1R - 428-43

REPORTS

DATE:

3-31-08

Hobbs O-29 Vent

1R 428-43

CLOSURE

3-31-08

Hobbs O-29 Vent

CLOSURE

RICE OPERATING COMPANY

JUNCTION BOX CLOSURE REPORT

BOX LOCATION

SWD SYSTEM	JUNCTION	UNIT	SECTION	TOWNSHIP	RANGE	COUNTY	BOX DIMENSIONS - FEET		
							Length	Width	Depth
Hobbs	O-29 vent (#1R428-43)	O	29	18S	38E	Lea	no box--System abandoned		

COPY

LAND TYPE: BLM ______ STATE ______ FEE LANDOWNER Occidental Petroleum (Oxy) OTHER ______

Depth to Groundwater 66 feet NMOCD SITE ASSESSMENT RANKING SCORE: 10

Date Started 11/4/2004 Date Completed 8/22/2007 NMOCD Witness no

Soil Excavated 0 cubic yards Excavation Length n/a Width n/a Depth n/a feet

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

General Description of Remedial Action:

This junction box site was delineated using a soil boring according to the Investigation and Characterization Plan submitted by R.T. Hicks Consultants (2004). The Corrective Action Plan (CAP) for this site was verbally approved by NMOCD on 7/18/2007 and confirmed via email on 8/8/2007. The former box site was backfilled with clean, imported topsoil on 8/22/2007 and additional soil was spread on the surface. The site was then seeded with a blend of native vegetation and is expected to return to productive capacity at a normal rate. The enclosed Hicks report (December 2007) documents the fulfillment of the approved CAP and requests closure of this site.

enclosures as stated

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

REPORT ASSEMBLED BY Kristin Farris Pope SIGNATURE *Kristin Farris Pope*

DATE 11/28/2007 TITLE Project Scientist

R. T. HICKS CONSULTANTS, LTD.

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

December 4, 2007

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

RE: NMOCD Case #1R428-43, O-29-Vent
Hobbs SWD System Abandonment
Closure Report

Dear Mr. Hansen:

This letter and Appendices are the final Closure Report for the O-29 Vent. The NMOCD approved Corrective Action Plan (Section 4.0, page 3) included creating an infiltration barrier and re-vegetation of the ground surface at the O-29 Vent. Appendix A includes the junction box closure form. Appendix B provides photographs of the re-vegetation at the site. Appendix C includes copies of previous submissions and the NMOCD approval email.

We respectfully request NMOCD approve site closure in writing. Thank you for your attention to this matter.

Sincerely,
R.T. Hicks Consultants, Ltd.

Katie Lee

Katie Lee
Staff Scientist

Copy: Rice Operating Company
Hobbs NMOCD Office

[illegible]

[illegible]

[illegible]

[illegible] OPERATING COMPANY

JUNCTION BOX CLOSURE REPORT

BOX LOCATION

[illegible]	[illegible]	LOT	SECTION	TOWNSHIP	RANGE	COUNTY	BOX DIMENSIONS (FT)		
							Length	Width	Depth
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

LAND TYPE: BLM ____ STATE ____ FEE LANDOWNER ____ [illegible] ____ OTHER ____

[illegible] ____ [illegible] ____ [illegible] RANKING SCORE: 10

Date Started [illegible] Date Completed [illegible] [illegible] [illegible]

Soil Excavated ____ [illegible] cubic yards Excavation Length [illegible] Width [illegible] Depth [illegible] [illegible]

Soil Disposed ____ [illegible] cubic yards Offsite Facility n/a Location n/a

General Description of Remedial Action:

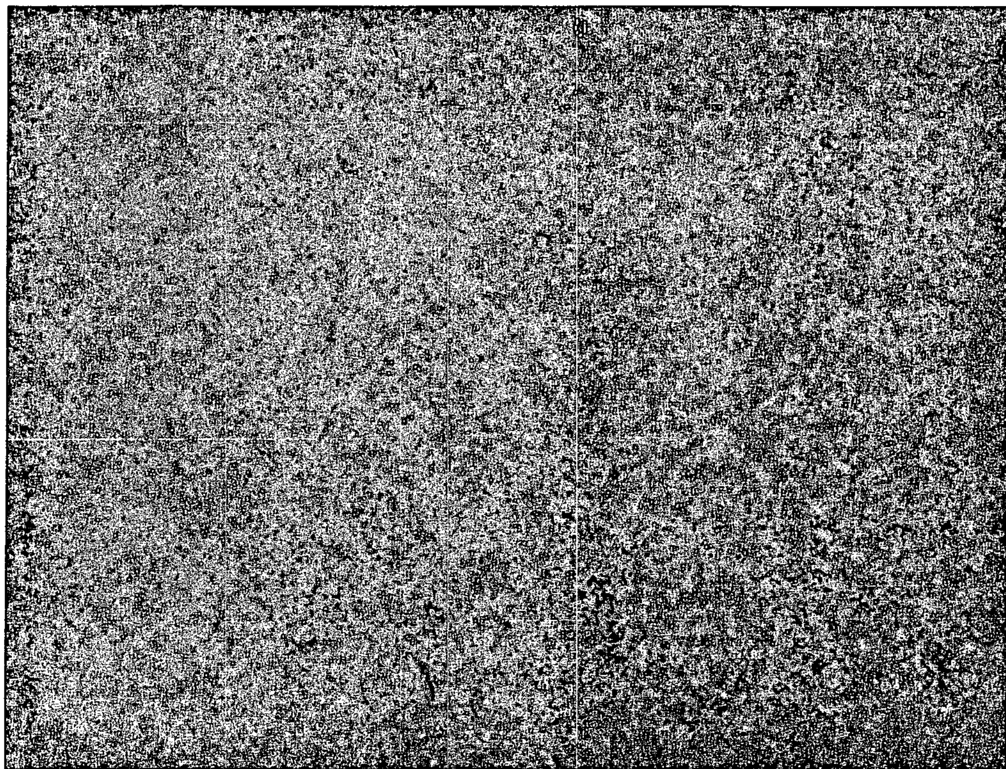
[illegible]

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

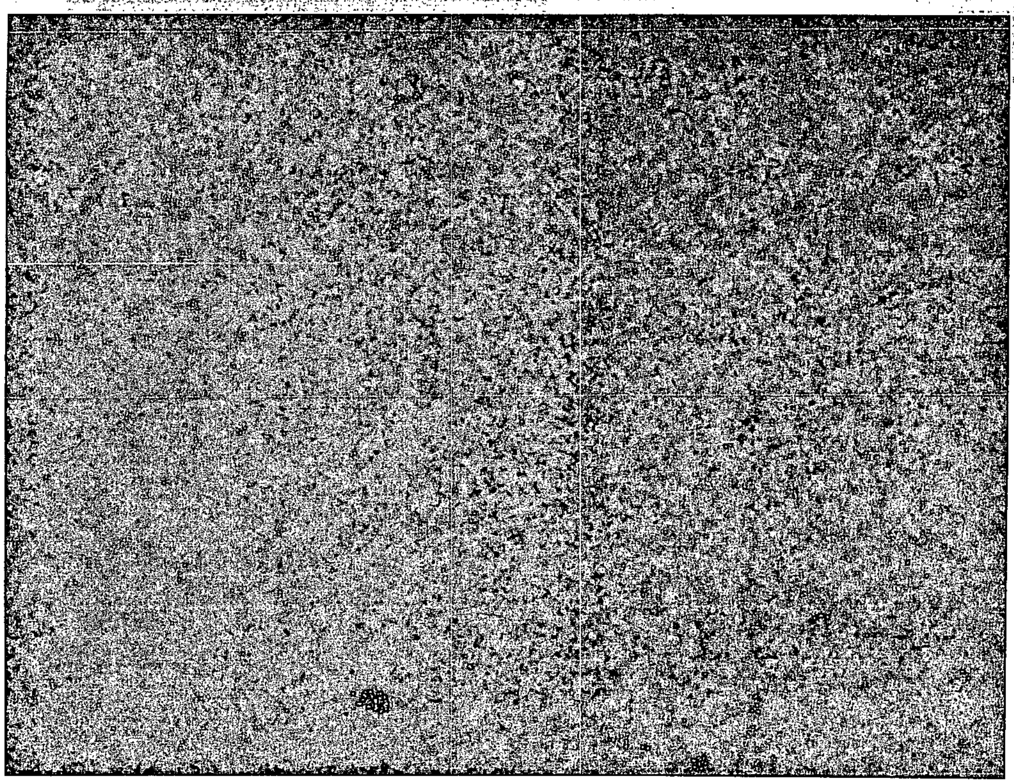
REPORT ASSEMBLED BY [illegible] SIGNATURE [illegible]

DATE [illegible] TITLE [illegible]

Appendix B – Photographs Documenting Re-Vegetation at O-29 Vent



Figures 1 & 2: Views of O-29-Vent showing re-vegetation



[illegible]

Katie Lee

From: Kristin Pope [kpope@riceswd.com]
Sent: Wednesday, October 31, 2007 3:30 PM
To: Katie Lee
Subject: Fw: Summary of July 18 meeting

----- Original Message -----
From: Hansen, Edward J., EMNRD
To: Kristin Pope
Cc: Carolyn Haynes ; Scott Curtis ; Sanchez, Daniel J., EMNRD ; Price, Wayne, EMNRD
Sent: Wednesday, August 08, 2007 11:26 AM
Subject: RE: Summary of July 18 meeting

Kristin,
Your summary appears to be accurate and complete.
Attached is the summary that you sent with comments from me [OCD case #s and formal (email) approval dates].
I'll be sending more formal (via email) approvals for the closures and some of the CAPs soon.
Also, I will review and comment on the other CAPs and the APs a.s.a.p.

Thanks for the summary.
Let me know if you have any questions regarding my comments.

Edward J. Hansen
Hydrologist
Environmental Bureau
505-476-3489

From: Kristin Pope [mailto:kpope@riceswd.com]
Sent: Wednesday, August 08, 2007 10:34 AM
To: Sanchez, Daniel J., EMNRD; Price, Wayne, EMNRD; Hansen, Edward J., EMNRD
Cc: Carolyn Haynes; Scott Curtis
Subject: Summary of July 18 meeting

Gentlemen,

Please review the attached summary of our July 18 meeting. Please let me know if anything needs to be changed. OCD and ROC have already moved forward with several of the projects listed but I would like written confirmation for our files. Thanks again for your time.

Kristin Farris Pope
Project Scientist
RICE Operating Company
Hobbs, New Mexico
(505) 393-9174

OCD/ROC MEETING SUMMARY July 18, 2007

CLOSURES

1. Abatement Completion Report for BD Zachary Hinton EOL submitted by R.T. Hicks Consultants on 3/15/2007. AP-50

2. Abatement Completion Report for EME Marathon Barber (jct. E-5) submitted by R.T. Hicks Consultants on 5/16/2007. 1R0427-91 *Approved soil work completed Dec. 2006*

3. Closure Report for Hobbs I-29 EOL boot submitted by R.T. Hicks Consultants on 5/23/2007. Approved soil work completed in 2006. 1R428-42

4. Closure Request for BD jct. N-29 submitted by R.T. Hicks Consultants on 2/10/2007. #1R0426-37

APPROVALS

1. Stage 1&2 Abatement Plan for Vacuum F/G-35 SWD submitted by R.T. Hicks Consultants; proof of public notice submitted Feb. 2006; AP-59
   Vadose zone remedy complete; reclaiming surface; groundwater treatment ongoing at F-35; evaluating treatment potential at G-35

2. INVESTIGATION & CHARACTERIZATION PLANS (ICP)
   NMOCD Approved (1 – 14) via email August 6, 2007

   1. Hobbs O-5 Historical Release by Hicks on 4/11/2007 #1R428-69
   2. EME State 'H' EOL by P. Galusky on 5/1/2007 #1R427-15
   3. Justis E-1 vent by Highlander on 11/29/2006. #1R0432-06
   4. Vacuum State 'P' EOL by Galusky on 4/20/07 #1R425-26
   5. Vacuum jct. F-31-1 by Hicks on 4/17/07. #1R425-27
   6. BD P-26-1 vent by Trident on 2/12/2007. #1R0426-106
   7. BD jct. P-26-2 by Trident on 2/12/2007. #1R0426-107
   8. Hobbs jct. E-4, M-4 vent, & N-4 vent (1 plan) by Hicks on 4/17/07 #1R428-71, #1R428-76, #1R428-68, respectively
   9. EME L-6 boot by Trident on 12/1/2006. #1R0427-09
   10. EME B-8 leak by Trident on 12/1/2006. #1R0480
   11. EME jct. F-18 by Arcadis on 7/6/2007 #1R427-16
   12. BD jct. F-25-1 by Arcadis on 7/12/2007 #1R426-10
   13. EME L-15-1 vent by Galusky on 7/16/2007 #1R427-173
   14. EME State 'Q' EOL boot by Galusky on 7/16/2007 #1R427-174

3. Corrective Action Plan (CAP) for Hobbs E-15 SWD submitted on 11/28/2006 by Arcadis G&M. *Approved with clay or GCL condition* #1R428-40
   NMOCD Approved with conditions via email July 27, 2007

4. CAP for Hobbs F-29-1b boot submitted by R.T. Hicks Consultants on 4/2/2007. #1R428-45

5. CAP for Hobbs O-29 vent submitted by R.T. Hicks Consultants on 4/2/2007. #1R428-43

6. CAP for Hobbs I-29 vent submitted by R.T. Hicks Consultants on 4/13/2007. #1R428-41

7. CAP for Hobbs jct. E-33-1 submitted by R.T. Hicks Consultants on 1/2/2007. #1R428-67

8. CAP for Hobbs B-32 boot submitted by R.T. Hicks Consultants on 1/22/2007. #1R428-57

9. CAP for Hobbs jct. E-32-1 submitted by R.T. Hicks Consultants on 1/22/2007. #1R428-65

10. CAP for Hobbs F-33 vent submitted by R.T. Hicks Consultants on 1/22/2007. #1R428-58

11. CAP for EME A-2 leak submitted by Highlander on 5/23/2007. # 1R0427-62 *condition: install clay at 4 ft instead of 3 ft as proposed*

12. CAP for jct. A-2-1 submitted by Highlander on 5/23/2007. # 1R0427-177 *condition: install clay at 4 ft instead of 3 ft as proposed*

13. CAP for EME I-1 off-site encroachment submitted by Trident on 2/27/07. #1R0464

Rule 19 ABATEMENT PLANS
OCD granted approval to install monitoring wells as proposed while reviewing plans for administrative completeness:

1. Stage 1 & 2 Abatement Plan for Hobbs F-29 SWD submitted on 10/27/2006 by R.T. Hicks Consultants. *Public notice ready to submit upon approval.* AP-64

2. Stage 1 Abatement Plan for EME C-16(1) leak submitted on 5/25/2007 by L. Peter Galusky; #1R0476 *Public notice ready to submit upon approval.*

3. Stage 1 Abatement Plan for EME C-16(2) leak submitted on 5/25/2007 by L. Peter Galusky; #1R0477 *Public notice ready to submit upon approval.*

4. Stage 1&2 Abatement Plan for BD Santa Rita release site submitted on 12/11/2006 by Trident. AP-58 *want to drill more MWs*

5. Stage 1&2 Abatement Plan for EME jct. M-16-1 submitted on 1/29/2007 by Arcadis G&M. AP-42

6. Stage 1&2 Abatement Plan for EME jct. A-20 submitted on 1/29/2007 by Arcadis G&M. AP-43

7. Stage 1 Abatement Plan for BD H-35 pit submitted by Arcadis G&M on 3/23/2007. #1R0216

8. Stage 1 & 2 Abatement Plan for Justis jct. L-1 boot submitted by Highlander on 1/17/07. AP-48

OCD WILL REVIEW

1. Stage 1 Final Report & Closure Request for EME jct. K-33-1 submitted by Whole Earth on 12/28/2006. AP-60
   OCD requests confirmation of regional gradient/impact

2. CAP for EME M-5 SWD submitted by Hicks on 9/10/2004. #1R424

3. Rule 19 Release and CAP for soil for BD jct. F-17 submitted by Highlander on 8/30/06. *Additional information requested by OCD was submitted on 12/29/06 and presented at meeting on 2/21/2007.* AP-47

4. Request for Release from Rule 19 for EME H-13 release submitted on 8/30/2006 by Highlander Environmental. AP-44
   Additional information requested by OCD was submitted on 12/29/06 and presented at meeting on 2/21/2007. Showed current site photos.

5. Final Investigation Report & CAP for EME jct. K-6 submitted by Trident on 3/7/2007. AP-46.

OTHER

1. CAP for BD K-4 leak submitted by Highlander on 4/23/2007. #1R0459
   APPROVAL to begin pumping from MW-1 as proposed;
   OCD will evaluate CAP (soil work)

2. CAP for BD O-17-1 vent submitted by Highlander on 5/11/2007. #1R426-12
   No groundwater impact; soil work only
   ROC WILL REVISE AND RE-SUBMIT FOR CLARIFICATION

3. GEOSYNTHETIC CLAY LINER (GCL) option for Junction Box Upgrade Program
Modification request required; can be emailed.
NMOCD Approved with conditions via email July 27, 2007

A

Corrective Action Plan

0-29 Vent Site

Section 29, T18S, R 38E

NMOCD Case #: 1-R0428-45

Prepared for:

Rice Operating Company
122 West Taylor
Hobbs, NM 88240

R.T. Hicks Consu
901 Rio Grande Blvd. N
Albuquer

Table of Contents

Plates

Appendices

1.0 INTRODUCTION

The O-29 Vent, located west of Hobbs, New Mexico, in section 29, T18S, R38E, was a junction box in the Hobbs Salt Water Disposal (SWD) system, which disposed of produced water from the late 1950s until 2002, when the system closed. Future impacts from the system are not possible. With the abandonment of the system in 2002, Rice Operating Company (ROC) excavated and removed the SWD O-29 Vent and the uppermost three feet of the vadose zone. At the time of investigation, the excavation was filled with a mixture of sand-caliche. Activities at the site followed the NMOCD-approved workplan (August 6, 2004).

This Corrective Action Plan presents:

1) A description of the characterization activities performed by R.T. Hicks Consultants (Hicks Consultants) and Rice Operating Company (ROC) at the O-29 Vent site located in the Hobbs SWD,
2) Evaluations and conclusions drawn from activities performed,
3) A proposal for closure of the site after the selected remedy is implemented.

2.0 WORK ELEMENTS PERFORMED

Detailed descriptions of characterization activities are provided in Appendix A. Appendix B shows the results of field chloride measurements. Plate 1 is an aerial photograph of the site when it was active, taken between 1996 and 1998, showing the locations of the boring and background boring.

Activities included:

1. O-29 soil boring characterization.
2. Background soil boring characterization.
3. Field measurements consisted of chloride titration and PID readings for volatiles.
4. Two selected soil samples were submitted for laboratory

analysis in accordance with the workplan.

5. HYDRUS-1D simulation of the site.
6. Development of a corrective action plan.

3.0 CONCLUSIONS

3.1 ACTIVITIES AT THE O-29 VENT HAVE NOT CAUSED COCs TO REACH GROUND WATER.

From chloride concentration and PID measurement profiles (confirmed by laboratory analysis), Hicks Consultants concludes that saturated conditions between the surface and ground water never developed, that constituents of concern (COCs) reside in the upper two-thirds of the vadose zone and, therefore, that activities at this site have not caused COCs to reach ground water.

3.2 CHLORIDE CONCENTRATIONS WILL NOT EXCEED WQCC GROUND WATER STANDARDS.

Using highly conservative input data, HYDRUS-1D modeling of the vadose zone chlorides predicts that resulting ground water chloride concentrations will be below the 250 ppm Water Quality Control Commission (WQCC) secondary drinking water standard. At a nearby background monitoring well, over four years of data show that chloride concentration ranges from 111 mg/L to 301 mg/L, with an average concentration of 159 mg/L. The predicted chloride concentration increase at the O-29 site (42 mg/L) could not be differentiated from natural vegetation. The model inputs and methodology are discussed in Appendix C.

3.3 THE SITE PRESENTS NO THREAT TO FRESH WATER, PUBLIC HEALTH OR THE ENVIRONMENT.

Because residual petroleum hydrocarbons and chloride are not present in sufficient concentration or sufficient mass, Hicks Consultants concluded that the site represents no threat to fresh water, public health, or the environment (see discussion in Appendix A and Appendix C).

4.0 RECOMMENDATION

Hicks Consultants recommends that ROC create an infiltration barrier through re-vegetation of the ground surface at the O-29 Vent site. This remedy is protective of ground water quality, human health, and the environment. Upon documentation of this action, a closure report/request will be submitted to NMOCD.

Details of Characterization Activities At the O-29 Vent Site

APPENDIX A

1) O-29 SOIL BORING CHARACTERIZATION

The boring at the O-29 Vent site was drilled in November, 2004, to a depth of 65 feet within the capillary fringe at this site. Plate 2 illustrates the lithology and distribution of constituents of concern. From 0–35 feet below ground surface (bgs), the split spoon obtained samples at 5-foot intervals.

The dry and unconsolidated nature of the sand-silt from 35–60 feet bgs caused the loss of split-spoon samples during retrieval (with the exception of a caliche layer at 46 feet bgs that was successfully sampled with the split spoon).

Due to increased soil moisture at 60 feet bgs, the split spoon was able to retain samples to the total depth of 65 feet. In the interval between 35 feet bgs and 60 feet bgs, samples were collected from cuttings. This is the only material deviation from the NMOCD-approved workplan. Moist soil was observed at 65 feet bgs and depth to water was estimated at approximately 66 feet. The boring was plugged with Bentonite.

2) BACKGROUND SOIL BORING CHARACTERIZATION

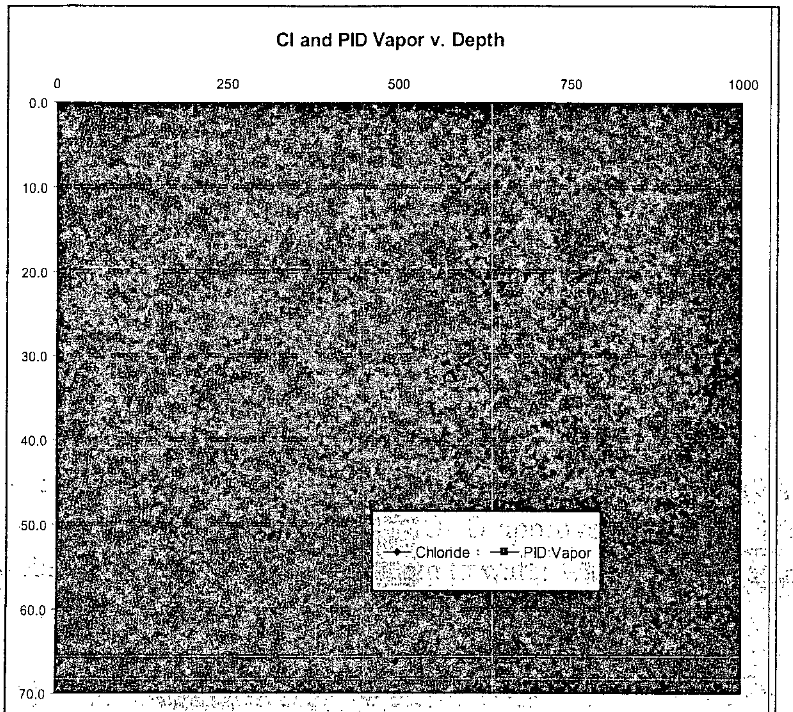
Samples taken from a background boring located about 4000 feet north-west of the site show that background chloride concentrations in the area are approximately 80 mg/kg. Appendix B presents the field data from this boring.

3) FIELD MEASUREMENTS

ROC took field measurements from each 5-foot sampling interval for chloride and volatiles in the field using the heated headspace method to measure total organic vapors by photoionization detector (PID). Samples were submitted to a laboratory from depths showing the highest field chloride and PID measurements (16 feet bgs) and from the capillary fringe (65 feet bgs); see Figure A-1. Plate 2 is a lithologic log of the boring with field chloride concentrations and PID measurements. Appendix B provides additional chemical data for the soil samples.

The maximum chloride concentration in the soil is 539 ppm at 16 feet bgs and chloride declines with depth, as shown by Figure A-1.

Figure A-1: Chloride Concentrations and PID Readings From Soil Boring Samples, 0-29 Vent Site, November 4, 2004



Chloride concentrations reach approximate background levels at a depth of 56 feet bgs. Field evidence demonstrates that the chloride mass resides in the upper two-thirds of the vadose zone.

PID readings follow a pattern similar to that of chloride, peaking at 16 feet bgs with 804 ppm total organic vapors, and reaching background concentrations below 30 feet bgs.

Laboratory analysis of the soil sample from 16 feet bgs showed benzene, toluene, ethylbenzene and xylene (BTEX) are present in total aggregate concentration below 50 ppm (Table A-1).

Table A-1: Laboratory Analysis Results of Samples From the O-29 Boring.

SWD B-5 (O-29 Vent), November, 2004				
Constituent of Concern	16 ft. bgs	Detection Limit	65 ft. bgs	Detection Limit
	mg/kg (dry)			
Benzene	0.257	0.2	ND	0.025
Toluene	2.61		ND	
Ethyl benzene	5.4		ND	
Xylene (p/m)	25.8		ND	
Xylene (o)	2.55		ND	

BTEX was not detected in field laboratory analysis of the soil sample from the capillary fringe (65 feet bgs).

Field Measurements & Laboratory Results For Soil Samples

0-29 Vent

Soil Bore

System: Hobbs Location: Vent 0-29 GW: 65 Landowner: Oxy

Soil Bore: @ Vent 0-29 GPS: Coord. System UTM 13 671817 E

UL/ O Sec. 29 T 18 R 38 Map Datum Nad83 3620861 N

Depth	Cl.		PID		Color	Time
6'	146		387		Tan Caliche Strong Smell	
11'	734		200		" "	
16'	539		804		" "	3:28
21'	359		126		Brown Caliche Some smell	
26'	317		64.8		Tan Sandy Caliche Some smell	
31'	353		73		Tan Sandy Caliche	
36'	281		23.2		Tan Sandy Caliche & Rock	
41'	198		18.8		Red Sand	
46'	135		8.3		Pink fine caliche	
51'	272		27.0		" "	
56'	136		34.1		" "	
61'	111		12.0		" "	
65'	72		13.9		Pink Tan caliche & Sand	
					Some moisture	4:37

Notes: Got moisture @ 65' Took pictures @ bore

Signature [signature] Date 11/4/04

Rice Operating Co.
122 W. Taylor
Hobbs NM, 88240

Project: Vent O-29
Project Number: None Given
Project Manager: Roy Rascon

Fax: (505) 397-1471

Reported:
11/15/04 16:41

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
SB @ 16'	4K10010-01	Soil	11/04/04 15:28	11/10/04 07:50
SB @ 65'	4K10010-02	Soil	11/04/04 16:33	11/10/04 07:50

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NOV 19 2004
RICE OPERATING
HOBBS, NM

12600 West I-20 East - Odessa, Texas 79705 - (432) 563-1800 - Fax (432) 563-1713

Rice Operating Co.
122 W. Taylor
Hobbs NM, 88240

Project: Vent O-29
Project Number: None Given
Project Manager: Roy Rascon

Fax: (505) 397-1471
Reported:
11/15/04 16:41

Organics by GC

Environmental Lab of Texas

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
SB @ 16' (4K10010-01) Soil									
Benzene	0.257	0.200	mg/kg dry	200	EK41501	11/12/04	11/12/04	EPA 8021B	
Toluene	2.61	0.200	"	"	"	"	"	"	
Ethylbenzene	5.40	0.200	"	"	"	"	"	"	
Xylene (p/m)	25.8	0.200	"	"	"	"	"	"	
Xylene (o)	2.55	0.200	"	"	"	"	"	"	
Surrogate: a,a,a-Trifluorotoluene		*156 %*	*80-120*		"	"	"	"	S-04
Surrogate: 4-Bromofluorobenzene		*140 %*	*80-120*		"	"	"	"	S-04
Gasoline Range Organics C6-C12	1480	10.0	mg/kg dry	1	EK41006	11/10/04	11/11/04	EPA 8015M	
Diesel Range Organics >C12-C35	3130	10.0	"	"	"	"	"	"	
Total Hydrocarbon C6-C35	4610	10.0	"	"	"	"	"	"	
Surrogate: 1-Chlorooctane		*122 %*	*70-130*		"	"	"	"	
Surrogate: 1-Chlorooctadecane		*121 %*	*70-130*		"	"	"	"	
SB @ 65' (4K10010-02) Soil									
Benzene	ND	0.0250	mg/kg dry	25	EK41501	11/12/04	11/12/04	EPA 8021B	
Toluene	ND	0.0250	"	"	"	"	"	"	
Ethylbenzene	ND	0.0250	"	"	"	"	"	"	
Xylene (p/m)	ND	0.0250	"	"	"	"	"	"	
Xylene (o)	ND	0.0250	"	"	"	"	"	"	
Surrogate: a,a,a-Trifluorotoluene		*96.2 %*	*80-120*		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		*108 %*	*80-120*		"	"	"	"	
Gasoline Range Organics C6-C12	ND	10.0	mg/kg dry	1	EK41006	11/10/04	11/11/04	EPA 8015M	
Diesel Range Organics >C12-C35	ND	10.0	"	"	"	"	"	"	
Total Hydrocarbon C6-C35	ND	10.0	"	"	"	"	"	"	
Surrogate: 1-Chlorooctane		*103 %*	*70-130*		"	"	"	"	
Surrogate: 1-Chlorooctadecane		*116 %*	*70-130*		"	"	"	"	

RECEIVED
NOV 19 2004
RICE OPERATING
HOBBS, NM

12600 West I-20 East - Odessa, Texas 79705 - (432) 563-1800 - Fax (432) 563-1713

Operating Co. 122 W. Taylor Hobbs NM, 88240	Project: Vent O-29 Project Number: None Given Project Manager: Roy Rascon	Fax: (505) 397-1471 Reported: 11/15/04 16:41

General Chemistry Parameters by EPA / Standard Methods
Environmental Lab of Texas

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
SB @ 16' (4K10010-01) Soil									
Chloride	510	20.0	mg/kg Wet	2	EK41210	11/10/04	11/11/04	SW 846 9253	
% Moisture	12.0		%	1	EK41101	11/10/04	11/11/04	% calculation	
SB @ 65' (4K10010-02) Soil									
Chloride	ND	20.0	mg/kg Wet	2	EK41210	11/10/04	11/11/04	SW 846 9253	
% Moisture	10.0		%	1	EK41101	11/10/04	11/11/04	% calculation	

RECEIVED
NOV 19 2004
RICE OPERATING
HOBBS, NM

12600 West I-20 East - Odessa, Texas 79705 - (432) 563-1800 - Fax (432) 563-1713

Modeling Input Parameters & Results

APPENDIX C

To model the effect of the vadose zone remedy's impact on ground water at the O-29 Vent site, output from HYDRUS-1D is used as input to a ground water mixing model.

HYDRUS-1D modeling simulated fluxes through the vadose zone. The HYDRUS-1D output becomes the input to a simple ground water mixing model to predict chloride concentration in a simulated monitoring well immediately down-gradient of the site. Section 3.0 of "Modeling Study of Produced Water Release Scenarios" (Hendrickx, et al.; 2005) provides a general description of this modeling approach (see Appendix D for reference works cited).

The observed vadose zone chloride profile was installed in the model. The present chloride load within the soil profile is the result of all previous events at the site and is based upon field observation and analysis producing the most accurate modeling approach.

The O-29 Vent field chloride data were integrated over the vertical depth of the vadose zone to obtain a chloride load of 9.54 kg/m2. The integrated chloride load of a nearby site is 7.89 kg/m2. Because the sites have similar chloride loads and soil properties, Hicks Consultants elected to modify the model of this nearby site to represent the O-29 Vent site. Site specific parameters were altered to represent the properties and dimensions of the O-29 Vent site. As chloride is conserved during migration through the vadose zone, the mixing model output was multiplied by a scaling factor (9.54/7.89 = 1.21) to obtain predicted chloride concentrations in the aquifer for the O-29 Vent site.

INPUT DATA:

Modeling inputs for the O-29 Vent site are presented in Table C-1.

Table C-1: HYDRUS-1D and Mixing Model Input Parameters

Input Parameter	Source
Vadose zone thickness - 60 feet	Field data and professional judgement
Vadose zone texture (Plate 3)	Field data
Dispersion length: <6% of model length	Professional judgement
Climate	2004 Hobbs, NM, data and Pearl Weather Station data
Soil moisture	HYDRUS-1D initial condition simulation
Initial soil chloride concentration profile	From ROC field measurements
Length of release parallel to ground water flow: 15 feet	ROC Field measurement
Background chloride in ground water: 100 ppm	Chemical analysis
Ground water flux: 8.6 cm/day	Calculated from published data
Aquifer thickness: 10 feet	Conservative choice

SOIL PROFILE

The modified model was constructed with a vadose zone soil profile representative of an excavated site (0 to 19 feet bgs). Although the O-29 Vent site was not excavated, this choice is considered conservative of ground water quality in that the upper 19 feet of the soil profile have been replaced with materials featuring higher hydraulic conductivities than the native materials (caliche) at the O-29 Vent site (See Plate 3).

Vadose zone thickness is 65 feet at the O-29 Vent site. The modified model uses a thickness of 60 feet. This primary effect of this difference is to reduce time of transit of infiltrated water through the vadose zone.

DISPERSION LENGTHS

Because of Hicks Consultants' recent experience with similar soils conservative dispersion lengths were employed. Standard practice calls for employing a dispersion length that is 10% of the model length. For each lithologic unit identified in Plate 3, a dispersion length less than 6% of the model thickness was installed (Table C-2 presents the dispersion lengths for each lithology).

Table C-2: Dispersion Lengths

O-29 Hydrus-1D Soil Profile Properties				
Material	Description	Length (cm)	Dispersion (cm)	% of Profile Length
1	Sandy loam	30	50	2.78
2	Caliche-sand	60	30	1.67
3	Caliche	90	10	0.56
4	Sand-silt	1070	100	5.56
5	Loamy sand	550	100	5.56

CLIMATE

Weather data used in the predictive modeling include Hobbs data from November, 2003, to December, 2004, plus an additional 45 years from the Pearl Weather Station, approximately 11 miles west of the Hobbs Airport. The Pearl Weather Station is the closest station to the O-29 Vent site featuring sufficiently complete weather data for the HYDRUS-1D input files.

SOIL MOISTURE

An initial soil moisture condition was obtained running a HYDRUS-1D simulation for 45 years using the weather data from the Pearl Weather Station. Because soils are relatively dry in this climate and vadose zone hydraulic conductivity varies with moisture content, it is important that simulation experiments of different remedial strategies begin with an initial "steady state" soil moisture content. Vegetation was not allowed in order to create a "wetter" initial condition. This choice is conservative of ground water quality in that "wetter" soils have greater hydraulic conductivities.

The calculation of soil moisture content begins with an initial soil moisture input estimated by professional judgment. Then, sufficient years of weather data are run through the model to establish a "steady state" moisture content. Because only minimal changes in the HYDRUS-1D soil moisture content profile occurred after year 30 of the initial condition calculation, a 45 year simulation was considered acceptable to establish the initial moisture condition. Soil profiles hydrated in this manner were used in all simulations of chloride movement.

INITIAL CHLORIDE PROFILE

From the observed field data generated by ROC personnel, linearly interpolated chloride concentrations were assigned to the model's more finely spaced nodes of the hydrated soil profile.

MIXING MODEL INPUTS:

INFLUENCE DISTANCE

As the vent was oriented vertically, the affected surface area is small. Significant lateral impacts were not observed, and the disturbed area was measured as 11 feet by 15 feet.The affected diameter of the site parallel to ground water flow was taken as 15 feet to be conservative of ground water quality.

BACKGROUND CHLORIDE CONCENTRATION

From nearby well data, a value of 100 mg/L chloride for ground water was used for the predictive modeling.

HYDRAULIC CONDUCTIVITY

Hicks Consultants believes that the hydraulic conductivity of the saturated zone at the O-29 Vent site is similar to that observed for the Ogallala Aquifer throughout the general area. McAda (1984) simulated water level declines using a two-dimensional digital model and employed hydraulic conductivity values of 51-75 feet/day (1.9 E-4 to 2.8 E-4 m/s) in the area. According to Freeze and Cherry (1979), these values correspond to clean sand, which agrees with nearby lithologic descriptions of the saturated zone. A value of 45 feet/day was assumed for hydraulic conductivity of the uppermost saturated zone to be conservative of ground water quality.

GROUNDWATER GRADIENT

A hydraulic gradient of 0.0063 was calculated for this site (Intera Report and USGS Topographic Map). Using a hydraulic conductivity of 45 ft/day, ground water flux is calculated as 8.6 cm/day.

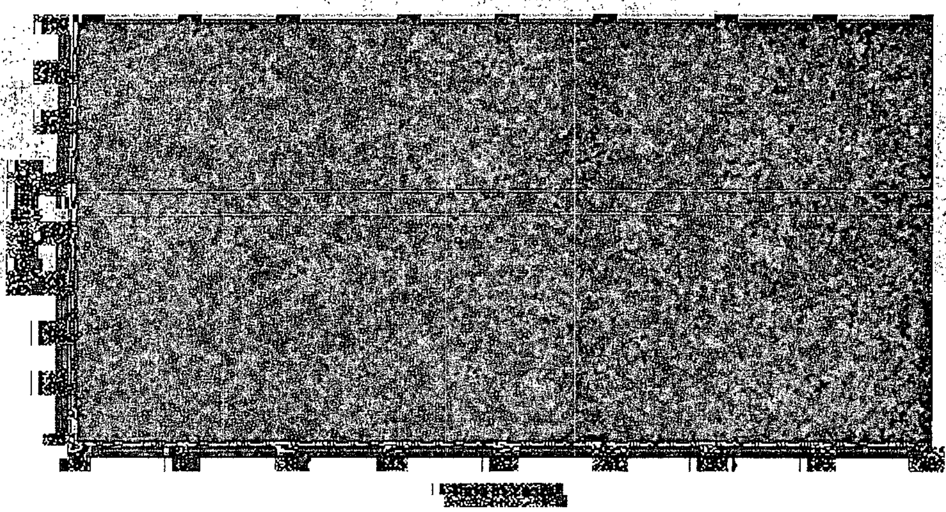
AQUIFER THICKNESS

Field data within Section 29 demonstrate that the aquifer is greater than 40 feet thick. A restricted aquifer thickness of 10 feet was employed in the mixing model in accordance with OCD request. This choice is conservative of ground water quality as it results in higher predicted chloride concentrations in a simulated monitoring well.

MODELING RESULTS:

Using the input data described above, HYDRUS-1D and the ground water mixing model predict no exceedance of WQCC ground water standards at the O-29 Vent site (see Figure C-1). For this simulation, it was assumed that no vegetation is present at the site.

Figure C-1: Predicted Chloride Concentration in the Aquifer for the O-29 Site with No Vegetation



As field chloride data demonstrate, impacts at this site are marginally greater than background; thus, an insignificant impact to ground water quality would be expected. As shown in Figure C-1, chloride concentration in the aquifer attains a maximum of 142 ppm approximately 13 years from now. The effect of the chloride load is no longer distinguishable 29 years from now.

Chloride concentration in ground water varies in response to natural causes. At a nearby background monitoring well, over four years of data show that chloride concentration ranges from 111 mg/L to 301 mg/L with an average concentration of 159 mg/L and a standard deviation of 59 mg/L. Therefore, the predicted chloride concentration increase at the O-29 site (42 mg/L) could not be differentiated from natural variation.

Works Consulted

APPENDIX D

Ash, S.R., 1963, Ground water conditions in northern Lea County, U.S. Geological Survey Hydrologic Investigations Atlas HA-62.

Hendrickx, J., Rodriguez, G., Hicks, R. T., and Simunek, January 2005, Modeling Study of Produced Water Release Scenarios, API Publication Number 4734, 11 pp.

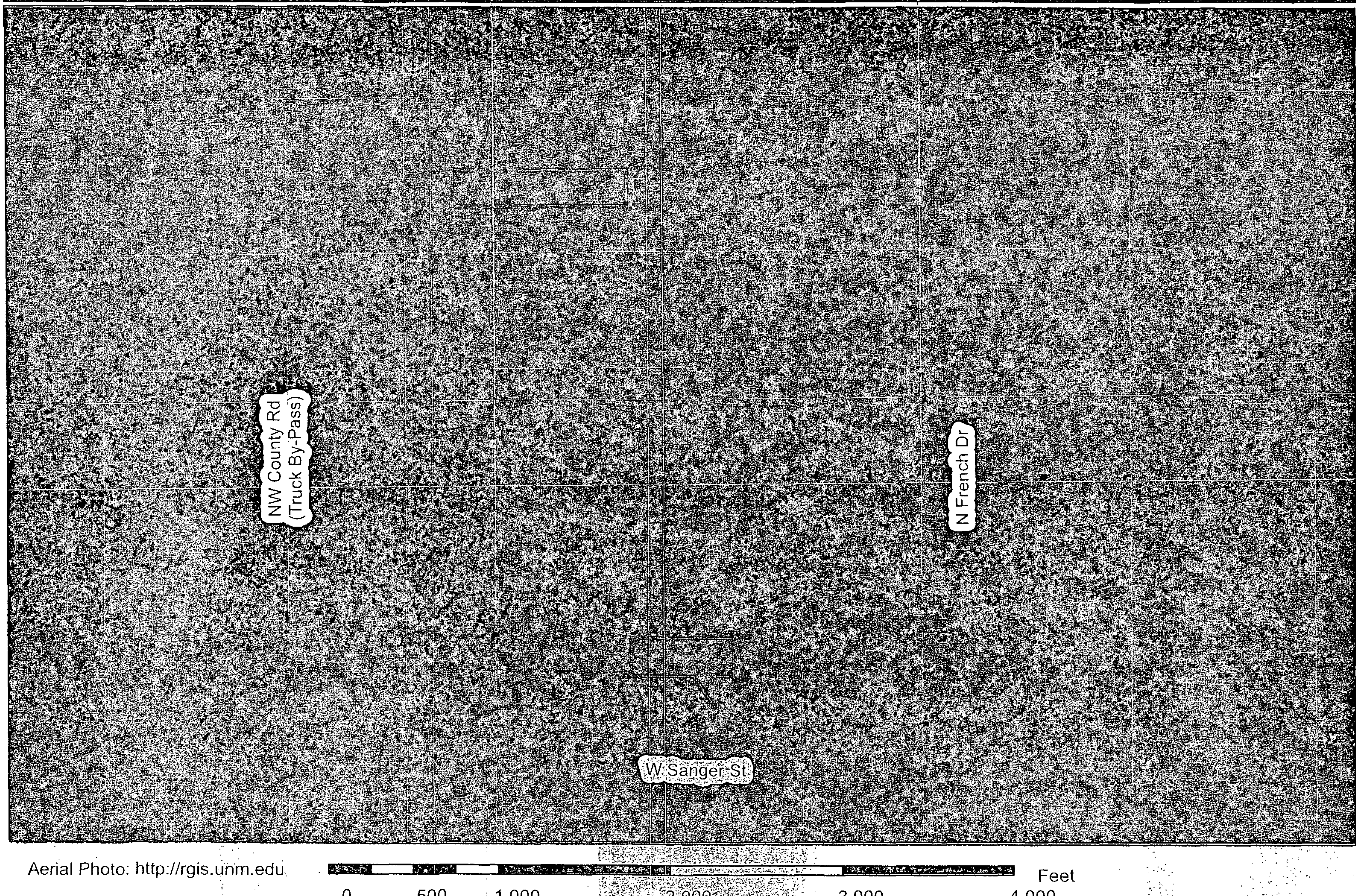
Intera Incorporated, July 8, 2003, Windmill Oil Site Ground Water Sampling Results, prepared for the New Mexico Oil Conservation Division, 3 pp.

McAda, D.P., 1985, Projected water-level declines in the Ogallala aquifer in Lea County, New Mexico, US Geological Survey Water-Resources Investigations Report 84-4062, 84 pp.

Musharrafieh, G. and Chudnoff, M., January 1999, Numerical Simulation of Groundwater Flow for Water Rights Administration in the Lea County Underground Water Basin New Mexico, New Mexico Office of the State Engineer Technical Report 99-1, 6 pp.

Nicholson Jr., A. and Clebsch, A., 1961, Geology and Ground Water Conditions of Southern Lea County, New Mexico, Ground Water Report 6, US Geological Survey, New Mexico Bureau of Mines and Mineral Resources.

[illegible] [redacted] [illegible]



Aerial Photo: http://rgis.unm.edu

R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	2004 Aerial Photograph showing the O-29 Vent Site	Plate 1
	Rice Operating Company: O-29 Vent Site (NMOCD#: 1R0428-43)	March 2007

Logger:	David Hamilton	**Client:**	**Boring ID:**
Driller:	Eades Drilling	Rice Operating Company	
Drilling Method:	Air Rotary	**Project Name:**	
Start Date:	11/4/2004	O-29 Vent	
End Date:	11/4/2004	**Location:**	O-29 Vent Site B-5 (65 feet)
		T18S R38E	
		Section 29, Unit O	

Depth (feet)	Description	Lithology	Comments	Field data Depth	Chloride mg/kg	PID
0.0	Sand silt, caliche, tan, 0-17 feet		Discolored, strong odor			
2.0						
4.0						
6.0				6.0	146	387.0
8.0						
10.0				11.0	334	200.0
12.0						
14.0						
16.0	Well indurated caliche, 17-20 feet			16.0	539	804.0
18.0			Hard drilling with chattering of bit			
20.0	Very fine grained sand silt, some caliche, tan, 20-27 feet			21.0	354	126.0
22.0			Tan-yellow color			
24.0						
26.0	Very fine grained sand silt, tan-red, 27-42 feet			26.0	317	64.8
28.0						
30.0				31.0	353	7.3
32.0						
34.0						
36.0				36.0	281	23.2
38.0						
40.0				40.0	198	18.8
42.0	V. f, grained sand silt, caliche, tan, 42-44 ft.					
44.0	Well indurated caliche, very fine grained sand silt, tan, 44-51 feet		Split spoon could only collect 0,5 ft. sample			
46.0				46.0	135	8.3
48.0						
50.0	Very fine grained sand , tan , 51-60 feet			51.0	272	27.0
52.0						
54.0				56.0	126	34.1
56.0						
58.0						
60.0	Very fine grained sand silt, 60-65 feet			61.0	111	12.0
62.0			Split spoon sample taken at 63-65 feet, soil damp. Hole backfilled with bentonite.			
64.0				65.0	72	13.9
66.0						

R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 505-266-5004	**O-29 Vent**	**Plate 2**
	Exploratory Boring	**March 2007**

HYDRUS-1D Vadose Zone Soil Profile	Client: Rice Operating Company	Location: T18S R38E Section 29
	Project Name: O-29 Vent	

Depth (feet)	Description	Model Profile	Depth (feet)
0.0	Sandy loam 0-1 feet		0.0
2.0			2.0
4.0			4.0
6.0			6.0
8.0	Loamy sand, 1-19 feet		8.0
10.0			10.0
12.0			12.0
14.0			14.0
16.0			16.0
18.0	Sand, silt 19-20feet		18.0
20.0	Caliche, 20-22 feet		20.0
22.0			22.0
24.0			24.0
26.0			26.0
28.0	Sand, silt 22-34 feet		28.0
30.0			30.0
32.0			32.0
34.0	Caliche, 34-35 feet		34.0
36.0			36.0
38.0	Sand, silt, 35-45 feet		38.0
40.0			40.0
42.0			42.0
44.0	Sand , caliche, 45-47 feet		44.0
46.0			46.0
48.0			48.0
50.0			50.0
52.0	Sand, silt, 47-60 feet		52.0
54.0			54.0
56.0			56.0
58.0			58.0
60.0			60.0

R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 505-266-5004	**O-29 Vent Site**	**Plate 3** **March, 2007**

R. T. HICKS CONSULTANTS, LTD.

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

October 20, 2004

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

RE: Hobbs SWD System Abandonment
Potential Groundwater-Impacted Junction Box Sites
Case 1R0414

Dear Mr. Price

This letter serves as our notification for conducting field work associated with the above-referenced project. We will commence field work on November 2.

As discussed in our approved workplan, we have identified five sites that are representative of the system and we plan to install one boring at each site. These five sites are:

1. I-29 Vent Produced Water Pipeline Vent 18S.38E.29.I
2. I-29 EOL Boot End of Line Boot 18S.38E,29.I
3. O-29 Vent Produced Water Pipeline Vent 18S.38E.29.O
4. F-29-1A Junction Box 18S.38E.29.F
5. F-29-1B Produced Water Pipeline Boot 18S.38E.29.F

Below, we outline our approach as described in the workplan and in response to your August 6, 2004 conditional approval.

1. We will locate the vertical definition sampling borehole as close as practical to the suspected release source.
2. From each boring, we will obtain a split-spoon soil sample every five or ten feet throughout the entire vadose zone (ground surface to ground water).
3. We will evaluate these discrete samples, the borehole drilling characteristics, and drill cuttings to develop a lithologic profile of the vadose zone.
4. We will employ standard methods, as described in the Junction Box Replacement Program Plan, to evaluate all soil samples in the field for chloride content, TPH and volatile organic constituent content.
5. We will submit at least one soil sample from each boring to a qualified laboratory for evaluation of chloride and BTEXN (benzene, toluene, ethylbenzene, xylene, naphthalene). The field geologist will identify samples for laboratory analysis after review of the field analysis of chloride, TPH and VOCs. For all borings, we will submit the deepest sample for laboratory analysis of these constituents.

6. The geologist will select two samples from the first boring and two samples from the fourth boring for laboratory analysis of soil moisture content and bulk density.
7. We will obtain a background soil sample at a depth of about 5 feet at a location 300 feet from any visible or suspected surface releases.
8. If field analyses of a borehole show chloride concentrations are consistently greater than 3 times background from ground surface to ground water, we will conclude that periodic discharges from the source created saturated conditions in the past. For any borehole that encounters these potential saturated conditions, we will continue drilling through the saturated zone to the top of the Dockum Group red beds, which form the base of the aquifer in this area. If the saturated thickness of the aquifer in this boring is less than 25 feet, we will install a 2-inch monitoring well with five feet of screen above the water table and 15 feet below the water table, in a manner consistent with industry standards (see NMOCD, ASTM or EPA publications).
9. If the saturated thickness of the aquifer is greater than 25 feet we will install one well screen as described above and a second 5-foot screen above the top of the Dockum Group red beds.
10. We will sample any ground water monitoring wells using micro-purge and "no-purge" techniques to collect two separate samples from this "flow through" monitoring well. We will collect a water sample just below the air water interface, which will be employed for evaluation of any impact from a release of hydrocarbons as well as chloride and TDS. At the bottom of the aquifer we will obtain a second sample, which we will test for chloride TDS.
11. We expect no material horizontal migration from these potential release sites. If previous excavation work did not provide adequate horizontal characterization, we will provide a protocol for such characterization after our evaluation of these vertical delineation borings.

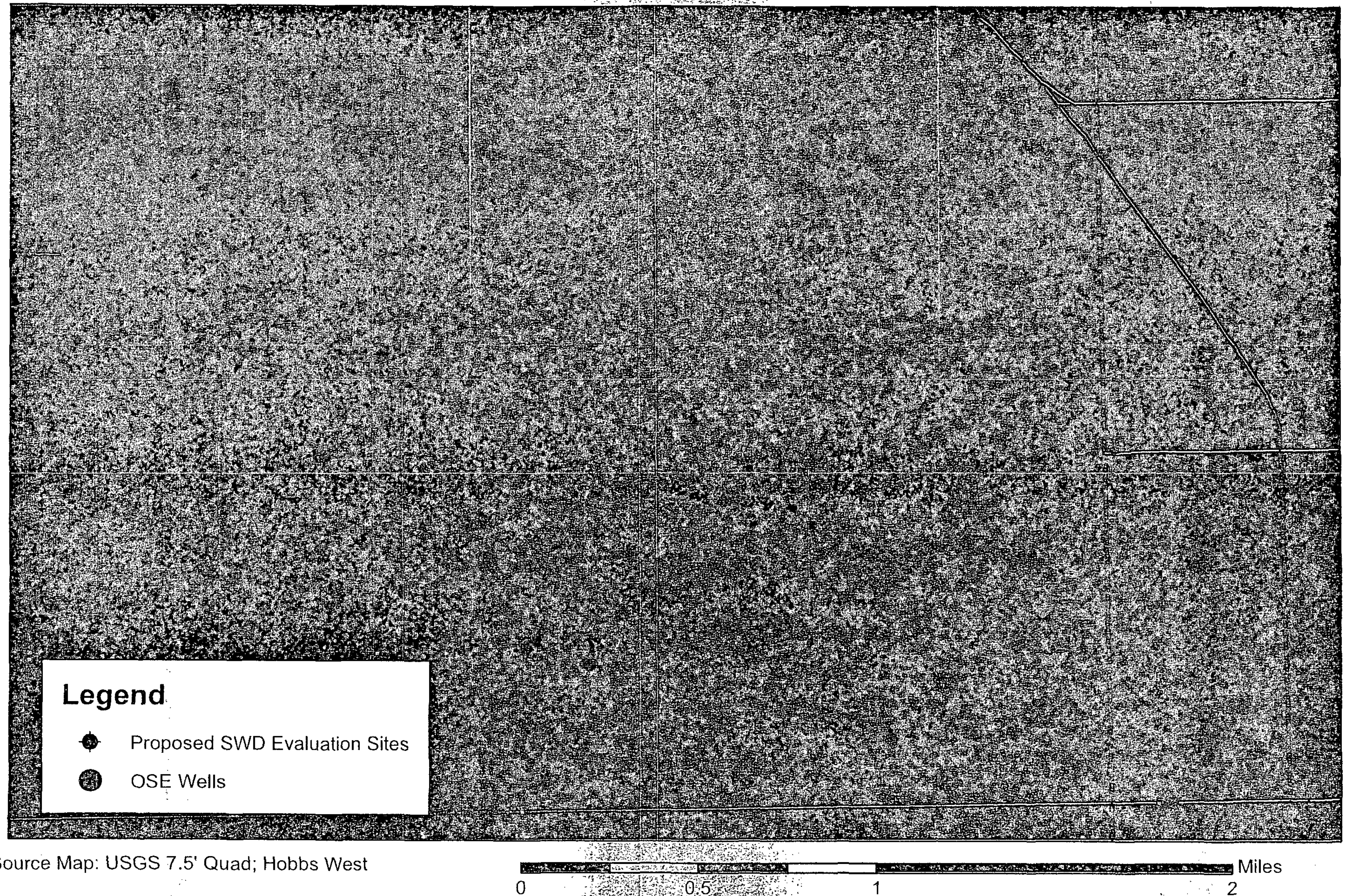
If you have any questions concerning this field program, please contact Andrew Parker of my staff or me.

Sincerely,
R.T. Hicks Consultants, Ltd.

Randall T. Hicks

Randall Hicks
Principal

Copy: Rice Operating Company



Source Map: USGS 7.5' Quad; Hobbs West

R.T. Hicks Consultants, LLC 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Location of wells on the Office of the State Engineer (OSE) database	Plate 2
	Rice Operating Company	March 2004

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

March 11, 2004

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

RE: Hobbs SWD System Abandonment
Potential Groundwater-Impacted Junction Box Sites

Dear Mr. Price

Rice Operating Company (ROC) retained Hicks Consultants to address potential environmental concerns at the above referenced sites. This submission proposes a scope of work that we believe will best mitigate any threat to human health and the environment and lead to closure of the regulatory file for this site.

Background

Plate 1 shows the location of the area of the Hobbs SWD System that is the subject of this work plan. During the abandonment process, ROC found evidence of produced water leakage at 36 sites (see Table 1 and Plate 1). Our initial field inspection suggests that past releases at some of these sites are very minor and will pose no threat to human health or the environment, including surface soil. Nevertheless, we propose a more thorough examination of these sites and submission of our findings.

The Hobbs SWD System operated at a capacity of about 40,000 barrels/day from the late 1950s to the late 1980s. During the past decade, about 1000 barrels/day flowed through the system. We believe that the soil staining and other evidence of produced water leakage at these 36 sites dates to the time when the system was operating at capacity. We hypothesize that accidental releases to the environment at many of these sites ceased in the 1990s and natural restoration has mitigated the effects of any past releases. At most release sites, we witnessed no vegetation stress that we could attribute to any past releases. Our proposed scope of work is outlined below.

Task 1 Collect Regional Hydrogeologic Data

Within the area shown on Plate 1, we found over 2000 wells in the database of the Office of the State Engineer (OSE). Plate 2 shows the location of selected water wells on the OSE and USGS database. Table 2 identifies the well owners and certain other specifics regarding these selected wells. We understand that the NMOCD is currently obtaining water levels and water quality samples in support of an investigation of the nearby Windmill Oil Company site (Section 30). We understand that the results of the NMOCD study are not presently available. We do not plan to duplicate NMOCD efforts and Table 2 excludes all wells found in Section 30.

Nevertheless, we require some regional data in order to proceed in a timely fashion. We will attempt to sample at least 10 wells identified in Table 2 to provide an understanding of the regional water quality. Where possible, we will obtain static water levels from these wells. For each of these wells, we will obtain available driller's logs to help us define the regional geology.

We will evaluate these data, data available from the NMOCD investigation of the Windmill Oil Company, published data, and available historical data from the USGS database. The purpose of this research is to assist us with the planning of the proposed drilling program (Task 2).

Task 2 Evaluate Chloride and BTEXN Concentrations in Soil at Five Sites, Evaluate Ground Water Quality if Necessary

We have identified five sites that are representative of the system and we plan to install one boring at each site. These five sites (see Plate 1 and Table 1) are:

1.	I-29 Vent	Produced Water Pipeline Vent	18S.38E.29.I
2.	I-29 EOL Boot	End of Line Boot	18S.38E,29.I
3.	O-29 Vent	Produced Water Pipeline Vent	18S.38E.29.O
4.	F-29-1A	Junction Box	18S.38E.29.F
5.	F-29-1B	Produced Water Pipeline Boot	18S.38E.29.F

We will locate the sampling borehole as close as practical to the suspected release source. Due to the presence of caliche in the subsurface, we plan to employ air-rotary drilling techniques. From each boring, we will obtain split-spoon soil samples every five or ten feet of the vadose zone.

We will evaluate these discrete samples, the borehole drilling characteristics, and drill cuttings to develop a lithologic profile of the vadose zone. We will employ standard methods, as described in the Junction Box Replacement Program Plan, to evaluate all soil samples in the field for chloride content, TPH and volatile organic constituent content. We will submit at least one soil sample from each boring to a qualified laboratory for evaluation of chloride and BTEXN (benzene, toluene, ethylbenzene, xylene, naphthalene). The field geologist will identify samples for laboratory analysis after review of the field analysis of chloride, TPH and VOCs. The geologist will select two samples from the first boring and two samples from the fourth boring for laboratory analysis of soil moisture content and bulk density. We will also obtain a background soil sample at a depth of about 5 feet.

If field analyses of a borehole show chloride concentrations are consistently greater than 3 times background from ground surface to ground water, we will conclude that periodic discharges from the source created saturated conditions in the past. For any borehole that encounters potential saturated conditions, we will continue drilling through the saturated zone to the top of the Dockum Group red beds, which form the base of the aquifer in this area. If the saturated thickness of the aquifer in this boring is less than 25 feet, we will install a 2-inch monitoring well with five feet of screen above the water table and 15 feet below the water table, in a manner consistent with industry standards (see NMOCD, ASTM or EPA publications). If the saturated thickness of the aquifer is greater than 25 feet we will install one well screen as described above and a second 5-foot screen above the top of the Dockum Group red beds. We will use micro-purge and "no-purge" techniques to collect two separate samples from this "flow-through" monitoring well. We will collect a sample the air water interface, which will be employed for evaluation of any impact from a release of hydrocarbons as well as chloride and TDS. At the bottom of the aquifer we will obtain a second sample, which we will test for chloride TDS. Appendix A describes the "no-purge" sampling technique we plan to employ at this site after initial sampling using micro-purge techniques.

Task 3 Evaluate Chloride, Benzene and Naphthalene Flux from the Vadose Zone to Ground Water

We anticipate that one or all of the five sites selected for borehole investigation will show evidence of seepage from the source to a depth of more than 10-feet. For these sites, excavation and disposal of released material can cause more environmental damage than it cures. For such sites, we propose to employ HYDRUS-1D and a simple ground water mixing model to evaluate the potential of any residual chloride and hydrocarbon mass in the vadose zone to materially impair ground water quality at the site. We will employ predictions of the migration of chloride ion, benzene and naphthalene from the vadose zone to ground water in our selection of an appropriate remedy for the land surface and underlying vadose zone. This simulation is the "no action" alternative, which predicts chloride flux to ground water in the absence of any action by ROC. We have selected these three constituents for simulation modeling because each of these constituents exists in the fluids stored in the tanks and each is specifically regulated by New Mexico ground water regulations (WQCC).

We will employ the input parameters to HYDRUS and the mixing model outlined in Table 3. In

Table 3: Input Parameters for HYDRUS-1D

Input Parameter	Source
Vadose Zone Thickness	Proposed borings and/or well logs on file with the OSE
Vadose Zone Texture	Proposed borings and well logs on file with the OSE
Dispersion Length	Professional judgment, typically 10% of the model length
Soil Moisture	Field Measurements from borings and/or HYDRUS-1D simulations
Vadose Zone Chloride Load	Sampling data from proposed borings
Length of release perpendicular to ground	Field Measurements, these sites are generally less than 30 feet in diameter
Climate	Pearl, NM station (Hobbs)
Background Chloride in Ground Water	Samples from water supply wells
Ground Water Flux	Calculated from regional hydraulic data, data from nearby wells, and published data
Aquifer Thickness	Nicholson and Clebsch (1960), and well logs on file with the OSE

the no action simulation, we will assume that vegetation is present over the release site. This assumption is consistent with our site observations. We anticipate that any release of chloride to ground water will disperse throughout the entire thickness of the aquifer after a short travel distance. Unless the hydrogeology of the site suggests differently (see Task 1), we plan to use the entire aquifer thickness as the input to the mixing model equation. For hydrocarbons, such as benzene and naphthalene, assuming a chemical stratification within the aquifer is appropriate. For these constituents, we plan to use only the uppermost 10 feet of the aquifer in the mixing model equation

Task 4 Design Corrective Action Plan

After ROC completes the abandonment of the Hobbs SWD System, there can be no additional releases of produced water. Our modeling of the "no action alternative" at these five sites may show that the residual chloride and hydrocarbon mass in the vadose zone poses a threat to ground water quality. If such a threat does exist, we will expand upon the HYDRUS-1D model predictions described above to develop a remedy for the vadose zone. If necessary, we will simulate:

1. excavation, disposal and replacement of clean soil to remove the chloride and hydrocarbon mass,

2. installation of a low permeability barrier to minimize natural infiltration,

3. surface grading and seeding to eliminate any ponding of precipitation and promote evapotranspiration, thereby minimizing natural infiltration, and

4. a combination of the above potential remedies.

We will select the vadose zone remedy that offers the greatest environmental benefit while causing the least environmental damage. We will provide a Net Environmental Benefit Analysis to support our selection of the remedy.

We will use the ground water mixing model or a suitable alternative to assist in the design of any required ground water remedy. It is possible, however, that the background chloride and /or hydrocarbon concentrations in ground water measured in the nearby wells are equal to or higher than the concentration in any monitoring well installed under this work plan. Such data would strongly suggest that the site in question has not caused any material impairment of ground water quality. If we find no evidence of impairment of water quality due to past activities, we will not prepare a ground water remedy. If data suggest that the site has contributed chloride or hydrocarbons to ground water and caused ground water impairment, we will examine the following alternatives:

1. Natural restoration due to dilution and dispersion,

2. Pump and dispose to remove the chloride and hydrocarbon mass in the saturated zone,

3. Pump and treat to remove the chloride and hydrocarbon mass in the saturated zone,

4. Because of the location of the site, institutional controls negotiated with the landowner may provide an effective remedy. Such controls may be restriction of water use to livestock until natural restoration returns the water quality to state standards, a provision for alternative supply well design, or a provision for well head treatment to mitigate any damage to the water resource.

We will select the ground water remedy that offers the greatest environmental benefit while causing the least environmental damage. We will provide a Net Environmental Benefit Analysis to support our selection of the remedy. We may propose additional ground water monitoring wells to support the evaluation and selection of a remedy.

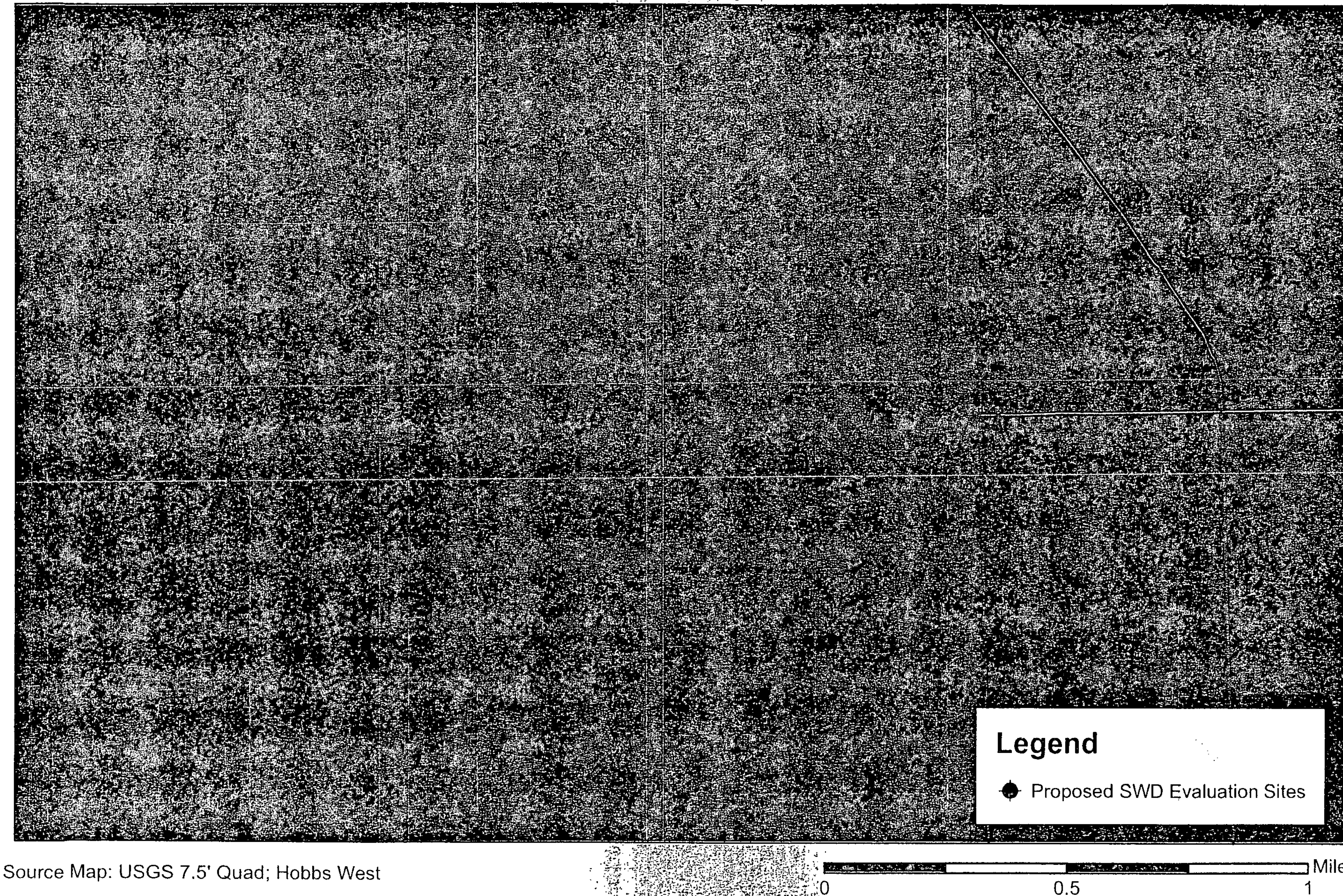
We plan to deliver a Corrective Action Plan that is similar to the Junction Box Replacement Program Plan. This type of submittal will allow ROC to evaluate each site, prioritize the restoration of each site based upon a risk profile, and then begin restoration of those sites that pose the highest risks. Depending upon the results of the work described herein, ROC may elect to move forward with an area-wide plan rather than proposing 36 individual remedies. We propose to complete the work of described in Tasks 1-3, begin the work outlined in Task 4 and then meet with NMOCD to discuss the scope of the final submittal.

We plan to commence data collection for the HYDRUS-1D simulations described above in late late March or early April. Your approval to move forward with this work plan will facilitate our access to nearby wells and approval of expenditures by the System Partners.

Sincerely,
R.T. Hicks Consultants, Ltd.

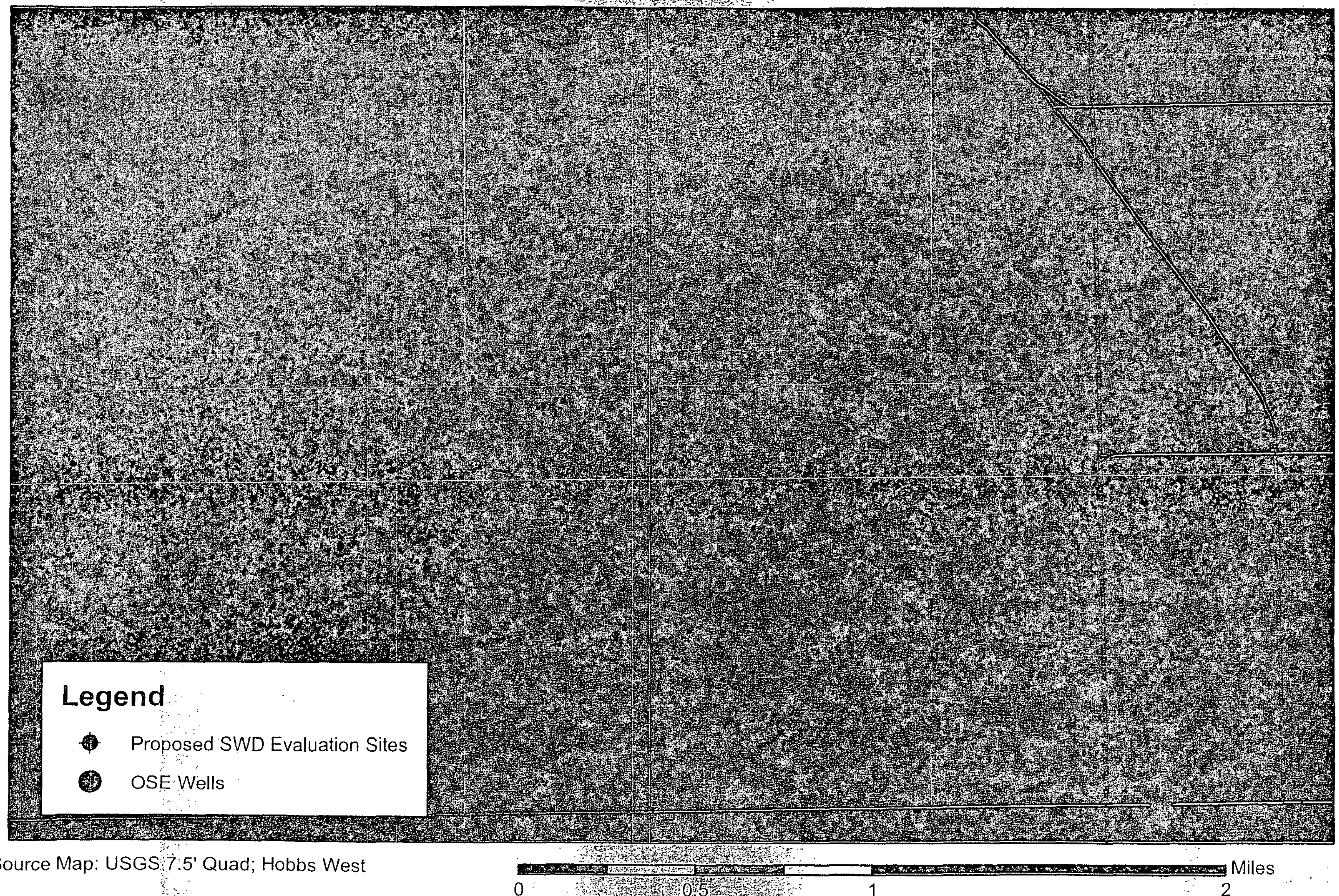
Randall T. Hicks
Principal

Copy:
Rice Operating Company



Source Map: USGS 7.5' Quad; Hobbs West

R.T. Hicks Consultants, LLC 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Location of Salt Water Disposal System	Plate 1
	Rice Operating Company	March 2004



Source Map: USGS 7.5' Quad; Hobbs West

R.T. Hicks Consultants, LLC 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Location of wells on the Office of the State Engineer (OSE) database	Plate 2
	Rice Operating Company	March 2004

Table 1

HOBBS Junction Box Disclosures: Potential Groundwater Impact

These junction box sites have become "disclosure" rather than "closure" sites because significant TPH or salt impact has deemed the site remediation to be outside the scope of the Rice Operating Company Generic Junction Box Plan. Each of these sites has the potential for groundwater impact, based on delineaton results. As noted, some of the sites are confirmed to have groundwater impact and have been officially reported to the NMOCD and are being monitored for groundwater quality. These sites are being evaluated for risk-based corrective action and plans will be submitted to the NMOCD.

F-24-3 Vent	Hobbs	F	Sec 24, T18S, R37E	<50		NM	Initial evaluation only	1/31/2003
F-25 EOL	Hobbs	F	Sec 25, T18S, R37E	<50		NM	Initial evaluation only	1/31/2003
M-20 Vent	Hobbs	M	Sec 20, T18S, R38E	<50		Samuel Bruton	Initial evaluation only	1/31/2003
E-29 Vent	Hobbs	E	Sec 29, T18S, R38E	<50		Oxy Permian	Initial evaluation only	1/31/2003
I-29 EOL	Hobbs	I	Sec 29, T18S, R38E	<50		Oxy Permian	Initial evaluation only	1/31/2003
K-29 EOL Boot	Hobbs	K	Sec 29, T18S, R38E	<50		Oxy Permian	Initial evaluation only	1/31/2003
O-29 EOL	Hobbs	O	Sec 29, T18S, R38E	<50		Oxy Permian	Initial evaluation only	1/31/2003
O-29 Vent	Hobbs	O	Sec 29, T18S, R38E	<50		Oxy Permian	Initial evaluation only	1/31/2003
O-29-1 Vent	Hobbs	O	Sec 29, T18S, R38E	<50		Oxy Permian	Initial evaluation only	1/31/2003
P-29 Vent	Hobbs	P	Sec 29, T18S, R38E	<50		Oxy Permian	Initial evaluation only	1/31/2003
C-30 Vent	Hobbs	C	Sec 30, T18S, R38E	<50		James Hanson	Initial evaluation only	1/31/2003
Jct. F-31-1	Hobbs	F	Sec 31, T18S, R38E	<50		V. R. Jones	Initial evaluation only	1/31/2003
Jct. F-31-2	Hobbs	F	Sec 31, T18S, R38E	<50		V. R. Jones	Initial evaluation only	1/31/2003
B-32 Boot	Hobbs	B	Sec 32, T18S, R38E	<50		Oxy Permian	Initial evaluation only	1/31/2003
F-33 Vent	Hobbs	F	Sec 33, T18S, R38E	<50		NM	Initial evaluation only	1/31/2003
A-6 Vent	Hobbs	A	Sec 6, T19S, R38E	<50		NM	Initial evaluation only	1/31/2003
Jct. A-25	Hobbs	A	Sec 25, T18S, R37E	<50		NM	Initial evaluation only	1/31/2003
Jct. P-31	Hobbs	P	Sec 31, T18S, R38E	<50		Kress Jones	Initial evaluation only	1/31/2003
Jct. F-24-1	Hobbs	F	Sec 24, T18S, R37E	<50		NM	Primary Delineation only	1/31/2003
Jct. F-29-1A	Hobbs	F	Sec 29, T18S, R38E	<50		Oxy Permian	Primary Delineation only	1/31/2003
Jct. F-29-1B (G-29)	Hobbs	F	Sec 29, T18S, R38E	<50		Oxy Permian	Primary Delineation only	2/4/2004
I-29 Vent	Hobbs	I	Sec 29, T18S, R38E	<50		Oxy Permian	Primary Delineation only	1/31/2003
F-30 Vent	Hobbs	F	Sec 30, T18S, R38E	<50		James Hanson etux	Primary Delineation only	1/31/2003
Jct. L-30	Hobbs	L	Sec 30, T18S, R38E	<50		NM	Primary Delineation only	1/31/2003
Jct. E-32-1	Hobbs	E	Sec 32, T18S, R38E	<50		Oxy Permian	Primary Delineation only	1/31/2003
Jct. E-32-2	Hobbs	E	Sec 32, T18S, R38E	<50		Oxy Permian	Primary Delineation only	1/31/2003

Jct. E-33-1	Hobbs	E	Sec 33, T18S, R38E	<50		NM	Primary Delineation only	1/31/2003
Jct. N-4	Hobbs	N	Sec 4, T19S, R38E	<50		NM	Primary Delineation only	1/31/2003
O-5 Vent	Hobbs	O	Sec 5, T19S, R38E	<50		Dee Cochran	Primary Delineation only	1/31/2003
Jct. H-29	Hobbs	H	Sec 29, T18S, R38E	<50		Sage & Cottrell	Primary Delineation only	1/31/2003
Jct. E-4	Hobbs	E	Sec 4, T19S, R38E	<50		NM	Primary Delineation only	1/31/2003
Jct. O-13 (N)	Hobbs	O	Sec 13, T18S, R37E	<50		Charles Seed Trst	Primary Delineation only	1/31/2003
G-9 Vent	Hobbs	G	Sec 9, T19S, R38E	<50		NM	Primary Delineation only	1/31/2003
Jct. A-6	Hobbs	A	Sec 6, T19S, R38E	<50		NM	Primary Delineation only	1/31/2003
Jct. E-33-2	Hobbs	E	Sec 33, T18S, R38E	<50		NM	Primary Delineation only	1/31/2003
vent M-4	Hobbs	M	Sec. 4, T19S, R38E	<50		J. A. Desoto	Initial evaluation only	9/11/2003

These Hobbs SWD System junction boxes, which have potential for groundwater impact, are not yet at a work-status to report as a disclosure. The Hobbs SWD System Environmental Committee has directed Rice Operating Company to prioritize the sites according to vadose zone and groundwater receptors, NMOCD score, landowner, surface use, etc. in order to coordinate the most effective and timely use of resources. The Hobbs SWD System Environmental Committee is committed to completing the abandonment of the Hobbs SWD Gathering System, and projects the remediation of these junction box sites to be a long-term endeavor, possibly 7-10 years. Each of these sites have significant TPH and salt impact and are deemed to be outside the scope of the Rice Operating Company Generic Junction Box Plan. As sites are prioritized, work plans will be developed and submitted to the NMOCD for review, feedback and approval.

Table 2: Selected Water Well Records from the OSE Database

DB File Nbr	Use Div	Owner	Well Depth	Water Depth	Well Number	Source	Tws	Rng	Sec	q	q	Date	Date
L 06660 (E)	PRO	MORAN OIL PROD & DRILLIN	120	48	G CORP L 06660 (E)	Shallow	18S	38E	19	3	3	3/23/1970	3/23/1970
L 06337	PRO	INC. CAPITAN DRILLING CO	110	40	MPANY L 06337	Shallow	18S	38E	19	4	2	6/10/1968	6/10/1968
L 08716	SAN	OIL FIELD RENTAL SERVICE	130	49	CO. L 08716	Shallow	18S	38E	20	2	1	3/23/1982	3/24/1982
L 07810	SAN	MACK TRUCK DEALERSHIP	120	60	L 07810	Shallow	18S	38E	20	2	2	11/25/1977	11/27/1977
L 09475	SAN	STOEHR WIRE ROPE OF TEXA	120	60	S INC. L 09475	Shallow	18S	38E	20	2	2	5/7/1984	5/7/1984
L 08851	SAN	A.A. OILFIELD	120	54	L 08851	Shallow	18S	38E	20	2	3	7/1/1982	7/2/1982
L 08009	SAN	INC. HOBBS DIESEL	167	60	L 08009	Shallow	18S	38E	28	1	1	1/16/1979	1/20/1979
L 08867	SAN	BIG HORN TANK RENTAL	120	52	L 08867	Shallow	18S	38E	29	2	2	7/9/1982	7/10/1982
L 07754	OBS	CROWN CHEMICAL COMPANY	207	50	L 07754	Shallow	18S	38E	29	2	4	9/8/1977	9/14/1977
L 06570 (E)	PRO	MORAN OIL PROD & DRILLIN	110	54	G CORP L 06570 (E)	Shallow	18S	38E	29	3	3	8/5/1969	8/5/1969
L 07570	DOM	SOUTHWESTERN DRILLING MU	122	48	D L 07570	Shallow	18S	38E	29	3	3	6/21/1976	6/22/1976
L 07005	SAN	TWO-STATE TANK RENTAL CO	150	50	L 07005	Shallow	18S	38E	29	3	3	10/14/1972	10/18/1972
L 11176		TEXLAND PETROLEUM-HOBBS,	220	65	LLC L 11176	Shallow	18S	38E	29	4	1	7/31/2001	8/3/2001
L 02395	PRO	AMERADA PETROLEUM CORPOR	87	30	ATION L 02395	Shallow	18S	38E	30	1	2	8/31/1953	8/31/1953
L 05849	PRO	AMERADA PETROLEUM CORPOR	38	34	ATION L 05849	Shallow	18S	38E	30	1	4	2/10/1966	2/12/1966
L 05818	PRO	AMERADA PETROLEUM CORPOR	32	32	ATION L 05818	Shallow	18S	38E	30	1	4	12/15/1965	12/17/1965
L 10093	PRO	WINDMILL OIL COMPANY	52	42	L 10093	Shallow	18S	38E	30	4	1	10/2/1989	10/2/1989
L 10094	PRO	WINDMILL OIL COMPANY	52	42	L 10094	Shallow	18S	38E	30	4	1	10/3/1989	10/3/1989
L 10095	PRO	WINDMILL OIL COMPANY	52	42	L 10095	Shallow	18S	38E	30	4	1	10/4/1989	10/4/1989
L 10096	PRO	WINDMILL OIL COMPANY	52	42	L 10096	Shallow	18S	38E	30	4	1	10/6/1989	10/6/1989
L 09936	PRO	WINDMILL OIL COMPANY	50	41	L 09936	Shallow	18S	38E	30	4	1	7/28/1987	8/1/1987
L 10097	PRO	WINDMILL OIL COMPANY	52	41	L 10097	Shallow	18S	38E	30	4	1	10/3/1989	10/4/1989
L 05874	SAN	STAR TOOL COMPANY	125	45	L 05874	Shallow	18S	38E	32	1	1	3/2/1966	3/3/1966
L 10620	SAN	BULL DOG TOOL	158	43	L 10620	Shallow	18S	38E	32	1	3	12/17/1996	12/17/1996
L 10558	SAN	BULL DOG TOOL INC	120	80	L 10558	Shallow	18S	38E	32	1	3	5/5/1996	5/15/1996
L 10035	SAN	BALER SERVICE TOOLS	150	65	L 10035	Shallow	18S	38E	32	1		10/20/1988	10/20/1988
b	SAN	SONNY'S OIL FIELD SERVIC	150	34	E INC. L 06245	Shallow	18S	38E	32	1		12/29/1967	12/30/1967
L 02964	DOM	INC. BAKER OIL TOOLS	100	30	L 02964	Shallow	18S	38E	32	3	3	9/10/1955	9/11/1955
L 02555	DOM	SKELLY OIL COMPANY	116	34	L 02555	Shallow	18S	38E	32	3	3	6/25/1954	6/25/1954
h	PRO	PAN AMERICAN PETROLEUM	120	52	L 06574 (E)	Shallow	18S	38E	33	1	3	8/18/1969	8/19/1969
L 02232	DOM	CONTINENTAL TANKE INC.	112	56	L 02232	Shallow	18S	38E	33	3		6/23/1953	6/23/1953
L 03516	PRO	CACTUS DRILLING COMPANY	106	45	L 03516 APPR	Shallow	18S	38E	34	3	3	8/21/1956	8/22/1956