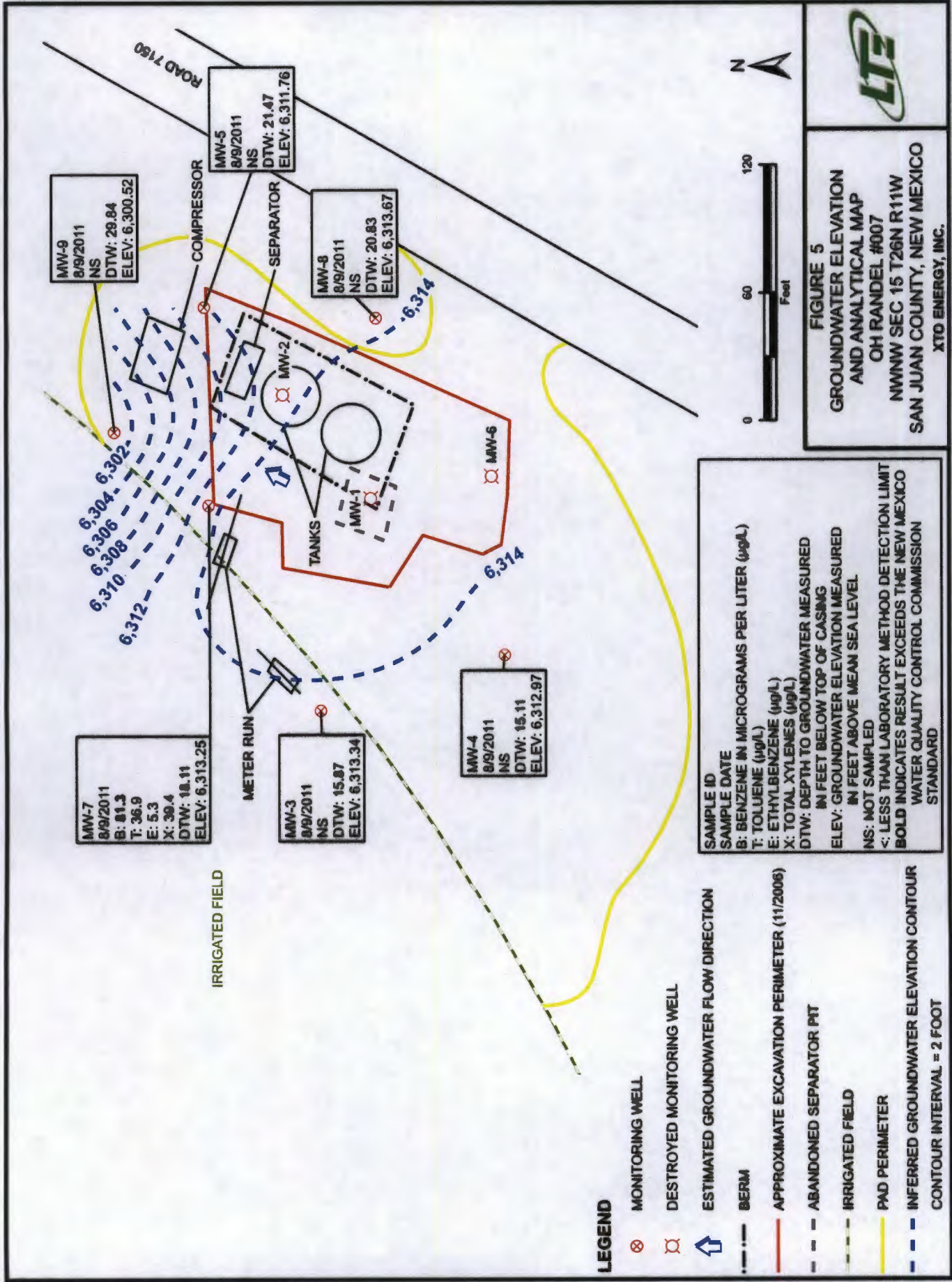
**LEGEND**

- MONITORING WELL
- DESTROYED MONITORING WELL
- ESTIMATED GROUNDWATER FLOW DIRECTION
- BERM
- APPROXIMATE EXCAVATION PERIMETER (11/2006)
- ABANDONED SEPARATOR PIT
- IRRIGATED FIELD
- PAD PERIMETER
- INFERRED GROUNDWATER ELEVATION CONTOUR  
CONTOUR INTERVAL = 3 FEET

SAMPLE ID	
SAMPLE DATE	B: BENZENE IN MICROGRAMS PER LITER (µg/L)
	T: TOLUENE (µg/L)
	E: ETHYLBENZENE (µg/L)
	X: TOTAL XYLENES (µg/L)
DTW: DEPTH TO GROUNDWATER MEASURED IN FEET BELOW TOP OF CASING	ELEV: GROUNDWATER ELEVATION MEASURED IN FEET ABOVE MEAN SEA LEVEL
NS: NOT SAMPLED	NM: NOT MEASURED
<b>&lt;</b> LESS THAN LABORATORY METHOD DETECTION LIMIT	
<b>W</b> WATER QUALITY CONTROL COMMISSION STANDARD	

PUXTO Energy\GIS\PROJECTS\1531510310\1531510310\_MWELV\_ANALYTICAL\_MAP\_2017\_02.dwg





MW-7  
8/9/2011  
B: 81.3  
T: 36.9  
E: 5.3  
X: 39.4  
DTW: 18.11  
ELEV: 6,313.25

MW-3  
8/9/2011  
NS  
DTW: 15.87  
ELEV: 6,313.34

MW-4  
8/9/2011  
NS  
DTW: 15.11  
ELEV: 6,312.97

MW-9  
8/9/2011  
NS  
DTW: 29.84  
ELEV: 6,300.52

MW-5  
8/9/2011  
NS  
DTW: 21.47  
ELEV: 6,311.76

MW-8  
8/9/2011  
NS  
DTW: 20.83  
ELEV: 6,313.67

**FIGURE 5**  
**GROUNDWATER ELEVATION**  
**AND ANALYTICAL MAP**  
OH RADEL #007  
NWNW SEC 15 T26N R11W  
SAN JUAN COUNTY, NEW MEXICO  
XTO ENERGY, INC.

**LEGEND**

- ⊗ MONITORING WELL
- ⊗ DESTROYED MONITORING WELL
- ➔ ESTIMATED GROUNDWATER FLOW DIRECTION
- BERM
- APPROXIMATE EXCAVATION PERIMETER (11/2006)
- ABANDONED SEPARATOR PIT
- IRRIGATED FIELD
- PAD PERIMETER
- INFERRED GROUNDWATER ELEVATION CONTOUR
- CONTOUR INTERVAL = 2 FOOT

**SAMPLE ID**  
SAMPLE DATE  
B: BENZENE IN MICROGRAMS PER LITER (µg/L)  
T: TOLUENE (µg/L)  
E: ETHYLBENZENE (µg/L)  
X: TOTAL XYLENES (µg/L)  
DTW: DEPTH TO GROUNDWATER MEASURED IN FEET BELOW TOP OF CASING  
ELEV: GROUNDWATER ELEVATION MEASURED IN FEET ABOVE MEAN SEA LEVEL  
NS: NOT SAMPLED  
<: LESS THAN LABORATORY METHOD DETECTION LIMIT  
**BOLD INDICATES RESULT EXCEEDS THE NEW MEXICO WATER QUALITY CONTROL COMMISSION STANDARD**







## TABLES



TABLE 1

GROUNDWATER ANALYTICAL RESULTS - BTEX  
 O H RANDEL #007  
 XTO ENERGY, INC.

Well ID	Date	Benzene (ug/L)	Toluene (ug/L)	Ethylbenzene (ug/L)	Total Xylenes (ug/L)
<b>NMWQCC Groundwater Standard</b>		<b>10 µg/L</b>	<b>750 µg/L</b>	<b>750 µg/L</b>	<b>620 µg/L</b>
MW-3	4/24/2002	24	2.4	0.58	200
MW-3	8/27/2002	9.4	ND	ND	150
MW-3	10/8/2002	NA	NA	NA	NA
MW-3	3/3/2003	5.5	ND	ND	43
MW-3	6/18/2003	6.1	0.97	ND	43
MW-3	8/29/2003	3.2	0.53	ND	24
MW-3	12/5/2006	<1	<1	<1	<3
MW-3	5/17/2007	<1	<1	<1	<2
MW-3	8/9/2007	<1	<1	<1	<2

MW-4	4/24/2002	ND	0.59	ND	2.1
MW-4	8/27/2002	1.3	ND	ND	3.5
MW-4	3/3/2003	4.2	ND	ND	5
MW-4	6/18/2003	6.2	ND	ND	4.5
MW-4	8/29/2003	8.3	ND	ND	4.3
MW-4	12/5/2006	<1	<1	<1	<3
MW-4	5/17/2007	<1	<1	<1	<2
MW-4	8/9/2007	<1	<1	<1	<2

MW-5	4/24/2002	<b>510</b>	0.64	8.9	240.0
MW-5	8/10/2002	NA	NA	NA	NA
MW-5	6/18/2003	<b>1,100</b>	20	ND	<b>660.0</b>
MW-5	6/21/2004	<b>2,000</b>	ND	ND	260.0
MW-5	6/28/2005	<b>1,100</b>	15	ND	160.0
MW-5	12/5/2006	<b>37</b>	<1	<1	4.1
MW-5	5/17/2007	<1	<1	<1	<2

MW-6	4/24/2002	<b>6,100</b>	<b>4,800</b>	<b>920</b>	<b>6,600</b>
------	-----------	--------------	--------------	------------	--------------

MW-7	5/17/2007	<b>8,500</b>	<b>17,000</b>	<b>980</b>	<b>16,000</b>
MW-7	8/9/2007	<b>9,800</b>	<b>11,000</b>	<b>770</b>	<b>12,000</b>
MW-7	11/27/2007	<b>12,000</b>	<b>9,000</b>	<b>940</b>	<b>13,000</b>
MW-7	5/12/2008	<b>7,900</b>	<b>11,000</b>	<b>830</b>	<b>12,000</b>
MW-7	11/7/2008	<b>12,000</b>	<b>16,000</b>	<b>1,100</b>	<b>17,000</b>



TABLE 1

GROUNDWATER ANALYTICAL RESULTS - BTEX  
 O H RANDEL #007  
 XTO ENERGY, INC.

Well ID	Date	Benzene (ug/L)	Toluene (ug/L)	Ethylbenzene (ug/L)	Total Xylenes (ug/L)
<b>NMWQCC Groundwater Standard</b>		<b>10 µg/L</b>	<b>750 µg/L</b>	<b>750 µg/L</b>	<b>620 µg/L</b>
MW-7	7/8/2009	<b>9,800</b>	<b>8,200</b>	<100	<b>12,000</b>
MW-7	11/5/2009	<b>9,800</b>	<b>7,900</b>	570	<b>13,000</b>
MW-7	5/25/2010	<b>7,200</b>	<b>3,800</b>	440	<b>11,000</b>
MW-7	8/12/2010	<b>82</b>	58	9.2	200
MW-7	11/17/2010	<b>5,200</b>	<b>5,500</b>	76.0	<b>3,400</b>
MW-7	2/14/2011	<b>2,200</b>	<b>1,000</b>	<120	<b>1,800</b>
MW-7	5/17/2011	<b>500</b>	190	16	180
MW-7	8/9/2011	<b>81.3</b>	36.9	5.3	39.4
MW-7	11/9/2011	<b>26</b>	16	2.3	20

MW-8	5/17/2007	<1.0	1.9	<1.0	3.7
MW-8	8/9/2007	<1.0	<1.0	<1.0	<2.0
MW-8	11/27/2007	<b>21.0</b>	<1.0	<1.0	<2.0
MW-8	5/12/2008	1.4	<1.0	<1.0	<2.0
MW-8	11/7/2008	1.2	<1.0	<1.0	<2.0
MW-8	7/8/2009	<1.0	<1.0	<1.0	<2.0
MW-8	11/5/2009	1.1	<1.0	<1.0	<2.0

MW-9	7/8/2009	<b>91</b>	160	6.9	100
MW-9	11/30/2009	<1	<1	<1	<2
MW-9	5/25/2010	<1.0	<1.0	<1.0	<2.0
MW-9	8/12/2010	<0.5	<5.0	<0.5	<1.5
MW-9	11/17/2010	2.4	<5.0	<0.5	<1.5

**Notes:**

µg/l - micrograms per liter

< indicates result is less than the stated laboratory method detection limit

NMWQCC - New Mexico Water Quality Control Commission

NS - Not Sampled

\* - Well was Destroyed

**BOLD** indicates the result exceeds the NMWQCC Standard

Benzene, toluene, ethylbenzene, and total xylenes analyzed by EPA Method 8021B





**TABLE 2**

**GROUNDWATER ANALYTICAL RESULTS - GENERAL CHEMISTRY  
OH RANDEL #007  
XTO ENERGY, INC.**

Analyte	Unit	NMWQCC Standard	MW-3 (Collected 1/4/12)
Chloride	mg/L	250	43
Fluoride	mg/L	1.6	0.84
Nitrate	mg/L	10	<b>21</b>
Nitrite	mg/L	NE	1.5
Sulfate	mg/L	600	220
Alkalinity	mg/L	NE	460
ORP	mV	NE	150
pH	su	6-9	7.9
Phosphorus, Total	mg/L	NE	0.9
Specific Conductance	umhos/cm	NE	2,100
Total Dissolved Solids	mg/L	1,000	<b>1,100</b>
Calcium	mg/L	NE	400
Iron	mg/L	1.0	<b>320</b>
Magnesium	mg/L	NE	96
Potassium	mg/L	NE	56
Sodium	mg/L	NE	320

**Notes:**

mg/L - milligrams per liter

mV - millivolts

NE - not established

NMWQCC - New Mexico Water Quality Control Commission

ORP - oxygen reduction potential

su - standard unit



**TABLE 3**

**GROUNDWATER ELEVATION SUMMARY  
O H RANDEL #007  
XTO ENERGY, INC.**

<b>Well ID</b>	<b>Date</b>	<b>Depth to Product (feet BTOC)</b>	<b>Depth to Water (feet BTOC)</b>	<b>Groundwater Elevation (feet AMSL)</b>
MW-1	4/22/2002	16.30	16.63	No Survey Data
MW-1	4/24/2002	NM	NM	No Survey Data
MW-1	8/27/2002	16.19	16.49	No Survey Data
MW-1	10/08/2002	15.79	16.16	No Survey Data
MW-1	5/23/2003	15.73	16.04	No Survey Data
MW-1	5/28/2003	15.81	15.99	No Survey Data
MW-1	6/6/2003	15.93	16.04	No Survey Data
MW-1	6/18/2003	15.97	16.04	No Survey Data
MW-1	6/26/2003	17.85	17.93	No Survey Data
MW-1	7/31/2003	16.18	16.19	No Survey Data
MW-1	8/29/2003	NM	16.29	No Survey Data
MW-1	6/21/2004	16.28	17.09	No Survey Data
MW-1	9/20/2006	0.00	22.28	No Survey Data
MW-1	12/5/2006 *	NM	NM	No Survey Data

MW-2	4/22/2002	NM	18.32	No Survey Data
MW-2	4/24/2002	18.35	18.38	No Survey Data
MW-2	8/27/2002	18.92	19.86	No Survey Data
MW-2	10/08/2002	17.50	18.02	No Survey Data
MW-2	5/23/2003	17.30	17.83	No Survey Data
MW-2	5/28/2003	17.62	17.78	No Survey Data
MW-2	6/6/2003	17.71	17.83	No Survey Data
MW-2	6/18/2003	17.79	17.88	No Survey Data
MW-2	6/26/2003	16.05	16.09	No Survey Data
MW-2	7/31/2003	NM	15.86	No Survey Data
MW-2	8/29/2003	NM	15.99	No Survey Data
MW-2	6/21/2004	16.10	16.83	No Survey Data
MW-2	9/20/2006	0.00	17.15	No Survey Data
MW-2	12/5/2006 *	NM	NM	No Survey Data

MW-3	4/22/2002	0.00	16.26	6312.95
MW-3	4/24/2002	0.00	16.25	6312.96
MW-3	8/27/2002	0.00	15.28	6313.93



**TABLE 3**

**GROUNDWATER ELEVATION SUMMARY  
O H RANDEL #007  
XTO ENERGY, INC.**

<b>Well ID</b>	<b>Date</b>	<b>Depth to Product (feet BTOC)</b>	<b>Depth to Water (feet BTOC)</b>	<b>Groundwater Elevation (feet AMSL)</b>
MW-3	10/8/2002	0.00	14.74	6314.47
MW-3	3/3/2003	0.00	15.17	6314.04
MW-3	6/18/2003	0.00	15.16	6314.05
MW-3	8/29/2003	0.00	15.39	6313.82
MW-3	9/20/2006	NM	NM	NM
MW-3	12/5/2006	0.00	13.85	6315.36
MW-3	3/8/2007	0.00	13.40	6315.81
MW-3	5/17/2007	0.00	12.87	6316.34
MW-3	8/9/2007	0.00	12.37	6316.84
MW-3	5/12/2008	0.00	14.83	6314.38
MW-3	11/7/2008	0.00	13.92	6315.29
MW-3	7/8/2009	0.00	14.14	6315.07
MW-3	11/5/2009	0.00	14.53	6314.68
MW-3	5/25/2010	0.00	14.21	6315.00
MW-3	8/12/2010	0.00	NM	NM
MW-3	11/17/2010	0.00	15.30	6313.91
MW-3	2/14/2011	NM	NM	NM
MW-3	5/17/2011	0.00	15.74	6313.47
MW-3	8/9/2011	0.00	15.87	6313.34
MW-3	11/9/2011	0.00	16.21	6313.00

MW-4	4/22/2002	0.00	16.63	6311.45
MW-4	4/24/2002	0.00	16.66	6311.42
MW-4	8/27/2002	0.00	16.47	6311.61
MW-4	10/8/2002	0.00	16.03	6312.05
MW-4	3/3/2003	0.00	15.94	6312.14
MW-4	6/18/2003	0.00	16.03	6312.05
MW-4	8/29/2003	0.00	16.29	6311.79
MW-4	9/20/2006	NM	NM	NM
MW-4	12/5/2006	0.00	13.75	6314.33
MW-4	3/8/2007	0.00	12.55	6315.53
MW-4	5/17/2007	0.00	13.03	6315.05
MW-4	8/9/2007	0.00	12.59	6315.49



**TABLE 3**

**GROUNDWATER ELEVATION SUMMARY  
O H RANDEL #007  
XTO ENERGY, INC.**

<b>Well ID</b>	<b>Date</b>	<b>Depth to Product (feet BTOC)</b>	<b>Depth to Water (feet BTOC)</b>	<b>Groundwater Elevation (feet AMSL)</b>
MW-4	5/12/2008	0.00	12.57	6315.51
MW-4	11/7/2008	0.00	13.68	6314.40
MW-4	7/8/2009	0.00	13.72	6314.36
MW-4	11/5/2009	0.00	14.12	6313.96
MW-4	5/25/2010	0.00	13.86	6314.22
MW-4	8/12/2010	0.00	14.39	6313.69
MW-4	11/17/2010	0.00	14.60	6313.48
MW-4	2/14/2011	0.00	15.55	6312.53
MW-4	5/17/2011	0.00	14.95	6313.13
MW-4	8/9/2011	0.00	15.11	6312.97
MW-4	11/9/2011	0.00	15.38	6312.70

MW-5	4/22/2002	0.00	19.11	6314.12
MW-5	4/24/2002	0.00	19.14	6314.09
MW-5	8/10/2002	0.00	19.10	6314.13
MW-5	6/18/2003	0.00	18.86	6314.37
MW-5	6/21/2004	0.00	19.64	6313.59
MW-5	6/28/2005	0.00	17.30	6315.93
MW-5	9/20/2006	NM	NM	NM
MW-5	12/5/2006	0.00	18.65	6314.58
MW-5	3/8/2007	0.00	18.15	6315.08
MW-5	5/17/2007	0.00	17.78	6315.45
MW-5	8/9/2007	0.00	NM	NM
MW-5	5/12/2008	0.00	18.82	6314.41
MW-5	11/7/2008	0.00	18.90	6314.33
MW-5	7/8/2009	0.00	20.08	6313.15
MW-5	11/5/2009	0.00	20.44	6312.79
MW-5	5/25/2010	0.00	20.33	6312.90
MW-5	8/12/2010	0.00	20.51	6312.72
MW-5	11/17/2010	0.00	20.93	6312.30
MW-5	2/14/2011	0.00	20.97	6312.26
MW-5	5/17/2011	0.00	21.20	6312.03
MW-5	8/9/2011	0.00	21.47	6311.76



**TABLE 3**

**GROUNDWATER ELEVATION SUMMARY  
O H RANDEL #007  
XTO ENERGY, INC.**

<b>Well ID</b>	<b>Date</b>	<b>Depth to Product (feet BTOC)</b>	<b>Depth to Water (feet BTOC)</b>	<b>Groundwater Elevation (feet AMSL)</b>
MW-5	11/9/2011	0.00	21.69	6311.54

MW-6	4/22/2002	0.00	18.31	No Survey Data
MW-6	4/24/2002	0.00	18.32	No Survey Data
MW-6	8/27/2002	NM	NM	No Survey Data
MW-6	10/8/2002	16.84	18.13	No Survey Data
MW-6	5/23/2003	16.62	17.95	No Survey Data
MW-6	5/28/2003	16.68	17.90	No Survey Data
MW-6	6/6/2003	16.80	18.00	No Survey Data
MW-6	6/18/2003	16.78	18.02	No Survey Data
MW-6	6/26/2003	16.88	18.10	No Survey Data
MW-6	7/31/2003	17.77	19.13	No Survey Data
MW-6	8/29/2003	16.88	18.34	No Survey Data
MW-6	6/21/2004	17.78	18.95	No Survey Data
MW-6	9/20/2006	15.79	16.87	No Survey Data
MW-6	12/5/2006 *	NM	NM	No Survey Data

MW-7	5/17/2007	0.00	15.46	6315.90
MW-7	8/9/2007	0.00	14.72	6316.64
MW-7	11/27/2007	0.00	14.91	6316.45
MW-7	5/12/2008	0.00	15.12	6316.24
MW-7	11/7/2008	0.00	15.82	6315.54
MW-7	7/8/2009	0.00	16.44	6314.92
MW-7	11/5/2009	0.00	16.76	6314.60
MW-7	5/25/2010	0.00	16.63	6314.73
MW-7	8/12/2010	0.00	16.82	6314.54
MW-7	11/17/2010	0.00	17.65	6313.71
MW-7	2/14/2011	0.00	17.74	6313.62
MW-7	5/17/2011	0.00	17.92	6313.44
MW-7	8/9/2011	0.00	18.11	6313.25
MW-7	11/9/2011	0.00	18.46	6312.90

MW-8	5/17/2007	0.00	19.64	6314.86
------	-----------	------	-------	---------



**TABLE 3**

**GROUNDWATER ELEVATION SUMMARY  
O H RANDEL #007  
XTO ENERGY, INC.**

<b>Well ID</b>	<b>Date</b>	<b>Depth to Product (feet BTOC)</b>	<b>Depth to Water (feet BTOC)</b>	<b>Groundwater Elevation (feet AMSL)</b>
MW-8	8/9/2007	0.00	18.94	6315.56
MW-8	11/27/2007	0.00	19.20	6315.30
MW-8	5/12/2008	0.00	19.97	6314.53
MW-8	11/7/2008	0.00	19.55	6314.95
MW-8	7/8/2009	0.00	20.01	6314.49
MW-8	11/5/2009	0.00	20.41	6314.09
MW-8	5/25/2010	0.00	20.31	6314.19
MW-8	8/12/2010	0.00	20.41	6314.09
MW-8	11/17/2010	0.00	20.63	6313.87
MW-8	2/14/2011	0.00	20.35	6314.15
MW-8	5/17/2011	0.00	20.30	6314.20
MW-8	8/9/2011	0.00	20.83	6313.67
MW-8	11/9/2011	0.00	21.00	6313.50

MW-9	7/8/2009	0.00	35.26	6295.10
MW-9	11/5/2009	0.00	33.08	6297.28
MW-9	5/25/2010	0.00	29.28	6301.08
MW-9	8/12/2010	0.00	31.12	6299.24
MW-9	5/25/2010	0.00	20.31	6310.05
MW-9	8/12/2010	0.00	20.41	6309.95
MW-9	11/17/2010	0.00	30.49	6299.87
MW-9	2/14/2011	0.00	31.60	6298.76
MW-9	5/17/2011	0.00	30.39	6299.97
MW-9	8/9/2011	0.00	29.84	6300.52
MW-9	11/9/2011	0.00	28.76	6301.60

**Notes:**

BTOC - Below Top of Casing

AMSL - Above Mean Sea Level

NM - Not Measured

\* - Well was destroyed



**APPENDIX A**  
**GENERAL CHEMISTRY ANALYTICAL LABORATORY REPORT**  
**JANUARY 4, 2012**







12065 Lebanon Rd.  
Mt. Juliet, TN 37122  
(615) 758-5858  
1-800-767-5859  
Fax (615) 758-5859  
Tax I.D. 62-0814289  
Est. 1970

James McDaniel  
XTO Energy - San Juan Division  
382 Road 3100  
Aztec, NM 87410

### Report Summary

Wednesday January 11, 2012

Report Number: L554320

Samples Received: 01/05/12

Client Project:

Description: OH Randell

The analytical results in this report are based upon information supplied by you, the client, and are for your exclusive use. If you have any questions regarding this data package, please do not hesitate to call.

Entire Report Reviewed By:

Daphne Richards , ESC Representative

#### Laboratory Certification Numbers

A2LA - 1461-01, AIHA - 100789, AL - 40660, CA - 01157CA, CT - PH-0197,  
FL - E87487, GA - 923, IN - C-TN-01, KY - 90010, KYUST - 0016,  
NC - ENV375/DW21704/BIO041, ND - R-140. NJ - TN002, NJ NELAP - TN002,  
SC - 84004, TN - 2006, VA - 460132, WV - 233, AZ - 0612,  
MN - 047-999-395, NY - 11742, WI - 998093910, NV - TN000032011-1,  
TX - T104704245-11-3, OK - 9915, PA - 68-02979

Accreditation is only applicable to the test methods specified on each scope of accreditation held by ESC Lab Sciences.

Note: The use of the preparatory EPA Method 3511 is not approved or endorsed by the CA ELAP.

This report may not be reproduced, except in full, without written approval from ESC Lab Sciences. Where applicable, sampling conducted by ESC is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.



12065 Lebanon Rd.  
 Mt. Juliet, TN 37122  
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Tax I.D. 62-0814289

Est. 1970

REPORT OF ANALYSIS

January 11, 2012

James McDaniel  
 XTO Energy - San Juan Division  
 382 Road 3100  
 Aztec, NM 87410

Date Received : January 05, 2012  
 Description : OH Randell  
 Sample ID : MW-3  
 Collected By : Brooke Herb  
 Collection Date : 01/04/12 12:35

ESC Sample # : L554320-01  
 Site ID : OH RANDELL  
 Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Chloride	43.	5.0	mg/l	9056	01/05/12	5
Fluoride	0.84	0.50	mg/l	9056	01/05/12	5
Nitrate	21.	0.50	mg/l	9056	01/05/12	5
Nitrite	1.5	0.50	mg/l	9056	01/05/12	5
Sulfate	220	25.	mg/l	9056	01/05/12	5
Alkalinity	460	20.	mg/l	2320B	01/08/12	1
ORP	150		mV	2580	01/11/12	1
pH	7.9		su	9040C	01/07/12	1
Phosphorus, Total	0.90	0.10	mg/l	365.1	01/11/12	1
Specific Conductance	2100	1.8	umhos/cm	9050A	01/07/12	1
Dissolved Solids	1100	10.	mg/l	2540C	01/09/12	1
Calcium	400	0.50	mg/l	6010B	01/06/12	1
Iron	320	0.10	mg/l	6010B	01/06/12	1
Magnesium	96.	0.10	mg/l	6010B	01/06/12	1
Potassium	56.	0.50	mg/l	6010B	01/06/12	1
Sodium	320	0.50	mg/l	6010B	01/06/12	1

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit (PQL)

Note:

The reported analytical results relate only to the sample submitted.

This report shall not be reproduced, except in full, without the written approval from ESC.

Reported: 01/11/12 16:36 Printed: 01/11/12 16:37  
 L554320-01 (PH) - 7.90@16.7c

Attachment A  
List of Analytes with QC Qualifiers

Sample Number	Work Group	Sample Type	Analyte	Run ID	Qualifier
L554320-01	WG573078	SAMP	pH	R1992712	T8
	WG573486	SAMP	Phosphorus, Total	R1996153	T2

Attachment B  
Explanation of QC Qualifier Codes

Qualifier	Meaning
T2	(ESC) - Additional method/sample information: The laboratory analysis was from an unpreserved or improperly preserved sample.
T8	(ESC) - Additional method/sample information: Sample(s) received past/too close to holding time expiration.

Qualifier Report Information

ESC utilizes sample and result qualifiers as set forth by the EPA Contract Laboratory Program and as required by most certifying bodies including NELAC. In addition to the EPA qualifiers adopted by ESC, we have implemented ESC qualifiers to provide more information pertaining to our analytical results. Each qualifier is designated in the qualifier explanation as either EPA or ESC. Data qualifiers are intended to provide the ESC client with more detailed information concerning the potential bias of reported data. Because of the wide range of constituents and variety of matrices incorporated by most EPA methods, it is common for some compounds to fall outside of established ranges. These exceptions are evaluated and all reported data is valid and useable "unless qualified as 'R' (Rejected)."

Definitions

- Accuracy** - The relationship of the observed value of a known sample to the true value of a known sample. Represented by percent recovery and relevant to samples such as: control samples, matrix spike recoveries, surrogate recoveries, etc.
- Precision** - The agreement between a set of samples or between duplicate samples. Relates to how close together the results are and is represented by Relative Percent Difference.
- Surrogate** - Organic compounds that are similar in chemical composition, extraction, and chromatography to analytes of interest. The surrogates are used to determine the probable response of the group of analytes that are chemically related to the surrogate compound. Surrogates are added to the sample and carried through all stages of preparation and analyses.
- TIC** - Tentatively Identified Compound: Compounds detected in samples that are not target compounds, internal standards, system monitoring compounds, or surrogates.

Summary of Remarks For Samples Printed  
01/11/12 at 16:37:05

TSR Signing Reports: 288  
R5 - Desired TAT

drywt

Sample: L554320-01 Account: XTORNM Received: 01/05/12 09:00 Due Date: 01/12/12 00:00 RPT Date: 01/11/12 16:36



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Tax I.D. 62-0814289

Est. 1970

January 11, 2012

Analyte	Result	Laboratory Blank Units	% Rec	Limit	Batch	Date Analyzed
Calcium	< .5	mg/l			WG572927	01/06/12 08:39
Iron	< .1	mg/l			WG572927	01/06/12 08:39
Magnesium	< .1	mg/l			WG572927	01/06/12 08:39
Potassium	< .5	mg/l			WG572927	01/06/12 08:39
Sodium	< .5	mg/l			WG572927	01/06/12 08:39
Chloride	< 1	mg/l			WG572825	01/05/12 08:28
Fluoride	< .1	mg/l			WG572825	01/05/12 08:28
Nitrate	< .1	mg/l			WG572825	01/05/12 08:28
Nitrite	< .1	mg/l			WG572825	01/05/12 08:28
Sulfate	< 5	mg/l			WG572825	01/05/12 08:28
Specific Conductance	1.20	umhos/cm			WG573041	01/07/12 11:34
pH	4.70	su			WG573078	01/07/12 10:45
Alkalinity	< 20	mg/l			WG573158	01/08/12 15:30
Dissolved Solids	< 10	mg/l			WG572865	01/09/12 13:04
Phosphorus, Total	< .1	mg/l			WG573486	01/11/12 10:52

Analyte	Units	Result	Duplicate Duplicate	RPD	Limit	Ref Samp	Batch
Calcium	mg/l	14.0	14.0	0	20	L554496-02	WG572927
Iron	mg/l	9.30	9.30	0.108	20	L554496-02	WG572927
Magnesium	mg/l	5.50	5.50	0.182	20	L554496-02	WG572927
Potassium	mg/l	3.00	2.94	0.340	20	L554496-02	WG572927
Sodium	mg/l	14.0	14.0	1.44	20	L554496-02	WG572927
Sulfate	mg/l	0	5.30	NA	20	L553650-02	WG572825
Sulfate	mg/l	61.0	61.0	0	20	L553150-03	WG572825
Sulfate	mg/l	170.	170.	0	20	L553650-07	WG572825
Specific Conductance	umhos/cm	1000	1000	0.598	20	L553636-01	WG573041
Specific Conductance	umhos/cm	24000	24000	0.416	20	L554565-06	WG573041
pH	su	5.20	5.20	0.966	1	L554311-01	WG573078
pH	su	7.50	7.50	0.535	1	L554724-01	WG573078
Alkalinity	mg/l	69.0	69.0	0.145	20	L554586-02	WG573158
Dissolved Solids	mg/l	180.	175.	0	5	L554281-02	WG572865
Phosphorus, Total	mg/l	0	0	0	20	L554076-02	WG573486
Phosphorus, Total	mg/l	1.40	1.40	0.717	20	L554532-01	WG573486

\* Performance of this Analyte is outside of established criteria.

For additional information, please see Attachment A 'List of Analytes with QC Qualifiers.'



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Analyte	Units	Duplicate		RPD	Limit	Ref Samp	Batch
		Result	Duplicate				
ORP	mV	150.	150.	0	20	L554320-01	WG573607

Analyte	Units	Laboratory Control Sample		% Rec	Limit	Batch
		Known Val	Result			
Calcium	mg/l	11.3	11.8	104.	85-115	WG572927
Iron	mg/l	1.13	1.14	101.	85-115	WG572927
Magnesium	mg/l	11.3	12.1	107.	85-115	WG572927
Potassium	mg/l	11.3	11.7	104.	85-115	WG572927
Sodium	mg/l	11.3	12.2	108.	85-115	WG572927
Chloride	mg/l	40	40.4	101.	90-110	WG572825
Fluoride	mg/l	8	8.24	103.	90-110	WG572825
Nitrate	mg/l	8	8.27	103.	90-110	WG572825
Nitrite	mg/l	8	8.08	101.	90-110	WG572825
Sulfate	mg/l	40	40.2	101.	90-110	WG572825
Specific Conductance	umhos/cm	350	340.	97.1	85-115	WG573041
pH	su	7.98	8.07	101.*	98-101	WG573078
Alkalinity	mg/l	100	96.0	96.0	85-115	WG573158
Dissolved Solids	mg/l	8800	8590	97.6	85-115	WG572865
Phosphorus, Total	mg/l	1	0.955	95.5	85-115	WG573486
ORP	mV	229	230.	100.	95.6-104.37	WG573607

Analyte	Units	Laboratory Control Sample Duplicate			Limit	RPD	Limit	Batch
		Result	Ref	%Rec				
Chloride	mg/l	40.3	40.4	101.	90-110	0.248	20	WG572825
Fluoride	mg/l	8.27	8.24	103.	90-110	0.363	20	WG572825
Nitrate	mg/l	8.27	8.27	103.	90-110	0	20	WG572825
Nitrite	mg/l	8.07	8.08	101.	90-110	0.124	20	WG572825
Sulfate	mg/l	40.3	40.2	101.	90-110	0.248	20	WG572825
Specific Conductance	umhos/	340.	340.	97.0	85-115	0	20	WG573041
pH	su	8.05	8.07	101.	98-101	0.248	20	WG573078
Alkalinity	mg/l	99.0	96.0	99.0	85-115	3.08	20	WG573158
Dissolved Solids	mg/l	8600	8590	98.0	85-115	0.0931	20	WG572865
Phosphorus, Total	mg/l	0.928	0.955	93.0	85-115	2.87	20	WG573486

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Analyte	Units	Laboratory Control Sample Duplicate			Limit	RPD	Limit	Batch
		Result	Ref	%Rec				
ORP	mV	230.	230.	100.	95.6-104.37	0	20	WG573607

Analyte	Units	Matrix Spike				Limit	Ref Samp	Batch
		MS Res	Ref Res	TV	% Rec			
Calcium	mg/l	25.4	14.0	11.3	101.	75-125	L554496-02	WG572927
Iron	mg/l	10.2	9.30	1.13	79.6	75-125	L554496-02	WG572927
Magnesium	mg/l	17.3	5.50	11.3	104.	75-125	L554496-02	WG572927
Potassium	mg/l	14.3	2.94	11.3	100.	75-125	L554496-02	WG572927
Sodium	mg/l	25.3	14.0	11.3	100.	75-125	L554496-02	WG572927
Nitrate	mg/l	5.03	0	5	101.	80-120	L554364-01	WG572825
Nitrite	mg/l	5.24	0	5	105.	80-120	L554364-01	WG572825
Alkalinity	mg/l	110.	22.0	100	88.0	80-120	L554586-01	WG573158
Phosphorus, Total	mg/l	2.52	0	2.5	101.	80-120	L554076-01	WG573486

Analyte	Units	MSD	Matrix Spike Duplicate		Limit	RPD	Limit	Ref Samp	Batch
			Ref	%Rec					
Calcium	mg/l	25.5	25.4	102.	75-125	0.393	20	L554496-02	WG572927
Iron	mg/l	10.2	10.2	79.6	75-125	0	20	L554496-02	WG572927
Magnesium	mg/l	17.3	17.3	104.	75-125	0	20	L554496-02	WG572927
Potassium	mg/l	14.2	14.3	99.6	75-125	0.702	20	L554496-02	WG572927
Sodium	mg/l	25.0	25.3	97.3	75-125	1.19	20	L554496-02	WG572927
Nitrate	mg/l	4.96	5.03	99.2	80-120	1.40	20	L554364-01	WG572825
Nitrite	mg/l	5.16	5.24	103.	80-120	1.54	20	L554364-01	WG572825
Alkalinity	mg/l	110.	110.	88.0	80-120	0	20	L554586-01	WG573158
Phosphorus, Total	mg/l	2.58	2.52	103.	80-120	2.35	20	L554076-01	WG573486

Batch number / Run number / Sample number cross reference

WG572927: R1991176: L554320-01  
 WG572825: R1991332: L554320-01  
 WG573041: R1992673: L554320-01  
 WG573078: R1992712: L554320-01  
 WG573158: R1992753: L554320-01  
 WG572865: R1993192: L554320-01  
 WG573486: R1996153: L554320-01  
 WG573607: R1996293: L554320-01

\* \* Calculations are performed prior to rounding of reported values.  
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The data package includes a summary of the analytic results of the quality control samples required by the SW-846 or CWA methods. The quality control samples include a method blank, a laboratory control sample, and the matrix spike/matrix spike duplicate analysis. If a target parameter is outside the method limits, every sample that is effected is flagged with the appropriate qualifier in Appendix B of the analytic report.

Method Blank - an aliquot of reagent water carried through the entire analytic process. The method blank results indicate if any possible contamination exposure during the sample handling, digestion or extraction process, and analysis. Concentrations of target analytes above the reporting limit in the method blank are qualified with the "B" qualifier.

Laboratory Control Sample - is a sample of known concentration that is carried through the digestion/extraction and analysis process. The percent recovery, expressed as a percentage of the theoretical concentration, has statistical control limits indicating that the analytic process is "in control". If a target analyte is outside the control limits for the laboratory control sample or any other control sample, the parameter is flagged with a "J4" qualifier for all effected samples.

Matrix Spike and Matrix Spike Duplicate - is two aliquots of an environmental sample that is spiked with known concentrations of target analytes. The percent recovery of the target analytes also has statistical control limits. If any recoveries that are outside the method control limits, the sample that was selected for matrix spike/matrix spike duplicate analysis is flagged with either a "J5" or a "J6". The relative percent difference (%RPD) between the matrix spike and the matrix spike duplicate recoveries is all calculated. If the RPD is above the method limit, the effected samples are flagged with a "J3" qualifier.



**APPENDIX B**  
**REFERENCES**



## REFERENCES

Fetter, C.W., 1988, *Applied Hydrogeology*, 587 p.

Stone, W.J., Lyford, F.P., Frenzel, P.F., Mizell, N.H., and Padgett, E.T., 1983, *Hydrogeology and Water Resources of the San Juan Basin, New Mexico*, New Mexico Bureau of Mines and Mineral Resources Hydrologic Report 6, 70 p.

