

**3R-1035**

**Initial C-141**

**&**

**Approved Work plan**

**XTO**

**Sullivan Gas Com D #1E**

**Date: 2015**

District I  
1625 N. French Dr., Hobbs, NM 88240  
District II  
811 S. First St., Artesia, NM 88210  
District III  
1000 Rio Brazos Road, Aztec, NM 87410  
District IV  
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico  
Energy Minerals and Natural Resources  
Oil Conservation Division  
1220 South St. Francis Dr.  
Santa Fe, NM 87505

FEB 10 2016

Form C-141  
Revised August 8, 2011Submit 1 Copy to appropriate District Office in  
accordance with 19.15.29 NMAC.**Release Notification and Corrective Action****OPERATOR** Initial Report  Final Report

Name of Company: XTO Energy, Inc.	Contact: James McDaniel
Address: 382 Road 3100, Aztec, New Mexico 87410	Telephone No.: (505) 333-3701
Facility Name: Sullivan Gas COM D #1E	Facility Type: Gas Well (Dakota)
Surface Owner: Fee	Mineral Owner
API No. 30-045-24083	

**LOCATION OF RELEASE**

Unit Letter	Section	Township	Range	Feet from the	North/South Line	Feet from the	East/West Line	County
F	26	29 N	11W	1475	FNL	1500	FWL	San Juan

Latitude: 36.70013 Longitude: -108.396484

**NATURE OF RELEASE**

Type of Release: Produced Oil	Volume of Release: 4 bbls	Volume Recovered: None
Source of Release: Leaking union on oil flow line	Date and Hour of Occurrence: June 1, 2015	Date and Hour of Discovery: June 1, 2015
Was Immediate Notice Given? <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Not Required	If YES, To Whom?	
By Whom?	Date and Hour:	
Was a Watercourse Reached? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If YES, Volume Impacting the Watercourse. Unknown	

If a Watercourse was Impacted, Describe Fully.\*

Groundwater Impacts discovered on 6/10/2015. Extent of known groundwater impact is outlined in the attached remediation plan approved by the NMOCD on 1/7/2016; see attached email.

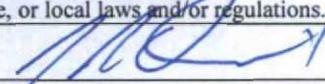
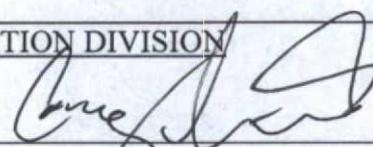
Describe Cause of Problem and Remedial Action Taken.

On June 1, 2015, a small release was discovered at the surface when the separator was manually dumped by the lease operator. The volume of the release was estimated at 4 bbls due to the volume of the separator. Upon investigation, the release was determined to come from a leaking union in the fiberglass flow line beneath the ground. Additional spill assessment activities showed impacted soil beneath the flow line. The site was then ranked a 20 pursuant to the NMOCD Guidelines for the Remediation of Leaks, Spills and Releases due to a depth to groundwater of less than 50 feet. Additional assessment activities also showed that the leak had impacted groundwater. Immediate notification was given to the NMOCD on June 11, 2015, upon the discovery of groundwater impacts.

Describe Area Affected and Cleanup Action Taken.\*

XTO proposes to remediate the location pursuant to the attached remediation plan, approved on 1/7/2016 by the NMOCD; see attached email.

I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to NMOCD rules and regulations all operators are required to report and/or file certain release notifications and perform corrective actions for releases which may endanger public health or the environment. The acceptance of a C-141 report by the NMOCD marked as "Final Report" does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to ground water, surface water, human health or the environment. In addition, NMOCD acceptance of a C-141 report does not relieve the operator of responsibility for compliance with any other federal, state, or local laws and/or regulations.

Signature: 	<b>OIL CONSERVATION DIVISION</b>	
Printed Name: James McDaniel	Approved by Environmental Specialist: 	
Title: EHS Supervisor	Approval Date: 2/25/16	Expiration Date:
E-mail Address: james_mcdaniel@xtoenergy.com	Conditions of Approval:	Attached <input type="checkbox"/>
Date: 2/5/16	Phone: 505-333-3701	

\* Attach Additional Sheets If Necessary

#NCS 151895 2648  
Assigned to 3R-1035

## McDaniel, James

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**From:** Smith, Cory, EMNRD <Cory.Smith@state.nm.us>  
**Sent:** Thursday, January 07, 2016 9:37 AM  
**To:** McDaniel, James  
**Cc:** Nee, Martin; Hixon, Logan; 'Ashley Ager (aager@ltenv.com)'; Powell, Brandon, EMNRD; Fields, Vanessa, EMNRD  
**Subject:** RE: Sullivan GC D #1E  
**Categories:** External Sender

James,

As per our phone conversation, Santa Fe has no issues with the proposed Work Plan for the Sullivan Gas Com D #1 E. XTO may move forward with the approved work plan.

If you have any questions please give me a call.

Cory Smith  
Environmental Specialist  
Oil Conservation Division  
Energy, Minerals, & Natural Resources  
1000 Rio Brazos, Aztec, NM 87410  
(505)334-6178 ext 115  
[cory.smith@state.nm.us](mailto:cory.smith@state.nm.us)

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**From:** McDaniel, James [[mailto:James\\_McDaniel@xtoenergy.com](mailto:James_McDaniel@xtoenergy.com)]  
**Sent:** Thursday, December 31, 2015 7:45 AM  
**To:** Smith, Cory, EMNRD; Powell, Brandon, EMNRD  
**Cc:** Nee, Martin; Hixon, Logan; 'Ashley Ager ([aager@ltenv.com](mailto:aager@ltenv.com))'  
**Subject:** Sullivan GC D #1E

Any word on the approval of our workplan for this location?

James McDaniel  
EH&S Supervisor  
CHMM #15676  
CSP #30009  
XTO Energy Inc.  
382 Road 3100  
Aztec, New Mexico 87410  
Phone: 505.333.3701 | Mobile: 505.787.0519  
[james\\_mcdaniel@xtoenergy.com](mailto:james_mcdaniel@xtoenergy.com)

An ExxonMobil Subsidiary



November 30, 2015

Mr. Brandon Powell  
New Mexico Oil Conservation Division  
1000 Rio Brazos Road  
Aztec, NM 87410

**RE: Updated Remediation Work Plan  
XTO Energy, Inc.  
Sullivan GC D #1E, API # 30-045-24083  
San Juan County, New Mexico**

Dear Mr. Powell:

LT Environmental, Inc. (LTE), on behalf of XTO Energy, Inc. (XTO), presents the following updated remediation work plan to continue addressing soil and groundwater impact at the Sullivan GC D #1E natural gas production well (Site). The Site is located south of Sullivan Road in Bloomfield, New Mexico approximately one quarter mile southeast of the San Juan River in Unit F of Section 26 of Township 29 North and Range 11 West (Figure 1). In June 2015, XTO identified a historical condensate release originating at a union on a fiberglass pipeline between the separator and aboveground storage tank. Following the results of the initial hand auger and pothole investigation, LTE conducted a soil and groundwater investigation utilizing a Geoprobe® direct-push drilling rig. The results of the initial investigations were reported in the letter report *Subsurface Investigation Results and Remediation Work Plan* submitted to the New Mexico Oil Conservation Division (NMOCD) on September 11, 2015. In that report, LTE proposed additional delineation, investigation of product recovery, and active *in situ* remediation at the Site. This report documents groundwater investigation and product recovery conducted since the letter report was submitted, presents the results of a limited soil vapor extraction (SVE) pilot test, and updates the remediation plan proposed for the Site based on these results.

#### **ADDITIONAL DELINEATION**

As documented in the September 11, 2015 letter report, XTO and LTE conducted several investigations consisting of soil and groundwater sampling from potholes, hand auger and Geoprobe® boreholes, a product recovery well (PR-1), and three monitoring wells installed via hollow stem auger drill rig (MW01, MW02, MW03, and MW04). The locations of the sampling points are depicted on Figure 2. On October 8, 2015, LTE replaced the original PR-1 with a 4-inch diameter product recovery well and installed monitoring wells MW05 and MW06 in the locations identified on Figure 2.

The wells were installed using a CME-75 drilling rig equipped with hollow stem augers. Product recovery well PR-1 was advanced to approximately 29.5 feet below ground surface (bgs), at which depth, field screening and visual observations indicated the depth of impact could be defined (approximately 26.5 bgs). The monitoring well was constructed with 4-inch diameter schedule 40



polyvinyl chloride (PVC). Blank casing was installed in the bottom three feet of the well and 15 feet of 0.02-inch machine slotted flush-threaded PVC well screen were set from 26.5 feet to 11.5 feet bgs. Monitoring wells MW05 and MW06 were constructed with 2-inch diameter schedule 40 PVC and included 10 feet of 0.01 inch PVC well screen. A clean 10-20 grade silica sand gravel pack was placed from the bottom of the soil borings to two feet above the top of the screen. Two feet of three-eighths inch bentonite chips were set above the gravel pack, followed by a neat cement slurry to the surface, containing a minimum of 5 percent powdered bentonite. The wells were set in a locking flush-mount casing. Borehole logs and well construction diagrams for PR-1, MW05, and MW06 are included in Attachment 1.

The new wells were developed utilizing a new PVC bailer. LTE purged fluid until at least 10 casing volumes had been removed from each well and turbidity was reduced to the greatest possible extent. All purged water was disposed of at a produced water tank on site. New and existing groundwater monitoring wells were professionally surveyed for top-of casing elevations to an accuracy of plus or minus 0.01 feet so that groundwater flow direction and gradient could be determined.

The groundwater elevations and product thickness were periodically gauged in the groundwater monitoring wells and results are provided in Table 1. The most recent groundwater elevations and product thickness results were obtained on November 18, 2015 and depicted on Figure 3. Groundwater flow direction is north-northwest. Free-phase product is present in PR-1, MW01, MW02, MW05, and MW06. Product is thickest at MW05, which contains 0.8 feet of product.

Groundwater samples were collected and analyzed for benzene, toluene, ethylbenzene, and total xylenes (BTEX) from monitoring wells where product was not observed (MW03 and MW04). Results from the most recent samples collected on September 14, 2015 indicated all BTEX constituents exceeded New Mexico Water Quality Control Commission (NMWQCC) standards in the groundwater sample collected from MW03 and benzene exceeded NMWQCC standards in the groundwater sample collected from MW04. Groundwater analytical results are summarized in Table 2 and results from September 14, 2015 are provided on Figure 3.

## **PRODUCT RECOVERY**

XTO and LTE have conducted active and passive product recovery at the Site. Product was removed with disposable bailers and a vacuum truck and by utilizing oil-absorbent socks in monitoring wells between site visits. The total volume of fluids (groundwater plus product) recovered from the Site is approximately 1,213 gallons to date.

LTE performed a dual phase extraction (DPE) test with a mobile vacuum truck on October 19, 2015. A stinger was lowered into the monitoring wells PR-1, MW01, MW02, MW05, and MW06 to extract air and fluid. The fluid elevations were measured before and after each event. Test results indicated a relatively stable extraction rate of 8.5 gallons per minute, a drawdown of approximately 4.5 feet was achieved in the 4-inch diameter extraction well PR-1. Fluid recovery from the 2-inch monitoring wells was less, averaging 2.3 gallons per minute.



A combination fluid extraction and vapor extraction test (dual phase extraction) was accomplished on November 4, 2015. During the test, the top of the extraction well PR-1 was sealed and an applied vacuum of 15 inches of mercury was measured at the well. The fluid recovery rate was slowly increased during the test as drop pipe was lowered within the well. The short duration test primarily provided an estimated flow rate of 10.5 gallons per minute. During the pilot test, approximately 15 barrels of impacted groundwater were removed with an estimated 13 gallons of free product recovered.

### **LIMITED SVE PILOT TEST**

Based on the subsurface site lithology and potential hydrocarbon impact footprint, *in-situ* remediation of the soil and groundwater was recommended in the September 11, 2015 letter report. In order to test the efficacy of a SVE system as a potential means of remediation at the Site, LTE conducted a pilot test on November 4, 2015. Using a mobile vacuum truck to apply vacuum to the product recovery well PR-1, several different flow rates were tested to evaluate the effective area of influence at the different flow rates. The influence was evaluated by monitoring the vacuum observed in monitoring wells MW01, MW02, MW05 and MW06. An effective area of influence of 40 feet using 30 inches of water column (IWC) on PR-1 was achieved during the pilot test at a flow rate of 12 cubic feet per minute. The observed vacuum was higher in monitoring wells located closer to the upgradient hillside and this is likely caused by less permeable soil in the unsaturated zone closer to the hillside. Petroleum vapor concentrations were monitored in the extraction piping during the test and elevated concentrations were observed indicating SVE was effectively removing petroleum impact.

### **UPDATED REMEDIATION WORK PLAN**

#### **Delineation**

Soil and groundwater sampling observations and laboratory analytical results suggest soil is impacted near the source and a groundwater plume extends downgradient from the source to the northwest at MW04. Since additional monitoring wells did not fully define the areas affected by free product or the groundwater plume extent, LTE proposes installing five monitoring wells in locations depicted on Figure 3. LTE may step out from the proposed locations and advance additional boreholes should field screening, visual, and olfactory observations indicate groundwater is impacted. The installation of additional monitoring wells will define the extent of the impacted groundwater footprint and ensure that impacts are not migrating off location.

#### **Soil Sampling**

LTE will provide a geologist trained in conducting groundwater investigations to oversee drilling activities at the Site and collect soil samples from the borehole with a split spoon hammer sampler. Samples from immediately beneath the ground surface and then every five feet thereafter will be field screened for volatile aromatic hydrocarbons. Samples with the highest field screening result will be shipped on ice via overnight courier under strict chain-of-custody protocol to Environmental Science Corporation (ESC) to be analyzed for BTEX and total petroleum



hydrocarbon (TPH) – gasoline range organics (GRO) and diesel range organics (DRO) according to USEPA Method 8021B and 8015M, respectively. Samples that field screen less than 100 parts per million (ppm) using a photoionization detector for hydrocarbons will not be analyzed.

### **Groundwater Monitoring Well Installation and Sampling**

LTE will convert the soil borings to monitoring wells. Monitoring wells will be constructed of schedule 40 polyvinyl chloride (PVC) and will include 0.01-inch machine slotted flush-threaded PVC well screen. The groundwater monitoring wells will be 2-inches in diameter. LTE will set at least 5 feet of screen beneath the groundwater elevation and approximately 5 feet above the groundwater elevation to allow for seasonal fluctuations and a proper seal for the 2-inch diameter wells. A clean 10-20 grade silica sand gravel pack will be placed from the bottom of the borings to two feet above the top of the screen. A total of 2 feet of 3/8-inch bentonite chips will be set above the gravel pack, followed by a neat cement slurry, containing a minimum of 5 percent (%) powdered bentonite to the surface. LTE will install a concrete surface completion and a steel well protector with locking cap around the PVC stick-up. For any monitoring wells within or near vehicle right-of-ways, surface completions will include a flush-mounted locking vault. All monitoring wells will be surveyed after construction using a Trimble GeoXT Global Positioning System (GPS) and surveyor's level. The top-of-casing elevation will be measured to an accuracy of no less than plus or minus 0.01 feet.

After installation, the newly constructed monitoring wells will be developed by removing a minimum of 10 saturated well casing volumes of water while monitoring pH, specific conductivity, and temperature. LTE will then allow the monitoring wells to recharge a minimum of 24 hours prior to sampling. Groundwater samples will be analyzed for BTEX according to USEPA Method 8021B.

### **Soil Vapor Extraction**

Because free product has been observed in five monitoring points (PR-1, MW01, MW02, MW05, and MW06), LTE recommends implementation of SVE operations immediately followed by a remedy to address impacted groundwater based on SVE results. The impact has resulted from a release of natural gas condensate which is comprised mostly of light, readily volatilized petroleum hydrocarbon compounds. SVE will promote volatilization of the hydrocarbon impact distributed within the vadose zone and any remaining liquid free product that has accumulated on top of the groundwater. The SVE system will be designed to optimize extraction in areas where the impact has been observed in the unsaturated soil intervals.

The SVE is estimated to provide an influence of approximately 40 feet from the well, and based on this estimate, four existing monitoring well locations (MW01, MW02, MW05, and MW06) will be utilized as SVE wells along with a new SVE well near PR-1 (Figure 4). LTE will install a 2-inch diameter SVE well near PR-1. The well will include 0.02-inch screen from approximately 3 feet bgs to 26.5 feet bgs to include the entire impacted soil column for effective vapor extraction.



An extraction blower capable of operating at approximately 100 cubic feet per minute (cfm) and an applied vacuum of 30 IWC will be installed. Operations and maintenance (O&M) of the system will be conducted weekly for the first 2 months, then be reduced based on system performance. O&M will consist of adjusting the SVE air flow distribution and field screening recovered hydrocarbon vapors. The design will be further evaluated based on results from additional monitoring wells, and if the extent of free product is greater than current estimates, an additional SVE well will be included.

Air samples of recovered vapors will be collected and analyzed for total volatile petroleum hydrocarbons (TVPH) and BTEX by modified United States Environmental Protection Agency (EPA) Method TO-15M to calculate the hydrocarbon recovery rate during system operation. The recovery rate will be compared to NMAQB air emissions regulations.

#### **Groundwater Monitoring/Product Gauging and Recovery**

Depth to groundwater and product thickness in all monitoring wells will be gauged monthly. At the same time, any wells containing free product will be manually bailed for product removal. Groundwater will be sampled from all wells that do not contain free product twice during an initial 6-month SVE operation to be analyzed for BTEX. Six months after installing the SVE system, or once product thickness and BTEX concentrations have been reduced significantly by the SVE system, XTO will reassess the remediation scope and propose future remediation designs, such as air sparging or enhanced fluid recovery, with the ultimate goal of observing eight consecutive quarters with analytical results in compliance with NMWQCC standards. If product thickness does not decrease or the groundwater impact plume exhibits signs of migration, additional investigation and installation of more active product recovery will occur.

#### **Reporting**

Groundwater monitoring results will be submitted in monthly reports to the NMOCD Aztec field office. Data will be presented on relevant figures including potentiometric surface maps, and tabular groundwater elevations and analytical results. More complete details including product recovery volumes, SVE data (applied pressure, flow, and vacuum with air emission estimates), groundwater elevations, and analytical results will be provided in annual reports to the NMOCD Santa Fe office. The initial annual report will include soil borings and monitoring well completion logs and a cross section depicting the subsurface observations.

XTO has requested land use access to install the off-site monitoring wells from the private property owner, Western Refining Southwest, Inc. Once the landowner grants access, XTO will initiate the delineation as described in this work plan. Implementation of the SVE system will begin once an electrical drop is installed at the Site. XTO is currently working with the City of Bloomfield to determine cost and schedule the installation.

LTE appreciates the opportunity to provide this remediation work plan to the NMOCD. If you have any questions or comments regarding this work plan, do not hesitate to contact me at (970)



385-1096 or via email at [aager@ltenv.com](mailto:aager@ltenv.com) or James McDaniel at (505) 787-0519 or at [james.mcdaniel@xtoenergy.com](mailto:james.mcdaniel@xtoenergy.com).

Sincerely,

LT ENVIRONMENTAL, INC.

A handwritten signature in black ink that reads 'Ashley L. Ager'. The signature is written in a cursive, flowing style.

Ashley L. Ager, M.S.  
Senior Geologist

Attachments

Cc: James McDaniel, XTO  
Martin Nee, XTO

**FIGURES**



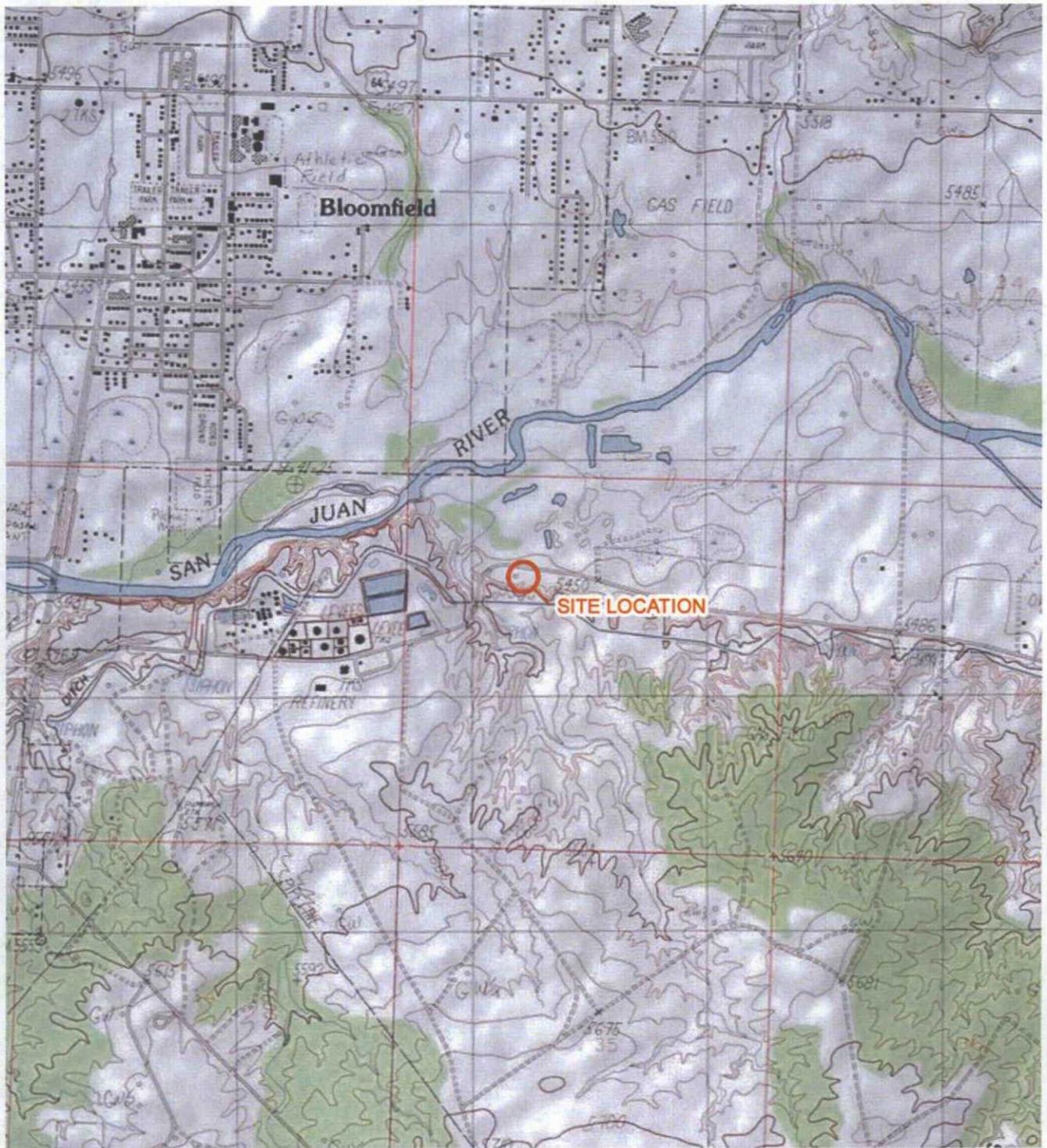
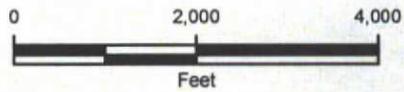


IMAGE COURTESY OF ESRI/USGS

**LEGEND**

 SITE LOCATION



NEW MEXICO

**FIGURE 1**  
**SITE LOCATION MAP**  
**SULLIVAN GC D #1E**  
**SAN JUAN COUNTY, NEW MEXICO**



**XTO ENERGY, INC.**



WELL ID  
 GROUNDWATER ELEVATION SURVEY DATE  
 B: BENZENE (µg/L)  
 T: TOLUENE (µg/L)  
 E: ETHYL BENZENE (µg/L)  
 X: TOTAL XYLENES (µg/L)  
 ELEV: GROUNDWATER ELEVATION MEASURED IN FEET ABOVE MEAN SEA LEVEL  
 PSH: PRODUCT THICKNESS MEASURED IN FEET  
 µg/L: MICROGRAMS PER LITER  
**BOLD INDICATES RESULT EXCEEDS NEW MEXICO WATER QUALITY CONTROL COMMISSION STANDARD**

SULLIVAN ROAD

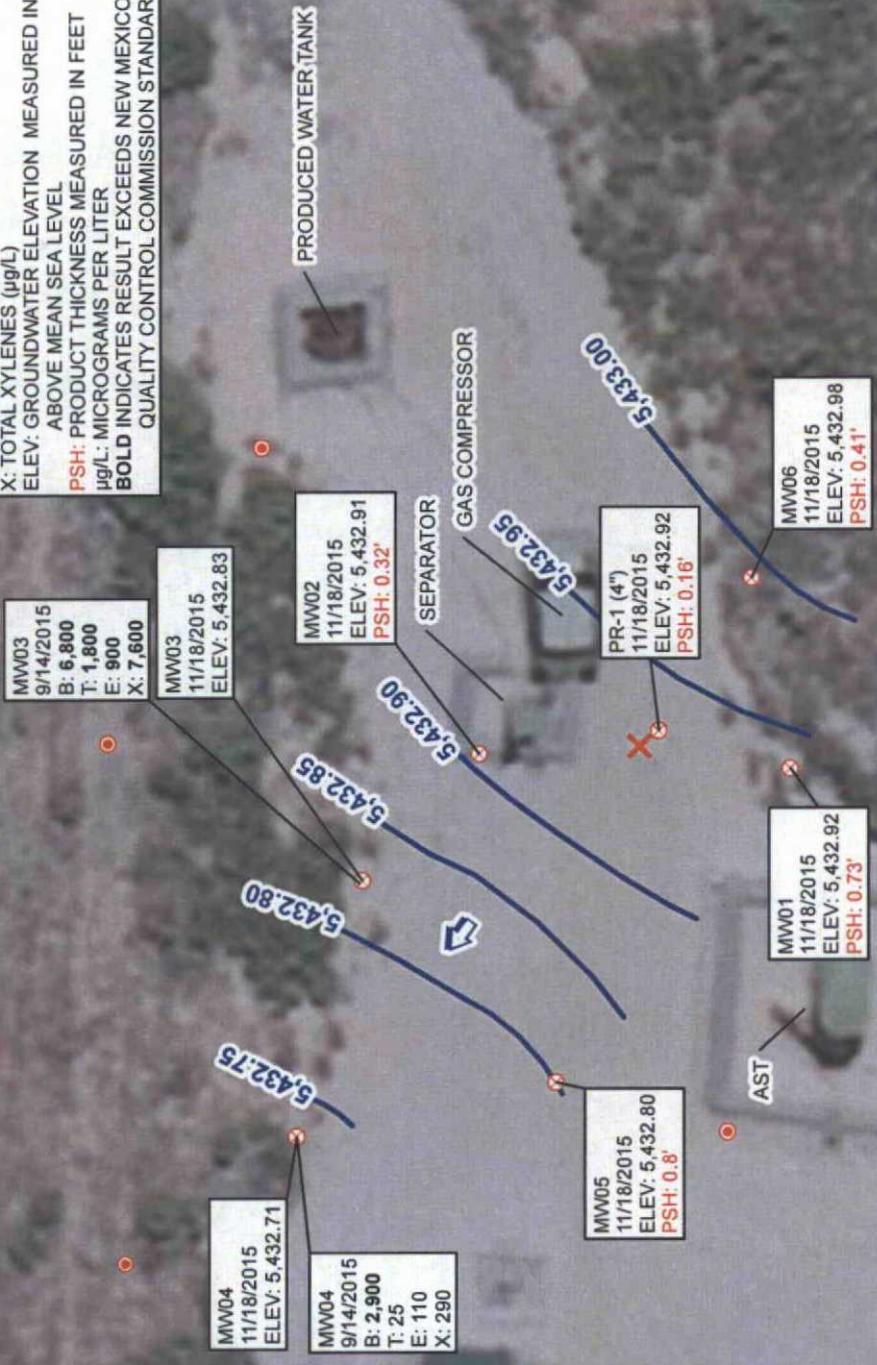
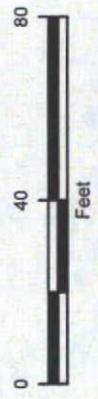


IMAGE COURTESY OF ESRI



— RELATIVE GROUNDWATER ELEVATION CONTOUR  
 CONTOUR INTERVAL = 0.05 FEET

AST: ABOVEGROUND STORAGE TANK

- LEGEND**
- RELEASE ORIGIN
  - MONITORING WELL
  - PROPOSED MONITORING WELL
  - ESTIMATED GROUNDWATER FLOW DIRECTION

**FIGURE 3**  
 GROUNDWATER ELEVATION CONTOUR MAP  
 SULLIVAN GC D #1E  
 SAN JUAN COUNTY, NEW MEXICO



XTO ENERGY, INC.

WELL ID  
 GROUNDWATER ELEVATION SURVEY DATE  
 B: BENZENE (µg/L)  
 T: TOLUENE (µg/L)  
 E: ETHYLBENZENE (µg/L)  
 X: TOTAL XYLENES (µg/L)  
 ELEV: GROUNDWATER ELEVATION MEASURED IN FEET ABOVE MEAN SEA LEVEL  
 PSH: PRODUCT THICKNESS MEASURED IN FEET  
 µg/L: MICROGRAMS PER LITER  
**BOLD INDICATES RESULT EXCEEDS NEW MEXICO WATER QUALITY CONTROL COMMISSION STANDARD**

SULLIVAN ROAD

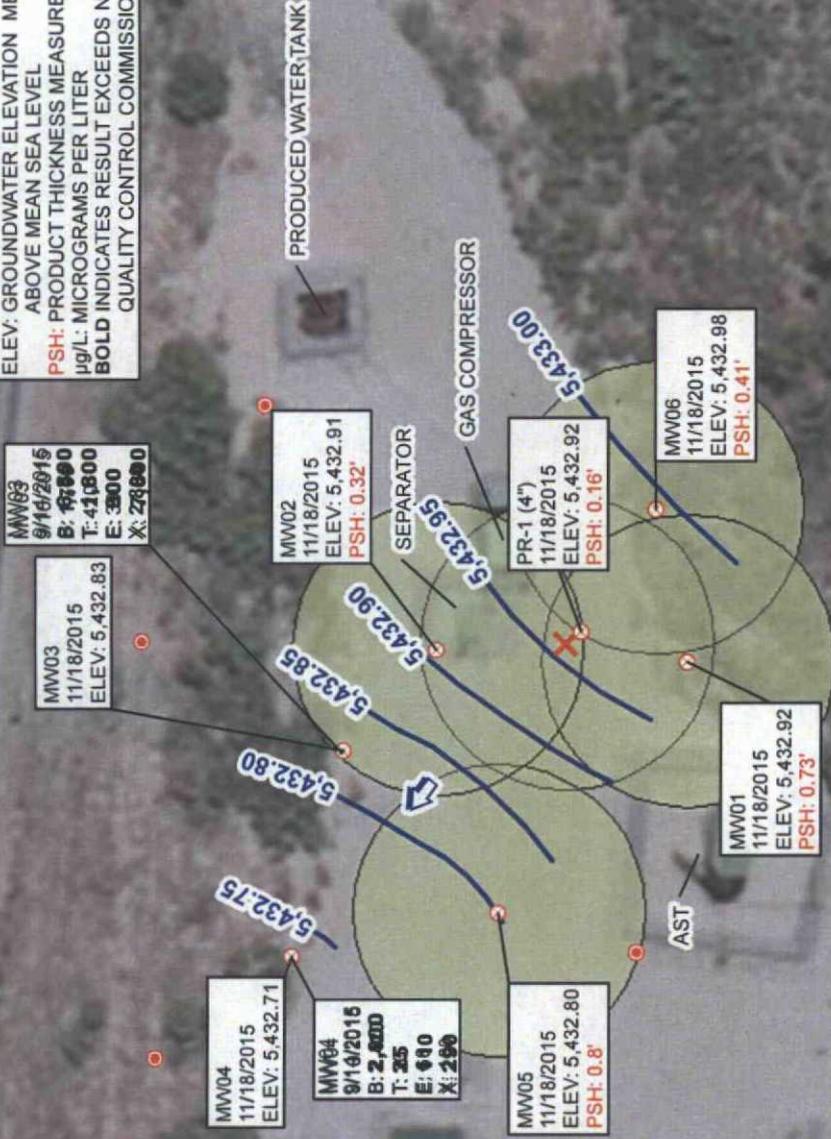


IMAGE COURTESY OF ESRI



**LEGEND**

- RELEASE ORIGIN
- MONITORING WELL
- PROPOSED MONITORING WELL
- ESTIMATED GROUNDWATER FLOW DIRECTION
- RELATIVE GROUNDWATER ELEVATION CONTOUR
- CONTOUR INTERVAL = 0.05 FEET
- PROPOSED SOIL VAPOR EXTRACTION RADIUS OF INFLUENCE
- AST: ABOVEGROUND STORAGE TANK

**FIGURE 64**  
 PROPOSED SOIL VAPOR EXTRACTION SYSTEM MAP  
 SULLIVAN GC D #1E  
 SAN JUAN COUNTY, NEW MEXICO



XTO ENERGY, INC.

**TABLES**



**TABLE 1**  
**GROUNDWATER ELEVATIONS**  
**SULLIVAN GAS COM D#1E**  
**XTO ENERGY, INC.**

Well ID	Date	Top of Casing Elevation (feet*)	Depth to Product (feet BTOC)	Depth to Groundwater (feet BTOC)	Product Thickness (feet)	Product Thickness (inches)	Groundwater Elevation (feet)
PR-1	9/10/2015	5,452.23	21.55	21.82	0.27	3.24	5,430.63
	9/19/2015		--	--	--	0.21	--
	9/25/2015		--	--	--	0.19	--
	9/28/2015		20.95	21.51	0.56	6.72	5,431.17
	11/4/2015		19.09	19.58	0.49	5.88	5,433.04
	11/11/2015		19.23	19.39	0.16	1.92	5,432.97
	11/18/2015		19.28	19.44	0.16	1.92	5,432.92
MW01	9/10/2015	5,454.15	21.55	21.82	0.27	3.24	5,432.55
	9/19/2015		--	--	--	0.21	--
	9/25/2015		--	--	--	0.19	--
	9/28/2015		20.95	21.51	0.56	6.72	5,433.09
	11/4/2015		20.98	21.60	0.62	7.44	5,433.05
	11/11/2015		21.05	21.74	0.69	8.28	5,432.96
	11/18/2015		21.08	21.81	0.73	8.76	5,432.92
MW02	9/10/2015	5,451.95	NP	18.85	NP	NP	5,433.10
	9/19/2015		--	--	--	0.05	--
	9/25/2015		--	--	--	0.15	--
	9/28/2015		18.85	19.04	0.19	2.28	5,433.06
	11/4/2015		18.88	19.21	0.33	3.96	5,433.00
	11/11/2015		18.97	19.31	0.34	4.08	5,432.91
	11/18/2015		18.98	19.30	0.32	3.84	5,432.91
MW03	9/10/2015	5,452.50	NP	19.45	NP	NP	5,433.05
	9/28/2015		NP	19.49	NP	NP	5,433.01
	11/4/2015		19.54	19.56	0.02	0.24	5,432.96
	11/11/2015		NP	19.65	NP	NP	5,432.85
	11/18/2015		NP	19.67	NP	NP	5,432.83
MW04	9/10/2015	5,451.92	NP	18.94	NP	NP	5,432.98
	9/28/2015		NP	19.98	NP	NP	5,431.94
	11/4/2015		NP	19.08	NP	NP	5,432.84
	11/11/2015		NP	19.2	NP	NP	5,432.72
	11/18/2015		NP	19.21	NP	NP	5,432.71
MW05	11/4/2015	5,451.89	18.82	19.51	0.69	8.28	5,432.93
	11/11/2015		18.90	19.69	0.79	9.48	5,432.83
	11/18/2015		18.93	19.73	0.80	9.60	5,432.80
MW06	11/4/2015	5,454.95	21.81	22.12	0.31	3.72	5,433.08
	11/11/2015		21.88	22.30	0.42	5.04	5,432.99
	11/11/2015		21.89	22.30	0.41	4.92	5,432.98

**Notes:**

A product density factor of 0.7996 is used to account for the presence of free product in wells in which free product was observed

\* - surveyed using North American Vertical Datum 1988 geoid 12B in U.S. survey feet

BTOC - Below Top of Casing

NP - No Product



TABLE 2

GROUNDWATER ANALYTICAL RESULTS  
 SULLIVAN GAS COM D #1E  
 XTO ENERGY, INC.

Sample ID	Date Sampled	Benzene (µg/l)	Toluene (µg/l)	Ethylbenzene (µg/l)	Total Xylenes (µg/l)
BH-2	6/16/2015	760	3,000	620	7,400
BH-3	6/16/2015	<5.0	<5.0	<5.0	<10
SB03	8/19/2015	4,430	17,100	1,100	11,300
SB05	8/19/2015	2.60	6.85	1.93	22.5
SB06	8/19/2015	4,400	40,000	1,950	18,100
MW02	9/10/2015	6,500	24,200	1,770	11,400
MW03	9/10/2015	2,050	420	390	2,890
	9/14/2015	6,800	1,800	900	7,600
MW04	9/10/2015	3,480	30	60	180
	9/14/2015	2,900	25	110	290
<b>NMWQCC Standard</b>		<b>10</b>	<b>750</b>	<b>750</b>	<b>620</b>

Notes:

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

NMWQCC - New Mexico Water Quality Control Commission

µg/l - micrograms per liter



**ATTACHMENTS**





Compliance . Engineering . Remediation  
 LT Environmental, Inc.  
 2243 Main Avenue, Suite 3  
 Durango, Colorado 81301

Boring/Well Number:

MW-5

Date:

10/8/15

Project:

Sullivan BCD #1A

Project Number:

Logged By:

AC

Drilled By:

Kyvek

**BORING LOG/MONITORING WELL COMPLETION DIAGRAM**

Lat/Long:	Elevation:	Detector:	Drilling Method:	Sampling Method:	Hole Diameter	Total Depth:
		MiniRae	Augur	Split Spoon	4.25	
Casing Type:	Casing Diameter:	Casing Length:	Slot Size:	Slot Length:	Depth to Water:	
BVC	9"	30.0ft	0.01			
Gravel Pack:	Seal:	Grout:	Comments:			
10/70 Silica		3/8" chips				

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Soil/Rock Type	Lithology/Remarks
					0			Cuttings not recorded until visual impact observed
					2			
	dry 0.0		no		4			
					6			
	dry 0.0		no		8			8ft 12ft
					10			
					12			15ft
	moist 0.0		yes		14			
	wet 2802.5		yes		16		2.5y 2.5/1	19ft
					18		Staining, odor, Black Silty Sand. Coarse medium to fine 60% Silt 40%	
					20	SM	WLG 19ft	30ft
	wet 2315		no		22		2.5y 1/2 Light brownish gray coarse, no odor large to fine 80% Silt 20%	
					24			30ft
	wet 0.0		no		26	SM		
					28			30ft
					30			

Sand:  
 3.5 bags  
 Solid color  
 Silica

Grout:  
 1 bag  
 Solid Hole plug



Compliance - Engineering - Remediation  
 LT Environmental, Inc.  
 2243 Main Avenue, Suite 3  
 Durango, Colorado 81301

Boring/Well Number:

MW-6

Date:

10/8/15

Project:

SULLIVAN #1E

Project Number:

Logged By:

AC

Drilled By:

Kyvek

**BORING LOG/MONITORING WELL COMPLETION DIAGRAM**

Lat/Long:	Elevation:	Detector:	Drilling Method:	Sampling Method:	Hole Diameter:	Total Depth:
		mini Pac	Auger	SPLIT SPOON	4.25	
Casing Type:	Casing Diameter:	Casing Length:	Slot Size:	Slot Length:	Depth to Water:	
PVC	2"	27ft	0.01			
Gravel Pack:	Seal:	Groat:	Comments:			
10/20 Silica		3/8" chips				

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Soil/Rock Type	Lithology/Remarks
					0			Cuttings not recorded until observed
					2			
	DRY		NO		4			
					6			
	DRY		NO		8			
					10			
	DRY		NO		12			
					14			
	DRY		NO		16			
					18			
	MUST 250.6 by 20				20		SM	2.5y 25/1 Black strong color/staining silty sand med to fine 75% silt 25% 20ft
	met 230.5		yes		22			22ft
	met 29.1		NO	MW-6 226 1045	24		SM	2.5y 4/1 dark gray silty sand, SAA 27ft
	DRY				26			
					28			
					30			
								Sand: 3.5 bags 50lb Colorado Silica
								Groat: 1 bag 50lb hole plug

