1RP-4831
DELINEATION PLAN
EMSU Well #101 Flow Line Leak
Lea County, New Mexico

Latitude: 32.548117°

Longitude: -103.293928°

LAI Project No. 17-0192-01

October 15, 2017

Prepared for:

XTO Energy, Inc.
500 West Illinois Ave., Suite 100
Midland, Texas 79701

Prepared by:

Larson & Associates, Inc.
507 North Marienfeld Street, Suite 205
Midland, Texas 79701

Mark J. Larson, P.G.
Certified Professional Geologist #10490

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1.0 INTRODUCTION

This delineation plan is submitted to the New Mexico Oil Conservation Division (OCD) District 1 on behalf of XTO Energy, Inc. (XTO) for a produced water leak near the Eunice Monument South Unit (EMSU) Well #101 (Site) located in Unit C (NW/4, NE/4), Section 30, Township 20 South, Range 37 East, in Lea County, New Mexico. The geodetic position is latitude 32.548117° and longitude -103.293928°. Figure 1 presents a location and topographic map. Figure 2 presents an aerial map.

1.1 Background

The spill occurred on September 20, 2017, after a crew installing a fresh water line cut through the 2 inch fiberglass flow line that conveys produced water from the EMSU Well #101 to a satellite battery. The line strike caused approximately 135.79 barrels (bbl) of produced water to be released. A vacuum truck was called out and picked up approximately 30 bbl. The release covered an area estimated at approximately 30 x 264 feet or about 7,920 square feet to a depth of approximately 18 inches. The surface and mineral owner is the State of New Mexico State Land Office (SLO). On September 27, 2017, XTO submitted the initial C-141 to OCD District 1 which assigned the release remediation permit 1RP-4831, with conditions. Attachment A presents the initial C-141.

1.2 Physical Setting

The physical setting is as follows:

- Elevation is approximately 3,532 feet above mean sea level (amsl);
- Topography slopes towards the east and southeast;
- No surface water features are present within 1,000 feet;
- The soils are designated as "Pyote and maljamar find sands", consisting of approximately 30 inches of fine sand underlain by fine sandy loam to approximately 60 inches derived from sedimentary rock;
- The upper geological unit is the Tertiary-age Blackwater Draw and Ogallala formations, in descending order, comprised of very fine to medium-grained quartz sand and gravel, with minor amount of silt and clay with indistinct to massive crossbeds;
- The Ogallala formation is underlain by clay, silty clay, shale and sandstone of the Chinle formation (Triassic) and is about 300 feet thick;
- According to records from the U.S. Geological Survey (U.S.G.S.) and State of New Mexico Office of the State Engineer (OSE) the nearest fresh water well is located in Unit P (SE/4, SE/4), Section 30, Township 20 South, Range 37 East or about 4,000 feet southeast (cross gradient) from the Site;
- Depth to groundwater in the well was reported at approximately 104.10 feet below ground surface (bgs) in 1996.

1.3 Remediation Action Levels

Remediation action levels (RRAL) were calculated for benzene, BTEX and TPH based on the following criteria established by the OCD in "*Guidelines for Remediation of Leaks, Spills and Releases, August 13,* 1993":

Criteria	*Result*	*Score*
Depth-to-Groundwater	>100 feet	0
Wellhead Protection Area	No	0
Distance to Surface Water Body	>1000 Horizontal Feet	0

The following RRAL apply to the release for ranking score: 0

- Benzene 10 mg/Kg
- BTEX 50 mg/Kg
- TPH 5,000 mg/Kg

Depth to groundwater greater than 100 feet bgs requires vertical delineation for chloride to 600 milligrams per kilogram (mg/Kg) and maintained a minimum 5 feet farther in depth.

2.0 DELINEATION PLAN

LAI proposes to direct push technology (DPT) to collect soil samples at eight (8) locations in the spill area outside of the trench excavated to repair the fiberglass flow line plus a sample in each cardinal direction (north, south, east and west) for horizontal delineation. LAI will collect soil samples from inside the bottom of the trench at approximately 4 feet bgs plus 6 and 8 feet bgs for vertical delineation. Soil samples will be collected from the sidewalls (north, south, east and west) at approximately 3 feet bgs. The soil samples from inside the trench will be collected with a stainless steel trowel and hand auger. The soil samples outside the trench will be collected with direct push technology (DPT) at 1 foot increments to about 4 feet bgs and 2 foot increments to approximately 12 feet bgs depending on subsurface conditions. The samples will be tested in the field for chloride using QuanTab® chloride test strips (300 - 6,000 mg/L). Additional samples may be collected if chloride is not delineated vertically to 600 mg/Kg with an additional five (5) vertical feet below the deepest sample from each location as allowed by subsurface conditions. The samples will be delivered to Permian Environmental lab (PBEL) in Midland, Texas, under preservation and chain of custody. The laboratory will analyze the bottom sample at approximately 4 feet bgs from the trench, trench sidewalls and the upper samples (0 to 1 foot) for total petroleum hydrocarbons (TPH), including gasoline range organics (GRO), diesel range organics (DRO) and oil range organics (ORO) by EPA SW-846 Methods 8015M. All samples will be analyzed for chloride by EPA Method 300. Figure 3 presents the approximate boring locations.

3.0 DELINEATION REPORT

XTO will submit a delineation report following receipt of the final laboratory analysis that will include a plan to remediate the spill.

Figures

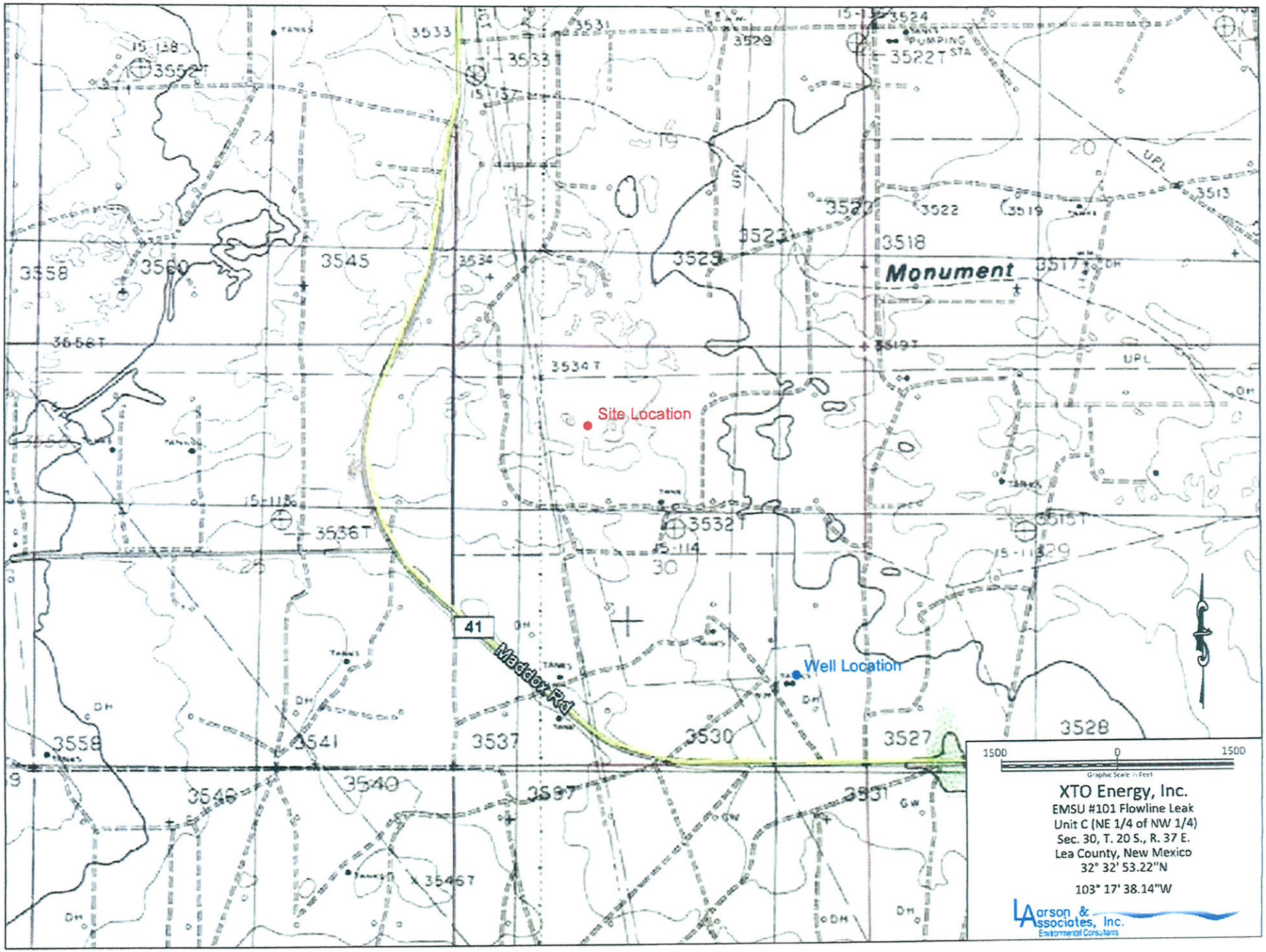


Figure 1 - Topographic Map

Figure 2 - Aerial Map

Figure 3 - Aerial Map Showing Spill Area and Proposed Soil Sample Location

Attachment A

Initial C-141

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

Form C-141
Revised April 3, 2017

Submit 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 Shannon Walker
Address 500 W. Illinois Suite 100 Midland, TX 79701	Telephone No.575-394-2089
Facility Name: EMSU 101	Facility Type: Well flow line

Surface Owner: State of New Mexico	Mineral Owner: State of New Mexico	API No.30-025-30220

LOCATION OF RELEASE

Unit Letter	Section	Township	Range	Feet from the	North/South Line	Feet from the	East/West Line	County
C	30	20S	37E	660	NORTH	1980	WEST	LEA

Latitude 32.548117 **Longitude** -103.293928

NATURE OF RELEASE

Type of Release: Produced Water	Volume of Release: Estimated 135.79 bbls	Volume Recovered 30bbls
Source of Release: 2" FG Flowline failure due to fatigue	Date and Hour of Occurrence 09/20/2017 @ 12:30MT	Date and Hour of Discovery 09/20/2017 @12:30MT
Was Immediate Notice Given? ☒ Yes ☐ No ☐ Not Required	If YES, To Whom? Olivia Yu	
By Whom? Shannon Walker	Date and Hour 09/20/2017	
Was a Watercourse Reached? ☐ Yes ☒ No	If YES, Volume Impacting the Watercourse. N/A	

If a Watercourse was Impacted, Describe Fully.* N/A

RECEIVED
By Olivia Yu at 1:12 pm, Sep 29, 2017

Describe Cause of Problem and Remedial Action Taken.*

Line rupture, no remedial action taken at this time.
Estimated area affected L30'x W264'x D18"
Larson and Associates have been contacted to begin remediation.

Describe Area Affected and Cleanup Action Taken.*
Pasture Land. We were able to recover 30 barrels. As of this time no remediation has been taken.

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: Patricia Donald

Printed Name: Patricia Donald

Title: Regulatory Analyst

E-mail Address:Patricia_Donald@xtoenergy.com

Date: 09/27/2017 Phone:432-571-8220

OIL CONSERVATION DIVISION

Approved by Environmental Specialist: BJ

Approval Date: 9/29/2017 Expiration Date:

Conditions of Approval: see attached directive

Attached ☑

* Attach Additional Sheets If Necessary

1RP-4831 nOY1727247823

fOY1727247704 pOY1727248175

Operator/Responsible Party,

The OCD has received the form C-141 you provided on _9/28/2017_ regarding an unauthorized release. The information contained on that form has been entered into our incident database and remediation case number _1RP-4831__ has been assigned. **Please refer to this case number in all future correspondence.**

It is the Division's obligation under both the Oil & Gas Act and Water Quality Act to provide for the protection of public health and the environment. Our regulations (19.15.29.11 NMAC) state the following,

> *The responsible person shall complete division-approved corrective action for releases that endanger public health or the environment. The responsible person shall address releases in accordance with a remediation plan submitted to and approved by the division or with an abatement plan submitted in accordance with 19.15.30 NMAC.* [emphasis added]

Release characterization is the first phase of corrective action unless the release is ongoing or is of limited volume and all impacts can be immediately addressed. Proper and cost-effective remediation typically cannot occur without adequate characterization of the impacts of any release. Furthermore, the Division has the ability to impose reasonable conditions upon the efforts it oversees. **As such, the Division is requiring a workplan for the characterization of impacts associated with this release be submitted to the OCD District _1_ office in __Hobbs____ on or before _10/29/2017_. If and when the release characterization workplan is approved, there will be an associated deadline for submittal of the resultant investigation report. Modest extensions of time to these deadlines may be granted, but only with acceptable justification.**

The goals of a characterization effort are: 1) determination of the lateral and vertical extents along with the magnitude of soil contamination. 2) determine if groundwater or surface waters have been impacted. 3) If groundwater or surface waters have been impacted, what are the extents and magnitude of that impact. 4) The characterization of any other adverse impacts that may have occurred (examples: impacts on vegetation, impacts on wildlife, air quality, loss of use of property, etc.). To meet these goals as quickly as possible, the following items must, at a minimum, be addressed in the release characterization workplan and subsequent reporting:

- Horizontal delineation of soil impacts in each of the four cardinal compass directions. Adsorbed soil contamination must be characterized for the following constituents using the associated laboratory methods: benzene, toluene, ethylbenzene, and total xylenes by either Method 8260 or 8021, total petroleum hydrocarbons by Method 8015 extended range (GRO+DRO+MRO; C_6 thru C_{36}), and for chloride by Method 300. This is not an exclusive list of potential contaminants. Analyzed parameters should be modified based on the nature of the released substance(s). Soil sampling must be both within the impacted area and beyond.

- Vertical delineation of soil impacts. Adsorbed soil contamination must be characterized for the following constituents using the associated laboratory methods: benzene, toluene, ethylbenzene, and total xylenes by either Method 8260 or 8021, total petroleum hydrocarbons by Method 8015 extended range (GRO+DRO+MRO; C_6 thru C_{36}), and for chloride by Method 300. As above, this is not an exclusive list of potential contaminants and can be modified. Vertical characterization samples should be taken at depth intervals no greater than five feet apart. Lithologic description of encountered soils must also be provided. At least ten vertical feet of soils with contaminant concentrations at or below these values must be demonstrated as existing above the water table.

- Nominal detection limits for field and laboratory analyses must be provided.

- Composite sampling is not generally allowed.

- Field screening and assessment techniques are acceptable (headspace, titration, EC [include algorithm for validation purposes], EM, etc.), but the sampling and assay procedures must be clearly defined. Copies of field notes are highly desirable. A statistically significant set of split samples must be submitted for confirmatory laboratory analysis, including the laterally farthest and vertically deepest sets of soil samples. Make sure there are at least two soil samples submitted

for laboratory analysis from each borehole or test pit (highest observed contamination and deepest depth investigated). Copies of the actual laboratory results must be provided including chain of custody documentation.

•Probable depth to shallowest protectable groundwater and lateral distance to nearest surface water. If there is an estimate of groundwater depth, the information used to arrive at that estimate must be provided. If there is a reasonable assumption that the depth to protectable water is 50 feet or less, the responsible party should anticipate the need for at least one groundwater monitoring well to be installed in the area of likely maximum contamination.

• If groundwater contamination is encountered, an additional investigation workplan may be required to determine the extents of that contamination. Groundwater and/or surface water samples, if any, must be analyzed by a competent laboratory for volatile organic hydrocarbons (typically Method 8260 full list), total dissolved solids, pH, major anions and cations including chloride and sulfate, dissolved iron, and dissolved manganese. The investigation workplan must provide the groundwater sampling method(s) and sample handling protocols. To the fullest extent possible, aqueous analyses must be undertaken using nominal method detection limits. As with the soil analyses, copies of the actual laboratory results must be provided including chain of custody documentation.

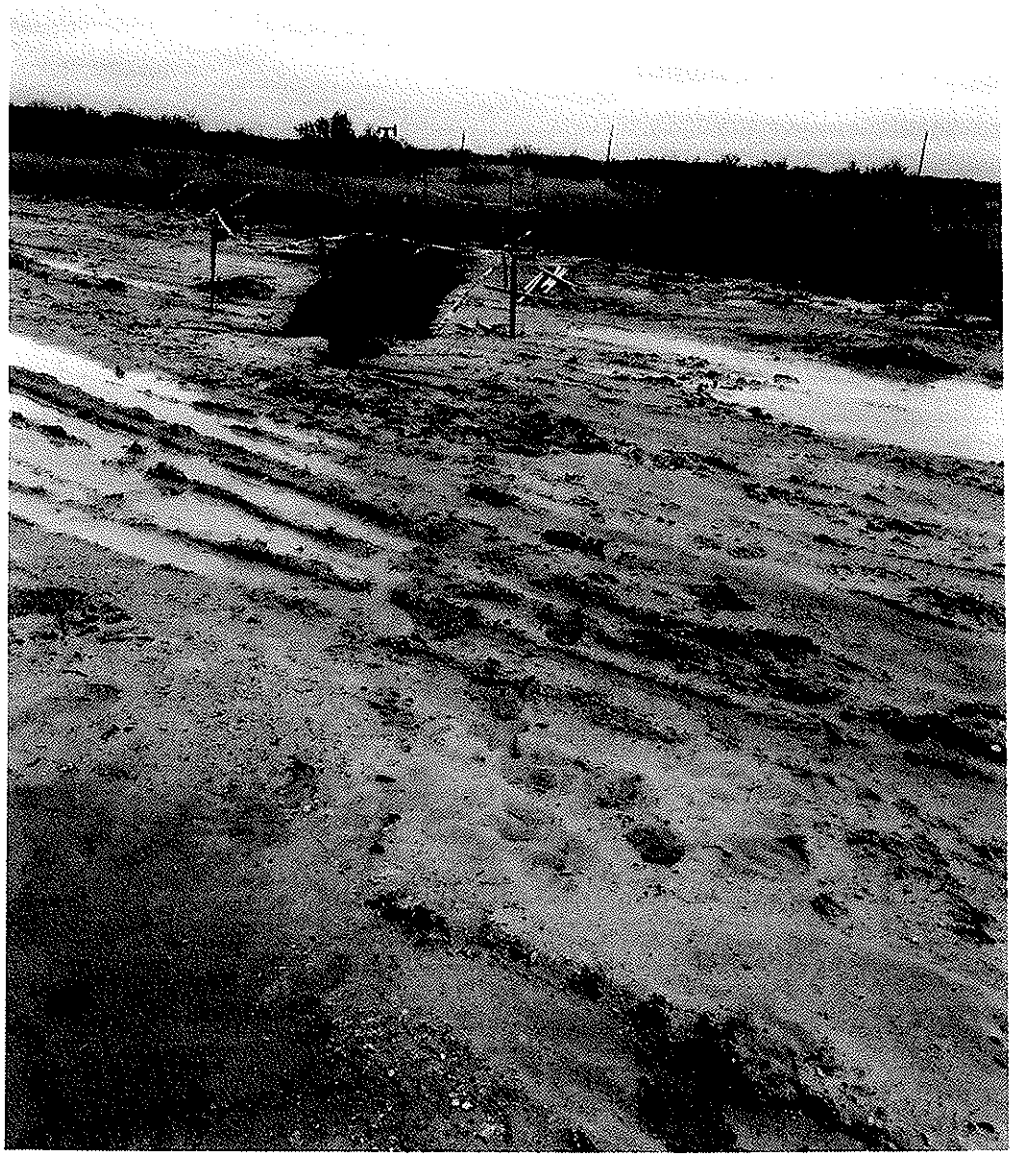
• Accurately scaled and well-drafted site maps must be provided providing the location of borings, test pits, monitoring wells, potentially impacted areas, and significant surface features including roads and site infrastructure that might limit either the release characterization or remedial efforts. Field sketches may be included in subsequent reporting, but should not be considered stand-alone documentation of the site's layout. Digital photographic documentation of the location and fieldwork is recommended, especially if unusual circumstances are encountered.

Nothing herein should be interpreted to preclude emergency response actions or to imply immediate remediation by removal cannot proceed as warranted. Nonetheless, characterization of impacts and confirmation of the effectiveness of remedial efforts must still be provided to the OCD before any release incident will be closed.

Jim Griswold
OCD Environmental Bureau Chief
1220 South St. Francis Drive
Santa Fe, New Mexico 87505
505-476-3465
jim.griswold@state.nm.us

Attachment B

Photographs



Site Viewing Southeast, October 6, 2017

Site Viewing East, October 6, 2017