1R - 425-36

WORKPLANS

Date:

1-6-11

Hansen, Edward J., EMNRD

From: Katie Lee [katie@rthicksconsult.com]
Sent: Monday, February 21, 2011 5:22 PM
To: Hansen, Edward J., EMNRD
Cc: 'Katie Jones'; Hack Conder; 'David Hamilton'
Subject: CAP Addendum, Vacuum C-33, 1R425-36
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 following work:~~

- 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 chloride concentration below 500 mg/kg and a PID (field) reading below 100 ppm will be imported to replace excavated 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-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.

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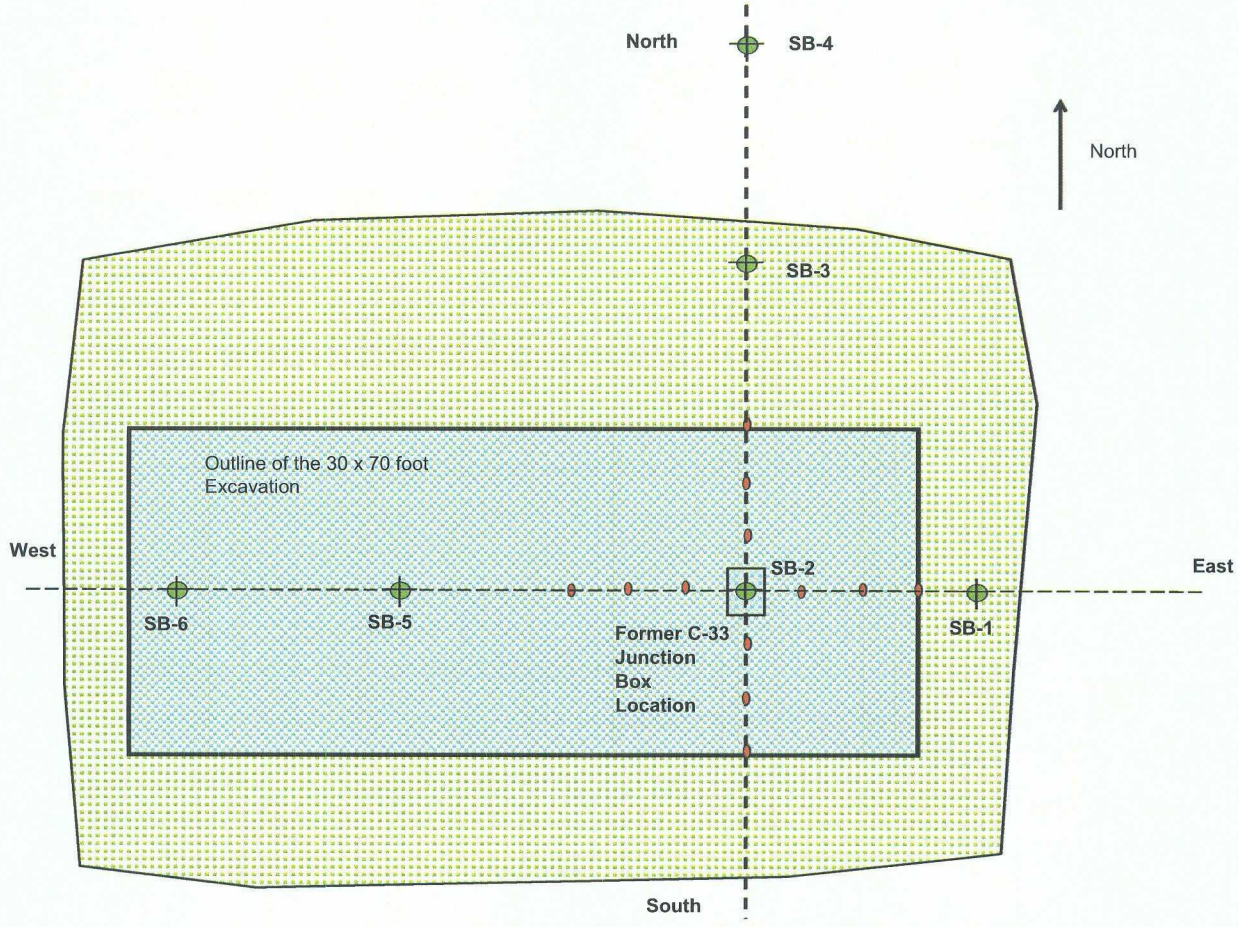
Trench and Boring Locations and Remedy Plan	Client: Rice Operating Company	Location: Section 33, T17S, R35E
	Project Name: Vacuum C-33 Boot	



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

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.

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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	--
			Protect GW (DAF_{20})		0.0201	21.7	20.2	2.06	--
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.

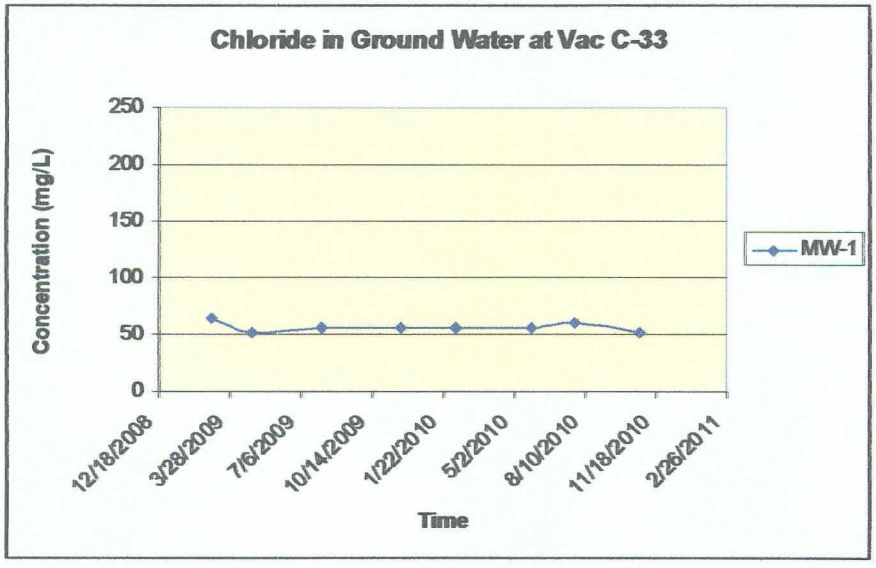
Conclusions

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

Plates

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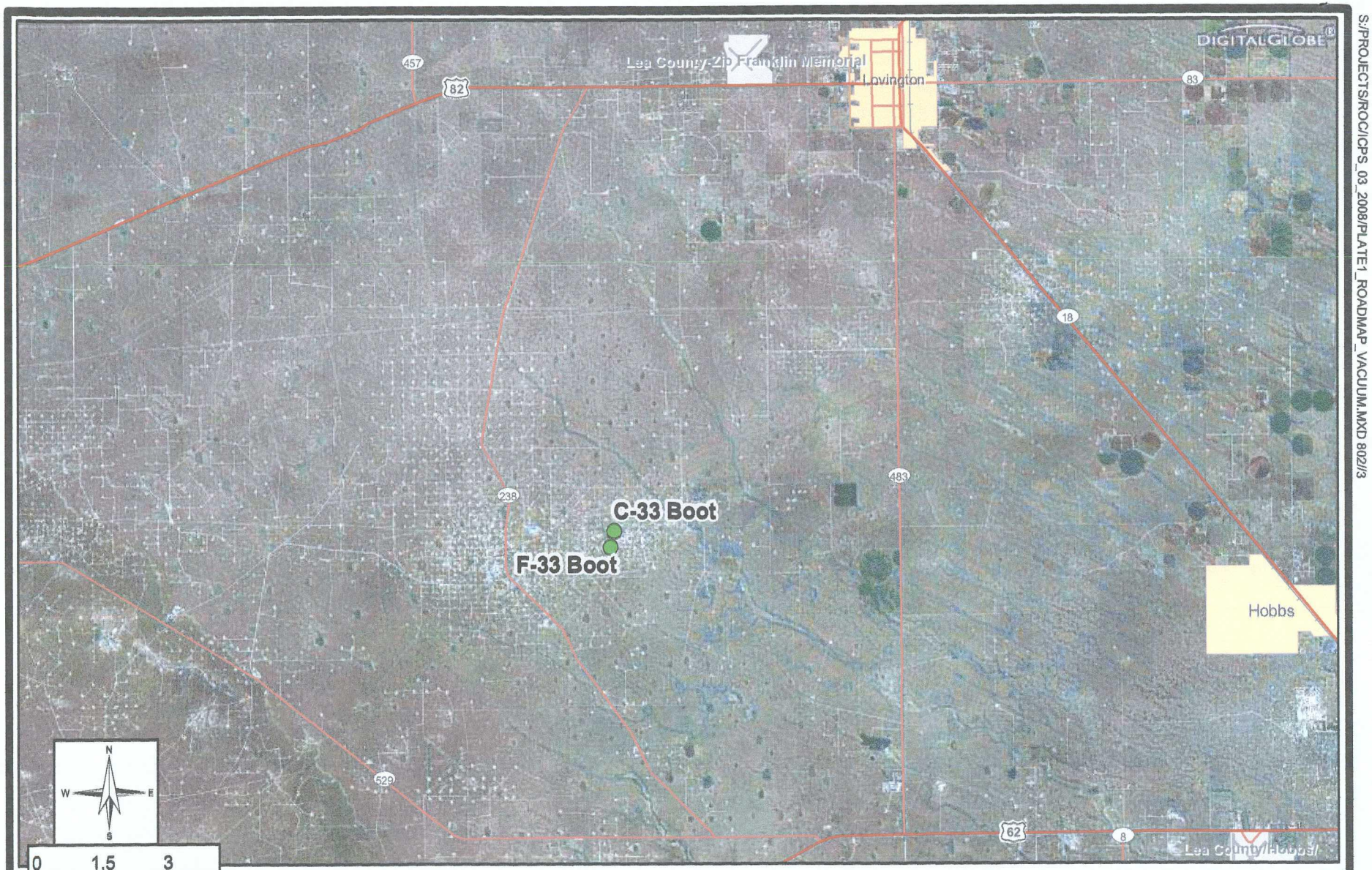

Explanation

- ICP Site (Vacuum System)

R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Site Environs near the Vacuum System	Plate 1
	Rice Operating Company: Initial Characterization Plan Vacuum System	Oct. 2010

S:/PROJECTS/ROC/ICPS_03_2008/PLATE1_ROADMAP_VACUUM.MXD 802/3

3/6/2008

Chloride Concentration Profiles arranged as South-North and West-East Cross Sections. SB-2, drilled through the former Junction Box, is common to both.

Client: Rice Operating Company

Project Name: Vacuum C-33 Boot

Location: Section 33,T17S, R35E

South — North

Depth [feet]	15' S of JB	10' S of JB	5' S of JB	SB2 (center)	5' N of JB	10' N of JB	15' N of JB	SB3 30' North	SB4 50' North
1	1,070	2,507				1,129	1,575		
2	915	1,949				1,456	2,218		
3	988	1,340				1,093	1,651		
4	737	2,111	2,998			4,286	1,116		
5	984	1,158	2,645	3,753		5,212	1,707	1,909	247
6	672	975	2,472						
7	879	488	2,179		1,346	7,452	3,462		
8	914	495	1,506		2,480	9,635	6,428		
9	343	333	1,918		908	5,043	10,572		
10	1,459	647	1,436	1,589	1,264	4,267	8,500	1,022	369
11	196	680	516		982	4,550	9,375		
12	366	758	2,385		1,114	2,931	8,021		
15				664				541	241
20				630				1,464	277
25				865					
30				6,991					
35				3,045					
40				6,118					
45				574					
50				5,635					
55				6,300					
60				5,732					
65				4,420					
70				2,175					

West — East

Depth [feet]	SB-6: 50' West of JB	SB 5: 30' West of JB	15' W of JB	10' W of JB	5' W of JB	SB2 (center)	5' E of JB	10' E of JB	15' E of JB	SB1 20' East
1										
2										
3										
4										
5	2,565	9,447	1,147	1,625		3,753		4,348	776	390
6										
7			1,309	6,558	3,186		6,049	7,086	1,884	
8			986	8,100	4,356		5,621	8,395	394	
9			2,124	8,439	14,286		7,027	7,010	926	
10	1,026	2,301	6,424	9,685	8,656	1,589	6,656	4,984	959	321
11			5,640	2,931	6,462		9,747	2,674	2,186	
12			2,354	9,723	6,606		16,379	3,125	4,287	
15	4,376	2,271				664				1,992
20	6,346	4,818				630				2,508
25						865				4,864
30						6,991				2,030
35						3,045				1,567
40						6,118				1,780
45						574				845
50						5,635				1,839
55						6,300				1,849
60						5,732				1,601
65						4,420				
70						2,175				

Chloride Concentration Scale in [mg/kg]
> 8000
8000-8000
8000 - 5000
5000 -4000
3000 -4000
2000 -3000
1000 - 2000
<1000

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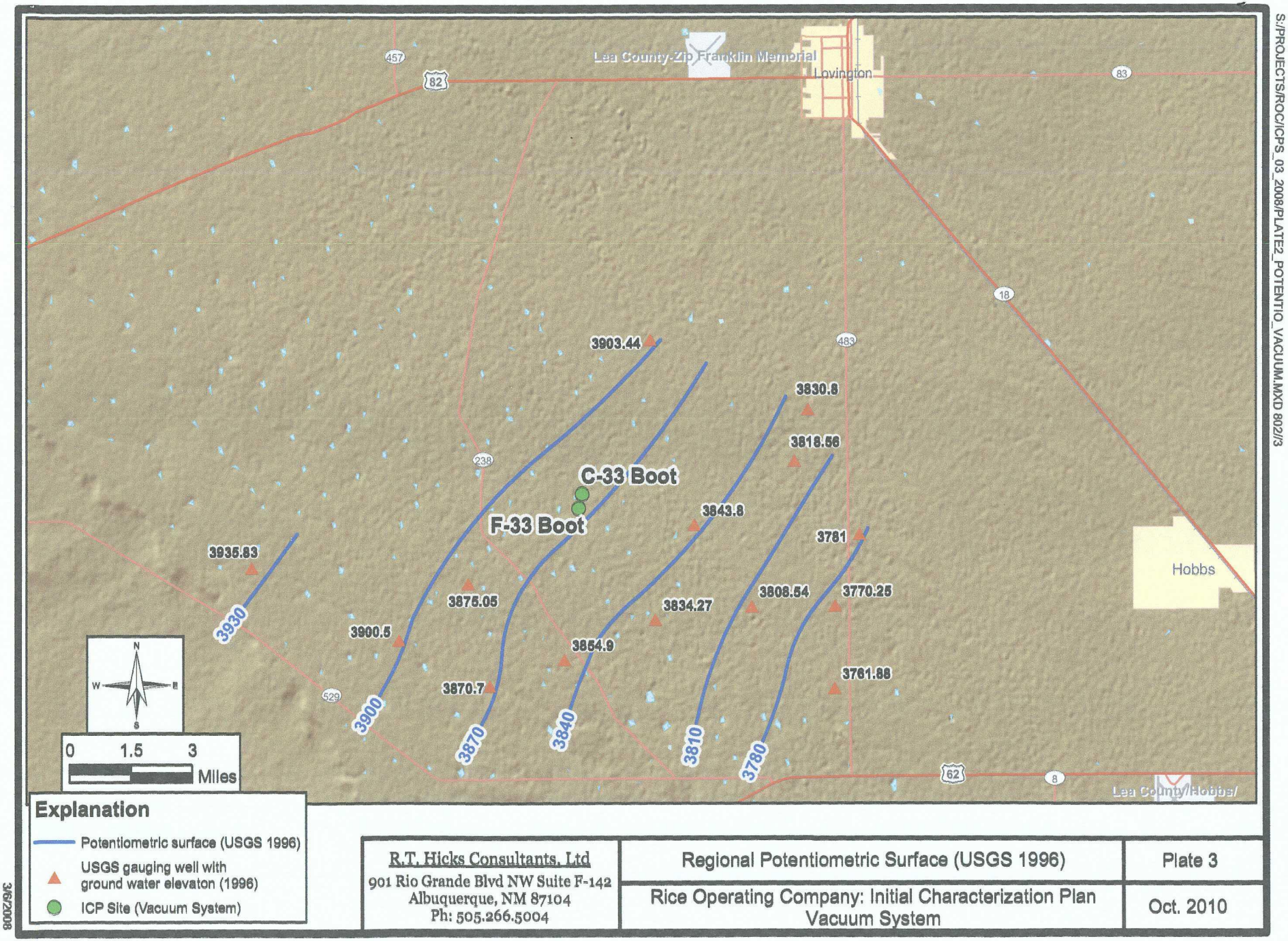
Vacuum C-33 Boot

Plate 2

October, 2010



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Regional Potentiometric Surface (USGS 1996)	Plate 3
Rice Operating Company: Initial Characterization Plan Vacuum System	Oct. 2010

S:/PROJECTS/ROC/ICPS_03_2008/PLATE2_POTENTIO_VACUUM.MXD 802/3

3/6/2008

0 1000 2000ft

N
W E
S

R.T. Hicks Consultants, Ltd	Chloride in Ground Water (mg/L)	Plate 4
	ROC: Vacuum C-33	Oct 2010

N
W
E
S

0 100 200 Feet

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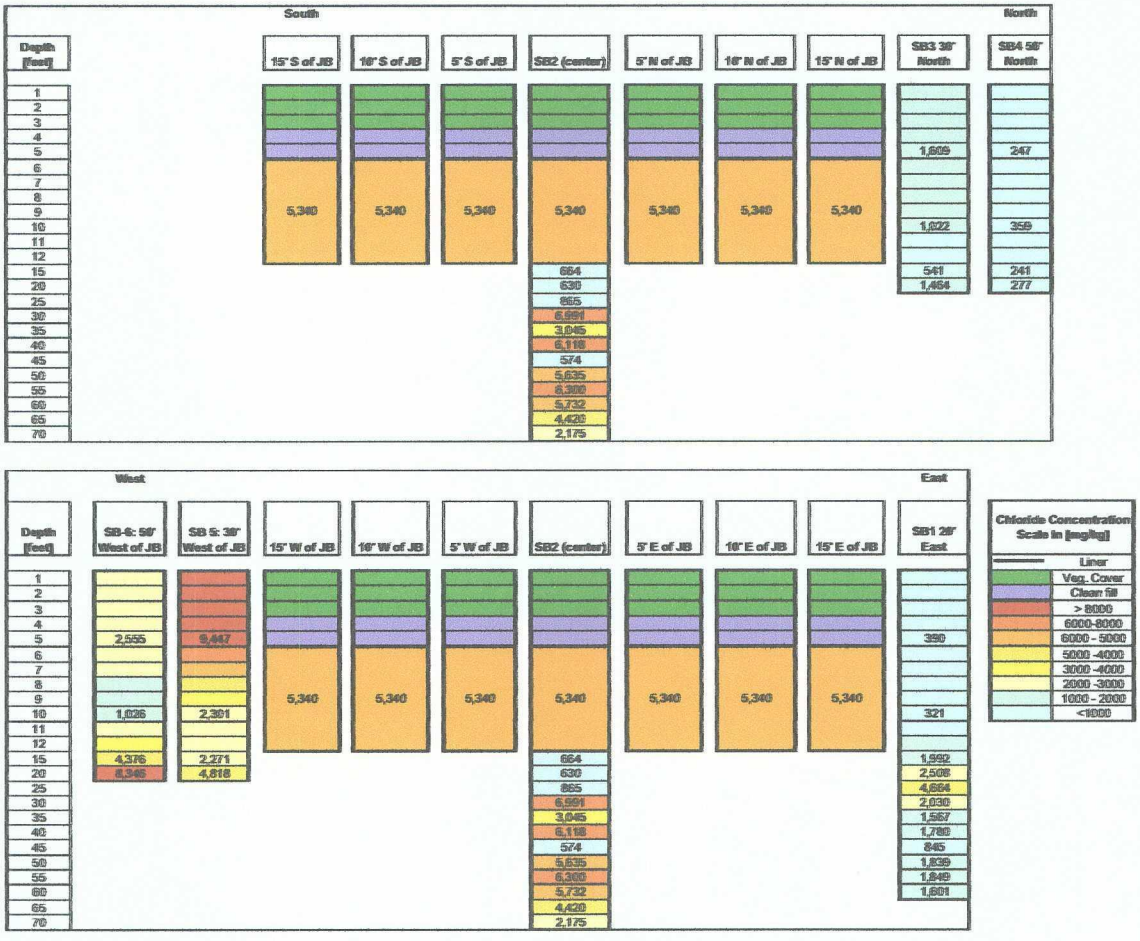
Historic Aerial Photos (RGIS) | PLATE 5

ROC: C-33 Boot Vacuum | Oct. 2010

3/16/2009

S:/PROJECTS/ROC/VACUUM_C33_BOOT/HISTORIC_TILE.MXD

Chloride Concentration Profiles arranged as South-North and West-East Cross Sections. Excavated Material replaced with clean fill is shown in purple. Vegetative Cap shown in green. Blended fill has Chl. Conc. of 5,340 mg/kg.	Client: Rice Operating Company Project Name: Vacuum C-33 Boot	Location: Section 33,T17S, R35E



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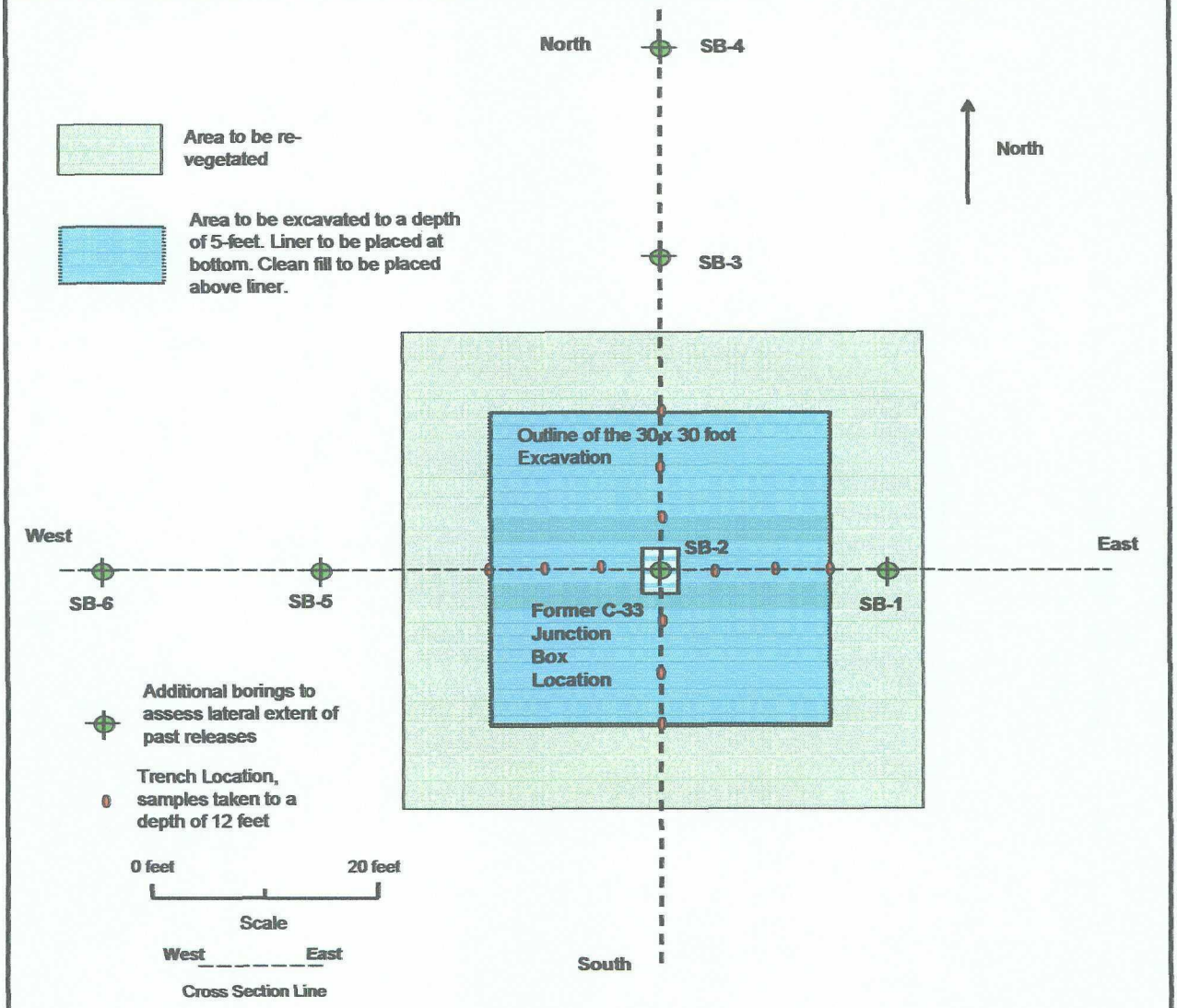
Trench and Boring Locations and Remedy Plan	Client: Rice Operating Company	Location: Section 33, T17S, R35E
	Project Name: Vacuum C-33 Boot	



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Tables

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

Table 1a. Field Results for Chloride and Volatile Organic Constituents in Trenches at the source, north and east of the former Junction Box Location

Depth	At former Junction Box (source)	5' N of JB	10' N of JB	15' N of JB	5' E of JB	10' E of JB	15' E of JB
feet, bgs	Chloride titration, mg/kg						
1	not taken	not taken	1,129	1,575	not taken	7,485	3,077
2			1,456	2,218		2,980	657
3			1,093	1,851		2,517	379
4			4,286	1,116		3,529	1,063
5			5,212	1,707		4,348	776
6			6,629	1,518		7,096	681
7	1,710	1,346	7,452	3,462	6,049	7,086	1,884
8	2,376	2,480	9,835	6,428	5,621	8,365	394
9	1,570	908	5,043	10,572	7,027	7,010	926
10	2,546	1,284	4,297	8,500	6,568	4,584	959
11	1,177	952	4,550	9,373	9,747	2,674	2,186
12	1,119	1,114	2,931	8,621	16,379	3,125	4,287
Depth	PID, ppm						
1	not taken	not taken	7.7	36.1	not taken	12.1	3.4
2			7.2	43.7		11.4	0
3			0.0	20.7		7.2	0
4			173	18.0		49.4	0
5			330	15.9		142	0
6			301	15.1		260	0
7	102	150	443	66.7	297	376	0
8	155	614	631	145	408	433	0
9	215	585	761	382	599	389	0
10	230	601	815	285	435	181	0
11	212	549	830	340	479	438	9.6
12	370	997	897	270	625	916	54.3

Table 1b. Field Results for Chloride and Volatile Organic Constituents in Trenches south and west of the former Junction Box Location

Depth	5' S of JB	10' S of JB	15' S of JB	5' W of JB	10' W of JB	15' W of JB
feet, bgs	Chloride titration, mg/kg					
1	not taken	2,507	1,070	not taken	1,249	1,629
2		1,949	915		1,274	1,217
3		1,340	968		1,539	1,970
4	2,998	2,111	737		4,991	1,147
5	2,645	1,158	964		1,625	1,147
6	2,472	975	672		2,361	1,405
7	2,179	486	876	3,166	6,558	1,309
8	1,506	485	914	4,356	8,100	986
9	1,918	333	343	14,265	8,439	2,124
10	1,436	647	1,458	6,668	9,685	6,424
11	516	680	196	6,462	2,931	5,540
12	2,385	758	366	6,608	9,723	2,354
Depth	PID, ppm					
1	not taken	43.3	0	not taken	26.6	0
2		30	0		38.5	0
3		28.1	7.8		117	193
4	28.5	31.6	0		582	14.2
5	14.8	32	0		721	128
6	6.2	14.8	0		1,224	566
7	7.6	26.4	0	229	1,234	742
8	10.3	15.4	0	359	1,080	741
9	8.7	12.4	0	888	1,199	815
10	7.6	70.2	0	1,120	1,380	1,174
11	10.7	239	0	1,229	1,477	1,075
12	96.1	196	0	1,013	1,468	1,070

Table 2a. Field and Laboratory Results for Chloride and Volatile Organic Constituents in from MW-1, SB-1 and SB-2 at the former Junction Box Site.

	MW-1		SB-1			SB-2		
Depth	Chloride in [mg/kg]	PID [ppm]	Chloride in [mg/kg]		PID [ppm]	Chloride in [mg/kg]		PID [ppm]
[feet]	Field Titration		Field Titration	Laboratory Data		Field Titration	Laboratory Data	
4.0	232	1.0	390		0.3	3,760		34
10.0	178	0.6	453		0.2	1,590		152
14.0	186	0.3	1,993		0.1	664		134
20.0	779	0.2	2,508		0	629		371
24.0	2,596	0.2	4,672	5,440	-	865	1,100	609
30.0	1,328	0.3	2,029		-	7,002	7,520	88
34.0	1,170	0.1	1,566		-	3,041		22.6
40.0	234	0.2	1,780		-	6,115		9.6
44.0	138	0.3	845		-	574		18.3
50.0	181	0.2	1,840		-	5,645		5.6
54.0	181	0.1	1,784		-	6,371		3.1
60.0	167	0.1	1,605	1,730	-	5,764		3.1
64.0	Not Taken		Not taken			4,415	4,640	3.5
70.0						2,176		1.9

Table 2b. Field and Laboratory Results for Chloride and Volatile Organic Constituents from SB-3 and SB-4 at the former Junction Box Site.

	SB-3			SB-4		
Depth	Chloride in [mg/kg]		PID [ppm]	Chloride in [mg/kg]		PID [ppm]
[feet]	Field Titration	Laboratory Data		Field Titration	Laboratory Data	
4.0	1,609		0.5	247		0.4
10.0	1,022		0.5	359	224	0.3
14.0	541		0.5	241		0.2
20.0	1,466	1,410	0.1	277		0.2

Table 2c. Field and Laboratory Results for Chloride and Volatile Organic Constituents from SB-5 and SB-6 at the former Junction Box Site.

	SB-5			SB-6		
Depth	Chloride in [mg/kg]			Chloride in [mg/kg]		
[feet]	Field Titration	Laboratory Data	PID [ppm]	Field Titration	Laboratory Data	PID [ppm]
4.0	9,447	11,400	127	2,558		0.4
10.0	2,300		37	1,027		0.3
14.0	2,271		51	4,370		0.2
20.0	4,823		4.1	8,338	10,600	0.1

Appendix A

Junction Box Characterization Results

Approved March 2008 ICP

R.T. Hicks Consultants, Ltd.

901 Rio Grande Blvd. NW, Suite F-142
Albuquerque, NM 87104

RICE OPERATING COMPANY
JUNCTION BOX **DISCLOSURE*** REPORT

BOX LOCATION

SWD SYSTEM	JUNCTION	UNIT	SECTION	TOWNSHIP	RANGE	COUNTY	NEW BOX DIMENSIONS - FEET		
							Length	Width	Depth
Vacuum	C-33 boot	C	33	17S	35E	Lea	no box: System abandonment		

LAND TYPE: BLM ____ STATE X FEE LANDOWNER ____ OTHER ____

Depth to Groundwater 85 feet NMOCD SITE ASSESSMENT RANKING SCORE: 10

Date Started 8/30/2007 Date Completed 10/5/2007 NMOCD Witness n/a

Soil Excavated 400 cubic yards Excavation Length 30 Width 30 Depth 12 feet

Soil Disposed 0 cubic yards Offsite Facility n/a Location n/a

FINAL ANALYTICAL RESULTS: Sample Date 9/13/2007, 9/14/2007 Sample Depth 12 ft

5-point composite sample of bottom and 4-point composite sample of excavation sidewalls. TPH, BTEX, and chloride laboratory test results completed by using an approved laboratory and testing procedures pursuant to NMOCD guidelines.

Sample Location	Benzene mg/kg	Toluene mg/kg	Ethyl Benzene mg/kg	Total Xylenes mg/kg	GRO mg/kg	DRO mg/kg	Chlorides mg/kg
4-WALL COMP.	PID = 97.3 (field reading)				<10.0	537	6140
BOTTOM COMP.	0.007	0.022	0.040	0.337	234	4370	4510
BACKFILL	<0.025	0.110	0.249	1.49	17.2	1090	5340

General Description of Remedial Action:

This junction was addressed as part of the Vacuum SWD System abandonment. After the junction box was removed, the site was delineated using a backhoe to collect soil samples at regular intervals producing a 30 x 30 x 12-ft-deep excavation. Organic vapors in the soil were measured using a PID which yielded slightly elevated concentrations in some areas. Chloride field tests were performed on each sample and yielded elevated concentrations which generally did not relent with depth. Composite samples were collected from the excavation bottom, walls, and excavated soil for laboratory confirmation of chloride, TPH, and BTEX concentrations. The excavated soil was blended on site and then returned to the excavation and contoured to the surrounding surface. An identification plate was placed on the surface of the backfilled site to mark the location of the former junction for future environmental consideration. R.T. Hicks Consultants of Albuquerque have been assigned to this project. OCD was notified of potential groundwater impact of this site on 12/20/2007.

enclosures: photos, lab results, PID field screenings, chloride graph, BTEX comparison table

CHLORIDE FIELD TESTS

LOCATION	DEPTH ft	ppm
15 ft NORTH of former junction	1	1575
	2	2218
	3	1851
	4	1116
	5	1707
	6	1518
	7	3462
	8	6428
	9	10572
	10	8500
	11	9373
	12	8621
4-wall comp.	n/a	4004
bottom comp.	12	3129
backfill comp.	n/a	3838

I HEREBY CERTIFY THAT THE INFORMATION ABOVE IS TRUE AND COMPLETE TO THE BEST OF MY KNOWLEDGE AND BELIEF.

SITE SUPERVISOR Roy Rascon SIGNATURE Roy R Rascon COMPANY RICE Operating Company

REPORT ASSEMBLED BY Kristin Farmer Pope SIGNATURE Kristin Farmer Pope

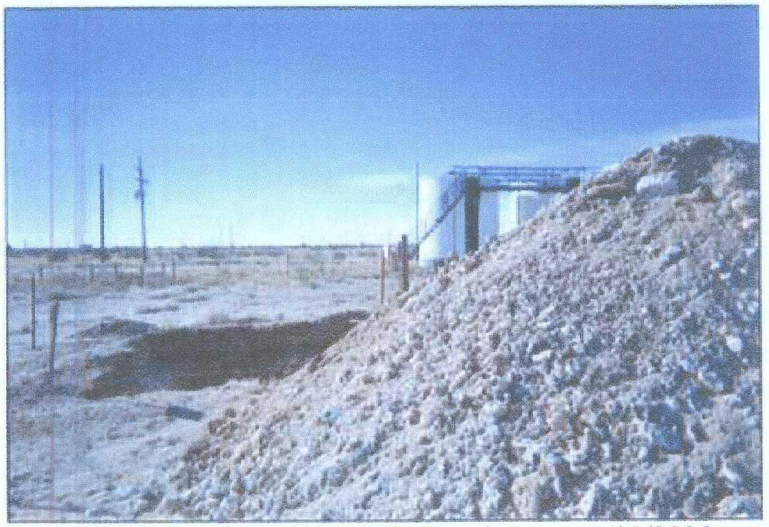
DATE 12/19/2007 TITLE Project Scientist

** This site is a "DISCLOSURE." It will be placed on a prioritized list of similar sites for further consideration.*

Vacuum C-33 boot

unit C, Section 33, T17S, R35E

undisturbed junction box prior to excavation 11/8/2005



box removed; NORM decontamination 1/30/2006

final 30 x 30 x 12-ft excavation 9/12/2007

identification plate at surface of backfilled site marking former junction 10/11/2007

backfilled excavation with identification plate 10/11/2007

CARDINAL LABORATORIES

PHONE (915) 673-7001 • 2111 BEECHWOOD • ABILENE, TX 79603
PHONE (505) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

RECEIVED
SEP 20 2007
RICE OPERATING
HOBBS NM

ANALYTICAL RESULTS FOR
RICE OPERATING CO.
ATTN: ROY R. RASCON
122 W. TAYLOR
HOBBS, NM 88240
FAX TO: (505) 397-1471

Receiving Date: 09/14/07
Reporting Date: 09/17/07
Project Number: NOT GIVEN
Project Name: VAC JCT C-33 BOOT
Project Location: NOT GIVEN

Sampling Date: 09/13/07 & 09/14/07
Sample Type: SOIL
Sample Condition: COOL & INTACT
Sample Received By: SB
Analyzed By: BC/KS

LAB NO.	SAMPLE ID	GRO (C_6-C_{10}) (mg/Kg)	DRO (>C_{10}-C_{28}) (mg/Kg)	Cl* (mg/Kg)
ANALYSIS DATE		09/14/07	09/14/07	09/17/07
H13299-1	5PT BTTM COMP @ 12'BGS	234	4370	4510
H13299-3	4-WALL COMP @ 30x30	<10.0	537	6140
H13299-4	BLENDED BACKFILL 20PT COMP	17.2	1090	5340
Quality Control		535	566	500
True Value QC		600	600	500
% Recovery		89.1	94.4	100
Relative Percent Difference		3.8	3.7	<0.1

METHODS: TPH GRO & DRO: EPA SW-846 8015 M; Cl: Std. Methods 4500-ClˉB
*Analyses performed on 1:4 w:v aqueous extracts.

Chemist

09/18/07
Date

H13299A RICE

CARDINAL LABORATORIES

PHONE (325) 673-7001 · 2111 BEECHWOOD · ABILENE, TX 79603
PHONE (505) 393-2326 · 101 E. MARLAND · HOBBS, NM 88240

ANALYTICAL RESULTS FOR
RICE OPERATING CO.
ATTN: ROY R. RASCON
122 WEST TAYLOR
HOBBS, NM 88240
FAX TO: (505) 397-1471

Receiving Date: 09/14/07
Reporting Date: 09/18/07
Project Number: NOT GIVEN
Project Name: VAC JCT C-33 BOOT
Project Location: NOT GIVEN

Sampling Date: 09/13/07 & 09/14/07
Sample Type: SOIL
Sample Condition: COOL & INTACT
Sample Received By: SB
Analyzed By: CK

LAB NUMBER	SAMPLE ID	BENZENE (mg/Kg)	TOLUENE (mg/Kg)	ETHYL BENZENE (mg/Kg)	TOTAL XYLENES (mg/Kg)
ANALYSIS DATE		09/14/07	09/14/07	09/14/07	09/14/07
H13299-1	5PT BTTM COMP @ 12' BGS	0.007	0.022	0.040	0.337
H13299-2	BTTM @ 12' SP-1 THRU SP-5	0.005	0.017	0.043	0.280
H13299-4	BLENDED BACKFILL 20 PT COMP	<0.025	0.110	0.249	1.49
Quality Control		0.102	0.094	0.094	0.283
True Value QC		0.100	0.100	0.100	0.300
% Recovery		102	93.6	93.5	94.4
Relative Percent Difference		1.1	1.4	1.5	1.3

METHOD: EPA SW-846 8021B

Chemist

09/18/07
Date

H13299 RICE

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 OPER. CO.	BILL TO
Project Manager: Roy R. Rascon	P.O. #:
Address: 122 W. TAYLOR	Company:
City: Hobbs State: NM Zip: 88240	Attn:
Phone #: 505-393-9174 Fax #: 505-397-1471	Address:
Project #: Project Owner:	City:
Project Name: VAC JCT C-33 Boot	State: Zip:
Project Location:	Phone #:
Sampler Name: Roy R. Rascon	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	Cl-	TPH 8015 M	BTEX	ANALYSIS REQUEST
H13299-1	SPT BTM Comp @ 12' BGS	C	1			✓					✓		9-13-07	1100	✓	✓	✓	
2	BTM @ 12' SP#1	G	1			✓					✓		9-13-07	1045				COMPOSITE SAMPLES BTM @ 12' SP#1 thru 5 TN LAB to RUN BTEX only
3	SP#2	G	1			✓					✓		9-13-07	1037				
4	SP#3	G	1			✓					✓		9-13-07	1030				
5	SP#4	G	1			✓					✓		9-13-07	1026				
6	SP#5	G	1			✓					✓		9-13-07	1015				
38	4-WALL COMP @ 30X30	C	1			✓					✓		9-13-07	1500	✓	✓		
48	Blended Backfill 20 PT Comp	C	1			✓					✓		9-14-07	1015	✓	✓	✓	

Relinquished By: Roy R Rascon	Date: 9-14-07 Time: 1320	Received By: Sue Barnes	
Relinquished By:	Date: Time:	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: Email to JPURUIS & RRASCON @ RICESWD.COM ok

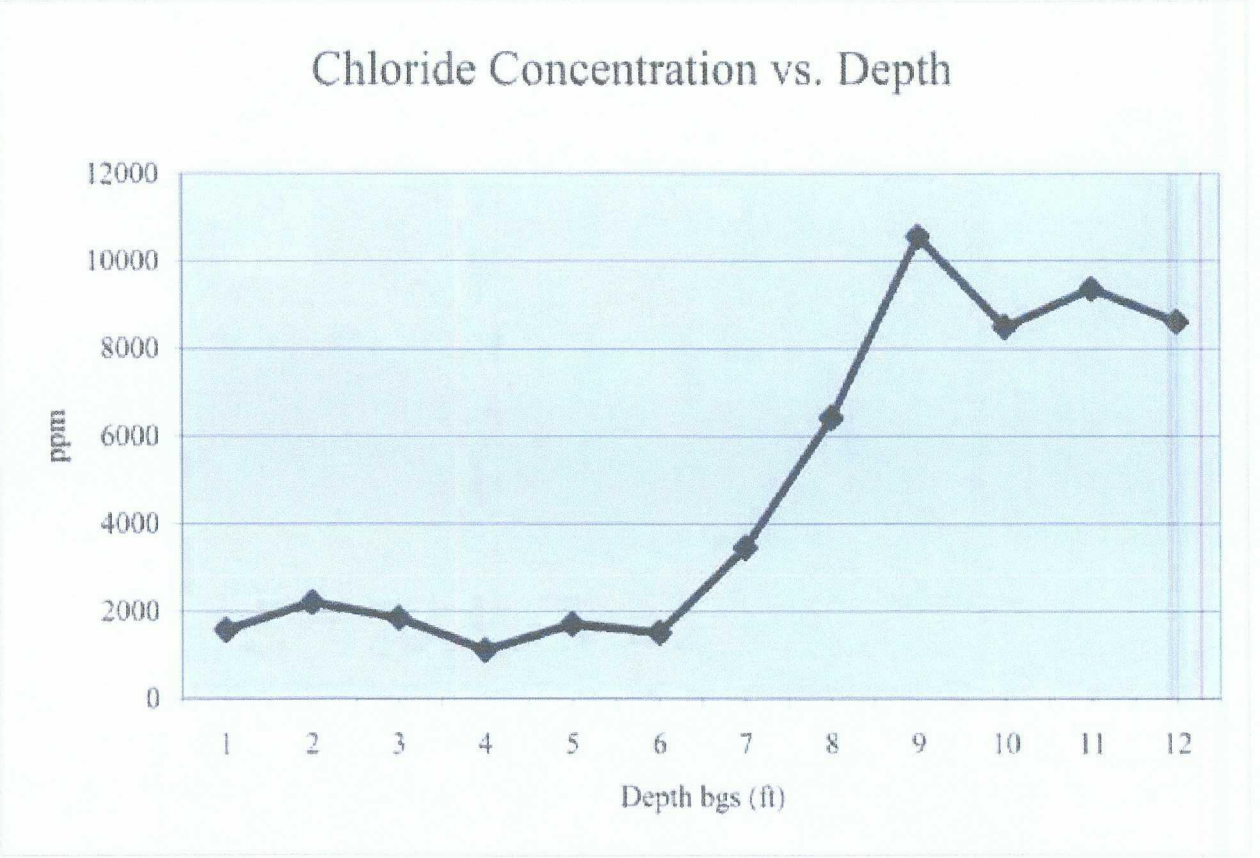
† Cardinal cannot accept verbal changes. Please fax written changes to 505-393-2476

Vacuum C-33 boot

unit 'C', Sec. 33, T17S, R35E

15 ft NORTH of former junction

Depth bgs (ft)	[Cl] ppm
1	1575
2	2218
3	1851
4	1116
5	1707
6	1518
7	3462
8	6428
9	10572
10	8500
11	9373
12	8621



Groundwater = 85 ft

2007 BTEX Study

Revised Junction Box Upgrade Plan (2003)

System: Vacuum
Site: C-33 boot
Date: *9/13/2007*
Sampler: Roy Rascon
Laboratory: Cardinal Laboratories

Location	Component	PID reading (ppm)	FIELD COMPOSITE (mg/kg)			
			Benzene	Toluene	Ethyl Benzene	Total Xylenes
bottom composite at 12 ft BGS	5 sample points	353	0.007	0.022	0.040	0.337
			LAB COMPOSITE (mg/kg)			
excavation dimesions 30 x 30 x 12 ft			0.005	0.017	0.043	0.280

Field PID tests <100 ppm are considered final for BTEX. If PID is >100 ppm, the components of the BTEX composite sample will be collected individually and will be composited under laboratory conditions to prevent excessive volatilization. A 15-box, 30-sample study will be made to compare field-compositing with lab-compositing BTEX samples. Composite components are collected in a skewed 'W' pattern.

Revised Junction Box Upgrade Work Plan (July 16, 2003)

RICE OPERATING COMPANY

122 West Tayor Hobbs, NM 88240
PHONE: (505) 393-9174 FAX: (505) 397-1471

PID METER CALIBRATION & FIELD REPORT FORM

CK. MODEL NO.	
	X

MODEL: PGM 7600 SERIAL NO: 110-013676
MODEL: PGM 7600 SERIAL NO: 110-013744
MODEL: PGM 7600 SERIAL NO: 110-012383
MODEL: PGM 7600 SERIAL NO: 110-012920

GAS COMPOSITION: ISOBUTYLENE 100PPM / AIR: BALANCE

LOT NO : 07-3264	EXPIRATION DATE: 1-18-09
FILL DATE: 7-18-07	METER READING ACCURACY: 100.0

ACCURACY : +/- 2%

SYSTEM	JUNCTION	UNIT	SECTION	TOWN SHIP	RANGE
VAC	C-33 BOOT	C	33	17S	35E

SAMPLE ID	PID	SAMPLE ID	PID
9-13-07 W wall 5pt SP#1	234		
#2	20.3		
#3	417		
#4	138		
#5	18.8		
W wall 5pt comp.	236		
9-13-07 4-wall comp @ 30x30x12	97.3		
9-14-07 blended backfill	127		

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

SIGNATUE: Roy R. Rapstine DATE: 9-14-07

R. T. HICKS CONSULTANTS, LTD.

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

March 17, 2008

Mr. Edward Hansen
New Mexico Oil Conservation Division
1220 South St. Francis Drive
Santa Fe, New Mexico 87505

RE: Investigation Characterization Plan:
Vacuum Salt Water Disposal System: F-33 Boot, C-33 Boot
T17S, R35E, Section 33

Dear Mr. Hansen:

On behalf of Rice Operating Company (ROC), R.T. Hicks Consultants, Ltd. is pleased to submit this Investigation Characterization Plan (ICP) for the above- referenced sites within the Vacuum Salt Water Disposal System. Plate 1 is a map showing the sites relative to major roads in the area, nearby ROC sites and nearby USGS monitoring wells. GPS coordinates for the site are approximately: 32° 47' 48.79" N, 103° 27' 56.63" W (C-33) and 32° 47' 35.44" N, 103° 27' 55.46"W (F-33).

Both sites were initially addressed as part of Vacuum System abandonment and excavated to 30L x 30W x 12D feet and backfilled with blended dirt to the surface. 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 following work elements are either complete or proposed to characterize this site sufficiently to develop an appropriate corrective action plan:

1. ROC has identified and documented the location of all current and historic equipment and pipelines associated with the site.
2. ROC has conducted initial trench sampling adjacent to the former junction boxes.
3. ROC and Hicks Consultants will use a drilling rig to install one soil boring at the center of the source area to delineate the vertical extent of chloride in the soil.
4. Soil samples employed for delineation will be obtained from regular intervals below ground surface in each boring, if possible from split spoon samples at 5-foot intervals.
5. If field analysis of hydrocarbon vapors and observations of staining show that hydrocarbon impact is unlikely at the site or below 20-feet, collection of samples from cuttings may be substituted for split spoon sampling (chloride only).
6. A representative number of the soil samples will be sent to a laboratory to allow for verification of the field results.

7. General soil texture descriptions will be provided for each sample boring.
8. The criteria to delineate the maximum vertical extent of impact is the shallowest of the following:
   a. After three consecutive samples demonstrate <250 ppm chloride using field analyses and <100ppm total hydrocarbon vapors using the headspace method (see attached ROC Quality Procedure in Appendix A), or
   b. After five consecutive samples show a decreasing trend of chloride and hydrocarbons and the last sample shows chloride < 250 ppm and total hydrocarbon vapors <100 ppm (Appendix A).
   c. Soil boring to capillary fringe should neither (a) or (b) apply
9. If the boring penetrates the capillary fringe, a monitoring well will be completed with a 2 or 4" diameter 25 feet down gradient from the source for use during possible corrective actions. Plate 2 presents a potentiometric surface map for the site area.

The ROC trench characterization has not identified the lateral extent of chloride at either site. Plates 3 and 4 present figures showing the excavation, locations of previous trenching activities, and our proposed borings to complete lateral characterization at each site. These borehole locations have been selected because they are 20 feet beyond the furthest trenches where the soil data has an average chloride concentration greater than 1,000 mg/kg. The total depth of borings installed to characterize lateral extent shall be 20 feet below ground surface with soil samples for delineation taken at 5 foot intervals.

Rice Operating Company (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 who own the Vacuum System (System Partners) provide all operating capital on a percentage ownership/usage basis. Major projects require System Partner authorization for expenditures (AFE) approval and work begins as funds are received. We will implement the work outlined herein after NMOCD approval and subsequent authorization from the System Partners. The Vacuum SWD system is in abandonment.

For all environmental projects, ROC will choose a path forward that:

1. Protects public health.
2. Provides the greatest net environmental benefit.
3. Complies with NMOCD Rules.
4. Is supported by good science.

The last criteria employed when evaluating any proposed remedy or investigative work is confirming that there is a reasonable relationship between the benefits created by the proposed remedy or assessment and the economic and social costs.

Each site shall have three submissions or a combination of:

1. This Investigation and Characterization Plan (ICP), which is a proposal for data gathering, and site characterization and assessment (this submission).
2. Upon evaluation of the data and results from the ICP, a recommended remedy will be submitted in a Corrective Action Plan (CAP).
3. Finally, after implementing the remedy, a closure report with final documentation will be submitted.

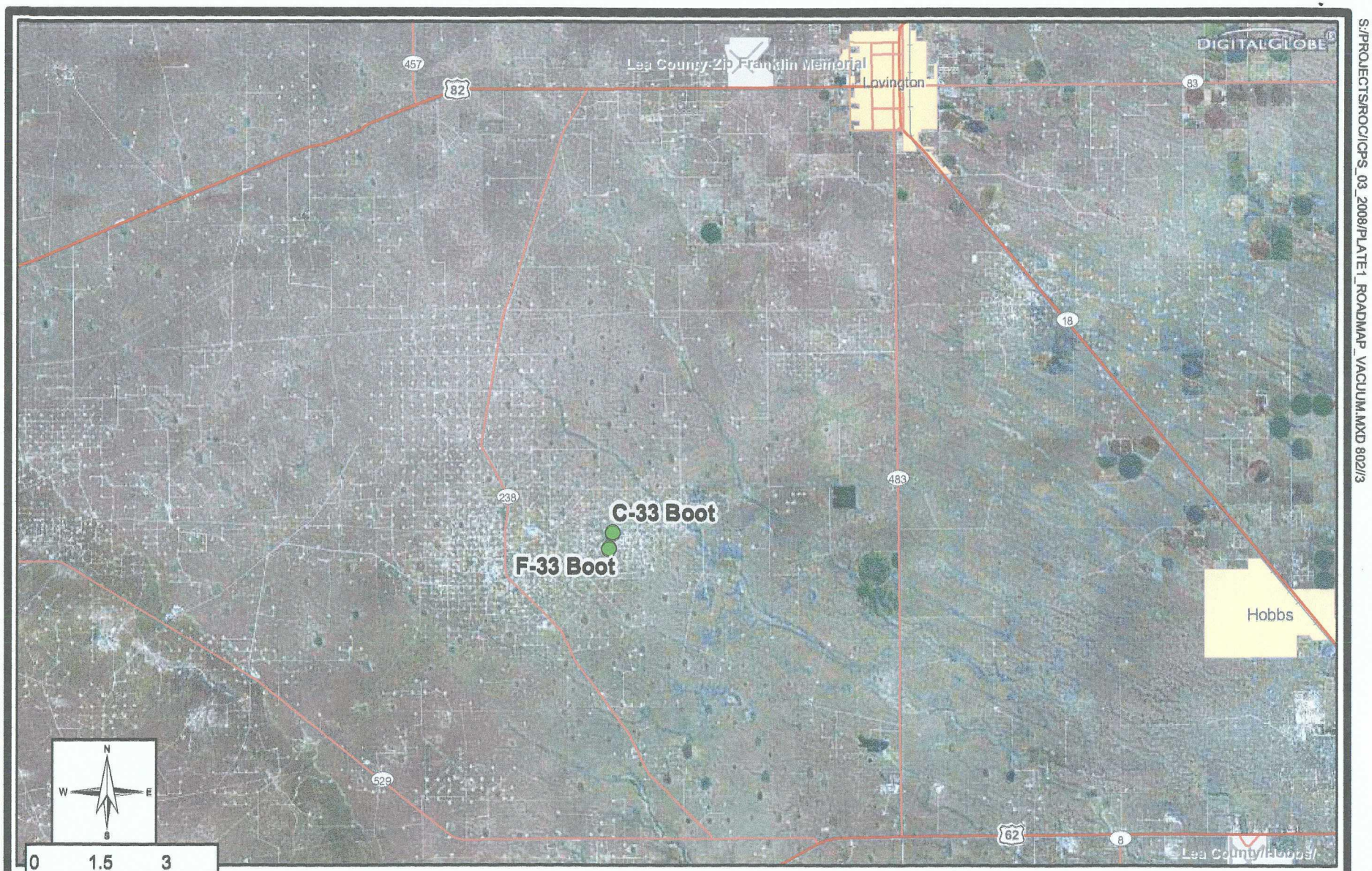
Following the site characterization described above, a Corrective Action Plan with the data and analysis supportive of a procedure for site closure will be submitted. Quality Procedures for characterization work are provided in Appendix A.

If you have any questions or comments regarding this ICP, please contact Kristin Pope of Rice Operating Company as she has reviewed and approved this submission.

Sincerely,
R.T. Hicks Consultants, Ltd.

Randall T. Hicks
Principal

Copy: Rice Operating Company



Explanation

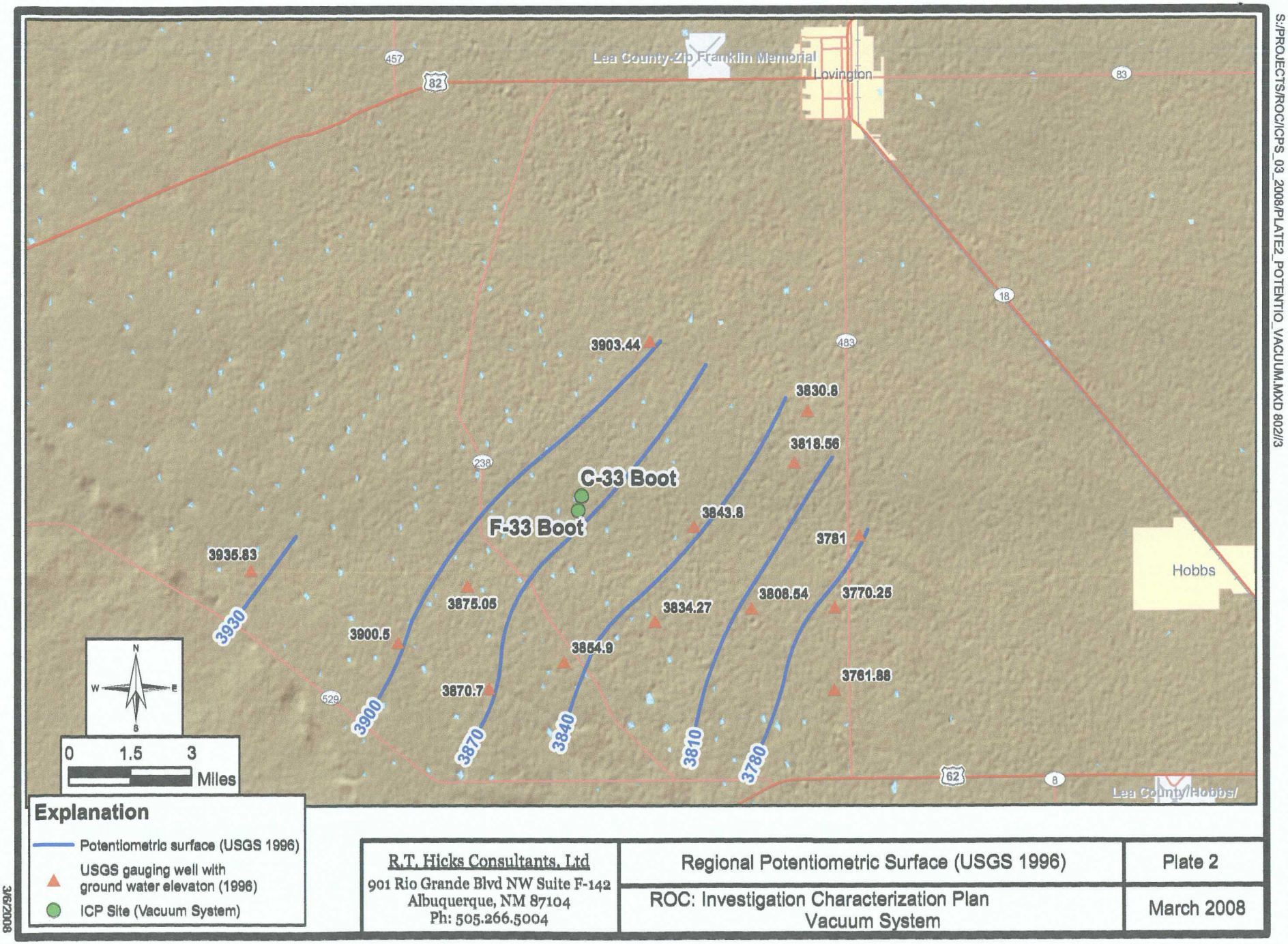
- ICP Site (Vacuum System)

R.T. Hicks Consultants, Ltd
901 Rio Grande Blvd NW Suite F-142
Albuquerque, NM 87104
Ph: 505.266.5004

Site Environs near the Vacuum System	Plate 1
ROC: Investigation Characterization Plan - Vacuum System	March 2008

S:/PROJECTS/ROC/ICPS_03_2008/PLATE1_ROADMAP_VACUUM.MXD 802/3

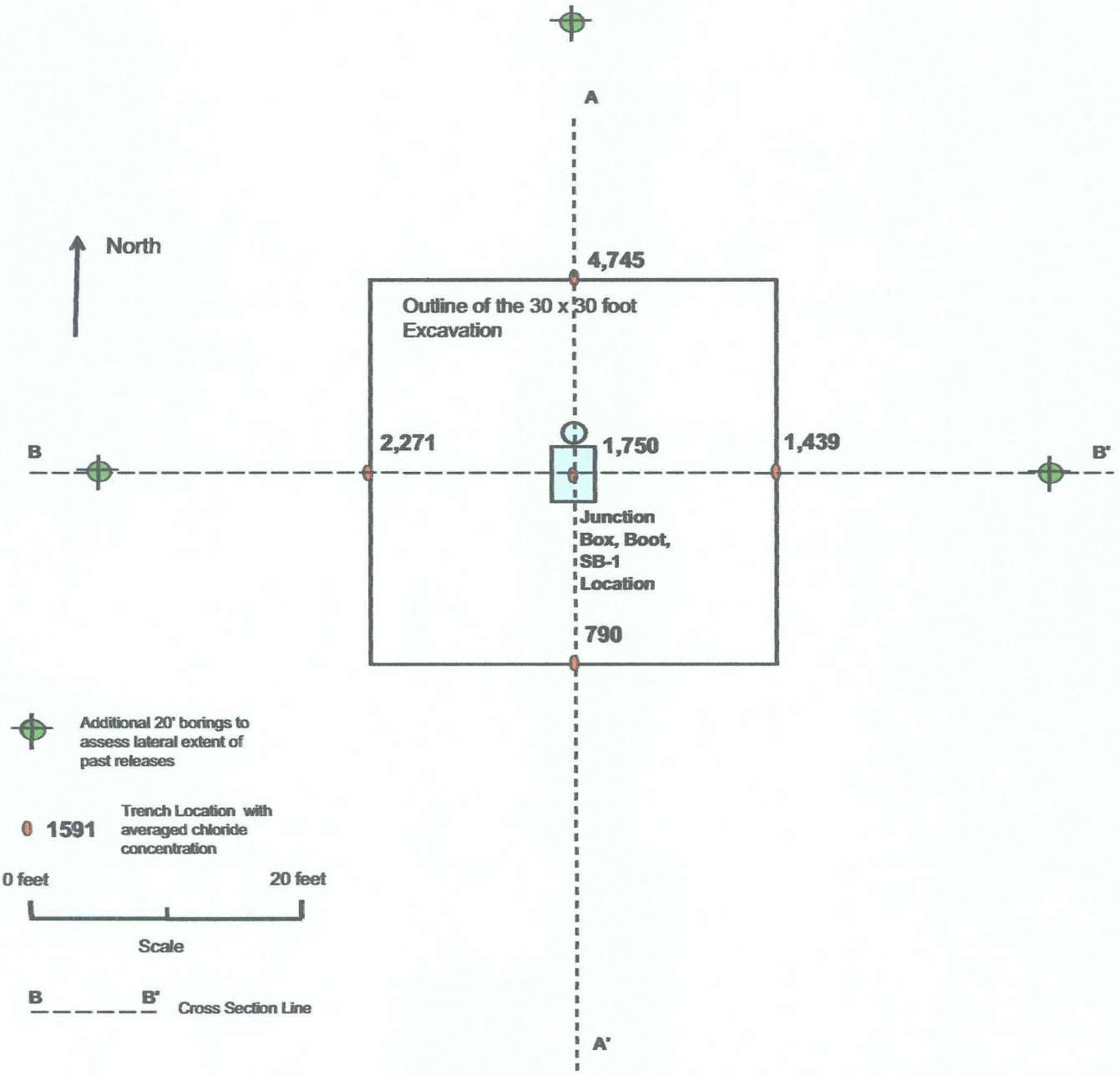
3/6/2008



S:/PROJECTS/ROC/ICPS_03_2008/PLATE2_POTENTIO_VACUUM.MXD 802//3

3/6/2008

Proposed locations of Lateral Characterization Borings	Client: Rice Operating Company Project Name: Vacuum C-33 Boot	Location: Section 33, T17S, R35E



R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 505-266-5004	Vacuum C-33 Boot	Plate 4 March 2008

Appendix A

Rice Operating Company

QUALITY PROCEDURE - 03
Sampling and Testing Protocol - Chloride Titration Using .282 Normal Silver Nitrate Solution

1.0 Purpose
This procedure is to be used to determine the concentration of chloride in soil.

2.0 Scope
This procedure is to be used as the standard field measurement for soil chloride concentrations.

3.0 Sample Collection and Preparation

3.1 Collect at least 80 grams of soil from the sample collection point. Take care to insure that the sample is representative of the general background to include visible concentrations of hydrocarbons and soil types. Ifnecessary, prepare a composite sanlple for soils obtained at several points in the sample area. Take care to insure that no loose vegetation, rocks or liquids are included in the sample(s).

3.2 The soil sample(s) shall be immediately inserted into a one-quart or large polyethylene freezer bag. Care should be taken to insure that no cross-contamination occurs between the soil sample and the collection tools or sample processing equipment.

3.3 The sealed sample bag should be massaged to break up any clods.

4.0 Sample Preparation

4.1 Tare a clean glass vial having a minimum 40 ml capacity. Add at least 10 grams of the soil sample and record the weight.

4.2 Add at least 10 grams of reverse osmosis water to the soil sample and shake for 20 seconds.

4.3 Allow the sample to set for a period of 5 minutes or until the separation of soil and water.

4.4 Carefully pour the free liquid extract from the sample through a paper filter into a clean plastic cup if necessary.

5.0 Titration Procedure

5.1 Using a graduated pipette, remove 10 ml extract and dispense into a clean plastic cup.

5.2 Add 2-3 drops potassium chromate (K_2CrO_4) to mixture.

5.3 If the sample contains any sulfides (hydrogen or iron sulfides are common to oilfield soil samples) add 2-3 drops of hydrogen peroxide (H_2O_2) to mixture.

5.4 Using a 10 ml pipette, carefully add 0.282 normal silver nitrate (one drop at a time) to the sample while constantly agitating it. Stop adding silver nitrate when the solution begins to change from yellow to red. Be consistent with endpoint recognition.

5.5 Record the ml of silver nitrate used.

6.0 Calculation
To obtain the chloride concentration, insert measured data into the following formula:

$$\frac{0.282 \times 35{,}450 \times \text{ml } AgNO_3}{\text{ml water extract}} \times \frac{\text{grams of water in mixture}}{\text{grams of soil in mixture}}$$

Using Step 5.0, determine the chloride concentration of the RO water used to mix with the soil sample. Record this concentration and subtract it from the formula results to find the net chloride in the soil sample.

Record all results on the delineation form.

Rice Operating Company

QUALITY PROCEDURE -07
Sampling and Testing Protocol for VOC in Soil

1.0 Purpose
This procedure is to be used to determine the concentrations of Volatile Organic Compounds in soils.

2.0 Scope
This procedure is to be used as the standard field measurement for soil VOC concentrations. It is not to be used as a substitute for full spectrographic speciation of organic compounds.

3.0 Procedure

3.1 Sample Collection and Preparation

3.1.1 Collect at least 500 g. of soil from the sample collection point. Take care to insure that the sample is representative of the general background to include visible concentrations of hydrocarbons and soil types. If necessary, prepare a composite sample of soils obtained at several points in the sample area. Take care to insure that no loose vegetation, rocks or liquids are included in the sample(s).

3.1.2 The soil sample(s) shall be immediately inserted into a one-quart or larger polyethylene freezer bag and sealed. When sealed, the bag should contain a nearly equal space between the soil sample and trapped air. Record the sample name and the time that the sample was collected on the Field Analytical Report Form.

3.1.3 The sealed samples shall be allowed to set for a minimum of five minutes at a temperature of between 10-15 Celsius, (59-77° F). The sample temperatures may be adjusted by cooling the sample in ice, or by heating the sample within a generally controlled environment such as the inside of a vehicle. The samples should not be placed directly on heated surfaces or placed in direct heat sources such as lamps or heater vents.

3.1.4 The sealed sample bag should be massaged to break up any clods, and to provide the soil sample with as much exposed surface area as practically possible.

3.2 Sampling Procedure

3.2.1 The instrument to be used in conducting VOC concentration testing shall be an Environmental Instruments 13471 OVM / Datalogger or a similar pro-type instrument. (Device will be identified on VOC Field Test Report Form.) Prior to use, the instrument shall be zeroed-out in accordance with the appropriate maintenance and calibration procedure

outlined in the instrument operation manual. The PID device will be calibrated each day it's used.

3.2.2 Carefully open one end of the collection bag and insert the probe tip into the bag taking care that the probe tip not touch the soil sample or the sidewalls of the bag.

3.2.3 Set the instrument to retain the highest result reading value. Record the reading onto the Field Test Report Form.

3.2.4 If the instrument provides a reading exceeding 100 ppm, proceed to conduct BTEX Speciation in accordance with QP-O2 and QP-O6. If the reading is 100 ppm or less, NMOCD BTEX guideline has been met and no further testing fur BTEX is necessary. File the Field Test Report Form in the project file.

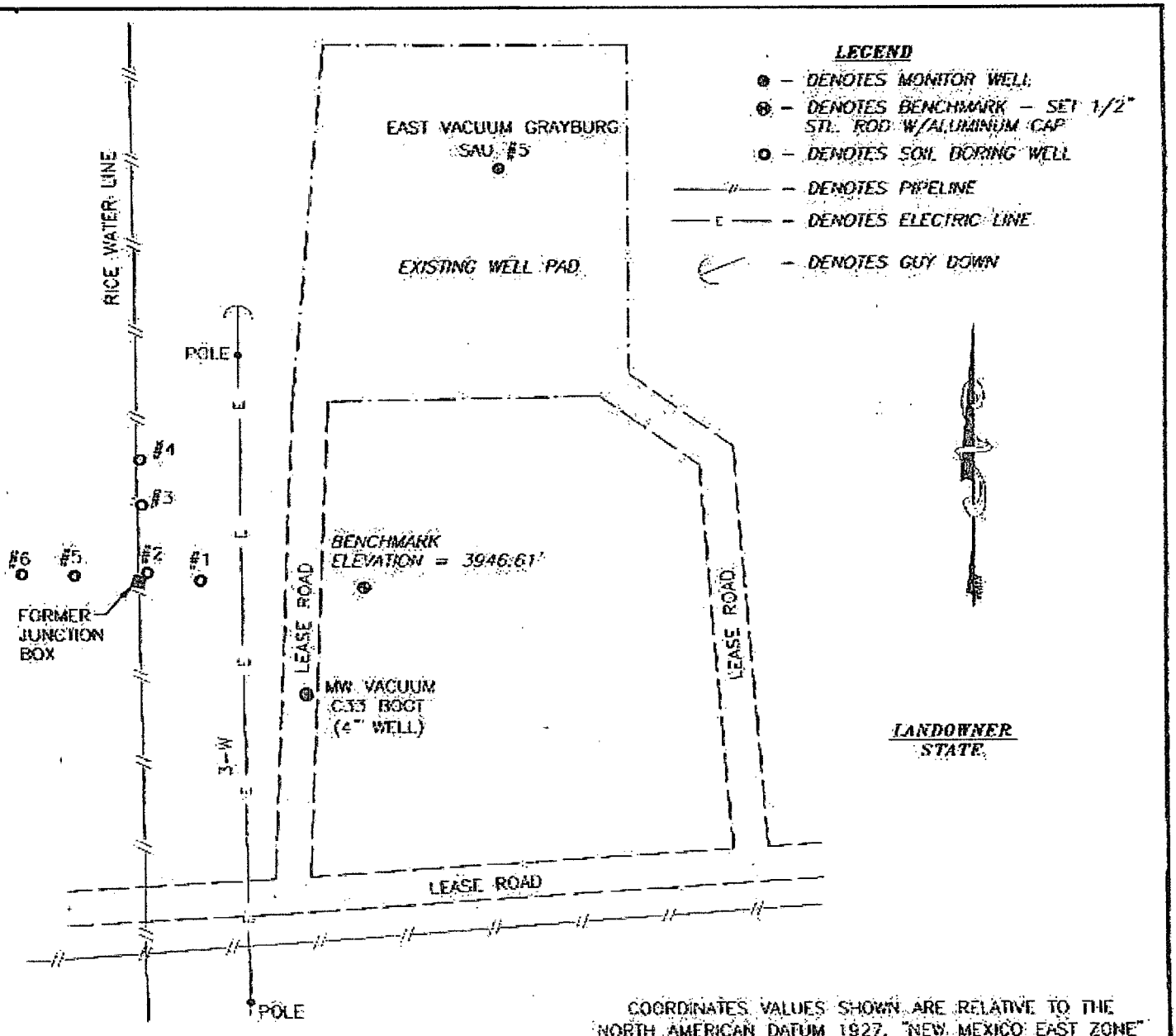
4.0 Clean-up

After testing, the soil samples shall be returned to the sampling location, and the bags collected for off-site disposal, IN NO CASE SHALL THE SAME BAG BE USED TWICE. EACH SAMPLE CONTAINER MUST BE DISCARDED AFTER EACH USE.

Appendix B

Site Survey

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



COORDINATES VALUES SHOWN ARE RELATIVE TO THE NORTH AMERICAN DATUM 1927, "NEW MEXICO EAST ZONE" ELEVATIONS ARE RELATIVE TO THE NORTH AMERICAN VERTICAL DATUM 1988

WELL	COORDINATES	ELEVATIONS
MW C33 BOOT	654907.5 N 767571.6 E	NATURAL GROUND – 3946.38' TOP OF PVC – 3949.15' TOP OF CONCRETE – 3946.76'

I HEREBY CERTIFY THAT I DIRECTED AND AM RESPONSIBLE FOR THIS SURVEY, THAT THIS SURVEY IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF, AND THAT THIS SURVEY AND PLAT MEET THE MINIMUM STANDARDS FOR SURVEYING IN NEW MEXICO.

RONALD J. EIDSON, NEW MEXICO No. 12641 — 03/24/09

PROVIDING SURVEYING SERVICES SINCE 1946
JOHN WEST SURVEYING COMPANY
412 N. DAL PASO
HOBBS, N.M. 88240
(575) 393-3117

RICE OPERATING COMPANY

SURVEY TO LOCATE VACUUM C33 BOOT MONITOR WELL & FACILITIES IN THE NE/4 NW/4 OF SECTION 33, TOWNSHIP 17 SOUTH, RANGE 35 EAST, N.M.P.M., LEA COUNTY, NEW MEXICO

Survey Date: 2/24/09		Sheet 1 of 1 Sheets
W.O. Number: 09.11.0264		Drawn By: L.A.
Date: 3/24/09	REL: 09110184	09110264

Appendix C

Laboratory Analyses for Soil

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

CARDINAL LABORATORIES

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

ANALYTICAL RESULTS FOR
RICE OPERATING COMPANY
ATTN: HACK CONDER
122 WEST TAYLOR
HOBBS, NM 88240
FAX TO: (575) 397-1471

Receiving Date: 02/05/09
Reporting Date: 02/06/09
Project Number: NOT GIVEN
Project Name: VACUUM C-33 BOOT
Project Location: VACUUM C-33 BOOT

Analysis Date: 02/06/09
Sampling Date: 02/03/09
Sample Type: SOIL
Sample Condition: COOL & INTACT
Sample Received By: ML
Analyzed By: HM

LAB NO.	SAMPLE ID	Cl^- (mg/kg)
H16833-1	SB #2 @ 65'	4,640
H16833-2	SB #2 @ 25'	1,100
H16833-3	SB #1 @ 25'	5,440
H16833-4	SB #1 @ 60'	1,730
H16833-5	SB #2 @ 30'	7,520
H16833-6	SB #3 @ 20'	1,410
H16833-7	SB #4 @ 10'	224
H16833-8	SB #5 @ 5'	11,400
H16833-9	SB #6 @ 20'	10,600
Quality Control		490
True Value QC		500
% Recovery		98.0
Relative Percent Difference		2.0

METHOD: Standard Methods	4500-ClB

Note: Analyses performed on 1:4 w:v aqueous extracts.

Chemist

02/06/09
Date

H16833 RICE

CARDINAL LABORATORIES

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

ANALYTICAL RESULTS FOR
RICE OPERATING COMPANY
ATTN: HACK CONDER
122 W. TAYLOR
HOBBS, NM 88240
FAX TO: (575) 397-1471

Receiving Date: 02/05/09
Reporting Date: 02/10/09
Project Number: NOT GIVEN
Project Name: VACCUM C-33 BOOT
Project Location: VACCUM C-33 BOOT

Sampling Date: 02/03/09
Sample Type: SOIL
Sample Condition: COOL & INTACT
Sample Received By: ML
Analyzed By: ZL

LAB NUMBER	SAMPLE ID	BENZENE (mg/kg)	TOLUENE (mg/kg)	ETHYL BENZENE (mg/kg)	TOTAL XYLENES (mg/kg)
ANALYSIS DATE		02/09/09	02/09/09	02/09/09	02/09/09
H16833-2	SB #2 @ 25'	0.373	<0.250	11.3	25.3
H16833-8	SB #5 @ 5'	0.082	0.138	0.183	0.728
Quality Control		0.052	0.054	0.052	0.155
True Value QC		0.050	0.050	0.050	0.150
% Recovery		104	108	104	103
Relative Percent Difference		3.5	1.8	<1.0	<1.0

METHOD: EPA SW-846 8021B

TEXAS NELAP CERTIFICATION T104704398-08-TX FOR BENZENE, TOLUENE, ETHYL BENZENE, AND TOTAL XYLENES.

Chemist

02/11/09
Date

H16833 BRICE

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 #: 393-9174 Fax #: 397-1471	Address:
Project #: Project Owner:	City:
Project Name: Vacuum C-33 boot	State: Zip:
Project Location: Vacuum C-33 boot	Phone #:
Sampler Name: Lara Weinheimer	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								
H16833-1	SB #2 @ 65'		1			✓					✓		2/3/09	10:39	✓										
-2	SB #2 @ 25'		1			✓					✓		2/3/09	10:26	✓		✓								
-3	SB #1 @ 25'		1			✓					✓		2/3/09	09:24	✓										
-4	SB #1 @ 60'		1			✓					✓		2/3/09	09:48	✓										
-5	SB #2 @ 30'		1			✓					✓		2/3/09	10:27	✓										
-6	SB #3 @ 20'		1			✓					✓		2/3/09	01:36	✓										
-7	SB #4 @ 10'		1			✓					✓		2/3/09	02:00	✓										
-8	SB #5 @ 5'		1			✓					✓		2/3/09	02:17	✓		✓								
-9	SB #6 @ 20'		1			✓					✓		2/3/09	02:52	✓										

Relinquished By: L. Weinheimer	Date: 2-5-09 Time: 4:15	Received By:	Phone Result: ☐ Yes ☑ No Add'l Phone #:
Relinquished By:	Date: Time:	Received By:	Fax Result: ☐ Yes ☑ No Add'l Fax #:
Delivered By: (Circle One) Sampler - UPS - Bus - Other:	Sample Condition Cool: ☑ Yes ☐ No Intact: ☐ Yes ☐ No	CHECKED BY: (Initials)	REMARKS: email results Hconder@riceswd.com; jpurvis@riceswd.com; Lweinheimer@riceswd.com

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

NEED SAMPLES BACK, PLEASE

Appendix D

Explanation of VLEACH Model

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

R. T. HICKS CONSULTANTS, LTD.
901 Rio Grande Blvd NW ▲ Suite F-142 ▲ Albuquerque, NM 87104 ▲ 505.266.5004 ▲ Fax: 505.266.0745

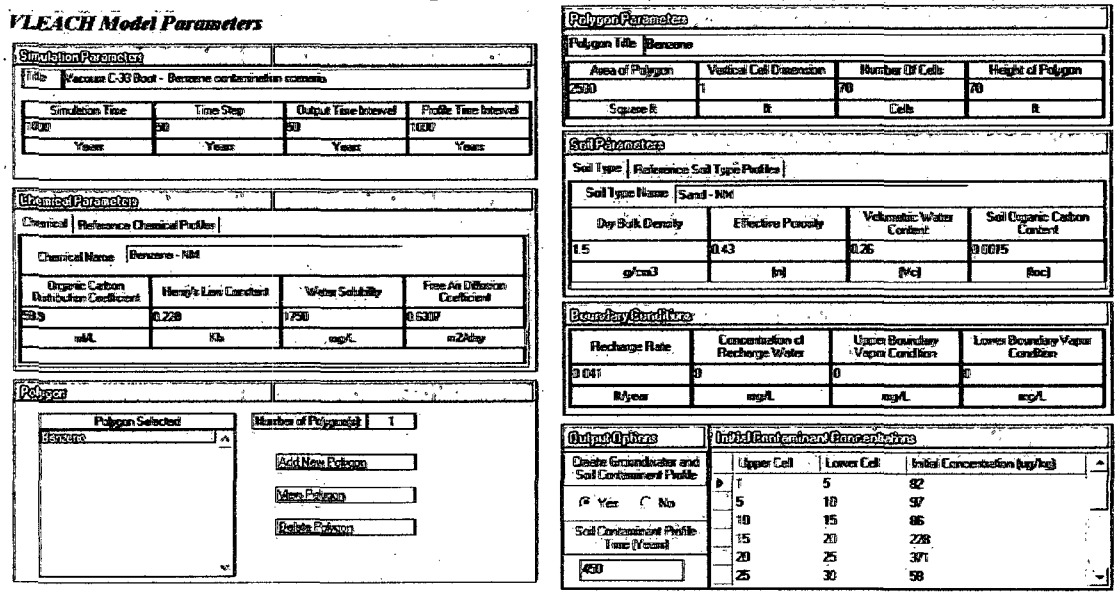
Input and Results of the VLEACH Simulation Performed at the Rice Operating Co. Vacuum C-33 Boot Site

The specific parameters used in the simulation and diffusion to ground water equation at the site are presented in the table and figures below.

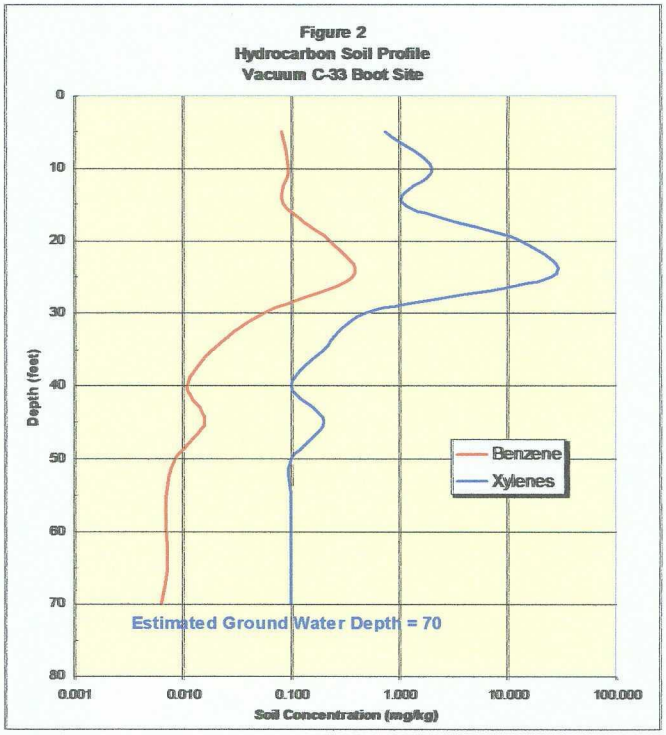
Table 1 – Common Parameters Employed in the VLEACH model for the Vacuum C-33 Boot Site

Model Parameter	Value	Source of Value
Benzene & Xylene Chemical Parameters	Chemical Specific	NMED June 2006 Soil Screening Levels Document
Spill Area (ft^2)	2,500	Site Measurement (Estimate)
Groundwater Table Depth (ft)	70	Estimate from Soil Boring and Monitoring Well Data
Vadose Zone Soil Bulk Density (g/cm^3)	1.5	NMED June 2006 Document
Vadose Zone Porosity (unitless)	0.43	NMED June 2006 Document
Volumetric Water Content (%)	0.26	NMED June 2006 Document
Vadose Zone Soil Organic Content (f_{oc})	0.0015	NMED June 2006 Document
Recharge Rate (ft/year)	0.041	Musharrafieh 1999
Benzene & Xylene Concentrations (ug/kg)	Chemical Specific	Worst-Case Hydrocarbon Profile (SB-2 & SB-5)
Slope of Water Table	0.002	Regional Map (Attachment A)
Hydraulic Conductivity (ft/d)	20	Musharrafieh 1999
Max width perpendicular to direction of GW flow (ft)	50	Site Measurement
Aquifer Porosity (unitless)	0.25	Prof. Judgment Conservative Assumption
Mixing zone depth in aquifer	6.6	Prof. Judgment Conservative Assumption

Figure 1 - Actual Input Screens from the VLEACH Model Program for the Benzene Run



As a conservative measure, a "worst-case" hydrocarbon soil profile was constructed by taking the highest benzene and xylenes concentration from each sampled depth as shown in Figure 2. Sampling depths for which laboratory results were not available were estimated from the field screening data. The benzene and xylenes values from this profile were conservatively assumed to be present across the entire 2,500 ft² area.

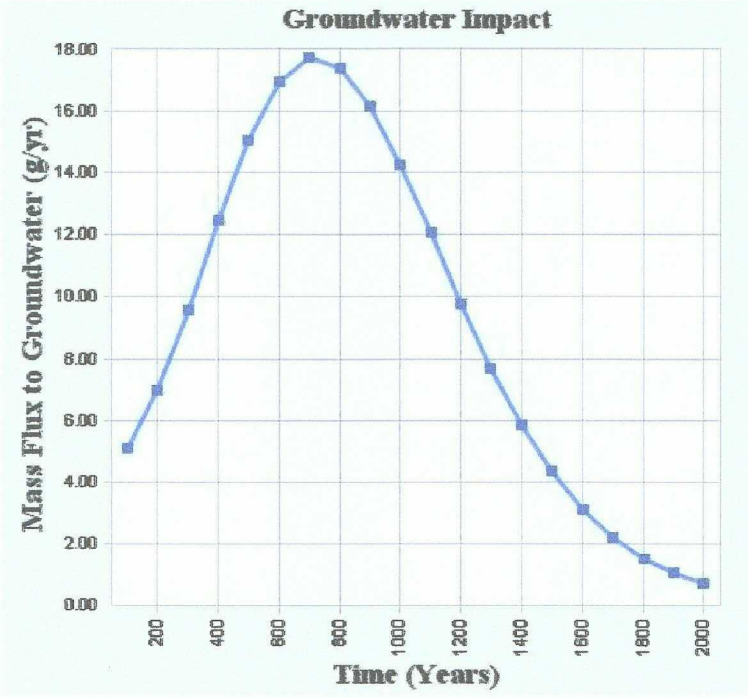


The results from the VLEACH modeling relative to this assessment are provided as a graph that presents the subsurface impact as Mass Flux to Ground Water in grams/year (g/yr) as a function of future time as shown in Figure 3.

Simulation Time, Time Step, Output Time Interval, and Profile Time Interval were adjusted to provide the clearest presentation of the results based on the time required to identify the maximum impact to groundwater. The model results show the highest benzene impact to ground water will occur about 450 years from now and the highest xylene impact to ground water will occur about 700 years from now.

Figure 3 - Results of VLEACH Vadose Model for Benzene – Present Day to 1,000 Years

Figure 4 - Results for VLEACH Vadose Model Xylenes – Present Day to 2,000 Years



In order to compare the modeled results to the NMED ground water standard, the VLEACH output data required a conversion from g/yr to mg/L. This was performed by calculating the annual recharge (flux) volume from the spill area and the annual ground water flow volume below the spill area as shown:

Recharge is defined as: $Flux_{flow}(L/yr) = A \times R \times 29.317$ where,

A = spill area (ft^2)
R = recharge rate (ft/yr), and
29.317 = conversion factor from ft^3 to liters

Groundwater flow is defined as: $GW_{flow}(L/yr) = \left(\frac{k \times i}{\theta_T}\right) \times T_{aq} \times W \times 29.317$ where,

k = hydraulic conductivity of the aquifer (ft/yr)
i = groundwater gradient (ft/ft)
θ_T = porosity of the aquifer
T_{aq} = aquifer mixing zone thickness (ft) and,
W = length of the spill area (ft) perpendicular to the ground water gradient direction

The relationship between the annual recharge volume and the annual ground water flow volume was used to calculate the predicted ground water concentration for the initial (year zero) time and the maximum impact year time for the constituent of concern as demonstrated on the table below:

Chemical of Concern	Present Impact Data				Maximum Impact Data				NM Water Quality (mg/L)
	Year	Impact (g/yr)	Leachate Conc. (mg/L)	GW Conc. (mg/L)	Year	Impact (g/yr)	Leachate Conc. (mg/L)	GW Conc. (mg/L)	
Benzene	0	0.3	0.1	0.0005	450	0.77	0.3	**0.0014**	0.01
Total Xylenes	0	4	1	0.007	700	18	6	**0.031**	0.6

Bold text values indicate concentrations that exceed the NMED Water Quality Standard values for groundwater.

Appendix E

Recent Laboratory Analyses of Ground Water

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

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:	11/01/2010	Sampling Date:	10/27/2010
Reported:	11/08/2010	Sampling Type:	Water
Project Name:	VACUUM C-33	Sampling Condition:	Cool & Intact
Project Number:	NOT GIVEN	Sample Received By:	Jodi Henson
Project Location:	T17S-R35E-SEC33 C - LEA COUNTY, NM		

Sample ID: MONITOR WELL #1 (H021204-01)

BTEX 8021B mg/L Analyzed By: cms

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Benzene*	<0.001	0.001	11/03/2010	ND	0.098	98.1	0.100		
Toluene*	<0.001	0.001	11/03/2010	ND	0.097	97.1	0.100		
Ethylbenzene*	<0.001	0.001	11/03/2010	ND	0.097	96.7	0.100		
Total Xylenes*	<0.003	0.003	11/03/2010	ND	0.291	96.9	0.300		

Surrogate: 4-Bromofluorobenzene (PIL *105 %* *80-120*

Chloride, SM4500Cl-B mg/L Analyzed By: HM

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	**52.0**	4.00	11/08/2010	ND	104	104	100	3.92	

Sulfate 375.4 mg/L Analyzed By: HM

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Sulfate	**46.1**	10.0	11/08/2010	ND	45.1	113	40.0	15.3	

TDS 160.1 mg/L Analyzed By: HM

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
TDS	**375**	5.00	11/02/2010	ND				1.75	

Cardinal Laboratories

*=Accredited Analyte

Celey D. Keene

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

Celey D. Keene, Lab Director/Quality Manager

101 East Marland - Hobbs, New Mexico 88240
Tel (575) 393-2326
Fax (575) 393-2476

Cardinal Laboratories, Inc.

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

LAB Order ID # _____

Company Name: RICE Operating Company	BILL TO Company: RICE Operating Company — PO#
Project Manager: Hack Conder	Address: (Street, City, Zip) 122 W Taylor Street ~ Hobbs, New Mexico 88240
Address: (Street, City, Zip) 122 W Taylor Street ~ Hobbs, New Mexico 88240	Phone#: (575) 393-9174 — Fax#: (575)397-1471
Phone #: (575) 393-9174	Fax #: (575) 397-1471
Project #: — Project Name: Vacuum C-33	
Project Location: T17S-R35E-Sec33 C ~ Lea County New Mexico	Sampler Signature: Rozanne Johnson (575)631-9310 rozanne@valornet.com

LAB # (LAB USE ONLY)	FIELD CODE	(G)rab or (C)omp	# CONTAINERS	MATRIX: WATER	SOIL	AIR	SLUDGE	PRESERVATIVE METHOD: HCL (2 40ml VOA)	HNO_3	$NaHSO_4$	H_2SO_4	ICE (1-1 liter HDPE)	NONE	SAMPLING: DATE (2010)	TIME
H21204-1	Monitor Well #1	G	3	X				2				1		10-27	1045

	MTBE 8021B/602	BTEX 8021B/602	TPH 418.1/TX1005 / TX1005 Extended (C35)	PAH 8270C	Total Metals Ag As Ba Cd Cr Pb Se Hg 6010B/200.7	TCLP Metals Ag As Ba Cd Cr Pb Se Hg	TCLP Volatiles	TCLP Semi Volatiles	TCLP Pesticides	RCI	GC/MS Vol. 8260B/624	GC/MS Semi. Vol. 8270C/625	PCB's 8082/608	Pesticides 8081A/608	BOD, TSS, pH	Moisture Content	Cations (Ca, Mg, Na, K)	Anions (Cl, SO4, CO3, HCO3)	Sulfates	Total Dissolved Solids	Chlorides	Turn Around Time ~ 24 Hours
		X																	X	X	X	

ANALYSIS REQUEST

(Circle or Specify Method No.)

Relinquished by: Rozanne Johnson	Date: 11/1/2010	Time: 16:00	Received by:	Date: Time:
Relinquished by:	Date: Time:		Received By: (Laboratory Staff) Jodi Henson	Date: 11/1/10 Time: 16:00
Delivered By: (Circle One) Sampler - UPS - Bus - Other:	Sample Condition: Cool: Yes / No; Intact: Yes / No		CHECKED BY: (Initials)	

Phone Results		Yes		No	
Fax Results		Yes		No	Additional Fax Number:

REMARKS:

Em Email Results to: hconder@riceswd.com
lweinheimer@riceswd.com
kjones@riceswd.com
rozanne@valornet.com

#26