

1R - 425-66

WORKPLANS

Date:

2-6-12

Rice Environmental Consulting & Safety

P.O. Box 5630 Hobbs, NM 88241

Phone 575.393.4411 Fax 575.393.0293

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CERTIFIED MAIL

RETURN RECEIPT NO. 7011 2000 0002 0285 5049

February 6th, 2012

Mr. Edward Hansen

New Mexico Energy, Minerals, & Natural Resources

Oil Conservation Division, Environmental Bureau

1220 S. St. Francis Drive

Santa Fe, New Mexico 87505

**RE: Additional Groundwater Monitoring and Corrective Action Plan for
Groundwater**

Rice Operating Company – Vacuum SWD System

Vacuum L-26 vent (1R425-66): UL/L sec. 26 T17S R35E

Mr. Hansen:

RICE Operating Company (ROC) has retained Rice Environmental Consulting and Safety (RECS) to address potential environmental concerns at the above-referenced site in the abandoned Vacuum Salt Water Disposal (SWD) system. ROC is the service provider (agent) for the Vacuum 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 4 miles east of Buckeye, New Mexico at UL/L sec. 26 T17S R35E as shown on the Site Location Map (Figure 1). Groundwater sampling at the site indicates that groundwater is located at +/- 56 ft bgs.

ROC conducted a junction box excavation and sampling program in 2008. Soil samples were collected at regular intervals within a 30 x 30 x 12 ft deep excavation. The samples were screened in the field for both chlorides and hydrocarbons and representative composite samples were sent to a commercial laboratory for analysis. Gasoline Range Organics (GRO) readings were non-detect in the bottom composite and backfill composite but had a reading of 88.5 mg/kg in the 4-wall composite. Diesel Range Organics (DRO) readings were 869 mg/kg for the 4-wall composite, 214 mg/kg for the bottom composite and 436 mg/kg for the backfill composite. Excavated soil was blended on-site and returned to the excavation up to 4 feet bgs. At 4 feet bgs, a geo-synthetic liner was installed across the 30 x 30 foot excavation with a six inch padding of blow sand both above and below. After the site was excavated in 2011 to prepare for the 20-mil reinforced polyethylene liner installation, it was determined the geo-synthetic liner

was actually installed deeper at approximately 4.5 to 5 feet bgs. The excavation was backfilled with remaining soil on site and contoured to match the surrounding area.

On May 10th, 2010, four soil bores were installed at the site. The soil bores were sampled at regular intervals and field tested for chlorides and hydrocarbons. Representative samples from each bore were taken to a commercial laboratory for verification of field sampling numbers. Laboratory readings in all soil bores, except SB-3, exhibited chloride concentrations that decreased with depth. SB-1 decreased from 4,320 mg/kg at 30 ft to 528 mg/kg at 60 ft, SB-2 decreased from 3,400 mg/kg at 5 ft to 192 mg/kg at 20 ft, and SB-4 decreased from 2,880 mg/kg at 25 ft to 1,540 mg/kg at 40 ft. SB-3 increased with depth from 320 mg/kg at 15 ft to 704 mg/kg at 20 ft. Laboratory readings for GRO, DRO, and BTEX showed non-detect throughout all bores.

On September 14th, 2010, an Initial Characterization Report and Corrective Action Plan was submitted to NMOCD and approved on April 4th, 2011. Included in the report were recommendations to: (1) install a monitoring well 50 feet down gradient from the site and (2) surface restoration, including the removal of large rocks and seeding the area to encourage re-vegetation. On April 1st, 2011, an addendum to the CAP was submitted to NMOCD. It stated that a single monitoring well (MW-1) had been installed on November 15th, 2010 and based on the initial monitor well sampling results, additional monitoring wells would be installed to further delineate groundwater quality. In addition, ROC proposed the installation of a 64 ft x 63 ft, 20-mil reinforced polyethylene liner to further protect the groundwater. The excavation would be backfilled with soil containing a chloride concentration below 500 mg/kg and a PID (field) reading below 100 ppm. The site would then be seeded with a native seed mix.

Beginning on May 23rd, 2011, a 64 ft x 63 ft area was excavated to a depth of five feet below the surface (bgs), uncovering the existing 30 ft by 30 ft geo-synthetic liner that was installed in December 2008. The bottom of the excavation was padded with six inches of clean blow sand and a 20-mil reinforced polyethylene liner was installed at 4.5 feet bgs. A 6-inch pad of clean blow sand was placed above the liner to protect the liner from punctures. Pond bottom soil was used to backfill the excavation and blow sand was used to complete the backfill and to contour the site to the surrounding area. On July 15th, 2011, soil amendments were added to the site and the site was seeded with a native vegetative mix. On August 2nd, 2011, an 'Initial CAP Report – Liner Installation' was submitted to NMOCD delineating the liner installation activities. In response to this report, NMOCD approved the soil closure for this site on October 13th, 2011, and required that ROC place additional monitoring wells at the site.

Additional Groundwater Monitoring

Two additional monitoring wells were installed at the site on April 11th, 2011 (Figure 2). Both wells were field tested for chlorides and hydrocarbons as they were advanced and showed clean soil throughout (Appendix A). All three wells have been sampled quarterly since their installation; the most recent sampling event occurring on December 2nd, 2011 (Figure 3). The source well, MW-1, had a chloride reading of 920 mg/kg, the up gradient

well, MW-2, had a chloride reading of 36 mg/kg and the down gradient well, MW-3, had a chloride reading of 450 mg/kg (Appendix B).

Corrective Action Plan for Groundwater

It is evident from the quarterly groundwater sampling that chlorides from the site have leached through the vadose zone into groundwater. Therefore, RECS submits the following as a Corrective Action Plan for Groundwater. MW-1, a 2-inch monitor well, will be plugged and replaced with a 4-inch recovery well. MW-1 will be plugged and abandoned using a 1-3% bentonite/concrete slurry and a three foot concrete cap. Once the recovery well is installed, a recovery system will be placed at the site and ROC will conduct a groundwater source removal and test pumping program. The purpose of this pumping program is to determine if groundwater may be restored within a short period of time and to assist in the evaluation of groundwater restoration methods. Water removed from the recovery well will be used for well and pipeline maintenance. ROC will evaluate the results of the pumping program and submit a written report which will include recommendations.

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

Sincerely,



Lara Weinheimer
Project Scientist
RECS
(575) 441-0431

Attachments:

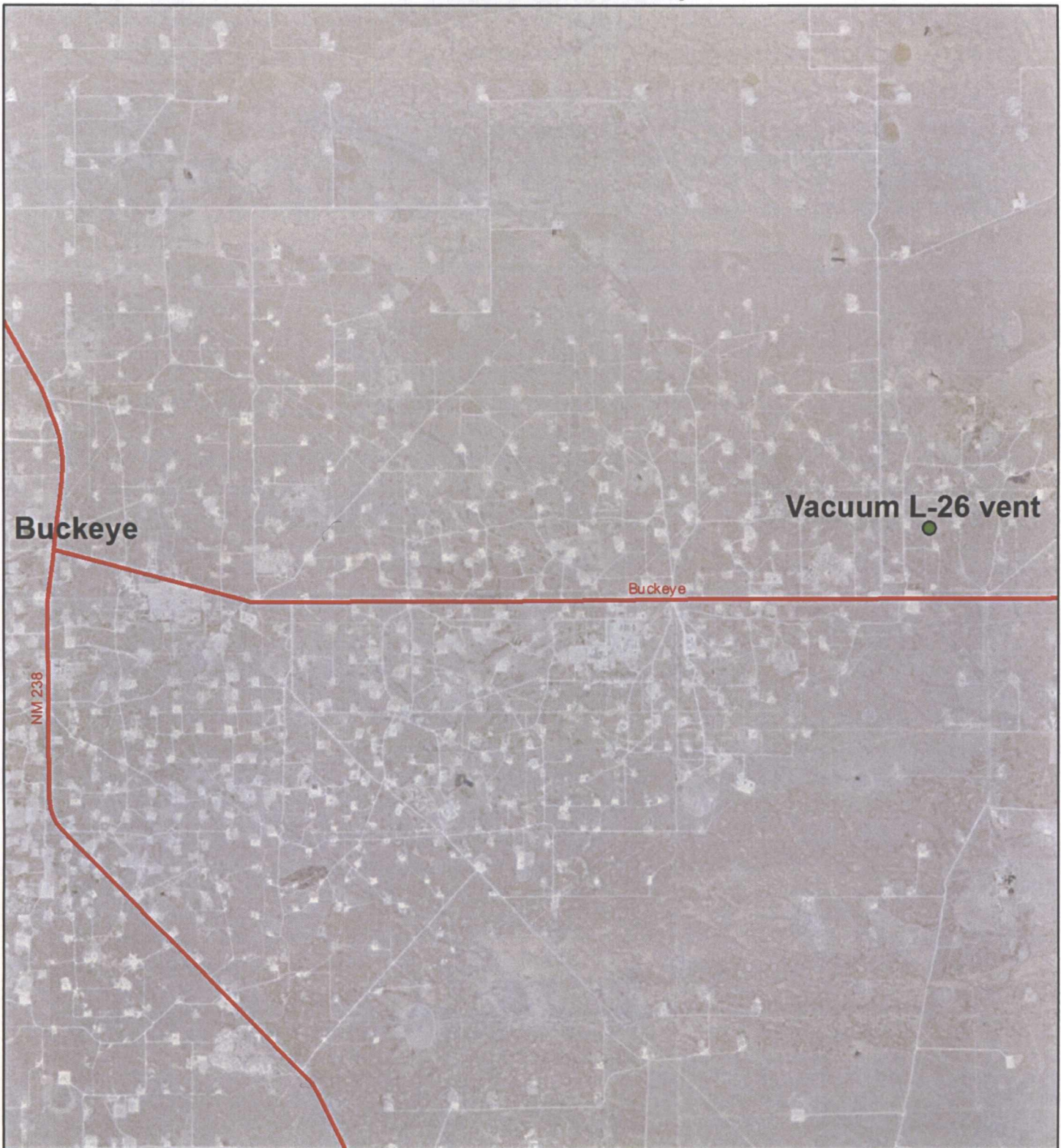
- Figure 1 – Site Location Map
- Figure 2 – Monitor Well Installation Map
- Figure 3 – Monitor Well Sampling Map
- Appendix A – Monitor Well Installation Logs
- Appendix B – Monitor Well Sampling Laboratory Confirmation



Figures

RICE Environmental Consulting and Safety (RECS)
P.O. Box 5630 Hobbs, NM 88241
Phone 575.393.4411 Fax 575.393.0293

Site Location Map



Vacuum L-26 vent

Case #: 1R425-66

Legals: UL/L sec. 26
T17S R35E

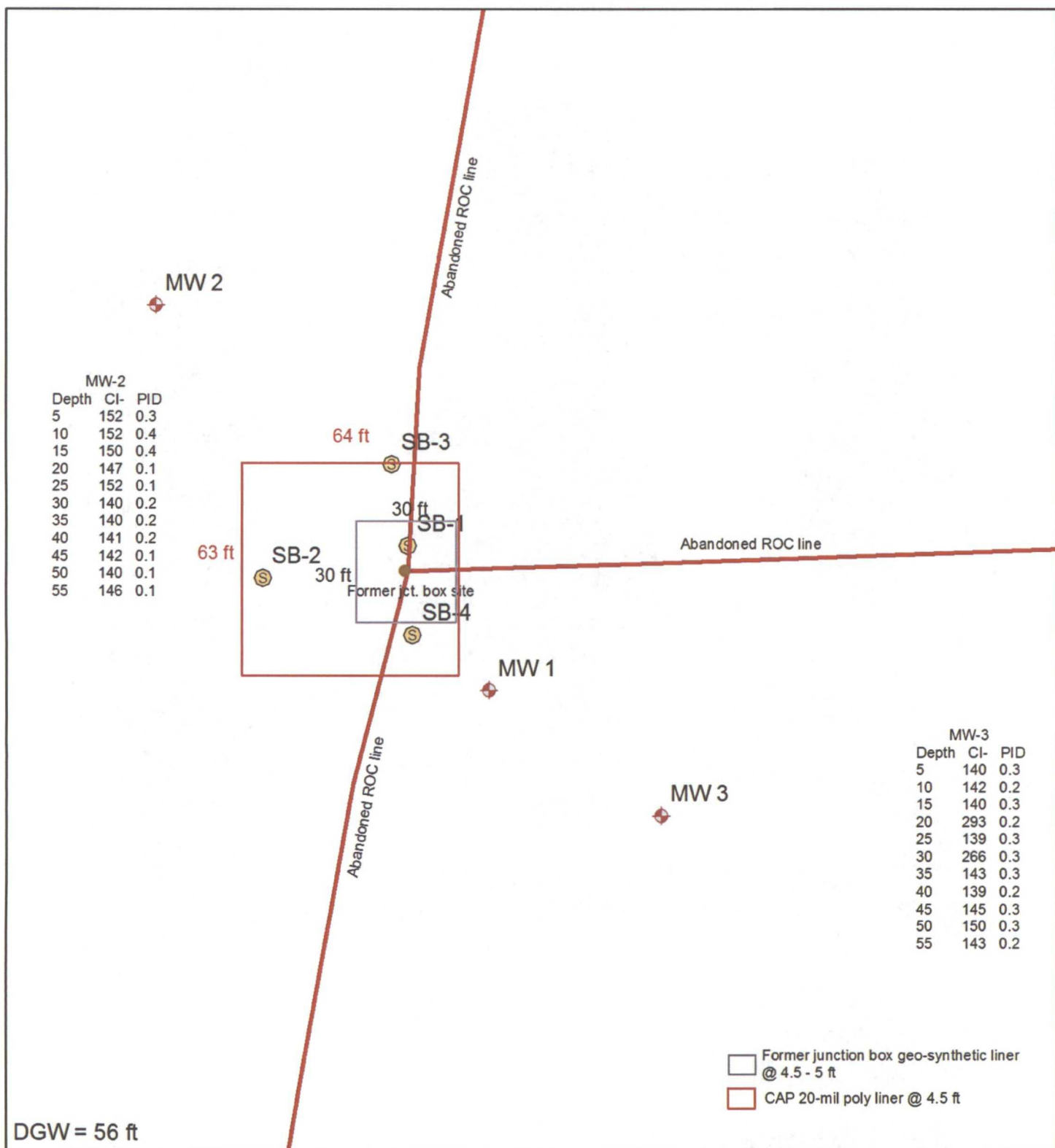
Figure 1



0 0.25 0.5 1
Miles

Drawing date: 1-11-12
Drafted by: L. Weinheimer

Monitor Well Installation

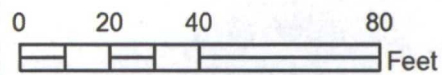


Vacuum L-26 vent

Case #: 1R425-66

Legals: UL/L sec. 26
T17S R35E

Figure 2



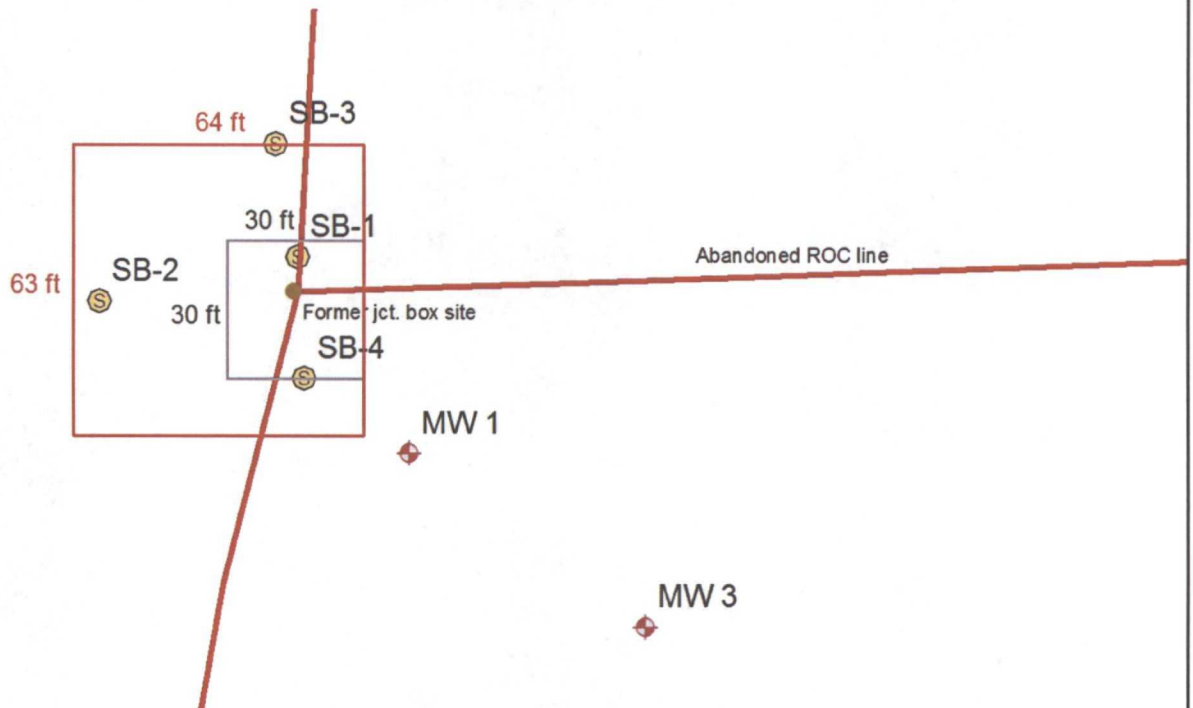
Drawing date: 2-3-12
Drafted by: L. Weinheimer

Monitor Well Sampling

MW	Depth to Water	Total Depth	Sample Date	Cl	TDS	Benzene	Toluene	Ethyl Benzene	Total Xylenes	Sulfate
				(mg/L)						
MW-1	56.53	72.54	11/22/2010	940	2120	<0.001	<0.001	<0.001	<0.003	79.6
	56.6	72.57	2/16/2011	960	2130	<0.001	<0.001	<0.001	<0.003	64
	56.7	72.57	6/4/2011	1040	2710	<0.001	<0.001	<0.001	<0.003	64.7
	56.79	72.57	8/31/2011	940	2440	<0.001	<0.001	<0.001	<0.003	67
	56.88	72.57	12/2/2011	920	2230	<0.001	<0.001	<0.001	<0.003	73.7

MW	Depth to Water	Total Depth	Sample Date	Cl	TDS	Benzene	Toluene	Ethyl Benzene	Total Xylenes	Sulfate
				(mg/L)						
MW-2	56.83	62.78	6/4/2011	32	457	<0.001	<0.001	<0.001	<0.003	37
	56.93	62.78	8/31/2011	32	374	<0.001	<0.001	<0.001	<0.003	33.5
	57.02	62.78	12/2/2011	36	405	<0.001	<0.001	<0.001	<0.003	40.8

MW 2



MW	Depth to Water	Total Depth	Sample Date	Cl	TDS	Benzene	Toluene	Ethyl Benzene	Total Xylenes	Sulfate
				(mg/L)						
MW-3	56.14	68.92	6/4/2011	432	1210	<0.001	<0.001	<0.001	<0.003	69.1
	52.24	68.92	8/31/2011	416	1250	<0.001	<0.001	<0.001	<0.003	47.3
	56.34	68.92	12/2/2011	450	1330	<0.001	<0.001	<0.001	<0.003	56.8

DGW = 56 ft

- ☐ Former junction box geo-synthetic liner @ 4.5 to 5 ft
- ☐ CAP 20-mil poly liner @ 4.5 ft



Vacuum L-26 vent

Case #: 1R425-66

Legals: UL/L sec. 26
T17S R35E

Figure 3



0 20 40 80
Feet

Drawing date: 1-11-12
Drafted by: L. Weinheimer


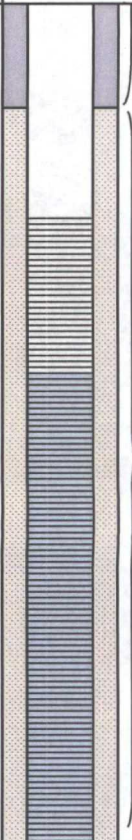


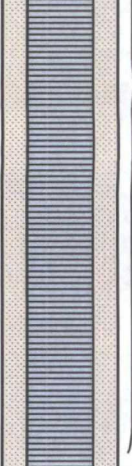






Appendix A

Monitor Well Installation Logs


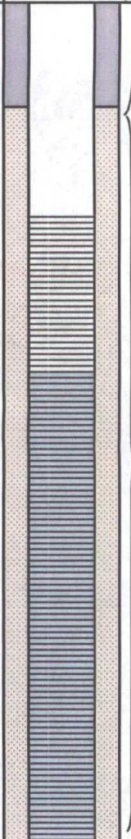
RICE Environmental Consulting and Safety (RECS)
P.O. Box 5630 Hobbs, NM 88241
Phone 575.393.4411 Fax 575.393.0293

Logger:	Jordan Woodfin						
Driller:	Harrison & Cooper, Inc.						
Drilling Method:	Air rotary		Project Name:	Well ID:			
Start Date:	4/11/2011		Vacuum L-26 vent	MW-2			
End Date:	4/11/2011	Project Consultant:		Location: UL/L sec. 26 T17S R35E			
Comments: Located 110 ft north-west of the former junction box site. All samples were from cuttings. No samples taken to the lab. DRAFTED BY: L. Weinheimer TD = 70 ft GW = 56 ft		Lat: 32°48'13.115"N County: Lea Long: 103°25'59.21"W State: NM					
Depth (feet)	chloride field tests	LAB	PID	Description	Lithology	Well Construction	
				White well consolidated caliche			
5 ft	152		0.3				
				Tan very fine silty caliche			
10 ft	152		0.4				
15 ft	150		0.4				
				Tan to red very fine silty caliche			
20 ft	147		0.1				
25 ft	152		0.1				
30 ft	140		0.2				
35 ft	140		0.2				
40 ft	141		0.2				
				Light brown very fine silty sand			

Depth (feet)	chloride field tests	LAB	PID	Description		Lithology		Well Construction
45 ft	142		0.1					
50 ft	140		0.1					
55 ft	146		0.1	NO SAMPLES TAKEN				
60 ft								
65 ft								
70 ft								

Logger:	Jordan Woodfin					
Driller:	Harrison & Cooper, Inc.					
Drilling Method:	Air rotary		Project Name:	Well ID:		
Start Date:	4/11/2011		Vacuum L-26 vent	MW-3		
End Date:	4/11/2011	Project Consultant:		Location: UL/L sec. 26 T17S R35E		
Comments: Located 106 ft south-east of the former junction box site. All samples were from cuttings. No samples taken to the lab. DRAFTED BY: L. Weinheimer TD = 70 ft GW = 56 ft		Lat: 32°48'11.591"N County: Lea Long: 103°25'57.436"W State: NM				
Depth (feet)	chloride field tests	LAB	PID	Description	Lithology	Well Construction
5 ft	140		0.3	Tan very fine silty caliche (hard drilling)		2 in PVC
10 ft	142		0.2	Tan very fine silty caliche (hard drilling)		2 in PVC
15 ft	140		0.3	Tan very fine silty caliche (hard drilling)		2 in PVC
20 ft	293		0.2	Tan very fine silty caliche (hard drilling)		2 in PVC
25 ft	139		0.3	Tan very fine silty caliche (hard drilling)		2 in PVC
30 ft	266		0.3	Light brown very fine silty sand		2 in PVC
35 ft	143		0.3	Light brown very fine silty sand		2 in PVC
40 ft	139		0.2	Light brown very fine silty sand		2 in PVC

bentonite
seal

Depth (feet)	chloride field tests	LAB	PID	Description		Lithology		Well Construction
45 ft	145		0.3					sand pack
50 ft	150		0.3					
55 ft	143		0.2					
60 ft								
65 ft								
70 ft								



Appendix B

Monitoring Well Sampling Laboratory Confirmation

RICE Environmental Consulting and Safety (RECS)

P.O. Box 5630 Hobbs, NM 88241

Phone 575.393.4411 Fax 575.393.0293

December 09, 2011

Hack Conder
Rice Operating Company
112 W. Taylor
Hobbs, NM 88240

RE: VACUUM L-26 VENT

Enclosed are the results of analyses for samples received by the laboratory on 12/06/11 16:00.

Cardinal Laboratories is accredited through Texas NELAP for:

Method SW-846 8021	Benzene, Toluene, Ethyl Benzene, and Total Xylenes
Method SW-846 8260	Benzene, Toluene, Ethyl Benzene, and Total Xylenes
Method TX 1005	Total Petroleum Hydrocarbons

Certificate number T104704398-08-TX. Accreditation applies to solid and chemical materials and non-potable water matrices.

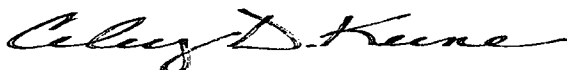
Cardinal Laboratories is accredited through the State of Colorado Department of Public Health and Environment for:

Method EPA 552.2	Haloacetic Acids (HAA-5)
Method EPA 524.2	Total Trihalomethanes (TTHM)
Method EPA 524.4	Regulated VOCs (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:

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

 Received: 12/06/2011
 Reported: 12/09/2011
 Project Name: VACUUM L-26 VENT
 Project Number: NOT GIVEN
 Project Location: T17S-R35E-SEC26 L-LEA CTY., NM

 Sampling Date: 12/02/2011
 Sampling Type: Water
 Sampling Condition: Cool & Intact
 Sample Received By: Jodi Henson

Sample ID: MONITOR WELL #1 (H102605-01)

BTEx 8021B		mg/L		Analyzed By: MS						
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier	
Benzene*	<0.001	0.001	12/07/2011	ND	0.048	95.6	0.0500	0.725		
Toluene*	<0.001	0.001	12/07/2011	ND	0.046	91.7	0.0500	0.131		
Ethylbenzene*	<0.001	0.001	12/07/2011	ND	0.053	106	0.0500	0.246		
Total Xylenes*	<0.003	0.003	12/07/2011	ND	0.153	102	0.150	0.368		

Surrogate: 4-Bromofluorobenzene (PIL) 104 % 70.7-118

Chloride, SM4500Cl-B		mg/L	Analyzed By: AP							
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier	
Chloride*	920	4.00	12/07/2011	ND	104	104	100	0.00		

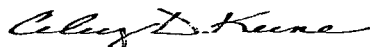
Sulfate 375.4		mg/L		Analyzed By: HM					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Sulfate*	73.7	10.0	12/07/2011	ND	18.8	94.0	20.0	2.70	

TDS 160.1		mg/L		Analyzed By: HM					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
TDS*	2230	5.00	12/07/2011	ND	241	100	240	1.43	

Cardinal Laboratories

*=Accredited Analyte

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Celey D. Keene, Lab Director/Quality Manager

Analytical Results For:

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

 Received: 12/06/2011
 Reported: 12/09/2011
 Project Name: VACUUM L-26 VENT
 Project Number: NOT GIVEN
 Project Location: T17S-R35E-SEC26 L-LEA CTY., NM

 Sampling Date: 12/02/2011
 Sampling Type: Water
 Sampling Condition: Cool & Intact
 Sample Received By: Jodi Henson

Sample ID: MONITOR WELL #2 (H102605-02)

BTEX 8021B			mg/L							
			Analyzed By: MS							
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier	
Benzene*	<0.001	0.001	12/07/2011	ND	0.048	95.6	0.0500	0.725		
Toluene*	<0.001	0.001	12/07/2011	ND	0.046	91.7	0.0500	0.131		
Ethylbenzene*	<0.001	0.001	12/07/2011	ND	0.053	106	0.0500	0.246		
Total Xylenes*	<0.003	0.003	12/07/2011	ND	0.153	102	0.150	0.368		

Surrogate: 4-Bromofluorobenzene (PIL) 106 % 70.7-118

Chloride, SM4500Cl-B		mg/L		Analyzed By: AP					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride*	36.0	4.00	12/07/2011	ND	104	104	100	0.00	

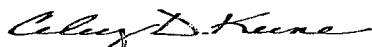
Sulfate 375.4		mg/L		Analyzed By: HM					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Sulfate*	40.8	10.0	12/07/2011	ND	18.8	94.0	20.0	2.70	

TDS 160.1		mg/L		Analyzed By: HM					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
TDS*	405	5.00	12/07/2011	ND	241	100	240	1.43	

Cardinal Laboratories

*=Accredited Analyte

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Celey D. Keene, Lab Director/Quality Manager

Analytical Results For:

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

 Received: 12/06/2011
 Reported: 12/09/2011
 Project Name: VACUUM L-26 VENT
 Project Number: NOT GIVEN
 Project Location: T17S-R35E-SEC26 L-LEA CTY., NM

 Sampling Date: 12/02/2011
 Sampling Type: Water
 Sampling Condition: Cool & Intact
 Sample Received By: Jodi Henson

Sample ID: MONITOR WELL #3 (H102605-03)

BTEX 8021B			mg/L		Analyzed By: MS					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier	
Benzene*	<0.001	0.001	12/07/2011	ND	0.048	95.6	0.0500	0.725		
Toluene*	<0.001	0.001	12/07/2011	ND	0.046	91.7	0.0500	0.131		
Ethylbenzene*	<0.001	0.001	12/07/2011	ND	0.053	106	0.0500	0.246		
Total Xylenes*	<0.003	0.003	12/07/2011	ND	0.153	102	0.150	0.368		

Surrogate: 4-Bromofluorobenzene (PIL) 106 % 70.7-118

Chloride, SM4500Cl-B		mg/L		Analyzed By: AP					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride*	450	4.00	12/07/2011	ND	104	104	100	0.00	

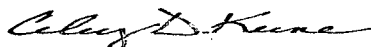
Sulfate 375.4		mg/L		Analyzed By: HM					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Sulfate*	56.8	10.0	12/07/2011	ND	18.8	94.0	20.0	2.70	

TDS 160.1		mg/L		Analyzed By: HM					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
TDS*	1330	5.00	12/07/2011	ND	241	100	240	1.43	

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Celey D. Keene, Lab Director/Quality Manager

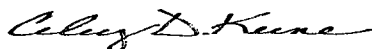
Notes and Definitions

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

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 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.



Celestine D. Keene, Lab Director/Quality Manager

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