1R - 425-88

REPORTS

DATE:

4-11-11

Rice Environmental Consulting & Safety
P.O. Box 5630 Hobbs, NM 88241
Phone 575.393.4411 Fax 575.393.0293

CERTIFIED MAIL
RETURN RECIEPT NO. 7008 1140 0001 3070 5603

May 11th, 2011

Mr. Edward Hansen
New Mexico Energy, Minerals, & Natural Resources
Oil Conservation Division, Environmental Bureau
1220 S. St. Francis Drive
Santa Fe, New Mexico 87505

RE: **CAP REPORT and TERMINATION REQUEST**
Rice Operating Company – Vacuum SWD System
Vacuum D-31 EOL (1R425-88): UL/D sec. 31 T17S R35E

Mr. Hansen:

RICE Operating Company (ROC) has retained Rice Environmental Consulting and Safety (RECS) to address potential environmental concerns at the above-referenced site in the abandoned Vacuum Salt Water Disposal (SWD) system. ROC is the service provider (agent) for the Vacuum SWD System and has no ownership of any portion of the pipeline, well, or facility. The system is owned by a consortium of oil producers, System Parties, who provide all operating capital on a percentage/usage basis.

Background and Previous Work
This site is located approximately 0.3 miles south of Buckeye, New Mexico in UL/D, Sec. 31, T17S, R35E, as shown on the Site Location Map (Figure 1). NM OSE records indicate that groundwater would likely be encountered at a depth of approximately 117 +/- feet.

In 2009, ROC initiated work on the former Vacuum D-31 EOL junction as part of the system abandonment. The site was delineated using a backhoe to form an excavation with dimensions 30x25x12-ft deep and soil samples were screened at regular intervals for both hydrocarbons and chlorides. A 4-wall, bottom, and blended backfill composite sample was collected from the excavation for laboratory verification. Laboratory results yielded negligible concentrations of gasoline range organics (GRO) and diesel range organics (DRO) in all samples. Chloride concentrations were confirmed at 672 mg/kg in the 4-wall composite, 1,200 mg/kg in the bottom composite, and 720 mg/kg in the blended backfill composite. The blended excavated soil (blended backfill composite) was returned to the excavation 5 feet below ground surface (bgs). A 5 foot deep shelf was excavated 5 feet in each direction in preparation for a clay barrier. At 5 ft below ground surface (bgs), a 40x35 ft clay barrier was installed with a compaction test performed on May 21, 2009. The remaining blended excavated soil was blended with clean, imported soil and placed over the clay barrier. Laboratory analysis of the blended backfill II composite confirmed a chloride concentration of 256 mg/kg. The area was contoured to the

surrounding landscape, seeded, and an identification plate was placed on the surface of the site to mark its location for future environmental considerations.

To further investigate depth of chloride presence, one soil bore (SB-1) was initiated on June 19, 2009 at 3 feet south-east of the former junction box. The boring was advanced to 80 feet bgs with soil samples collected every 5 feet and field tested for organic vapors and chlorides. Field chloride titrations yielded concentrations that decreased with depth, which was confirmed by laboratory analysis of the 35 foot (1,500 mg/kg) and the 80 foot (272 mg/kg) samples. TPH (GRO and DRO) concentrations were negligible in both samples. The entire borehole was plugged with bentonite to the ground surface.

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

On behalf of ROC, RECS submitted an Investigation and Characterization Plan (ICP) to the NMOCD on October 26, 2010. The plan proposed additional investigative and characterization work at the site to determine if there is potential for groundwater degradation from residual chlorides at the site, as summarized below:

1. Using site specific data, a conservative chloride migration model would be used to determine if unsaturated chloride transport through the vadose zone would cause the underlying groundwater to exceed 250 mg/L in the future.
2. A visual inspection of the site would be conducted to determine if soil restoration is required to promote re-vegetation of the ground surface. Depending on the findings, the appropriate steps will be taken to re-vegetate the site. Vegetation acts as a 'natural infiltration barrier' because plants capture water through their roots, reducing the volume of water infiltrating below the root zone.
3. Collect regional hydrogeologic data to verify depth to groundwater in the area of this site. A one-half mile well inventory will be performed. The water well inventory will include a review of water well records listed on the New Mexico State Engineer Office and the United States Geologic Survey (USGS) websites.

ICP Investigative Results

As part of the Investigation and Characterization Plan approved by NMOCD on October 28, 2010, a conservative chloride migration model was utilized on the Vacuum D-31 EOL site to determine what, if any, affect the residual chlorides in the soil would have on the groundwater immediately beneath the site. The results of this modeling were included in the ICP Report and CAP submitted on December 27, 2010 and approved by the NMOCD on January 12, 2011. In addition, as part of the ICP, regional hydrogeologic data was collected to verify depth to groundwater.

The CAP proposed importing clean soil which would be blended with hay, peat moss, and organic compost and spread over the site. The material would be tilled in and contoured to the surrounding area. Silk net fencing would be installed and the site seeded with native vegetation. The resultant vegetation would provide an infiltration barrier that will limit migration of constituents to groundwater. Plants capture water through their roots, thereby reducing the

amount of water infiltrating through the root zone and carrying constituents through the vadose zone to groundwater.

Completed Corrective Actions
Corrective action activities began on December 22nd, 2010 and were complete on May 9th, 2011.

- Three loads of blow sand mixed with peanut hay were imported to the site. The mixture was spread over the site to facilitate vegetative growth. A fence with silk netting was placed along the west and south side of the site to prevent wind erosion of the sand and to help keep the seed in place. On February 15th, 2011, the site was seeded with five pounds of Grama seed and ten pounds of Winter Wheat seed (see Appendix B). The site is expected to return to normal vegetative capacity.

- To verify the chloride migration model included in the ICP Report and CAP, an exposure assessment was run by ROC for this site using the United States Environmental Protection Agency Exposure Assessment Multimedia Model (MULTIMED Version 1.01, June 1991). Date inputs and model outputs are included in Attachment C. With the existing clay barrier, the model output concludes that the peak increased concentration of chlorides in groundwater contributed by soils in the vadose zone would be approximately 56.20 mg/kg in 1,100 years. Since the estimated increase in chloride concentrations in groundwater from residual chloride migration is below the WQCC standard of 250 mg/L, no further action is warranted for this site.

Since the Corrective Action Plan activities as approved by NMOCD are complete, ROC requests Termination status for this site.

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

Sincerely,

Lara Weinheimer
Project Scientist
RECS
(575) 441-0431

Attachments:
Figures – Site location map
Appendix A – Junction Box Disclosure Report
Appendix B – Documentation of CAP activities
Appendix C – Multimed Exposure Assessment

Figures

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

Site Location

RICE ENVIRONMENTAL RECS CONSULTING & SAFETY, LLC

Vacuum D-31 EOL

Legals: UL/D sec. 31
T17S R35E
NMOCD Case #: 1R425-88

FIGURE 1

0 500 1,000 2,000 Feet

Drawing date:
Revision date:
Drafted by:

Appendix A

Junction Box Disclosure Report

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

RICE OPERATING COMPANY
JUNCTION BOX DISCLOSURE* REPORT

BOX LOCATION

SWD SYSTEM	JUNCTION	UNIT	SECTION	TOWNSHIP	RANGE	COUNTY	BOX DIMENSIONS - FEET		
							Length	Width	Depth
Vacuum	D-31 EOL	D	31	17S	35E	Lea	eliminated		

LAND TYPE: BLM ___ STATE X FEE LANDOWNER _____ OTHER _____

Depth to Groundwater 117 feet NMOCD SITE ASSESSMENT RANKING SCORE: 20

Date Started 2/18/2009 Date Completed 6/8/2009 OCD Witness no

Soil Excavated 333.3 cubic yards Excavation Length 30 Width 25 Depth 12 feet

Soil Disposed 84 cubic yards Offsite Facility Sundance Location Eunice, NM

FINAL ANALYTICAL RESULTS:

Sample Date 4/6/2009, 4/15/2009, 5/20/2009, 6/19/2009 **Sample Depth** 12 ft, 35 ft, 80 ft

Procure 5-point composite sample of bottom and 4-point composite sample of sidewalls. TPH and Chloride laboratory test results completed by using an approved lab and testing procedures pursuant to NMOCD guidelines.

Sample Location	PID (field) ppm	GRO mg/kg	DRO mg/kg	Chlorides mg/kg
4-WALL COMP.	0.5	<10.0	<10.0	672
BOTTOM COMP.	2.3	<10.0	<10.0	1,200
BLENDED BACKFILL COMP.	2.0	<10.0	<10.0	720
BLENDED BACKFILL II COMP	0.9			256
SB #1 @ 35'		<10.0	<10.0	1,500
SB #1 @ 80'		<10.0	<10.0	272

CHLORIDE FIELD TESTS

LOCATION	DEPTH	mg/kg
4-WALL COMP.	n/a	568
BOTTOM COMP.	12'	957
BLENDED BACKFILL COMP.	n/a	722
BLENDED BACKFILL II COMP.	n/a	303
BACKGROUND	6"	194
Soil Bore 3 ft. south east of the former junction box	15'	861
	20'	871
	25'	844
	30'	1,393
	35'	1,412
	40'	1,338
	45'	997
	50'	1,101
	55'	779
	60'	525
	65'	531
	70'	510
	75'	425
	80'	300

General Description of Remedial Action: This junction was addressed during the Vacuum SWD System Abandonment. An investigation was conducted at the former junction box site using a backhoe to collect soil samples at regular intervals creating a 30x25x12-ft excavation. Chloride field tests performed on each sample yielded elevated concentrations. Organic vapors, measured using a PID, yielded low concentrations. Representative composite samples were sent to a commercial laboratory for analysis of chloride and TPH, which confirmed elevated chloride concentrations and low concentrations of TPH. The blended excavated soil was returned to the excavation 5 ft below ground surface (BGS). A 5-ft-deep shelf was excavated 5 ft in every direction. At 5-4 ft BGS, a 1-ft thick clay barrier was installed with a compaction test performed on 5/21/2009. The remaining backfill was blended on site with clean imported soil and returned to ground surface and contoured to the surrounding area. On 6/8/2009, the site was seeded with a blend of native vegetation and is expected to return to a productive capacity at a normal rate. To further investigate depth of chloride presence, a soil bore was initiated on 6/19/2009 at 3 ft SE of the former junction box site. The boring was advanced to a depth of 80 ft BGS with soil samples collected every 5 ft and field tested for chloride and organic vapors. Lab analysis of the 35 and 80 ft samples yielded chloride concentrations that decreased with depth and low concentrations of organics. The entire bore hole was plugged with bentonite to the ground surface. NMOCD was notified of potential groundwater impact on 3/12/09.

ADDITIONAL EVALUATION IS HIGH PRIORITY

enclosures: photos, boring log, lab results, PID (field) screenings, cross-section, compaction test, chloride curve

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

SITE SUPERVISOR Jordan Woodfin SIGNATURE Jordan Woodfin COMPANY RICE OPERATING COMPANY

REPORT ASSEMBLED BY Larry Bruce Baker Jr. INITIAL LBB

PROJECT LEADER Larry Bruce Baker Jr. SIGNATURE Larry Bruce Baker Jr. DATE 4-1-10

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

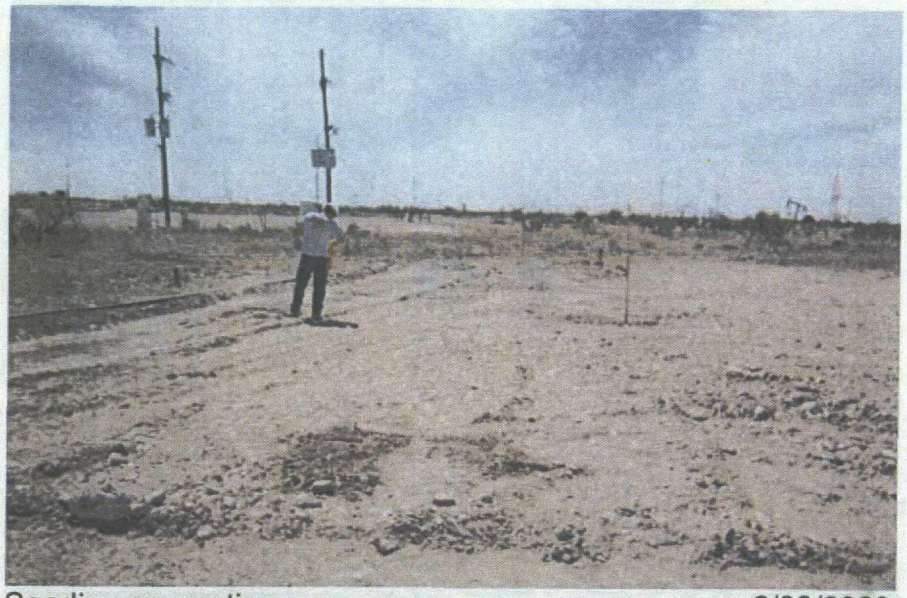
Vacuum D-31 EOL

Unit D, Section 31, T17S, R35E

Site prior to excavation 2/18/2009

Delineation trench being excavated 3/25/2009

Compaction test 5/21/2009



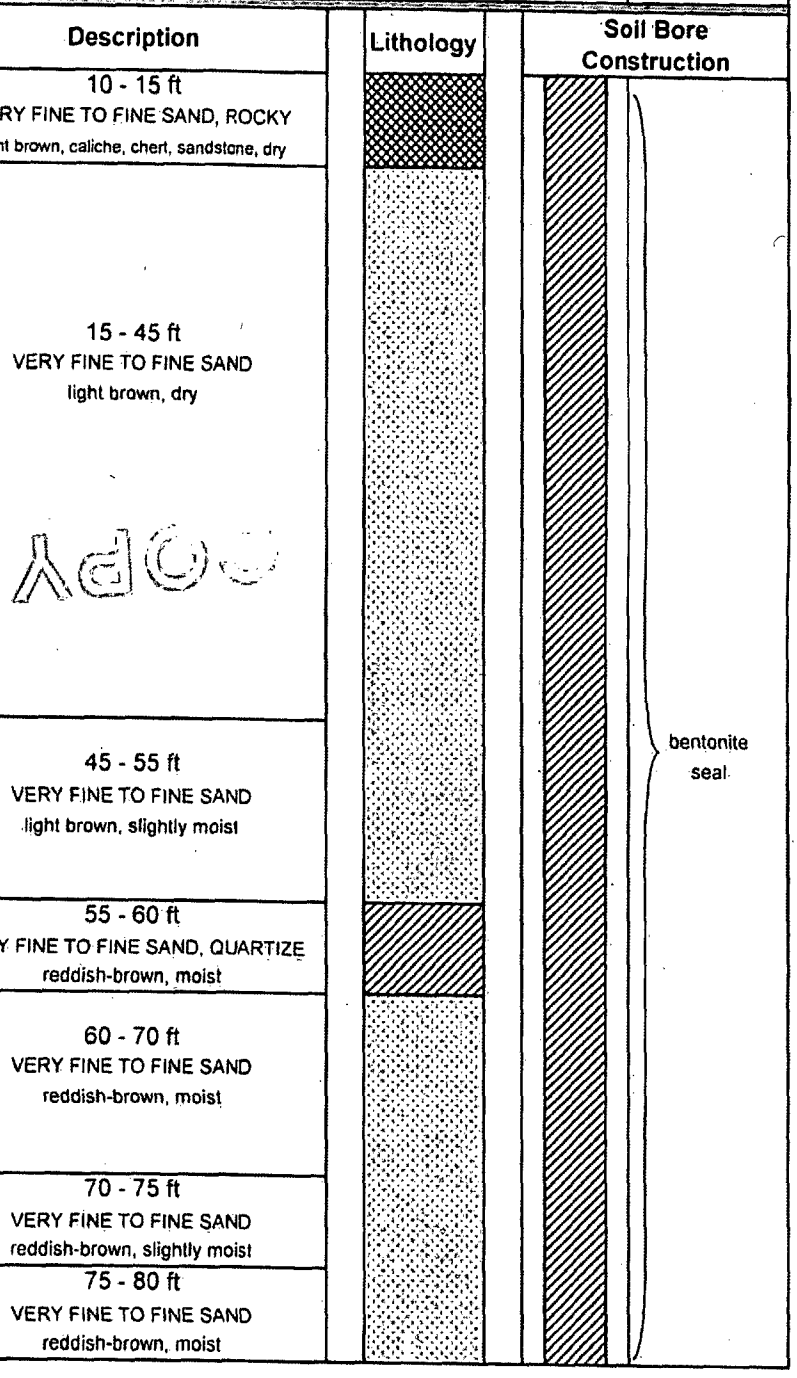
Seeding excavation 6/08/2009

Drilling Soil Bore #1 6/19/2009

plugging Soil Bore #1 with bentonite 6/19/2009

Logger:	Lara Weinheimer	**Client:** RICE Operating Company	**Well ID:** SB - 1
Driller:	Harrison & Cooper, Inc. Drilling		
Drilling Method:	Air rotary	**Project Name:** Vacuum D-31 EOL	
Start Date:	6-19-09		
End Date:	6-19-09	**Location:** Vacuum SWD System unit 'D' Sec.31 T17S, R35E Lea County, NM	
Comments: Located: 3 ft SE of the former junction box site TD = 80 ft GW = ~117 ft			

Depth (feet)	chloride field tests	PID	Description
			10 - 15 ft VERY FINE TO FINE SAND, ROCKY light brown, caliche, chert, sandstone, dry
15	861	0	
20	871	0	15 - 45 ft VERY FINE TO FINE SAND light brown, dry
25	844		
30	1393		
35	1412		
LAB	1500	GRO < 10	
		DRO < 10	
40	1338		
45	997		
50	1101		45 - 55 ft VERY FINE TO FINE SAND light brown, slightly moist
55	779		
60	525		55 - 60 ft VERY FINE TO FINE SAND, QUARTIZE reddish-brown, moist
65	531		60 - 70 ft VERY FINE TO FINE SAND reddish-brown, moist
70	510		
75	425		70 - 75 ft VERY FINE TO FINE SAND reddish-brown, slightly moist
80	300		75 - 80 ft VERY FINE TO FINE SAND reddish-brown, moist
LAB	272	GRO < 10	
		DRO < 10	



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: 06/23/09
Reporting Date: 11/09/09**
Project Owner: NOT GIVEN
Project Name: VACUUM D-31 EOL**
Project Location: VACUUM D-31 EOL**

Sampling Date: 06/19/09
Sample Type: SOIL
Sample Condition: COOL & INTACT
Sample Received By: HM
Analyzed By: AB/HM

LAB NUMBER	SAMPLE ID	GRO (C_6-C_{10}) (mg/kg)	DRO (>C_{10}-C_{28}) (mg/kg)	Cl^- (mg/kg)
ANALYSIS DATE		06/24/09	06/24/09	06/23/09
H17687-1	SB #1 @ 35'	<10.0	<10.0	1,500
H17687-2	SB #1 @ 80'	<10.0	<10.0	272
Quality Control		590	600	460
True Value QC		500	500	500
% Recovery		118	120	98.0
Relative Percent Difference		1.5	1.0	2.0

METHODS: TPH GRO & DRO: EPA SW-846 8015 M; Cl^-: Std. Methods 4500-ClB

*Analyses performed on 1:4 w:v aqueous extracts. Reported on wet weight.

**Revised Report

Chemist

11/9/09
Date

COPY

H17687 TCL 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: ROC	BILL TO
Project Manager: Herb Leuder	P.O. #:
Address:	Company:
City: State: Zip:	Attn:
Phone #: Fax #:	Address:
Project #: Project Owner:	City:
Project Name: Vacuum Jct D-31 Vacuum D-31 EOL	State: Zip:
Project Location: Vacuum Jct D-31 Vacuum D-31 EOL	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	Cl	SO4									
H17657-1	SB #1 @ 35'	C	1			X					X		11-19-09	2:15	X	X									
-2	SB #1 @ 80'	C	1			X					X		11-19-09	2:45	X	X									

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: 11-22-09	Received By:	
	Time: 12:07		
Relinquished By:	Date:	Received By:	
	Time:		

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

REMARKS: Joe Pearis called on 11/06/09 @ 1:30, email jpurvis@riceswd.com * Changed Project Name + Location to bbaker@ " Vacuum D-31 EOL lweinheimer@ "

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

Sample Condition		CHECKED BY: (Initials)
Cool	Intact	
☐ Yes ☐ No	☐ Yes ☐ No	

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

RICE OPERATING COMPANY

122 West Taylor ~ Hobbs, NM 88240
PHONE: (575) 393-9174 FAX: (575) 397-1471

PID METER CALIBRATION & FIELD REPORT FORM

CK MODEL NO.	✓	MODEL: PGM 7300	SERIAL NO: 590-000183
		MODEL: PGM 7300	SERIAL NO: 590-000504
		MODEL: PGM 7600	SERIAL NO: 110-12383
		MODEL: PGM 7600	SERIAL NO: 110-02920

GAS COMPOSITION: ISOBUTYLENE 100PPM / AIR: BALANCE

LOT NO: 08-3425	EXPIRATION DATE: 8-29-09
FILL DATE: 2-29-09	METER READING ACCURACY: 100.0

ACCURACY: +/- 2%

SYSTEM	SITE	UNIT	SECTION	TOWNSHIP	RANGE
Vacuum	Jct D-31	D	31	T17S	R35E

SAMPLE ID: Soil bore #1

DEPTH	PID
15'	0
20'	0

DEPTH	PID

DEPTH	PID

DEPTH	PID

DEPTH	PID

DEPTH	PID

DEPTH	PID

DEPTH	PID

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

Signature _____ Date 6-19-09

SITE MAP

N

CARDINAL LABORATORIES

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

ANALYTICAL RESULTS FOR
RICE OPERATING COMPANY
ATTN: JORDAN WOODFIN
122 W. TAYLOR
HOBBS, NM 88240

Receiving Date: 04/06/09
Reporting Date: 04/08/09
Project Number: NOT GIVEN
Project Name: VACUUM JCT D-31 EOL
Project Location: VACUUM JCT D-31 EOL

Sampling Date: 04/06/09
Sample Type: SOIL
Sample Condition: COOL & INTACT
Sample Received By: ML
Analyzed By: AB/TR

LAB NUMBER	SAMPLE ID	GRO (C_6-C_{10}) (mg/kg)	DRO (>C_{10}-C_{28}) (mg/kg)	Cl* (mg/kg)
ANALYSIS DATE		04/07/09	04/07/09	04/07/09
H17200-1	5PT BTM COMP	<10.0	<10.0	1,200
H17200-2	4 WALL COMP	<10.0	<10.0	672
Quality Control		547	542	500
True Value QC		500	500	500
% Recovery		109	108	100
Relative Percent Difference		3.5	3.5	< 0.1

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

COPY

Chemist

04/07/09
Date

H17200 TCL 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 OPERATING	**BILL TO**	
Project Manager:	JORDAN WOODFIN	P.O. #:	
Address:	122 W. TAYLOR ST.	Company:	
City:	HOBBS State: NM Zip: 88240	Attn:	
Phone #:	393 9174	Address:	
Project #:	Project Owner:	City:	
Project Name:	VACUUM JCT D-31 EOL	State: Zip:	
Project Location:	VACUUM JCT D-31 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	BTEX 8021B	TPH 8015M											
H17200-1	SPT BTM COMP	G	1			X					X		4-2-09	715P	X	X											
-2	1/WALL COMP	G	1			X					X		4-02-09	330P	X	X											

PLEASE NOTE: Liability and Damages. Cardinal's liability and client's exclusive remedy for any claim arising whether based in contract or tort, shall be limited to the amount paid by the client for the analyses. All claims, including those for negligence and any other cause whatsoever shall be deemed waived unless made in writing and received by Cardinal within 30 days after completion of the applicable service. In no event shall Cardinal be liable for incidental or consequential damages, including, without limitation, business interruptions, loss of use, or loss of profits incurred by client, its subsidiaries, affiliates or successors arising out of or related to the performance of services hereunder by Cardinal, regardless of whether such claim is based upon any of the above stated reasons or otherwise.

Relinquished By:	Date: 4-10-09	Received By:	Phone Result: ☐ Yes ☑ No Add'l Phone #:
JORDAN WOODFIN	Time: 5:35		Fax Result: ☑ Yes ☐ No Add'l Fax #:
Relinquished By:	Date:	Received By:	REMARKS: EMAIL RESULTS TO BBAKER@RICESWD.COM cc JPURVIS@RICESWD.COM cc JWOODFIN@RICESWD.COM
	Time:		
Delivered By: (Circle One) Sampler - UPS - Bus - Other:	Sample Condition Cool / Intact ☑ Yes ☑ Yes ☐ No ☐ No	CHECKED BY: (Initials)	

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

RICE OPERATING COMPANY

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

Check Model Number:

	Model: PGM 7300	Serial No: 590-000183		Model: PGM 7600	Serial No: 110-023920
	Model: PGM 7300	Serial No: 590-000508		Model: PGM 7600	Serial No: 110-013744
✓	Model: PGM 7300	Serial No: 590-000504		Model: PGM 7600	Serial No: 110-013676

GAS COMPOSITION: ISOBUTYLENE 100PPM / AIR: BALANCE

LOT NO: 08-3425	EXPIRATION DATE: 8-29-09
FILL DATE: 2-29-08	METER READING ACCURACY: 100

ACCURACY : +/- 2%

SYSTEM	JUNCTION	UNIT	SECTION	TOWN SHIP	RANGE
Vacuum	D-31 EA	D	-31	17S	35E

SAMPLE ID	PID	SAMPLE ID	PID
4 Wall Comp	0.5		
5pt Btm Comp	2.3		
		COPY	

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

SIGNATURE: Jordan Woolf DATE: 4-2-09

CARDINAL LABORATORIES

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

ANALYTICAL RESULTS FOR
RICE OPERATING COMPANY
ATTN: JORDAN WOODFIN
122 W. TAYLOR
HOBBS, NM 88240

Receiving Date: 04/15/09
Reporting Date: 04/17/09
Project Number: NOT GIVEN
Project Name: VACUUM JCT D-31 EOL
Project Location: VACUUM JCT D-31 EOL

Sampling Date: 04/15/09
Sample Type: SOIL
Sample Condition: COOL & INTACT
Sample Received By: ML
Analyzed By: AB/HM

LAB NUMBER	SAMPLE ID	GRO (C_6-C_{10}) (mg/kg)	DRO (>C_{10}-C_{28}) (mg/kg)	Cl* (mg/kg)
ANALYSIS DATE		04/17/09	04/17/09	04/16/09
H17243-1	BLENDED BACKFILL	<10.0	<10.0	720
Quality Control		538	538	500
True Value QC		500	500	500
% Recovery		108	108	100
Relative Percent Difference		13.9	10.5	< 0.1

METHODS: TPH GRO & DRO: EPA SW-846 8015 M; Cl: Std. Methods 4500-Cl B
*Analysis performed on a 1:4 w:v aqueous extract.

Chemist

04/17/09
Date

H17243 TCL RICE

CARDINAL LABORATORIES

101 East Marland, Hobbs, NM 88240
(575) 393-2326 Fax (575) 393-2476

Page ____ of ____

		BILL TO
Company Name: RICE OPERATING		P.O. #:
Project Manager: JORDAN WOODFIN		Company:
Address: 122 W TAYLOR		Attn:
City: HOBBS	State: NM Zip: 88240	Address:
Phone #: 393-9174	Fax #:	City:
Project #:	Project Owner:	State: Zip:
Project Name: Vacuum Jct D-31 EOL		Phone #:
Project Location: Vacuum Jct D-31 EOL		Fax #:
Sampler Name: JORDAN WOODFIN		

ANALYSIS REQUEST

LAB USE ONLY 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	Cl-	TPH 8015M
H17243-1	Blended BACKFill	C	1			X					X		4-15-09	3:45p	X	X

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.

Sampler Relinquished: JORDAN Woodfin — Date: 4-15-09 — Time: 4:28 — Received By: [signature]

Relinquished By: — Date: — Time: — Received By:

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

Temp.

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

CHECKED BY: (Initials) [initials]

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

REMARKS:
Email Results to
BBAKER@RICESWD.COM
CC JPURVIS@RICESWD.COM
CC JWOODFIN@RICESWD.COM

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

RICE OPERATING COMPANY

122 West Taylor 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: 110-013676

GAS COMPOSITION: ISOBUTYLENE 100PPM / AIR: BALANCE

LOT NO.: 08-3425	EXPIRATION DATE: 8-29-09
FILL DATE: 2-29-08	METER READING ACCURACY: 100

ACCURACY : +/- 2%

SYSTEM	JUNCTION	UNIT	SECTION	TOWN SHIP	RANGE
Vacuum	D-31 EOL	D	31	17S	35E

SAMPLE ID	PID	SAMPLE ID	PID
Blended Backfill	20		

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

SIGNATURE: Jordan Woody

DATE: 4-15-09

CARDINAL LABORATORIES

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

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

Receiving Date: 05/19/08
Reporting Date: 05/20/09
Project Number: NOT GIVEN
Project Name: VACUUM JCT D-31 EOL
Project Location: VACUUM JCT D-31 EOL

Analysis Date: 05/20/09
Sampling Date: 05/19/09
Sample Type: SOIL
Sample Condition: COOL & INTACT
Sample Received By: ML
Analyzed By: AB

LAB NO.	SAMPLE ID	Cl^- (mg/kg)
H17457-1	BLENDED BACKFILL II	256
Quality Control		500
True Value QC		500
% Recovery		100
Relative Percent Difference		2.0

METHOD: Standard Methods	4500-Cl B

Note: Analysis performed on a 1:4 w:v aqueous extract.

Chemist

Date 05/20/09

H17457 RICE

CARDINAL LABORATORIES

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

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

Company Name: RICE OPERATING
Project Manager: JORDAN WOODFEIN
Address: 122 W. TAYLOR
City: HOBBS State: NM Zip: 88240
Phone #: 393-9174 Fax #:
Project #: Project Owner:
Project Name: Vacuum Jct D-31 EOL
Project Location: Vacuum Jct D-31 EOL
Sampler Name: JORDAN WOODFIN

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

Lab I.D. (FOR LAB USE ONLY)	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	ANALYSIS REQUEST: Cl-	TPH 8015m (Cancel TPH per Bruce Stubbs)
H17457-1	Blended Backfill II	C	1			X					X		5-19-09	300p	X	X

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: 5-22-09 Time: 4:35
Received By: [signature]
Relinquished By: Date: Time:
Received By:
Delivered By: (Circle One) Sampler (circled) - UPS - Bus - Other:
Sample Condition: Cool ☑ Yes ☐ No; Intact ☑ Yes ☐ No
CHECKED BY: (Initials) [initials]

Phone Result: ☐ Yes ☐ No Add'l Phone #:
Fax Result: ☐ Yes ☐ No Add'l Fax #:
REMARKS:
EMAIL Results to:
BBAKER@RICESWD.COM
cc JPURVIS@RICESWD.COM
cc JWOODFIN@RICESWD.COM

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

RUSH!

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
X	Model: PGM 7300	Serial No: 590-000504			Model: PGM 7600	Serial No: 110-013676

GAS COMPOSITION: ISOBUTYLENE 100PPM / AIR: BALANCE

LOT NO : 083425	EXPIRATION DATE: 8-29-09
FILL DATE:2-29-08	METER READING ACCURACY: 100

ACCURACY : +/- 2%

SYSTEM	JUNCTION	UNIT	SECTION	TOWN SHIP	RANGE
Vacuum	D-31 EOL	D	31	17S	35E

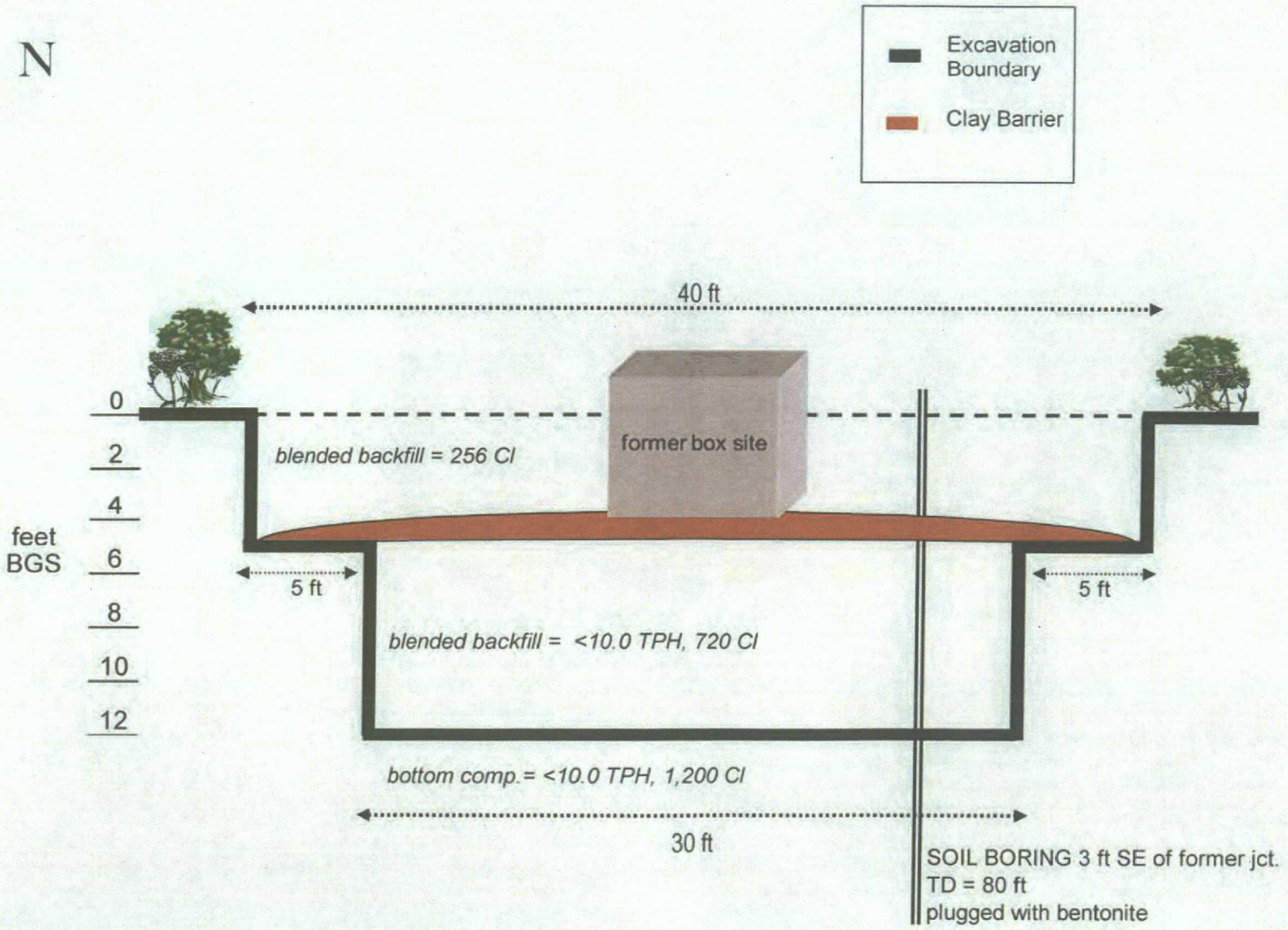
SAMPLE ID	PID	SAMPLE ID	PID
Blended Backfill #1	0.9		

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

SIGNATUE: Jaden Woolf DATE: 5-19-09

Vacuum D-31 EOL
Unit 'D' Sec. 31, T17S, R35E

Excavation Cross-Section



LABORATORY TEST REPORT
PETTIGREW & ASSOCIATES, P.A.
1110 N. GRIMES
HOBBS, NM 88240
(575) 393-9827

DEBRA P. HICKS, P.E./L.S.I.
WILLIAM M. HICKS, III P.E./L.S.

To: Rice Operating Company
Attn: Hack Conder
122 W. Taylor
Hobbs, NM 88240

Material: Cooper Red Clay

Test Method: ASTM: D 2922

Project: General Information
Project No. 2008.1069

Date of Test: ~~April 16, 2009~~ typo
5/21/09 EH

Depth: See Below

Depth of Probe: 12"

Test No.	Location	Dry Density % Max	% Moisture	Depth
SG 13	Vacuum Jct. D/31 EOL - 10' W. & 10' N. of SE Corner of Pit	90.7	16.9	5' Below Surface

COPY

Control Density: 100.4
ASTM: D 698

Optimum Moisture: 21.6%

Required Compaction: 90 - 95%

Densometer ID: 815

Lab No.: 09 3200-3201

PETTIGREW & ASSOCIATES

Copies To: Rice Operating

BY: Debra P. Hicks

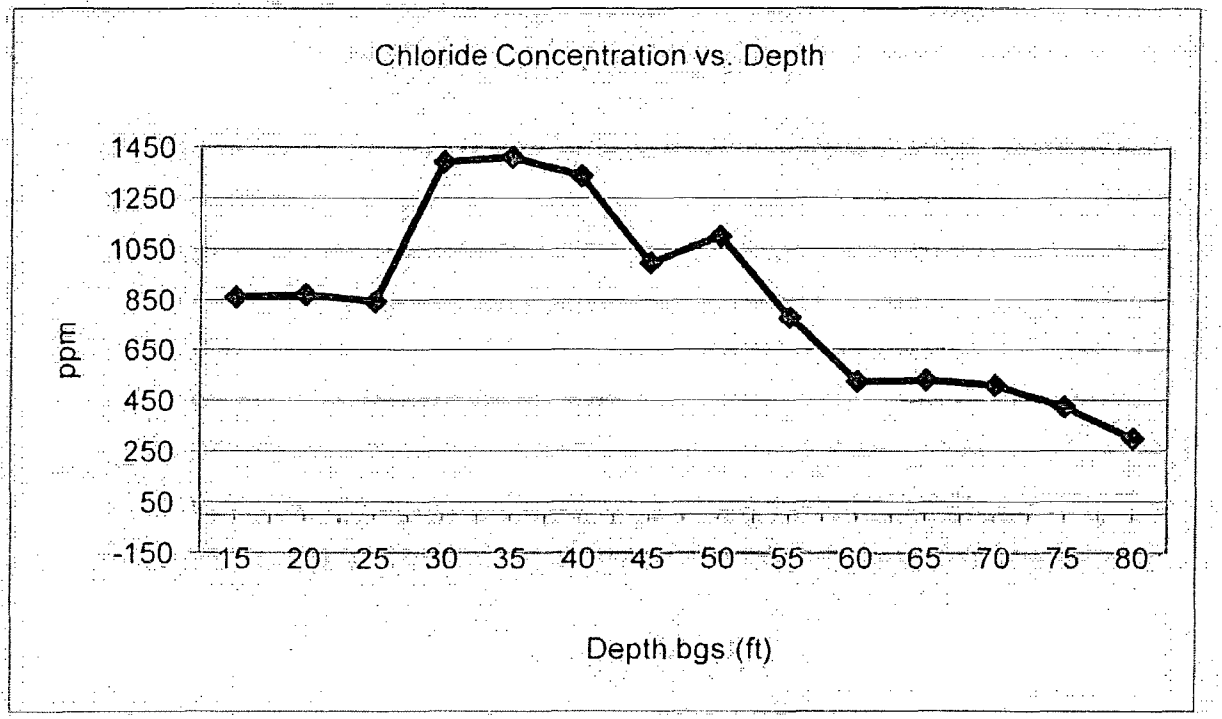
BY: _____ P.E.

Vacuum D-31 EOL

Unit 'D', Sec. 31, T17S, R35E

SOIL BORING samples at 3 ft southeast of the junction (source)

Depth bgs (ft)	[Cl] ppm
15	861
20	871
25	844
30	1393
35	1412
40	1338
45	997
50	1101
55	779
60	525
65	531
70	510
75	425
80	300



Groundwater = 117 ft

Appendix B

Documentation of CAP activities

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

112 West Taylor
Hobbs, NM 88240
Phone: (575) 393-9174
Fax: (575) 393-0293

REVEGETATION FORM

1. General Information

Site Name: **Vacuum D-31 EOL**						
U/L **D**	Section **31**	Township **18S**	Range **37E**	County **Lea**	Latitude **N 32.79713**	Longitude **W 103.50246**
Contact Name: **Bruce Baker**						
Email: bbaker@riceswd.com						
Site size: **(99'x105') 10,395** square feet				Map detail of site attached ☐		
Additional information:						

2. Soils

Salvaged from site ☒	Bioremediated ☐	Imported ☒	Blended ☐	Depth (in.):
Texture: **sandy**	Describe soil and subsoil: **caliche**			
Soil prep methods:	Rip ☐ Depth (in.):	Disc ☒ Depth (in.): **3 in.**		Rollerpack ☐
Date complete: **2/15/2011**				

3. Bioremediation

Fertilizer ☐ Type: Lbs/acre:	Hay ☒	Other ☐ Describe:

4. Seeding

Custom seed mix ☒	Prescribed mix ☐	Seed mix name:	Seeding date: **2/15/2011**
Broadcast ☒ Method: portable seeder			
Soil conditions during seeding: Dry ☒ Damp ☐ Wet ☐			
Photos attached ☒		Observations: **5 lbs blue gramma and 10 lbs winter wheat**	

5. Certification

Name: **Robert Harrison**	Title: **Environmental Tech**	Date: **2/15/2011**
Signature: *not available*		

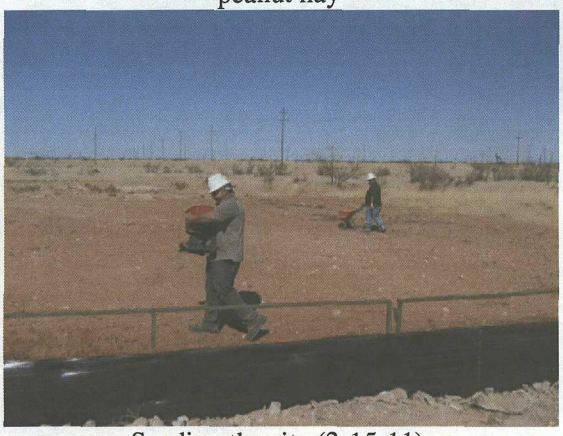
Vacuum D-31 EOL
Unit D, Section 31, T-17-S, R-35-E

Importing the top soil with peanut hay mix

Spreading the top soil with peanut hay mix

Completed the spreading of the top soil and peanut hay

Discing the site for seeding (2-15-11)



Seeding the site (2-15-11)

Completed CAP work (2-15-11)

Appendix C

Multimed Exposure Assessment

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

MULTIMED V1.01 DATE OF CALCULATIONS: 9-MAY-2011 TIME: 15: 4:23

U. S. E N V I R O N M E N T A L P R O T E C T I O N A G E N C Y

E X P O S U R E A S S E S S M E N T

M U L T I M E D I A M O D E L

MULTIMED (Version 1.50, 2005)

1
Run options
--- -------

Chemical simulated is Chloride

Option Chosen Saturated and unsaturated zone models
Run was DETERMIN
Infiltration Specified By User: 4.800E-03 m/yr
Run was transient
Well Times: Entered Explicitly
Reject runs if Y coordinate outside plume
Reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model
1
1
UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	240
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1
NVFLAYR	- Number of layers in flow model	1

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system
1

Layer information

LAYER NO.	LAYER THICKNESS	MATERIAL PROPERTY
1	24.38	1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS			LIMITS
			MEAN	STD DEV	MIN	MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	3.60	-999.	-999.	-999.
Unsaturated zone porosity	--	CONSTANT	0.250	-999.	-999.	-999.
Air entry pressure head	m	CONSTANT	0.700	-999.	-999.	-999.
Depth of the unsaturated zone	m	CONSTANT	24.4	0.000	0.000	0.000

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS			LIMITS
			MEAN	STD DEV	MIN	MAX
Residual water content	--	CONSTANT	0.116	-999.	-999.	

-999.						
	Brook and Corey exponent,EN	--	CONSTANT	-999.	-999.	-999.
-999.						
	ALFA coefficient	1/cm	CONSTANT	0.500E-02	-999.	-999.
-999.						
	Van Genuchten exponent, ENN	--	CONSTANT	1.09	-999.	-999.
-999.						

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

NLAY	- Number of different layers used		1
NTSTPS	- Number of time values concentration calc		40
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		2
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		2
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	0.0
WTFUN	- Weighting factor	--	1.2

OPTIONS CHOSEN

Convolution integral approach
Nondecaying pulse source
Computer generated times for computing concentrations

1

DATA FOR LAYER 1

VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS			LIMITS
			MEAN	STD DEV	MIN	MAX

Thickness of layer	m	CONSTANT	24.4	-999.	-999.
-999.					
Longitudinal dispersivity of layer	m	DERIVED	-999.	-999.	-999.
-999.					
Percent organic matter	--	CONSTANT	0.000	-999.	-999.
-999.					
Bulk density of soil for layer	g/cc	CONSTANT	1.83	-999.	-999.
-999.					
Biological decay coefficient	1/yr	CONSTANT	0.000	-999.	-999.
-999.					

1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS		
			MEAN	STD DEV	MIN
LIMITS					
MAX					
Solid phase decay coefficient	1/yr	CONSTANT	0.000	-999.	-999.
-999.					
Dissolved phase decay coefficient	1/yr	CONSTANT	0.000	-999.	-999.
-999.					
Overall chemical decay coefficient	1/yr	CONSTANT	0.000	-999.	-999.
-999.					
Acid catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	-999.
-999.					
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000	-999.	-999.
-999.					
Base catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000	-999.	-999.
-999.					
Reference temperature	C	CONSTANT	25.0	-999.	-999.
-999.					
Normalized distribution coefficient	ml/g	CONSTANT	0.000	-999.	-999.
-999.					
Distribution coefficient	--	DERIVED	-999.	-999.	-999.
-999.					
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000	-999.	-999.
-999.					
Air diffusion coefficient	cm2/s	CONSTANT	-999.	-999.	-999.
-999.					
Reference temperature for air diffusion	C	CONSTANT	-999.	-999.	-999.
-999.					

Molecular weight	g/M	CONSTANT	-999.	-999.	-999.
-999.					
Mole fraction of solute	--	CONSTANT	-999.	-999.	-999.
-999.					
Vapor pressure of solute	mm Hg	CONSTANT	-999.	-999.	-999.
-999.					
Henry`s law constant	atm-m^3/M	CONSTANT	-999.	-999.	-999.
-999.					
Overall 1st order decay sat. zone	1/yr	DERIVED	0.000	0.000	0.000
1.00					
Not currently used		CONSTANT	0.000	0.000	0.000
0.000					
Not currently used		CONSTANT	0.000	0.000	0.000
0.000					

1

SOURCE SPECIFIC VARIABLES

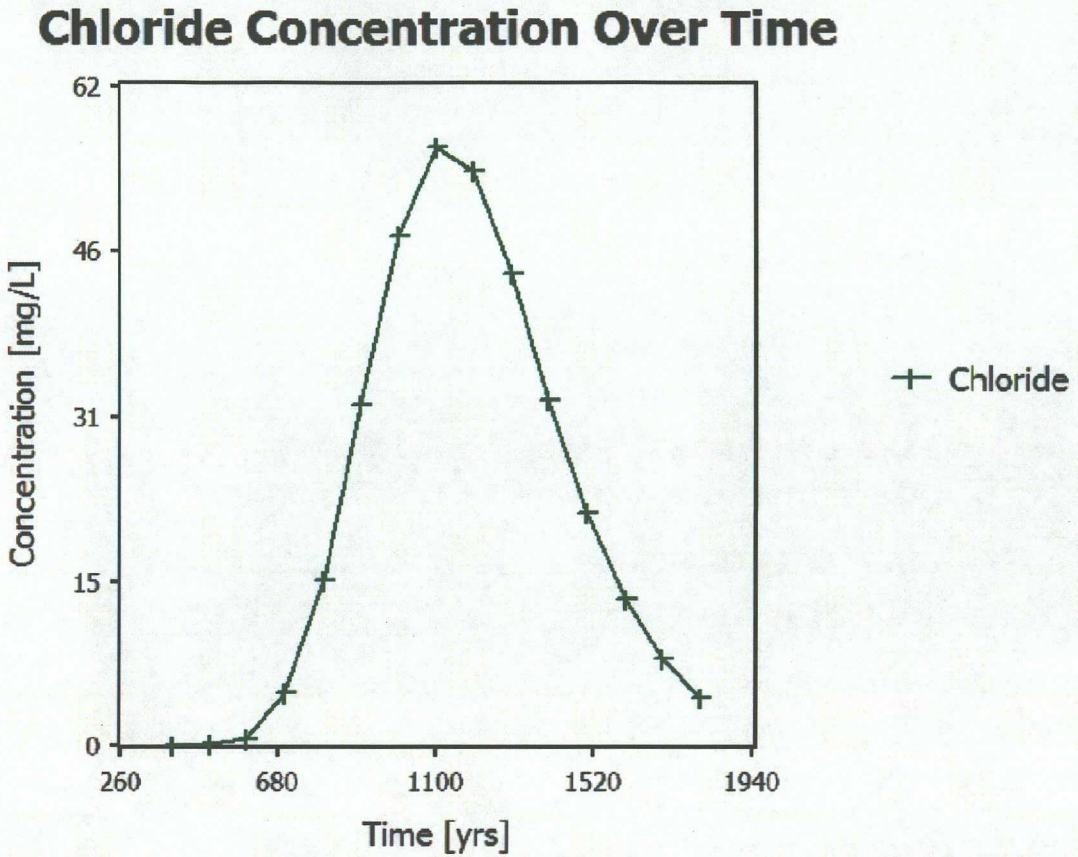
VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS			LIMITS
			MEAN	STD DEV	MIN	MAX
Infiltration rate	m/yr	CONSTANT	0.480E-02	-999.	-999.	-999.
Area of waste disposal unit	m^2	DERIVED	0.139E+04	-999.	-999.	-999.
Duration of pulse	yr	DERIVED	50.0	-999.	-999.	-999.
Spread of contaminant source	m	DERIVED	-999.	-999.	-999.	-999.
Recharge rate	m/yr	CONSTANT	0.000	-999.	-999.	-999.
Source decay constant	1/yr	CONSTANT	0.000	0.000	0.000	0.000
Initial concentration at landfill	mg/l	CONSTANT	850.	-999.	-999.	-999.
Length scale of facility	m	CONSTANT	9.14	-999.	-999.	-999.
Width scale of facility	m	CONSTANT	9.14	-999.	-999.	-999.
Near field dilution		DERIVED	1.00	0.000	0.000	1.00

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS		LIMITS	
			MEAN	STD DEV	MIN	MAX
Particle diameter	cm	CONSTANT	-999.	-999.	-999.	-999.
Aquifer porosity	--	CONSTANT	0.300	-999.	-999.	-999.
Bulk density	g/cc	CONSTANT	1.70	-999.	-999.	-999.
Aquifer thickness	m	CONSTANT	9.14	-999.	-999.	-999.
Source thickness (mixing zone depth)	m	DERIVED	3.00	-999.	-999.	-999.
Conductivity (hydraulic)	m/yr	CONSTANT	30.0	-999.	-999.	-999.
Gradient (hydraulic)		CONSTANT	0.300E-02	-999.	-999.	-999.
Groundwater seepage velocity	m/yr	DERIVED	-999.	-999.	-999.	-999.
Retardation coefficient	--	DERIVED	-999.	-999.	-999.	-999.
Longitudinal dispersivity	m	FUNCTION OF X	-999.	-999.	-999.	-999.
Transverse dispersivity	m	FUNCTION OF X	-999.	-999.	-999.	-999.
Vertical dispersivity	m	FUNCTION OF X	-999.	-999.	-999.	-999.
Temperature of aquifer	C	CONSTANT	20.0	-999.	-999.	-999.
pH	--	CONSTANT	7.00	-999.	-999.	-999.
Organic carbon content (fraction)		CONSTANT	0.000	-999.	-999.	-999.
Well distance from site	m	CONSTANT	1.00	-999.	-999.	-999.
Angle off center	degree	CONSTANT	0.000	-999.	-999.	-999.

Well vertical distance m CONSTANT 0.000 -999. -999. -999.
1

TIME	CONCENTRATION
0.400E+03	0.00000E+00
0.500E+03	0.15476E+00
0.600E+03	0.60119E+00
0.700E+03	0.49888E+01
0.800E+03	0.15548E+02
0.900E+03	0.31980E+02
0.100E+04	0.47912E+02
0.110E+04	0.56206E+02
0.120E+04	0.53983E+02
0.130E+04	0.44302E+02
0.140E+04	0.32540E+02
0.150E+04	0.21954E+02
0.160E+04	0.13851E+02
0.170E+04	0.82227E+01
0.180E+04	0.45251E+01


Chloride Concentration Over Time
62
46
31
15
0
Concentration [mg/L]
260
680
1100
1520
1940
Time [yrs]
Chloride