APPROVED By Olivia Yu at 11:20 am, Apr 02, 2018

NMOCD approves of the proposed delineation for 1RP-4258.

1RP-4258 DELINEATION PLAN LR Chamberlain Tank Battery Crude Oil & Produced Water Spill Lea County, New Mexico

Latitude: N33.022359° Longitude: W-103.170896°

LAI Project No. 17-0175-24

February 20, 2018

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

Prepared by: Larson & Associates, Inc. S07 North Marienfeld Street, Suite 205 Midland, Texas 79701

hson Geologist

Mark J. Larson, P.G. Certified Professional Geologist #10490 This Page Intentionally Left Blank

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1RP-4258 Delineation Plan LR Chamberlain Tank Battery Crude Oil & Produced Water Spill February 20, 2018

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 and produced water spill at the LR Chamberlain Tank Battery (Site) located in Unit C (NE/4, NW/4), Section 14, Township 15 South, Range 37 East, in Lea County, New Mexico. The geodetic position is North 33.022359° and West -103.170896°. Figure 1 presents a topographic map. Figure 2 presents an aerial map.

1.1 Background

The spill occurred on February 15, 2016, due to the dump valve on the free water knockout malfunctioning and allowing for approximately 260 barrels (bbl) of crude oil and produced water to be released inside and outside the earthen containment. Approximately 250 bbl were recovered. The affected area measures about 10,400 square feet. The initial C-141 was submitted on April 22, 2016 and assigned remediation permit number 1RP-4258. Appendix A presents the initial C-141.

On May 23, 2016 Environmental Plus, Inc. (EPI), personnel collected soil samples near the northeast corner of the tank battery and outside the spill area (SP1). Samples were collected at depths of 3, 4, 6, 7, 8, 9, 10, 11 and 12 feet below ground surface (bgs). The soil samples were analyzed in the field for chloride and screened for organic vapors using a photoionization detector (PID). The highest PID reading was reported at 7 feet (762 ppm). The highest chloride reading was at 11 feet bgs (440 mg/Kg).

EPI delivered the soil sample from SP1, 12 feet bgs to Cardinal Labs, in Hobbs, New Mexico under preservation and chain of custody. The soil sample was analyzed for benzene, toluene, ethylbenzene and xylenes (BTEX), total petroleum hydrocarbons (TPH), including gasoline range organics (GRO) and diesel range organics (DRO) and chloride by EPA SW-846 Methods 8021B and 8015M, respectively, and chloride by titration method SM4500CL-B, respectively. The laboratory reported BTEX and TPH below the RRAL. Chloride was reports at 176 milligrams per kilogram (mg/Kg). Visually contaminated soil was scraped and disposed at an OCD approved landfill. Appendix B presents the EPI site drawing and analytical data.

1.2 Physical Setting

The physical setting is as follows:

- The surface elevation is approximately 3,800 feet above mean sea level (msl);
- The surface topography gradually slopes towards the southeast and southwest;
- There are no surface water features within 1,000 feet of the Site;
- The soils are designated as "Stegall loam, 0 to 1 percent slopes", consisting of 0 to 8 inches of loam, underlain by 8 to 28 inches of clay loam;
- The surface geology is the Ogallala Formation (lower Pliocene to middle Miocene)- Alluvial and eolian deposits, and petrocalcic soils of the southern High Plains;
- A monitoring well located approximately 400 feet southeast (1RP-10-1-2351) reported groundwater in the Ogallala formation at approximately 64.73 feet bgs (12/3/2015);
- The nearest fresh water well is located in Unit G (SW/4, NE/4), Section 14, Township 15 South, Range #7 East, about 0.30 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 | >1,000 Horizontal Feet | 0 |

The following RRAL apply to the release ranking score:

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

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

2.0 DELINEATION PLAN

LAI proposes to collect soil samples at six (6) locations within the contaminated area inside the secondary 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 at the same depth intervals for horizontal delineation. The soil samples will be delivered under chain of custody and preservation to Xenco Laboratories (Xenco) in Midland, Texas, and analyzed for 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 Method 8021B, 8015M and 300 respectively. Pending laboratory results, further delineation may be required to reach cleanup level standards. Figure 2 presents a site map showing proposed soil sample locations. Appendix C presents photographs.

3.0 REMEDIATION PLAN

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

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Figures



Figure 1 - Topographic Map



Figure 2 - Aerial Map

Appendix A

Initial C-141

RECEIVED By JKeyes at 8:33 am, Apr 25, 2016

District 1 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 Mex 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 | 🛛 Init | tial Report | Final Report |
|---|------------------------|----------|-------------|--------------|
| Name of Company: Legacy, L.P. | Contact: Manuel Sor | iano | | |
| Address: P.O. Box 10848, Midland, Texas 797 | D2 Telephone No. 432-2 | 269-8806 | | |
| Facility Name: LR Chamberlain Battery | Facility Type: Batter | У | | |
| Surface Owner: Darr Angell | Mineral Owner: | | API No. | |

LOCATION OF RELEASE

| | | | | | | | |
|-------------|---------|----------|-------|--------|------------------|----------------|--------|
| Unit Letter | Section | Township | Range | 83 . 0 | North/South Line | East/West Line | County |
| С | 14 | 15S | 37E | | | | Lea |
| | | | | | | | |

Latitude: <u>N 33.022359°</u> Longitude: <u>W 103.170896°</u>

NATURE OF RELEASE

| Type of Release: oil and produced water | Volume of Release: ~260 bbls | Volume Re | covered: ~250 bbls |
|--|---|-----------------|-----------------------------|
| Source of Release: dump on free water knockout malfunction | Date and Hour of Occurrence: | Date and H | our of Discovery: |
| | 2-15-16 @ 11:00 pm | 2-16-16 @ | 8:30 am |
| Was Immediate Notice Given? | If YES, To Whom? | | |
| 🗌 Yes 🛛 No 🔲 Not Required | | | |
| By Whom? | | | |
| Was a Watercourse Reached? | Date and Hour: | | |
| | If YES, Volume Impacting the Wa | tercourse: | |
| 🗌 Yes 🖾 No | Not Applicable | | |
| If a Watercourse was Impacted, Describe Fully.* Not Applicable | | · | |
| , | | | |
| | | | |
| | | | |
| Describe Cause of Problem and Remedial Action Taken.* | | | |
| The dump on the free water knockout malfunctioned causing the release | of oil and produced water. Vacuum tru | icks were call | ed in to draw up standing |
| fluid. | | | |
| | | | |
| Describe Area Affected and Cleanup Action Taken.* | | | |
| The spill impacted approximately 10,400 sq. ft. of caliche tank battery pa | ad. The entire release of oil and produc | ed water was | contained within the berms. |
| Vacuum trucks collected approximately 250 bbls of fluid from within co | ntainment. The stained soil has been so | craped up and | hauled to a state approved |
| disposal facility. | | | |
| 1 housing and for the information after a first of the second | | | NR (0000 1 1 |
| I hereby certify that the information given above is true and complete to | the best of my knowledge and underst | and that pursu | ant to NMOCD fulles and |
| regulations all operators are required to report and/or file certain release | notifications and perform corrective ac | tions for relea | ises which may endanger |
| public health or the environment. The acceptance of a C-141 report by the acceptance of a C-141 report | he NMOCD marked as "Final Report" | does not relie | ve the operator of hability |
| should their operations have failed to adequately investigate and remedia | ite contamination that pose a threat to g | 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. | | | |
| 1 10 | <u>OIL CONSERV</u> | <u>ATION D</u> | <u>IVISION</u> |
| Signature: They Signas | | | |
| Signature: / Mult. / Duran | | ant. | 11 |
| Distant for the fi | Approved by Environmental Speciali | st: Jamer | nye |
| Printed Name: Manuel Seriano | | | |
| | 04/25/2016 | | 06/25/2016 |
| Title: Production Foreman | Approval Date: 04/25/2016 | Expiration D | ate: |
| | | | |
| E-mail Address: jsoriano@legacylp.com | Conditions of Approval: | | Attached |
| n linn is | Discrete samples only. Delineate and | remediate | IRP 4258 |
| Date: <u>4-22-16</u> Phone: 432-269-8806 | per NMOCD guidelines. | | |

* Attach Additional Sheets If Necessary

nJXK1611630540 pJXK1611630727

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Appendix B

EPI Site Drawing and Analytical Drawing





May 26, 2016

Daniel Dominguez Environmental Plus, Inc. P.O. Box 1558 Eunice, NM 88231

RE: LR CHAMBERLAIN

Enclosed are the results of analyses for samples received by the laboratory on 05/24/16 15:33.

Cardinal Laboratories is accredited through Texas NELAP under certificate number T104704398-15-7. Accreditation applies to drinking water, non-potable water and solid and chemical materials. All accredited analytes are denoted by an asterisk (*). For a complete list of accredited analytes and matrices visit the TCEQ website at www.tceq.texas.gov/field/ga/lab_accred_certif.html.

Cardinal Laboratories is accreditated through the State of Colorado Department of Public Health and Environment for:

| Method EPA 552.2 | Haloacetic Acids (HAA-5) |
|------------------|------------------------------|
| Method EPA 524.2 | Total Trihalomethanes (TTHM) |
| Method EPA 524.4 | Regulated VOCs (V1, V2, V3) |

Accreditation applies to public drinking water matrices.

This report meets NELAP requirements and is made up of a cover page, analytical results, and a copy of the original chain-of-custody. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Celey D. Keine

Celey D. Keene Lab Director/Quality Manager



Analytical Results For:

Environmental Plus, Inc. Daniel Dominguez P.O. Box 1558 Eunice NM, 88231 Fax To: (505) 394-2601

| Received: | 05/24/2016 | Sampling Date: | 05/23/2016 |
|-------------------|-------------------------|---------------------|---------------|
| Reported: | 05/26/2016 | Sampling Type: | Soil |
| Project Name: | LR CHAMBERLAIN | Sampling Condition: | Cool & Intact |
| Project Number: | NONE GIVEN | Sample Received By: | Jodi Henson |
| Project Location: | UL-C SEC.14, T15S, R37E | | |

Sample ID: SP 1 (12') (H601131-01)

| BTEX 8021B | mg/ | 'kg | Analyze | d By: MS | | | | | |
|--------------------------------------|--------|-----------------|------------|--------------|------|------------|---------------|------|-----------|
| Analyte | Result | Reporting Limit | Analyzed | Method Blank | BS | % Recovery | True Value QC | RPD | Qualifier |
| Benzene* | <0.050 | 0.050 | 05/25/2016 | ND | 2.14 | 107 | 2.00 | 1.18 | |
| Toluene* | <0.050 | 0.050 | 05/25/2016 | ND | 2.07 | 104 | 2.00 | 1.11 | |
| Ethylbenzene* | <0.050 | 0.050 | 05/25/2016 | ND | 1.86 | 92.9 | 2.00 | 1.39 | |
| Total Xylenes* | <0.150 | 0.150 | 05/25/2016 | ND | 5.71 | 95.1 | 6.00 | 1.47 | |
| Total BTEX | <0.300 | 0.300 | 05/25/2016 | ND | | | | | |
| Surrogate: 4-Bromofluorobenzene (PID | 100 9 | % 73.6-14 | 0 | | | | | | |
| Chloride, SM4500Cl-B | mg/ | 'kg | Analyze | d By: AP | | | | | |
| Analyte | Result | Reporting Limit | Analyzed | Method Blank | BS | % Recovery | True Value QC | RPD | Qualifier |
| Chloride | 176 | 16.0 | 05/25/2016 | ND | 432 | 108 | 400 | 0.00 | |
| TPH 8015M | mg/ | 'kg | Analyze | d By: MS | | | | | |
| Analyte | Result | Reporting Limit | Analyzed | Method Blank | BS | % Recovery | True Value QC | RPD | Qualifier |
| GRO C6-C10 | <10.0 | 10.0 | 05/25/2016 | ND | 190 | 94.9 | 200 | 5.43 | |
| DRO >C10-C28 | 32.1 | 10.0 | 05/25/2016 | ND | 186 | 92.9 | 200 | 16.1 | |
| | | | | | | | | | |
| Surrogate: 1-Chlorooctane | 102 9 | % 35-147 | , | | | | | | |

Cardinal Laboratories

*=Accredited Analyte

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Celez D. Keine

Celey D. Keene, Lab Director/Quality Manager



Notes and Definitions

| QR-03 | The RPD value for the sample duplicate or MS/MSD was outside if QC acceptance limits due to matrix interference. QC batch accepted based on LCS and/or LCSD recovery and/or RPD values. |
|-------|---|
| QM-07 | The spike recovery was outside acceptance limits for the MS and/or MSD. The batch was accepted based on acceptable LCS recovery. |
| ND | Analyte NOT DETECTED at or above the reporting limit |
| RPD | Relative Percent Difference |
| ** | Samples not received at proper temperature of 6°C or below. |
| *** | Insufficient time to reach temperature. |
| - | Chloride by SM4500Cl-B does not require samples be received at or below 6°C |
| | Samples reported on an as received basis (wet) unless otherwise noted on report |

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*=Accredited Analyte

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Celey D. Keene, Lab Director/Quality Manager

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| | Environmental Plus, Inc. P.O. Box 1558 2100 Avenue O Funice NM 88231 | al Plus, Inc. x 1558 inue O d 82231 | | | FIELD N | FIELD MEASUREMENT/OBSERVATION LOG | ENT/OBSE | RVATIO | A LOG | | | | |
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| 5 | (575) 394-2601 (fax) | | COMPANY: Legacy | | PROJECT N | PROJECT NAME: L.R. Chamberlan | Chamberlar | | PR(| PROJECT NUMBER: | ABER: | | |
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| | | | | | | | CHLORID | CHLORIDE ANALYSIS | 74 | | | | |
| SAMPLE ID | SAMPLE DEPTH (FT) | COLLECTION TIME | PID ANALYSIS TIME | | PID READING (PPM) | | | Titration Tube Reading | | mg/Kg | SO | SOIL DESCRIPTION | |
| Sp1 | 3' | 6:01 | 9:26 | 7 | 423 | 2 gms of soil | 40 ml H2O | 12 x | 20 = 240 | | | | |
| Sp1A | 4' | 9.05 | 9:18 | č | 673 | 2 gms of soil | 40 ml H2O | 12 x | 20 = 240 | | | | |
| Sp1B | 6' | 9:46 | 10:04 | | 139 | 2 gms of soil | 40 ml H2O | 20 x | 20 = 400 | | | | |
| Sp1C | 7' | 9:48 | 10:05 | | 762 | 2 gms of soil | 40 ml H2O | 20 x | 20 = 400 | | | | |
| Sp1D | 8' | 9:59 | 10:07 | | 122 | 2 gms of soil | 40 ml H2O | 20 x | 20 = 400 | | | | |
| SplE | 9' | 10:00 | 10:21 | 5 | 97.4 | 2 gms of soil | 40 ml H2O | 20 x | 20 = 400 | | | | |
| Sp1F | 10' | 10:10 | 10:22 | 7 | 470 | 2 gms of soil | 40 ml H2O | 20 x | 20 = 400 | | | | |
| Sp1G | 11' | 10:29 | 10:43 | | 191 | 2 gms of soil | 40 ml H2O | 22 x | 20 = 440 | | | | |
| Sight | 12' | 11:06 | 11:16 | - | 48 | 2 gms of soil | 40 ml H2O | Х | 20 = | | | | |
| | | | | | | 2 gms of soil | 40 ml H2O | х | 20 = | | | | |
| | | | | | | 2 gms of soil | 40 ml H2O | х | 20 = | | | | |
| | | | | | | 2 gms of soil | 40 ml H2O | x | 20 = | | | | |
| | | | | | | 2 gms of soil | 40 ml H2O | х | 20 = | | | | |
| | | | | | | 2 gms of soil | 40 ml H2O | х | 20 = | | | | |
| | | | | | | 2 gms of soil | 40 ml H2O | х | 20 = | | | | |
| | | | | | | 2 gms of soil | 40 ml H2O | х | 20 = | | | | |
| | | | | | | 2 gms of soil | 40 ml H2O | х | 20 = | | | | |
| | | | | | | 2 gms of soil | 40 ml H2O | х | 20 = | | | | |
| | | | | | | 2 gms of soil | 40 ml H2O | x | 20 = | ┨ | | | |
| | | | PID (| PID CALIBRATION | | | | | | | | WEATHER | |
| Time | | Fresh Air | Span Gas | L | Time | Fresh Air | Air | | Span Gas | - | Time | Temp. Misc | |
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Appendix C

Photographs

1RP-4258 LR Chamberlain Battery Crude Oil & Produced Water Spill October 9, 2017



Site Location



Site Prior to Remediation Viewing South, September 14, 2017

1RP-4258 LR Chamberlain Battery Crude Oil & Produced Water Spill October 9, 2017



Site Prior to Remediation Viewing East, September 14, 2017



Site Prior to Remediation Viewing South, September 14, 2017

1RP-4258 LR Chamberlain Battery Crude Oil & Produced Water Spill October 9, 2017



Site Prior to Remediation Viewing West, September 14, 2017