1R - 425-84

WORKPLANS

Date:

11-8-13

Rice Environmental Consulting & Safety
P.O. Box 2948, Hobbs, NM 88241
Phone 575.393.2967

CERTIFIED MAIL
RETURN RECEIPT NO. 7007 2560 0003 0323 9001

November 8, 2013

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: **Corrective Action Plan (CAP)**
Rice Operating Company – Vacuum SWD System
Vacuum Jct. C-31 (1R425-84): UL/C sec. 31 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 0.5 miles southeast of Buckeye, New Mexico in Unit Letter C, Section 31, T17S, R35E as shown on the Site Location Map and Geographical Location Map (Figure 1 and Figure 2). Soil bore installation at the site indicates that groundwater is likely to be encountered at 100 ft bgs.

In 2009, ROC initiated work on the former Vacuum Jct. C-31 junction boxes. The site was delineated using a backhoe to collect soil samples at regular intervals, creating a 30 x 20 x 12-ft deep excavation. Soil samples were field tested for chlorides and hydrocarbons and resulted in elevated chloride concentrations. Representative samples were taken to a commercial laboratory for analysis. Laboratory analysis of the four-wall composite resulted in a chloride concentration of 2,400 mg/kg, a gasoline range organics (GRO) concentration of 69.1 mg/kg and a diesel range organics (DRO) concentration of 1,110 mg/kg. BTEX analysis of the four-wall composite resulted in benzene and toluene concentrations of non-detect, an ethyl benzene concentration of 0.363 mg/kg and a total xylenes concentration of 1.48 mg/kg. Laboratory analysis of the bottom composite resulted in a chloride concentration of 944 mg/kg, a GRO concentration of 158 mg/kg and a DRO concentration of 1,590 mg/kg. BTEX analysis of the bottom composite resulted in benzene, toluene, and ethyl benzene concentrations of non-detect and a total xylenes concentration of 2.77 mg/kg.

The excavated soil was blended on site and a representative composite sample was sent to a commercial laboratory for analysis of chlorides and TPH. The laboratory analysis resulted in a chloride concentration of 1,200 mg/kg, a GRO concentration of 10.4 mg/kg and a DRO concentration of 1,130 mg/kg. The blended backfill was returned to the excavation to 5 ft below ground surface (bgs) and a geo-synthetic and plastic liner were installed and properly seated into the excavation. The remaining backfill was blended with clean, imported soil and analyzed by a commercial laboratory for chlorides and TPH. Laboratory analysis of the blended backfill II resulted in a chloride concentration of 400 mg/kg, a GRO concentration of non-detect and a DRO concentration of 312 mg/kg. The blended backfill II returned the excavation to ground surface and was used to contour the site to the surrounding area. On June 8th, 2009, the site was seeded with a blend of native vegetation.

NMOCD was notified of potential groundwater impact on March 12th, 2010, and a junction box disclosure report was submitted to NMOCD with all the 2009 junction box closures and disclosures.

On February 8th, 2013, ROC submitted an Investigation and Characterization Plan (ICP) to NMOCD, which was approved on March 4th, 2013. As part of the ICP, RECS personnel were on site April 11th and 12th, 2013 to install soil bores (Figure 3). A total of six soil bores were drilled at the site and as they were advanced, soil samples were taken at regular intervals. The samples were field tested for chlorides and hydrocarbons and representative samples were taken to a commercial laboratory for analysis. Laboratory analysis showed evidence that as the bores were advanced, the chloride levels declined with depth in all six bores. DRO levels were non-detect in SB-2 and SB-6 at all depths and declined with depth to non-detect in the remainder of the bores. GRO levels returned results of non-detect in all bores at all depths.

On May 31st 2013, ROC submitted and Investigation and Characterization Plan (ICP) Report and Request for Further Delineation to NMOCD, which was approved on August 28th, 2013. The report recommended that ROC continue to investigate the site to determine the lateral extent of the chloride contamination. ROC would also review historical photos and, if warranted, install monitor wells. All monitor wells would be installed and sampled according to NMOCD and industry standards.

Additional soil bores were installed on September 24th, 2013 to further delineate the site (Figure 4). A total of five soil bores were drilled at the site and as they were advanced, soil samples were taken at regular intervals. The samples were field tested for chlorides and hydrocarbons and representative samples were taken to a commercial laboratory for analysis. SB-7 returned laboratory chloride results of 3,680 mg/kg at 15 ft bgs, which decreased to 80 mg/kg at 75 ft bgs. SB-8 returned laboratory chloride results of 1,150 mg/kg, which decreased to 176 mg/kg at 20 ft bgs. SB-9 returned laboratory chloride results of non-detect at the surface, 32 mg/kg at 5 ft bgs and 64 mg/kg at 10 ft bgs. SB-10 returned laboratory results of 3,480 mg/kg at the surface which decreased to 2,160 mg/kg at 20 ft bgs and 128 mg/kg at 40 ft bgs. SB-11 returned laboratory chloride results of 2,360 mg/kg at the surface, which decreased to 2,200 mg/kg at 10 ft bgs and 64 mg/kg

at 35 ft bgs. GRO and DRO results were non-detect in all the bores at all depths except for at SB-9 which returned a DRO result of 22.7 mg/kg at the surface and at SB-10 which returned a GRO result of 11 mg/kg at 20 ft bgs and a DRO result of 53.5 mg/kg at the surface (Appendix A).

A surface sample was taken 10 ft to the east of SB-11. The sample was field tested for chlorides and hydrocarbons and then taken to a commercial laboratory for confirmatory analysis. The surface sample returned a chloride result of 272 mg/kg, a GRO result of non-detect and a DRO result of 35.3 mg/kg (Appendix A).

Historical aerial photos were assessed to determine areas of concern adjacent to the site. In the 1955 aerial photo, a facility is evident north of the site and a stain is evident south of the site. In the 2013 aerial photo, a facility is evident directly east of the site (Appendix B).

Corrective Action Plan

RECS recommends that to inhibit the downward migration of contaminates at the site to groundwater, ROC install a 20-mil reinforced poly liner at 3 ft bgs measuring 84 ft to the west, 132 ft to the south and 70 ft to the east. The north edge of the liner will cover SB-10 by 5 ft. The northeast corner will also remain 5 ft away from a 10 inch, non-ROC steel line for safety reasons (Figure 4). The soils placed above the liner will have a laboratory chloride reading no greater than 500 mg/kg and a field PID reading below 100 ppm. Excavated soils will be evaluated for use as backfill and any soils requiring disposal will be properly disposed of at a NMOCD approved facility. Upon completion of backfilling, the site will be seeded with a native vegetative mix and soil amendments will be added as necessary. 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 to groundwater.

In order to determine what affect the residual chlorides may have had on the groundwater quality below the site, RECS recommends that ROC install a near-source monitor well (MW-1) located just outside the liner (Figure 4). To determine if there is an up-gradient source of contaminates coming onto the site from the non-ROC adjacent historical facilities, MW-2 will be installed approximately 100 ft up-gradient of the site. The monitor wells will be installed after the liner installation is completed. The monitor wells will be 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 'remediation termination' request for site closure.

RECS appreciates the opportunity to work with you on this project. Please call Hack Conder at (575) 393-2967 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 – Geographical Location Map
Figure 3 – Soil Bore Installation
Figure 4 – Soil Bore Installation, Proposed Liner and MW Installation
Appendix A – Soil Bore Installation Documentation
Appendix B – Historical Aerial Photos

Figures

RICE Environmental Consulting and Safety (RECS)
P.O. Box 2948, Hobbs, NM 88241
Phone 575.393.2967

Site Location Map

RICE ENVIRONMENTAL RECS CONSULTING & SAFETY, LLC

Vacuum Jct. C-31

UL/ C, Section 31,
T17S, R35E
Lea County, NM

NMOCD Case #: 1R425-84

Figure 1

N
W E
S

0 0.05 0.1 0.2
Miles

Drawing date: 2-8-13

Geographical Location Map

RICE ENVIRONMENTAL RECS CONSULTING & SAFETY, LLC

Vacuum Jct. C-31

UL/ C, Section 31,
T17S, R35E
Lea County, NM

NMOCD Case #: 1R425-84

Figure 2

N W E S

0 235 470 940 Feet

Drawing date: 10/22/13

Soil Bore Installation

SB-1

Depth	Cl-	PID	Lab Cl-	GRO	DRO
SS	1158	0.1			
5'	370	1.3			
10'	443	2.4			
15'	335	3.9			
20'	682	2.2			
25'	1425	1.2			
30'	2216	0.6	2210	<10.0	14.4
35'	1724	0.8			
40'	2026	0.8			
45'	1545	0.9			
50'	949	0.7			
55'	903	0.7			
60'	996	0.5			
65'	534	1.2			
70'	302	1.1			
75'	242	0.8	256	<10.0	<10.0

SB-2

Depth	Cl-	PID	Lab Cl-	GRO	DRO
SS	771	0.7			
5'	600	1.2			
10'	677	10.3			
15'	173	5.7			
20'	1264	3.6			
25'	1096	3.1			
30'	2099	3.8			
35'	3385	3.7			
40'	3619	3.7	3960	<10.0	<10.0
45'	1841	2.2			
50'	1696	1.8			
55'	1788	2.5			
60'	1076	3.8			
65'	1296	3			
70'	591	2.8			
75'	1813	4.6			
80'	2014	3.6			
85'	1400	3.3			
90'	1693	3.4	1710	<10.0	<10.0

SB-3

Depth	Cl-	PID	Lab Cl-	GRO	DRO
SS	641	0.7			
5'	508	1.2			
10'	1767	96.8			
15'	3905	22.1			
20'	2982	24.5			
25'	3179	4.5			
30'	3531	4.9			
35'	2476	3.1			
40'	4242	3.3	4000	<10	20.7
45'	3402	2.5			
50'	3722	2.7			
55'	3284	4.1			
60'	1544	2.5			
65'	2194	3			
70'	1431	1.5			
75'	753	1.9			
80'	841	2.3			
85'	707	3.3			
90'	892	4.2	928	<10	<10

SB-4

Depth	Cl-	PID	Lab Cl-	GRO	DRO
SS	4425	1	5920	<10.0	45.9
5'	1092	1.4			
10'	3520	2.1	4880	<10.0	<10.0
15'	1926	2			
20'	743	2			
25'	2271	0.9			
30'	1545	1.7			
35'	997	1.8			
40'	826	1.8			
45'	1072	2.1			
50'	1481	2.6			
55'	1794	2.3			
60'	1749	2.7			
65'	1002	2.6			
70'	796	1.5			
75'	858	1.9			
80'	1097	2.3			
85'	701	2.1			
90'	1053	0.9	1150	<10.0	<10.0

SB-5

Depth	Cl-	PID	Lab Cl-	GRO	DRO
SS	2621	0.8	4160	<10.0	11.3
5'	780	4.2			
10'	1609	16.5			
15'	1479	8.4			
20'	600	40			
25'	334	8.1			
30'	657	5.3			
35'	1424	4.5			
40'	2096	4			
45'	1995	2.9			
50'	2440	3	2600	<10.0	<10.0
55'	1676	3.4			
60'	1420	3.6			
65'	385	4.2			
70'	556	4.3			
75'	497	1.3			
80'	277	1.6			
85'	248	2	240	<10.0	<10.0

SB-6

Depth	Cl-	PID	Lab Cl-	GRO	DRO
SS	978	0.9			
5'	462	2.6			
10'	495	3.9			
15'	693	1.6			
20'	1081	2.5			
25'	2933	3.2			
30'	2838	3.1			
35'	2825	2.6			
40'	2963	2.4	3280	<10.0	<10.0
45'	1762	2.4			
50'	2678	2.1			
55'	2198	1.9			
60'	2046	1.8			
65'	1908	1.7			
70'	1053	1.8			
75'	1092	2.3			
80'	1049	3.4			
85'	581	3.1			
90'	717	2.2	656	<10.0	<10.0

DGW: 100 ft.

RICE ENVIRONMENTAL RECS CONSULTING & SAFETY, LLC

Vacuum Jct. C-31

UL/ C, Section 31,
T17S, R35E
Lea County, NM

NMOCD Case #: 1R425-84

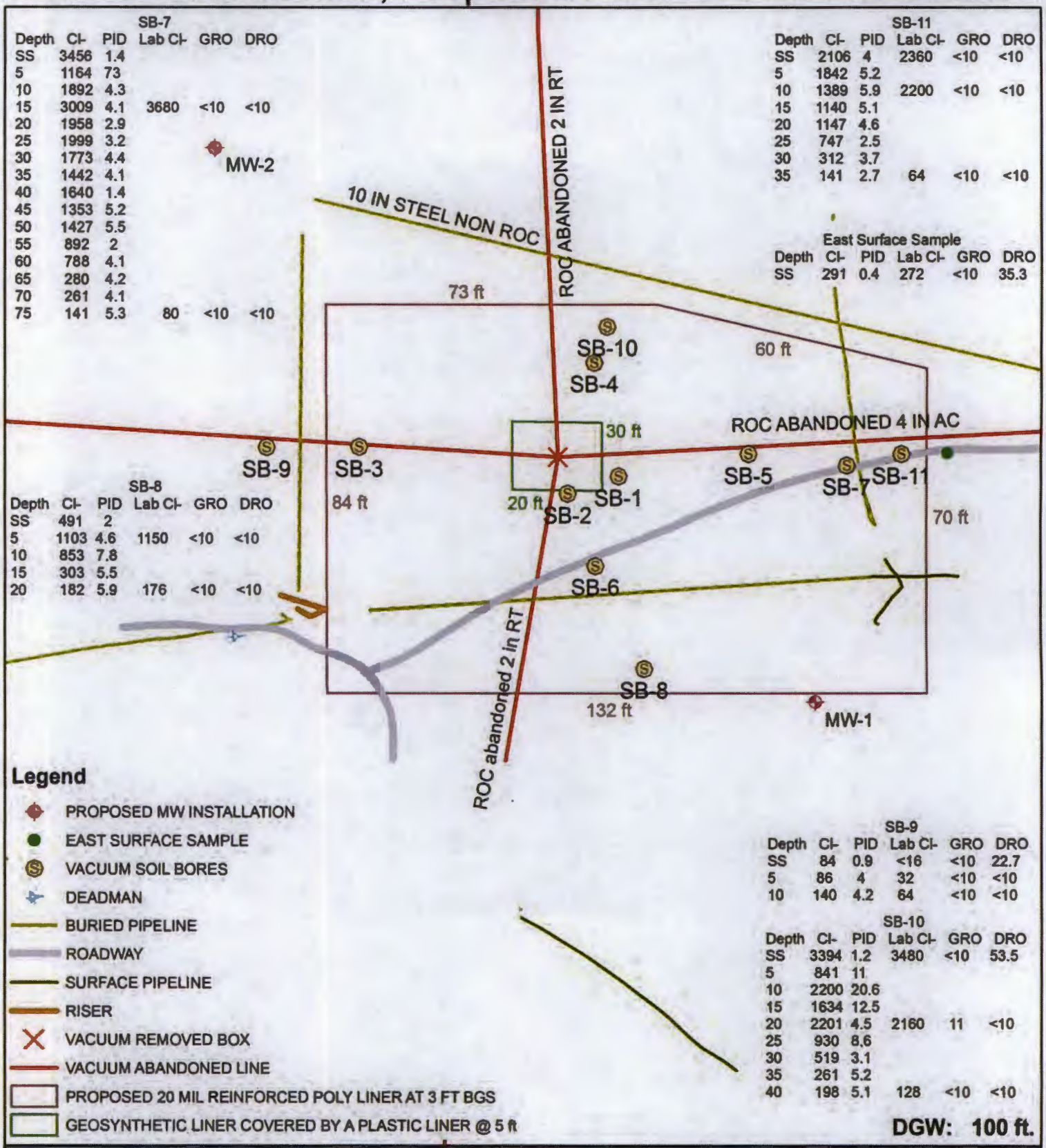
Figure 3

N W E S

0 10 20 40 Feet

GPS DATE: 4/9/13 TG
Drawing date: 10/22/13
Drafted by: L. Weinheimer

Soil Bore Installation, Proposed Liner and MW Installation



SB-7

Depth	Cl-	PID	Lab Cl-	GRO	DRO
SS	3456	1.4			
5	1164	73			
10	1892	4.3			
15	3009	4.1	3680	<10	<10
20	1958	2.9			
25	1999	3.2			
30	1773	4.4			
35	1442	4.1			
40	1640	1.4			
45	1353	5.2			
50	1427	5.5			
55	892	2			
60	788	4.1			
65	280	4.2			
70	261	4.1			
75	141	5.3	80	<10	<10

SB-11

Depth	Cl-	PID	Lab Cl-	GRO	DRO
SS	2106	4	2360	<10	<10
5	1842	5.2			
10	1389	5.9	2200	<10	<10
15	1140	5.1			
20	1147	4.6			
25	747	2.5			
30	312	3.7			
35	141	2.7	64	<10	<10

East Surface Sample

Depth	Cl-	PID	Lab Cl-	GRO	DRO
SS	291	0.4	272	<10	35.3

SB-8

Depth	Cl-	PID	Lab Cl-	GRO	DRO
SS	491	2			
5	1103	4.6	1150	<10	<10
10	853	7.8			
15	303	5.5			
20	182	5.9	176	<10	<10

SB-9

Depth	Cl-	PID	Lab Cl-	GRO	DRO
SS	84	0.9	<16	<10	22.7
5	86	4	32	<10	<10
10	140	4.2	64	<10	<10

SB-10

Depth	Cl-	PID	Lab Cl-	GRO	DRO
SS	3394	1.2	3480	<10	53.5
5	841	11			
10	2200	20.6			
15	1634	12.5			
20	2201	4.5	2160	11	<10
25	930	8.6			
30	519	3.1			
35	261	5.2			
40	198	5.1	128	<10	<10

Legend

- PROPOSED MW INSTALLATION
- EAST SURFACE SAMPLE
- VACUUM SOIL BORES
- DEADMAN
- BURIED PIPELINE
- ROADWAY
- SURFACE PIPELINE
- RISER
- VACUUM REMOVED BOX
- VACUUM ABANDONED LINE
- PROPOSED 20 MIL REINFORCED POLY LINER AT 3 FT BGS
- GEOSYNTHETIC LINER COVERED BY A PLASTIC LINER @ 5 ft

DGW: 100 ft.

RICE ENVIRONMENTAL CONSULTING & SAFETY, LLC — RECS

Vacuum Jct. C-31

UL/ C, Section 31,
T17S, R35E
Lea County, NM

NMOCD Case #: 1R425-84

Figure 4

N W E S

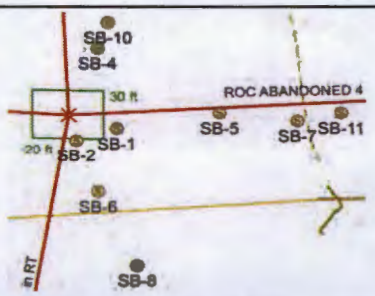
0 10 20 40 Feet

GPS DATE: 9/27/13 TG
Drawing date: 10/22/13
Drafted by: Lara Weinheimer

Appendix A

Soil Bore Installation Documentation

RICE Environmental Consulting and Safety (RECS)
P.O. Box 2948 Hobbs, NM 88241
Phone 575.393.2967

Logger:	Edward Cesareo		
Driller:	Harrison & Cooper, Inc.		
Drilling Method:	Air rotary		
Start Date:	9/24/2013		
End Date:	9/24/2013		

RICE ENVIRONMENTAL CONSULTING & SAFETY, LLC — RECS

Project Name: Vacuum jct. C-31 **Well ID:** SB-7

Project Consultant: RECS

Comments: SB-7 is located 64 ft east of the former junction box site. All samples were from cuttings.

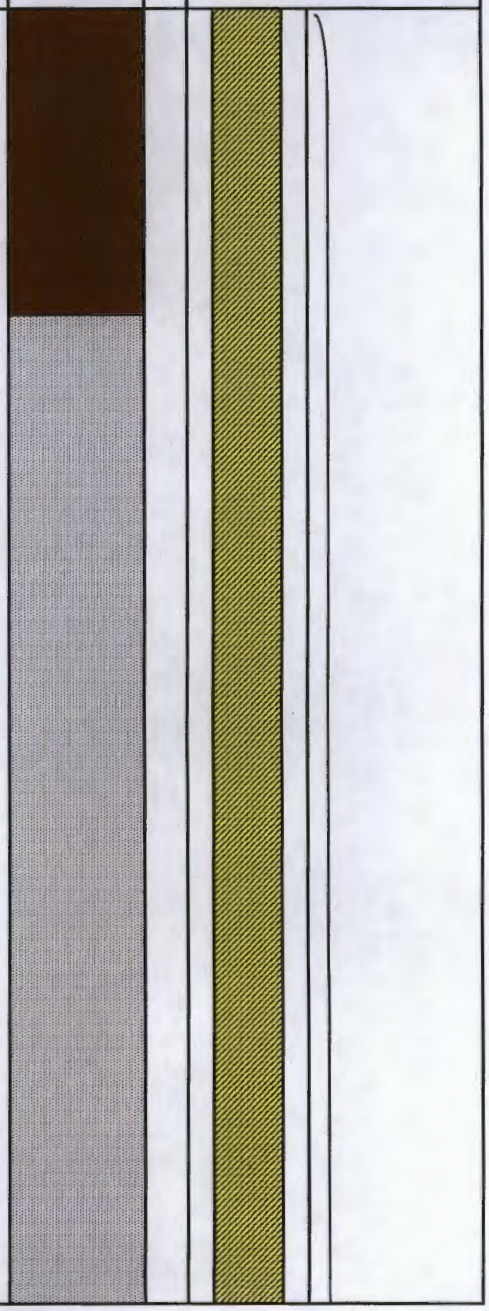
DRAFTED BY: L. Weinheimer

TD = 75 ft GW = 100 ft

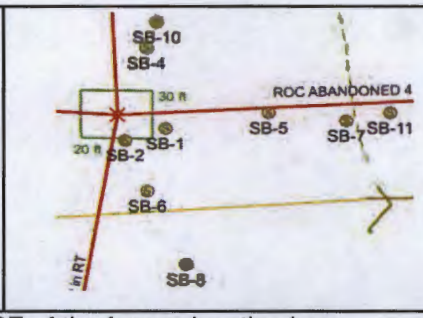
Location: UL/C sec. 31 T17S R35E

Lat: 32°47'50.023"N **Long:** 103°29'55.231"W **County:** Lea **State:** NM

Depth (feet)	Chloride field tests	LAB	PID	Description
SS	3456		1.4	BROWN SAND
5 ft	1164		73	
10 ft	1892		4.3	
15 ft	3009	Cl- 3680	4.1	
		GRO <10		
		DRO <10		
20 ft	1958		2.9	CALICHE
25 ft	1999		3.2	
30 ft	1773		4.4	
35 ft	1442		4.1	



Depth (feet)	Chloride field tests	LAB	PID	Description	Lithology	Well Construction
				CALICHE		bentonite seal
40 ft	1640		1.4			
45 ft	1353		5.2			
50 ft	1427		5.5			
				BROWN SAND		
55 ft	892		2			
60 ft	788		4.1			
65 ft	280		4.2			
70 ft	261		4.1			
75 ft	141	Cl- 80	5.3			
		GRO <10				
		DRO <10				

Logger:	Edward Cesareo		**Project Name:** Vacuum jct. C-31 **Well ID:** SB-8
Driller:	Harrison & Cooper, Inc.		**Project Consultant:** RECS
Drilling Method:	Air rotary		
Start Date:	9/24/2013		
End Date:	9/24/2013		

Comments: SB-8 is located 50 ft SE of the former junction box site. All samples were from cuttings.

DRAFTED BY: L. Weinheimer

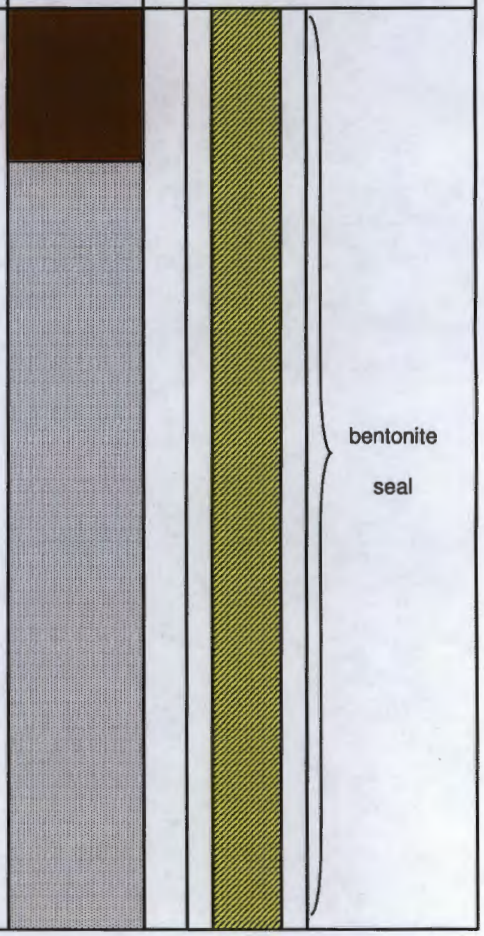
TD = 20 ft GW = 100 ft

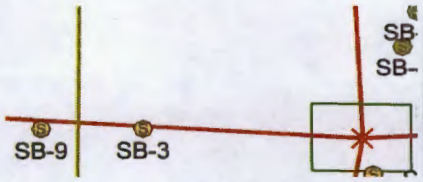
Location: UL/C sec. 31 T17S R35E

Lat: 32°47'49.597"N **County**: Lea

Long: 103°29'55.76"W **State**: NM

Depth (feet)	Chloride field tests	LAB	PID	Description
				BROWN SAND
SS	491		2.0	
				CALICHE WITH SOME SANDSTONE
5 ft	1103	Cl- 1150	4.6	
		GRO <10		
		DRO <10		
10 ft	853		7.8	
15 ft	303		5.5	
20 ft	182	Cl- 176	5.9	
		GRO <10		
		DRO <10		



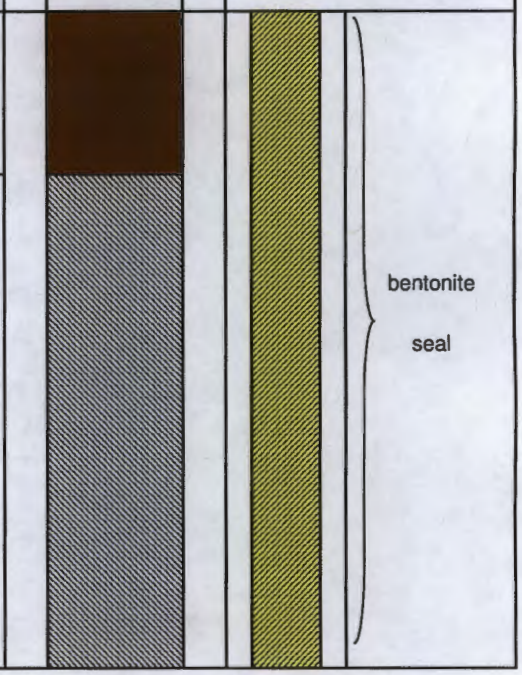
Logger:	Edward Cesareo		RICE ENVIRONMENTAL RECS CONSULTING & SAFETY, LLC
Driller:	Harrison & Cooper, Inc.		**Project Name:** Vacuum jct. C-31 **Well ID:** SB-9
Drilling Method:	Air rotary		**Project Consultant:** RECS
Start Date:	9/24/2013		**Location:** UL/C sec. 31 T17S R35E
End Date:	9/24/2013		**Lat:** 32°47'49.895"N **County:** Lea **Long:** 103°29'56.436"W **State:** NM

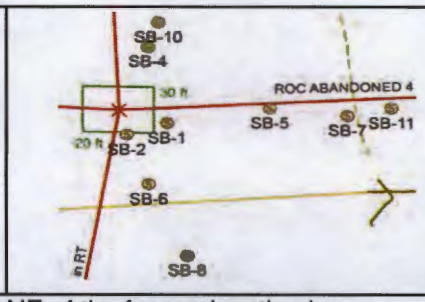
Comments: SB-9 is located 64 ft west of the former junction box site. All samples were from cuttings.

DRAFTED BY: L. Weinheimer

TD = 10 ft GW = 100 ft

Depth (feet)	Chloride field tests	LAB	PID	Description
				BROWN SAND
SS	84	Cl- <16	0.9	
		GRO <10		CALICHE WITH SOME SANDSTONE
		DRO 22.7		
5 ft	86	Cl- 32	4.0	
		GRO <10		
		DRO <10		
10 ft	140	Cl- 64	4.2	
		GRO <10		
		DRO <10		



Logger:	Edward Cesareo		**Project Name:** Vacuum jct. C-31 **Well ID:** SB-10
Driller:	Harrison & Cooper, Inc.		**Project Consultant:** RECS
Drilling Method:	Air rotary		**Location:** UL/C sec. 31 T17S R35E
Start Date:	9/24/2013		**Lat:** 32°47'50.326"N **County:** Lea
End Date:	9/24/2013		**Long:** 103°29'55.85"W **State:** NM

Comments: SB-10 is located 30 ft NE of the former junction box site. All samples were from cuttings.

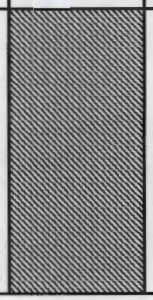
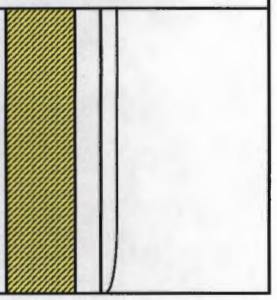
DRAFTED BY: L. Weinheimer

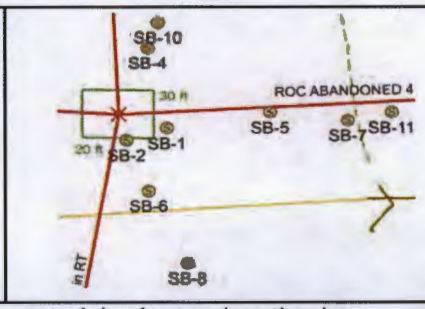
TD = 40 ft GW = 100 ft

Depth (feet)	Chloride field tests	LAB	PID	Description
				BROWN SAND
SS	3394	Cl- 3480	1.2	
		GRO <10		CALICHE WITH SOME SANDSTONE
		DRO 53.5		
5 ft	841		11.0	
10 ft	2200		20.6	
15 ft	1634		12.5	
20 ft	2201	Cl- 2160	4.5	
		GRO 11		
		DRO <10		
25 ft	930		8.6	
30 ft	519		3.1	
35 ft	261		5.2	

Lithology

Well Construction: bentonite seal

Depth (feet)	Chloride field tests	LAB	PID	Description	Lithology	Well Construction
				CALICHE WITH SOME SANDSTONE		
40 ft	198	Cl-128	5.1			
		GRO <10				
		DRO <10				

Logger:	Edward Cesareo		
Driller:	Harrison & Cooper, Inc.		
Drilling Method:	Air rotary		
Start Date:	9/24/2013		
End Date:	9/24/2013		

RICE ENVIRONMENTAL CONSULTING & SAFETY, LLC — RECS

Project Name: Vacuum jct. C-31 **Well ID:** SB-11

Project Consultant: RECS

Comments: SB-11 is located 76 ft east of the former junction box site. All samples were from cuttings.

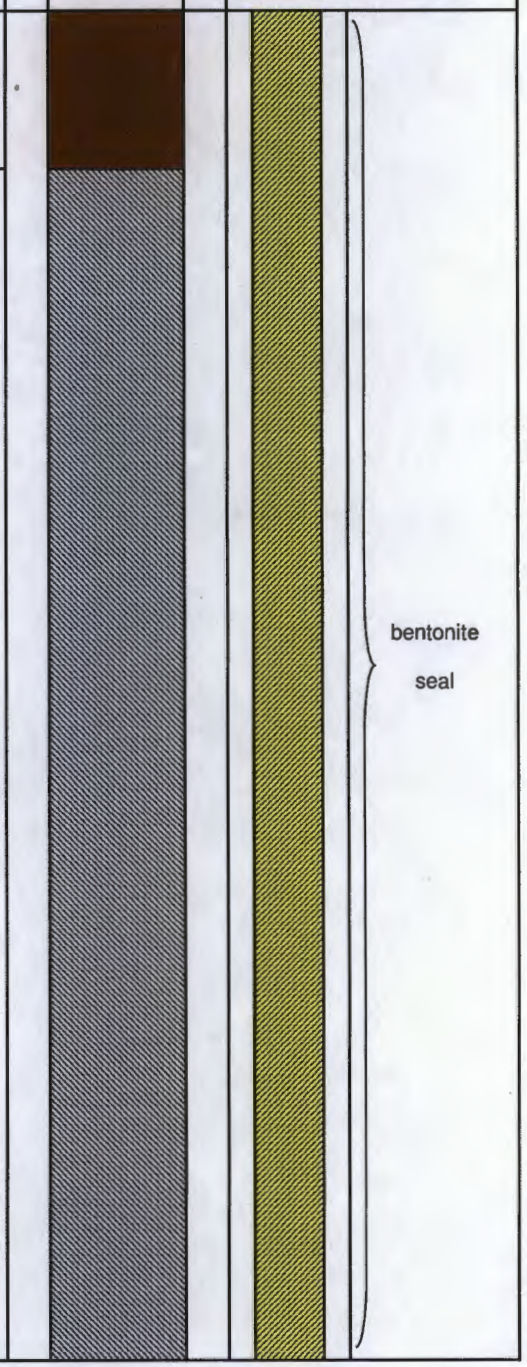
DRAFTED BY: L. Weinheimer

TD = 35 ft GW = 100 ft

Location: UL/C sec. 31 T17S R35E

Lat: 32°47'50.045"N **Long:** 103°29'55.091"W **County:** Lea **State:** NM

Depth (feet)	Chloride field tests	LAB	PID	Description
				BROWN SAND
SS	2106	Cl- 2360	4	
		GRO <10		CALICHE WITH SOME SANDSTONE
		DRO <10		
5 ft	1842		5.2	
10 ft	1389	Cl- 2200	5.9	
		GRO <10		
		DRO <10		
15 ft	1140		5.1	
20 ft	1147		4.6	
25 ft	747		2.5	
30 ft	312		3.7	
35 ft	141	Cl- 64	2.7	
		GRO <10		
		DRO <10		



CARDINAL Laboratories

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

September 27, 2013

KATIE JONES

Rice Operating Company

112 W. Taylor

Hobbs, NM 88240

RE: VACUUM JUNCTION C-31

Enclosed are the results of analyses for samples received by the laboratory on 09/24/13 16:40.

Cardinal Laboratories is accredited through Texas NELAP under certificate number T104704398-11-3. 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.

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. Keene

Celey D. Keene

Lab Director/Quality Manager

CARDINAL Laboratories

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

Analytical Results For:

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

Received:	09/24/2013	Sampling Date:	09/24/2013
Reported:	09/27/2013	Sampling Type:	Soil
Project Name:	VACUUM JUNCTION C-31	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	T19S/R35E		

Sample ID: SB #7 15' (H302322-01)

Chloride, SM4500Cl-B mg/kg **Analyzed By: AP**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	**3680**	16.0	09/26/2013	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	09/26/2013	ND	172	85.9	200	0.524	
DRO >C10-C28	<10.0	10.0	09/26/2013	ND	157	78.7	200	0.805	

Surrogate: 1-Chlorooctane	*89.4 %*	*65.2-140*
Surrogate: 1-Chlorooctadecane	*94.0 %*	*63.6-154*

Sample ID: SB #7 75' (H302322-02)

Chloride, SM4500Cl-B mg/kg **Analyzed By: AP**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	**80.0**	16.0	09/26/2013	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	09/26/2013	ND	172	85.9	200	0.524	
DRO >C10-C28	<10.0	10.0	09/26/2013	ND	157	78.7	200	0.805	

Surrogate: 1-Chlorooctane	*86.2 %*	*65.2-140*
Surrogate: 1-Chlorooctadecane	*91.5 %*	*63.6-154*

Cardinal Laboratories

*=Accredited Analyte

Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

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

Analytical Results For:

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

Received:	09/24/2013	Sampling Date:	09/24/2013
Reported:	09/27/2013	Sampling Type:	Soil
Project Name:	VACUUM JUNCTION C-31	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	T19S/R35E		

Sample ID: SB #8 5' (H302322-03)

Chloride, SM4500Cl-B mg/kg **Analyzed By: AP**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	**1150**	16.0	09/26/2013	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	09/26/2013	ND	172	85.9	200	0.524	
DRO >C10-C28	<10.0	10.0	09/26/2013	ND	157	78.7	200	0.805	

Surrogate: 1-Chlorooctane	*98.4 %*	*65.2-140*
Surrogate: 1-Chlorooctadecane	*105 %*	*63.6-154*

Sample ID: SB #8 20' (H302322-04)

Chloride, SM4500Cl-B mg/kg **Analyzed By: AP**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	**176**	16.0	09/26/2013	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	09/26/2013	ND	172	85.9	200	0.524	
DRO >C10-C28	<10.0	10.0	09/26/2013	ND	157	78.7	200	0.805	

Surrogate: 1-Chlorooctane	*99.1 %*	*65.2-140*
Surrogate: 1-Chlorooctadecane	*101 %*	*63.6-154*

Cardinal Laboratories

*=Accredited Analyte

Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

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

Analytical Results For:

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

Received:	09/24/2013	Sampling Date:	09/24/2013
Reported:	09/27/2013	Sampling Type:	Soil
Project Name:	VACUUM JUNCTION C-31	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	T19S/R35E		

Sample ID: SB #9 SURFACE (H302322-05)

Chloride, SM4500Cl-B mg/kg **Analyzed By: AP**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	<16.0	16.0	09/26/2013	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	09/26/2013	ND	172	85.9	200	0.524	
DRO >C10-C28	**22.7**	10.0	09/26/2013	ND	157	78.7	200	0.805	

Surrogate: 1-Chlorooctane	*96.7 %*	*65.2-140*
Surrogate: 1-Chlorooctadecane	*102 %*	*63.6-154*

Sample ID: SB #9 5' (H302322-06)

Chloride, SM4500Cl-B mg/kg **Analyzed By: AP**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	**32.0**	16.0	09/26/2013	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	09/26/2013	ND	172	85.9	200	0.524	
DRO >C10-C28	<10.0	10.0	09/26/2013	ND	157	78.7	200	0.805	

Surrogate: 1-Chlorooctane	*99.5 %*	*65.2-140*
Surrogate: 1-Chlorooctadecane	*107 %*	*63.6-154*

Cardinal Laboratories

*=Accredited Analyte

Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

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

Analytical Results For:

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

Received:	09/24/2013	Sampling Date:	09/24/2013
Reported:	09/27/2013	Sampling Type:	Soil
Project Name:	VACUUM JUNCTION C-31	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	T19S/R35E		

Sample ID: SB #9 10' (H302322-07)

Chloride, SM4500Cl-B mg/kg **Analyzed By: AP**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	**64.0**	16.0	09/26/2013	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	09/26/2013	ND	172	85.9	200	0.524	
DRO >C10-C28	<10.0	10.0	09/26/2013	ND	157	78.7	200	0.805	

Surrogate: 1-Chlorooctane	*98.0 %*	*65.2-140*
Surrogate: 1-Chlorooctadecane	*103 %*	*63.6-154*

Sample ID: SB #10 SURFACE (H302322-08)

Chloride, SM4500Cl-B mg/kg **Analyzed By: AP**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	**3480**	16.0	09/26/2013	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	09/26/2013	ND	172	85.9	200	0.524	
DRO >C10-C28	**53.5**	10.0	09/26/2013	ND	157	78.7	200	0.805	

Surrogate: 1-Chlorooctane	*83.9 %*	*65.2-140*
Surrogate: 1-Chlorooctadecane	*93.3 %*	*63.6-154*

Cardinal Laboratories

*=Accredited Analyte

Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

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

Analytical Results For:

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

Received:	09/24/2013	Sampling Date:	09/24/2013
Reported:	09/27/2013	Sampling Type:	Soil
Project Name:	VACUUM JUNCTION C-31	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	T19S/R35E		

Sample ID: SB #10 20' (H302322-09)

Chloride, SM4500Cl-B mg/kg **Analyzed By: AP**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	**2160**	16.0	09/26/2013	ND	416	104	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	**11.0**	10.0	09/26/2013	ND	172	85.9	200	0.524	
DRO >C10-C28	<10.0	10.0	09/26/2013	ND	157	78.7	200	0.805	

Surrogate: 1-Chlorooctane	*110 %*	*65.2-140*
Surrogate: 1-Chlorooctadecane	*119 %*	*63.6-154*

Sample ID: SB #10 40' (H302322-10)

Chloride, SM4500Cl-B mg/kg **Analyzed By: AP**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	**128**	16.0	09/26/2013	ND	416	104	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	09/26/2013	ND	172	85.9	200	0.524	
DRO >C10-C28	<10.0	10.0	09/26/2013	ND	157	78.7	200	0.805	

Surrogate: 1-Chlorooctane	*97.5 %*	*65.2-140*
Surrogate: 1-Chlorooctadecane	*106 %*	*63.6-154*

Cardinal Laboratories *=Accredited Analyte

Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

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

Analytical Results For:

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

Received:	09/24/2013	Sampling Date:	09/24/2013
Reported:	09/27/2013	Sampling Type:	Soil
Project Name:	VACUUM JUNCTION C-31	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	T19S/R35E		

Sample ID: SB #11 SURFACE (H302322-11)

Chloride, SM4500Cl-B mg/kg **Analyzed By: AP**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	**2360**	16.0	09/26/2013	ND	416	104	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	09/26/2013	ND	172	85.9	200	0.524	
DRO >C10-C28	<10.0	10.0	09/26/2013	ND	157	78.7	200	0.805	

Surrogate: 1-Chlorooctane	*95.8 %*	*65.2-140*
Surrogate: 1-Chlorooctadecane	*97.4 %*	*63.6-154*

Sample ID: SB #11 10' (H302322-12)

Chloride, SM4500Cl-B mg/kg **Analyzed By: AP**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	**2200**	16.0	09/26/2013	ND	416	104	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	09/26/2013	ND	183	91.6	200	10.4	
DRO >C10-C28	<10.0	10.0	09/26/2013	ND	172	85.9	200	18.0	

Surrogate: 1-Chlorooctane	*105 %*	*65.2-140*
Surrogate: 1-Chlorooctadecane	*110 %*	*63.6-154*

Cardinal Laboratories

*=Accredited Analyte

Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

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

Analytical Results For:

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

Received:	09/24/2013	Sampling Date:	09/24/2013
Reported:	09/27/2013	Sampling Type:	Soil
Project Name:	VACUUM JUNCTION C-31	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	T19S/R35E		

Sample ID: SB #11 35' (H302322-13)

Chloride, SM4500Cl-B mg/kg **Analyzed By: AP**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	**64.0**	16.0	09/26/2013	ND	416	104	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	09/27/2013	ND	183	91.6	200	10.4	
DRO >C10-C28	<10.0	10.0	09/27/2013	ND	172	85.9	200	18.0	

Surrogate: 1-Chlorooctane	*118 %*	*65.2-140*
Surrogate: 1-Chlorooctadecane	*128 %*	*63.6-154*

Sample ID: EAST SURFACE SAMPLE (H302322-14)

Chloride, SM4500Cl-B mg/kg **Analyzed By: AP**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	**272**	16.0	09/26/2013	ND	416	104	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	09/26/2013	ND	183	91.6	200	10.4	
DRO >C10-C28	**35.3**	10.0	09/26/2013	ND	172	85.9	200	18.0	

Surrogate: 1-Chlorooctane	*122 %*	*65.2-140*
Surrogate: 1-Chlorooctadecane	*137 %*	*63.6-154*

Cardinal Laboratories *=Accredited Analyte

Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

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

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

Celey D. Keene, Lab Director/Quality Manager

CARDINAL LABORATORIES

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

101 East Marland, Hobbs, NM 88240 2111 Beechwood, Abilene, TX 79603
(505) 393-2326 FAX (505) 393-2476 (325) 673-7001 FAX (325)673-7020

Company Name:	RICE Operating	**BILL TO**	
Project Manager:	Katie Jones	**P.O. #:**	
Address:	112 W. Taylor	**Company:**	
City:	Hobbs **State:** NM **Zip:** 88240	**Attn:**	
Phone #:	**Fax #:**	**Address:**	
Project #:	**Project Owner:**	**City:**	
Project Name:		**State:** **Zip:**	
Project Location:	VACCUM JCT. C-31 T-17-S/R-35-E	**Phone #:**	
Sampler Name:	Edward Cesareo	**Fax #:**	

ANALYSIS REQUEST

FOR LAB USE ONLY Lab I.D.	Sample I.D.	(G)RAB OR (C)OMP	# CONTAINERS	MATRIX: GROUNDWATER	WASTEWATER	SOIL	OIL	SLUDGE	OTHER	PRESERV: ACID/BASE	ICE / COOL	OTHER	SAMPLING: DATE	TIME	Chlorides	TPH 8015 M	BTEX	Texas TPH	Complete Cations/Anions	TDS
H303372																				
1	SB#7 15'	G	1			✓					✓		9-24-13	9:40	✓	✓				
2	SB#7 75'	G	1			✓					✓			9:45	✓	✓				
3	SB#8 5'	G	1			✓					✓			10:35	✓	✓				
4	SB#8 20'	G	1			✓					✓			10:40	✓	✓				
5	SB#9 Surface	G	1			✓					✓			11:30	✓	✓				
6	SB#9 5'	G	1			✓					✓			11:35	✓	✓				
7	SB#9 10'	G	1			✓					✓			11:40	✓	✓				
8	SB#10 Surface	G	1			✓					✓			12:00	✓	✓				
9	SB#10 20'	G	1			✓					✓			12:05	✓	✓				
10	SB#10 40'	G	1			✓					✓			12:10	✓	✓				

Relinquished By:	Edward Cesareo	**Date:** 9-24-13 **Time:** 9:40	**Received By:** Jodi Henson
Relinquished By:		**Date:** **Time:**	**Received By:**

Delivered By: (Circle One) Sampler - UPS - Bus - Other: 5°c

Sample Condition Cool ☑ Yes ☐ No Intact ☑ Yes ☐ No

CHECKED BY: (Initials) JH

Phone Result: ☐ Yes ☑ No **Add'l Phone #:**
Fax Result: ☐ Yes ☑ No **Add'l Fax #:**
REMARKS:

email results
hconder@rice-ecs.com; Lweinheimer@rice-ecs.com;
kjones@riceswd.com; Lpena@riceswd.com;
knorman@rice-ecs.com; ecesareo@rice-ecs.com

† Cardinal cannot accept verbal changes. Please fax written changes to 505-393-2476

#54

CARDINAL LABORATORIES

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

101 East Marland, Hobbs, NM 88240 2111 Beechwood, Abilene, TX 79603
(505) 393-2326 FAX (505) 393-2476 (325) 673-7001 FAX (325)673-7020

Company Name:	RICE Operating	**BILL TO**	
Project Manager:	Katie Jones	**P.O. #:**	
Address:	112 W. Taylor	**Company:**	
City:	Hobbs **State:** NM **Zip:** 88240	**Attn:**	
Phone #:	**Fax #:**	**Address:**	
Project #:	**Project Owner:**	**City:**	
Project Name:		**State:** **Zip:**	
Project Location:	VACUUM JCT. C-31 T-19-S/R-35-E	**Phone #:**	
Sampler Name:	Edward Cesareo	**Fax #:**	

FOR LAB USE ONLY Lab I.D.	Sample I.D.	(G)RAB OR (C)OMP	# CONTAINERS	MATRIX: GROUNDWATER	WASTEWATER	SOIL	OIL	SLUDGE	OTHER	PRESERV.: ACID/BASE	ICE / COOL	OTHER	SAMPLING: DATE	TIME	Chlorides	TPH 8015 M	BTEX	Texas TPH	Complete Cations/Anions	TDS
H302322																				
11	SB#11 surface	G	1			✓					✓		9-24-13	3:05	✓	✓				
12	SB#11 10'	G	1			✓					✓			3:10	✓	✓				
13	SB#11 35'	G	1			✓					✓			3:15	✓	✓				
14	SB NEAST Surface Sample	G	1			✓					✓			3:20	✓	✓				

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 the client for the 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 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 services hereunder by Cardinal, regardless of whether such claim is based upon any of the above stated reasons or otherwise.

Relinquished By:	**Date:** 9-24-13	**Received By:**	Phone Result: ☐ Yes ☑ No Add'l Phone #:
	Time: 4:40		Fax Result: ☐ Yes ☑ No Add'l Fax #:
Relinquished By:	**Date:**	**Received By:**	REMARKS: email results hconder@rice-ecs.com; Lweinheimer@rice-ecs.com; kjones@riceswd.com; Lpena@riceswd.com; knorman@rice-ecs.com; ecesareo@rice-ecs.com
	Time:		
Delivered By: (Circle One) Sampler - UPS - Bus - Other:	5°C	**Sample Condition** Cool: ☑ Yes ☐ No Intact: ☑ Yes ☐ No	**CHECKED BY:** (Initials)

† Cardinal cannot accept verbal changes. Please fax written changes to 505-393-2476

#54

Appendix B

Historical Aerial Photos

RICE Environmental Consulting and Safety (RECS)
P.O. Box 2948 Hobbs, NM 88241
Phone 575.393.2967

1955

RICE ENVIRONMENTAL
RECS
CONSULTING & SAFETY, LLC

Vacuum Jct. C-31

UL/ C, Section 31,
T17S, R35E
Lea County, NM

NMOCD Case #: 1R425-84

N
W E
S

0 70 140 280
Feet

Drawing date: 6-11-13

2013

RICE ENVIRONMENTAL
RECS
CONSULTING & SAFETY, LLC

Vacuum Jct. C-31

UL/ C, Section 31,
T17S, R35E
Lea County, NM

NMOCD Case #: 1R425-84

N
W E
S

0 70 140 280
Feet

Drawing date: 6-11-13