

PO Box 2948 | Hobbs, NM 88241 | Phone 575.393.2967

May 17, 2018

### **Bradford Billings**

New Mexico Energy, Minerals, & Natural Resources Oil Conservation Division, Environmental Bureau 1220 S. St. Francis Drive Santa Fe, New Mexico 87505

### RE: Corrective Action Plan (CAP) Report and Soil Closure Request Rice Operating Company – BD SWD System BD L-36 EOL (1R426-278): UL/L, Sec. 36, T21S, R37E

Mr. Billings:

RICE Operating Company (ROC) has retained Basin Environmental Service Technologies (Basin) to address potential environmental concerns at the above-referenced site in the BD Salt Water Disposal (SWD) system. ROC is the service provider (agent) for the BD SWD System and has no ownership of any portion of the pipeline, well, or facility. The system is owned by a consortium of oil producers, System Parties, who provide all operating capital on a percentage ownership/usage basis.

### **Background and Previous Work**

The site is located approximately 2 miles east of Eunice, New Mexico at UL/L, Sec. 36, T21S, R37E as shown on the Geographical Location Map and Area Map. NM OSE records indicate that groundwater will likely be encountered at a depth of approximately 47 feet below ground surface (bgs).

In 2010, ROC initiated work on the former L-36 EOL junction box. The site was delineated using a backhoe to form a 20 ft x 20 ft x 12 ft deep excavation and soil samples were screened at regular intervals for both hydrocarbons and chlorides. From the excavation, a 4-wall composite sample and a bottom composite sample were sent to a commercial laboratory for analysis. The 4-wall composite returned a chloride reading of 896 mg/kg, a Gasoline Range Organics (GRO) reading non-detect and a Diesel Range Organics (DRO) reading of 330 mg/kg. The bottom composite sample returned a chloride reading of 3,280 mg/kg, a GRO reading of non-detect and a DRO reading of 242 mg/kg. The excavated soil was blended on site and a representative sample was sent to a commercial laboratory for analysis. The sample returned a chloride reading of 560 mg/kg, a GRO reading of non-detect and a DRO reading of non-detect and a DRO reading of non-detect and a DRO reading of 1 aboratory for analysis. The sample returned a chloride reading of set and a presentative sample was sent to a commercial laboratory for analysis. The sample returned a chloride reading of 560 mg/kg, a GRO reading of non-detect and a DRO reading of 69.5 mg/kg. The blended backfill was returned to the excavation up to 5 ft bgs. At 5 – 4 ft bgs, a 1 ft thick clay barrier was installed. The clay layer will provide a barrier that will inhibit the downward migration of chlorides to groundwater. The remaining blended backfill soil was returned to the excavation,

and clean, imported soil was used to backfill the excavation to the ground surface and to contour the site to the surrounding area. On April 29<sup>th</sup>, 2010, the site was seeded with a blend of native vegetation.

To further investigate the depth of chloride presence, a soil bore was installed on June 11<sup>th</sup>, 2010. The soil bore was installed 10 ft north of the former junction box site and was advanced to a depth of 39 ft bgs. Soil samples were collected every 3 ft between 15 and 39 ft and each sample was field titrated for chlorides and field screened for PIDs. The 36 ft and 39 ft sample were sent to a commercial laboratory for analysis, resulting in a 36 ft chloride concentration of 3,680 mg/kg and GRO and DRO concentrations of non-detect. The 39 ft sample resulted in a chloride concentration of 3,360 mg/kg and GRO and DRO concentrations of non-detect. The entire borehole was plugged with bentonite to the ground surface.

NMOCD was notified of potential groundwater impact on October 5<sup>th</sup>, 2010. A junction box disclosure report was submitted to NMOCD with all the 2010 junction box closures and disclosures.

### **Investigation and Characterization Plan (ICP)**

An ICP was submitted on April 24<sup>th</sup>, 2015, and approved on May 7<sup>th</sup>, 2015. A total of 3 soil bores were installed at the site on May 20<sup>th</sup>, 21<sup>st</sup> and July 10<sup>th</sup>, 2015. As the bores were advanced, soil samples were taken every 3 ft and field tested for chlorides and hydrocarbons. Representative samples from each bore were taken to a commercial laboratory for confirmatory analysis. SB-2 returned a laboratory chloride reading of 5,280 mg/kg at 33 ft bgs, which decreased to 4,160 mg/kg at 42 ft bgs. SB-3 returned laboratory chloride readings of 7,040 mg/kg at 24 ft bgs and decreased to 4,240 mg/kg at 39 ft bgs. SB-4 returned a laboratory chloride reading of 304 mg/kg at 12 ft bgs, which decreased to 128 mg/kg at 15 ft bgs. GRO and DRO readings at all depth in all bores were non-detect, with the exception of DRO at 33 ft in SB-2, which resulted in a concentration of 72.7 mg/kg. The northern edge of the site is defined by SB-4 with chloride concentrations decreasing to 128 mg/kg at 12 ft bgs. The eastern edge is defined by the 5 ft east vertical with a chloride concentration of 84 mg/kg at 12 ft bgs. The western edge is defined by the 15 ft west vertical with a chloride concentration of 119 mg/kg at 12 ft bgs. The 10 ft south vertical defined the southern edge of the site with a chloride concentration of 178 mg/kg.

### **Corrective Action Plan**

A CAP was submitted on February 9<sup>th</sup>, 2017, which recommended the installation of a 42 ft x 31 ft, 20-mil reinforced poly liner at 5-3.5 ft bgs depending on the depth of the existing clay liner. NMOCD responded on February 23<sup>rd</sup>, 2017, requesting additional data to the south of the site.

### **Additional Investigation**

In accordance with the request from OCD, three additional soil bores (SB-5, SB-6 and SB-7) were installed at the site on September 18<sup>th</sup> and September 21<sup>st</sup>, 2017. As the bores were

advanced, soil samples were taken every 3 ft and field tested for chlorides and hydrocarbons. Representative samples from each bore were taken to a commercial laboratory for confirmatory analysis. SB-5 returned a laboratory chloride reading of 1,260 mg/kg at 33 ft bgs, which decreased to 1,040 mg/kg at 42 ft bgs. SB-6 returned laboratory chloride readings of 1,100 mg/kg at 24 ft bgs and decreased to 384 mg/kg at 42 ft bgs. SB-7 returned a laboratory chloride reading of 752 mg/kg at 36 ft bgs, which decreased to 32 mg/kg at 42 ft bgs. (The sample at 42 ft bgs in SB-7 originally resulted in a chloride concentration of 928 mg/Kg from the laboratory. Since this relatively high concentration did not coincide with the field chloride test result for that sample and the lower chloride results at 36 ft and 39 ft bgs, ROC ordered a re-analysis of the sample. ROC believes that there was some human error with the sample originally.) GRO and DRO readings at all depth in all bores were non-detect. Each bore was plugged with bentonite to ground surface.

### **Corrective Action Plan Addendum**

Based on the additional soil data, Basin recommended that ROC install a **91** ft x 31 ft (rather than a 42 ft x 31 ft), 20-mil reinforced poly liner at 5 - 3.5 ft bgs, depending on the actual depth of the existing clay liner. The liner will inhibit the downward migration of residual constituents through the vadose zone, and will cover the existing 20x20-ft clay liner. The soils placed above the liner will have a laboratory chloride reading no greater than 500 mg/kg and a field PID measurement below 100 ppm. Excavated soils was evaluated for use as backfill and any soils that do not meet requirements was properly disposed of at a NMOCD approved facility. The excavation was backfilled to ground surface and contoured to the surrounding location.

The soils over and surrounding the site was prepared with soil amendments as necessary and seeded with a native vegetative mix. Vegetation above the liner will also provide a natural infiltration barrier for the site since plants capture water through their roots thereby reducing the volume of water moving through the vadose zone.

### **CAP Report and Soil Closure Request**

According to the Corrective Action Plan (CAP) and CAP Addendum, which was approved by the NMOCD on the October  $30^{\text{th}}$ , 2017, ROC installed a 20-mil reinforced poly liner across the site with the dimensions of 91 x 31 ft at a depth of 4.5 ft bgs, which covered the previously installed 20 x 20 ft clay liner. A total of 852 cubic yards of excavated soil were taken to a NMOCD approved facility for disposal. The bottom of the excavation was padded with 6 inches imported blow sand and a 20-mil reinforced liner was installed and properly seated at 4.5 ft bgs. The top of the liner was padded with 6 inches of imported blow sand, and the excavation was backfilled to ground surface with imported top soil. A sample of the imported blow sand and a sample of the imported top soil were sent to a commercial laboratory for analysis of chloride and returned a result of 16 mg/kg and 32 mg/kg, respectively. The soil samples were also analyzed for GRO and DRO resulting in <10 mg/Kg for all samples. The backfilled site was then seeded with a blend of native vegetation. Vegetation above the liner will also provide a natural infiltration barrier for the site, since plants capture water through their roots thereby reducing the

volume of water moving through the vadose zone. Documentation of this work is included in the Appendix.

### **Groundwater Monitoring Plan**

In order to determine what affect the residual chlorides may have had on the groundwater quality below the site, BEST recommends that ROC install a near-source monitor well (MW-1) located approximately 45 feet down-gradient of the former junction box. To determine if there is an upgradient source of contaminates coming onto the site, MW-2 will be installed approximately 75 feet up-gradient of the former junction box. Also, an additional monitoring well (MW-3) will be installed approximately 100 feet down-gradient of the former junction box (see Proposed Monitoring Wells). Additional monitoring wells may be required to fully delineate groundwater quality. The monitor wells will be installed to NMOCD and EPA standards and then sampled quarterly. Once groundwater quality has been determined, ROC will either submit a groundwater remedy to NMOCD to address groundwater quality at the site or submit a termination request for site closure.

ROC has completed the vadose zone remediation as approved by NMOCD in the CAP. The 20mil reinforced liner will inhibit the further migration of chlorides through the vadose zone in to groundwater. Therefore, ROC requests "Soil Closure" or similar closure status.

Basin appreciates the opportunity to work with you on this project. Please call Katie Jones Davis at (575) 393-9174 or me if you have any questions or wish to discuss the site.

Sincerely,

Edward J. Hansen

Edward J. Hansen Senior Hydrologist Basin Environmental Service Technologies

Attachments: Geographical Location Map Area Map Installed Liner Plat Proposed Monitoring Wells Plat Appendix – Liner Installation Documentation

# Figures

Basin Environmental Service Technologies (BEST) P.O. Box 2948, Hobbs, NM 88241 Phone: 575-393-2967

# **Geographical Location Map**



# Area Map



**Liner Installation** 



## **Proposed Monitor Wells**



# Appendix

Basin Environmental Service Technologies (BEST) P.O. Box 2948, Hobbs, NM 88241 Phone: 575-393-2967

## BD L-36 EOL Unit L, Section 36, T21S, R37E



Spotting lines with hydrovac, facing southwest

12/13/2017



Exporting excavated soil, facing northeast

12/19/2017



Installing 20-mil, reinforced liner at 4.5 ft bgs, facing north 12/19/2017



Excavating the site to 5 ft bgs, facing north

12/18/2017



Importing blow sand, facing south

12/19/2017



Padding the 20-mil, reinforced liner with imported soil, facing northeast 12/19/2017



Backfilling and contouring the site with imported soil, facing west 12/27/2017



Seeding site, completing silt net fencing, facing northeast 12/28/2017



Tilling and seeding backfilled site, facing southwest

12/28/2017



Site complete, facing north



December 28, 2017

KATIE JONES Rice Operating Company 112 W. Taylor Hobbs, NM 88240

RE: BD L-36 EOL

Enclosed are the results of analyses for samples received by the laboratory on 12/19/17 16:30.

Cardinal Laboratories is accredited through Texas NELAP under certificate number T104704398-17-10. 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 <a href="https://www.tceq.texas.gov/field/ga/lab">www.tceg.texas.gov/field/ga/lab</a> accredited analytes and matrices visit the TCEQ website at <a href="https://www.tceq.texas.gov/field/ga/lab">www.tceg.texas.gov/field/ga/lab</a> accred certif.html.

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

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

Accreditation applies to public drinking water matrices.

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

Sincerely,

Celey D. Keine

Celey D. Keene Lab Director/Quality Manager



### Analytical Results For:

Rice Operating Company KATIE JONES 112 W. Taylor Hobbs NM, 88240 Fax To: (575) 397-1471

Received:	12/19/2017	Sampling Date:	12/19/2017
Reported:	12/28/2017	Sampling Type:	Soil
Project Name:	BD L-36 EOL	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Tamara Oldaker
Project Location:	NOT GIVEN		

### Sample ID: IMPORTED BACKFILL (H703512-01)

Chloride, SM4500Cl-B	mg,	/kg	Analyze	d By: AC					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	<b>16.0</b> 16.0		12/21/2017 ND		432	108	400	3.77	
TPH 8015M	mg/kg		Analyze	d By: MS					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10*	<10.0	10.0	12/27/2017	ND ND	213 208	107 104	200 200	0.274 0.493	
DRO >C10-C28*	<10.0	10.0	12/27/2017						
Surrogate: 1-Chlorooctane	107	% 28.3-16	4						
Surrogate: 1-Chlorooctadecane	102	% 34.7-15	7						

### **Cardinal Laboratories**

### \*=Accredited Analyte

PLEASE NOTE: Liability and Damages. Cardinal's liability and client's exclusive remedy for any daim arising, whether based in contract or tort, shall be limited to the amount paid by client for analyses. All claims, including these for negligence and any other cause whitsoever shall be deemed walved unless made in writing and received by claims, including within thirty (30) days after completion of the applicable service. In no event shall Cardinal be liable for incidental or consequential damages, including, without limitation, business interruptions, loss of use, or loss of profits incurred by client, its subsidiaries, affiliates or successors arising out of or related to the performance of the services hereunder by Cardinal, regardless of whether such claims based upon any of the above stated reasons or otherwise. Results relate only to the samples identified above. This reproduced except in full with written approval of Cardinal laboratories.

Celleg Z. Kene

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 $6^{\circ}C$
	Samples reported on an as received basis (wet) unless otherwise noted on report

### **Cardinal Laboratories**

### \*=Accredited Analyte

PLEASE NOTE: Liability and Damages. Cardina's liability and dient's exclusive remedy for any daim arising, whether based in contract or tort, shall be limited to the amount paid by dient for analyses. All daims, induding those for negligence and any other cause whatsoever shall be deemed walved unless made in writing and received by Cardinal within thirty (30) days after completion of the applicable service. In no event shall Cardinal be liable for indextal or consequential damages, induding, without limitation, business interruptions, loss of use, or loss of profits incurred by client, its subsidiaries, affiliates or successors arising out of or related to the performance of the services hereunder by Cardinal, regardless of whether such claim is based upon any of the above stated reasons or otherwise, Results relate only to the samples identified above. This report shall not be reproduced except in full with written approval of Cardinal Laboratories,

Celeg D. Keine

Celey D. Keene, Lab Director/Quality Manager



# CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

101 East Marland, Hobbs, NM 88240



Page 4 of 4



December 29, 2017

KATIE JONES Rice Operating Company 112 W. Taylor Hobbs, NM 88240

RE: BD L-36 EOL

Enclosed are the results of analyses for samples received by the laboratory on 12/20/17 16:00.

Cardinal Laboratories is accredited through Texas NELAP under certificate number T104704398-17-10. 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 <a href="https://www.tceq.texas.gov/field/ga/lab">www.tceq.texas.gov/field/ga/lab</a> accredited analytes and matrices visit the TCEQ website at <a href="https://www.tceq.texas.gov/field/ga/lab">www.tceq.texas.gov/field/ga/lab</a> accred certif.html.

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

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

Accreditation applies to public drinking water matrices.

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

Sincerely,

Celez D. Keine

Celey D. Keene Lab Director/Quality Manager



### Analytical Results For:

Rice Operating Company KATIE JONES 112 W. Taylor Hobbs NM, 88240 Fax To: (575) 397-1471

Received:	12/20/2017	Sampling Date:	12/20/2017
Reported:	12/29/2017	Sampling Type:	Soil
Project Name:	BD L-36 EOL	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Tamara Oldaker
Project Location:	NOT GIVEN		

### Sample ID: BACKFILL FROM PIT (H703561-01)

Chloride, SM4500CI-B	mg,	/kg	Analyze	d By: AC					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	<b>32.0</b> 16.0		12/27/2017 ND		416	104	400	3.77	
TPH 8015M	mg,	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	12/27/2017	ND	204	102	200	6.53	
DRO >C10-C28*	<10.0	10.0	12/27/2017	ND	188	94.1	200	2.22	
Surrogate: 1-Chlorooctane	86.9	% 28.3-16	4						
Surrogate: 1-Chlorooctadecane	85.3	% 34.7-15	7						

### **Cardinal Laboratories**

### \*=Accredited Analyte

PLEASE NOTE: Liability and Damages. Cardinal's liability and client's exclusive remedy for any claim arising, whether based in contract or tort, shall be limited to the amount paid by client for analyses. All claims, including those for negligence and any other cause whatsoever shall be deemed walved unless made in writing and received by 'clardinal within thirty (30) days after completion of the applicable service. In no event shall Cardinal be liable for incidental or consequential damages, including, without limitation, business interruptions, loss of use, or loss of profits incurred by client, its subcliaries, affiliates or successors arising out of or related to the performance of the services hereunder by Cardinal, regardless of whether such climits based upon any of the above stated reasons or otherwise. Results relate only to the samples identified above. This report shall not be reproduced except in full with written approval of Cardinal Laboratories.

Celleg to Keine

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 SM4500CI-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**

### \*=Accredited Analyte

PLEASE NOTE: Liability and Damages. Cardinal's liability and dient's exclusive remedy for any daim arising, whether based in contract or tort, shall be limited to the amount paid by dient for analyses. All daims, including those for negligence and any other cause whatsoever shall be deemed waived unless made in writing and received by Cardinal within thirty (30) days after completion of the applicable service. In no event shall Cardinal be liable for incidental or consequential damages, including, without limitation, business interruptions, loss of use, or loss of profits incurred by client, its subsidiaries, affiliates or successors arising out of or related to the performance of the services hereunder by Cardinal, regardless of whether such claim is based upon any of the above stated reasons or otherwise. Results relate only to the samples identified above. This report shall not be reproduced except in full with written approval of Cardinal Laboratories.

Celeg Litteene-

Celey D. Keene, Lab Director/Quality Manager



# CHAIN-OF-CUSTODY AND ANALYSIS REQUEST



+ Pardinal rannot arrent varhal chandee Dlasee fav written chandee to (575) 309-3396

Page 4 of 4



112 West Taylor Hobbs, NM 88240 Phone: (575) 393-9174 Fax: (575) 397-1471

### **VEGETATION FORM**

Site name: BD	L-36 EOL					
U/L	Section	Township	Range	County	Latitude	Longitude
L	36	21S	37E	Lea	32.431908	-103.122049
Contact Name:	Katie Jones Davis					
mail:	kjones@riceswd.com				an a	
ite size:	2,500 square feet					

2. Soils	*Do not rip caliche subsoils; caliche rocks brought to the surface by ripping shall be removed.											
Salvaged from site	Bioremediated	Impor	and the second se	And Person in Frank Person in F	Blended		Dept	MAN CALCULAT				
Texture: sandy		1	Describe soil	& subsoi	i: top so	il and l	blow sand					
Soil prep methods:	Rip	Depth	h (in)		Disc	X	Dept	th (in)	3		Rollerpack	
Date completed: 12/27	//2017											

### 3. Bioremediation

Fertilizer	Нау	Other		
Туре:	Describe:	Describe:		
Lbs/acre:			7.1.4.4.	

4. Seeding	*Attach seed bag tags to this form. Seed bag tags shall contain the site name and S-T-R.										
Custom Seed Mix	X	Prescribed Mix		Seed Mix N	eed Mix Name: 5 lbs Lea County Mix & 50 lbs Winter Wheat Seed Mix					12/28/2017	
Method: broadcast w	ith se	eder									
Soil conditions during s	eed:	Dry	Х	Damp	V	Vet	T				
Observations: Seed	was ti	lled into the soil							di tana ang		

### 5. Certification I hereby certify that the information in this form and attachments is true and complete to the best of my knowledge and belief.

Name:	Katie Jones Davis	r	Title:	Environmental Manager	Date:	12/28/2017
Signature:	KKI 4	nh				