APPROVED
By Olivia Yu at 10:47 am, Jan 19, 2018

NMOCD approves of the proposed delineation plan for 1RP-4780.

1RP-4780
DELINEATION PLAN
Lea Federal Unit 34H
Crude Oil Spill
Lea County, New Mexico

Latitude: N32° 34' 46"
Longitude: W-103° 31' 1"

LAI Project No. 17-0175-34

December 28, 2017

Prepared for:
Legacy Reserves Operating, LP
303 West Wall Street, Suite 1300
Midland, Texas 79701

Prepared by:
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Midland, Texas 79701

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Certified Professional Geologist #10490

Sarah R. Johnson
Staff Geologist

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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 (OCD) District I for a crude oil spill at the Lea Federal Unit 34H (Site) located in Unit C (NE/4, NW/4), Section 13, Township 20 South, Range 34 East in Lea County, New Mexico. The geodetic position is North 32° 34' 46" and West -103° 31' 1". Figure 1 presents a topographic map. Figure 2 presents an aerial map.

1.1 Background

The spill occurred on July 31, 2017; due to an over pressurized flow line causing a poly line to rupture. The rupture allowed for the release of approximately 8 barrels (bbl) of crude oil. No liquids were recovered. The affected area measures approximately 100 x 75 feet, with the majority of the affected area being an overspray. Verbal notification was given to Brian Cunningham and the poly line was shut in. The initial C-141 was submitted on August 4, 2017 and assigned remediation permit number 1RP-4780.

1.2 Physical Setting

The physical setting is as follows:

- The surface elevation is approximately 3,660 feet above mean sea level (msl);
- The topography slopes gently towards the southeast;
- There are no surface water features within 1,000 feet of the Site;
- The soils are designated as "Kermit-Palomas fine sands, 0 to 12 percent slopes", consisting of 0 to 8 inches of fine sand underlain by 8 to 60 inches of fine sand;
- The surface geology is Eolian and Piedmont deposits from the Holocene to middle Pleistocene, the deposits consisting of interlayed eolian sands and piedmont-slope deposits underlain by the Teriary-age Blackwater Draw and Ogallala formations in descending order;
- 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 0.50 miles east of the Site;

1.3 Remediation Action Levels

Remediation action levels (RRAL) were calculated for benzene, BTEX and TPH based on the following criteria established by 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	>1,000 Horizontal Feet	0

The following RRAL apply to the release for ranking score: 10

- Benzene 10 mg/Kg
- BTEX 50 mg/Kg
- TPH 1,000 mg/Kg

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

2.0 DELINEATION PLAN

LAI proposes to collect soil samples at three (3) locations within the contaminated area. 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 soil 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 preservation and chain of custody to Permian Basin Environmental Lab (PBEL) in Midland, Texas, and analyzed for benzene, toluene, ethylbenzene and xylene (BTEX), total petroleum hydrocarbons (TPH), including gasoline range organics (GRO), diesel range organics (DRO) and oil range organics (ORO) and chloride by EPA SW-846 Methods 8021B, 8015M and 300 respectively. Pending laboratory results, further delineation will be determined to reach cleanup level standards. Figure 3 presents a site map showing proposed soil sample locations.

3.0 REMEDIATION

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

Figures

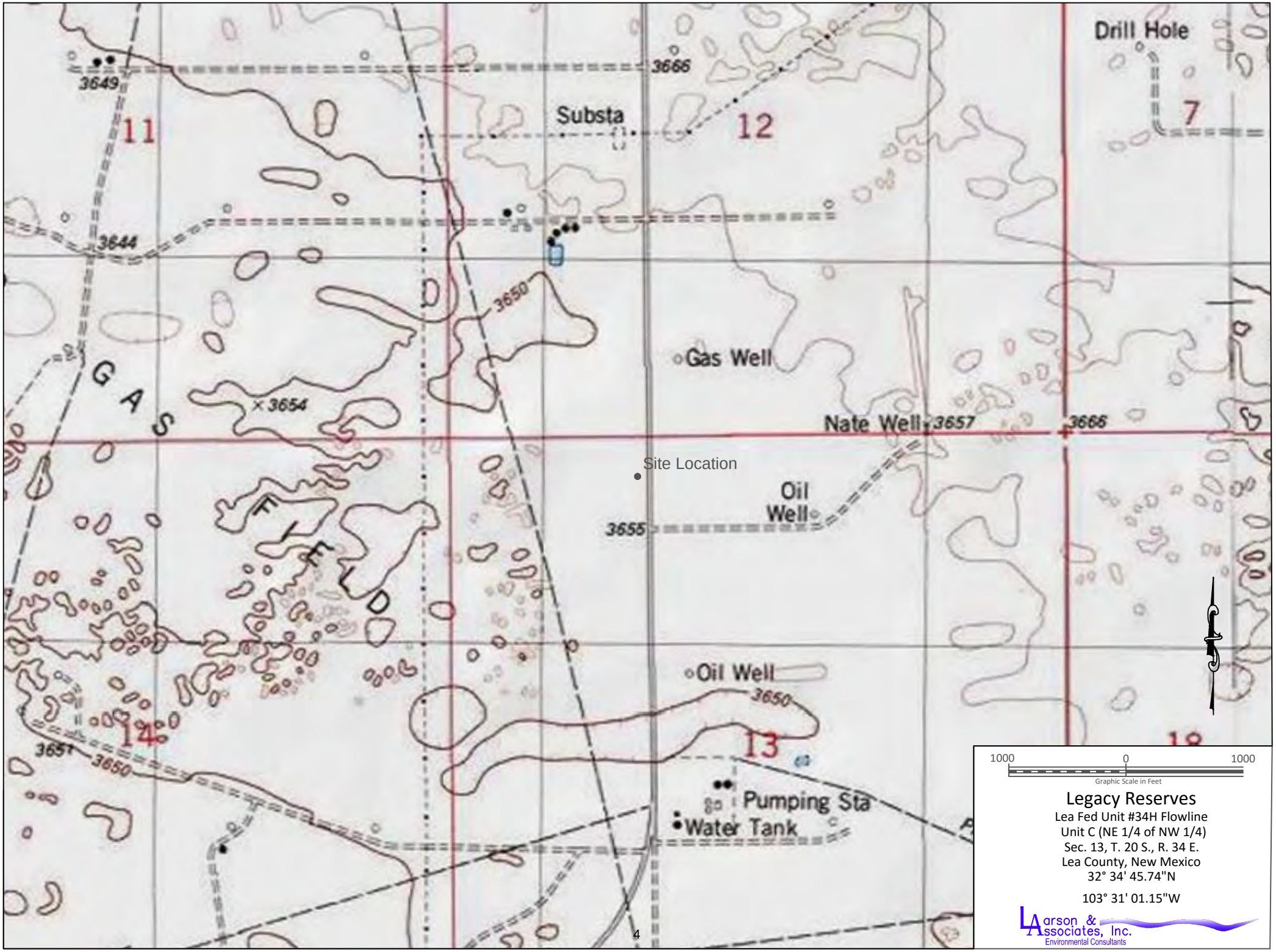

Figure 1 - Topographic Map

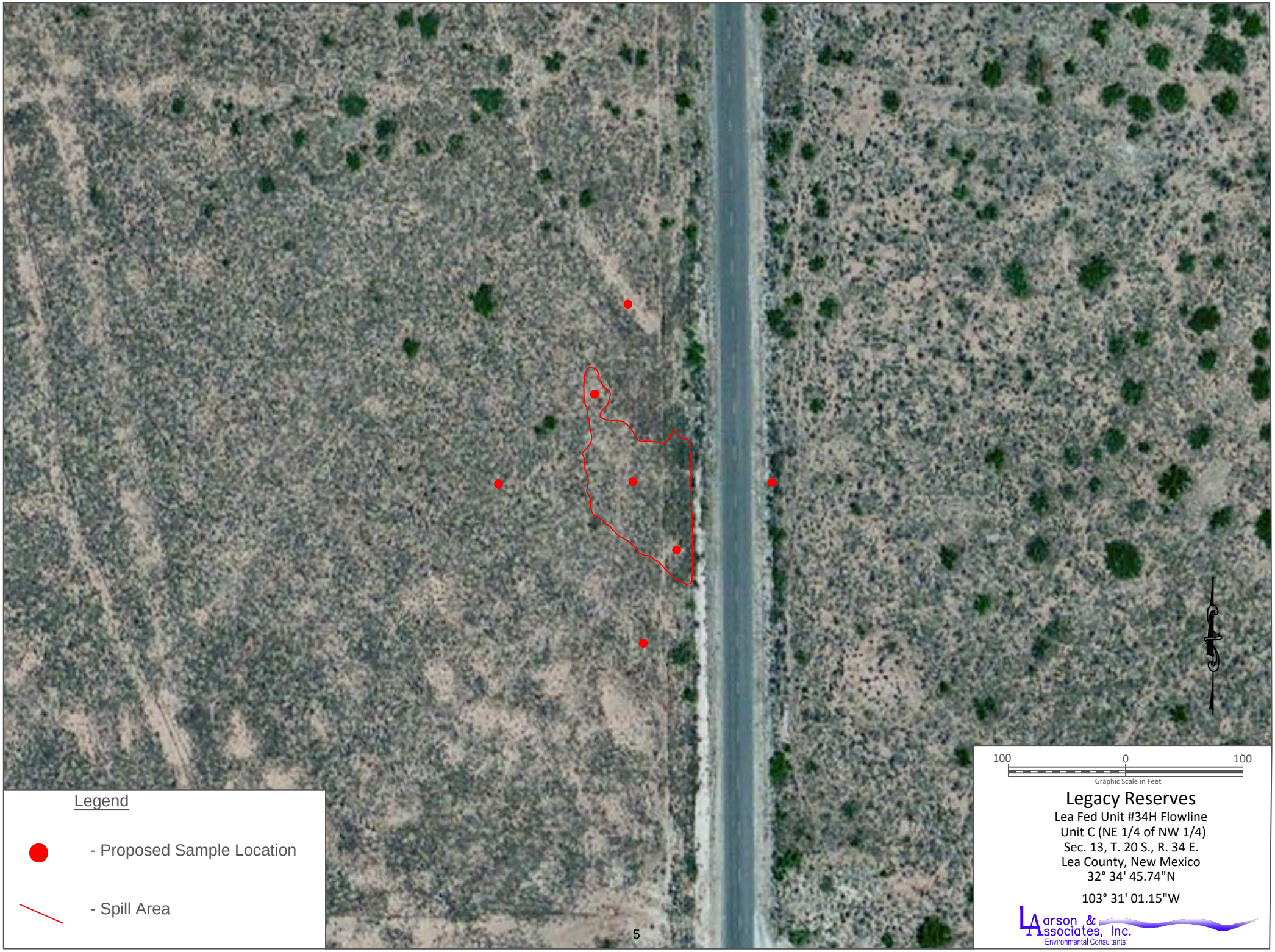

Figure 2 - Aerial Map Showing Proposed Sample Locations

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 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 Legacy Reserves	Contact Brian Cunningham
Address	Telephone No.432-234-9450
Facility Name Lea Fed Unit 34H	Facility Type oil well

Surface Owner Fee	Mineral Owner BLM	API No. #30-025-42344

LOCATION OF RELEASE

Unit Letter	Section	Township	Range	Feet from the	North/South Line	Feet from the	East/West Line	County
C	13	20S	34E	2' FNL	North	1690' FEL	East	Lea

Latitude 32*34' 46" N Longitude 103*31'1" W NAD83

32.579444, -103.516944

NATURE OF RELEASE

Type of Release Flow line oil	Volume of Release 8BBLS / Volume Recovered
Source of Release Well oil	Date and Hour of Occurrence 7/31/2017 / Date and Hour of Discovery 4:00 PM
Was Immediate Notice Given? ☐ Yes ☐ No ☐ Not Required	If YES, To Whom? Brian Cunningham
By Whom? Pumper	Date and Hour 4:00PM
Was a Watercourse Reached? ☐ Yes ☒ No	If YES, Volume Impacting the Watercourse.

If a Watercourse was Impacted, Describe Fully.*

RECEIVED
By Olivia Yu at 11:01 am, Aug 11, 2017

Describe Cause of Problem and Remedial Action Taken.*
Flowline was over pressured causing poly line to rupture well was immediately shut off all fluids where absorbed by sandy surface

Describe Area Affected and Cleanup Action Taken.*

Affected area was is approximately 100by75 most of the affected area includes overspray.

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	OIL CONSERVATION DIVISION
Printed Name: Brian Cunningham	Approved by Environmental Specialist:
Title: Production Foreman	Approval Date: 8/11/2017 / Expiration Date:
E-mail Address: bcunningham@legacylp.com	Conditions of Approval: see attached directive / Attached ☑
Date: 8/4/17 Phone: 432-234-9450	

* Attach Additional Sheets If Necessary

1RP-4780 nOY1722340557 fOY1722340420 pOY1722341291

Operator/Responsible Party,

The OCD has received the form C-141 you provided on _8/4/2017_ regarding an unauthorized release. The information contained on that form has been entered into our incident database and remediation case number _1RP-4780__ 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 _9/11/2017_. 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 North, September 28, 2017

Site Prior to Remediation Viewing East, September 28, 2017

Site Prior to Remediation Viewing West, September 28, 2017

Site Prior to Remediation Viewing East, September 28, 2017

Site Prior to Remediation Viewing South, September 28, 2017