

# *Basin Environmental Service Technologies, LLC*

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## **REMEDIATION SUMMARY & SITE CLOSURE REQUEST**

**ECHO PRODUCTION  
EAST LIVINGSTON RIDGE DELAWARE – AREA 1  
Lea County, New Mexico  
Unit Letter “M” (SW/SW), Section 31, Township 22 South, Range 32 East  
Latitude 32.343580 North, Longitude -103.718976 West  
NMOCD Reference #: 1RP-4250**

Prepared For:

Echo Production  
P.O. Box 1210  
Graham, Texas 76450

Prepared By:

Basin Environmental Service Technologies, LLC  
3100 Plains Highway  
Lovington, New Mexico 88260

**February 2018**

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Robbie Runnels  
Project Manager

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## 1.0 INTRODUCTION & BACKGROUND INFORMATION

Basin Environmental Service Technologies, LLC (Basin Environmental), on behalf of Echo Production (Echo), has prepared this *Remediation Summary & Site Closure Request* for the release site known as East Livingston Ridge Delaware – Area 1 (Area – 1). The legal description of the release site is Unit Letter “M” (SW/SW), Section 31, Township 22 South, Range 32 East, in Lea County, New Mexico. The geographic coordinates of the release site are 32.343580° North latitude and -103.718976° West longitude. The property affected by the release is owned by United States Department of the Interior - Bureau of Land Management (BLM). A "Site Location Map" is provided as Figure 1.

On February 19, 2016, during a relinquishment inspection, Randal Pair of the BLM discovered three (3) separate release areas along the pipeline right-of-way (ROW) being relinquished. During the week of March 14, 2016, Jamie Keyes of the New Mexico Oil Conservation Division (OCD) discovered an additional release area along the pipeline ROW to be relinquished. The release known as Area 1 was attributed to a failure in the pipe integrity at some time during operation. An unknown amount of crude oil and produced water impacted approximately two-thousand, four-hundred seventeen square feet (2,417 ft<sup>2</sup>) of pasture. The release areas were reported to the OCD on April 18, 2016 and approved the same day. The “Release Notification and Corrective Action” (Form C-141) is provided as Appendix A.

On April 19, 2016, Basin Environmental commenced delineation activities at the release site of Area 1. Three soil samples along the pathway of the release were retrieved from the surface (SP 1, SP 2, SP 5) and a hand-augered soil borings were advanced at the point of where the surface samples were retrieved in order to investigate the vertical extent of impacted soil. Each soil sample point was advanced in one-foot (1') intervals to approximately four feet (4') below ground surface (bgs). Representative surface soil samples and the soil samples retrieved at approximately 4' bgs were submitted to Cardinal Laboratories in Hobbs, New Mexico, for Total Petroleum Hydrocarbon (TPH) concentration analysis using Environmental Protection Agency (EPA) Method SW 846-8015M. The representative soil samples were also analyzed for chloride concentrations using Standard Method 4500-CL- B.

Laboratory analytical results indicated TPH concentrations at 4' ranged from 3,529 mg/kg in soil sample SP 2 @ 4' to 5,824 mg/kg in soil sample SP 1 @ 4'. Chloride concentrations ranged from 1,600 mg/kg in soil sample SP 5 @ 4' to 3,040 mg/kg in soil sample SP 2 @ 4'.

Review of laboratory analytical documentation indicated additional vertical delineation of the release was required.

General photographs of the release site and remediation activities are provided as Appendix B. Locations of the soil sampling are depicted in Figure 2, "Site & Sample Location Map". Laboratory analytical results are summarized in Table 1, "Concentrations of Benzene, BTEX, TPH & Chloride in Soil". Laboratory analytical reports are provided in Appendix C.

On May 18, 2016, a Corrective Action Plan (Work Plan) was submitted to the BLM and NMOCD outlining a strategy to advance the site to an approved closure. The Work Plan was approved upon submittal by a representative of the BLM, with the additional requirements that an Archeological survey take place.

The Work Plan was approved by an NMOCD representative on an “at-risk” basis. This entails that additional remediation may be required at a later date in that delineation had not been completed.

## 2.0 NMOCD SITE CLASSIFICATION

A search of the New Mexico Water Rights Reporting System (NMWRRS) database maintained by the New Mexico Office of the State Engineer (NMOSE) indicated information was unavailable for Section 31, Township 22 South, Range 32 East. A depth-to-groundwater (DGW) reference map utilized by the NMOCD indicates groundwater could be encountered approximately at a depth greater than four hundred feet (400') bgs. Utilizing gradient patterns and the Water Incident Database (WAID), DGW coincides with the groundwater reference map. Based on the NMOCD ranking system, zero (0) points were assigned to the site as a result of this criterion. A DGW map is provided as Figure 2.

A search of the NMWRRS database indicated there are no water wells within one thousand feet (1,000') of the release. Based on the NMOCD ranking system, zero (0) points will be assigned to the site as a result of this criterion.

There are no surface water bodies within one thousand feet (1,000') of the release. Based on the NMOCD ranking system, zero (0) points will be assigned to the site as a result of this criterion.

NMOCD guidelines indicate the Area – 1 release site has an initial ranking score of zero (0) points. The soil remediation levels for a site with a ranking score of zero (0) points are as follows:

- Benzene – 10 mg/kg (ppm)
- Benzene, ethylbenzene, toluene, and xylenes (BTEX) – 50 mg/kg (ppm)
- Total petroleum hydrocarbons (TPH) – 5,000 mg/kg (ppm)

The New Mexico Administrative Code (NMAC) does not currently specify a remediation level for chloride concentrations in soil. Chloride remediation levels are set by the NMOCD on a site-specific basis and have been presumed to be 1,000 mg/kg for a site with a ranking score of zero (0).

### **3.0 SUMMARY OF SOIL REMEDIATION ACTIVITIES**

In January of 2017, Basin personnel were on the location to perform remediation activities. The entire release area was excavated to a depth of approximately five feet (5') bgs. Discrete soil samples were retrieved from the floor of the excavation (Floor 1, Floor 2, Floor 3, Floor 4) to be analyzed at a commercial laboratory for concentrations of TPH and chloride. All four (4) floor soil samples revealed a concentration of TPH to be well below the remediation recommended action levels (RRAL). Chloride concentration was found to be above the RRAL for soils samples Floor 1, Floor 2, and Floor 3.

In an attempt to complete delineation for chlorides, (presumed to be 250 mg/kg for this site), excavation was advanced in the areas where soil samples were taken for Floor 1, Floor 2, and Floor 3. The point where soil sample Floor 1 was retrieved was advanced to a depth of twenty-three feet (23') bgs. Delineation had still not occurred. Floor 2 and Floor 3 were advanced to nine feet (9') bgs without achieving delineation.

Basin applied a six-inch (6") cushion of sand in the floor of the excavation and then installed a 20-mil liner in the necessary area of the excavation. Another 6" cushion of sand was applied on the liner to protect it from backfilling activities. The liner was to prevent the migration of contaminants from moving toward the groundwater and from percolating upwards to the vadose zone. Soil-boring conduit was then placed and welded to the liner to facilitate backfilling.

The site known as Area 1 was then backfilled with clean, non-impacted, imported soils and contoured to the surrounding area.

On September 21, 2017, Basin personnel procured an environmental drilling rig in order to achieve delineation for three (3) sample points of Area 1. Soil Bore 1 (SB-1) was advanced vertically to a depth of ninety feet (90') bgs before ascertaining delineation. A discrete soil sample was retrieved at this depth and the drilling advanced to ninety-five (95) and one-hundred feet (100') respectively. Discrete soil samples were retrieved at these depths and delivered to a laboratory for confirmatory analysis.

Soil Bore 2 (SB-2) was advanced vertically to a depth of one-hundred ten feet (110') bgs before ascertaining delineation. The drilling was advanced to one-hundred fifteen (115) and one-hundred twenty feet (120') respectively. Discrete soil samples were retrieved at these depths and delivered to a laboratory for confirmatory analysis.

Soil Bore 3 (SB-3) was advanced vertically to a depth of one-hundred thirty feet (130') bgs before ascertaining delineation. The drilling advanced to one-hundred thirty-five (135) and one-hundred forty feet (140') respectively. Discrete soil samples were retrieved at these depths and delivered to a laboratory for confirmatory analysis.

All samples were confirmed to be below the RRAL for the site for concentrations of BTEX and chlorides.

The location will be seeded with a land-owner approved seed mix free of noxious or invasive species at a time conducive for germination.

## **4.0 QA/QC PROCEDURES**

### **4.1 Soil Sampling**

Soil Samples were delivered to Cardinal Laboratories, Inc., in Hobbs, New Mexico, for analysis of BTEX, TPH, and/or chloride concentrations using the methods described below. Soil samples were analyzed for BTEX, TPH, and/or chloride concentrations within fourteen (14) days following the collection date.

The soil samples were analyzed as follows:

- BTEX concentrations in accordance with EPA Method SW 846-8021b
- TPH concentrations in accordance with modified EPA Method SW 846-8015M
- Chloride concentrations in accordance with EPA Method 300.1

### **4.2 Decontamination of Equipment**

Cleaning of the sampling equipment was the responsibility of the environmental technician. Prior to use, and between each sample, the sampling equipment was cleaned with Liqui-Nox® detergent and rinsed with distilled water.

### **4.3 Laboratory Protocol**

The laboratory was responsible for proper QA/QC procedures after signing the chain-of-custody form(s). These procedures were either transmitted with the laboratory analytical reports or are on file at the laboratory.



## 5.0 SITE CLOSURE REQUEST

The East Livingston Ridge Delaware Area 1 release site was excavated to the extent practicable five feet (5') below bgs. Soil samples collected from the discrete hand-auguring, soil boring, floor, and sidewalls of the excavation were analyzed by an NMOCD-approved laboratory. The concentrations of BTEX and TPH were below the RRALs established for the site.

A twenty (20) mil, impermeable, polyethylene liner was installed on the floor of the excavation prior to backfilling as chloride concentrations were above the RRAL's established for this site. The liner was extended horizontally into a four-foot (4') buffer zone around the excavation to facilitate shedding of moisture outside the footprint of the excavation and the maximum horizontal extent of in-situ impacted soil. This engineered control will serve to inhibit vertical migration of contaminants left in-situ both upward to the vegetative zone and downward to the underlying groundwater.

Basin Environmental recommends Echo Production provide the NMOCD's Hobbs District Office and the BLM's Carlsbad Field Office a copy of this *Remediation Summary & Risk-Based Site Closure Request* and request the NMOCD grant site closure to the East Livingston Ridge Delaware Area 1 release site.

## 6.0 LIMITATIONS

Basin Environmental Service Technologies, LLC, has prepared this *Remediation Summary & Site Closure Request* to the best of its ability. No other warranty, expressed or implied, is made or intended. Basin Environmental has examined and relied upon documents referenced in the report and on oral statements made by certain individuals. Basin Environmental has not conducted an independent examination of the facts contained in referenced materials and statements. Basin Environmental has presumed the genuineness of these documents and statements and that the information provided therein is true and accurate. Basin Environmental has prepared this report in a professional manner, using the degree of skill and care exercised by similar environmental consultants. Basin Environmental notes that the facts and conditions referenced in this report may change over time, and the conclusions and recommendations set forth herein are applicable only to the facts and conditions as described at the time of this report.

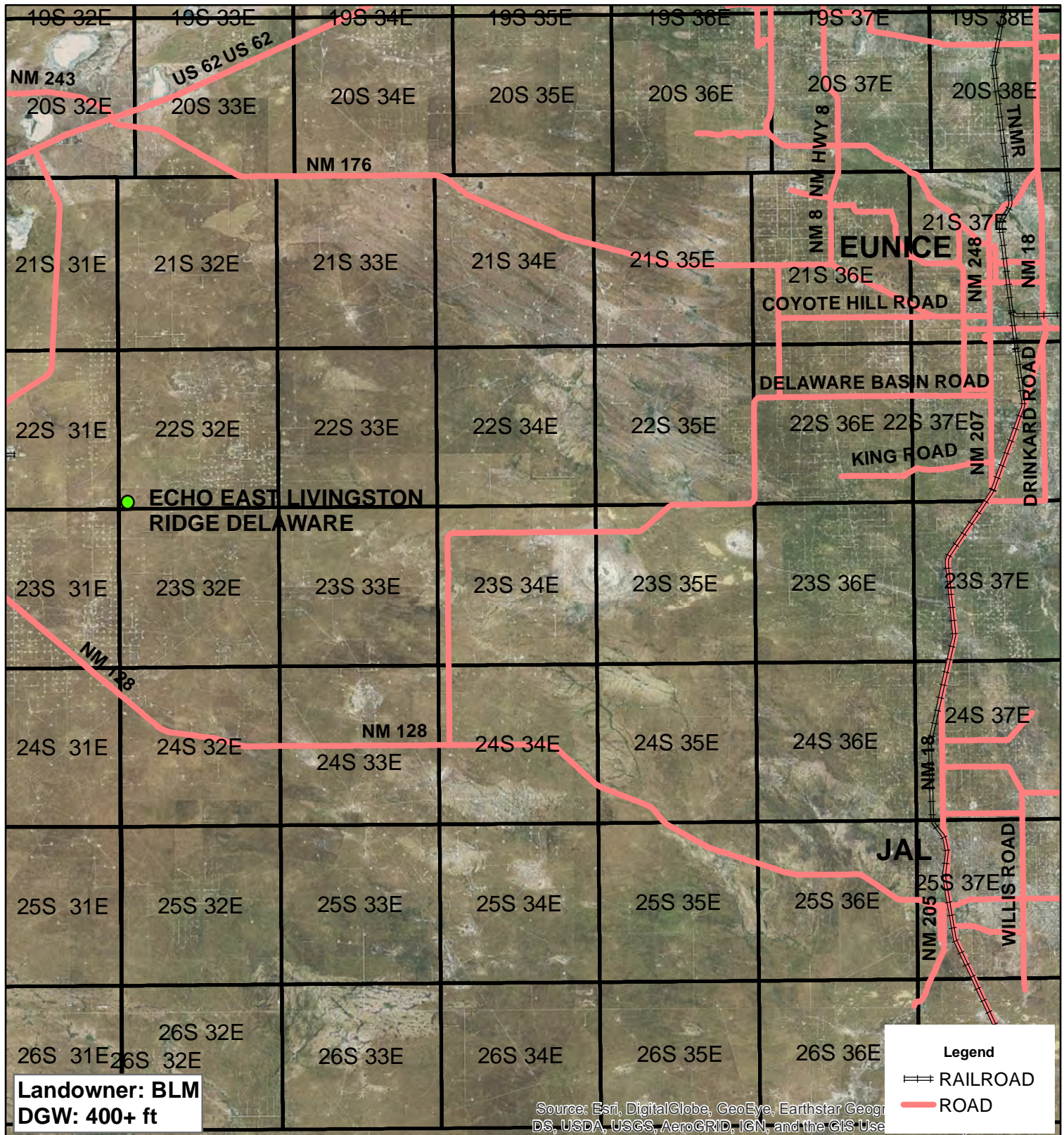
This report has been prepared for the benefit of Echo Production. The information contained in this report, including all exhibits and attachments, may not be used by any other party without the express consent of Basin Environmental Service Technologies, LLC, and/or Echo Production.

## **7.0 DISTRIBUTION:**

- Copy 1: Olivia Yu  
New Mexico Energy, Minerals and Natural Resources Department  
Oil Conservation Division (District 1)  
1625 N French Drive  
Hobbs, NM 88240
- Copy 2: Yolanda Jordan  
Bureau of Land Management  
602 E. Greene Street  
Carlsbad, NM 88220
- Copy 3: Buck Dollar  
Echo Production  
P.O. Box 1210  
Graham, Texas 76450
- Copy 4: Don Belleh  
Bitco Insurance Companies  
Old Republic Insurance Group  
P.O. Box 16627  
Lubbock, Texas 79490
- Copy 5: Basin Environmental Service Technologies, LLC  
P.O. Box 301  
Lovington, New Mexico 88260

# FIGURES

# Site Locations



## **ECHO PRODUCTION E LIVINGSTON RIDGE DELAWARE**

1RP-4250

UL K, M & N SECTION 31  
T-22-S R-32-E  
LEA COUNTY, NM

GPS: 32.344590 -103.716479

## Figure 1

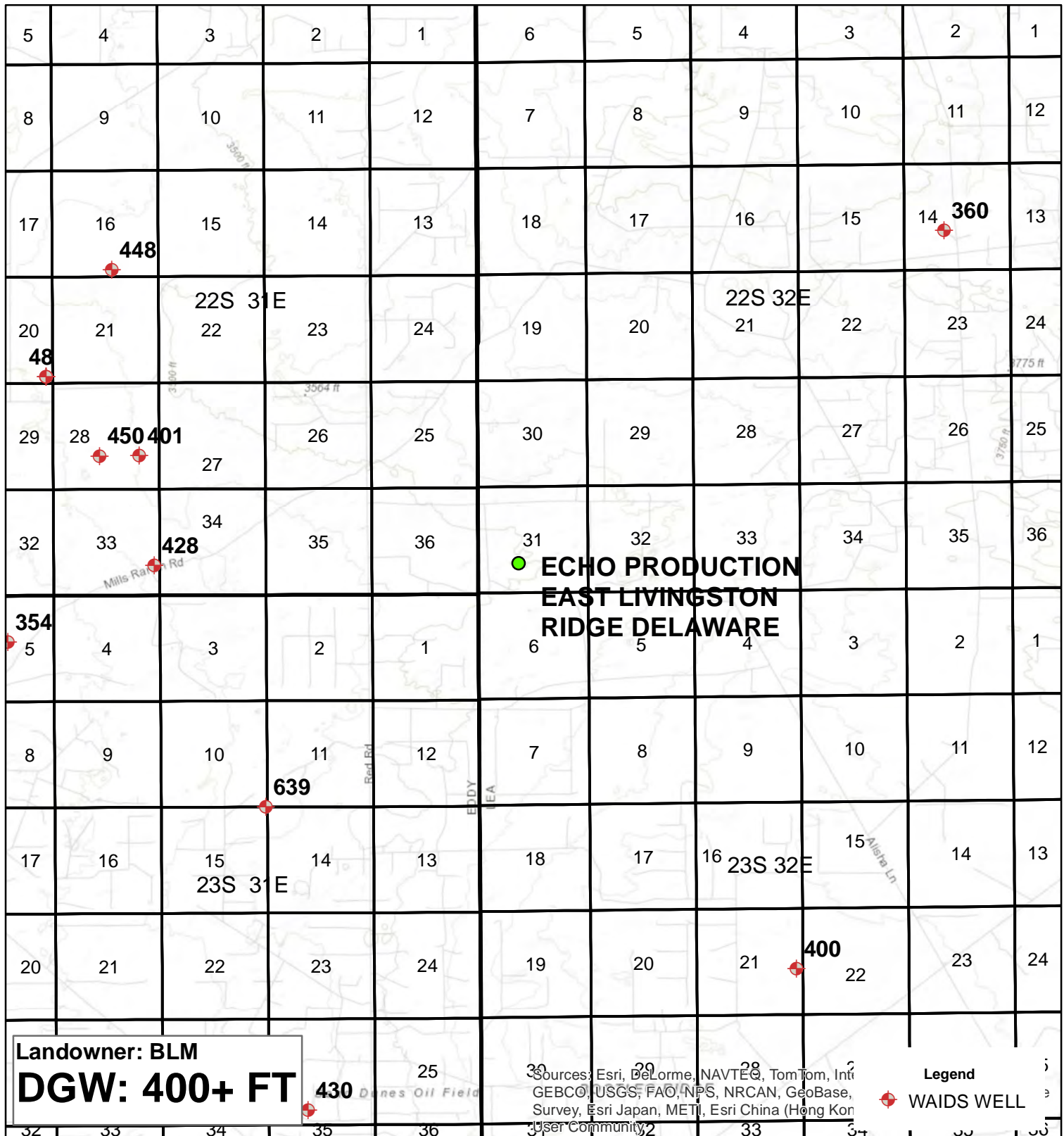
0 2.5 5  
Miles

Drawing date: 1/31/18  
Drafted by: T. Grieco





# Depth to Groundwater



**Landowner: BLM**

## DGW: 400+ FT

430

30	29	28	
31	30	29	28
32	31	30	29
33	32	31	30
34	33	32	31
35	34	33	32
36	35	34	33
37	36	35	34
38	37	36	35
39	38	37	36
40	39	38	37
41	40	39	38
42	41	40	39
43	42	41	40
44	43	42	41
45	44	43	42
46	45	44	43
47	46	45	44
48	47	46	45
49	48	47	46
50	49	48	47
51	50	49	48
52	51	50	49
53	52	51	50
54	53	52	51
55	54	53	52
56	55	54	53
57	56	55	54
58	57	56	55
59	58	57	56
60	59	58	57
61	60	59	58
62	61	60	59
63	62	61	60
64	63	62	61
65	64	63	62
66	65	64	63
67	66	65	64
68	67	66	65
69	68	67	66
70	69	68	67
71	70	69	68
72	71	70	69
73	72	71	70
74	73	72	71
75	74	73	72
76	75	74	73
77	76	75	74
78	77	76	75
79	78	77	76
80	79	78	77
81	80	79	78
82	81	80	79
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94	93	92	91
95	94	93	92
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97	96	95	94
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99	98	97	96
100	99	98	97
101	100	99	98
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103	102	101	100
104	103	102	101
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107	106	105	104
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110	109	108	107
111	110	109	108
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113	112	111	110
114	113	112	111
115	114	113	112
116	115	114	113
117	116	115	114
118	117	116	115
119	118	117	116
120	119	118	117
121	120	119	118
122	121	120	119
123	122	121	120
124	123	122	121
125	124	123	122
126	125	124	123
127	126	125	124
128	127	126	125
129	128	127	126
130	129	128	127
131	130	129	128</

### Legend

## WAIDS WELL



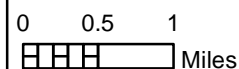
***ECHO PRODUCTION  
E LIVINGSTON RIDGE  
DELAWARE***

**1RP-4250**

UL K, M & N SECTION 31  
T-22-S R-32-E  
LEA COUNTY, NM

**GPS: 32.344590 -103.716479**

## Figure 2

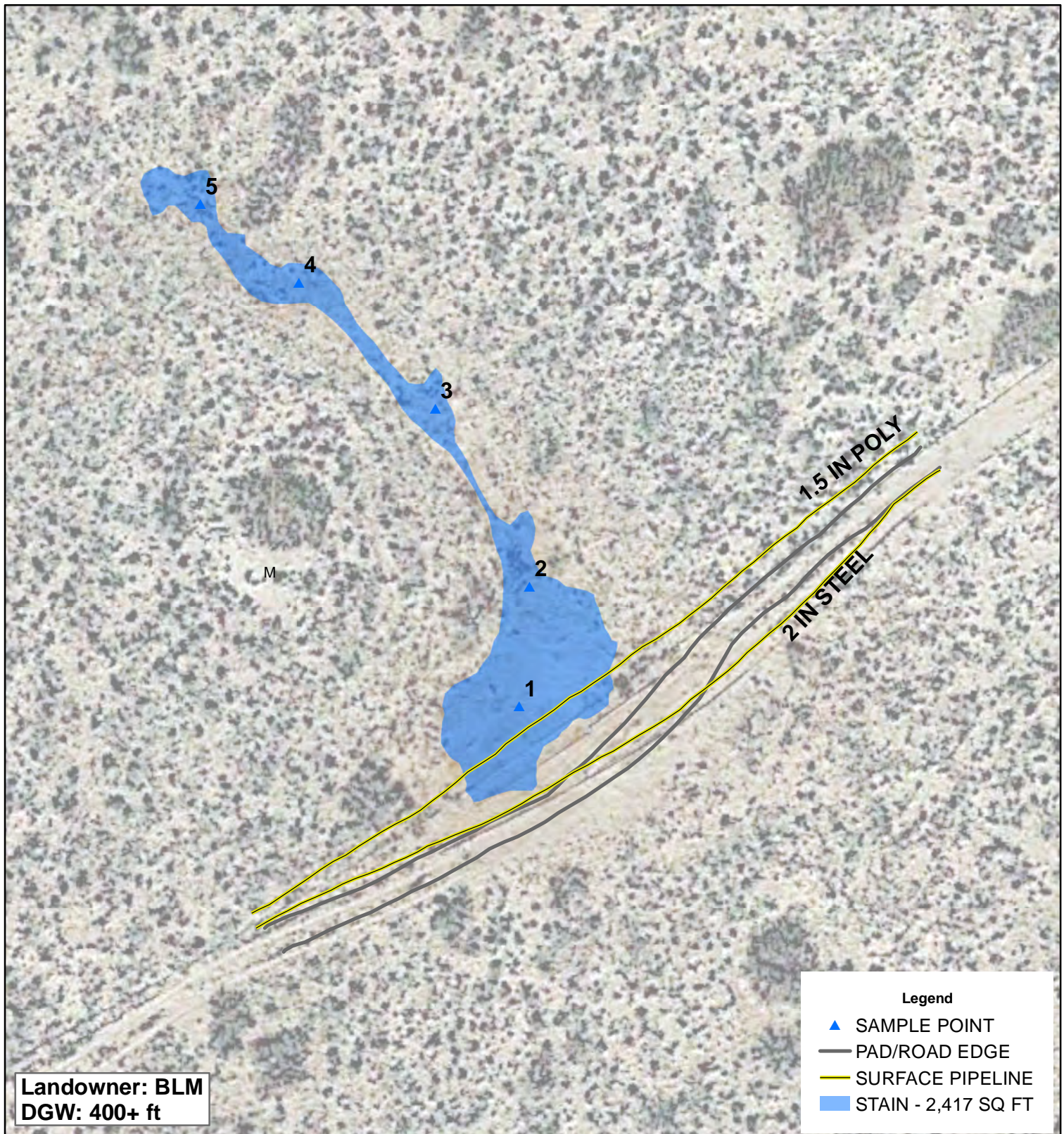


Drawing date: 3/29/16  
Drafted by: T. Grieco





# Initial Sampling



## ***ECHO PRODUCTION E LIVINGSTON RIDGE DELAWARE***

1RP-4250

UL K, M & N SECTION 31  
T-22-S R-32-E  
LEA COUNTY, NM

**Underground facilities are  
spatially projected  
and need to be field verified.**

GPS: 32.343580 -103.718976

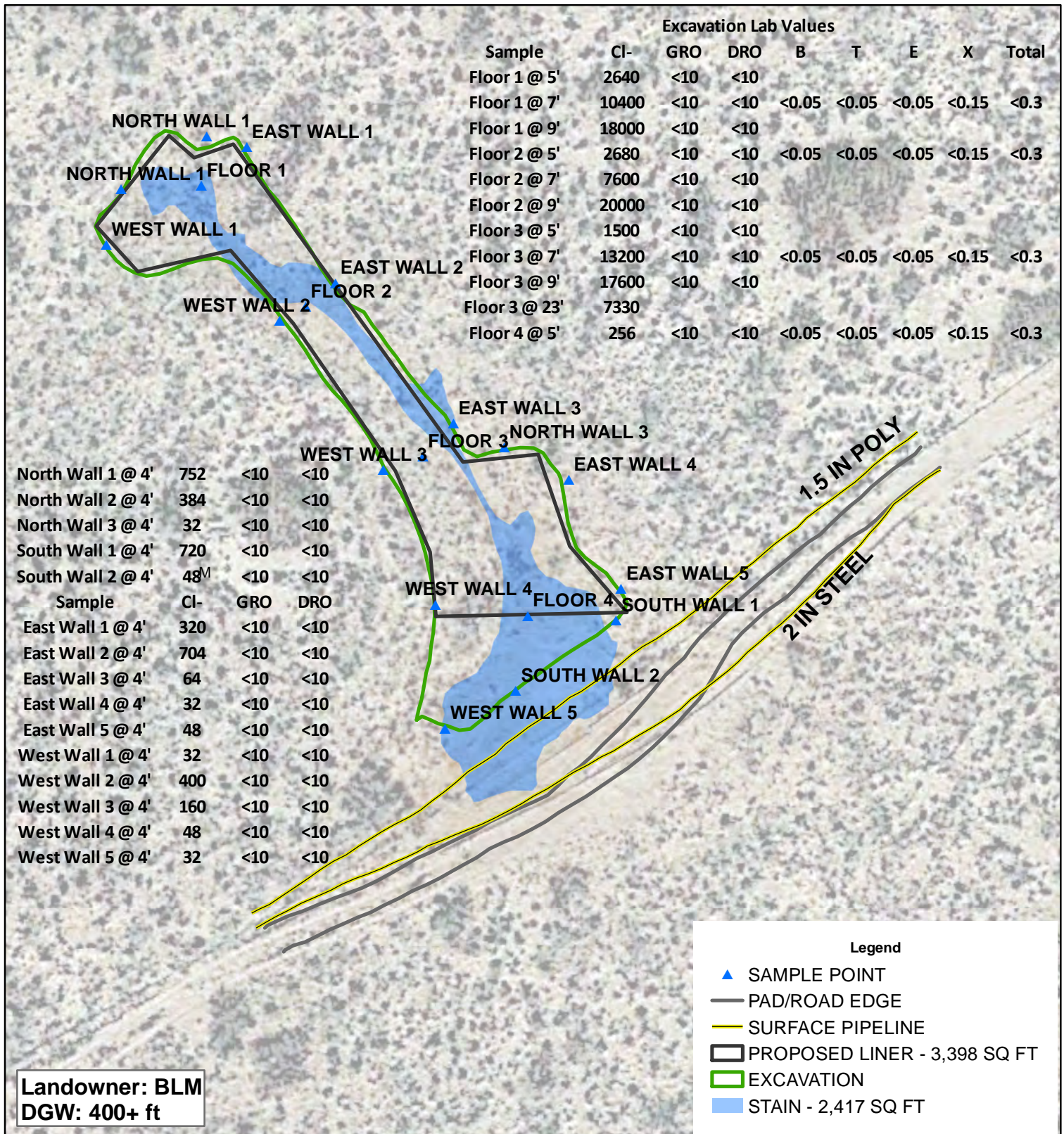
0 25 50  
Feet

GPS date: 3/28/16 TG  
Drawing date: 3/29/16  
Drafted by: T. Grieco





# Proposed Liner



## ECHO PRODUCTION EAST LIVINGSTON RIDGE DELAWARE #1 AREA 1

UL M SECTION 31  
T-22-S R-32-E  
LEA COUNTY, NM

**Underground facilities are  
spatially projected  
and need to be field verified.**

GPS: 32.343580 -103.718976

0 25 50 Feet

GPS date: 3/28/16 TG, 1/31/17 MT

Drawing date: 2/28/17

Drafted by: T. Grieco





# TABLES

TABLE 1  
CONCENTRATIONS OF BENZENE, BTEX, TPH & CHLORIDE IN SOIL  
Initial and Final Samples  
ECHO PRODUCTION  
EAST LIVINGSTON RIDGE DELAWARE - AREA 1  
LEA COUNTY, NEW MEXICO  
NMOCD # - 1RP - 3985  
Unit Letter M, Section 31, Township 22 South, Range 32 East

SAMPLE LOCATION	SAMPLE DEPTH (BGS)	SAMPLE DATE	SOIL STATUS	METHOD: EPA SW 846-8021B, 5030					METHOD: 8015M			TPH C <sub>6</sub> -C <sub>35</sub> (mg/Kg)	4500 CI-B CHLORIDE (mg/Kg)
				BENZENE (mg/Kg)	TOLUENE (mg/Kg)	ETHYL- BENZENE (mg/Kg)	TOTAL XYLENES (mg/Kg)	TOTAL BTEX (mg/Kg)	GRO C <sub>6</sub> -C <sub>10</sub> (mg/Kg)	DRO C <sub>10</sub> -C <sub>28</sub> (mg/Kg)	ORO C <sub>28</sub> -C <sub>35</sub> (mg/Kg)		
Area #1 SP1@Surface	0'	4/19/2016	In-Situ	NA	NA	NA	NA	NA	28.8	9960.0	2470.0	12459	4160
Area #1 SP2@Surface	0'	4/19/2016	In-Situ	NA	NA	NA	NA	NA	37.6	7260.0	2640.0	9938	3640
Area #1 SP5@Surface	0'	4/19/2016	In-Situ	NA	NA	NA	NA	NA	<100	10900.0	5580.0	16480	3240
Area #1 SP1 @ 4'	4'	4/19/2016	In-Situ	NA	NA	NA	NA	NA	124.0	4250.0	1450.0	5824	2520
Area #1 SP2 @ 4'	4'	4/19/2016	In-Situ	NA	NA	NA	NA	NA	34.5	2810.0	684.0	3529	3040
Area #1 SP5 @ 4'	4'	4/19/2016	In-Situ	NA	NA	NA	NA	NA	<100	3360.0	1030.0	4390	1600
Area #1 Floor 4 @ 5'	5'	1/11/2017	In-Situ	<0.050	<0.050	<0.050	<0.150	<0.300	<10.0	<10.0	NA	<10.0	256.0
Area #1 NW 1 @ 4'	4'	1/11/2017	In-Situ	NA	NA	NA	NA	NA	<10.0	<10.0	NA	<10.0	384.0
Area #1 NW 3 @ 4'	4'	1/11/2017	In-Situ	NA	NA	NA	NA	NA	<10.0	<10.0	NA	<10.0	32.0
Area #1 SW 2 @ 4'	4'	1/11/2017	In-Situ	NA	NA	NA	NA	NA	<10.0	<10.0	NA	<10.0	48.0
Area #1 EW 1 @ 4'	4'	1/11/2017	In-Situ	NA	NA	NA	NA	NA	<10.0	<10.0	NA	<10.0	320.0
Area #1 EW 3 @ 4'	4'	1/11/2017	In-Situ	NA	NA	NA	NA	NA	<10.0	<10.0	NA	<10.0	64.0
Area #1 EW 4 @ 4'	4'	1/11/2017	In-Situ	NA	NA	NA	NA	NA	<10.0	<10.0	NA	<10.0	32.0
Area #1 EW 5 @ 4'	4'	1/11/2017	In-Situ	NA	NA	NA	NA	NA	<10.0	<10.0	NA	<10.0	48.0
Area #1 WW 2 @ 4'	4'	1/11/2017	In-Situ	NA	NA	NA	NA	NA	<10.0	<10.0	NA	<10.0	400.0
Area #1 WW 3 @ 4'	4'	1/11/2017	In-Situ	NA	NA	NA	NA	NA	<10.0	<10.0	NA	<10.0	160.0
Area #1 WW 4 @ 4'	4'	1/11/2017	In-Situ	NA	NA	NA	NA	NA	<10.0	<10.0	NA	<10.0	48.0
Area #1 WW 5 @ 4'	4'	1/11/2017	In-Situ	NA	NA	NA	NA	NA	<10.0	<10.0	NA	<10.0	32.0
Area #1 Floor 1 @ 7'	7'	1/31/2017	In-Situ	<0.050	<0.050	<0.050	<0.150	<0.300	<10.0	<10.0	NA	<10.0	10,400.0
Area #1 Floor 1 @ 9'	9'	1/31/2017	In-Situ	NA	NA	NA	NA	NA	<10.0	<10.0	NA	<10.0	18,000.0
Area #1 Floor 2 @ 9'	9'	1/31/2017	In-Situ	NA	NA	NA	NA	NA	<10.0	<10.0	NA	<10.0	20,000.0
Area #1 Floor 3 @ 7'	7'	1/31/2017	In-Situ	<0.050	<0.050	<0.050	<0.150	<0.300	<10.0	<10.0	NA	<10.0	13,200.0
Area #1 Floor 3 @ 9'	9'	1/31/2017	In-Situ	NA	NA	NA	NA	NA	<10.0	<10.0	NA	<10.0	17,600.0
Area #1 WW 1 @ 4'	4'	1/31/2017	In-Situ	NA	NA	NA	NA	NA	<10.0	<10.0	NA	<10.0	32.0
Area #1 Floor 1 @ 23'	23'	2/1/2017	In-Situ	NA	NA	NA	NA	NA	<10.0	<10.0	NA	<10.0	7,330.0
Area #1 EW 2 @ 4'	4'	4/19/2017	In-Situ	NA	NA	NA	NA	NA	<10.0	<10.0	NA	<10.0	64.0
Area #1 SW 1 @ 4'	4'	4/19/2017	In-Situ	NA	NA	NA	NA	NA	<10.0	<10.0	NA	<10.0	32.0
Area #1 NW 1 @ 4'	4'	4/19/2017	In-Situ	NA	NA	NA	NA	NA	<10.0	<10.0	NA	<10.0	48.0
SB1 @ 90'	90	9/21/2107	In-Situ	NA	NA	NA	NA	NA	NA	NA	NA	NA	192.0
SB1 @ 95'	95'	9/21/2107	In-Situ	NA	NA	NA	NA	NA	NA	NA	NA	NA	160.0
SB1 @ 100'	100'	9/21/2107	In-Situ	<0.050	<0.050	<0.050	<0.150	<0.300	<10.0	<10.0	<10.0	<10.0	128.0
SB2 @ 110'	110'	9/21/2107	In-Situ	NA	NA	NA	NA	NA	NA	NA	NA	NA	256.0
SB2 @ 115'	115'	9/21/2107	In-Situ	NA	NA	NA	NA	NA	NA	NA	NA	NA	176.0
SB2 @ 120'	120'	9/21/2107	In-Situ	<0.050	<0.050	<0.050	<0.150	<0.300	<10.0	<10.0	<10.0	<10.0	272.0
SB3 @ 130'	130'	9/21/2107	In-Situ	NA	NA	NA	NA	NA	NA	NA	NA	NA	224.0
SB3 @ 135'	135'	9/21/2107	In-Situ	NA	NA	NA	NA	NA	NA	NA	NA	NA	224.0
SB3 @ 140'	140'	9/21/2107	In-Situ	<0.050	<0.050	<0.050	<0.150	<0.300	<10.0	<10.0	<10.0	<10.0	208.0

**TABLE 1**  
**CONCENTRATIONS OF BENZENE, BTEX, TPH & CHLORIDE IN SOIL**  
 Initial and Final Samples  
 ECHO PRODUCTION  
 EAST LIVINGSTON RIDGE DELAWARE - AREA 1  
 LEA COUNTY, NEW MEXICO  
 NMOCD # - 1RP - 3985  
 Unit Letter M, Section 31, Township 22 South, Range 32 East

NMOCD Recommended Remediation Action Level	10				50				5000	1,000
--	----	--	--	--	----	--	--	--	------	-------

NA = Not analyzed.

# APPENDICES

# APPENDIX –A

C-141

# APPENDIX – B

## Photo Documentation

# Echo Production – E. Livingston Ridge Delaware Area 1

Unit Letter M of Section 31, T22S, R32E



Excavated area, facing northeast

2/1/17



Excavated area, facing west

2/1/17



Liner placement, facing north

2/1/17



Installed liner, facing northeast

4/27/17



# Echo Production – E. Livingston Ridge Delaware Area 1

Unit Letter M of Section 31, T22S, R32E



Installed conduit, facing west

4/27/17



Backfilling, facing north

4/27/17



Backfilling complete, west

4/28/17



Backfilling complete, facing southwest

4/28/17



# APPENDIX – C

## Analytical Reports

April 29, 2016

ROBBIE RUNNELS

Basin Environmental Service

P.O. Box 301

Lovington, NM 88260

RE: E. LIVINGSTON RIDGE DELAWARE

Enclosed are the results of analyses for samples received by the laboratory on 04/22/16 9:30.

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/qa/lab\\_accred\\_certif.html](http://www.tceq.texas.gov/field/qa/lab_accred_certif.html).

Cardinal Laboratories is accredited 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. Keene

Lab Director/Quality Manager

**Analytical Results For:**

Basin Environmental Service  
ROBBIE RUNNELS  
P.O. Box 301  
Lovington NM, 88260  
Fax To: (575) 396-1429

Received:	04/22/2016	Sampling Date:	04/18/2016
Reported:	04/29/2016	Sampling Type:	Soil
Project Name:	E. LIVINGSTON RIDGE DELAWARE	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	LEA COUNTY, NM		

**Sample ID: AREA #4 SP 1 @ SURFACE (H600874-01)**

Chloride, SM4500Cl-B		mg/kg		Analyzed By: AP					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	864	16.0	04/27/2016	ND	400	100	400	0.00	
TPH 8015M		mg/kg		Analyzed By: MS					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<10.0	10.0	04/25/2016	ND	206	103	200	7.10	
DRO >C10-C28	729	10.0	04/25/2016	ND	213	106	200	5.30	
EXT DRO >C28-C35	394	10.0	04/25/2016	ND					
Surrogate: 1-Chlorooctane									
	68.1 %	35-147							
Surrogate: 1-Chlorooctadecane									
	108 %	28-171							

**Sample ID: AREA #4 SP 2 @ SURFACE (H600874-02)**

Chloride, SM4500Cl-B		mg/kg		Analyzed By: AP					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	912	16.0	04/27/2016	ND	400	100	400	0.00	
TPH 8015M		mg/kg		Analyzed By: MS					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<10.0	10.0	04/25/2016	ND	206	103	200	7.10	
DRO >C10-C28	950	10.0	04/25/2016	ND	213	106	200	5.30	QM-07, QR-03
EXT DRO >C28-C35	434	10.0	04/25/2016	ND					
Surrogate: 1-Chlorooctane	76.8 %	35-147							
Surrogate: 1-Chlorooctadecane	99.3 %	28-171							

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\*=Accredited Analyte

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Celey D. Keene, Lab Director/Quality Manager

**Analytical Results For:**

Basin Environmental Service  
ROBBIE RUNNELS  
P.O. Box 301  
Lovington NM, 88260  
Fax To: (575) 396-1429

Received:	04/22/2016	Sampling Date:	04/18/2016
Reported:	04/29/2016	Sampling Type:	Soil
Project Name:	E. LIVINGSTON RIDGE DELAWARE	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	LEA COUNTY, NM		

**Sample ID: AREA #4 SP 5 @ SURFACE (H600874-03)**

Chloride, SM4500CI-B		mg/kg		Analyzed By: AP					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	784	16.0	04/27/2016	ND	400	100	400	0.00	
TPH 8015M		mg/kg		Analyzed By: MS					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<10.0	10.0	04/25/2016	ND	206	103	200	7.10	
DRO >C10-C28	618	10.0	04/25/2016	ND	213	106	200	5.30	
EXT DRO >C28-C35	310	10.0	04/25/2016	ND					
Surrogate: 1-Chlorooctane	76.3 %	35-147							
Surrogate: 1-Chlorooctadecane	109 %	28-171							

**Sample ID: AREA #4 SP 1 @ 6' (H600874-04)**

Chloride, SM4500CI-B		mg/kg		Analyzed By: AP						
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier	
Chloride	1260	16.0	04/27/2016	ND	400	100	400	0.00		
TPH 8015M		mg/kg		Analyzed By: MS						S-06
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier	
GRO C6-C10	<50.0	50.0	04/25/2016	ND	206	103	200	7.10		
DRO >C10-C28	6360	50.0	04/25/2016	ND	213	106	200	5.30		
EXT DRO >C28-C35	2820	50.0	04/25/2016	ND						
Surrogate: 1-Chlorooctane										
	77.1 %	35-147								
Surrogate: 1-Chlorooctadecane										
	492 %	28-171								

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\*=Accredited Analyte

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Celey D. Keene, Lab Director/Quality Manager

**Analytical Results For:**

Basin Environmental Service  
ROBBIE RUNNELS  
P.O. Box 301  
Lovington NM, 88260  
Fax To: (575) 396-1429

Received:	04/22/2016	Sampling Date:	04/18/2016
Reported:	04/29/2016	Sampling Type:	Soil
Project Name:	E. LIVINGSTON RIDGE DELAWARE	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	LEA COUNTY, NM		

**Sample ID: AREA #4 SP 2 @ 6' (H600874-05)**

Chloride, SM4500Cl-B		mg/kg		Analyzed By: AP						
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier	
Chloride	1230	16.0	04/27/2016	ND	400	100	400	0.00		
TPH 8015M		mg/kg		Analyzed By: MS						S-04
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier	
GRO C6-C10	<10.0	10.0	04/25/2016	ND	206	103	200	7.10		
DRO >C10-C28	4550	10.0	04/25/2016	ND	213	106	200	5.30		
EXT DRO >C28-C35	2050	10.0	04/25/2016	ND						
Surrogate: 1-Chlorooctane	81.9 %	35-147								
Surrogate: 1-Chlorooctadecane	425 %	28-171								

**Sample ID: AREA #4 SP 5 @ 6' (H600874-06)**

Chloride, SM4500Cl-B		mg/kg		Analyzed By: AP						
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier	
Chloride	1420	16.0	04/27/2016	ND	400	100	400	0.00		
TPH 8015M		mg/kg		Analyzed By: MS						S-04
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier	
GRO C6-C10	11.6	10.0	04/25/2016	ND	206	103	200	7.10		
DRO >C10-C28	6450	10.0	04/25/2016	ND	213	106	200	5.30		
EXT DRO >C28-C35	2950	10.0	04/25/2016	ND						
Surrogate: 1-Chlorooctane	79.8 %	35-147								
Surrogate: 1-Chlorooctadecane	263 %	28-171								

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Celey D. Keene, Lab Director/Quality Manager

**Analytical Results For:**

Basin Environmental Service  
ROBBIE RUNNELS  
P.O. Box 301  
Lovington NM, 88260  
Fax To: (575) 396-1429

Received:	04/22/2016	Sampling Date:	04/18/2016
Reported:	04/29/2016	Sampling Type:	Soil
Project Name:	E. LIVINGSTON RIDGE DELAWARE	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	LEA COUNTY, NM		

**Sample ID: AREA #3 SP 2 @ SURFACE (H600874-07)**

Chloride, SM4500CI-B		mg/kg		Analyzed By: AP						
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier	
Chloride	800	16.0	04/27/2016	ND	400	100	400	0.00		
TPH 8015M		mg/kg		Analyzed By: MS						S-06
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier	
GRO C6-C10	<200	200	04/26/2016	ND	206	103	200	7.10		
DRO >C10-C28	11000	200	04/26/2016	ND	213	106	200	5.30		
EXT DRO >C28-C35	4070	200	04/26/2016	ND						
Surrogate: 1-Chlorooctane	143 %	35-147								
Surrogate: 1-Chlorooctadecane	411 %	28-171								

**Sample ID: AREA #3 SP 4 @ SURFACE (H600874-08)**

Chloride, SM4500CI-B		mg/kg		Analyzed By: AP						
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier	
Chloride	816	16.0	04/27/2016	ND	400	100	400	0.00		
TPH 8015M		mg/kg		Analyzed By: MS						S-04
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier	
GRO C6-C10	<10.0	10.0	04/25/2016	ND	206	103	200	7.10		
DRO >C10-C28	6590	10.0	04/25/2016	ND	213	106	200	5.30		
EXT DRO >C28-C35	2810	10.0	04/25/2016	ND						
Surrogate: 1-Chlorooctane										
	84.2 %	35-147								
Surrogate: 1-Chlorooctadecane										
	241 %	28-171								

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Celey D. Keene, Lab Director/Quality Manager

**Analytical Results For:**

Basin Environmental Service  
ROBBIE RUNNELS  
P.O. Box 301  
Lovington NM, 88260  
Fax To: (575) 396-1429

Received:	04/22/2016	Sampling Date:	04/18/2016
Reported:	04/29/2016	Sampling Type:	Soil
Project Name:	E. LIVINGSTON RIDGE DELAWARE	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	LEA COUNTY, NM		

**Sample ID: AREA #3 SP 7 @ SURFACE (H600874-09)**

Chloride, SM4500CI-B		mg/kg		Analyzed By: AP						
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier	
Chloride	880	16.0	04/27/2016	ND	400	100	400	0.00		
TPH 8015M		mg/kg		Analyzed By: MS						S-04
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier	
GRO C6-C10	<10.0	10.0	04/25/2016	ND	206	103	200	7.10		
DRO >C10-C28	8530	10.0	04/25/2016	ND	213	106	200	5.30		
EXT DRO >C28-C35	3500	10.0	04/25/2016	ND						
Surrogate: 1-Chlorooctane										
	87.3 %	35-147								
Surrogate: 1-Chlorooctadecane										
	285 %	28-171								

**Sample ID: AREA #3 SP 2 @ 4' (H600874-10)**

Chloride, SM4500CI-B		mg/kg		Analyzed By: AP						
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier	
Chloride	2120	16.0	04/27/2016	ND	400	100	400	0.00		
TPH 8015M		mg/kg		Analyzed By: MS						S-04
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier	
GRO C6-C10	30.2	10.0	04/25/2016	ND	206	103	200	7.10		
DRO >C10-C28	2140	10.0	04/25/2016	ND	213	106	200	5.30		
EXT DRO >C28-C35	639	10.0	04/25/2016	ND						
Surrogate: 1-Chlorooctane										
	90.5 %	35-147								
Surrogate: 1-Chlorooctadecane										
	178 %	28-171								

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Celey D. Keene, Lab Director/Quality Manager

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ROBBIE RUNNELS  
P.O. Box 301  
Lovington NM, 88260  
Fax To: (575) 396-1429

Received:	04/22/2016	Sampling Date:	04/18/2016
Reported:	04/29/2016	Sampling Type:	Soil
Project Name:	E. LIVINGSTON RIDGE DELAWARE	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	LEA COUNTY, NM		

**Sample ID: AREA #3 SP 4 @ 6' (H600874-11)**

Chloride, SM4500CI-B		mg/kg		Analyzed By: AP						
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier	
Chloride	2600	16.0	04/27/2016	ND	400	100	400	0.00		
TPH 8015M		mg/kg		Analyzed By: MS						S-04
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier	
GRO C6-C10	82.4	10.0	04/25/2016	ND	206	103	200	7.10		
DRO >C10-C28	5330	10.0	04/25/2016	ND	213	106	200	5.30		
EXT DRO >C28-C35	1480	10.0	04/25/2016	ND						
Surrogate: 1-Chlorooctane	94.9 %	35-147								
Surrogate: 1-Chlorooctadecane	177 %	28-171								

**Sample ID: AREA #3 SP 7 @ 6' (H600874-12)**

Chloride, SM4500CI-B		mg/kg		Analyzed By: AP						
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier	
Chloride	2800	16.0	04/26/2016	ND	416	104	400	0.00	QM-07	
TPH 8015M		mg/kg		Analyzed By: MS						S-04
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier	
GRO C6-C10	72.7	10.0	04/25/2016	ND	206	103	200	7.10		
DRO >C10-C28	4940	10.0	04/25/2016	ND	213	106	200	5.30		
EXT DRO >C28-C35	1410	10.0	04/25/2016	ND						
Surrogate: 1-Chlorooctane	96.8 %	35-147								
Surrogate: 1-Chlorooctadecane	293 %	28-171								

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\*=Accredited Analyte

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Celey D. Keene, Lab Director/Quality Manager



**Analytical Results For:**

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ROBBIE RUNNELS  
P.O. Box 301  
Lovington NM, 88260  
Fax To: (575) 396-1429

Received:	04/22/2016	Sampling Date:	04/19/2016
Reported:	04/29/2016	Sampling Type:	Soil
Project Name:	E. LIVINGSTON RIDGE DELAWARE	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	LEA COUNTY, NM		

**Sample ID: AREA #2 SP 3 @ SURFACE (H600874-13)**

Chloride, SM4500CI-B		mg/kg		Analyzed By: AP						
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier	
Chloride	2000	16.0	04/26/2016	ND	416	104	400	0.00		
TPH 8015M		mg/kg		Analyzed By: MS						S-04
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier	
GRO C6-C10	15.9	10.0	04/25/2016	ND	206	103	200	7.10		
DRO >C10-C28	5740	10.0	04/25/2016	ND	213	106	200	5.30		
EXT DRO >C28-C35	2000	10.0	04/25/2016	ND						
Surrogate: 1-Chlorooctane										
	87.5 %	35-147								
Surrogate: 1-Chlorooctadecane										
	203 %	28-171								

**Sample ID: AREA #2 SP 4 @ SURFACE (H600874-14)**

Chloride, SM4500CI-B		mg/kg		Analyzed By: AP						
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier	
Chloride	2320	16.0	04/26/2016	ND	416	104	400	0.00		
TPH 8015M		mg/kg		Analyzed By: MS						S-04
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier	
GRO C6-C10	24.6	10.0	04/25/2016	ND	206	103	200	7.10		
DRO >C10-C28	7900	10.0	04/25/2016	ND	213	106	200	5.30		
EXT DRO >C28-C35	2500	10.0	04/25/2016	ND						
Surrogate: 1-Chlorooctane										
	94.4 %	35-147								
Surrogate: 1-Chlorooctadecane										
	248 %	28-171								

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Celey D. Keene, Lab Director/Quality Manager

**Analytical Results For:**

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ROBBIE RUNNELS  
P.O. Box 301  
Lovington NM, 88260  
Fax To: (575) 396-1429

Received:	04/22/2016	Sampling Date:	04/19/2016
Reported:	04/29/2016	Sampling Type:	Soil
Project Name:	E. LIVINGSTON RIDGE DELAWARE	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	LEA COUNTY, NM		

**Sample ID: AREA #2 SP 7 @ SURFACE (H600874-15)**

Chloride, SM4500CI-B		mg/kg		Analyzed By: AP						
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier	
Chloride	4960	16.0	04/26/2016	ND	416	104	400	0.00		
TPH 8015M		mg/kg		Analyzed By: MS						S-06
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier	
GRO C6-C10	<200	200	04/26/2016	ND	206	103	200	7.10		
DRO >C10-C28	20700	200	04/26/2016	ND	213	106	200	5.30		
EXT DRO >C28-C35	5380	200	04/26/2016	ND						
Surrogate: 1-Chlorooctane										
	160 %	35-147								
Surrogate: 1-Chlorooctadecane										
	1300 %	28-171								

**Sample ID: AREA #2 SP 3 @ 5' (H600874-16)**

Chloride, SM4500CI-B		mg/kg		Analyzed By: AP					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	2480	16.0	04/26/2016	ND	416	104	400	0.00	
TPH 8015M		mg/kg		Analyzed By: MS					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	17.6	10.0	04/25/2016	ND	206	103	200	7.10	
DRO >C10-C28	1290	10.0	04/25/2016	ND	213	106	200	5.30	
EXT DRO >C28-C35	334	10.0	04/25/2016	ND					
Surrogate: 1-Chlorooctane									
	79.0 %	35-147							
Surrogate: 1-Chlorooctadecane									
	133 %	28-171							

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Celey D. Keene, Lab Director/Quality Manager

**Analytical Results For:**

Basin Environmental Service  
ROBBIE RUNNELS  
P.O. Box 301  
Lovington NM, 88260  
Fax To: (575) 396-1429

Received:	04/22/2016	Sampling Date:	04/19/2016
Reported:	04/29/2016	Sampling Type:	Soil
Project Name:	E. LIVINGSTON RIDGE DELAWARE	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	LEA COUNTY, NM		

**Sample ID: AREA #2 SP 4 @ 5' (H600874-17)**

Chloride, SM4500CI-B		mg/kg		Analyzed By: AP					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	1180	16.0	04/26/2016	ND	416	104	400	0.00	
TPH 8015M		mg/kg		Analyzed By: MS					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<10.0	10.0	04/25/2016	ND	206	103	200	7.10	
DRO >C10-C28	<10.0	10.0	04/25/2016	ND	213	106	200	5.30	
EXT DRO >C28-C35	14.5	10.0	04/25/2016	ND					
Surrogate: 1-Chlorooctane	75.4 %	35-147							
Surrogate: 1-Chlorooctadecane	89.7 %	28-171							

**Sample ID: AREA #2 SP 7 @ 5' (H600874-18)**

Chloride, SM4500CI-B		mg/kg		Analyzed By: AP					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	1230	16.0	04/26/2016	ND	416	104	400	0.00	
TPH 8015M		mg/kg		Analyzed By: MS					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<10.0	10.0	04/25/2016	ND	206	103	200	7.10	
DRO >C10-C28	247	10.0	04/25/2016	ND	213	106	200	5.30	
EXT DRO >C28-C35	51.3	10.0	04/25/2016	ND					
Surrogate: 1-Chlorooctane	73.3 %	35-147							
Surrogate: 1-Chlorooctadecane	89.3 %	28-171							

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Celey D. Keene, Lab Director/Quality Manager

**Analytical Results For:**

Basin Environmental Service  
ROBBIE RUNNELS  
P.O. Box 301  
Lovington NM, 88260  
Fax To: (575) 396-1429

Received:	04/22/2016	Sampling Date:	04/19/2016
Reported:	04/29/2016	Sampling Type:	Soil
Project Name:	E. LIVINGSTON RIDGE DELAWARE	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	LEA COUNTY, NM		

**Sample ID: AREA #1 SP 1 @ SURFACE (H600874-19)**

Chloride, SM4500Cl-B		mg/kg		Analyzed By: AP						
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier	
Chloride	4160	16.0	04/26/2016	ND	416	104	400	0.00		
TPH 8015M		mg/kg		Analyzed By: MS						S-04
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier	
GRO C6-C10	28.8	10.0	04/25/2016	ND	206	103	200	7.10		
DRO >C10-C28	9960	10.0	04/25/2016	ND	213	106	200	5.30		
EXT DRO >C28-C35	2470	10.0	04/25/2016	ND						
Surrogate: 1-Chlorooctane										
	85.3 %	35-147								
Surrogate: 1-Chlorooctadecane										
	547 %	28-171								

**Sample ID: AREA #1 SP 2 @ SURFACE (H600874-20)**

Chloride, SM4500Cl-B		mg/kg		Analyzed By: AP						
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier	
Chloride	3640	16.0	04/26/2016	ND	416	104	400	0.00		
TPH 8015M		mg/kg		Analyzed By: MS						S-04
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier	
GRO C6-C10	37.6	10.0	04/25/2016	ND	206	103	200	7.10		
DRO >C10-C28	7260	10.0	04/25/2016	ND	213	106	200	5.30		
EXT DRO >C28-C35	2640	10.0	04/25/2016	ND						
Surrogate: 1-Chlorooctane										
	85.9 %	35-147								
Surrogate: 1-Chlorooctadecane										
	887 %	28-171								

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Celey D. Keene, Lab Director/Quality Manager

**Analytical Results For:**

Basin Environmental Service  
ROBBIE RUNNELS  
P.O. Box 301  
Lovington NM, 88260  
Fax To: (575) 396-1429

Received:	04/22/2016	Sampling Date:	04/19/2016
Reported:	04/29/2016	Sampling Type:	Soil
Project Name:	E. LIVINGSTON RIDGE DELAWARE	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	LEA COUNTY, NM		

**Sample ID: AREA #1 SP 5 @ SURFACE (H600874-21)**

Chloride, SM4500Cl-B		mg/kg		Analyzed By: AP						
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier	
Chloride	3240	16.0	04/26/2016	ND	416	104	400	0.00		
TPH 8015M		mg/kg		Analyzed By: MS						S-06
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier	
GRO C6-C10	<100	100	04/26/2016	ND	206	103	200	0.134		
DRO >C10-C28	10900	100	04/26/2016	ND	215	108	200	3.54		
EXT DRO >C28-C35	5580	100	04/26/2016	ND						
Surrogate: 1-Chlorooctane										
	91.4 %	35-147								
Surrogate: 1-Chlorooctadecane										
	911 %	28-171								

**Sample ID: AREA #1 SP 1 @ 4' (H600874-22)**

Chloride, SM4500Cl-B		mg/kg		Analyzed By: AP						
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier	
Chloride	2520	16.0	04/26/2016	ND	416	104	400	0.00		
TPH 8015M		mg/kg		Analyzed By: MS						S-06
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier	
GRO C6-C10	124	100	04/26/2016	ND	206	103	200	0.134		
DRO >C10-C28	4250	100	04/26/2016	ND	215	108	200	3.54		
EXT DRO >C28-C35	1450	100	04/26/2016	ND						
Surrogate: 1-Chlorooctane										
	105 %	35-147								
Surrogate: 1-Chlorooctadecane										
	330 %	28-171								

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Celey D. Keene, Lab Director/Quality Manager

**Analytical Results For:**

Basin Environmental Service  
ROBBIE RUNNELS  
P.O. Box 301  
Lovington NM, 88260  
Fax To: (575) 396-1429

Received:	04/22/2016	Sampling Date:	04/19/2016
Reported:	04/29/2016	Sampling Type:	Soil
Project Name:	E. LIVINGSTON RIDGE DELAWARE	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	LEA COUNTY, NM		

**Sample ID: AREA #1 SP 2 @ 4' (H600874-23)**

Chloride, SM4500CI-B		mg/kg		Analyzed By: AP					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	3040	16.0	04/26/2016	ND	416	104	400	0.00	
TPH 8015M		mg/kg		Analyzed By: MS					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	34.5	10.0	04/26/2016	ND	206	103	200	0.134	
DRO >C10-C28	2810	10.0	04/26/2016	ND	215	108	200	3.54	
EXT DRO >C28-C35	684	10.0	04/26/2016	ND					
Surrogate: 1-Chlorooctane									
	97.5 %	35-147							
Surrogate: 1-Chlorooctadecane									
	149 %	28-171							

**Sample ID: AREA #1 SP 5 @ 4' (H600874-24)**

Chloride, SM4500CI-B		mg/kg		Analyzed By: AP						
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier	
Chloride	1600	16.0	04/26/2016	ND	416	104	400	0.00		
TPH 8015M		mg/kg		Analyzed By: MS						S-06
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier	
GRO C6-C10	<100	100	04/26/2016	ND	206	103	200	0.134		
DRO >C10-C28	3360	100	04/26/2016	ND	215	108	200	3.54		
EXT DRO >C28-C35	1030	100	04/26/2016	ND						
Surrogate: 1-Chlorooctane										
	95.3 %	35-147								
Surrogate: 1-Chlorooctadecane										
	246 %	28-171								

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Celey D. Keene, Lab Director/Quality Manager

### Notes and Definitions

S-06	The recovery of this surrogate is outside control limits due to sample dilution required from high analyte concentration and/or matrix interference's.
S-04	The surrogate recovery for this sample is outside of established control limits due to a sample matrix effect.
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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---

Celey D. Keene, Lab Director/Quality Manager



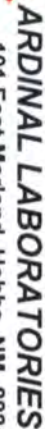
**ORDINAL LABORATORIES**

101 East Marland, Hobbs, NM 88240  
(575) 393-2326 FAX (575) 393-2476

## CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

[illegible]





101 East Marland, Hobbs, NM 88240  
(575) 393-2326 FAX (575) 393-2476

## ANALYSIS REQUEST

FOR LAB USE ONLY

Lab I.D.

**Sample I.D.**

H1600874

[illegible]

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Relinquished By:

Date:

Received By:

7

Phone

☐ Yes ☐ No

Add'l Phone #:

10

10

Relinquished By:

Date:

Received By:

[illegible]

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Delivered By: (Circle One)

5

Sam	
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Sampler - UPS - Bus - Other:

10/10

Yes

1

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FORM-006  
Revision 1.0

Corrected - 1.12 + Cardinal cannot accept verbal changes. Please fax written changes to 575-393-2476

#54





101 East Marland, Hobbs, NM 88240  
(575) 393-2326 FAX (575) 393-2476

## CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

[illegible]

January 17, 2017

ROBBIE RUNNELS

Basin Environmental Service

P.O. Box 301

Lovington, NM 88260

RE: E. LIVINGSTON RIDGE DELAWARE

Enclosed are the results of analyses for samples received by the laboratory on 01/12/17 12:45.

Cardinal Laboratories is accredited through Texas NELAP under certificate number T104704398-16-8. 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/qa/lab\\_accred\\_certif.html](http://www.tceq.texas.gov/field/qa/lab_accred_certif.html).

Cardinal Laboratories is accredited 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. Keene

Lab Director/Quality Manager

**Analytical Results For:**

 Basin Environmental Service  
 ROBBIE RUNNELS  
 P.O. Box 301  
 Lovington NM, 88260  
 Fax To: (575) 396-1429

Received:	01/12/2017	Sampling Date:	01/11/2017
Reported:	01/17/2017	Sampling Type:	Soil
Project Name:	E. LIVINGSTON RIDGE DELAWARE	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	LEA COUNTY, NM		

**Sample ID: AREA #1 FLOOR 1 @ 5' (H700084-01)**

Chloride, SM4500Cl-B		mg/kg		Analyzed By: AC					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	2640	16.0	01/13/2017	ND	416	104	400	0.00	
TPH 8015M		mg/kg		Analyzed By: MS					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<10.0	10.0	01/16/2017	ND	208	104	200	2.59	
DRO >C10-C28	<10.0	10.0	01/16/2017	ND	247	123	200	2.12	
Surrogate: 1-Chlorooctane		87.5 %	35-147						
Surrogate: 1-Chlorooctadecane		100 %	28-171						

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Celey D. Keene, Lab Director/Quality Manager

**Analytical Results For:**

Basin Environmental Service  
ROBBIE RUNNELS  
P.O. Box 301  
Lovington NM, 88260  
Fax To: (575) 396-1429

Received:	01/12/2017	Sampling Date:	01/11/2017
Reported:	01/17/2017	Sampling Type:	Soil
Project Name:	E. LIVINGSTON RIDGE DELAWARE	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	LEA COUNTY, NM		

**Sample ID: AREA #1 FLOOR 2 @ 5' (H700084-02)**

BTX 8021B		mg/kg		Analyzed By: CK					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Benzene*	<0.050	0.050	01/16/2017	ND	2.25	113	2.00	0.346	
Toluene*	<0.050	0.050	01/16/2017	ND	2.22	111	2.00	0.116	
Ethylbenzene*	<0.050	0.050	01/16/2017	ND	2.24	112	2.00	0.289	
Total Xylenes*	<0.150	0.150	01/16/2017	ND	6.31	105	6.00	0.427	
Total BTX	<0.300	0.300	01/16/2017	ND					

Surrogate: 4-Bromofluorobenzene (PID) 101 % 73.6-140

Chloride, SM4500CI-B		mg/kg		Analyzed By: AC					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	2680	16.0	01/13/2017	ND	416	104	400	0.00	

TPH 8015M		mg/kg		Analyzed By: MS					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<10.0	10.0	01/16/2017	ND	208	104	200	2.59	
DRO >C10-C28	<10.0	10.0	01/16/2017	ND	247	123	200	2.12	

Surrogate: 1-Chlorooctane 86.4 % 35-147

Surrogate: 1-Chlorooctadecane 91.5 % 28-171

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Celey D. Keene, Lab Director/Quality Manager

**Analytical Results For:**

 Basin Environmental Service  
 ROBBIE RUNNELS  
 P.O. Box 301  
 Lovington NM, 88260  
 Fax To: (575) 396-1429

Received:	01/12/2017	Sampling Date:	01/11/2017
Reported:	01/17/2017	Sampling Type:	Soil
Project Name:	E. LIVINGSTON RIDGE DELAWARE	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	LEA COUNTY, NM		

**Sample ID: AREA #1 FLOOR 3 @ 5' (H700084-03)**

Chloride, SM4500Cl-B		mg/kg		Analyzed By: AC					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	1500	16.0	01/13/2017	ND	416	104	400	0.00	
TPH 8015M		mg/kg		Analyzed By: MS					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<10.0	10.0	01/16/2017	ND	208	104	200	2.59	
DRO >C10-C28	<10.0	10.0	01/16/2017	ND	247	123	200	2.12	
Surrogate: 1-Chlorooctane	85.0 %	35-147							
Surrogate: 1-Chlorooctadecane	91.5 %	28-171							

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Celey D. Keene, Lab Director/Quality Manager

**Analytical Results For:**

Basin Environmental Service  
ROBBIE RUNNELS  
P.O. Box 301  
Lovington NM, 88260  
Fax To: (575) 396-1429

Received:	01/12/2017	Sampling Date:	01/11/2017
Reported:	01/17/2017	Sampling Type:	Soil
Project Name:	E. LIVINGSTON RIDGE DELAWARE	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	LEA COUNTY, NM		

**Sample ID: AREA #1 FLOOR 4 @ 5' (H700084-04)**

BTX 8021B		mg/kg		Analyzed By: CK					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Benzene*	<0.050	0.050	01/16/2017	ND	2.25	113	2.00	0.346	
Toluene*	<0.050	0.050	01/16/2017	ND	2.22	111	2.00	0.116	
Ethylbenzene*	<0.050	0.050	01/16/2017	ND	2.24	112	2.00	0.289	
Total Xylenes*	<0.150	0.150	01/16/2017	ND	6.31	105	6.00	0.427	
Total BTX	<0.300	0.300	01/16/2017	ND					

Surrogate: 4-Bromofluorobenzene (PID) 102 % 73.6-140

Chloride, SM4500CI-B		mg/kg		Analyzed By: AC					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	256	16.0	01/13/2017	ND	416	104	400	0.00	

TPH 8015M		mg/kg		Analyzed By: MS					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<10.0	10.0	01/16/2017	ND	208	104	200	2.59	
DRO >C10-C28	<10.0	10.0	01/16/2017	ND	247	123	200	2.12	

Surrogate: 1-Chlorooctane 92.1 % 35-147

Surrogate: 1-Chlorooctadecane 96.3 % 28-171

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Celey D. Keene, Lab Director/Quality Manager

**Analytical Results For:**

 Basin Environmental Service  
 ROBBIE RUNNELS  
 P.O. Box 301  
 Lovington NM, 88260  
 Fax To: (575) 396-1429

Received:	01/12/2017	Sampling Date:	01/11/2017
Reported:	01/17/2017	Sampling Type:	Soil
Project Name:	E. LIVINGSTON RIDGE DELAWARE	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	LEA COUNTY, NM		

**Sample ID: AREA #1 NW 1 @ 4' (H700084-05)**

Chloride, SM4500Cl-B		mg/kg		Analyzed By: AC					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	752	16.0	01/13/2017	ND	416	104	400	0.00	
TPH 8015M		mg/kg		Analyzed By: MS					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<10.0	10.0	01/16/2017	ND	208	104	200	2.59	
DRO >C10-C28	<10.0	10.0	01/16/2017	ND	247	123	200	2.12	
Surrogate: 1-Chlorooctane	91.9 %	35-147							
Surrogate: 1-Chlorooctadecane	93.3 %	28-171							

**Sample ID: AREA #1 NW 2 @ 4' (H700084-06)**

Chloride, SM4500Cl-B		mg/kg		Analyzed By: AC					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	384	16.0	01/13/2017	ND	416	104	400	0.00	
TPH 8015M		mg/kg		Analyzed By: MS					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<10.0	10.0	01/16/2017	ND	208	104	200	2.59	
DRO >C10-C28	<10.0	10.0	01/16/2017	ND	247	123	200	2.12	
Surrogate: 1-Chlorooctane	89.5 %	35-147							
Surrogate: 1-Chlorooctadecane	99.5 %	28-171							

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**Analytical Results For:**

Basin Environmental Service  
ROBBIE RUNNELS  
P.O. Box 301  
Lovington NM, 88260  
Fax To: (575) 396-1429

Received:	01/12/2017	Sampling Date:	01/11/2017
Reported:	01/17/2017	Sampling Type:	Soil
Project Name:	E. LIVINGSTON RIDGE DELAWARE	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	LEA COUNTY, NM		

**Sample ID: AREA #1 NW 3 @ 4' (H700084-07)**

Chloride, SM4500Cl-B		mg/kg		Analyzed By: AC					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	32.0	16.0	01/13/2017	ND	416	104	400	0.00	
TPH 8015M		mg/kg		Analyzed By: MS					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<10.0	10.0	01/16/2017	ND	208	104	200	2.59	
DRO >C10-C28	<10.0	10.0	01/16/2017	ND	247	123	200	2.12	
Surrogate: 1-Chlorooctane	80.3 %	35-147							
Surrogate: 1-Chlorooctadecane	81.1 %	28-171							

**Sample ID: AREA #1 SW 1 @ 4' (H700084-08)**

Chloride, SM4500Cl-B		mg/kg		Analyzed By: AC					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	720	16.0	01/13/2017	ND	416	104	400	0.00	
TPH 8015M		mg/kg		Analyzed By: MS					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<10.0	10.0	01/16/2017	ND	208	104	200	2.59	
DRO >C10-C28	<10.0	10.0	01/16/2017	ND	247	123	200	2.12	
Surrogate: 1-Chlorooctane	80.9 %	35-147							
Surrogate: 1-Chlorooctadecane	92.4 %	28-171							

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**Analytical Results For:**

Basin Environmental Service  
ROBBIE RUNNELS  
P.O. Box 301  
Lovington NM, 88260  
Fax To: (575) 396-1429

Received:	01/12/2017	Sampling Date:	01/11/2017
Reported:	01/17/2017	Sampling Type:	Soil
Project Name:	E. LIVINGSTON RIDGE DELAWARE	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	LEA COUNTY, NM		

**Sample ID: AREA #1 SW 2 @ 4' (H700084-09)**

Chloride, SM4500Cl-B		mg/kg		Analyzed By: AC					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	48.0	16.0	01/13/2017	ND	416	104	400	0.00	
TPH 8015M		mg/kg		Analyzed By: MS					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<10.0	10.0	01/16/2017	ND	208	104	200	2.59	
DRO >C10-C28	<10.0	10.0	01/16/2017	ND	247	123	200	2.12	
Surrogate: 1-Chlorooctane	83.5 %	35-147							
Surrogate: 1-Chlorooctadecane	93.1 %	28-171							

**Sample ID: AREA #1 EW 1 @ 4' (H700084-10)**

Chloride, SM4500Cl-B		mg/kg		Analyzed By: AC					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	320	16.0	01/13/2017	ND	416	104	400	0.00	
TPH 8015M		mg/kg		Analyzed By: MS					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<10.0	10.0	01/16/2017	ND	208	104	200	2.59	
DRO >C10-C28	<10.0	10.0	01/16/2017	ND	247	123	200	2.12	
Surrogate: 1-Chlorooctane	93.2 %	35-147							
Surrogate: 1-Chlorooctadecane	104 %	28-171							

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**Analytical Results For:**

Basin Environmental Service  
ROBBIE RUNNELS  
P.O. Box 301  
Lovington NM, 88260  
Fax To: (575) 396-1429

Received:	01/12/2017	Sampling Date:	01/11/2017
Reported:	01/17/2017	Sampling Type:	Soil
Project Name:	E. LIVINGSTON RIDGE DELAWARE	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	LEA COUNTY, NM		

**Sample ID: AREA #1 EW 2 @ 4' (H700084-11)**

Chloride, SM4500Cl-B		mg/kg		Analyzed By: AC					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	704	16.0	01/13/2017	ND	416	104	400	0.00	
TPH 8015M		mg/kg		Analyzed By: MS					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<10.0	10.0	01/16/2017	ND	208	104	200	2.59	
DRO >C10-C28	<10.0	10.0	01/16/2017	ND	247	123	200	2.12	
Surrogate: 1-Chlorooctane	87.9 %	35-147							
Surrogate: 1-Chlorooctadecane	96.5 %	28-171							

**Sample ID: AREA #1 EW 3 @ 4' (H700084-12)**

Chloride, SM4500Cl-B		mg/kg		Analyzed By: AC					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	64.0	16.0	01/13/2017	ND	416	104	400	0.00	
TPH 8015M		mg/kg		Analyzed By: MS					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<10.0	10.0	01/16/2017	ND	208	104	200	2.59	
DRO >C10-C28	<10.0	10.0	01/16/2017	ND	247	123	200	2.12	
Surrogate: 1-Chlorooctane	89.6 %	35-147							
Surrogate: 1-Chlorooctadecane	93.5 %	28-171							

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**Analytical Results For:**

Basin Environmental Service  
ROBBIE RUNNELS  
P.O. Box 301  
Lovington NM, 88260  
Fax To: (575) 396-1429

Received:	01/12/2017	Sampling Date:	01/11/2017
Reported:	01/17/2017	Sampling Type:	Soil
Project Name:	E. LIVINGSTON RIDGE DELAWARE	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	LEA COUNTY, NM		

**Sample ID: AREA #1 EW 4 @ 4' (H700084-13)**

Chloride, SM4500Cl-B		mg/kg		Analyzed By: AC					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	32.0	16.0	01/13/2017	ND	416	104	400	0.00	
TPH 8015M		mg/kg		Analyzed By: MS					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<10.0	10.0	01/16/2017	ND	208	104	200	2.59	
DRO >C10-C28	<10.0	10.0	01/16/2017	ND	247	123	200	2.12	
Surrogate: 1-Chlorooctane	87.1 %	35-147							
Surrogate: 1-Chlorooctadecane	92.2 %	28-171							

**Sample ID: AREA #1 EW 5 @ 4' (H700084-14)**

Chloride, SM4500Cl-B		mg/kg		Analyzed By: AC					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	48.0	16.0	01/13/2017	ND	416	104	400	0.00	
TPH 8015M		mg/kg		Analyzed By: MS					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<10.0	10.0	01/16/2017	ND	208	104	200	2.59	
DRO >C10-C28	<10.0	10.0	01/16/2017	ND	247	123	200	2.12	
Surrogate: 1-Chlorooctane	95.9 %	35-147							
Surrogate: 1-Chlorooctadecane	108 %	28-171							

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**Analytical Results For:**

Basin Environmental Service  
ROBBIE RUNNELS  
P.O. Box 301  
Lovington NM, 88260  
Fax To: (575) 396-1429

Received:	01/12/2017	Sampling Date:	01/11/2017
Reported:	01/17/2017	Sampling Type:	Soil
Project Name:	E. LIVINGSTON RIDGE DELAWARE	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	LEA COUNTY, NM		

**Sample ID: AREA #1 WW 1 @ 4' (H700084-15)**

Chloride, SM4500Cl-B		mg/kg		Analyzed By: AC					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	1580	16.0	01/13/2017	ND	416	104	400	0.00	
TPH 8015M		mg/kg		Analyzed By: MS					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<10.0	10.0	01/16/2017	ND	208	104	200	2.59	
DRO >C10-C28	<10.0	10.0	01/16/2017	ND	247	123	200	2.12	
Surrogate: 1-Chlorooctane	83.2 %	35-147							
Surrogate: 1-Chlorooctadecane	91.2 %	28-171							

**Sample ID: AREA #1 WW 2 @ 4' (H700084-16)**

Chloride, SM4500Cl-B		mg/kg		Analyzed By: AC					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	400	16.0	01/13/2017	ND	416	104	400	0.00	
TPH 8015M		mg/kg		Analyzed By: MS					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<10.0	10.0	01/16/2017	ND	208	104	200	2.59	
DRO >C10-C28	<10.0	10.0	01/16/2017	ND	247	123	200	2.12	
Surrogate: 1-Chlorooctane	85.2 %	35-147							
Surrogate: 1-Chlorooctadecane	95.5 %	28-171							

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**Analytical Results For:**

Basin Environmental Service  
ROBBIE RUNNELS  
P.O. Box 301  
Lovington NM, 88260  
Fax To: (575) 396-1429

Received:	01/12/2017	Sampling Date:	01/11/2017
Reported:	01/17/2017	Sampling Type:	Soil
Project Name:	E. LIVINGSTON RIDGE DELAWARE	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	LEA COUNTY, NM		

**Sample ID: AREA #1 WW 3 @ 4' (H700084-17)**

Chloride, SM4500Cl-B		mg/kg		Analyzed By: AC					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	160	16.0	01/13/2017	ND	416	104	400	0.00	
TPH 8015M		mg/kg		Analyzed By: MS					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<10.0	10.0	01/16/2017	ND	208	104	200	2.59	
DRO >C10-C28	<10.0	10.0	01/16/2017	ND	247	123	200	2.12	
Surrogate: 1-Chlorooctane	88.7 %	35-147							
Surrogate: 1-Chlorooctadecane	94.0 %	28-171							

**Sample ID: AREA #1 WW 4 @ 4' (H700084-18)**

Chloride, SM4500Cl-B		mg/kg		Analyzed By: AC					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	48.0	16.0	01/13/2017	ND	416	104	400	0.00	
TPH 8015M		mg/kg		Analyzed By: MS					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<10.0	10.0	01/16/2017	ND	208	104	200	2.59	
DRO >C10-C28	<10.0	10.0	01/16/2017	ND	247	123	200	2.12	
Surrogate: 1-Chlorooctane	87.5 %	35-147							
Surrogate: 1-Chlorooctadecane	94.4 %	28-171							

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**Analytical Results For:**

 Basin Environmental Service  
 ROBBIE RUNNELS  
 P.O. Box 301  
 Lovington NM, 88260  
 Fax To: (575) 396-1429

Received:	01/12/2017	Sampling Date:	01/11/2017
Reported:	01/17/2017	Sampling Type:	Soil
Project Name:	E. LIVINGSTON RIDGE DELAWARE	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	LEA COUNTY, NM		

**Sample ID: AREA #1 WW 5 @ 4' (H700084-19)**

Chloride, SM4500Cl-B		mg/kg		Analyzed By: AC						
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier	
<b>Chloride</b>	<b>32.0</b>	16.0	01/13/2017	ND	416	104	400	0.00		
TPH 8015M		mg/kg		Analyzed By: MS						
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier	
GRO C6-C10	<10.0	10.0	01/16/2017	ND	208	104	200	2.59		
DRO >C10-C28	<10.0	10.0	01/16/2017	ND	247	123	200	2.12		
Surrogate: 1-Chlorooctane	85.4 %	35-147								
Surrogate: 1-Chlorooctadecane	90.7 %	28-171								

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### Notes and Definitions

BS1	Blank spike recovery above laboratory acceptance criteria. Results for analyte potentially biased high.
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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Celey D. Keene, Lab Director/Quality Manager





# ARDINAL LABORATORIES

101 East Marland, Hobbs, NM 88240  
(575) 393-2326 FAX (575) 393-2476

## CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

Company Name: Basin Environmental Service Technologies, LLC

Project Manager: Robbie Runnels

Address: P.O. Box 301

City: Lovington

State: NM Zip: 88260

Phone #: (575)396-2378

Fax #: (575)396-1429

Project #:

Project Owner: Echo Production

Project Name: E. Livingston Delaware Ridge

Project Location: Lea

Sampler Name: Matt Taylor

### BILL TO

### ANALYSIS REQUEST

P.O. #:

Company: Basin Env.

Attn: Jody

Address: P.O. Box 301

City: Lovington

State: NM Zip: 88260

Phone #: (575) 396-2378

Fax #: (575) 396-1429

FOR LAB USE ONLY

Lab I.D. Sample I.D.

H100084

(G)RAB OR (C)OMP.

# CONTAINERS

GROUNDWATER

WASTEWATER

SOIL

OIL

SLUDGE

OTHER :

ACID/BASE:

ICE / COOL

OTHER :

DATE TIME

Chloride

TPH (8015M)

BTEX (8021B)

1	Area#1 Floor 1@5'	g	1	X	X	1/11/16	9:00	X	X										
2	Area#1 Floor 2@5'	g	1	X	X	1/11/16	9:05	X	X	X									
3	Area#1 Floor 3@5'	g	1	X	X	1/11/16	9:10	X	X										
4	Area#1 Floor 4@5'	g	1	X	X	1/11/16	9:15	X	X	X									
5	Area#1 NW 1@4'	g	1	X	X	1/11/16	9:20	X	X										
6	Area#1 NW 2@4'	g	1	X	X	1/11/16	9:25	X	X										
7	Area#1 NW 3@4'	g	1	X	X	1/11/16	9:30	X	X										
8	Area#1 SW 1@4'	g	1	X	X	1/11/16	9:35	X	X										
9	Area#1 SW 2@4'	g	1	X	X	1/11/16	9:40	X	X										
10	Area#1 EW 1@4'	g	1	X	X	1/11/16	9:45	X	X										

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Relinquished By:

Date: 1/12/2016

Received By:

Matt Taylor

Time: 6:30

Robbie Runnels

Relinquished By:

Date: 1/11/17

Received By:

Time: 10:45

Robbie Runnels

Delivered By: (Circle One)

Time: 10:45

Robbie Runnels

Sampler - UPS - Bus - Other: #75

Time: 4:40

Robbie Runnels

Sample Condition

CHECKED BY:

Please email results to pm@basinenr.com

Cool Intact

Yes Yes

No No





# ARDINAL LABORATORIES

101 East Marland, Hobbs, NM 88240  
(575) 393-2326 FAX (575) 393-2476

## CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

Company Name: Basin Environmental Service Technologies, LLC

Project Manager: Robbie Runnels

Address: P.O. Box 301

City: Lovington

Phone #: (575)396-2378

Project #:

Project Name: E. Livingston Delaware Ridge

Project Location: Lea

Sampler Name: Matt Taylor

P.O. #:

Company: Basin Env.

Attn: Jody

Address: P.O. Box 301

City: Lovington

State: NM

Zip: 88260

Phone #: (575) 396-2378

Fax #: (575) 396-1429

### ANALYSIS REQUEST

Lab I.D.	Sample I.D.	(G)RAB OR (C)OMP.	# CONTAINERS	MATRIX						PRESERV.		DATE	TIME	Chloride									
				GROUNDWATER	WASTEWATER	SOIL	OIL	SLUDGE	OTHER :	ACID/BASE:	ICE / COOL			TPH (8015M)									
H700084	Area#1 EW 2@4'	g	1	X								1/11/16	9:50	X	X								
	Area#1 EW 3@4'	g	1	X								1/11/16	9:55	X	X								
	Area#1 EW 4@4'	g	1	X								1/11/16	10:00	X	X								
	Area#1 EW 5@4'	g	1	X								1/11/16	10:05	X	X								
	Area#1 WW 1@4'	g	1	X								1/11/16	10:10	X	X								
	Area#1 WW 2@4'	g	1	X								1/11/16	10:15	X	X								
	Area#1 WW 3@4'	g	1	X								1/11/16	10:20	X	X								
	Area#1 WW 4@4'	g	1	X								1/11/16	10:25	X	X								
	Area#1 WW 5@4'	g	1	X								1/11/16	10:30	X	X								

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Relinquished By:

Matt Taylor

Date:

1/12/2016

Received By:

6:30

Robbie Runnels

Relinquished By:

Matt Taylor

Date:

1/12/17

Received By:

4:45

Robbie Runnels

Delivered By: (Circle One)

Sampler - UPS - Bus - Other: #15

Date:

4:42

Sample Condition

Cool Intact

CHECKED BY:

(Initials)

Please email results to pm@basinenv.com

Phone Result:

Fax Result:

REMARKS:

Yes Yes No No

Add'l Phone #:

Add'l Fax #:

February 08, 2017

ROBBIE RUNNELS

Basin Environmental Service

P.O. Box 301

Lovington, NM 88260

RE: E. LIVINGSTON RIDGE DELAWARE

Enclosed are the results of analyses for samples received by the laboratory on 02/01/17 15:10.

Cardinal Laboratories is accredited through Texas NELAP under certificate number T104704398-16-8. 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/qa/lab\\_accred\\_certif.html](http://www.tceq.texas.gov/field/qa/lab_accred_certif.html).

Cardinal Laboratories is accredited 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. Keene

Lab Director/Quality Manager

**Analytical Results For:**

Basin Environmental Service  
ROBBIE RUNNELS  
P.O. Box 301  
Lovington NM, 88260  
Fax To: (575) 396-1429

Received:	02/01/2017	Sampling Date:	01/31/2017
Reported:	02/08/2017	Sampling Type:	Soil
Project Name:	E. LIVINGSTON RIDGE DELAWARE	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	LEA COUNTY, NM		

**Sample ID: AREA 1 FLOOR 1 @ 7' (H700245-01)**

BTEX 8021B		mg/kg		Analyzed By: MS					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Benzene*	<0.050	0.050	02/03/2017	ND	2.14	107	2.00	0.0867	
Toluene*	<0.050	0.050	02/03/2017	ND	2.10	105	2.00	0.136	
Ethylbenzene*	<0.050	0.050	02/03/2017	ND	2.11	106	2.00	0.0711	
Total Xylenes*	<0.150	0.150	02/03/2017	ND	5.99	99.8	6.00	0.215	
Total BTEX	<0.300	0.300	02/03/2017	ND					

Surrogate: 4-Bromofluorobenzene (PID) 103 % 73.6-140

Chloride, SM4500Cl-B		mg/kg		Analyzed By: AC						
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier	
Chloride	10400	16.0	02/03/2017	ND	432	108	400	0.00		

TPH 8015M		mg/kg		Analyzed By: MS					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<10.0	10.0	02/02/2017	ND	194	97.1	200	4.66	
DRO >C10-C28	<10.0	10.0	02/02/2017	ND	213	107	200	9.16	

Surrogate: 1-Chlorooctane 95.1 % 35-147

Surrogate: 1-Chlorooctadecane 107 % 28-171

Cardinal Laboratories

\*=Accredited Analyte

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Celey D. Keene, Lab Director/Quality Manager

**Analytical Results For:**

Basin Environmental Service  
ROBBIE RUNNELS  
P.O. Box 301  
Lovington NM, 88260  
Fax To: (575) 396-1429

Received:	02/01/2017	Sampling Date:	01/31/2017
Reported:	02/08/2017	Sampling Type:	Soil
Project Name:	E. LIVINGSTON RIDGE DELAWARE	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	LEA COUNTY, NM		

**Sample ID: AREA 1 FLOOR 1 @ 9' (H700245-02)**

Chloride, SM4500Cl-B		mg/kg		Analyzed By: AC					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	18000	16.0	02/03/2017	ND	432	108	400	0.00	
TPH 8015M		mg/kg		Analyzed By: MS					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<10.0	10.0	02/02/2017	ND	194	97.1	200	4.66	
DRO >C10-C28	<10.0	10.0	02/02/2017	ND	213	107	200	9.16	
Surrogate: 1-Chlorooctane	92.4 %	35-147							
Surrogate: 1-Chlorooctadecane	101 %	28-171							

**Sample ID: AREA 1 FLOOR 2 @ 7' (H700245-03)**

Chloride, SM4500Cl-B		mg/kg		Analyzed By: AC					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	7600	16.0	02/03/2017	ND	432	108	400	0.00	
TPH 8015M		mg/kg		Analyzed By: MS					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<10.0	10.0	02/02/2017	ND	194	97.1	200	4.66	
DRO >C10-C28	<10.0	10.0	02/02/2017	ND	213	107	200	9.16	
Surrogate: 1-Chlorooctane	98.2 %	35-147							
Surrogate: 1-Chlorooctadecane	102 %	28-171							

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Celey D. Keene, Lab Director/Quality Manager

**Analytical Results For:**

 Basin Environmental Service  
 ROBBIE RUNNELS  
 P.O. Box 301  
 Lovington NM, 88260  
 Fax To: (575) 396-1429

Received:	02/01/2017	Sampling Date:	01/31/2017
Reported:	02/08/2017	Sampling Type:	Soil
Project Name:	E. LIVINGSTON RIDGE DELAWARE	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	LEA COUNTY, NM		

**Sample ID: AREA 1 FLOOR 2 @ 9' (H700245-04)**

Chloride, SM4500Cl-B		mg/kg		Analyzed By: AC					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	20000	16.0	02/03/2017	ND	432	108	400	0.00	
TPH 8015M		mg/kg		Analyzed By: MS					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<10.0	10.0	02/02/2017	ND	194	97.1	200	4.66	
DRO >C10-C28	<10.0	10.0	02/02/2017	ND	213	107	200	9.16	
Surrogate: 1-Chlorooctane	91.9 %	35-147							
Surrogate: 1-Chlorooctadecane	91.0 %	28-171							

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Celey D. Keene, Lab Director/Quality Manager



**Analytical Results For:**

Basin Environmental Service  
ROBBIE RUNNELS  
P.O. Box 301  
Lovington NM, 88260  
Fax To: (575) 396-1429

Received:	02/01/2017	Sampling Date:	01/31/2017
Reported:	02/08/2017	Sampling Type:	Soil
Project Name:	E. LIVINGSTON RIDGE DELAWARE	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	LEA COUNTY, NM		

**Sample ID: AREA 1 FLOOR 3 @ 7' (H700245-05)**

BTEx 8021B		mg/kg		Analyzed By: MS					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Benzene*	<0.050	0.050	02/03/2017	ND	2.14	107	2.00	0.0867	
Toluene*	<0.050	0.050	02/03/2017	ND	2.10	105	2.00	0.136	
Ethylbenzene*	<0.050	0.050	02/03/2017	ND	2.11	106	2.00	0.0711	
Total Xylenes*	<0.150	0.150	02/03/2017	ND	5.99	99.8	6.00	0.215	
Total BTEx	<0.300	0.300	02/03/2017	ND					

Surrogate: 4-Bromofluorobenzene (PID) 103 % 73.6-140

Chloride, SM4500CI-B		mg/kg		Analyzed By: AC					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	13200	16.0	02/03/2017	ND	432	108	400	0.00	

TPH 8015M		mg/kg		Analyzed By: MS					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<10.0	10.0	02/02/2017	ND	194	97.1	200	4.66	
DRO >C10-C28	<10.0	10.0	02/02/2017	ND	213	107	200	9.16	

Surrogate: 1-Chlorooctane 92.8 % 35-147

Surrogate: 1-Chlorooctadecane 100 % 28-171

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Celey D. Keene, Lab Director/Quality Manager

**Analytical Results For:**

Basin Environmental Service  
ROBBIE RUNNELS  
P.O. Box 301  
Lovington NM, 88260  
Fax To: (575) 396-1429

Received:	02/01/2017	Sampling Date:	01/31/2017
Reported:	02/08/2017	Sampling Type:	Soil
Project Name:	E. LIVINGSTON RIDGE DELAWARE	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	LEA COUNTY, NM		

**Sample ID: AREA 1 FLOOR 3 @ 9' (H700245-06)**

Chloride, SM4500Cl-B		mg/kg		Analyzed By: AC					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	17600	16.0	02/03/2017	ND	432	108	400	0.00	
TPH 8015M		mg/kg		Analyzed By: MS					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<10.0	10.0	02/02/2017	ND	194	97.1	200	4.66	
DRO >C10-C28	<10.0	10.0	02/02/2017	ND	213	107	200	9.16	
Surrogate: 1-Chlorooctane	102 %	35-147							
Surrogate: 1-Chlorooctadecane	95.8 %	28-171							

**Sample ID: AREA 1 WW 1 @ 4' (H700245-07)**

Chloride, SM4500Cl-B		mg/kg		Analyzed By: AC					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	32.0	16.0	02/03/2017	ND	432	108	400	0.00	
TPH 8015M		mg/kg		Analyzed By: MS					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<10.0	10.0	02/02/2017	ND	194	97.1	200	4.66	
DRO >C10-C28	<10.0	10.0	02/02/2017	ND	213	107	200	9.16	
Surrogate: 1-Chlorooctane	88.7 %	35-147							
Surrogate: 1-Chlorooctadecane	101 %	28-171							

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Celey D. Keene, Lab Director/Quality Manager

### Notes and Definitions

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

---

Cardinal Laboratories

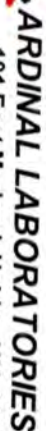
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Celey D. Keene, Lab Director/Quality Manager



101 East Marland, Hobbs, NM 88240  
(575) 393-2326 FAX (575) 393-2476

## CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

Page 8 of 8



PHONE (575) 393-2326 ° 101 E. MARLAND ° HOBBS, NM 88240

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February 09, 2017

ROBBIE RUNNELS

Basin Environmental Service

P.O. Box 301

Lovington, NM 88260

RE: E. LIVINGSTON RIDGE DELAWARE

Enclosed are the results of analyses for samples received by the laboratory on 02/03/17 15:00.

Cardinal Laboratories is accredited through Texas NELAP under certificate number T104704398-16-8. 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/qa/lab\\_accred\\_certif.html](http://www.tceq.texas.gov/field/qa/lab_accred_certif.html).

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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,

A handwritten signature in black ink that reads "Celey D. Keene". The signature is written in a cursive, flowing style.

Celey D. Keene

Lab Director/Quality Manager

**Analytical Results For:**

Basin Environmental Service  
ROBBIE RUNNELS  
P.O. Box 301  
Lovington NM, 88260  
Fax To: (575) 396-1429

Received:	02/03/2017	Sampling Date:	02/01/2017
Reported:	02/09/2017	Sampling Type:	Soil
Project Name:	E. LIVINGSTON RIDGE DELAWARE	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	LEA COUNTY, NM		

**Sample ID: AREA #1 FLOOR 3 @ 23' (H700284-01)****Chloride, SM4500Cl-B****mg/kg****Analyzed By: AC**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
<b>Chloride</b>	<b>7330</b>	16.0	02/09/2017	ND	400	100	400	3.92	

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\*=Accredited Analyte

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Celey D. Keene, Lab Director/Quality Manager



**Notes and Definitions**

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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Celey D. Keene, Lab Director/Quality Manager

**ARDINAL LABORATORIES**  
101 East Marland, Hobbs, NM 88240  
(575) 393-2326 FAX (575) 393-2476

101 East Marland, Hobbs, NM 88240

(575) 393-2326 FAX (575) 393-2476

# CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

[illegible]

April 28, 2017

ROBBIE RUNNELS

Basin Environmental Service

P.O. Box 301

Lovington, NM 88260

RE: E. LIVINGSTON RIDGE DELAWARE

Enclosed are the results of analyses for samples received by the laboratory on 04/21/17 15:40.

Cardinal Laboratories is accredited through Texas NELAP under certificate number T104704398-16-8. 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/qa/lab\\_accred\\_certif.html](http://www.tceq.texas.gov/field/qa/lab_accred_certif.html).

Cardinal Laboratories is accredited 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. Keene

Lab Director/Quality Manager

**Analytical Results For:**

Basin Environmental Service  
ROBBIE RUNNELS  
P.O. Box 301  
Lovington NM, 88260  
Fax To: (575) 396-1429

Received:	04/21/2017	Sampling Date:	04/19/2017
Reported:	04/28/2017	Sampling Type:	Soil
Project Name:	E. LIVINGSTON RIDGE DELAWARE	Sampling Condition:	** (See Notes)
Project Number:	NONE GIVEN	Sample Received By:	Tamara Oldaker
Project Location:	LEA COUNTY, NM		

**Sample ID: EW-2 (H701076-01)**

Chloride, SM4500Cl-B		mg/kg		Analyzed By: AC						
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier	
Chloride	64.0	16.0	04/26/2017	ND	416	104	400	3.77		

**Sample ID: SW-1 (H701076-02)**

Chloride, SM4500Cl-B		mg/kg		Analyzed By: AC					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	32.0	16.0	04/26/2017	ND	416	104	400	3.77	

**Sample ID: NW-1 (H701076-03)**

Chloride, SM4500Cl-B		mg/kg		Analyzed By: AC					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	48.0	16.0	04/26/2017	ND	416	104	400	3.77	

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Celey D. Keene, Lab Director/Quality Manager

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---

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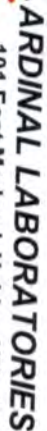
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Celey D. Keene, Lab Director/Quality Manager





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(575) 393-2326 FAX (575) 393-2476

### CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

Page 4 of 4



September 29, 2017

ROBBIE RUNNELS

Basin Environmental Service

P.O. Box 301

Lovington, NM 88260

RE: E. LIVINGSTON RIDGE DELAWARE

Enclosed are the results of analyses for samples received by the laboratory on 09/25/17 11:40.

Cardinal Laboratories is accredited through Texas NELAP under certificate number T104704398-16-8. 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/qa/lab\\_accred\\_certif.html](http://www.tceq.texas.gov/field/qa/lab_accred_certif.html).

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

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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. Keene

Lab Director/Quality Manager

**Analytical Results For:**

Basin Environmental Service  
ROBBIE RUNNELS  
P.O. Box 301  
Lovington NM, 88260  
Fax To: (575) 396-1429

Received:	09/25/2017	Sampling Date:	09/21/2017
Reported:	09/29/2017	Sampling Type:	Soil
Project Name:	E. LIVINGSTON RIDGE DELAWARE	Sampling Condition:	Cool & Intact
Project Number:	AREA 1	Sample Received By:	Celey D. Keene
Project Location:	LEA COUNTY, NM		

**Sample ID: SB1 @ 90' (H702601-01)**

Chloride, SM4500CI-B			mg/kg		Analyzed By: AC				
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	192	16.0	09/27/2017	ND	432	108	400	3.77	

**Sample ID: SB1 @ 95' (H702601-02)**

Chloride, SM4500CI-B			mg/kg		Analyzed By: AC				
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	160	16.0	09/27/2017	ND	432	108	400	3.77	

**Sample ID: SB1 @ 100' (H702601-03)**

BTX 8021B			mg/kg		Analyzed By: MS				
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Benzene*	<0.050	0.050	09/28/2017	ND	1.78	88.9	2.00	1.68	
Toluene*	<0.050	0.050	09/28/2017	ND	1.61	80.7	2.00	2.06	
Ethylbenzene*	<0.050	0.050	09/28/2017	ND	1.63	81.3	2.00	0.562	
Total Xylenes*	<0.150	0.150	09/28/2017	ND	4.94	82.3	6.00	0.354	
Total BTX	<0.300	0.300	09/28/2017	ND					

Surrogate: 4-Bromofluorobenzene (PID) 105 % 72-148

Chloride, SM4500CI-B			mg/kg		Analyzed By: AC				
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	128	16.0	09/27/2017	ND	432	108	400	3.77	

TPH 8015M			mg/kg		Analyzed By: MS				
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier

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Celey D. Keene, Lab Director/Quality Manager

**Analytical Results For:**

Basin Environmental Service  
ROBBIE RUNNELS  
P.O. Box 301  
Lovington NM, 88260  
Fax To: (575) 396-1429

Received:	09/25/2017	Sampling Date:	09/21/2017
Reported:	09/29/2017	Sampling Type:	Soil
Project Name:	E. LIVINGSTON RIDGE DELAWARE	Sampling Condition:	Cool & Intact
Project Number:	AREA 1	Sample Received By:	Celey D. Keene
Project Location:	LEA COUNTY, NM		

**Sample ID: SB1 @ 100' (H702601-03)**

TPH 8015M		mg/kg		Analyzed By: MS					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<10.0	10.0	09/27/2017	ND	224	112	200	1.88	
DRO >C10-C28	<10.0	10.0	09/27/2017	ND	230	115	200	0.344	
EXT DRO >C28-C36	<10.0	10.0	09/27/2017	ND					
Surrogate: 1-Chlorooctane	87.4 %	28.3-164							
Surrogate: 1-Chlorooctadecane	90.4 %	34.7-157							

**Sample ID: SB2 @ 110' (H702601-04)**

Chloride, SM4500Cl-B		mg/kg		Analyzed By: AC						
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier	
Chloride	256	16.0	09/27/2017	ND	432	108	400	3.77		

**Sample ID: SB2 @ 115' (H702601-05)**

Chloride, SM4500Cl-B		mg/kg		Analyzed By: AC						
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier	
Chloride	176	16.0	09/27/2017	ND	432	108	400	3.77		

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Basin Environmental Service  
ROBBIE RUNNELS  
P.O. Box 301  
Lovington NM, 88260  
Fax To: (575) 396-1429

Received:	09/25/2017	Sampling Date:	09/21/2017
Reported:	09/29/2017	Sampling Type:	Soil
Project Name:	E. LIVINGSTON RIDGE DELAWARE	Sampling Condition:	Cool & Intact
Project Number:	AREA 1	Sample Received By:	Celey D. Keene
Project Location:	LEA COUNTY, NM		

**Sample ID: SB2 @ 120' (H702601-06)**

BTX 8021B		mg/kg		Analyzed By: MS						
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier	
Benzene*	<0.050	0.050	09/28/2017	ND	1.78	88.9	2.00	1.68		
Toluene*	<0.050	0.050	09/28/2017	ND	1.61	80.7	2.00	2.06		
Ethylbenzene*	<0.050	0.050	09/28/2017	ND	1.63	81.3	2.00	0.562		
Total Xylenes*	<0.150	0.150	09/28/2017	ND	4.94	82.3	6.00	0.354		
Total BTX	<0.300	0.300	09/28/2017	ND						

Surrogate: 4-Bromofluorobenzene (PID) 104 % 72-148

Chloride, SM4500CI-B		mg/kg		Analyzed By: AC					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	272	16.0	09/27/2017	ND	432	108	400	3.77	

TPH 8015M		mg/kg		Analyzed By: MS					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<10.0	10.0	09/27/2017	ND	224	112	200	1.88	
DRO >C10-C28	<10.0	10.0	09/27/2017	ND	230	115	200	0.344	
EXT DRO >C28-C36	<10.0	10.0	09/27/2017	ND					

Surrogate: 1-Chlorooctane 64.5 % 28.3-164

Surrogate: 1-Chlorooctadecane 66.4 % 34.7-157

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Celey D. Keene, Lab Director/Quality Manager

**Analytical Results For:**

Basin Environmental Service  
ROBBIE RUNNELS  
P.O. Box 301  
Lovington NM, 88260  
Fax To: (575) 396-1429

Received:	09/25/2017	Sampling Date:	09/21/2017
Reported:	09/29/2017	Sampling Type:	Soil
Project Name:	E. LIVINGSTON RIDGE DELAWARE	Sampling Condition:	Cool & Intact
Project Number:	AREA 1	Sample Received By:	Celey D. Keene
Project Location:	LEA COUNTY, NM		

**Sample ID: SB3 @ 130' (H702601-07)**

Chloride, SM4500Cl-B		mg/kg		Analyzed By: AC						
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier	
Chloride	224	16.0	09/27/2017	ND	432	108	400	3.77		

**Sample ID: SB3 @ 135' (H702601-08)**

Chloride, SM4500Cl-B		mg/kg		Analyzed By: AC					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	224	16.0	09/27/2017	ND	432	108	400	3.77	

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Celey D. Keene, Lab Director/Quality Manager

**Analytical Results For:**

Basin Environmental Service  
ROBBIE RUNNELS  
P.O. Box 301  
Lovington NM, 88260  
Fax To: (575) 396-1429

Received:	09/25/2017	Sampling Date:	09/21/2017
Reported:	09/29/2017	Sampling Type:	Soil
Project Name:	E. LIVINGSTON RIDGE DELAWARE	Sampling Condition:	Cool & Intact
Project Number:	AREA 1	Sample Received By:	Celey D. Keene
Project Location:	LEA COUNTY, NM		

**Sample ID: SB3 @ 140' (H702601-09)**

BTX 8021B		mg/kg		Analyzed By: MS						
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier	
Benzene*	<0.050	0.050	09/28/2017	ND	1.78	88.9	2.00	1.68		
Toluene*	<0.050	0.050	09/28/2017	ND	1.61	80.7	2.00	2.06		
Ethylbenzene*	<0.050	0.050	09/28/2017	ND	1.63	81.3	2.00	0.562		
Total Xylenes*	<0.150	0.150	09/28/2017	ND	4.94	82.3	6.00	0.354		
Total BTX	<0.300	0.300	09/28/2017	ND						

Surrogate: 4-Bromofluorobenzene (PID) 105 % 72-148

Chloride, SM4500CI-B		mg/kg		Analyzed By: AC					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	208	16.0	09/27/2017	ND	432	108	400	3.77	

TPH 8015M		mg/kg		Analyzed By: MS					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<10.0	10.0	09/27/2017	ND	224	112	200	1.88	
DRO >C10-C28	<10.0	10.0	09/27/2017	ND	230	115	200	0.344	
EXT DRO >C28-C36	<10.0	10.0	09/27/2017	ND					

Surrogate: 1-Chlorooctane 83.5 % 28.3-164

Surrogate: 1-Chlorooctadecane 86.1 % 34.7-157

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Celey D. Keene, Lab Director/Quality Manager



101 East Marland, Hobbs, NM 88240

**(575) 393-2326 FAX (575) 393-2476**

## CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

[illegible]

# APPENDIX – D

## Soil Bore Logs



THE DRILLING PROFESSIONALS

## Soil Boring Log

Owner	Echo Production
Contractor	HCI Drilling
Date Completed	09/20/2017
Location	Area 1
Soil Boring Number	SB-1
Lithology	
0' – 2'	Topsoil
2' – 100'	Red Silty Clay w/ Stringers of Gypsum
Total Depth	100'
GPS Coordinates	32.343859, -103.718976

Copies: Email (Basin Env.)



THE DRILLING PROFESSIONALS

## Soil Boring Log

Owner	Echo Production
Contractor	HCI Drilling
Date Completed	09/20/2017
Location	Area 1
Soil Boring Number	SB-2
Lithology	
0' – 2'	Topsoil
2' – 120'	Red Silty Clay w/ Stringers of Gypsum
Total Depth	120'
GPS Coordinates	32.343859, -103.718976

Copies: Email (Basin Env.)



THE DRILLING PROFESSIONALS

## Soil Boring Log

Owner	Echo Production
Contractor	HCI Drilling
Date Completed	09/20/2017
Location	Area 1
Soil Boring Number	SB-3
Lithology	
0' – 2'	Topsoil
2' – 140'	Red Silty Clay w/ Stringers of Gypsum
Total Depth	140'
GPS Coordinates	32.343859, -103.718976

Copies: Email (Basin Env.)