1R - 425-36

REPORTS

DATE:

6-21-11

R. T. HICKS CONSULTANTS, LTD.
901 Rio Grande Blvd NW ▲ Suite F-142 ▲ Albuquerque, NM 87104 ▲ 505.266.5004 ▲ Fax: 505.266-0745

June 21, 2011

Mr. Edward J. Hansen
New Mexico Oil Conservation Division
1220 South St. Francis Drive
Santa Fe, New Mexico 87505
Via E-mail

RE: Termination Request and Monitoring Well Plugging Report
NMOCD Case #: 1R425-36
Vacuum C-33, T17S, R35E, Section 33

Mr. Hansen,

R.T. Hicks Consultants, Ltd. is submitting this Termination Request on behalf of Rice Operating Company (ROC) for the above-referenced site. The investigation demonstrated that neither chloride nor hydrocarbons are present in the vadose zone in quantities that represent a threat to fresh water or the environment and recommended re-vegetation. Surface restoration activities and re-vegetation efforts have been completed at the site.

Background
The Vacuum C-33 Boot site is located southwest of the city of Lovington and east of Buckeye, NM at Township 17S, Range 35E, Section 33, Unit C. In 2007, Rice Operating Company (ROC) excavated and removed the C-33 box and a 30-foot by 30-foot area of surrounding soil to a depth of twelve-feet. Characterization activities in 2007 identified chloride-impacted soil.

The Investigation & Characterization Plan (ICP) was dated March 17, 2008 and approved by the NMOCD on May 21, 2008. The ICP includes background information and a site vicinity map for this and nearby ROC sites.

As part of the approved ICP, ROC implemented the following scope in February 2009:

- six soil borings were advanced to determine the extent and magnitude of chloride release and
- one monitoring well was installed southeast (down gradient) from the site.

Our January 6, 2011 Corrective Action Plan (CAP) described the results of that field program and presented recommended actions. The CAP was approved by the NMOCD on February 22, 2011. The CAP (without appendices) and NMOCD approval are included in Attachment A. The recommended corrective action for the site was the installation of a 2,100 square foot synthetic liner 4-feet below ground surface over the former site, placement of soil over the liner and re-vegetation of the ground surface.

Documentation of Field Programs
Attachment B includes field analyses, laboratory analyses, re-vegetation data, photos documenting that surface restoration and re-vegetation efforts at the site conform to the approved CAP. Attachment B demonstrates:

- The liner was installed at 4-feet below existing grade on April 13, 2011
- The site was excavated and backfilled to grade from April 6 through April 26, 2011. A total of 888 yards of earth were transported to Sundance Disposal and 936 yards of soil was imported.
- Seeding of the area occurred on April 26, 2011
- Imported soil met the concentration requirements of the CAP
    - Backfill Pad: Cl^- 80 mg/kg and PID 0.0 ppm
    - Imported Soil: Cl^- 32 mg/kg and PID 0.0 ppm
    - Imported Soil for Top Cap: Cl^- <16 mg/kg and PID 19.6 ppm

Attachment B also includes driller's plugging report and photos documenting the March 23, 2011 plugging and abandonment of MW-1 according to NMOCD specifications. MW-1 was plugged using a cement grout containing 1% to 3% bentonite and a 3 foot cap of cement.

Recommendations

Previous investigations demonstrate that after implementation of the CAP residual chloride and hydrocarbons in the vadose zone will not with reasonable probability contaminate ground water or suface water in excess of the standards in Subsections B and C of 19.15.30.9 NMAC through leaching, percolation or other transport mechanisms, or as the water table fluctuates. Installation of the liner and re-vegetation of the site meets the mandate of NMOCD Rules for protection of surface water and the environment. ROC's documented actions will foster re-vegetation at the site. Installation of the liner and re-vegetation of the ground surface will limit infiltration of precipitation and the subsequent migration of constituents of concern to ground water. We recommend termination of the regulatory file.

ROC is the service provider (agent) for the Vacuum Saltwater Disposal System and has no ownership of any portion of pipeline, well, or facility. A consortium of oil producers that own the Vacuum System (System Parties) provides all operating capital on a percentage ownership/usage basis. The Vacuum SWD system is in abandonment.

Please contact Hack Conder of ROC at 575-393-9174 if you have any questions concerning this submission. Thank you for your time and consideration.

Sincerely,
R.T. Hicks Consultants, Ltd.

Randall Hicks
Principal

Copy: Hack Conder, Rice Operating Company

Attachment A

Corrective Action Plan Addendum

R.T. Hicks Consultants, Ltd.
901 Rio Grande Blvd. NW, Suite F-142
Albuquerque, NM 87104

From:	Hansen, Edward J., EMNRD
To:	Hack Conder
Cc:	Leking, Geoffrey R, EMNRD; Katie Jones; Katie Lee
Subject:	Corrective Action Plan (1R425-36) Approval - ROC Vacuum C-33 Boot Site
Date:	Tuesday, February 22, 2011 11:16:10 AM

RE: "Corrective Action Plan"
for the Rice Operating Company's
Vacuum C-33 Boot Site
Unit Letter C, Section 33, T17S, R35E, NMPM, Lea County, New Mexico
Corrective Action Plan (1R425-36) Approval

Dear Mr. Conder:

The New Mexico Oil Conservation Division (OCD) has received the Corrective Action Plan (CAP) for the Vacuum C-33 Boot Site, dated January 6, 2011, and addendum, dated February 21, 2011, and has conducted a review of the Plan. The Plan indicates that Rice Operating Company (ROC) has met the requirements of 19.15.29 NMAC (Part 29; formerly, Rule 116) for a remediation plan. Therefore, the OCD hereby conditionally approves the Corrective Action Plan as proposed for above-referenced site in accordance with 19.15.29 NMAC:

ROC must submit to the OCD a final report of the corrective actions (including groundwater monitoring well plugging) within 120 days.

Please be advised that OCD approval of this Plan does not relieve the owner/operator of responsibility should operations pose a threat to ground water, surface water, human health or the environment. In addition, OCD approval does not relieve the owner/operator of responsibility for compliance with any OCD, federal, state, or local laws and/or regulations.

If you have any questions regarding this matter, please contact me at 505-476-3489.

Edward J. Hansen
Hydrologist
Environmental Bureau

From: Katie Lee
To: Edward J. EMNRD Hansen
Cc: Katie Jones; Hack Conder; "David Hamilton"
Subject: CAP Addendum, Vacuum C-33, 1R425-36
Date: Monday, February 21, 2011 5:26:39 PM
Attachments: C33CAPAddendumPlate7.pdf

Mr. Hansen,

This email is an Addendum to the Vacuum C-33 Site (1R425-36) Corrective Action Plan, submitted to the NMOCD on January 6, 2011. Page 6, section: Recommendation, paragraph 3: text in blue lettering, below, will be added to the paragraph. Red lettering marked with a strike-through will be deleted. The new Plate 7 showing the proposed liner location and re-vegetated areas is attached. If you need any further information, please let me or Hack and Katie at ROC know.

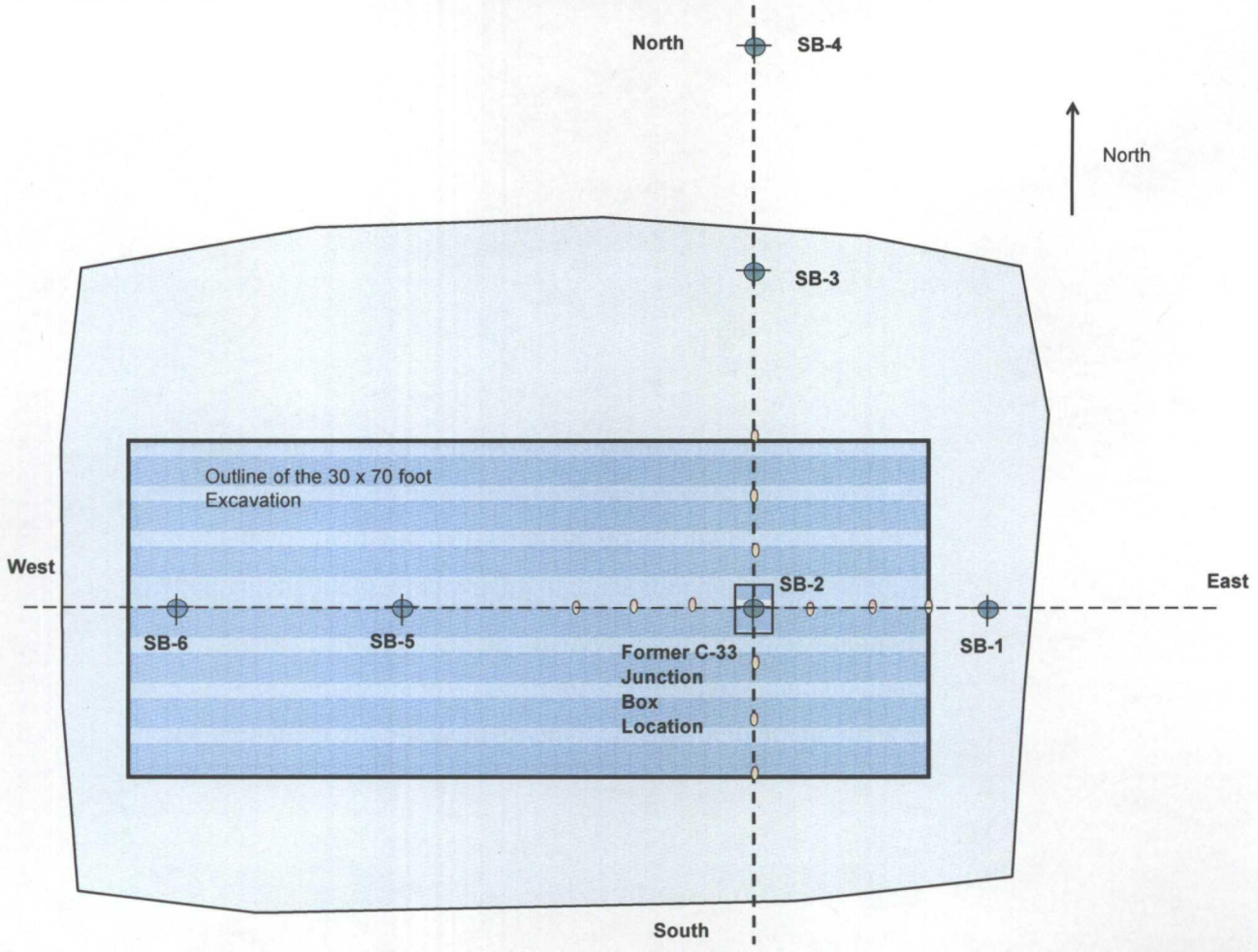
Our recommended corrective action ~~remedy~~ for the site is the installation of a 2,100 square foot synthetic liner 4 to 5-feet below ground surface over the former site, placement of soil over the liner and re-vegetation of the ground surface. This proposed remedy will limit infiltration of precipitation and the subsequent migration of constituents of concern to ground water. As part of this effort ROC plans to: ~~includes the follow~~

- Excavate the 30-foot by 70 ~~30~~-foot area (shown on Plates 6 and 7) to a depth of four to five-feet; and place a liner at the bottom. ~~Clean fill with a chlorid~~ ~~mg/kg and a PID (field) reading below 100 ppm~~ ~~ed material.~~
- Fill material for the excavation will have a chloride concentration of less than 500 mg/kg and a PID (field) reading of less than 100 ppm. The excavated soil will be evaluated and used provided it meets these criteria. Any soils requiring disposal will be properly disposed of at an NMOCD approved facility.
- Upon completion of the liner installation, re-vegetate the disturbed ~~a 45~~ area centered over the former excavation at the C-33 site to reduce infiltration (Plate 7).
- As monitored ground water at MW-1 shows eight quarters of data showing no ground water impact at the site above WQCC standards, we will plug and abandon MW-1 according to standard protocols upon NMOCD approval of this plan.

This remedy is protective of ground water quality, human health, and the environment.

Katie Lee
Project Scientist
RT Hicks Consultants, Ltd.
phone: 505.266.5004
mobile: 505.400.7925
fax: 505.266.0745

Trench and Boring Locations and Remedy Plan	Client: Rice Operating Company	Location: Section 33, T17S, R35E
	Project Name: Vacuum C-33 Boot	



LEGEND

0 feet Scale 20 feet

West East

Cross Section Line (Plate6)

Area to be excavated to a depth of 5-feet. Liner to be placed at bottom. Fill with chloride < 500 mg/kg and PID < 100 ppm to be placed above liner.

Area to be re-vegetated. Shape varies with disturbed area.

Additional borings to assess lateral extent of past releases

0 Trench Location, samples taken to a depth of 12 feet

R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 505-266-5004	Vacuum C-33 Boot	Plate 7 February 2011

R. T. HICKS CONSULTANTS, LTD.

901 Rio Grande Blvd NW ▲ Suite F-142 ▲ Albuquerque, NM 87104 ▲ 505.266.5004 ▲ Fax: 505.266-0745

January 6, 2011

Edward Hansen
NMOCD
1220 South St. Francis Drive
Santa Fe, New Mexico 87505
Via E-mail

RE: NMOCD Case #: 1R425-36
Vacuum C-33, T17S, R35E, Section 33
Corrective Action Plan

Mr. Hansen,

This letter presents a Corrective Action Plan for Vacuum C-33. The Vacuum C-33 boot site is located east of Buckeye, New Mexico in Section 33 of T17S, R35E (see Plate 1). To reach the site from Hobbs, drive:

1) West on US Highway 62 about 12 miles,
2) West on NM-529 about 2.4 miles,
3) Northwest on NM-238 about 9 miles to Buckeye,
4) East on Buckeye Road 2.69 miles, turn right and take the first right turn. Travel 0.26 miles west along the least road and turn right, the site is 156 feet north of the road.

The site was a junction box with boot in the Vacuum System which was abandoned in 2001. In 2007, Rice Operating Company (ROC) excavated and removed the C-33 box and a 30-foot by 30-foot area of surrounding soil to a depth of twelve-feet. Junction box characterization activities at the site followed ROC standard practices associated with junction box characterization and closure and the results of this program are presented in Appendix A. The surface was contoured to the surrounding area and an identification plate was placed at the site to mark the location of the former junction box.

Figure 1. Vacuum C-33, Backfilled Excavation with Identification Plate, October 2007

This Corrective Action Plan presents:

1) A description of the characterization activities performed by R.T. Hicks Consultants (Hicks Consultants) and ROC at the C-33 Boot site in the now abandoned Vacuum system.
2) Evaluations and conclusions drawn from activities performed, and
3) A proposal for termination of the site after the selected remedy is implemented.

Characterization Program

Work Elements Performed

Characterization activities performed by ROC and Hicks Consultants followed the approved March 17, 2008 Investigation Characterization Plan for the site, provided in Appendix A.

Appendix B presents a survey of the site and shows the locations of borings and the monitoring well in relation to nearby roads. Characterization activities performed included:

1) Initial ROC characterization, August-September 2007: ROC sampled the bottom and walls of the 30x30x12 foot excavation and thirteen locations within the excavation to a depth of 12 feet below ground surface:
    a. At the source,
    b. At locations 5 feet north, south, east, and west of the source,
    c. At locations 10 feet north, south, east, and west of the source, and
    d. At locations 15 feet north, south, east, and west of the source.
2) ROC conducted field chloride tests on all locations. In addition to field tests within the excavation, two soil samples were submitted for laboratory analyses: a composite from the walls of the excavation and a composite from the floor of the excavation.
3) After initial characterization the surface was restored and excavated soils were blended and backfilled.
4) In February 2009, six soil borings were advanced to determine the extent and magnitude of chloride release at the site:
    a. At the source,
    b. At locations 30 and 50 feet north of the source,
    c. 20 feet east of the source,
    d. At locations 30 and 50 feet west of the source.
5) During the February 2009 field event, one monitoring well was installed southeast (down gradient) from the site.

Results

Tables 1 and 2 (attached) present chloride and PID measurements from the sampling locations and excavation in September 2007 and the six soil borings in February 2009. Appendix C presents laboratory and field data from the characterization activities.

Plate 2 presents all chloride concentration data obtained from the trenches and the borings. The locations have been arranged in order to form relative south-north and west-east cross sections. SB-2, bored through the junction box location, is included in both.

Chloride Concentration Observations

1) To the south, chloride concentrations decline with depth and distance. Concentrations are generally less than 1,000 mg/kg 15 feet from the junction box.
2) To the north, chloride concentrations are highest 10-feet and 15-feet from the junction box. Between 15 and 30 feet north of the junction box concentrations decline to near 1,000 mg/kg or less.
3) East of the junction box, highest concentrations are 5-feet and 10-feet from the junction box. The trench and boring locations 15-feet and 20-feet east of the junction box have concentrations generally less than 1,000 mg/kg to a depth of 12-feet. Concentrations exceed 1,000 mg/kg at greater depths.
4) To the west, the highest chloride concentrations are 10-feet west of the source (SB-2). At 15-feet west, concentrations have declined. SB-5 (30-feet west) and SB-6 (50-feet west) have higher concentrations than the trench 15-feet west.

In general, chloride concentrations decline with distance from the source as is consistent with the minimal topographic relief. The trenches 5-feet north and 5-feet west demonstrate that local variation exists. The larger scale variation of declining concentration and then increasing concentration at 30-feet (SB-5) and 50-feet (SB-6) suggests that the source of this chloride is from oilfield activities at nearby sites.

Hydrocarbon Concentration Observations

The initial ROC source area excavation, conducted in 2007, encountered hydrocarbon-impacted soil which was confirmed by laboratory analysis of gas and diesel range organics which are essentially non-soluble with respect to leaching.

Field screening of hydrocarbon vapors in the soil from the soil borings identified concentrations greater than 150 ppm only in SB-2 near the source area. The maximum reading (609 ppm) was observed at 25 feet below the surface. Laboratory analysis of this sample indicated concentrations of benzene (0.373 mg/kg), toluene (<0.25 mg/kg), ethylbenzene (11.3 mg/kg), and total xylenes (25.3 mg/kg). A summary of the hydrocarbon laboratory results from all of the soil borings relative to the regulatory screening guidelines is provided on Table 3 below.

Table 3
Rice Operating Vacuum C-33 Boot Site
Laboratory Data - Soil Samples

Sample Location	Depth (feet)	Sample Date	PID (ppm)	Chloride (mg/kg)	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Xylenes (mg/kg)	BTEX (mg/kg)
SB-2	25	2/3/09	609	**1,100**	**0.373**	<0.25	11.3	**25.3**	37.2
SB-5	5	2/3/09	127	**11,400**	**0.082**	0.138	0.183	0.728	1.13
NMOCD Guideline Remediation Levels				**250**	**10**	--	--	--	**50**
2006 NMED Soil Screening Guidelines			**Com./Indus. Vapor Exposure Risk**		**25.8**	**252**	**128**	**82**	--
			GW (DAF_{20})		**0.0201**	**21.7**	**20.2**	**2.6**	
Site Specific GW Protective Levels (DAF_{48})					**0.048**	**52**	**48**	**5**	--

Elevated concentrations of benzene and xylenes in the soil require further evaluation to insure the protection of the underlying ground water. We used the VLEACH vadose zone model to determine if the benzene and xylenes identified during the site assessment would cause the underlying ground water to exceed the regulatory standard. The input to the model employed

field data from the site, nearby locations, and conservative default values for parameters that were not measured at or near the site.

The simulation results indicate that, if no further actions are taken, the maximum ground water impact will occur in 450 years for benzene (0.0014 mg/L) and 700 years for xylenes (0.031 mg/L). During this time neither the benzene nor xylenes mass input to the ground water will be sufficient to cause the water concentrations below the site to exceed the New Mexico water quality standards.

VLEACH is conservative of ground water quality because the model does not take into account the natural biological degradation of the hydrocarbons. Appendix D provides an explanation of the data used and results from the simulation at the Hobbs Vacuum C-33 Boot site. A detailed description of the model and a free windows-based program download is available from the USEPA at http://www.epa.gov/ada/csmos/models/vleach.html.

Monitoring Well Results

The monitoring well, MW-1 installed in March 2009, has been sampled for eight quarters with all chloride concentrations less than 65 mg/L (See Figure 2). Table 4 presents collected ground water data and Appendix E contains laboratory results for the most recent ground water analyses.

Table 4. Collected Ground Water for MW-1 at Vacuum C-33

Sample Date	Chloride	TDS	Sulfate	Benzene	Toluene	EthylBenzene	Total Xylenes
	(mg/L)						
3/2/2009	64	426	60	ND	ND	ND	ND
4/28/2009	52	402	55.5	ND	ND	ND	ND
8/5/2009	56	379	52.9	ND	ND	ND	ND
11/23/2009	56	402	38.8	ND	ND	ND	ND
2/9/2010	56	369	59.2	ND	ND	ND	ND
5/28/2010	56	410	52.7	ND	ND	ND	ND
7/27/2010	60	377	53	ND	ND	ND	ND
10/27/2010	52	375	46.1	ND	ND	ND	ND

ND: Not Detected above laboratory detection limits

Additional Characterization

Hydrogeology of Site

Data from the USGS (Water Table Levels and Aquifer Saturated Thickness in Lea County, Tillery, 2008) and MW-1 show that:

- The site overlies the Ogallala Aquifer
- Depth to water is about 75 feet
- Ground water flows southeast under a regional hydraulic gradient of about 0.003 (see Plate 3)

Data from the Office of the State Engineer (OSE) Technical Report 99-1 (Numerical Simulation of Groundwater Flow for Water Rights Administration in the Lea County Underground Water Basin New Mexico) characterized the area with these properties:

- The saturated thickness of the Ogallala at the site locale is 100-149 feet (USGS map of 2007 lists a thickness of 120-140 feet for this locale)
- The hydraulic conductivity of the Ogallala is between 21 to 40 ft/day

Plate 4 presents data on chloride in ground water from the PTTC database and shows:

- The average chloride concentration in ground water of the wells represented on the map is about 37 mg/L.

Historical Photos of the Site

Plate 5 shows four aerial photographs of the site from 1949, 1966, 1978, and 1996-1998. These photographs show the history of the site and surrounding activity, allowing us to conclude:

1. Oil field activity occurred near the site before 1949. Several pipelines, a two-tank battery (southwest of the site) and a pit (west of the site near the playa) exist in 1949.
2. By 1966, the tank battery southwest of the site has been expanded to four tanks.
3. The pipeline and C-33 junction box is constructed in the time interval between 1966 and 1978. Therefore, the possible active lifetime of the C-33 site is 23 to 35 years.
4. In the time interval of 1966 to 1978, the pit is removed and the tank battery expanded to six tanks from four.
5. Between 1978 and 1996, a well pad and well were placed northeast of the site and the tank battery was reduced from six tanks to two.

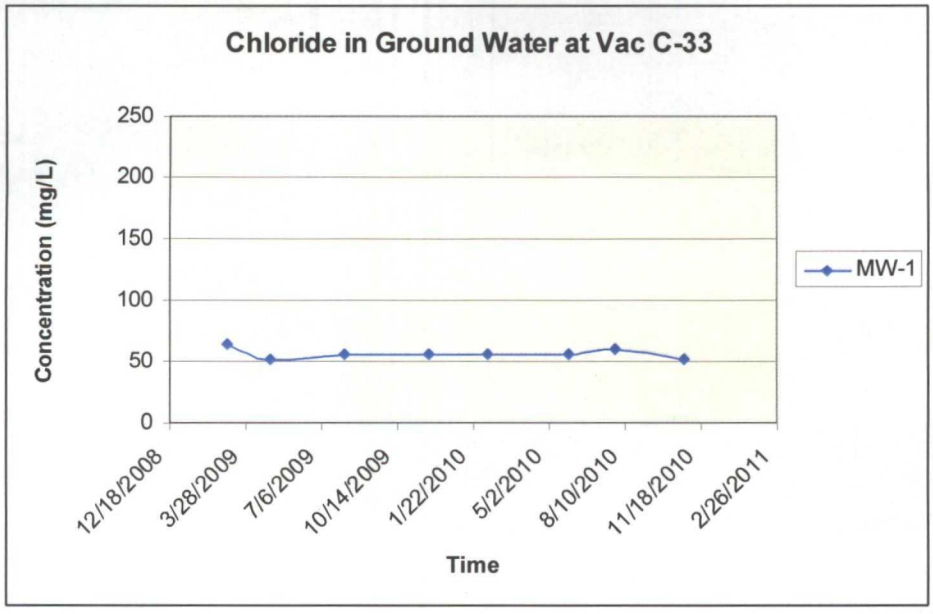
Conclusions

Constituents of Concern

Chloride:

The deepest boring at the site demonstrates that chloride has migrated through the vadose zone to ground water. The monitoring well data shows that the current chloride flux from the vadose zone to ground water is insufficient to elevate chloride concentrations above WQCC standards.

Figure 2. Chloride Concentration in ground water



Hydrocarbons:
Although hydrocarbons are present in the soil below the site, the vadose zone modeling performed using conservative input parameters indicates that the ground water below the site will not be impacted above the New Mexico water quality standards even if no further corrective actions are taken.

The Site presents no threat to Fresh Water, Public Health or the Environment

The monitoring well data shows that the current chloride flux from the vadose zone to ground water is insufficient to elevate chloride concentrations above 65 mg/L.

ROC refilled the 30-foot by 30-foot by 12-foot deep excavation with the blended material from the excavation. Chloride concentration of the fill is 5,340 mg/kg.

Hicks Consultants concludes that residual hydrocarbons are not present in sufficient concentrations or sufficient mass at the ROC site to represent a threat to fresh water, public health, safety, property or the environment.

Recommendation

Vegetative cover over an area removes water from the soil through transpiration in addition to water removed by evaporation. Such a cover can be called an evapotranspiration barrier (ET barrier). The amount of surface water that infiltrates to ground water at an area with an ET barrier is less than what infiltrates for an identical bare area. For soil above the water table; hydraulic conductivity, or the ability of a soil to transmit water, varies with moisture content of the soil. Hence, installation of a vegetative ET barrier results in considerably lowered vadose zone water and chloride fluxes to ground water.

Installation of a liner beneath a vegetative ET barrier reduces water and chloride fluxes to ground water to negligible levels while the liner has integrity. As the liner develops tears and chemically degrades, water and chloride fluxes beneath the degraded areas increase to rates equivalent to an area without a liner but with an ET barrier. Chloride beneath a degrading liner moves down toward ground water at different rates. These migration rates are less than the current rate allowing dilution and dispersion to decrease possible adverse impact to ground water.

Our recommended remedy for the site includes the following work:

- Excavate the 30-foot by 30-foot area (shown on Plates 6 and 7) to a depth of five-feet; and place a liner at the bottom. Clean fill with a chloride concentration below 500 mg/kg and a PID (field) reading below 100 ppm will be imported to replace excavated material.

- Upon completion of the liner installation, re-vegetate a 45-foot by 45-foot area centered over the former excavation at the C-33 site to reduce infiltration (Plate 7).

- As monitored ground water at MW-1 shows eight quarters of data showing no ground water impact at the site above WQCC standards, we will plug and abandon MW-1 according to standard protocols upon NMOCD approval of this plan.

This remedy is protective of ground water quality, human health, and the environment.

Upon documentation of this action, a termination report/request will be submitted to NMOCD.

January 6, 2011

ROC is the service provider (agent) for the Vacuum Salt Water Disposal System and has no ownership of any portion of pipeline, well or facility. The Vacuum SWD System is owned by a consortium of oil producers, System Parties, who provide all operating capital on a percentage ownership/usage basis.

Thank you for your time and consideration.

Sincerely,
R.T. Hicks Consultants, Ltd.

Katie Lee

Katie Lee
Project Scientist

Copy: Rice Operating Company

Attachment B

Corrective Actions and Monitor Well Plugging Report

R.T. Hicks Consultants, Ltd.
901 Rio Grande Blvd. NW, Suite F-142
Albuquerque, NM 87104

New Mexico State Land Office

Field Operations Division

(505) 827-5723 P.O. Box 1148 Santa Fe, NM 87504
(575) 392-8736 2702-D N. Grimes Hobbs, NM 88240
(575) 885-1323 N. Canal, Suite B Carlsbad, NM 88220
(575) 623-4979 1001 S. Atkinson Roswell, NM 88210
(575) 763-0796 105 E. 6th St. Clovis, NM 88101

REVEGETATION FORM

1. General Information

Site name: **VACUUM C-33 BOOT**				Lease No.:		
U/L or Qtr/Qtr	Section	Township	Range	County	Latitude	Longitude (NAD83)
C	**33**	**17S**	**35E**	**LEA**	**32°47'51.57"N**	**103°27'47.826W**
Company Name: **RICE OPERATING**				Contact Name: **HACK CONDER**		
Phone no.: **(575) 393-9174**		Email:	**hconder@riceswd.com**			
Address: **122 W. TAYLOR HOBBS, NM 88240**						
Spill / Release ☐ OCD Spill No.	P&A Well ☐ API No.	Pit Closure ☐	Facility Closure ☒ Type: **JUNCTION BOX**	Other ☐		
Site size:	acres	**14262** square feet	Map detail of site attached ☐			
Additional information:						

3. Soils **Do not rip caliche subsoils, caliche rocks brought to the surface by ripping shall be removed.*

Salvaged from site ☐	Bioremediated ☐	Imported ☒	Blended ☐	Depth (in):
Texture: **SANDY**	Describe soil & subsoil: **SAND OVER CALICHE**			
Soil prep methods:	Rip ☐ Depth(in):	Disc ☒ Depth (in): **8**	Rollerpack ☐	
Date completed: **5/26/11**	Photos attached ☒	Number of photos:		

4. Seeding **Attach seed bag tags to this form. Seed bag tags shall contain the site name and S-T-R.*

Custom seed mix ☒	Prescribed mix ☐	Seed mix name: **10 LBS WARM SEASON MIX 7.5 LBS BLUE GRAMA 20 LBS RACE HORSE OATS**	Seeding date: 5 /26 /11
Is seed mix divided into submixes based on seed size?		Yes ☐ No ☒	
Drill Seeder ☐ Drill Type:		Broadcast ☒ Method: **CRANK OPERATED BROADCAST SEEDER**	Hydroseeding ☐
Soil conditions during seeding:	Dry ☒	Damp ☐	Wet ☐
Photos attached ☐ Number of photos:	Observations:		

5. Additional Methods

Mulching ☒ Crimping ☐ Mulch type: **PEANUT HAY** Tons/acre:		Fertilizer ☐ Type: Lbs/acre:	Other ☒ Describe: **700 LBS OF BIO-ENHANCE**
Photos attached ☒ Number of photos:	Observations:		

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: **TONY GRIECO**	Title: **ENVIRONMENTAL TECH**	Date: **6/1/11**
Signature:		

Version 20080925

Vacuum C-33 boot (1R425-36)
Unit Letter C, Section 33, T17S, R35E

site prior to excavation, facing west

excavating the site, facing west


padding the base of the excavation with 6" of blow sand, facing west


70x30 ft, 20-mil reinforced liner installed at 4 ft bgs, facing west


padding above the liner with 6" of blow sand, facing east

hauling off soil to Sundance, facing west

importing clean soil, facing south

contouring the site with imported soil, facing west

spreading peanut hay on the backfilled site, facing north

spreading bioNhance on the backfilled site, facing southwest

seeding the backfilled site, facing southwest

tilling in seed and bioNhance, facing southwest

CARDINAL Laboratories

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

April 15, 2011

Bruce Baker

Rice Operating Company

112 W. Taylor

Hobbs, NM 88240

RE: VACUUM C-33 BOOT

Enclosed are the results of analyses for samples received by the laboratory on 04/13/11 7:55.

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 Hydorcarbons

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

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 (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
Bruce Baker
112 W. Taylor
Hobbs NM, 88240
Fax To: (575) 397-1471

Received:	04/13/2011	Sampling Date:	04/12/2011
Reported:	04/15/2011	Sampling Type:	Soil
Project Name:	VACUUM C-33 BOOT	Sampling Condition:	** (See Notes)
Project Number:	NOT GIVEN	Sample Received By:	Jodi Henson
Project Location:	NOT GIVEN		

Sample ID: BACKFILL PAD (H100740-01)

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

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	**16.0**	16.0	04/14/2011	ND	432	108	400	3.77	

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

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

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

Company Name: Rice Operating Company
Project Manager: Bruce Baker
Address: 122 W. Taylor
City: Hobbs State: NM Zip: 88240
Phone #: 575-393-9174 Fax #: 575-397-1471
Project #: Project Owner:
Project Name: Vacuum C-33 Boot
Project Location:
Sampler Name: Dustin Harris

BILL TO
P.O. #:
Company:
Attn:
Address:
City:
State: Zip:
Phone #:
Fax #:

ANALYSIS REQUEST

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	Cl
H100710-1	Backfill Pad	G	1			✓							4/13/11	9:25	✓

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: Dustin Harris Date: 4/13/11 Time: 7:30 Received By: [signature]

Relinquished By: [signature] Date: 4/13/11 Time: 7:55 Received By: Jodi Henson

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

19°

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

CHECKED BY: (Initials) [initials]

Phone Result: ☐ Yes ☐ No Add'l Phone #:
Fax Result: ☐ Yes ☐ No Add'l Fax #:
REMARKS: E-Mail Results To:
KJones @ RiceSwd.com
BBaker " "
Logan " "
DHarris " "

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

#26

RICE ENVIRONMENTAL CONSULTING & SAFETY

122 West Taylor Hobbs, NM 88240
PHONE (505) 393-9174 FAX: (505) 397-1471
PID METER CALIBRATION & FIELD REPORT FORM

CK. MODEL NO.			
✓	MODEL: PGM 7300	SERIAL NO: 590-000508
	MODEL: PGM 7300	SERIAL NO: 590-000504
	MODEL: PGM 7320	SERIAL NO: 592-903318
	MODEL: PGM 7300	SERIAL NO: 590-000183

GAS COMPOSITION: ISOBUTYLENE 100PPM / AIR: BALANCE

LOT NO : 92704l	EXPIRATION DATE: 11-16-12
METER READING ACCURACY: 100	

ACCURACY : +/- 2%

COMPANY
RICE OPERATING

SITE	UNIT	SECTION	TOWN SHIP	RANGE
VACUUM C-33 BOOT	C	33	17	35

SAMPLE ID	PID	SAMPLE ID	PID
BACKFILL PAD	0		

I verify that I have calibrated the above instrument in accordance to the manufacture operation manual.

SIGNATURE: Jack Harris DATE: 4-13-11

CARDINAL Laboratories

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

April 20, 2011

Bruce Baker

Rice Operating Company

112 W. Taylor

Hobbs, NM 88240

RE: VAC C-33 BOOT

Enclosed are the results of analyses for samples received by the laboratory on 04/18/11 8:00.

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 Hydorcarbons

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

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 (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
Bruce Baker
112 W. Taylor
Hobbs NM, 88240
Fax To: (575) 397-1471

Received:	04/18/2011	Sampling Date:	04/15/2011
Reported:	04/20/2011	Sampling Type:	Soil
Project Name:	VAC C-33 BOOT	Sampling Condition:	** (See Notes)
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	NOT GIVEN		

Sample ID: IMPORTED SOIL (H100779-01)

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

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	**32.0**	16.0	04/19/2011	ND	448	112	400	3.64	

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
(505) 393-2326 FAX (505) 393-2476

Company Name:	Rice Operating Co
Project Manager:	Bruce Baker
Address:	122 W. Taylor
City:	Hobbs
State:	NM
Zip:	88240
Phone #:	575-393-9174
Fax #:	
Project #:	
Project Owner:	
Project Name:	
Project Location:	Vac. C-33 BOOT
Sampler Name:	Robert Fegans

BILL TO

P.O. #:	
Company:	
Attn:	
Address:	
City:	
State:	Zip:
Phone #:	
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	Cl-
H10179-1	IMPORTED SOIL	C	1			✓							4-15-11	12:05	✓

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: 4/16/11 Time: 7:30	Received By:	
Relinquished By:	Date: 4/18/11 Time: 9:00	Received By:	
Delivered By: (Circle One) Sampler - UPS - Bus - Other:		Sample Condition: Cool ☐ Yes ☐ No; Intact ☑ Yes ☐ No	CHECKED BY: (Initials)

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

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

RICE OPERATING COMPANY

122 West Tayor Hobbs, NM 88240
PHONE: (575) 393-9174 FAX: (575) 397-1471
PID METER CALIBRATION & FIELD REPORT FORM

Check Model Number

	Model: PGM 7300	Serial No: 590-000183			Model: PGM 7600	Serial No: 110-023920
✓	Model: PGM 7300	Serial No: 590-000508			Model: PGM 7600	Serial No: 110-013744
	Model PGM 7300	Serial No: 590-000504			Model: PGM 7600	Serial No. 592-903318

GAS COMPOSITION ISOBUTYLENE 100PPM / AIR: BALANCE

LOT NO : 93737	EXPIRATION DATE: 6-16-2013
FILL DATE:	METER READING ACCURACY. 100 ppm

ACCURACY : +/- 2%

SYSTEM	JUNCTION	UNIT	SECTION	TOWN SHIP	RANGE
Vacuum	C-33 Boot (RB) ~~Heat~~	C	33	17S	35E

SAMPLE ID	PID	SAMPLE ID	PID
Imported Soil	0		

I verify that I have calibrated the above instrument in accordance to the manufacture operation manual.

SIGNATUE: Robert Lyons DATE. 4-15-2011

CARDINAL Laboratories

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

April 27, 2011

Hack Conder

Rice Operating Company

112 W. Taylor

Hobbs, NM 88240

RE: VACUUM C-33 BOOT

Enclosed are the results of analyses for samples received by the laboratory on 04/25/11 8:05.

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 Hydorcarbons

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

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

Received:	04/25/2011	Sampling Date:	04/21/2011
Reported:	04/27/2011	Sampling Type:	Soil
Project Name:	VACUUM C-33 BOOT	Sampling Condition:	** (See Notes)
Project Number:	NOT GIVEN	Sample Received By:	Jodi Henson
Project Location:	NOT GIVEN		

Sample ID: IMPORTED SOIL FOR TOP CAP (H100832-01)

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

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	<16.0	16.0	04/26/2011	ND	416	104	400	0.00	

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 Company	**BILL TO**
Project Manager: Hack Conder	P.O. #:
Address: 122 West Taylor	Company:
City: Hobbs State: NM Zip: 88240	Attn:
Phone #: 575-393-9174 Fax #: 575-397-1471	Address:
Project #: Project Owner:	City:
Project Name: VACUUM C-33 BOOT	State: Zip:
Project Location:	Phone #:
Sampler Name: TONY GRIECO	Fax #:

FOR LAB USE ONLY				MATRIX						PRESERV.			SAMPLING		ANALYSIS REQUEST										
Lab I.D.	Sample I.D.	(G)RAB OR (C)OMP	# CONTAINERS	GROUNDWATER	WASTEWATER	SOIL	OIL	SLUDGE	OTHER :	ACID/BASE:	ICE / COOL	OTHER :	DATE	TIME	Chlorides	TPH 8015 M	BTEX	Texas TPH	Complete Cations/Anions	TPH 8015 M Extended Thru C40						
H100832-1	IMPORTED SOIL FOR TOP CAP	C	1			✓							4/21/11	11:30	✓										

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: 4-25-11 Time: 8:00	Received By:	Phone Result: ☐ Yes ☑ No Add'l Phone #
Relinquished By:	Date: 4/25/11 Time: 3:05	Received By:	Fax Result: ☐ Yes ☑ No Add'l Fax #. REMARKS: email results
Delivered By: (Circle One) Sampler - UPS - Bus - Other:	Sample Condition Cool: ☐ Yes ☑ No Intact: ☐ Yes ☐ No	CHECKED BY: (Initials) CT	Hconder@riceswd.com; jwoodfin@rice-ecs.com; Lweinheimer@rice-ecs.com kjones@riceswd.com

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

NEED SAMPLES BACK, PLEASE

#26

RICE ENVIRONMENTAL CONSULTING & SAFETY

122 West Taylor Hobbs, NM 88240
PHONE (505) 393-9174 FAX: (505) 397-1471
PID METER CALIBRATION & FIELD REPORT FORM

CK. MODEL NO.			
	MODEL: PGM 7300	SERIAL NO. 590-000508	
	MODEL: PGM 7300	SERIAL NO: 590-000504	
	MODEL: PGM 7320	SERIAL NO. 592-903318	
✓	MODEL: PGM 7300	SERIAL NO: 590-000183	

GAS COMPOSITION: ISOBUTYLENE 100PPM / AIR: BALANCE

LOT NO : 930132	EXPIRATION DATE: 4/28/13
METER READING ACCURACY: 100	

ACCURACY : +/- 2%

COMPANY
RICE

SITE	UNIT	SECTION	TOWN SHIP	RANGE
IMPORTED SOIL FOR TOP CAP VAC C-33	C	33	17S	35E

SAMPLE ID	PID	SAMPLE ID	PID
BPT COMPOSITE	19.6		

I verify that I have calibrated the above instrument in accordance to the manufacture operation manual.

SIGNATURE: Tony Cr

DATE 4/21/11

7414 85th Street, Lubbock, Texas 79424-4951

P.O. Box 96, Wolfforth, Texas 79382-0096

Drilling & Pump Professionals

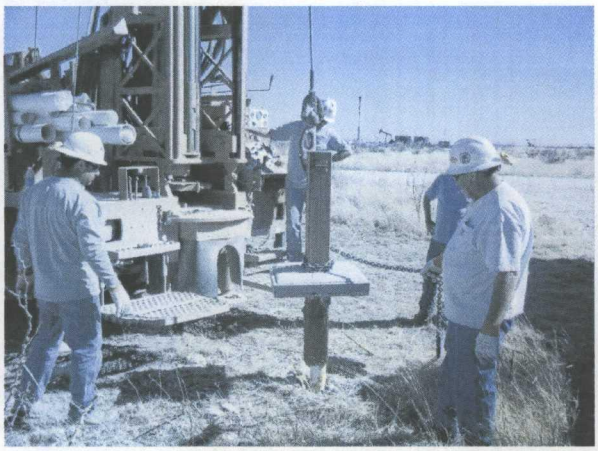
Ph: (806) 866-4026 Fax: (806) 866-4044 hcidrill.com

Plugging Report

Client	Rice Operating
Contractor	Harrison & Cooper
Date Completed	3/23/2011
Site	Vacuum C-33
Well ID	MW-1
Casing Diameter	4"
Well Depth	120'
Casing Material	PVC
Plugging Material	Portland/Bentonite Slurry
Slurry Interval	3'-120'
Cement Interval	0'-3'

Copies: File
Email (Lara Weinheimer; Katie Jones)

Vacuum C-33 boot
Unit C, Section 33, T-17-S, R-35-E



Pulling MW-1

Plugging the bore with 1-3% bentonite/concrete slurry

Completed plug and abandon