APPROVED
By Olivia Yu at 9:46 am, Mar 09, 2018

NMOCD approves of the proposed delineation plan for 1RP-4636. See email correspondence for additional stipulations.

1RP-4636
DELINEATION PLAN
Hamon Tank Battery
Produced Water Spill
Lea County, New Mexico

Latitude: 32° 35' 36.28"
Longitude: 103° 35' 53.02"

LAI Project No. 17-0175-36

December 15, 2017

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

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Certified Professional Geologist #10490

Sarah R. Johnson
Staff Geologist

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Appendices

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 1 for a produced water spill at the Hamon Tank Battery (Site) located in Unit B (NW/4, NE/4), Section 7, Township 20 South, Range 34 East in Lea County, New Mexico. The geodetic position is North 32° 35' 36.28" and West 103° 35' 53.02". Figure 1 presents a topographic map. Figure 2 presents an aerial map.

1.1 Background

The spill occurred on March 4, 2017, due to a separator catching on fire and releasing 40 barrels (bbl) of produced water. No fluids were recovered. The separator was shut in and the majority of the released fluids were consumed by the fire, with a small pooling of fluids in the northwest corner of the caliche pad. The release was reported to the OCD District 1 (verbal communication with Ms. Olivia Yu) on March 6, 2017. On March 7, 2017 the initial C-141 was submitted and assigned remediation permit number 1RP-4636. Appendix A presents the initial C-141.

1.2 Physical Setting

The physical setting is as follows:

- The surface elevation is approximately 3,615 feet above mean sea level (msl);
- The topography gently slopes towards the southwest;
- There is no surface water 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 60 inches of fine sand;
- The surface geology is of the Eolian and piedmont deposits (Holocene to middle Pleistocene)-interlayed eolian sands and piedmont-slope deposits;
- Groundwater occurs in the Ogallala formation at approximately 125 feet below ground surface (bgs);
- The nearest fresh water well is located in Unit N (SE/4, SW/4), Section 17, Township 20 South, Range 34 East, approximately 1.98 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 determined by the OCD in "*Guidelines for Remediation of Leaks, Spills and Releases, pp. 6-7, August 13, 1993":*

Criteria	***Result***	***Score***
Depth-to-Groundwater	>100 Feet	0
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: 0

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

Depth to groundwater greater than 100 feet bgs required vertical delineation for chloride to 250 milligrams per kilogram (mg/Kg) and maintained 5 feet farther in depth.

2.0 DELINEATION PLAN

LAI proposes to collect soil samples at three (3) locations within the spill 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 samples will be collected in each cardinal direction (north, south, east and west) of the spill area as well as one sample in the northwest corner of the well pad 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. The upper samples (0 to 1 foot) will be analyzed for BTEX and TPH, including gasoline range organics (GRO), diesel range organics (DRO) and oil range organics (ORO) by EPA SW-846 Methods 8021B and 8015M, respectively. Additional samples will be analyzed for BTEX and TPH for vertical delineation should the initial samples report concentrations above the RRAL. All samples will be analyzed for chloride by Method 300 respectively. Pending laboratory results, further delineation will be determined to reach cleanup level standards. Appendix B presents photographs.

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

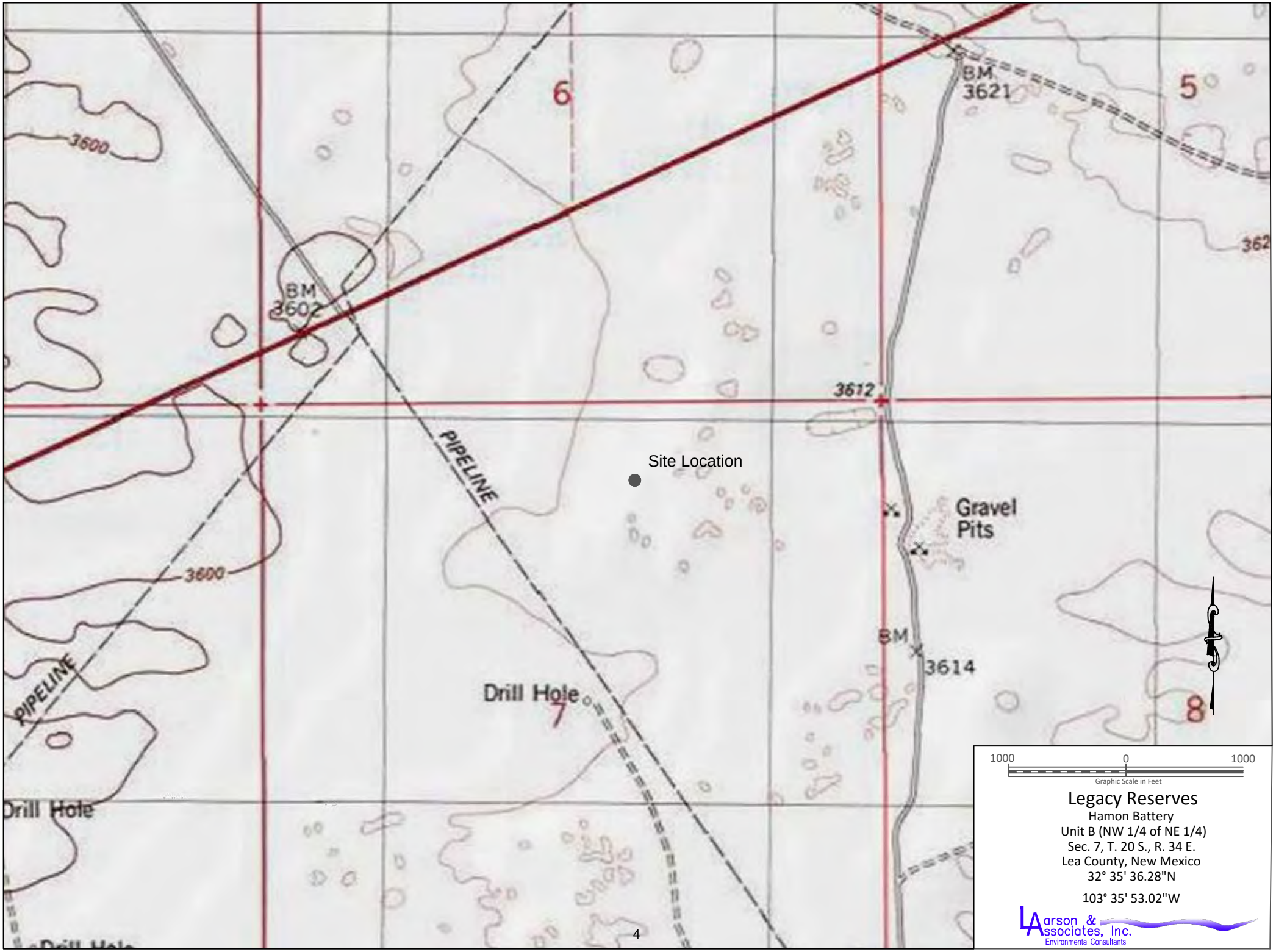

Figure 1 - Topographic Map

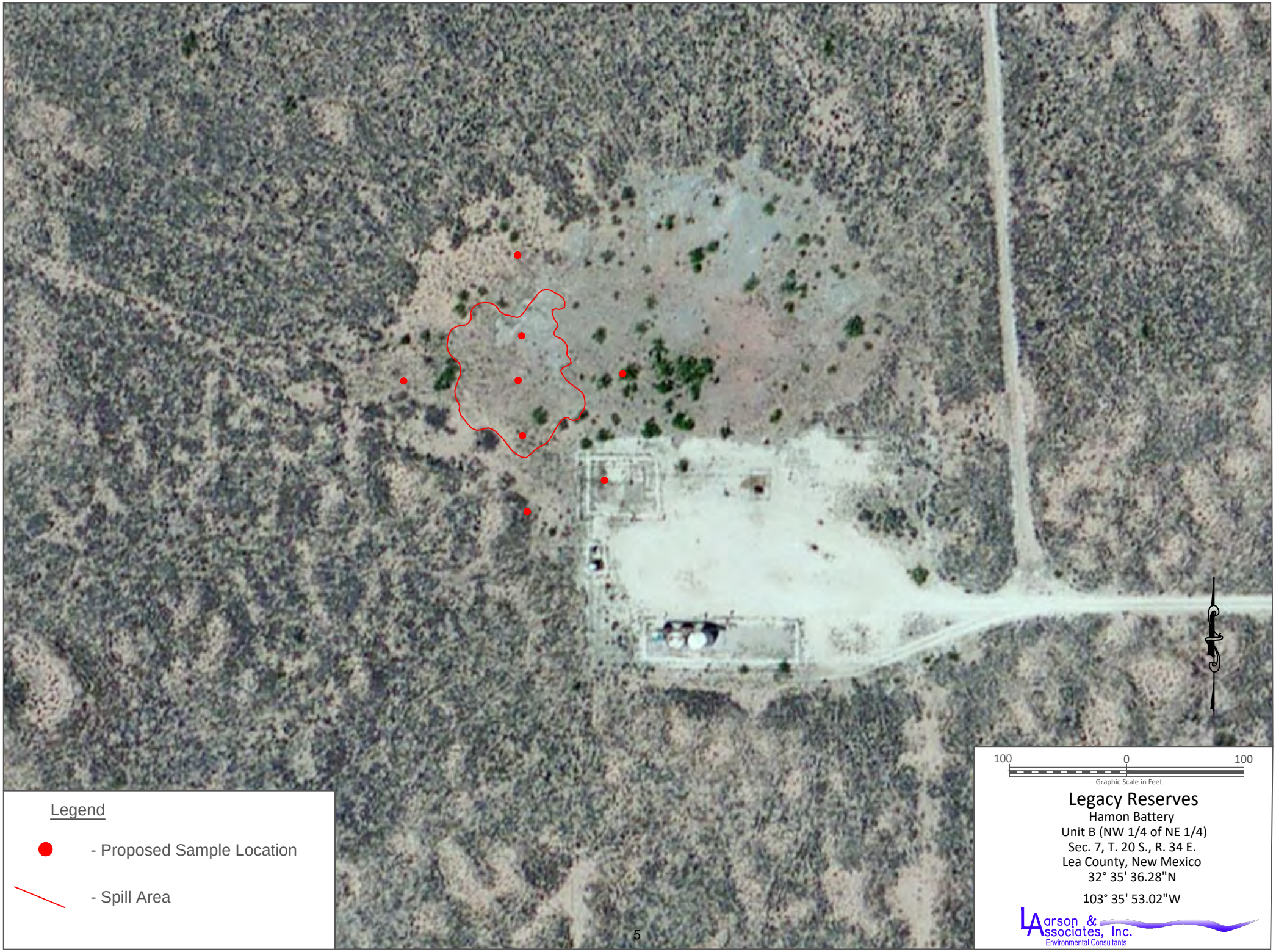

Figure 2 - Aerial Map Showing Proposed Sample Locations

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 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 – 303 W. Wall St. Suite 1800 Midland, TX 79701	Telephone No. – 432-234-9450
Facility Name – Hamon Battery	Facility Type – Tank Battery

Surface Owner – Federal	Mineral Owner – Federal	API No. – 30-025-30881

LOCATION OF RELEASE

Unit Letter	Section	Township	Range	Feet from the	North/South Line	Feet from the	East/West Line	County
J	7	20S	34E	1650	South	1980	East	Lea

Latitude 32.5849 **Longitude** -103.5976

NATURE OF RELEASE

Type of Release – Produced Liquid	Volume of Release – 40bbl	Volume Recovered -0
Source of Release - Separator	Date and Hour of Occurrence – 3/4/17	Date and Hour of Discovery – 10:00pm
Was Immediate Notice Given? ☒ Yes ☒ No ☐ Not Required	If YES, To Whom? Olivia Yue	
By Whom? Todd Roberson	Date and Hour 4/6/17 2:00pm	
Was a Watercourse Reached? ☐ Yes ☒ No	If YES, Volume Impacting the Watercourse.	

If a Watercourse was Impacted, Describe Fully.*

RECEIVED
By Olivia Yu at 7:41 am, Mar 10, 2017

Describe Cause of Problem and Remedial Action Taken.*
A separator caught fire and caused the vessel to leak. The facility was shut in and most of the fluid was consumed by the fire.

Describe Area Affected and Cleanup Action Taken.*
Most of the contaminate was contained inside the facility containment with a small area outside the containment. Samples will be taken and a work plan will be submitted to the NMOCD Dist. 1 office for approval.

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: Sergio Iglesias	OIL CONSERVATION DIVISION
Printed Name: Sergio Iglesias	Approved by Environmental Specialist:
Title: Well Tech	Approval Date: 3/10/2017 Expiration Date:
E-mail Address: SIglesias@legacylp.com	Conditions of Approval: see attached directive Attached ☑
Date: 3-9-17 Phone: 432-215-7567	

* Attach Additional Sheets If Necessary

1RP-4636 pOY1706928162 nOY1706927950

Operator/Responsible Party,

The OCD has received the form C-141 you provided on _3/7/2017_ regarding an unauthorized release. The information contained on that form has been entered into our incident database and remediation case number __1R-_4636_ 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 _4/10/2017__. 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 Prior to Remediation Viewing East, October 2, 2017

Site Prior to Remediation Viewing North, October 2, 2017

Site Prior to Remediation Viewing South, October 2, 2017

Site Prior to Remediation Viewing North West

Site Prior to Remediation Viewing South, October 2, 2017