1R - 425-64

REPORTS

DATE:

6-30-11

R. T. HICKS CONSULTANTS, LTD.

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

June 30, 2011

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

RECEIVED

JUL - 5 2011

Oil Conservation Division
1220 S. St. Francis Drive
Santa Fe, NM 87505

RE: Termination Request
NMOCD Case #: 1R425-64
Vacuum F-25 EOL Site, T17S, R35E, Section 25

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 F-25 EOL site is located east of Buckeye, NM at Township 17S, Range 35E, Section 25, Unit F. The initial assessment was conducted in August of 2005 and included the installation of three 12-foot deep sampling trenches. Chloride-impacted soil was identified from the surface to a depth of 12 feet below the surface. An Investigation & Characterization Plan (ICP) was submitted on September 30, 2009 and approved by the NMOCD on January 28, 2010. The ICP includes background information and a site vicinity, and ground water gradient map for this and other nearby ROC sites.

As part of the approved ICP, ROC installed five 35- to 55-foot soil borings to determine the vertical and horizontal extent of chloride-impacted soil on May 11, 2010. Our November 23, 2010 Corrective Action Plan (CAP), and Addendum dated January 31, 2011, described the results of that field program and presented recommended actions. The CAP and Addendum was approved by the NMOCD on February 1, 2011. A Corrected Addendum was submitted to the NMOCD on May 5, 2011. The Corrected Addendum showed the site location in relation a nearby lease road and buried pipeline. An extension of time for submittal of the final report was granted by the NMOCD on May 26, 2011. The CAP, Addendum, (without appendices) and NMOCD approvals are included in Attachment A. The recommended corrective action for the site was the installation of a 1,200 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 and Addendum. Attachment B demonstrates:

- The site was excavated and backfilled to grade from May 10 to 17, 2011. A total of 224 yards of soil was transported to Sundance Disposal and 280 yards of soil was imported.
- The liner was installed at 4-feet below existing grade on May 12, 2011
- Seeding of the area occurred on May 26, 2011
- Installation of silt net fencing completed on June 10, 2011
- Imported soil met the concentration requirements of the CAP
    - Backfill Pad: Cl^- 32 mg/kg and PID 0.0 ppm
    - Imported Pond Bottom Soil: Cl^- 32 mg/kg and PID 0.8 ppm
    - Imported Caliche: Cl^- <16 mg/kg and PID 2.7 ppm
    - Imported Soil for Top Cap: Cl^- <16 mg/kg and PID 1.6 ppm

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 surface 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. There are no monitoring wells located at this site.

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.

Dale Littlejohn PG
Geologist

Dale T. Littlejohn

Copy: Hack Conder, Rice Operating Company

Attachment A

Corrective Action Plan and Addendum

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

From:	Katie Jones
To:	"Edward J. EMNRD Hansen"
Cc:	Hack Conder; "Katie Lee"
Subject:	Vacuum F-25 EOL (1R425-64) CORRECTED CAP Addendum
Date:	Thursday, May 05, 2011 10:07:00 AM
Attachments:	Vacuum F-25 EOL Proposed liner.jpg

Mr. Hansen,

This email is a Corrected Addendum to the Vacuum F-25 EOL site (1R425-64) Corrective Action Plan, submitted to the NMOCD November 24, 2010. Page 1, second paragraph: text in blue lettering, below, will be added to the paragraph. Red lettering marked with a strike-through will be deleted. The new plate 4 showing the proposed liner location is attached. If you need any further information, please let me or Hack know.

"Our recommended corrective action for the site is the installation of a 30 x 40~~30~~ foot synthetic liner 4-5 feet below ground surface as seen at the attached Plate 4~~centered over the former site~~ and re-vegetation of the backfilled area~~an area 45 x 45 feet in size~~ above the former site. This design meets the mandate of NMOCD Rules for protection of surface water, ground water and the environment. The investigation demonstrates that with this remedy in place residual chloride and hydrocarbons in the vadose zone will not with reasonable probability contaminate ground water or surface 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 elevation fluctuates."

Page 3, section: Recommendation: text in blue lettering, below, will be added to the paragraph. Red lettering marked with a strike-through will be deleted.

"Our recommended remedy includes:

- Installation of a liner at a depth of four-feet underneath the 30-foot by 40~~30~~-foot area centered over the former site. Excavated soil will be evaluated for use as backfill above the liner. All backfill material will contain a chloride concentration below 500 mg/kg and PID (field parameter) reading less than 100 ppm. Any soils requiring disposal will be properly disposed of at an NMOCD approved facility.~~Clean fill (with a chloride concentration below 500 mg/kg and PID (field parameter) reading less than 100 ppm) will be imported to replace excavated material above the liner.~~
- Upon completion of the liner installation, the lease road will be repaired and the surrounding backfilled area will be seeded with native vegetation~~re-vegetate a 45-foot by 45-foot area centered east-west over the former excavation and adjacent to the road on the north to reduce infiltration~~ (see Plate 4).

This remedy is protective of ground water quality, human health, and the environment. Vegetative cover 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 that for an identical bare area. For soil above the water table; hydraulic conductivity (the ability of a soil to transmit water) varies with the moisture

content of the soil. Hence, installation of a vegetative ET barrier results in a considerably lowered migration rate of water and chloride 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 (likely decades to centuries after it was installed), downward movement of water and chloride beneath these areas increases to the rates equivalent to an area without a liner but with an ET barrier. The chloride beneath the disintegrating parts of a liner moves downwards to ground water before chloride underneath the intact parts of the liner. In this way, chloride from the site enters ground water at different times. The resulting chloride concentration in ground water is less than if chloride from the entire site enters ground water during a shorter time interval."

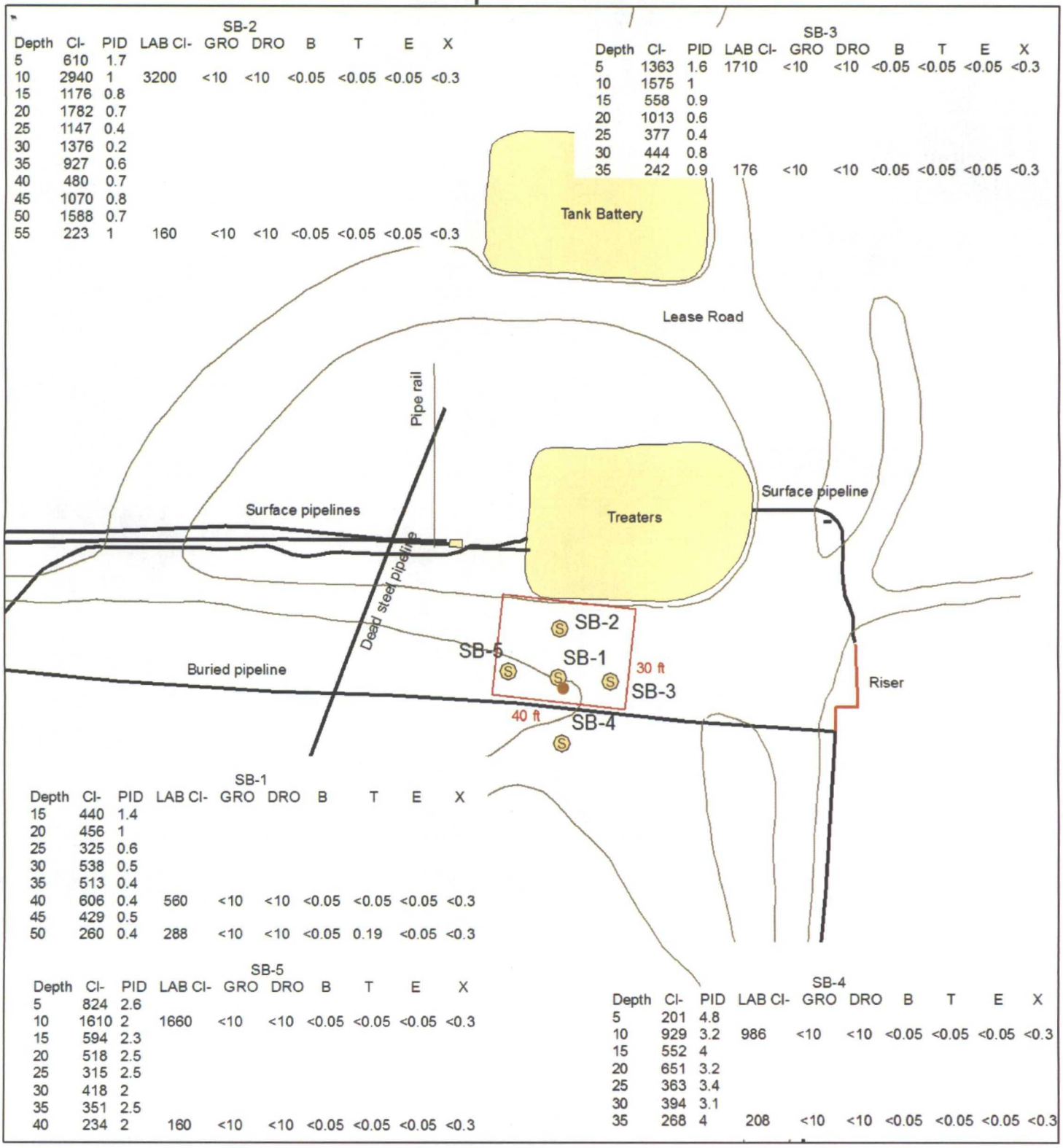
Page 4, section: Conclusions, paragraph 2: text in blue lettering, below, will be added to the paragraph. Red lettering marked with a strike-through will be deleted.

"The remedy design for the site is the installation of a 30 x ~~30~~40 foot synthetic liner 4-5 feet below ground surface centered over the former site and re-vegetation of the backfilled area ~~an area 45 x 45 feet in size~~ above the former site. Our recommended corrective action meets the mandate of NMOCD Rules for protection of surface water, ground water and the environment. The investigation demonstrates that with this remedy in place, residual chloride and hydrocarbons in the vadose zone will not with reasonable probability contaminate ground water or surface 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 elevation fluctuates. Upon documentation of installation of the liner and re-seeding of the site with an appropriate mix of native grasses we will submit a Termination Request for this site's regulatory file."

Thank you.

Katie Jones
Environmental Project Coordinator
RICE *Operating Company*

Proposed Liner



SB-2

Depth	Cl-	PID	LAB Cl-	GRO	DRO	B	T	E	X
5	610	1.7							
10	2940	1	3200	<10	<10	<0.05	<0.05	<0.05	<0.3
15	1176	0.8							
20	1782	0.7							
25	1147	0.4							
30	1376	0.2							
35	927	0.6							
40	480	0.7							
45	1070	0.8							
50	1588	0.7							
55	223	1	160	<10	<10	<0.05	<0.05	<0.05	<0.3

SB-3

Depth	Cl-	PID	LAB Cl-	GRO	DRO	B	T	E	X
5	1363	1.6	1710	<10	<10	<0.05	<0.05	<0.05	<0.3
10	1575	1							
15	558	0.9							
20	1013	0.6							
25	377	0.4							
30	444	0.8							
35	242	0.9	176	<10	<10	<0.05	<0.05	<0.05	<0.3

SB-1

Depth	Cl-	PID	LAB Cl-	GRO	DRO	B	T	E	X
15	440	1.4							
20	456	1							
25	325	0.6							
30	538	0.5							
35	513	0.4							
40	606	0.4	560	<10	<10	<0.05	<0.05	<0.05	<0.3
45	429	0.5							
50	260	0.4	288	<10	<10	<0.05	0.19	<0.05	<0.3

SB-5

Depth	Cl-	PID	LAB Cl-	GRO	DRO	B	T	E	X
5	824	2.6							
10	1610	2	1660	<10	<10	<0.05	<0.05	<0.05	<0.3
15	594	2.3							
20	518	2.5							
25	315	2.5							
30	418	2							
35	351	2.5							
40	234	2	160	<10	<10	<0.05	<0.05	<0.05	<0.3

SB-4

Depth	Cl-	PID	LAB Cl-	GRO	DRO	B	T	E	X
5	201	4.8							
10	929	3.2	986	<10	<10	<0.05	<0.05	<0.05	<0.3
15	552	4							
20	651	3.2							
25	363	3.4							
30	394	3.1							
35	268	4	208	<10	<10	<0.05	<0.05	<0.05	<0.3

RICE ENVIRONMENTAL CONSULTING & SAFETY, LLC

Vacuum F-25 EOL

Legals: UL/F sec. 25
T17S R35E

Case #: 1R425-64

Proposed liner

N W E S

Plate 4

0 20 40 80 Feet

Drawing date: 4-27-11
Drafted by: L. Weinheimer

From:	Hansen, Edward J., EMNRD
To:	Hack Conder
Cc:	Leking, Geoffrey R, EMNRD; Katie Jones; Katie Lee
Subject:	Corrective Action Plan (1R425-64) Approval - Vacuum F-25 EOL Site
Date:	Tuesday, February 01, 2011 12:13:04 PM

RE: "Corrective Action Plan"
for the Rice Operating Company's (ROC)
Vacuum F-25 EOL Site
Unit Letter F, Section 25, T17S, R35E, NMPM, Lea County, New Mexico
Corrective Action Plan (1R425-64) Approval

Dear Mr. Conder:

The New Mexico Oil Conservation Division (OCD) has received the Corrective Action Plan for the Vacuum F-25 EOL Site, dated November 23, 2010 (and addendum dated January 31, 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 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 Jones
To:	"Edward J. EMNRD Hansen"
Cc:	Hack Conder; "Katie Lee"
Subject:	Corrected Vacuum F-25 EOL (1R425-64) CAP Addendum
Date:	Monday, January 31, 2011 2:12:00 PM
Attachments:	Vacuum F-25 EOL (1R425-64) Proposed Liner - Plate 4.jpg

Mr. Hansen,

This email is an Addendum to the Vacuum F-25 EOL site (1R425-64) Corrective Action Plan, submitted to the NMOCD on November 24, 2010. Page 1, second paragraph: text in blue lettering, below, will be added to the paragraph. Red lettering marked with a strike-through will be deleted. The new plate 4 showing the proposed liner location is attached. If you need any further information, please let me or Hack know.

"Our recommended corrective action for the site is the installation of a 30 x ~~30~~40 foot synthetic liner 4-5 feet below ground surface centered over the former site and revegetation of an area 45 x 45 feet in size above the former site. This design meets the mandate of NMOCD Rules for protection of surface water, ground water and the environment. The investigation demonstrates that with this remedy in place residual chloride and hydrocarbons in the vadose zone will not with reasonable probability contaminate ground water or surface 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 elevation fluctuates."

Page 3, section: Recommendation: text in blue lettering, below, will be added to the paragraph. Red lettering marked with a strike-through will be deleted.

"Our recommended remedy includes:

- Installation of a liner at a depth of four-feet underneath the 30-foot by ~~30~~40-foot area centered over the former site. Excavated soil will be evaluated for use as backfill above the liner. All backfill material will contain a chloride concentration below 500 mg/kg and PID (field parameter) reading less than 100 ppm. Any soil requiring disposal will be properly disposed of at an NMOCD-approved facility. ~~Clean fill (with a chloride concentration below 500 mg/kg and PID (field parameter) reading less than 100 ppm) will be imported to replace excavated material above the liner.~~
- Upon completion of the liner installation, re-vegetate a 45-foot by 45-foot area centered east-west over the former excavation and adjacent to the road on the north to reduce infiltration (see Plate 4).

This remedy is protective of ground water quality, human health, and the environment. Vegetative cover 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 that for an identical bare area. For soil above the water table; hydraulic conductivity (the ability of a soil to transmit water) varies with the moisture content of the soil. Hence, installation of a vegetative ET barrier results in a considerably

lowered migration rate of water and chloride 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 (likely decades to centuries after it was installed), downward movement of water and chloride beneath these areas increases to the rates equivalent to an area without a liner but with an ET barrier. The chloride beneath the disintegrating parts of a liner moves downwards to ground water before chloride underneath the intact parts of the liner. In this way, chloride from the site enters ground water at different times. The resulting chloride concentration in ground water is less than if chloride from the entire site enters ground water during a shorter time interval."

Page 4, section: Conclusions, paragraph 2: text in blue lettering, below, will be added to the paragraph. Red lettering marked with a strike-through will be deleted.

"The remedy design for the site is the installation of a 30 x ~~30~~40 foot synthetic liner 4-5 feet below ground surface centered over the former site and re-vegetation of an area 45 x 45 feet in size above the former site. Our recommended corrective action meets the mandate of NMOCD Rules for protection of surface water, ground water and the environment. The investigation demonstrates that with this remedy in place, residual chloride and hydrocarbons in the vadose zone will not with reasonable probability contaminate ground water or surface 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 elevation fluctuates. Upon documentation of installation of the liner and re-seeding of the site with an appropriate mix of native grasses we will submit a Termination Request for this site's regulatory file."

Thank you.

Katie Jones
Environmental Project Coordinator
RICE *Operating Company*

R. T. HICKS CONSULTANTS, LTD.

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

November 23, 2010

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

RE: Vacuum F-25 EOL
NMOCD Case #s: 1R425-64
F-25 EOL, T17S, R35E, Section 25
Correction Action Plan

Mr. Hansen,

On behalf of Rice Operating Company (ROC), R.T. Hicks Consultants, Ltd. is pleased to submit this Correction Action Plan (CAP) for the F-25 EOL site within the Vacuum Salt Water Disposal System. The Vacuum F-25 EOL site is located east of Buckeye, New Mexico in Section 25 of T17S, R35E, GPS coordinates for the site are approximately: N32° 48' 29.125" W -103° 24' 56.843" (Plate 1). The site was a part of the Vacuum System which was abandoned in 2001.

Our recommended corrective action for the site is the installation of a 30 x 30 foot synthetic liner 4-5 feet below ground surface centered over the former site and re-vegetation of an area 45 x 45 feet in size above the former site. This design meets the mandate of NMOCD Rules for protection of surface water, ground water and the environment. The investigation demonstrates that with this remedy in place residual chloride and hydrocarbons in the vadose zone will not with reasonable probability contaminate ground water or surface 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 elevation fluctuates.

Characterization Activities

June - August 2005

The site was initially assessed as part of Vacuum System abandonment. The EOL box was removed. Three sampling trenches were then advanced to 12' below ground surface (bgs) to characterize impact at the source, 5 feet north and 5 feet west of the former EOL junction box. Samples were obtained at one-foot depth intervals and subjected to field chloride and PID measurements. A composite bottom sample was submitted for confirmatory laboratory analysis. The material was removed to a NMOCD-approved site and the site was filled and graded with imported clean material. Plate 2 presents soil sample results at the site.

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. The initial disclosure report for this site is included in Attachment A.

May 2010
ROC and Hicks Consultants had 5 soil borings completed at the site to vertically and horizontally characterize the site. SB-1 was drilled through the center of the former site to a depth of 50 feet.

SB-2, 15 feet north of the EOL junction box was drilled to a depth of 55 feet. SB-3, 15 feet east of the EOL junction box, and SB-4, 20 feet south of the EOL junction box were both drilled to a depth of 35 feet. SB-5, 15 feet west of the EOL junction box was drilled to a depth of 40 feet.

Chloride Profile Data Observations:

1. Trenches generally show increasing chloride concentration with increasing depth (12-feet).
2. Beneath the EOL junction box, concentrations increased from less than 600 mg/kg (1-foot) to above 2,000 mg/kg at 12-feet. Boring concentrations from 15-feet were less than 600 mg/kg to the total depth of 50 feet.
3. Highest chloride concentrations were found in SB-2, north of the EOL junction box (3,200 mg/kg at a depth of 10 feet). Additional local high chloride concentrations exist at 20-feet (1,782 mg/kg) and 50-feet (1,588 mg/kg).
4. To the south (SB-4) and west (SB-5), peak chloride concentrations of about 1,000 mg/kg and about 1,650 mg/kg respectively, occur at a depth of 10 feet. Concentrations decline to about 500 mg/kg at 20 feet and are less below this depth.
5. To the east (SB-3), chloride concentrations have a similar profile as to the west (SB-5) with a higher chloride concentration at the depth of 20 feet (1,013 mg/kg).

To summarize, chloride concentration data from the borings at the site demonstrate chloride masses at depths of about 10-feet, 20-feet, 30-feet, and 50-feet within the soil profile. Greatest chloride masses are to the north and east.

Hydrocarbon Data Results:
All samples were field checked with a photoionization detector (PID). All samples from the trenches measured less than 5.0 ppm with the exception of the uppermost sample and lowermost samples from the 5-feet west trench. The sample concentrations were 14.4 ppm and 41.6 ppm, respectively. Measurements from all the boring samples were less than 5.0 ppm.

Two samples from each of the five borings were submitted for laboratory analysis for BTEX. Concentrations from all samples were below laboratory detection limits. (Attachment B).

Hydrogeology of Site

Data collected regarding the hydrogeology of the site was used to create a conservative model of the remedy. More complete information about the hydrogeologic setting is included driller's logs for nearby wells (included in Attachment C) and in the model explanation, (see Attachment D).

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 60 feet below ground surface
- Ground water flows southeast under a regional hydraulic gradient of about 0.003 (see Plate 3)

Recommendations

Our recommended remedy includes:

- Installation of a liner at a depth of four-feet underneath the 30-foot by 30-foot area centered over the former site. Clean fill (with a chloride concentration below 500 mg/kg and PID (field parameter) reading less than 100 ppm) will be imported to replace excavated material above the liner.
- Upon completion of the liner installation, re-vegetate a 45-foot by 45-foot area centered east-west over the former excavation and adjacent to the road on the north to reduce infiltration (see Plate 4).

This remedy is protective of ground water quality, human health, and the environment. Vegetative cover 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 that for an identical bare area. For soil above the water table; hydraulic conductivity (the ability of a soil to transmit water) varies with the moisture content of the soil. Hence, installation of a vegetative ET barrier results in a considerably lowered migration rate of water and chloride to ground water.

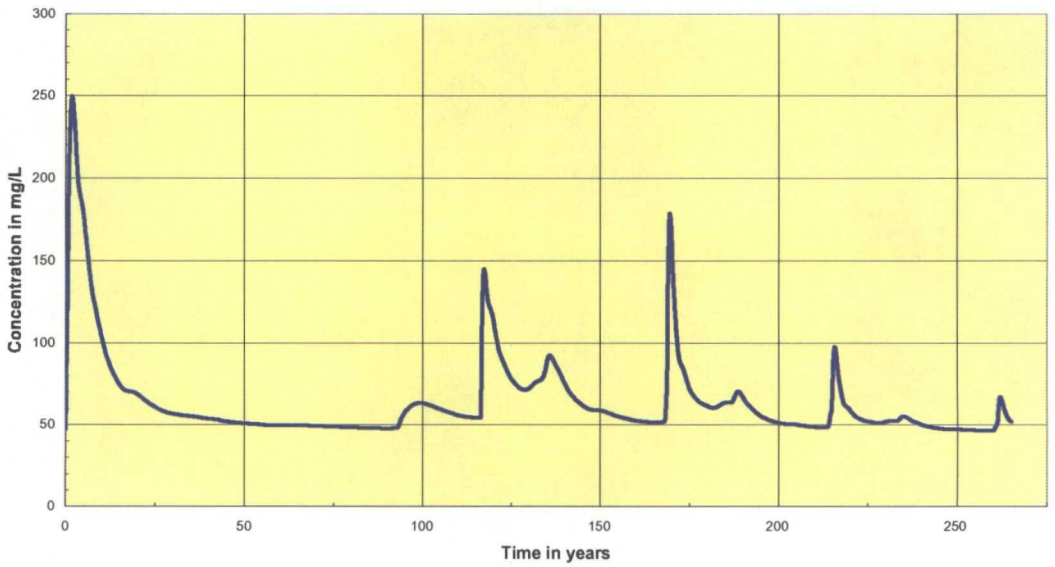
Installation of a liner beneath a vegetative ET barrier reduces water and chloride fluxes to ground water to negligible levels while the liner has integrity. As the liner develops tears and chemically degrades (likely decades to centuries after it was installed), downward movement of water and chloride beneath these areas increases to the rates equivalent to an area without a liner but with an ET barrier. The chloride beneath the disintegrating parts of a liner moves downwards to ground water before chloride underneath the intact parts of the liner. In this way, chloride from the site enters ground water at different times. The resulting chloride concentration in ground water is less than if chloride from the entire site enters ground water during a shorter time interval.

Model Simulation of the Remedy

Figure 1 is a graph of predicted chloride concentration in ground water at the down gradient edge of the site. Inputs to the model were site-specific for all inputs for which site data existed. For all unknown inputs, values were chosen so as to overstate predicted chloride concentration in ground water. Hence, by construction, the model is conservative of ground water quality. The liner was assumed to have complete integrity for 40-years and to completely degrade over the following 100-years. Therefore, the model has no liner after 140-years. Attachment D presents an explanation of all inputs and the resulting output of the site-specific model for the F-25 EOL site.

Figure 1

Chloride Concentration in the Aquifer at the F-25 Site. Liner is installed at a depth of 4-feet.



Conclusions

The site data that documents the residual mass of chloride and hydrocarbons in the vadose zone permit a conclusion that these constituents in the vadose zone will not with reasonable probability contaminate ground water or surface water in excess of the standards in Subsection B and C of the 19.15.30.9 NMAC through leaching, percolation or other transport mechanisms, or as the water table elevation fluctuates.

The remedy design for the site is the installation of a 30 x 30 foot synthetic liner 4-5 feet below ground surface centered over the former site and re-vegetation of an area 45 x 45 feet in size above the former site. Our recommended corrective action meets the mandate of NMOCD Rules for protection of surface water, ground water and the environment. The investigation demonstrates that with this remedy in place, residual chloride and hydrocarbons in the vadose zone will not with reasonable probability contaminate ground water or surface 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 elevation fluctuates. Upon documentation of installation of the liner and re-seeding of the site with an appropriate mix of native grasses we will submit a Termination Request for this site's regulatory file.

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. The Vacuum SWD system has been abandoned.

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.

Katie Lee

Katie Lee
Project Scientist

Copy: Hack Conder, Rice Operating Company

Attachment B

Corrective Actions

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 F-25 EOL**				Lease No.:		
U/L or Qtr/Qtr	Section	Township	Range	County	Latitude	Longitude (NAD83)
F	**25**	**17S**	**35E**	**LEA**	**32°48'29.089"N**	**103°24'56.824"W**
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 ☐		P&A Well ☐		Pit Closure ☐	Facility Closure ☒	Other ☐
OCD Spill No.		API No.			Type: **EOL BOX**	
Site size:		acres	**8892** 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: **SANDY TOPSOIL 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: **5 LBS SANDY SOIL MIX 7.5 LBS BLUE GRAMA 20 LBS RACEHORSE 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 SPREADER**	Hydroseeding ☐
Soil conditions during seeding:	Dry ☒	Damp ☐	Wet ☐
Photos attached ☒ Number of photos:	Observations: **SEED TILLED IN TO A DEPTH OF 4 INCHES**		

5. Additional Methods

Mulching ☒ Crimping ☐ Mulch type: **PEANUT HAY** Tons/acre: **2 BALES**		Fertilizer ☐ Type: Lbs/acre:	Other ☒ Describe: **9 BAGS (450 LBS) BIONHANCE TILLED INTO SOIL**
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 F-25 EOL
Unit F, Section 25, T17S, R35E

excavating the site to 40x30x4.5-ft bgs, facing north

excavation complete, facing north

padding the bottom of the excavation with 6 inches of blow sand, facing southwest

30x40 ft, 20-mil, reinforced liner installed at 4 ft bgs, facing northeast

hauling off excavated soil, facing south

6 inch blow sand pad above the liner, facing northeast

backfilling the excavation,
facing east

repairing the lease road,
facing north

importing blow sand, facing east

spreading peanut hay and bioNhance on the
backfilled site, facing southwest

seeding the backfilled area,
facing west

site complete,
facing southeast

CARDINAL Laboratories

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

May 13, 2011

Hack Conder

Rice Operating Company

112 W. Taylor

Hobbs, NM 88240

RE: VACUUM F-25 EOL

Enclosed are the results of analyses for samples received by the laboratory on 05/12/11 10:05.

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:	05/12/2011	Sampling Date:	05/11/2011
Reported:	05/13/2011	Sampling Type:	Soil
Project Name:	VACUUM F-25 EOL	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	VACUUM F-25 EOL		

Sample ID: IMPORTED SOIL TO PAD LINER (H100959-01)

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	05/13/2011	ND	448	112	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 F-25 EOL	**State:** **Zip:**
Project Location: Vacuum F-25 EOL	**Phone #:**
Sampler Name: Jordan Woodfin	**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					
H10959-1	imported soil to pad the liner	G	1			✓							5/11/11	03:00	✓									

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: Jordan Woodfin	**Date:** 5/12/11 **Time:** 7:30	**Received By:**	
Relinquished By:	**Date:** 5/12/11 **Time:** 10:05	**Received By:** Jodi Henson	
Delivered By: (Circle One) Sampler - UPS - Bus - Other:	**Sample Condition** Cool: ☑ Yes ☐ No Intact: ☑ Yes ☐ No	**CHECKED BY: (Initials)** CHH	

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

email results

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

#26

NEED SAMPLES BACK, PLEASE

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
	X	MODEL: PGM 7320	SERIAL NO: 592-903318
		MODEL: PGM 7300	SERIAL NO: 590-000183

GAS COMPOSITION: ISOBUTYLENE 100PPM / AIR: BALANCE

LOT NO : 927041	EXPIRATION DATE: 11-16-12
METER READING ACCURACY: 100	

ACCURACY : +/- 2%

COMPANY
Rice Operating

SYSTEM	JUNCTION	UNIT	SECTION	TOWN SHIP	RANGE
Vacuum	F-25 EOL	F	25	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.

SIGNATURE: Jordan Wood DATE: 5-11-11

CARDINAL Laboratories

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

May 17, 2011

Bruce Baker

Rice Operating Company

112 W. Taylor

Hobbs, NM 88240

RE: VACUUM F-25 EOL

Enclosed are the results of analyses for samples received by the laboratory on 05/16/11 8:10.

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:	05/16/2011	Sampling Date:	05/13/2011
Reported:	05/17/2011	Sampling Type:	Soil
Project Name:	VACUUM F-25 EOL	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	VACUUM F-25 EOL		

Sample ID: IMPORTED CALICHE (H100997-01)

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	05/16/2011	ND	432	108	400	0.00	

Sample ID: IMPORTED BLOW SAND (H100997-02)

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	05/16/2011	ND	432	108	400	0.00	

Sample ID: IMPORTED POND BTM SOIL (H100997-03)

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	05/16/2011	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:	Vacuum F-25 EOR
Sampler Name:	Robert Egans

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	+/-
H1DD997															
1	Imported Caliche	C	1			✓					✓		5-13-11		✓
2	Imported Blow Sand	C	1			✓					✓		5-13-11		✓
3	Imported Pond Bottom Soil	C	1			✓					✓		5-13-11		✓

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: 5/16/11 Time: 1430	Received By:	Phone Result: ☐ Yes ☐ No Add'l Phone #
Relinquished By:	Date: 5/16/11 Time: 8:10	Received By: Jodi Henson	Fax Result: ☐ Yes ☐ No Add'l Fax #:
Delivered By: (Circle One)	Sample Condition: Cool ☑ Yes ☐ No; Intact ☑ Yes ☐ No	CHECKED BY (Initials)	REMARKS:
Sampler - UPS - Bus - Other:			

† Cardinal cannot accept verbal changes. Please fax written changes to 575-393-2476

420

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 : 930737	EXPIRATION DATE: 6-16-2013
FILL DATE:	METER READING ACCURACY: 100

ACCURACY : +/- 2%

SYSTEM	JUNCTION	UNIT	SECTION	TOWN SHIP	RANGE
Vacuum	F-25 EOL	F	25	17S	35E

SAMPLE ID	PID	SAMPLE ID	PID
IMPORTED Caliche	2.7		
IMPORTED Pond Bottom	0.8		
IMPORTED Blow Sand	1.6		

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

SIGNATUE: Robert Evans DATE: 5-13-2011