1R-2391

Legacy Reserves
Chamberlain TB

Excavation Closure Report 3/3/14

Larson & Associates, Inc.
Environmental Consultants

March 3, 2014

VIA EMAIL: GeoffreyR.Leking@state.nm.us

Mr. Geoffrey R. Leking
Environmental Specialist
New Mexico Oil Conservation Division - District 1
1625 N. French Drive
Hobbs, New Mexico 88240

Re: 1RP-10-1-2391 – Excavation Closure Report, Chamberlain Flow Line Leak and Historic Contamination, Legacy Reserves, L.P., Lea County, New Mexico, July 25, 2013

Dear Geoffrey:
Please find the enclosed report which is revised for the correct remediation project (RP) number 1RP-10-1-2391). Please contact Mr. Kevin Bracey, with Legacy at (432) 689-5200 or me at (432) 687-0901, if you have questions.

Sincerely,

Larson & Associates, Inc.

Mark J. Larson, P.G.
(432) 687-0901
mark@laenvironmental.com

cc: Kevin Bracey
Patrick McMahon

Encl.

EXCAVATION CLOSURE REPORT

Chamberlain Flow Line
And Historic Contamination

#1RP-2391

Lea County, New Mexico

LAI Project No. 12-0126-01

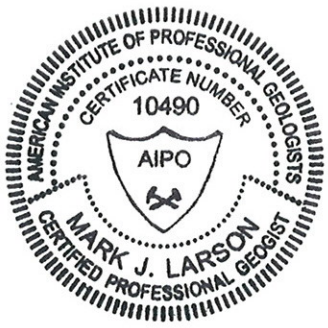
March 3, 2014

Prepared for:

Legacy Reserves, L.P.
30 West Wall Street, Suite 1400
Midland, Texas 79701

Prepared by:

Larson & Associates, Inc.
507 North Marienfeld, Suite 200
Midland, Texas 79701



Mark J. Larson
Certified Professional Geologist No. 10490

Table of Contents

List of Tables

List of Figures

List of Appendices

1.0 EXECUTIVE SUMMARY

This report is submitted to the New Mexico Oil Conservation Division (OCD) on behalf of Legacy Reserves, L.P. (Legacy) to present the closure of an excavation associated with a non-reportable flow line leak and area of historic contamination (Site) located south of the Chamberlain Tank Battery. The remediation was performed during September 2013. The Site is located in Unit C (NE 1/4, NW 1/4), Section 14, Township 15 South, Range 37 East, in Lea County, New Mexico. The geodetic position is north 33° 01' 16.7" and west 103° 10' 13.6." The surface owner is Angell Ranch Co., LLC.

Historic contamination, believed to be from a pit, was discovered while remediating a non-reportable quantity leak from a flow line. About 240 cubic yards of contaminated soil was excavated from the flow line leak and piled near the southeast corner of the Site. This soil was disposed to Sundance Services located east of Eunice, New Mexico. About 1,100 cubic yards of soil was excavated from the area of historic contamination and piled north of the excavation. On January 7, 2010, Legacy reported the contamination to the OCD District 1 which assigned remediation project number 1RP-10-1-2391 to the release.

Between April 2012 and June 2013, Larson & Associates, Inc (LAI) supervised excavation of additional soil, collected soil samples from 9 borings (BH-1 through BH-9) and installed 1 monitoring well (MW-1). Approximately 4,220 cubic yards of soil, including soil previously excavated from the historic contamination area, was disposed at the Jay Dan Landfarm, LLC, which is located west of Lovington, New Mexico. The laboratory analysis of soil samples determined the vertical extent of total petroleum hydrocarbons (TPH) near the center of the pit (BH-3). TPH was 53 milligrams per kilogram (mg/Kg) in the sample from about 47 to 48 feet below ground surface (bgs) and below the OCD recommended remediation action level of 100 mg/Kg. Chloride was 567 mg/Kg at approximately 55 feet bgs near the center of the pit.

The monitoring well (MW-1) was installed about 100 feet southeast (down gradient) of the pit where groundwater was encountered at approximately 65 feet bgs. Laboratory results of groundwater samples reported benzene, toluene, ethylbenzene and xylenes (BTEX) below the method detection limits (MDL). Chloride and TDS were 263 milligrams per liter (mg/L) and 1,180 mg/L, respectively, and above the Water Quality Control Commission (WQCC) domestic water quality standards of 250 milligrams per liter (mg/l) and 1,000 mg/L, respectively.

During September 2013, LAI supervised closing the flow line and pit excvations. An area of approximately 38,000 square feet or 0.87 acres was excavated to about 4 feet bgs. This soil was used to fill the excavation to about 4 feet bgs. A 20 mil polyethylene (geomembrane) liner was placed in the bottom and over the entire excavation (38,000 square feet). Approximately 10,308 cubic yards of clean soil was placed over the liner. The clean soil was acquired from a borrow area located west of the Site. The center of the excavation was crowned slightly for drainage. The surface will be seeded when adequate moisture is available, as determined by the landowner. Approximately 4,684 cubic yards of contaminated soil was disposed at Jay Dan Landfarm, LLC.

On December 26, 2013, LAI personnel collected first (1^{st}) quarter groundwater samples from the monitoring well. BTEX was below the method detection limits. Chloride and TDS were 151 mg/L and 784 mg/L, respectively, and below the WQCC standards of 250 mg/L and 1,000 mg/L, respectively.

2.0 INTRODUCTION

Legacy Reserves, L.P. (Legacy) submits this report to the New Mexico Oil Conservation Division (OCD) to document closure of an excavation (Site) associated with a flow line leak and area of historic contamination (Site) located south of the Chamberlain Tank Battery. The Site is located in Unit C (NE 1/4, NW 1/4), Section 14, Township 15 South, and Range 37 East, in Lea County, New Mexico. The geodetic position is north 33° 01' 16.7" and west 103° 10' 13.6". The surface is owned by Angell Ranch Co., LLC. Figure 1 presents a location and topographic map. Figure 2 presents an aerial photograph. Figure 3 presents a Site drawing.

2.1 Background

The Site is the location of a non-reportable quantity flow line spill and area of historic contamination believed to be a pit. The historic contamination was discovered while remediating the flow line spill. Approximately 240 cubic yards of soil was excavated from the flow line spill and pile near the southeast of the excavation. This soil contained elevated chloride (i.e., greater than 1,000 mg/Kg) and was disposed at Sundance Services located east of Eunice, New Mexico. About 1,100 cubic yards of soil was excavated from the historic contamination area and piled north of the excavation.

During May 2010 Basin Environmental Consulting, LLC (Basin), located in Lovington, New Mexico, collected soil samples from five (5) exploratory trenches and six (6) borings (SB-1 through SB-6). The trenches were excavated between approximately 3.5 (north) and 18 (main, west, south and east) feet bgs. The borings were drilled between approximately 50 (SB-2 through SB-6) and 60 (SB-1) feet bgs. Boring SB-1, located near the east side of the excavation, was completed as a temporary monitoring well where groundwater was reported at approximately 61 feet bgs. A laboratory analysis of a groundwater sample reported ethylbenzene (0.0021 mg/L) and xylenes (0.0058 mg/L) below the New Mexico Water Quality Control Commission (WQCC) human health standards. Chloride was reported at 286 mg/L and exceeded the WQCC domestic water quality standard (250 mg/L). An initial C-141 was submitted to the OCD District 1, on January 7, 2010. The OCD assigned the release remediation project number 1RP-10-1-2391.

2.2 Setting

The surface elevation is approximately 3,791 feet above mean sea level (MSL) and slopes gently to the southeast. The soil is designated as "Kimbrough gravelly loam, 0 to 3 percent slopes (Kg)" which occurs on upland areas known locally as "scabland." The soil has a surface layer approximately 6 inches thick of dark grayish brown gravelly loam which is underlain by indurated caliche. The unit is comprised of approximately 85% Kimbrough soil with the remainder being Lea, Sharvana, Stegall and Slaughter soils. The soil is too shallow for cropland therefore its main use is range and wildlife habitat.

According to the New Mexico Bureau of Geology and Mineral Resources, the Site is located in the Southern High Plains physiographic province. The Site is underlain by a thin layer of silty clay (loam). The silty clay is underlain by a resilient layer of caliche or caprock. The caliche is a hard, erosion resistant, pedogenic calcrete that between approximately 25 and 30 feet thick. The caliche grades into the Pliocene to Miocene aged Ogallala formation which is comprised of fluvial sand, silt, clay and localized gravel, with indistinct to massive crossbeds. The Ogallala sand is generally fine- to medium-grained quartz. The Ogallala formation is underlain by shale of the Triassic-age Chile formation of the Dockum Group. Figure 3 presents the site drawing and geological cross section locations.

Groundwater occurs in the Ogallala formation at approximately 63 feet bgs. The Triassic-age Chinle formation is the lower confining unit for the Ogallala formation and occurs at a depth of approximately 120 feet bgs according to records from the New Mexico Office of the State Engineer (OSE). A well used for livestock watering is located about 1,600 feet southeast of the Site. The regional groundwater flow direction is to the southeast (Nativ, 1988).

3.0 ADDITIONAL INVESTIGATION AND REMEDIATION

Between September 2012 and June 2013, LAI personnel supervised excavation of additional soil, collected soil samples from 9 borings (BH-1 through BH-9) and installed 1 monitoring well (MW-1). Approximately 4,220 cubic yards of soil, including soil from the initial excavation, was disposed at Jay Dan Landfarm, LLC located west of Lovington, New Mexico. The investigation determined the vertical limit of total petroleum hydrocarbons (TPH) near the center of the pit (BH-3) at approximately 50 feet bgs. Chloride was 455 mg/Kg at approximately 50 feet bgs in boring BH-3.

The monitoring well (MW-1) was drilled to about 100 feet southeast (down gradient) of the Site. The well was drilled into the Ogallala formation at approximately 75 feet bgs. Groundwater was measured at 65.85 feet below top of casing or approximately 63.07 feet bgs. On June 11, 2013, LAI personnel collected a groundwater sample which was analyzed for BTEX), cations (sodium, magnesium, calcium), anions (sulfate, chloride, alkalinity), nitrate and TDS. The laboratory reported BTEX below the MDL. Chloride (263 mg/L) and TDS (1,180 mg/L) exceeded the WQCC domestic water quality standards of 250 mg/L and 1,000 mg/L, respectively. A closure plan was submitted to the OCD on July 25, 2013 and approved on September 4, 2013. Appendix A presents the OCD approval.

4.0 EXCAVATION CLOSURE

During September 2013 LAI personnel supervised closure of the excavation. Watson Construction, Inc. (Watson), Hobbs, New Mexico, was contracted to excavate soil around the perimeter of the excavation to approximately 4 feet bgs. Soil was excavated from an area measuring approximately 38,000 square feet or about 0.87 acres. The excavated soil was used to fill the excavation to a depth of approximately 4 feet bgs. On September 17, 2013, Akome, Inc., located in Hobbs, New Mexico, installed a 20-mil polyethylene liner in the bottom of the excavations at about 4 feet bgs. The liner was covered with approximately 10,308 cubic yards of clean soil acquired from a borrow area located about 500 feet west of the Site. The excavation was crowned slightly to allow runoff. Approximately 4,684 cubic yards of contaminated soil was disposed at Jay Dan Landfarm, LLC. The surface will be seeded to the landowner's specifications upon receipt of adequate soil moisture. Figure 3 presents the location of the lined excavation. Appendix B presents photographs.

5.0 GROUNDWATER MONITORING

On December 26, 2013, LAI personnel collected first (1st) quarter groundwater samples from monitoring well MW-1. The well was purged by pumping with an environmental pump and dedicated tubing until approximately 3 casing volumes of groundwater was removed from the well. The purged water was disposed at the Chamberlain Tank Battery. Groundwater samples were collected with a dedicated polyethylene bailer and carefully poured into laboratory containers. The containers were seal and delivered under preservation and chain of custody to DHL Laboratory located in Round Rock, Texas. The laboratory analyzed the samples for BTEX, anions (sodium, magnesium, calcium), anions (sulfate,

chloride, alkalinity), nitrate and TDS. Table 1 presents the organic analytical data summary. Table 2 presents the inorganic analytical data summary. Figure 3 presents the well location. Appendix C presents the laboratory report.

Referring to Table 1, BTEX was not reported above the MDL. Chloride and TDS were reported at 151 mg/L and 784 mg/L, respectively, and below the WQCC domestic water quality standards of 250 mg/L and 1,000 mg/L, respectively.

6.0 RECOMMENDATIONS

The Site will be seeded once adequate moisture is received. Second (2^{nd}) quarter groundwater samples will be collected on March 11, 2014. The laboratory results will be submitted to the OCD following the 3^{rd} quarter event between April and June 2014. Appendix D presents the initial and final C-141.

TABLES

Table 1
Groundwater Organic Analytical Data Summary
Legacy Reserves, L.P., Chamberlin Site, 1RP-2391
Lea County, New Mexico

Sample ID	Date	Benzene	Toluene	Ethylbenzene	Xylene
WQCC Limit:		**0.01**	**0.75**	**0.75**	**0.62**
TMW-1	06/11/2013	<0.001	<0.001	<0.001	<0.003
	12/26/2013	<0.0008	<0.002	<0.002	<0.003

Notes: Analysis performed by Permian Basin Environmental Lab, Midland, Texas

All values except pH reported in milligrams per Liter - (mg/L, parts per million).

Table 2
Groundwater Inorganic Analytical Data Summary
Legacy Reserves, L.P., Chamberlin Site, 1RP-2391
Lea County, New Mexico

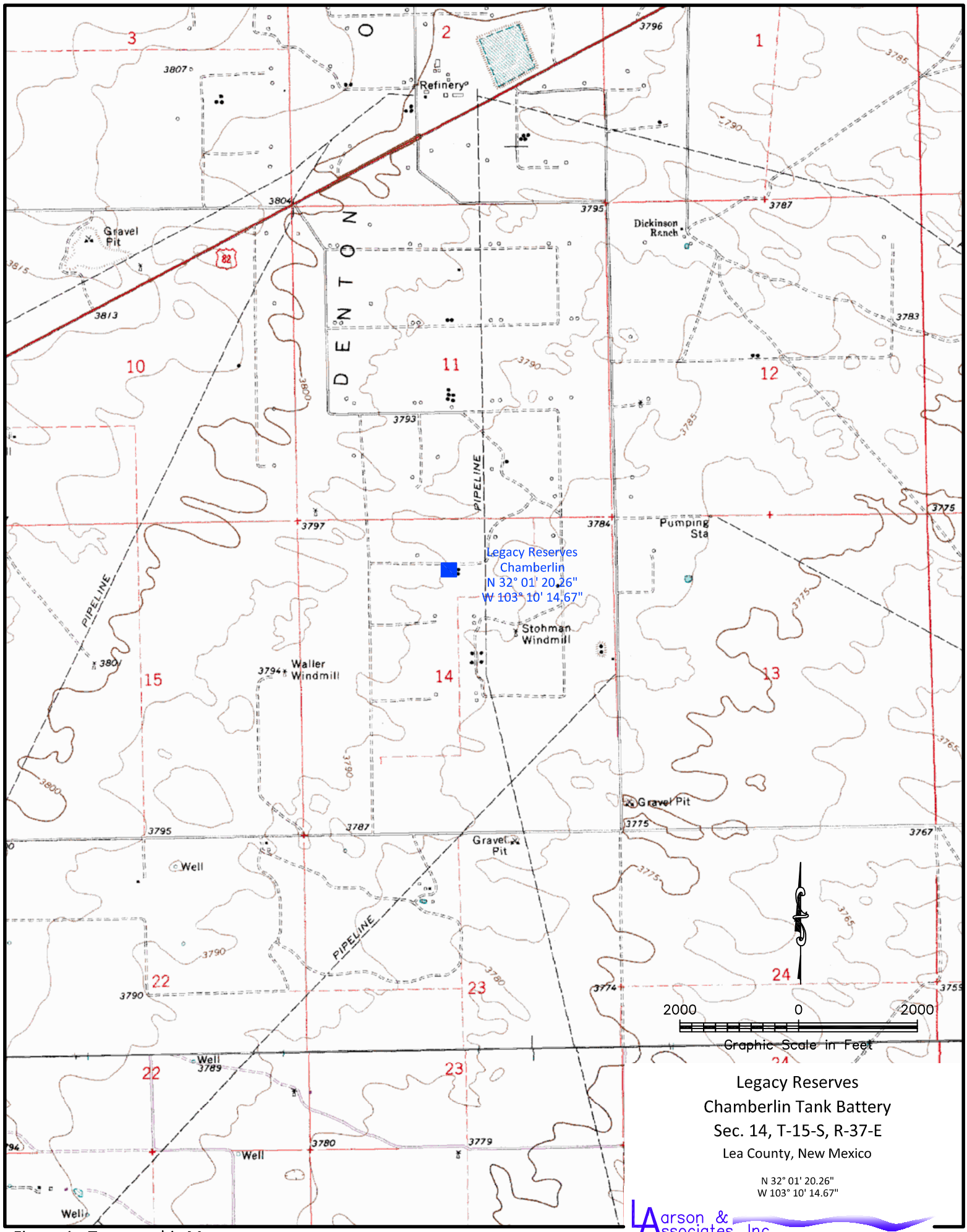
Sample ID	Date	Alkalinity (mg/L)	Chloride (mg/L)	Nitrate - N (mg/L)	TDS (mg/L)	Sulfate (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Potassium (mg/L)	Sodium (mg/L)
WQCC Limit:			**250**	**10**	**1000**	**600**				
TMW-1	06/11/2013	272	**263**	8.53	1,180	206	94	230	7.20	51
	12/26/2013	379	151	1.78	784	94.3	61.3	11.6	2.34	186

Notes: Analysis performed by Permian Basin Environmental Lab, Midland, Texas

All values except pH reported in milligrams per Liter - (mg/L, parts per million).

Indicates the value exceeds WQCC Domestic Water Quality Standard

FIGURES



Legacy Reserves
Chamberlin Tank Battery
Sec. 14, T-15-S, R-37-E
Lea County, New Mexico

N 32° 01' 20.26"
W 103° 10' 14.67"

Larson & Associates, Inc.
Environmental Consultants

Figure 1 - Topographic Map

Legacy Reserves
Chamberlin Tank Battery
Sec. 14, T-15-S, R-37-E
Lea County, New Mexico

N 33° 01' 20.26"
W 103° 10' 14.67"

Larson & Associates, Inc.
Environmental Consultants

Figure 2 - Aerial Map

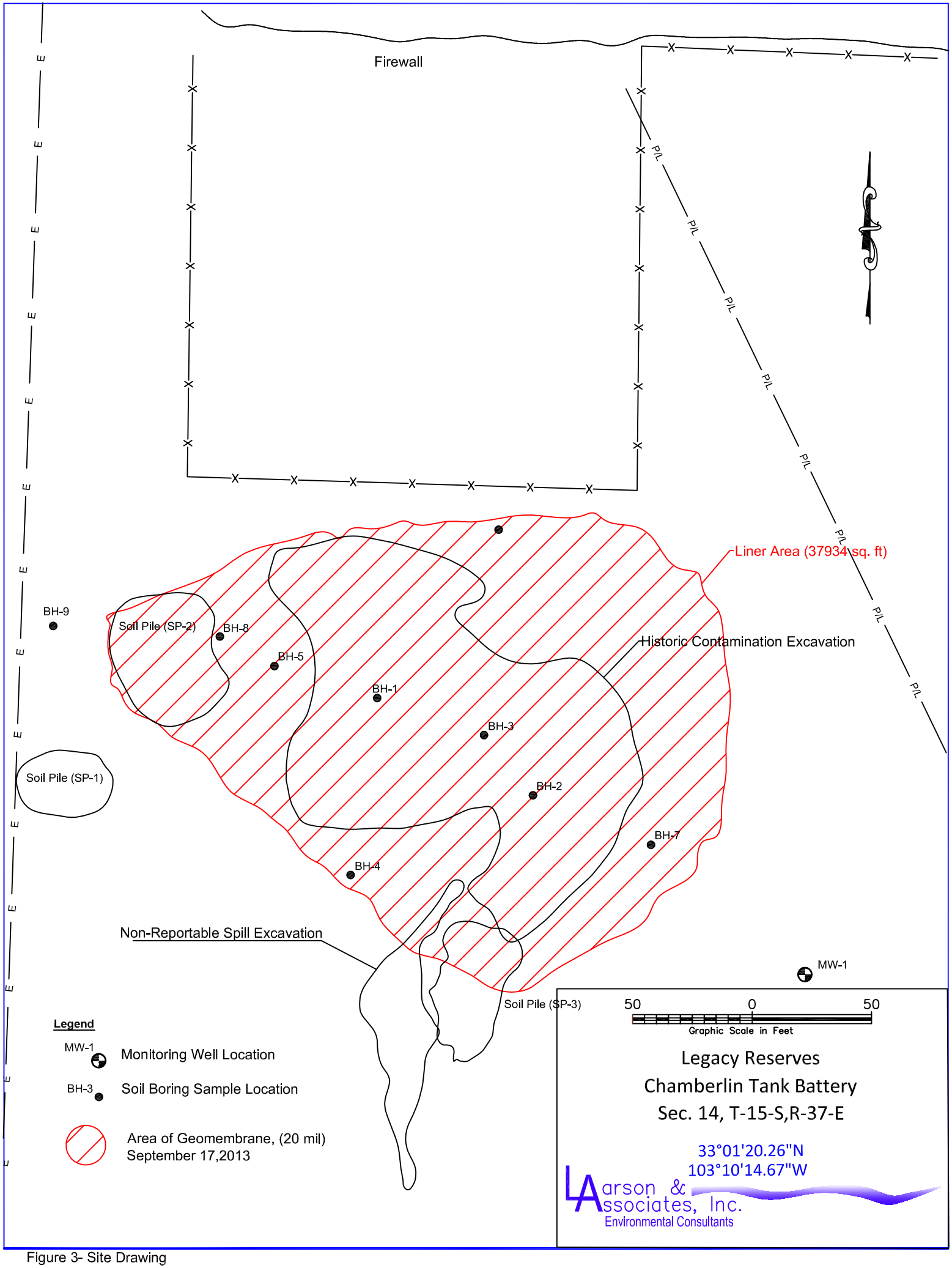


Figure 3- Site Drawing

APPPENDIX A

OCD Approval

Mark Larson

From: Griswold, Jim, EMNRD [Jim.Griswold@state.nm.us]
Sent: Wednesday, September 04, 2013 5:45 PM
To: Kevin Bracey
Cc: Mark Larson
Subject: 1R-2391, Chamberlain Battery Flow Line Leak

Mr. Bracey

I have reviewed the *Investigation and Remediation Report* dated 7/25/13 submitted on behalf of Legacy Reserves, LP by Larson & Associates, Inc. regarding historic releases immediately south the Chamberlain tank battery in Lea County northeast of Lovington, NM. I also made a visit to the site on August 23rd to meet with Mark Larson and the surface owner. I verbally approved the backfilling operation as described on page 8 of the report in the *Recommendations* section during the site visit. If the work has not already commenced, earthmoving operations may proceed including the removal of the soil pile residing south of the excavation area. Upon completion, a report of these backfilling and reseeding operations should be submitted to the OCD. Furthermore, monitoring well TMW-1 should be converted to a permanent well and sampled on a calendar quarter basis for the next 24 months. Groundwater samples should be analyzed for dissolved phase concentrations of benzene, toluene, ethylbenzene, total xylenes, naphthalene (all by Method 8260), sodium, magnesium, calcium, sulfate, chloride, nitrate, alkalinity, and total dissolved solids. Results of the groundwater testing should be submitted to the OCD semi-annually. Please retain a copy of this email for your files as no hardcopy will be sent. Thank you and feel free to contact me at any time with questions or comments.

Jim Griswold
Senior Hydrologist
EMNRD/Oil Conservation Division
1220 South St. Francis Drive
Santa Fe, New Mexico 87505
505.476.3465
email: jim.griswold@state.nm.us

--

APPENDIX B

Photographs

PHOTOGRAPHS

Legacy Chamberlain Lease Sign, April 4, 2012

Northwest Corner of Excavation (After May 2009) Viewing Northwest, April 4, 2012

PHOTOGRAPHS

Northwest Corner of Excavation (After May 2009) Viewing West, April 4, 2012

West Side of Excavation (After May 2009) Viewing Southwest, April 4, 2012

PHOTOGRAPHS

East Side of Excavation (After May 2009) Viewing North, April 4, 2012

Northwest Corner of Excavation Viewing North, August 24, 2012

PHOTOGRAPHS

Northwest Corner of Excavation Viewing Northwest, August 24, 2012

Northeast Corner of Excavation Viewing East, August 24, 2012

PHOTOGRAPHS

Southeast Corner of Excavation Viewing East, August 24, 2012

East Side of Excavation Viewing East, August 24, 2012

PHOTOGRAPHS

Northeast Corner of the Initial Soil Excavation Looking North, August 24, 2012

West Side of Excavation Viewing North, October 4, 2012

PHOTOGRAPHS

East Side of Excavation Viewing North, October 4, 2012

Southwest Corner of Excavation Viewing Southwest, October 4, 2012

PHOTOGRAPHS

Central Area of Excavation Viewing South, October 4, 2012

East Side of Excavation Viewing Southeast, October 4, 2012

PHOTOGRAPHS

Northeast Corner of Excavation Viewing Northeast, November 12, 2012

Southeast Corner of Excavation Viewing Southeast, November 12, 2012

PHOTOGRAPHS

Drilling at Location BH-2 Viewing South, March 13, 2013

East Side of Excavation Viewing North, July 9, 2013

PHOTOGRAPHS

East Side of Excavation Viewing South, July 9, 2013

Central Area of Excavation Viewing South, July 9, 2013

PHOTOGRAPHS

Central Area of Excavation Viewing North, July 9, 2013

West Side of Excavation Viewing West, July 9, 2013

PHOTOGRAPHS

West Side of Excavation Viewing South, July 9, 2013

Excavation Viewing Southeast, July 9, 2013

PHOTOGRAPHS

Flow Line (Non-Reportable Spill) Excavation Viewing South, July 9, 2013

Preparing Excavation for Liner Installation Viewing East, September 4, 2013

PHOTOGRAPHS

Preparing Excavation for Liner Viewing West, September 4, 2013

Preparing Excavation for Liner Viewing South, September 4, 2013

PHOTOGRAPHS

Preparing Excavation for Liner Viewing Southeast, September 4, 2013

Grading after Liner and Topsoil Viewing Southwest, September 26, 2013

PHOTOGRAPHS

Soil Borrow Are Viewing West, September 26, 2013

Project Completed Viewing Southeast, October 3, 2013

PHOTOGRAPHS

Project Completed Viewing South, October 3, 2013

Project Completed Viewing Southwest, October 3, 2013

APPENDIX C

Laboratory Report

January 07, 2014

Coty Woolf
Larson & Associates
507 N. Marienfeld #200
Midland, TX 79701
TEL: (432) 687-0901
FAX (432) 687-0456

Order No.: 1312221

RE: Legacy Chamberlain

Dear Coty Woolf:

DHL Analytical, Inc. received 1 sample(s) on 12/27/2013 for the analyses presented in the following report.

There were no problems with the analyses and all data met requirements of NELAC except where noted in the Case Narrative. All non-NELAC methods will be identified accordingly in the case narrative and all estimated uncertainties of test results are within method or EPA specifications.

If you have any questions regarding these tests results, please feel free to call. Thank you for using DHL Analytical.

Sincerely,

John DuPont
General Manager

This report was performed under the accreditation of the State of Texas Laboratory Certification Number: T104704211-13-11

Table of Contents

CHAIN-OF-CUSTODY

Larson & Associates, Inc.
Environmental Consultants
507 N. Marienfeld, Ste. 200
Midland, TX 79701
432-687-0901

DATE: 12-26-13 PAGE 1 OF 1
PO #: _____ LAB WORK ORDER #: 13122Z1
PROJECT LOCATION OR NAME: legacy - chamberlain
LAI PROJECT #: _____ COLLECTOR: ID

Data Reported to:

TRRP report? ☐ Yes ☐ No

TIME ZONE: Time zone/State: NM

S=SOIL P=PAINT
W=WATER SL=SLUDGE
A=AIR OT=OTHER

Field Sample I.D.	Lab #	Date	Time	Matrix	# of Containers	PRESERVATION: HCl	HNO_3	H_2SO_4 ☐ NaOH ☐	ICE	UNPRESERVED	ANALYSES: BTEX ☒ MTBE ☐	TRPH 418.1 ☐ TPH 1005 ☐ TPH 1006 ☐	GASOLINE MOD 8015 ☐	DIESEL - MOD 8015 ☐	VOC 8260 ☐	SVOC 8270 ☐ PAH 8270 ☐ HOLDPAH ☐	8081 FESTICIDES ☐ 8151 HERBICIDES ☐	8082 PCBS ☐	TCLP - METALS (RCRA) ☐ TCLP VOC ☐	TCLP - PEST ☐ HERB ☐ Semi-VOC ☐	TOTAL METALS (RCRA) ☐ D.W. 200.8 ☐ OTHER LIST ☐	LEAD - TOTAL ☐ TOX ☐ FLASHPOINT ☐ TCLP ☐	RCI ☐ TSS ☐ % MOISTURE ☐ CYANIDE ☐	TDS ☒ pH ☐ HEXAVALENT CHROMIUM ☐	EXPLOSIVES ☐ PECHLORATE ☐	CHLORIDE ☒ ANIONS ☒ ALKALINITY ☒	SO4	NO3	Ca, Na, K, Mg	FIELD NOTES
MW-1	01	12-26	12:00		5				X		X	X										X			X	X	X	X			

TOTAL

RELINQUISHED BY:(Signature) DATE/TIME 12-26-13 RECEIVED BY: (Signature)

RELINQUISHED BY:(Signature) DATE/TIME 12/27/13 8:35 RECEIVED BY: (Signature)

RELINQUISHED BY:(Signature) DATE/TIME RECEIVED BY: (Signature)

TURN AROUND TIME
NORMAL ☐
1 DAY ☐
2 DAY ☐
OTHER ☐

LABORATORY USE ONLY:
RECEIVING TEMP: 2.6 THERM #: 57
CUSTODY SEALS - ☐ BROKEN ☐ INTACT ☒ NOT USED
☒ CARRIER BILL #
☐ HAND DELIVERED

LSO
It's all in the delivery.

Airbill No. Z0479737

Lone Star Overnight
1-800-800-8984
www.lso.com

SHIP TO:
JENNIFER BARKER
DHL ANALYTICAL
2300 DOUBLE CREEK RD
ROUND ROCK, TX 78664
5123888222

From:
COTY WOOLF
LARSON AND ASSOCIATES
507 N MARIENFELD
MIDLAND, TX 79701
4326870901

B **AUS**

LSO PRIORITY OVERNIGHT
10:30 IN MOST CITIES
LATER IN REMOTE CITIES

PRINT DATE: 12/26/2013
QUICKCODE: WEIGHT: 30.00LBS
REF 1: 1D00V 0000

DHL Analytical, Inc.

Sample Receipt Checklist

Client Name **Larson & Associates**

Date Received: **12/27/2013**

Work Order Number **1312221**

Received by **JB**

Checklist completed by: _____ 12/27/2013
Signature | Date

Reviewed by JD 12/27/2013
Initials | Date

Carrier name LoneStar

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shippping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	2.6 °C
Water - VOA vials have zero headspace?	Yes ☑	No ☐	No VOA vials submitted ☐
Water - pH<2 acceptable upon receipt?	Yes ☐	No ☑	NA ☐ LOT # 7179
	Adjusted? Yes		Checked by CS
Water - ph>9 (S) or ph>12 (CN) acceptable upon receipt?	Yes ☐	No ☐	NA ☑ LOT #
	Adjusted?		Checked by

Any No response must be detailed in the comments section below.

Client contacted _____ Date contacted: _____ Person contacted _____

Contacted by: _____ Regarding _____

Comments: Sample was acidified in Login with HNO3 (Lot 7531)

Corrective Action _____

DHL Analytical, Inc. **Date:** *07-Jan-14*

CLIENT: Larson & Associates
Project: Legacy Chamberlain
Lab Order: 1312221

CASE NARRATIVE

Sample was analyzed using the methods outlined in the following references:

Method E300 - Anions Analysis
Method SW8021B - Volatile Organics by GC Analysis
Method SW6020A - Metals Analysis
Method M2540C - Total Dissolved Solids Analysis
Method M2320 B - Alkalinity Analysis

LOG IN

The sample was received and log-in performed on 12/27/13. A total of 1 sample was received. Nitric acid was added to the Metals fraction upon arrival at DHL Analytical. The sample arrived in good condition and was properly packaged.

ANIONS ANALYSIS

For Anions analysis performed on 12/27/13 the matrix spike and matrix spike duplicate recoveries were slightly below control limits for Chloride. These are flagged accordingly in the QC summary report. The reference sample selected for the matrix spike and matrix spike duplicate was from this work order. The LCS was within control limits for this analyte. No further corrective actions were taken.

METALS ANALYSIS

For Metals analysis performed on 1/2/14 the matrix spike recovery was slightly below control limits for Sodium. This is flagged accordingly. The reference sample selected for the matrix spike and matrix spike duplicate was not from this work order. The LCS was within control limits for this analyte. No further corrective actions were taken.

DHL Analytical, Inc.

Date: *07-Jan-14*

CLIENT: Larson & Associates
Project: Legacy Chamberlain
Lab Order: 1312221

Work Order Sample Summary

Lab Smp ID	Client Sample ID	Tag Number	Date Collected	Date Recved
1312221-01	MW-1		12/26/13 12:00 PM	12/27/2013

Lab Order: 1312221
Client: Larson & Associates
Project: Legacy Chamberlain

PREP DATES REPORT

Sample ID	Client Sample ID	Collection Date	Matrix	Test Number	Test Name	Prep Date	Batch ID
1312221-01A	MW-1	12/26/13 12:00 PM	Aqueous	SW5030C	Purge and Trap Water GC	01/03/14 09:40 AM	61195
1312221-01B	MW-1	12/26/13 12:00 PM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	12/31/13 08:25 AM	61154
	MW-1	12/26/13 12:00 PM	Aqueous	SW3005A	Aq Prep Metals : ICP-MS	12/31/13 08:25 AM	61154
1312221-01C	MW-1	12/26/13 12:00 PM	Aqueous	M2320 B	Alkalinity Preparation	12/27/13 11:15 AM	61134
	MW-1	12/26/13 12:00 PM	Aqueous	E300	Anion Preparation	12/27/13 10:00 AM	61132
	MW-1	12/26/13 12:00 PM	Aqueous	E300	Anion Preparation	12/27/13 10:00 AM	61132
	MW-1	12/26/13 12:00 PM	Aqueous	M2540C	TDS Preparation	01/02/14 08:30 AM	61188

Lab Order: 1312221
Client: Larson & Associates
Project: Legacy Chamberlain

ANALYTICAL DATES REPORT

Sample ID	Client Sample ID	Matrix	Test Number	Test Name	Batch ID	Dilution	Analysis Date	Run ID
1312221-01A	MW-1	Aqueous	SW8021B	Volatile Organics by GC	61195	1	01/03/14 12:27 PM	GC8_140103A
1312221-01B	MW-1	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	61154	10	01/02/14 03:57 PM	ICP-MS3_140102A
	MW-1	Aqueous	SW6020A	Trace Metals: ICP-MS - Water	61154	1	01/02/14 01:27 PM	ICP-MS2_140102A
1312221-01C	MW-1	Aqueous	M2320 B	Alkalinity	61134	1	12/27/13 11:38 AM	TITRATOR_131227A
	MW-1	Aqueous	E300	Anions by IC method - Water	61132	10	12/27/13 11:02 AM	IC_131227A
	MW-1	Aqueous	E300	Anions by IC method - Water	61132	1	12/27/13 10:31 AM	IC_131227A
	MW-1	Aqueous	M2540C	Total Dissolved Solids	61188	1	01/05/14 09:08 AM	WC_140102A

DHL Analytical, Inc.

Date: *07-Jan-14*

CLIENT:	Larson & Associates	**Client Sample ID:**	MW-1
Project:	Legacy Chamberlain	**Lab ID:**	1312221-01
Project No:		**Collection Date:**	12/26/13 12:00 PM
Lab Order:	1312221	**Matrix:**	AQUEOUS

Analyses	Result	MDL	RL	Qual	Units	DF	Date Analyzed
VOLATILE ORGANICS BY GC		**SW8021B**					Analyst: **AV**
Benzene	ND	0.000800	0.00200		mg/L	1	01/03/14 12:27 PM
Ethylbenzene	ND	0.00200	0.00600		mg/L	1	01/03/14 12:27 PM
Toluene	ND	0.00200	0.00600		mg/L	1	01/03/14 12:27 PM
Xylenes, Total	ND	0.00300	0.00900		mg/L	1	01/03/14 12:27 PM
Surr: a,a,a-Trifluorotoluene	98.8	0	87-113		%REC	1	01/03/14 12:27 PM
TRACE METALS: ICP-MS - WATER		**SW6020A**					Analyst: **SW**
Calcium	61.3	1.00	3.00		mg/L	10	01/02/14 03:57 PM
Magnesium	11.6	0.100	0.300		mg/L	1	01/02/14 01:27 PM
Potassium	2.34	0.100	0.300		mg/L	1	01/02/14 01:27 PM
Sodium	186	1.00	3.00		mg/L	10	01/02/14 03:57 PM
ANIONS BY IC METHOD - WATER		**E300**					Analyst: **JBC**
Chloride	151	3.00	10.0		mg/L	10	12/27/13 11:02 AM
Nitrate-N	1.78	0.100	0.500		mg/L	1	12/27/13 10:31 AM
Sulfate	94.3	1.00	3.00		mg/L	1	12/27/13 10:31 AM
ALKALINITY		**M2320 B**					Analyst: **JBC**
Alkalinity, Bicarbonate (As CaCO3)	379	12.5	25.0		mg/L @ pH 4.52	1	12/27/13 11:38 AM
Alkalinity, Carbonate (As CaCO3)	ND	12.5	25.0		mg/L @ pH 4.52	1	12/27/13 11:38 AM
Alkalinity, Hydroxide (As CaCO3)	ND	12.5	25.0		mg/L @ pH 4.52	1	12/27/13 11:38 AM
Alkalinity, Total (As CaCO3)	379	25.0	25.0		mg/L @ pH 4.52	1	12/27/13 11:38 AM
TOTAL DISSOLVED SOLIDS		**M2540C**					Analyst: **MK**
Total Dissolved Solids (Residue, Filterable)	784	10.0	10.0		mg/L	1	01/05/14 09:08 AM

Qualifiers:

*	Value exceeds TCLP Maximum Concentration Level	B	Analyte detected in the associated Method Blank
C	Sample Result or QC discussed in the Case Narrative	DF	Dilution Factor
E	TPH pattern not Gas or Diesel Range Pattern	J	Analyte detected between MDL and RL
MDL	Method Detection Limit	ND	Not Detected at the Method Detection Limit
RL	Reporting Limit	S	Spike Recovery outside control limits
N	Parameter not NELAC certified		

CLIENT: Larson & Associates
Work Order: 1312221
Project: Legacy Chamberlain

ANALYTICAL QC SUMMARY REPORT

RunID: GC8_140103A

The QC data in batch 61195 applies to the following samples: 1312221-01A

Sample ID **LCS-61195**	Batch ID: **61195**	TestNo: **SW8021B**	Units: **mg/L**
SampType: **LCS**	Run ID: **GC8_140103A**	Analysis Date: **1/3/2014 10:32:17 AM**	Prep Date: **1/3/2014**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	0.0444	0.00200	0.0500	0	88.9	81	125			
Toluene	0.0473	0.00600	0.0500	0	94.7	84	123			
Ethylbenzene	0.0485	0.00600	0.0500	0	96.9	83	119			
Xylenes, Total	0.144	0.00900	0.150	0	95.8	81	117			
Surr: a,a,a-Trifluorotoluene	192		200.0		95.9	87	113			

Sample ID **MB-61195**	Batch ID: **61195**	TestNo: **SW8021B**	Units: **mg/L**
SampType: **MBLK**	Run ID: **GC8_140103A**	Analysis Date: **1/3/2014 11:11:26 AM**	Prep Date: **1/3/2014**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	ND	0.00200								
Toluene	ND	0.00600								
Ethylbenzene	ND	0.00600								
Xylenes, Total	ND	0.00900								
Surr: a,a,a-Trifluorotoluene	200		200.0		100	87	113			

Sample ID **1312228-01AMS**	Batch ID: **61195**	TestNo: **SW8021B**	Units: **mg/L**
SampType: **MS**	Run ID: **GC8_140103A**	Analysis Date: **1/3/2014 1:26:44 PM**	Prep Date: **1/3/2014**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	0.0476	0.00200	0.0500	0	95.2	81	125			
Toluene	0.0507	0.00600	0.0500	0	101	84	123			
Ethylbenzene	0.0511	0.00600	0.0500	0	102	83	119			
Xylenes, Total	0.151	0.00900	0.150	0	100	81	117			
Surr: a,a,a-Trifluorotoluene	197		200.0		98.6	87	113			

Sample ID **1312228-01AMSD**	Batch ID: **61195**	TestNo: **SW8021B**	Units: **mg/L**
SampType: **MSD**	Run ID: **GC8_140103A**	Analysis Date: **1/3/2014 1:46:30 PM**	Prep Date: **1/3/2014**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	0.0472	0.00200	0.0500	0	94.3	81	125	0.901	20	
Toluene	0.0504	0.00600	0.0500	0	101	84	123	0.485	20	
Ethylbenzene	0.0511	0.00600	0.0500	0	102	83	119	0.060	20	
Xylenes, Total	0.151	0.00900	0.150	0	101	81	117	0.171	20	
Surr: a,a,a-Trifluorotoluene	196		200.0		98.1	87	113	0	0	

Qualifiers:

B	Analyte detected in the associated Method Blank	DF	Dilution Factor
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	R	RPD outside accepted control limits
RL	Reporting Limit	S	Spike Recovery outside control limits
J	Analyte detected between SDL and RL	N	Parameter not NELAC certified

CLIENT: Larson & Associates
Work Order: 1312221
Project: Legacy Chamberlain

ANALYTICAL QC SUMMARY REPORT

RunID: GC8_140103A

Sample ID **ICV-140103**	Batch ID: **R70530**	TestNo: **SW8021B**	Units: **mg/L**
SampType: **ICV**	Run ID: **GC8_140103A**	Analysis Date: **1/3/2014 9:57:41 AM**	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	0.0928	0.00200	0.100	0	92.8	80	120			
Toluene	0.0978	0.00600	0.100	0	97.8	80	120			
Ethylbenzene	0.0991	0.00600	0.100	0	99.1	80	120			
Xylenes, Total	0.293	0.00900	0.300	0	97.5	80	120			
Surr: a,a,a-Trifluorotoluene	192		200.0		95.9	87	113			

Sample ID **CCV1-140103**	Batch ID: **R70530**	TestNo: **SW8021B**	Units: **mg/L**
SampType: **CCV**	Run ID: **GC8_140103A**	Analysis Date: **1/3/2014 2:22:12 PM**	Prep Date:

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	0.0458	0.00200	0.0500	0	91.6	80	120			
Toluene	0.0490	0.00600	0.0500	0	97.9	80	120			
Ethylbenzene	0.0499	0.00600	0.0500	0	99.8	80	120			
Xylenes, Total	0.148	0.00900	0.150	0	98.6	80	120			
Surr: a,a,a-Trifluorotoluene	194		200.0		97.0	87	113			

Qualifiers:

B	Analyte detected in the associated Method Blank	DF	Dilution Factor
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	R	RPD outside accepted control limits
RL	Reporting Limit	S	Spike Recovery outside control limits
J	Analyte detected between SDL and RL	N	Parameter not NELAC certified

CLIENT: Larson & Associates
Work Order: 1312221
Project: Legacy Chamberlain

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS2_140102A

The QC data in batch 61154 applies to the following samples: 1312221-01B

Sample ID	**MB-61154**	Batch ID:	**61154**	TestNo:	**SW6020A**	Units:	**mg/L**
SampType:	**MBLK**	Run ID:	**ICP-MS2_140102A**	Analysis Date:	**1/2/2014 12:16:00 PM**	Prep Date:	**12/31/2013**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	ND	0.300								
Magnesium	ND	0.300								
Potassium	ND	0.300								
Sodium	ND	0.300								

Sample ID	**LCS-61154**	Batch ID:	**61154**	TestNo:	**SW6020A**	Units:	**mg/L**
SampType:	**LCS**	Run ID:	**ICP-MS2_140102A**	Analysis Date:	**1/2/2014 12:34:00 PM**	Prep Date:	**12/31/2013**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	5.38	0.300	5.00	0	108	80	120			
Magnesium	5.30	0.300	5.00	0	106	80	120			
Potassium	5.19	0.300	5.00	0	104	80	120			
Sodium	5.35	0.300	5.00	0	107	80	120			

Sample ID	**LCSD-61154**	Batch ID:	**61154**	TestNo:	**SW6020A**	Units:	**mg/L**
SampType:	**LCSD**	Run ID:	**ICP-MS2_140102A**	Analysis Date:	**1/2/2014 12:40:00 PM**	Prep Date:	**12/31/2013**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	5.57	0.300	5.00	0	111	80	120	3.47	15	
Magnesium	5.37	0.300	5.00	0	107	80	120	1.24	15	
Potassium	5.27	0.300	5.00	0	105	80	120	1.59	15	
Sodium	5.41	0.300	5.00	0	108	80	120	1.08	15	

Sample ID	**1312227-01D SD**	Batch ID:	**61154**	TestNo:	**SW6020A**	Units:	**mg/L**
SampType:	**SD**	Run ID:	**ICP-MS2_140102A**	Analysis Date:	**1/2/2014 12:58:00 PM**	Prep Date:	**12/31/2013**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	1.26	1.50	0	1.26				0.158	10	
Magnesium	0.706	1.50	0	0.691				2.28	10	
Potassium	2.03	1.50	0	2.02				0.468	10	

Sample ID	**1312227-01D PDS**	Batch ID:	**61154**	TestNo:	**SW6020A**	Units:	**mg/L**
SampType:	**PDS**	Run ID:	**ICP-MS2_140102A**	Analysis Date:	**1/2/2014 1:39:00 PM**	Prep Date:	**12/31/2013**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	6.45	0.300	5.00	1.26	104	80	120			
Magnesium	5.66	0.300	5.00	0.691	99.5	80	120			
Potassium	6.87	0.300	5.00	2.02	96.9	80	120			

Qualifiers:

B	Analyte detected in the associated Method Blank	DF	Dilution Factor
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	R	RPD outside accepted control limits
RL	Reporting Limit	S	Spike Recovery outside control limits
J	Analyte detected between SDL and RL	N	Parameter not NELAC certified

CLIENT: Larson & Associates
Work Order: 1312221
Project: Legacy Chamberlain

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS2_140102A

Sample ID **1312227-01D MS**	Batch ID: **61154**	TestNo: **SW6020A**	Units: **mg/L**
SampType: **MS**	Run ID: **ICP-MS2_140102A**	Analysis Date: **1/2/2014 1:44:00 PM**	Prep Date: **12/31/2013**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	6.67	0.300	5.00	1.26	108	80	120			
Magnesium	5.96	0.300	5.00	0.691	105	80	120			
Potassium	7.26	0.300	5.00	2.02	105	80	120			
Sodium	117	0.300	5.00	113	78.0	80	120			S

Sample ID **1312227-01D MSD**	Batch ID: **61154**	TestNo: **SW6020A**	Units: **mg/L**
SampType: **MSD**	Run ID: **ICP-MS2_140102A**	Analysis Date: **1/2/2014 1:50:00 PM**	Prep Date: **12/31/2013**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	6.75	0.300	5.00	1.26	110	80	120	1.12	15	
Magnesium	5.94	0.300	5.00	0.691	105	80	120	0.286	15	
Potassium	7.27	0.300	5.00	2.02	105	80	120	0.220	15	
Sodium	117	0.300	5.00	113	92.0	80	120	0.598	15	

Sample ID **1312227-01D SD**	Batch ID: **61154**	TestNo: **SW6020A**	Units: **mg/L**
SampType: **SD**	Run ID: **ICP-MS2_140102A**	Analysis Date: **1/2/2014 2:02:00 PM**	Prep Date: **12/31/2013**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sodium	124	15.0	0	118				4.94	10	

Sample ID **1312227-01D PDS**	Batch ID: **61154**	TestNo: **SW6020A**	Units: **mg/L**
SampType: **PDS**	Run ID: **ICP-MS2_140102A**	Analysis Date: **1/2/2014 2:08:00 PM**	Prep Date: **12/31/2013**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sodium	172	3.00	50.0	118	107	80	120			

Qualifiers:

B	Analyte detected in the associated Method Blank	DF	Dilution Factor
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	R	RPD outside accepted control limits
RL	Reporting Limit	S	Spike Recovery outside control limits
J	Analyte detected between SDL and RL	N	Parameter not NELAC certified

CLIENT: Larson & Associates
Work Order: 1312221
Project: Legacy Chamberlain

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS2_140102A

Sample ID	**ILCVL-140102**	Batch ID:	**R70501**	TestNo:	**SW6020A**	Units:	**mg/L**
SampType:	**LCVL**	Run ID:	**ICP-MS2_140102A**	Analysis Date:	**1/2/2014 12:05:00 PM**	Prep Date:	

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	0.104	0.300	0.100	0	104	70	130			
Magnesium	0.116	0.300	0.100	0	116	70	130			
Potassium	0.113	0.300	0.100	0	113	70	130			
Sodium	0.101	0.300	0.100	0	101	70	130			

Sample ID	**LCVL1-140102**	Batch ID:	**R70501**	TestNo:	**SW6020A**	Units:	**mg/L**
SampType:	**LCVL**	Run ID:	**ICP-MS2_140102A**	Analysis Date:	**1/2/2014 2:49:00 PM**	Prep Date:	

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	0.107	0.300	0.100	0	107	70	130			
Magnesium	0.112	0.300	0.100	0	112	70	130			
Potassium	0.115	0.300	0.100	0	115	70	130			
Sodium	0.127	0.300	0.100	0	127	70	130			

Sample ID	**ICV1-140102**	Batch ID:	**R70501**	TestNo:	**SW6020A**	Units:	**mg/L**
SampType:	**ICV**	Run ID:	**ICP-MS2_140102A**	Analysis Date:	**1/2/2014 11:47:00 AM**	Prep Date:	

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	2.72	0.300	2.50	0	109	90	110			
Magnesium	2.68	0.300	2.50	0	107	90	110			
Potassium	2.61	0.300	2.50	0	104	90	110			
Sodium	2.65	0.300	2.50	0	106	90	110			

Sample ID	**CCV1-140102**	Batch ID:	**R70501**	TestNo:	**SW6020A**	Units:	**mg/L**
SampType:	**CCV**	Run ID:	**ICP-MS2_140102A**	Analysis Date:	**1/2/2014 2:14:00 PM**	Prep Date:	

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	5.38	0.300	5.00	0	108	90	110			
Magnesium	5.16	0.300	5.00	0	103	90	110			
Potassium	5.08	0.300	5.00	0	102	90	110			
Sodium	5.23	0.300	5.00	0	105	90	110			

Qualifiers:

B	Analyte detected in the associated Method Blank	DF	Dilution Factor
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	R	RPD outside accepted control limits
RL	Reporting Limit	S	Spike Recovery outside control limits
J	Analyte detected between SDL and RL	N	Parameter not NELAC certified

CLIENT: Larson & Associates
Work Order: 1312221
Project: Legacy Chamberlain

ANALYTICAL QC SUMMARY REPORT

RunID: ICP-MS3_140102A

Sample ID	**ILCVL-140102**	Batch ID:	**R70510**	TestNo:	**SW6020A**	Units:	**mg/L**
SampType:	**LCVL**	Run ID:	**ICP-MS3_140102A**	Analysis Date:	**1/2/2014 12:57:00 PM**	Prep Date:	

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	0.0758	0.300	0.100	0	75.8	70	130			
Sodium	0.0932	0.300	0.100	0	93.2	70	130			

Sample ID	**LCVL1-140102**	Batch ID:	**R70510**	TestNo:	**SW6020A**	Units:	**mg/L**
SampType:	**LCVL**	Run ID:	**ICP-MS3_140102A**	Analysis Date:	**1/2/2014 4:22:00 PM**	Prep Date:	

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	0.0984	0.300	0.100	0	98.4	70	130			
Sodium	0.0765	0.300	0.100	0	76.5	70	130			

Sample ID	**ICV1-140102**	Batch ID:	**R70510**	TestNo:	**SW6020A**	Units:	**mg/L**
SampType:	**ICV**	Run ID:	**ICP-MS3_140102A**	Analysis Date:	**1/2/2014 12:45:00 PM**	Prep Date:	

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	2.55	0.300	2.50	0	102	90	110			
Sodium	2.61	0.300	2.50	0	104	90	110			

Sample ID	**CCV1-140102**	Batch ID:	**R70510**	TestNo:	**SW6020A**	Units:	**mg/L**
SampType:	**CCV**	Run ID:	**ICP-MS3_140102A**	Analysis Date:	**1/2/2014 4:03:00 PM**	Prep Date:	

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	5.45	0.300	5.00	0	109	90	110			
Sodium	5.33	0.300	5.00	0	107	90	110			

Qualifiers:

B	Analyte detected in the associated Method Blank	DF	Dilution Factor
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	R	RPD outside accepted control limits
RL	Reporting Limit	S	Spike Recovery outside control limits
J	Analyte detected between SDL and RL	N	Parameter not NELAC certified

CLIENT: Larson & Associates
Work Order: 1312221
Project: Legacy Chamberlain

ANALYTICAL QC SUMMARY REPORT

RunID: IC_131227A

The QC data in batch 61132 applies to the following samples: 1312221-01C

Sample ID	**LCS-61132**	Batch ID:	**61132**	TestNo:	**E300**	Units:	**mg/L**
SampType:	**LCS**	Run ID:	**IC_131227A**	Analysis Date:	**12/27/2013 9:21:48 AM**	Prep Date:	**12/27/2013**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	9.49	1.00	10.00	0	94.9	90	110			
Nitrate-N	5.07	0.500	5.000	0	101	90	110			
Sulfate	29.2	3.00	30.00	0	97.4	90	110			

Sample ID	**LCSD-61132**	Batch ID:	**61132**	TestNo:	**E300**	Units:	**mg/L**
SampType:	**LCSD**	Run ID:	**IC_131227A**	Analysis Date:	**12/27/2013 9:36:24 AM**	Prep Date:	**12/27/2013**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	9.55	1.00	10.00	0	95.5	90	110	0.699	20	
Nitrate-N	5.09	0.500	5.000	0	102	90	110	0.301	20	
Sulfate	29.2	3.00	30.00	0	97.5	90	110	0.024	20	

Sample ID	**MB-61132**	Batch ID:	**61132**	TestNo:	**E300**	Units:	**mg/L**
SampType:	**MBLK**	Run ID:	**IC_131227A**	Analysis Date:	**12/27/2013 10:07:16 A**	Prep Date:	**12/27/2013**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	ND	1.00								
Nitrate-N	ND	0.500								
Sulfate	ND	3.00								

Sample ID	**1312221-01C MS**	Batch ID:	**61132**	TestNo:	**E300**	Units:	**mg/L**
SampType:	**MS**	Run ID:	**IC_131227A**	Analysis Date:	**12/27/2013 11:18:03 A**	Prep Date:	**12/27/2013**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	322	10.0	200.0	150.7	85.6	90	110			S
Sulfate	298	30.0	200.0	90.67	104	90	110			

Sample ID	**1312221-01C MSD**	Batch ID:	**61132**	TestNo:	**E300**	Units:	**mg/L**
SampType:	**MSD**	Run ID:	**IC_131227A**	Analysis Date:	**12/27/2013 11:32:40 A**	Prep Date:	**12/27/2013**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	327	10.0	200.0	150.7	88.0	90	110	1.50	20	S
Sulfate	302	30.0	200.0	90.67	106	90	110	1.55	20	

Sample ID	**1312221-01C MS**	Batch ID:	**61132**	TestNo:	**E300**	Units:	**mg/L**
SampType:	**MS**	Run ID:	**IC_131227A**	Analysis Date:	**12/27/2013 11:47:16 A**	Prep Date:	**12/27/2013**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Nitrate-N	6.20	0.500	4.516	1.784	97.8	90	110			

Qualifiers:

B	Analyte detected in the associated Method Blank	DF	Dilution Factor
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	R	RPD outside accepted control limits
RL	Reporting Limit	S	Spike Recovery outside control limits
J	Analyte detected between SDL and RL	N	Parameter not NELAC certified

CLIENT: Larson & Associates
Work Order: 1312221
Project: Legacy Chamberlain

ANALYTICAL QC SUMMARY REPORT

RunID: IC_131227A

Sample ID **1312221-01C MSD**	Batch ID: **61132**	TestNo: **E300**	Units: **mg/L**		
SampType: **MSD**	Run ID: **IC_131227A**	Analysis Date: **12/27/2013 12:01:52 P**	Prep Date: **12/27/2013**		

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Nitrate-N	6.23	0.500	4.516	1.784	98.6	90	110	0.523	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	DF	Dilution Factor
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	R	RPD outside accepted control limits
RL	Reporting Limit	S	Spike Recovery outside control limits
J	Analyte detected between SDL and RL	N	Parameter not NELAC certified

CLIENT: Larson & Associates
Work Order: 1312221
Project: Legacy Chamberlain

ANALYTICAL QC SUMMARY REPORT

RunID: IC_131227A

Sample ID	**ICV-131227**	Batch ID:	**R70443**	TestNo:	**E300**	Units:	**mg/L**
SampType:	**ICV**	Run ID:	**IC_131227A**	Analysis Date:	**12/27/2013 8:58:04 AM**	Prep Date:	

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	24.0	1.00	25.00	0	96.0	90	110			
Nitrate-N	13.0	0.500	12.50	0	104	90	110			
Sulfate	74.6	3.00	75.00	0	99.5	90	110			

Sample ID	**CCV1-131227**	Batch ID:	**R70443**	TestNo:	**E300**	Units:	**mg/L**
SampType:	**CCV**	Run ID:	**IC_131227A**	Analysis Date:	**12/27/2013 12:16:28 P**	Prep Date:	

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	9.69	1.00	10.00	0	96.9	90	110			
Nitrate-N	5.06	0.500	5.000	0	101	90	110			
Sulfate	30.6	3.00	30.00	0	102	90	110			

Qualifiers:

B	Analyte detected in the associated Method Blank	DF	Dilution Factor
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	R	RPD outside accepted control limits
RL	Reporting Limit	S	Spike Recovery outside control limits
J	Analyte detected between SDL and RL	N	Parameter not NELAC certified

CLIENT: Larson & Associates
Work Order: 1312221
Project: Legacy Chamberlain

ANALYTICAL QC SUMMARY REPORT

RunID: TITRATOR_131227A

The QC data in batch 61134 applies to the following samples: 1312221-01C

Sample ID **LCS-61134**	Batch ID: **61134**	TestNo: **M2320 B**	Units: **mg/L @ pH 4.27**
SampType: **LCS**	Run ID: **TITRATOR_131227A**	Analysis Date: **12/27/2013 11:29:00 A**	Prep Date: **12/27/2013**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	55.7	20.0	50.00	0	111	74	129			

Sample ID **MB-61134**	Batch ID: **61134**	TestNo: **M2320 B**	Units: **mg/L @ pH 4.49**
SampType: **MBLK**	Run ID: **TITRATOR_131227A**	Analysis Date: **12/27/2013 11:31:00 A**	Prep Date: **12/27/2013**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	ND	20.0								
Alkalinity, Carbonate (As CaCO3)	ND	20.0								
Alkalinity, Hydroxide (As CaCO3)	ND	20.0								
Alkalinity, Total (As CaCO3)	ND	20.0								

Sample ID **1312221-01C DUP**	Batch ID: **61134**	TestNo: **M2320 B**	Units: **mg/L @ pH 4.52**
SampType: **DUP**	Run ID: **TITRATOR_131227A**	Analysis Date: **12/27/2013 11:46:00 A**	Prep Date: **12/27/2013**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	379	25.0	0	379.1				0	20	
Alkalinity, Carbonate (As CaCO3)	0	25.0	0	0				0	20	
Alkalinity, Hydroxide (As CaCO3)	0	25.0	0	0				0	20	
Alkalinity, Total (As CaCO3)	379	25.0	0	379.1				0	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	DF	Dilution Factor
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	R	RPD outside accepted control limits
RL	Reporting Limit	S	Spike Recovery outside control limits
J	Analyte detected between SDL and RL	N	Parameter not NELAC certified

CLIENT: Larson & Associates
Work Order: 1312221
Project: Legacy Chamberlain

ANALYTICAL QC SUMMARY REPORT

RunID: TITRATOR_131227A

Sample ID **ICV-131227**	Batch ID: **R70444**	TestNo: **M2320 B**	Units: **mg/L @ pH 4.5**
SampType: **ICV**	Run ID: **TITRATOR_131227A**	Analysis Date: **12/27/2013 8:31:00 AM**	Prep Date: **12/27/2013**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	18.7	20.0	0							
Alkalinity, Carbonate (As CaCO3)	82.2	20.0	0							
Alkalinity, Hydroxide (As CaCO3)	0	20.0	0							
Alkalinity, Total (As CaCO3)	101	20.0	100.0	0	101	98	102			

Sample ID **CCV3-131227**	Batch ID: **R70444**	TestNo: **M2320 B**	Units: **mg/L @ pH 4.49**
SampType: **CCV**	Run ID: **TITRATOR_131227A**	Analysis Date: **12/27/2013 11:09:00 A**	Prep Date: **12/27/2013**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	20.3	20.0	0							
Alkalinity, Carbonate (As CaCO3)	80.2	20.0	0							
Alkalinity, Hydroxide (As CaCO3)	0	20.0	0							
Alkalinity, Total (As CaCO3)	100	20.0	100.0	0	100	90	110			

Sample ID **CCV1-131227**	Batch ID: **R70444**	TestNo: **M2320 B**	Units: **mg/L @ pH 4.51**
SampType: **CCV**	Run ID: **TITRATOR_131227A**	Analysis Date: **12/27/2013 12:12:00 P**	Prep Date: **12/27/2013**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	23.6	20.0	0							
Alkalinity, Carbonate (As CaCO3)	77.4	20.0	0							
Alkalinity, Hydroxide (As CaCO3)	0	20.0	0							
Alkalinity, Total (As CaCO3)	101	20.0	100.0	0	101	90	110			

Qualifiers:

B	Analyte detected in the associated Method Blank	DF	Dilution Factor
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	R	RPD outside accepted control limits
RL	Reporting Limit	S	Spike Recovery outside control limits
J	Analyte detected between SDL and RL	N	Parameter not NELAC certified

CLIENT: Larson & Associates
Work Order: 1312221
Project: Legacy Chamberlain

ANALYTICAL QC SUMMARY REPORT

RunID: WC_140102A

The QC data in batch 61188 applies to the following samples: 1312221-01C

Sample ID	**MB-61188**	Batch ID:	**61188**	TestNo:	**M2540C**	Units:	**mg/L**
SampType:	**MBLK**	Run ID:	**WC_140102A**	Analysis Date:	**1/5/2014 9:08:00 AM**	Prep Date:	**1/2/2014**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	ND	10.0								

Sample ID	**LCS-61188**	Batch ID:	**61188**	TestNo:	**M2540C**	Units:	**mg/L**
SampType:	**LCS**	Run ID:	**WC_140102A**	Analysis Date:	**1/5/2014 9:08:00 AM**	Prep Date:	**1/2/2014**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	758	10.0	745.6	0	102	90	113			

Sample ID	**1312221-01C-DUP**	Batch ID:	**61188**	TestNo:	**M2540C**	Units:	**mg/L**
SampType:	**DUP**	Run ID:	**WC_140102A**	Analysis Date:	**1/5/2014 9:08:00 AM**	Prep Date:	**1/2/2014**

Analyte	Result	RL	SPK value	Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	788	10.0	0	784.0				0.509	5	

Qualifiers:

B	Analyte detected in the associated Method Blank	DF	Dilution Factor
J	Analyte detected between MDL and RL	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit	R	RPD outside accepted control limits
RL	Reporting Limit	S	Spike Recovery outside control limits
J	Analyte detected between SDL and RL	N	Parameter not NELAC certified

APPENDIX D

Initial and Final C-141

District I
1625 N. French Dr., Hobbs, NM 88240
District II
1301 W. Grand Avenue, 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 October 10, 2003

Submit 2 Copies to appropriate District Office in accordance with Rule 116 on back side of form

Release Notification and Corrective Action

OPERATOR

☒ Initial Report Final Report

Name of Company Legacy Reserves, LP	Contact Kevin Bracey
Address P. O. Box 10848, Midland, Texas 79702	Telephone No. 432-238-2856
Facility Name **Chamberlain Historical**	Facility Type Tank Battery

Surface Owner Darr Angell	Mineral Owner	Lease No.

LOCATION OF RELEASE

API # 30-025-05312

Unit Letter	Section	Township	Range	Feet from the	North/South Line	Feet from the	East/West Line	County
C	14	15S	37E					Lea

Latitude 33° 01 16.7" North Longitude 103° 10 13.6" West

NATURE OF RELEASE

Type of Release Produced Water and crude oil	Volume of Release Unknown	Volume Recovered Unknown
Source of Release Unknown	Date and Hour of Occurrence Historical	Date and Hour of Discovery Historical
Was Immediate Notice Given? Yes No Not Required	If YES, To Whom?	
By Whom?	Date and Hour	
Was a Watercourse Reached? ☐ Yes ☒ No	If YES, Volume Impacting the Watercourse.	

If a Watercourse was Impacted, Describe Fully.* WATER @ 57'

Describe Cause of Problem and Remedial Action Taken: Historical impact discovered during remediation of non-reportable release. The site will be remediated to NMOCD guidelines.

Describe Area Affected and Cleanup Action Taken. Release impacted approximately 20,000 square feet.

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: Kevin Bracey	**OIL CONSERVATION DIVISION**
Printed Name: Kevin Bracey	ENV ENGINEER: Approved by ~~District Supervisor~~: Geoffrey Leking
Title: Production Foreman	Approval Date: 01/11/10 Expiration Date: 03/11/10
E-mail Address: kbracey@legacylp.com	Conditions of Approval: DELINEATE TO CLEAN +1, SUBMIT FINAL C-141 BY 03/11/10. IRP-10-1-2391
Date: 1/7/2010 Phone: 432-238-2856	

fGRL 1001160082

RECEIVED
JAN 11 2010
HOBBSOCD

1RP-2391

District I
1625 N. French Dr., Hobbs, NM 88240
District II
1301 W. Grand Avenue, 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 October 10, 2003

Submit 2 Copies to appropriate District Office in accordance with Rule 116 on back side of form

Release Notification and Corrective Action

OPERATOR

☐ Initial Report ☒ Final Report

Name of Company: Legacy Reserves, L.P.	Contact: Kevin Bracey
Address: P.O. Box 10848, Midland, TX 79702	Telephone No.: (432) 238-2856
Facility Name: Chamberlain Historical	Facility Type: Tank Battery

Surface Owner: Darr Angell	Mineral Owner	Lease No.

LOCATION OF RELEASE

Unit Letter	Section	Township	Range	Feet from the	North/South Line	Feet from the	East/West Line	County
C	14	15S	37E					Lea

Latitude: N 33° 01' 16.7" Longitude: W 103° 10' 13.6"

NATURE OF RELEASE

Type of Release: Produced Water and Crude Oil	Volume of Release: Unknown	Volume Recovered: None
Source of Release: Unknown	Date and Hour of Occurrence: Historical	Date and Hour of Discovery: Historical
Was Immediate Notice Given? ☐ Yes ☐ No ☐ Not Required	If YES, To Whom?	
By Whom?	Date and Hour	
Was a Watercourse Reached? ☐ Yes ☒ No	If YES, Volume Impacting the Watercourse.	

If a Watercourse was Impacted, Describe Fully.*

Describe Cause of Problem and Remedial Action Taken.* Historic impact discovered during remediation of non-reportable quantity release from flow line. Soil was excavated to approximately 20 feet bgs and disposed at OCD permitted landfill/landfarm.

Describe Area Affected and Cleanup Action Taken.* Historic contamination believed to be from a pit was excavated to about 20 feet. Contaminated soil was disposed at OCD permitted landfill/landfarm. Excavation was filled to approximately 4 feet bgs where 20-mil polyethylene line was installed, per OCD approval. Remainder of excavation above liner was covered with topsoil. Location will be seeded per landowner's specification when adequate soil moisture is received.

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: Kevin Bracey	OIL CONSERVATION DIVISION	
Printed Name: Kevin Bracey	Approved by District Supervisor: Environmental Specialist	
Title: Production Superintendent	Approval Date: 3/07/2014	Expiration Date: —
E-mail Address: kbracey@legacylp.com	Conditions of Approval: —	Attached ☐ IRP-10-1-2391
Date: 03/03/2014 Phone: (432) 238-2856		

* Attach Additional Sheets If Necessary