APPROVED
By Olivia Yu at 9:48 am, Jan 22, 2018

NMOCD approves of the proposed delineation plan for 1RP-4654.

1RP-4654
DELINEATION PLAN
Lea Unit Central Battery
Crude Oil Spill
Lea County, New Mexico

Latitude: N32.585071°
Longitude: W-103.519497°

LAI Project No. 17-0175-33

January 8, 2018

Prepared for:
Legacy Reserves Operating, LP
303 West Wall Street, Suite 1300
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

Sarah R. Johnson
Staff Geologist

This Page Intentionally Left Blank

Table of Contents

1.0 INTRODUCTION……1
1.1 Background……1
1.2 Physical Setting……1
1.3 Remediation Action Levels……2
2.0 DELINEATION PLAN……2
3.0 REMEDIATION PLAN……2

Figures

Figure 1 Topographic Map
Figure 2 Site Map Showing Proposed Sample Points

Appendices

Appendix A Initial C-141
Appendix B Photographs

1.0 INTRODUCTION

Larson & Associates, Inc. (LAI) has prepared this delineation plan on behalf of Legacy Reserves Operating, LP (Legacy) for submittal to the New Mexico Oil Conservation Division (OCD) District I for a crude oil spill at the Lea Unit Central Battery (Site) located in Unit L (NW/4, SW/4), Section 12, Township 20 South, Range 34 East, in Lea County, New Mexico. The geodetic position is North 32.585071° and West -103.519497°. Figure 1 presents a topographic map. Figure 2 presents an aerial map.

1.1 Background

The spill occurred on March 21, 2017, due to failure of the man way gasket releasing 40 barrels (bbl) of crude oil. Approximately 30 bbl were recovered. The majority of the released fluids were contained inside the firewall with a small amount released outside the firewall. The spill was reported immediately to the OCD (verbal notification with Olivia Yu). The initial C-141 was submitted on March 23, 2017 and assigned remediation permit number 1RP-4654. Appendix A presents the initial C-141.

1.2 Physical Setting

The physical setting is as follows:

- The surface elevation is approximately 3,670 feet above mean sea level (msl);
- The topography slopes gradually towards the southwest and southeast;
- The nearest surface water feature is a man-made impoundment located about 0.05 miles south of the Site;
- The soils are designated as “Wink fine sand, 0 to 3 percent slope”, consisting of 0 to 12 inches of fine sand underlain by 12 to 23 inches sandy loam;
- The surface geology is the Eolian and Piedmont deposits (Holocene to middle Pleistocene)-interlayed eolian sands and piedmont-slope deposits;
- Groundwater occurs in the Ogallala formation at approximately 58 feet below ground surface (bgs) (1976);
- The nearest fresh water well is located in Unit P (SE/4, SE/4), Section 12, Township 20 South, Range 34 East, about 0.70 miles southeast of the Site.

1.3 Recommended Remediation Action Levels

The recommended 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, pp.6-7, August 13, 1993”*:

Criteria	*Result*	*Score*
Depth-to-Groundwater	50 – 99 Feet	10
Wellhead Protection Area	No	0
Distance to Surface Water Body	200 - 1,000 Horizontal Feet	10

The following RRAL apply to the release ranking score: 20

- Benzene 10 mg/Kg
- BTEX 50 mg/Kg
- TPH 100 mg/Kg

Depth to groundwater between 50 and 99 feet bgs require vertical delineation for chloride to 600 milligrams per kilogram (mg/Kg) and maintained a minimum of 5 feet farther in depth.

2.0 DELINEATION PLAN

LAI proposes to collect soil samples at four (4) locations within the containment. The samples will be collected at 1 foot intervals to approximately 4 feet bgs and 2 foot intervals to approximately 12 feet bgs using direct push technology (DPT) depending on subsurface conditions. Additional samples will be collected in each cardinal direction (north, south, east and west) of the spill area at the same depth intervals for horizontal delineation. The soil samples will be delivered under chain of custody and preservation to Permian Basin Environmental Lab (PBEL) in Midland, Texas. The upper samples (1.e., 0 to 1 foot) will be analyzed for benzene, toluene, ethylbenzene and xylenes (BTEX), total potential hydrocarbons (TPH), including gasoline range organics (GRO), diesel range organics (DRO) and oil range organics (ORO) by EPA SW0846 Methods 8021B, 8015M, with additional samples analyzed as needed for delineation. All samples will be analyzed for chloride by EPA Method 300. Pending laboratory results, further delineation may be required to reach cleanup level standards. Figure 3 presents a site map showing proposed soil sample locations.

3.0 REMEDIAITON PLAN

Legacy will include a remediation plan in the delineation report to be submitted to the OCD upon receipt of the laboratory report.

Figures

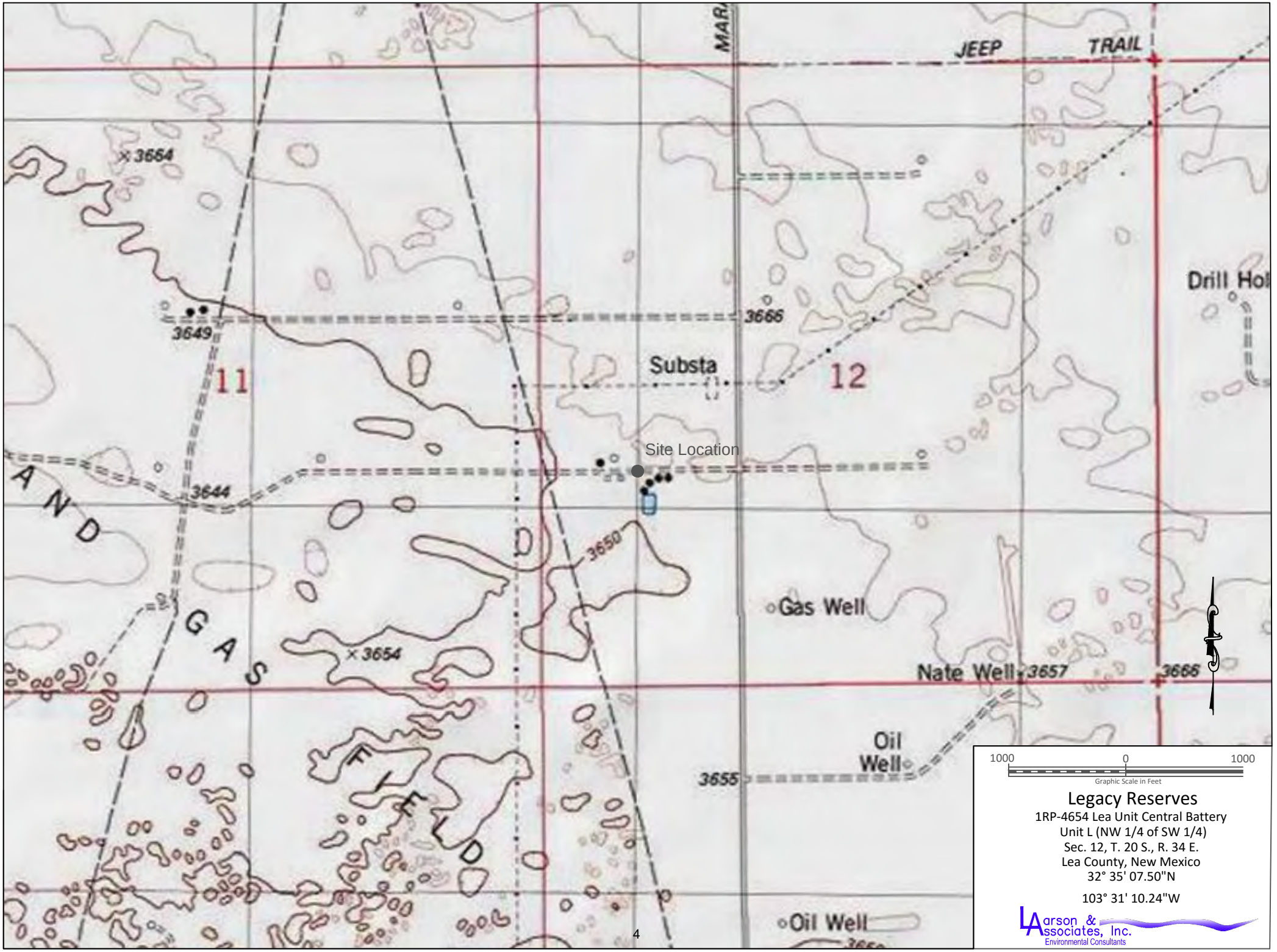


Figure 1 - Topographic Map

Figure 2 - Aerial Map

Appendix 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 August 8, 2011

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 – Legacy Reserves, LP	Contact – Brian Cunningham
Address – PO Box 104848	Telephone No. 432-234-9450
Facility Name – Lea Unit Central Battery	Facility Type – Producing Well

Surface Owner - Fee	Mineral Owner - Federal	API No. 30-025-32033

LOCATION OF RELEASE

Unit Letter	Section	Township	Range	Feet from the	North/South Line	Feet from the	East/West Line	County
L	12	20S	34E	2180	South	660	West	Lea

Latitude 32.585071 **Longitude** -103.519497

NATURE OF RELEASE

Type of Release - Hydrocarbon	Volume of Release – 40 bbl	Volume Recovered – 30 bbl
Source of Release – Man Way Gasket Failed	Date and Hour of Occurrence – 3/21/17 2:00 PM	Date and Hour of Discovery – 3/21/17 2:00 PM
Was Immediate Notice Given? ☒ Yes ☐ No ☐ Not Required	If YES, To Whom? Olivia Yu	
By Whom? Todd Roberson	Date and Hour	
Was a Watercourse Reached? ☐ Yes ☒ No	If YES, Volume Impacting the Watercourse.	

If a Watercourse was Impacted, Describe Fully.*

RECEIVED
By Olivia Yu at 7:47 am, Mar 27, 2017

Describe Cause of Problem and Remedial Action Taken.*

Man way gasket failed causing the release. The vessel was immediately shut down and a Vacuum Truck began picking up the fluid

Describe Area Affected and Cleanup Action Taken.*

Majority of the fluid stayed inside the containment with some fluid just outside the containment.

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: Brian Cunningham

Printed Name: Brian Cunningham

Title: Foreman

E-mail Address: bcunningham@legacylp.com

Date: 3/23/17 Phone: 432-234-9450

Attach Additional Sheets If Necessary

OIL CONSERVATION DIVISION

Approved by Environmental Specialist: OY

Approval Date: 3/27/2017 Expiration Date:

Conditions of Approval: see attached directive

Attached ☑

1RP-4654 nOY1708628222 pOY1708628583

Operator/Responsible Party,

The OCD has received the form C-141 you provided on _3/23/2017_ regarding an unauthorized release. The information contained on that form has been entered into our incident database and remediation case number __1R-_4654_ 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 _4/27/2017_. 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.

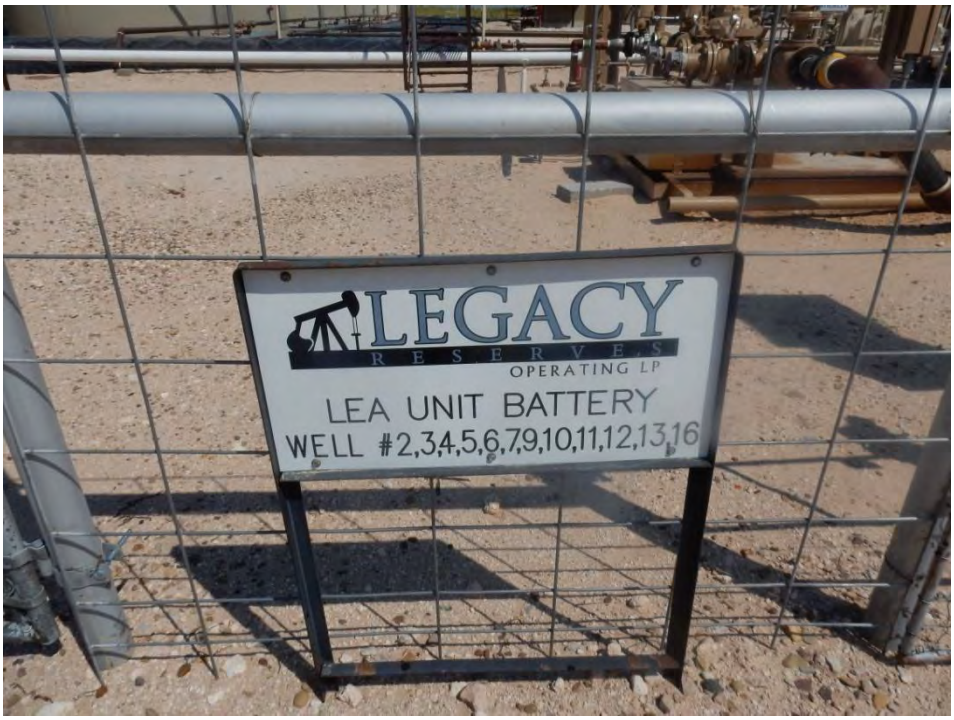
● Accurately scaled and well-drafted site maps must be provided providing the location of borings, test pits, monitoring wells, potentially impacted areas, and significant surface features including roads and site infrastructure that might limit either the release characterization or remedial efforts. 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

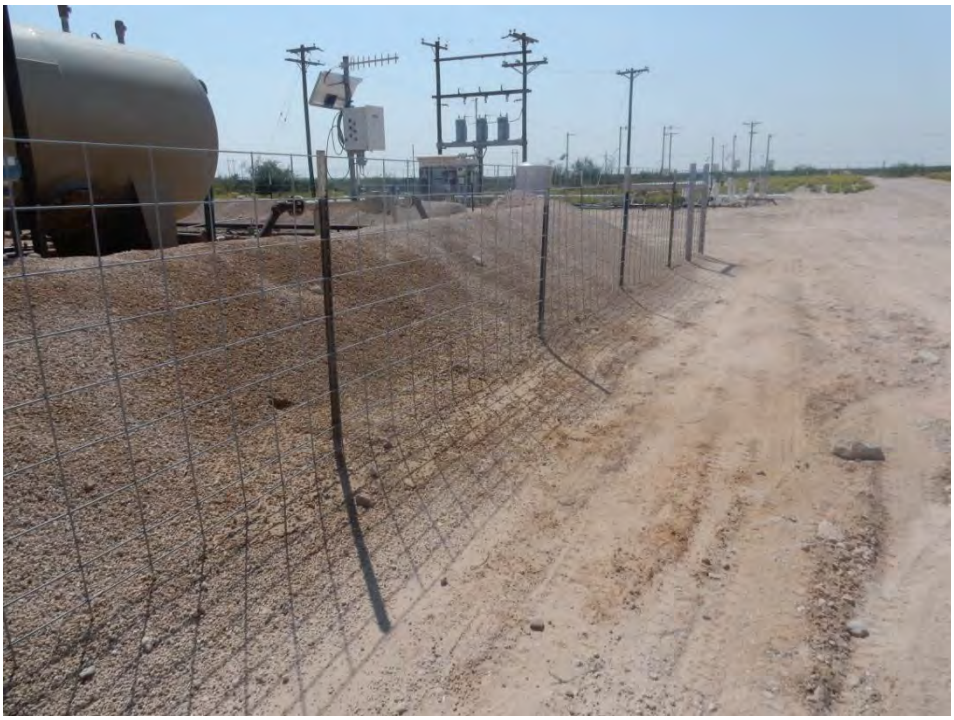
Appendix B

Photographs



Site Location

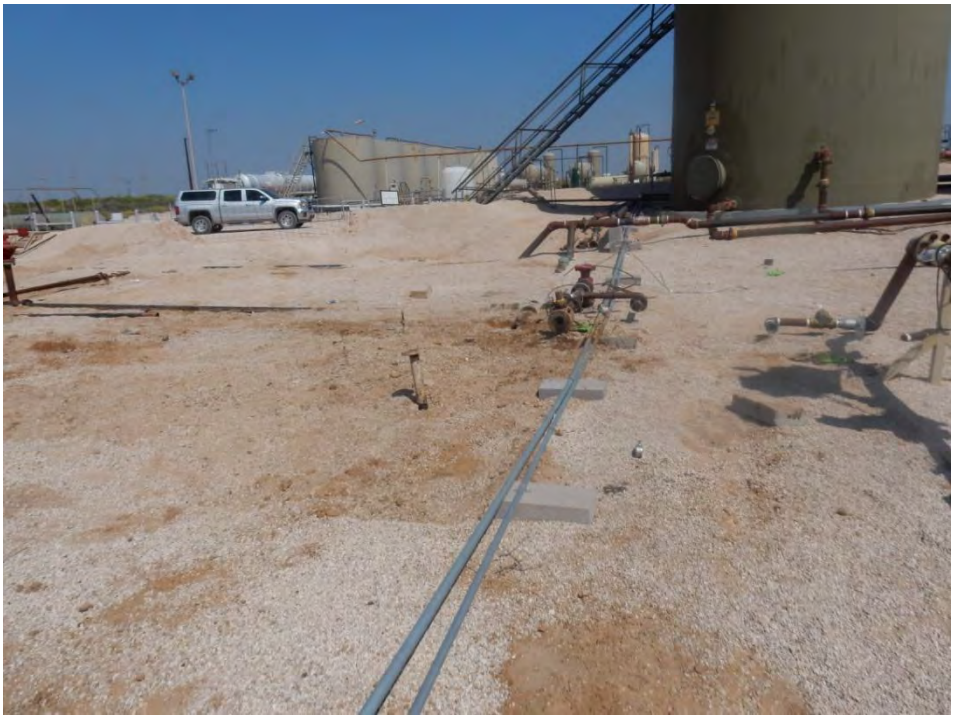
Site Prior to Remediation Viewing Northeast, September 8, 2017



Site Prior to Remediation Viewing West, September 8, 2017

Site Prior to Remediation Viewing Southeast, September 8, 2017

Site Prior to Remediation Viewing South, September 8, 2017



Site Prior to Remediation Viewing East, September 8, 2017