1R - 428-42

REPORTS

DATE:

May 18, 2007

May 18, 2007

1A#28-12

Final Site Closure Report: I-29 EOL Boot

R.T. Hicks Consultants, Ltd.

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

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

2007 MAY 29 AM 10 54

May 23, 2007

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

RE: Final Site Closure Report:
I-29 EOL Boot
NMOCD Case No.: not assigned

Dear Mr. Price:

On behalf of Rice Operating Company, we are pleased to submit the Final Site Closure Report for the above-referenced site. The Junction Box Closure Report Form is attached to this letter.

Please contact us with any comments or questions regarding this submission. We look forward to hearing from you.

Sincerely,
R.T. Hicks Consultants, Ltd.

Randall Hicks
Principal

Copy: Rice Operating Company, Hobbs NM
NMOCD, Hobbs NM

RICE OPERATING COMPANY

JUNCTION BOX CLOSURE REPORT

BOX LOCATION

SWD SYSTEM	JUNCTION	UNIT	SECTION	TOWNSHIP	RANGE	COUNTY	BOX DIMENSIONS - FEET		
							Length	Width	Depth
Hobbs	I-29 EOL boot	I	29	18S	38E	Lea	no box--System abandonment		

LAND TYPE: BLM _____ STATE _____ FEE LANDOWNER Occidental Permian OTHER _____

Depth to Groundwater 65 feet NMOCD SITE ASSESSMENT RANKING SCORE: 10

Date Started 11/4/2004 Date Completed 9/14/2006 NMOCD Witness no

Soil Excavated 466 cubic yards Excavation Length 35 Width 30 Depth 12 feet

Soil Disposed 70 cubic yards Offsite Facility Sundance Location Eunice, NM

General Description of Remedial Action:

As part of the OCD-approved Investigation & Characterization Plan submitted by R.T. Hicks Consultants, a delineation soil bore was installed at the former junction box site on 11/4/2004. Results and a remedy were submitted in a Corrective Action Plan in October 2005. OCD verbally approved the CAP on 3/30/2006 with the condition that the excavation be extended to 12 ft BGS; email confirmation was received 5/2/2006. Excavation activities as outlined in the CAP were conducted Aug.-Sept. 2006. **The enclosed Closure Report (May 2007) by Hicks documents these activities and requests regulatory closure of this file.**

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 4/30/2007 TITLE Project Scientist

May 18, 2007

Final Site Closure Report:
I-29 EOL Boot
Hobbs SWD System
T18S-R38E-Section 29, Unit Letter I
NMOCD Case No. Not Assigned

prepared for:

Rice Operating Company
122 West Taylor
Hobbs, NM 88240

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

Table of Contents

Plates & Tables

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1.0 Location

Unit I, Section 29 Township 18S Range 38E
Latitude: N 32° 43' 00"
Longitude: W -103° 09' 50"
(NAD 83)
NMOCD #: Not Assigned

Plate 1 shows the location of the I-29 EOL Boot site. This site remains within the boundaries of an active well location.

2.0 Work Elements Completed

1. In January 2003, ROC removed the junction box, excavated soil from the former site and collected samples from the excavation (Appendix A provides the data associated with this field program).

2. In November 2004, R.T. Hicks Consultants supervised field activities at the I-29 EOL Boot site. This involved reconnaissance and supervision of the bore-hole sampling of the vadose zone from ground surface to the capillary fringe (Appendix B contains the NMOCD-approved workplan for this field program as well as other relevant correspondence).

3. In October 2005, Hicks Consultants summarized the field data in the Corrective Action Plan (see Appendix C for previous reports).

4. On August 24, 2006 ROC implemented the remedy prescribed in the NMOCD approved Corrective Action plan (approved May 2, 2006) with the condition that ROC remove the upper 12-feet of soil, replace the material in the excavation with material with a lower chloride concentration then install a 1-foot layer of clay under 4-feet of top soil (see Appendix D).

3.0 Conclusions and Supporting Data

3.1 Residual Petroleum Hydrocarbons

Residual petroleum hydrocarbons are not present in the vadose zone at the site in sufficient mass to represent a threat to ground water quality. Table 1 shows the reuslts of soil analyses.

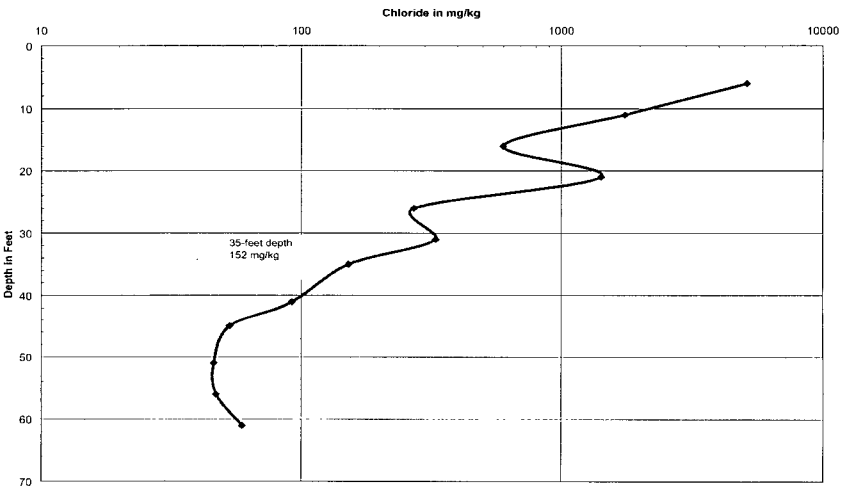
Table 1. Laboratory Data for SWD B-4 (I-29 EOL Boot)
November 2004 (mg/kg)

	6 feet bgs	61 feet bgs	Detection Limit
Benzene	ND	ND	0.025
Toluene	0.0139	ND	0.025
Ethylbenzene	0.0416	ND	0.025
Xylene (p/m)	0.055	ND	0.025
Xylene (o)	0.0298	ND	0.025
Chloride	4,890	ND	20

3.2 Chloride

Soil bore samples show that downward transport of chloride ceased at about 35 feet below ground surface, which is 30 feet above ground water. As shown in Figure 1 (from the Corrective Action Plan), chloride concentrations are less than 250 mg/kg from 35 feet bgs to the total depth of the boring. The high concentration of chloride at 6 feet below ground surface verifies that this boring is located within the release footprint and is representative of the Vadose zone below the release.

Figure 1: Soil Chloride Concentration at the I-29 EOL Boot Site vs. Depth



3.3 Evapotranspiration Barrier

According to approved CAP, the ET Barrier installed by ROC in 2006 sequesters chloride and other salts in the upper vadose zone, eliminating any threat to fresh water, public health or the environment.

4.0 Request for Closure

ROC investigated the I-29 EOL site and found no threat to public health, fresh water or the environment due to petroleum hydrocarbons. ROC submitted a plan to close the site which would cause the sequestration of chloride in the upper vadose zone such that this material poses no threat to ground water. This plan also mitigated any treat to public health or the environment. NMOCD approved the plan submitted by ROC on March 30, 2006 with an email confirmation of the approval on May 2, 2006. ROC removed the uppermost 12 feet of soil

and installed the infiltration barrier in accordance with the NMOCD-approved plan. Appendix D and Figure 2 present photodocumentation of the installed ET barrier at the site. Appendix D also includes disposal manifests verifying that 70 cubic yards were removed from the site and disposed of properly. As the area is located inside an active battery, the caliche pad was restored upon backfill. The surface will be reclaimed upon abandonment of the battery.

ROC respectfully requests closure of the regulatory file associated with the I-29 EOL Boot site.

Figure 2. Clay barrier installed at four feet below ground surface at site.

Plates

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

Source Map: Hobbs West NE Qtr (http://rgis.unm.edu)

0 500 1,000 Feet

N

	Aerial Photograph (1996-98) showing I-29 Site and Surrounds	Plate 1
	NMOCD: I-29 Corrective Action Plan (Rice Operating Company)	May 2007

Appendix A

Field Data & Laboratory Analysis

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

CARDINAL LABORATORIES, INC.

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

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

Page ____ of ____

Company Name:	Rice Operating	BILL TO	
Project Manager:	Kristin Farris Pope	P.O. #:	
Address:	122 w Taylor	Company:	
City:	Hobbs State: NM Zip: 88240	Attn:	
Phone #:	(505) 393-9174 Fax #: (505) 397-1471	Address:	
Project #:	Project Owner:	City:	
Project Name:		State: Zip:	
Project Location:	Hobbs, I-29 Boot	Phone #:	
Sampler Name:	Melanie Franks	Fax #:	

FOR LAB USE ONLY Lab I.D.	Sample I.D.	(G)RAB OR (C)OMP.	# CONTAINERS	MATRIX: GROUNDWATER	WASTEWATER	SOIL	OIL	SLUDGE	OTHER :	PRESERV.: ACID/BASE:	ICE / COOL	OTHER :	SAMPLING DATE	SAMPLING TIME	ANALYSIS REQUEST: CL	TPH 8015	BTEX
H11524-1	4 wall Comp.	C	1			X					X		9/11/06	4:24	X	X	
-2	5pt. Bttm Comp.	C	1			X					X		9/11/06	2:30	X	X	
-3	Dept Backfill Comp.	C	1			X					X		9/11/06	3:11	X	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.

Terms and Conditions: Interest will be charged on all accounts more than 30 days past due at the rate of 24% per annum from the original date of invoice, and all costs of collections, including attorney's fees.

Sampler Relinquished:	Melanie Franks	Date: 9/12/06 Time: 8:02	Received By: Ray R. Lasco
Relinquished By:	Ray R. Lasco	Date: 9-12-06 Time: 1:19 P	Received By: (Lab Staff) Nick Fulton
Delivered By: (Circle One)	Sampler - UPS - Bus - (Other)	Sample Condition: Temp, °C: Intact? ☑ Yes ☐ No	Checked By: (Initials) NF

Phone Result: ☐ Yes ☐ No
Fax Result: ☐ Yes ☐ No
REMARKS:
mfranks@ricesud.com

† Cardinal cannot accept verbal changes. Please fax written changes to (325) 673-7020.

CARDINAL LABORATORIES

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

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

Receiving Date: 09/12/06
Reporting Date: 09/13/06
Project Number: NOT GIVEN
Project Name: NOT GIVEN
Project Location: HOBBS I-29 BOOT

Sampling Date: 09/11/06
Sample Type: SOIL
Sample Condition: COOL & INTACT
Sample Received By: NF
Analyzed By: BC/HM

LAB NUMBER	SAMPLE ID	GRO (C_6-C_{10}) (mg/Kg)	DRO (>C_{10}-C_{28}) (mg/Kg)	Cl* (mg/Kg)
ANALYSIS DATE		09/12/06	09/12/06	09/12/06
H11524-1	4 WALL COMP.	27.1	451	544
H11524-2	5 PT. BTTM. COMP.	<10.0	40.6	592
H11524-3	6 PT. BACKFILL COMP.	<10.0	109	880
Quality Control		770	782	950
True Value QC		800	800	1000
% Recovery		96.3	97.8	95.0
Relative Percent Difference		1.8	2.7	0.0

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

Chemist

9/13/06
Date

H11524A

CARDINAL LABORATORIES

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

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

Receiving Date: 09/12/06
Reporting Date: 09/14/06
Project Number: NOT GIVEN
Project Name: NOT GIVEN
Project Location: HOBBS I-29 BOOT

Sampling Date: 09/11/06
Sample Type: SOIL
Sample Condition: COOL & INTACT
Sample Received By: NF
Analyzed By: BC

LAB NUMBER	SAMPLE ID	BENZENE (mg/Kg)	TOLUENE (mg/Kg)	ETHYL BENZENE (mg/Kg)	TOTAL XYLENES (mg/Kg)
ANALYSIS DATE		09/13/06	09/13/06	09/13/06	09/13/06
H11524-3	6 PT. BACKFILL COMP.	<0.005	<0.005	<0.005	<0.015
Quality Control		0.098	0.100	0.102	0.298
True Value QC		0.100	0.100	0.100	0.300
% Recovery		97.6	99.8	102	99.2
Relative Percent Difference		11.1	4.2	2.6	2.7

METHOD: EPA SW-846 8260

Chemist

09/14/06
Date

H11524

Logger:	David Hamilton	**Client:**	**Boring ID:**
Driller:	Eades Drilling	Rice Operating Company	
Drilling Method:	Air Rotary	**Project Name:**	
Start Date:	11/4/2004	I-29 EOL Boot	**Section 29 B-4 (62 feet)**
End Date:	11/4/2004	**Location:**	
		T18S R38E	
		Section 29, Unit I	

Depth (feet)	Description	Lithology	Comments	Field data		
				Depth	Chloride mg/kg	PID
0.0	Surface, 0-3 feet		Boring started 2 feet bgs in trench			
2.0	Sand silt, caliche, tan, 3-6 feet					
4.0						
6.0	Caliche, tan to white, 6-22 feet			6.0	5125	124.0
8.0						
10.0				11.0	1746	2.4
12.0						
14.0						
16.0				16.0	596	2.3
18.0						
20.0				21.0	1415	2.8
22.0	Very fine grained sand silt, tan, 22-30 feet					
24.0						
26.0				26.0	271	6.7
28.0						
30.0	Well indurated caliche, 30-33 feet		Hard drilling	31.0	328	7.5
32.0	Sandstone, red-tan, 33-35 feet		Very hard drilling			
34.0	Very fine grained sand, tan-red, 35-45 feet					
36.0				35.0	152	35.0
38.0						
40.0				41.0	92	9.7
42.0						
44.0	Very fine grained sand, some caliche, 45-50 feet					
46.0				45.0	53	7.0
48.0						
50.0	Very fine grained sand silt, tan red, 50-62 feet			51.0	46	4.3
52.0						
54.0				56.0	47	8.2
56.0						
58.0						
60.0			Last sample 60-62 feet, moist. Hole backfilled with Bentonite	61.0	59	4.4
62.0						

R.T. Hicks Consultants, Ltd
901 Rio Grande Blvd NW Suite F-142
Albuquerque, NM 87104
505-266-5004

I-29 EOL Boot	**Plate 2**
Exploratory Boring	**September, 2005**

Appendix B

Correspondence

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

Kristin Pope

From: "Price, Wayne, EMNRD" <wayne.price@state.nm.us>
To: "Kristin Pope" <kpope@riceswd.com>
Sent: Tuesday, May 02, 2006 7:40 AM
Subject: RE: March 30 verbal approvals

Yes!

From: Kristin Pope [mailto:kpope@riceswd.com]
Sent: Monday, May 01, 2006 2:10 PM
To: Price, Wayne, EMNRD
Subject: March 30 verbal approvals

Good day, Wayne. Thank you for your emailed approval regarding the EME jct. N-4-1 site. During our March 30 meeting, you gave verbal approval of the Corrective Action Plan (CAP) for the Hobbs I-29 EOL boot site with the condition that the excavation was extended to 12 ft BGS. Can we begin scheduling this work? Thanks.

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

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,

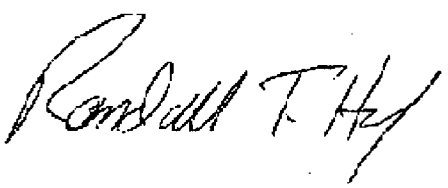
4. Because of the location of the site, institutional controls negotiated with the landowner may provide an effective remedy. Such controls may be restriction of water use to livestock until natural restoration returns the water quality to state standards, a provision for alternative supply well design,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

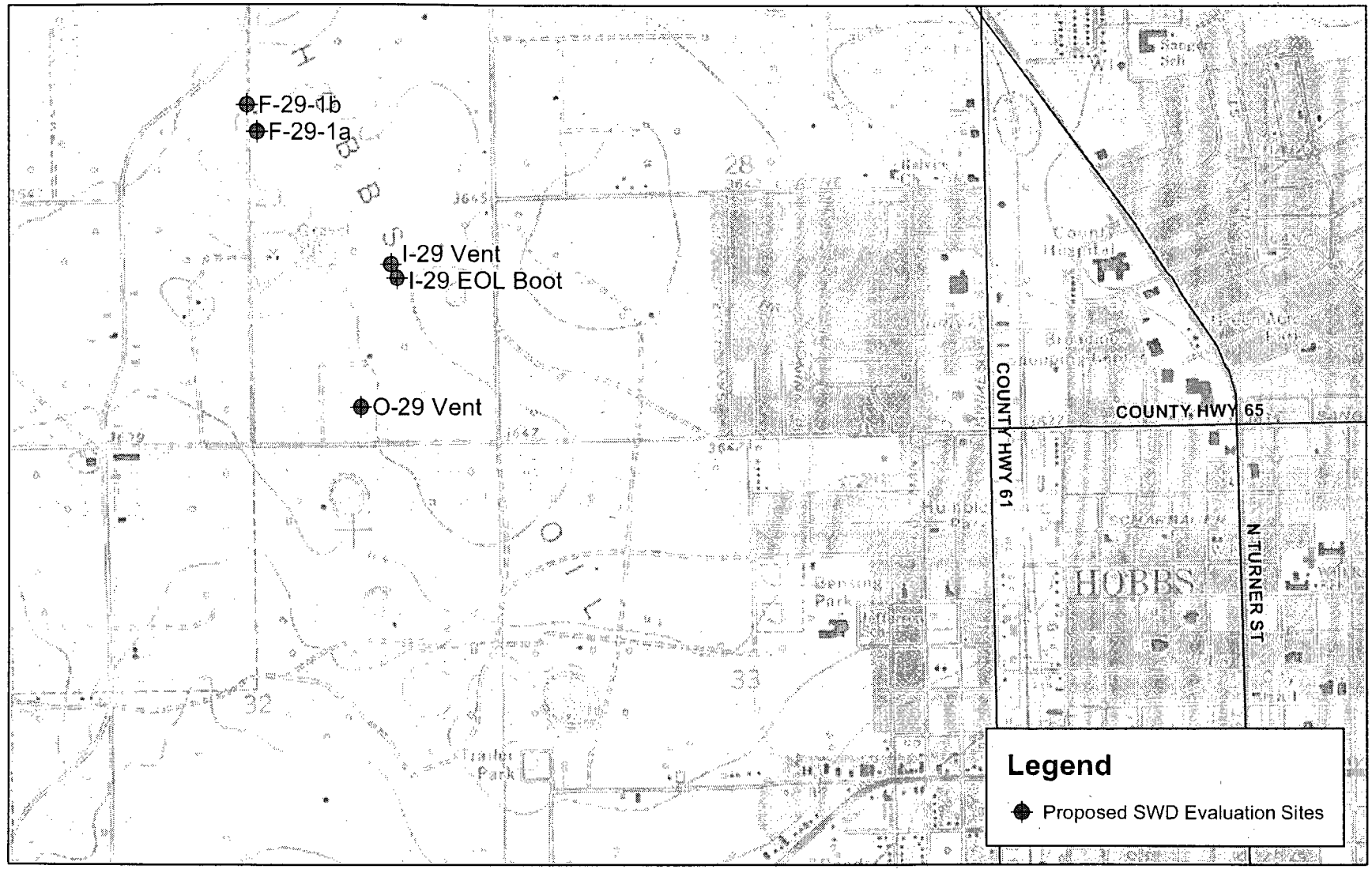
We plan to commence data collection for the HYDRUS-1D simulations described above in late late March or early April. Your approval to move forward with this work plan will facilitate our access to nearby wells and approval of expenditures by the System Partners.

Sincerely,
R.T. Hicks Consultants, Ltd.



Randall T. Hicks
Principal

Copy:
Rice Operating Company



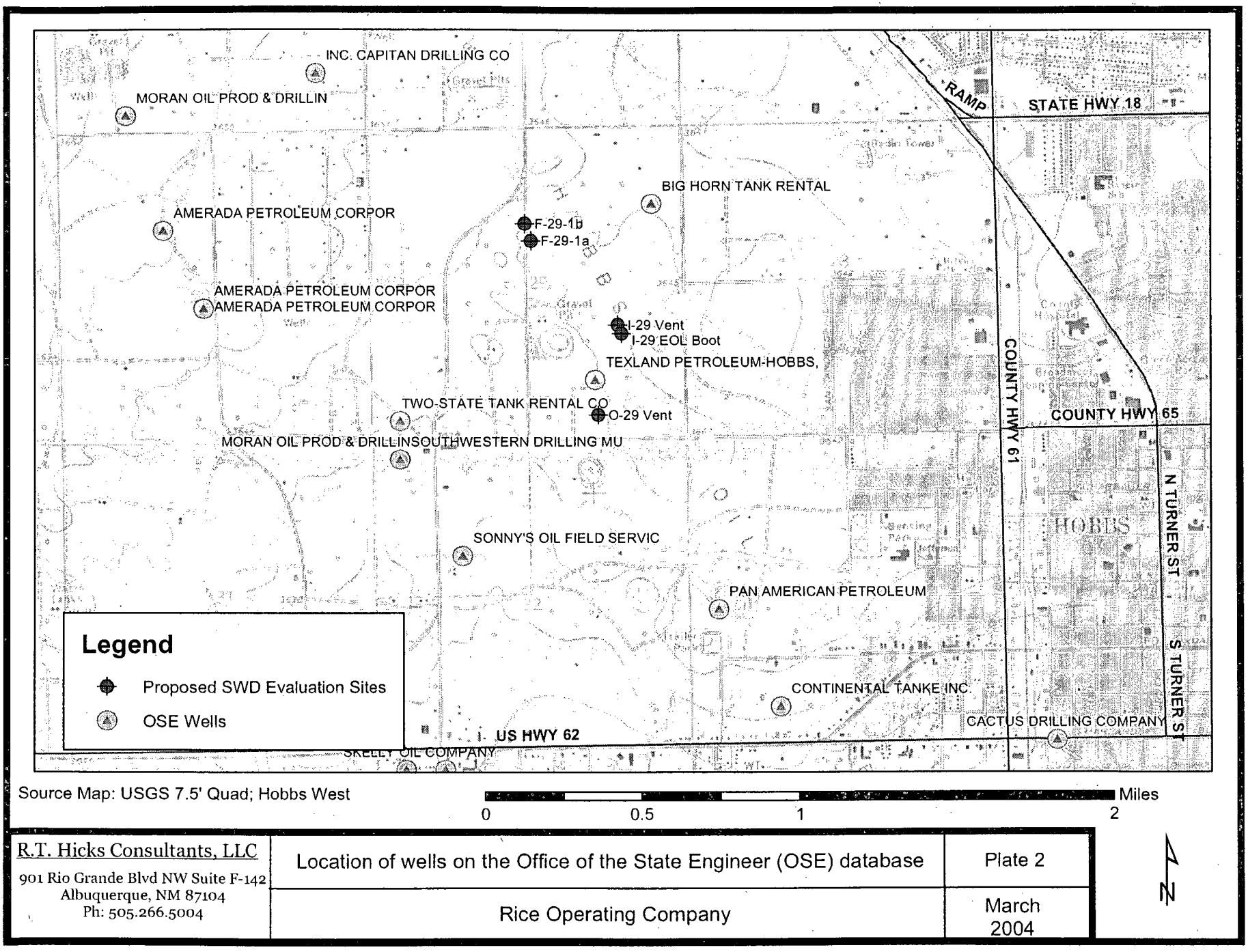
Source Map: USGS 7.5' Quad; Hobbs West

0 0.5 1 Miles

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

N



Source Map: USGS 7.5' Quad; Hobbs West

0 0.5 1 2 Miles

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

Appendix C

Previous Reports

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

October 20, 2005

Corrective Active Plan
I-29 EOL Boot

Prepared for:

Rice Operating Company
122 West Taylor
Hobbs, NM 88240

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

1.0 EXECUTIVE SUMMARY

This report presents the results of the characterization activities performed by R.T. Hicks Consultants (Hicks Consultants) and Rice Operating Company (ROC) at the I-29 EOL Boot site. Based on field data, laboratory results, and predictive modeling, the selected remedy for the site is removal of the upper 4-feet of soil at this site and placement of a 1-foot of low-permeability clay layer overlain by 3-feet of top fill installed with a slight crown to promote surface runoff. Using highly conservative input data, HYDRUS-1D modeling of this scenario predicts that resulting ground water chloride concentrations are less than 30 ppm above background concentrations (100 ppm) in the future. This remedy is protective of ground water quality, human health and the environment.

The Hobbs Salt Water Disposal System (SWD), which managed produced water from the late 1950s to the present, is now closed. Future releases from system are not possible.

Closure of facilities like the I-29-EOL Boot within Hobbs SWD followed the August 6, 2004 NMOCD-approved junction box closure plan. This plan calls for delineation of any impact from these sites during the closure process and states:

> *If 12 feet vertical delineation at the source reveals Target Concentrations for TPH or BTEX will not meet NMOCD guidelines or TPH and BTEX will meet guidelines but there is not a significant decline vs depth in chloride concentration, the site-impact is judged to be outside the scope of this work plan and will become a risk-based corrective action (RBCA) project-site.*

The I-29-EOL Boot site meets this criteria and this report describes characterization activities that are consistent with the NMOCD-approved workplan for this site. The characterization activities show that regulated hydrocarbons are not present in the vadose zone below the site and that chloride ion concentration in soil is less than 250 ppm from 30 feet below land surface to ground water.

2.0 SUMMARY AND CONCLUSIONS

1. The I-29 EOL Boot site is located in Section 29, T18S, R 38E, on the west side of Hobbs, New Mexico. This end of line boot is part of the Hobbs Salt Water Disposal System.

2. R.T. Hicks Consultants supervised field activities at the I-29 EOL Boot site in November 2004. This involved general reconnaissance identified in the NMOCD-approved work plan as well as supervision of the borehole sampling of the vadose zone from ground surface to the capillary fringe.

3. Due to the dry and unconsolidated nature of the sand-silt material, the split-spoon was unable to hold samples of the vadose zone from below 35-feet to the capillary fringe. Throughout this depth interval, samples from cuttings were collected instead. This is the only material deviation from the NMOCD-approved workplan.

4. With the exception of one sample, all field analyses of headspace organic vapors were less than 100 ppm. The sample obtained at 6-feet below grade contained 135 ppm total organic vapors.

5. Laboratory analyses confirm that regulated petroleum hydrocarbons are not present above screening levels employed by the Petroleum Storage Tank Bureau of the New Mexico Environment Department.

6. Chloride concentration data show that the center of mass of a release from the site resides from near ground surface to 25-feet below ground surface (bgs).

7. HYDRUS-1D simulated three potential remedies to mitigate the potential impact to ground water caused by the migration of chloride from the upper vadose zone to ground water.

8. Results of the HYDRUS-1D simulations allow R.T. Hicks Consultants to recommend:

   - Excavation of the upper 4-feet of material, placement of a 1-foot thick low-permeability clay layer from 4-feet bgs to 3-feet bgs,
   - Filling the remaining 3-feet of the excavation with a sandy loam topsoil mixture,
   - Grading the site to prevent any ponding of surface water, and
   - Seeding the area to enhance natural re-vegetation.

This remedy reduces chloride flux into the aquifer such that ground water chloride concentration is less than 30 ppm above background concentration (100 ppm).

3.0 BACKGROUND

The I-29-EOL Boot was a component of the Hobbs SWD system. With the abandonment of the system in 2002, Rice Operating Company (ROC) excavated and removed the EOL Boot and used imported soil to fill the excavation. Appendix A presents additional information regarding the Hobbs SWD system.

3.1 LOCATION

Appendix A includes a regional location map showing the location of the site relative to selected other components of the Hobbs SWD system and public roads. Plate 1 is an aerial photograph of the site when it was active, taken between 1996 and 1998. Plotted on Plate 1 is the location of the site, the monitoring well at the adjacent I-29 Vent site, the location of the Texland Petroleum well and French Lane. Office of the State Engineer (OSE) wells within a one-mile radius of the I-29 EOL Boot site are given in Appendix C.

3.2 CHARACTERIZATION ACTIVITIES

In November 2004, R. T. Hicks Consultants, ROC, and Eades Drilling mobilized to complete one boring at the site. At the I-29 EOL Boot site, the location of the borehole was chosen inside the small depression (about 2-feet deep) caused by the removal of the boot, allowing data collection within approximately 3-feet of the boot location. In order to permit comparison of the results from this boring with the ambient chloride concentrations in the vadose zone, collection of samples from a background soil boring was a critical element of the NMOCD-approved workplan. Appendix A shows the location of and results from this background soil boring.

At the I-29-EOL boot site from 0-35 feet below land surface, the split spoon obtained samples at 5-foot intervals. The dry and unconsolidated nature of the sand-silt below a depth of 35-feet made retrieval of the split spoon for samples impossible. Continued attempts to collect split spoon samples were unsuccessful until a depth of 56-feet below ground surface. Due to increased soil moisture at this depth, the split spoon was able to retain samples to the total depth of 62-feet. In the interval between 35-feet bgs and 55-feet bgs, samples were collected from cuttings. This is the only material deviation from the NMOCD-approved workplan.

In the field, ROC evaluated samples from each depth for chloride and used the heated headspace method to measure total organic vapors by PID. Samples were submitted to the laboratory from depths showing the highest field chloride and PID measurements (6-feet bgs) and from the capillary fringe (61-feet bgs).

4.0 HYDROGEOLOGY OF THE SITE

Appendix A describes the hydrogeology of the area of the Hobbs SWD system

4.1 CHARACTERIZATION OF THE VADOSE ZONE

The soil profile at the site is composed primarily of a very fine grained sand-silt with three prominent caliche layers in the upper soil profile (Plate 2). The uppermost 6-feet at the site is sand-silt with some caliche. A more consolidated caliche exists from 6-feet bgs to 22-feet bgs. A well-indurated caliche sandstone layer exists between 30- and 35-feet bgs. The lowest caliche layer exists at 45- to 50-feet bgs. From 35-feet bgs to the bottom of the boring, the sand-silt is a reddish tan. Moisture was observed in the material from the bottom of the boring at 62-feet bgs.

Field chloride measurements were performed by ROC personnel every 5-feet starting at 6-feet bgs as detailed earlier and presented in Appendix B and Figure 1. An additional sample was collected at 22-feet bgs due to difficulty in collecting sufficient material of the well-indurated caliche layer at this depth. At 6-feet bgs, ROC measured a field chloride concentration of 5,125 mg/kg. Chloride measurements declined to 596 mg/kg at 16-feet bgs. Two additional chloride measurements of 1,415 mg/kg and 328 mg/kg occurred at 21-feet bgs and 31-feet bgs, respectively. Below this depth, chloride measurements (from cuttings) were at background levels with no measurement above 100 mg/kg below 35-feet bgs. As shown in Appendix A, the background chloride concentration in this area is 80 mg/kg.

The sample from 6-feet bgs featured a field PID reading of 124 ppm. All other readings from 11-feet bgs to 61-feet bgs were at background levels with an exception of a reading of 35 ppm at a depth of 35-feet bgs (See Plate 2). Samples from 6-feet bgs and 61-feet bgs were sent for laboratory analysis of BTEX. Laboratory analysis from the site is included in Appendix B. In the sample from 6-feet bgs, there was no detection of benzene (Table 1). Toluene, ethyl benzene and xylene were detected in concentrations two to four orders of magnitude lower than NMED soil screening levels (*NMED TPH Screening Guidelines*, February, 2004, DAF 20 guidelines allowing decay of constituents of concern) and below NMOCD Guidance. No constituents of concern were detected in the sample from 61-feet bgs.

Laboratory Data for SWD B-4 (I-29 EOL Boot), November 2004

	6 ft bgs	61 feet bgs	Detection Limit	NMED Screening Limit
	mg/kg (dry)			
Benzene	ND	ND	0.025	0.0283
Toluene	0.0139	ND	0.025	6.8
Ethylbenzene	0.0416	ND	0.025	10.5
Xylene (p/m)	0.055	ND	0.025	158
Xylene (o)	0.0298	ND	0.025	147
	mg/kg (wet)			
Chloride	4890	ND	20	

Table 1. Laboratory data for I-29 EOL Boot, November 2004

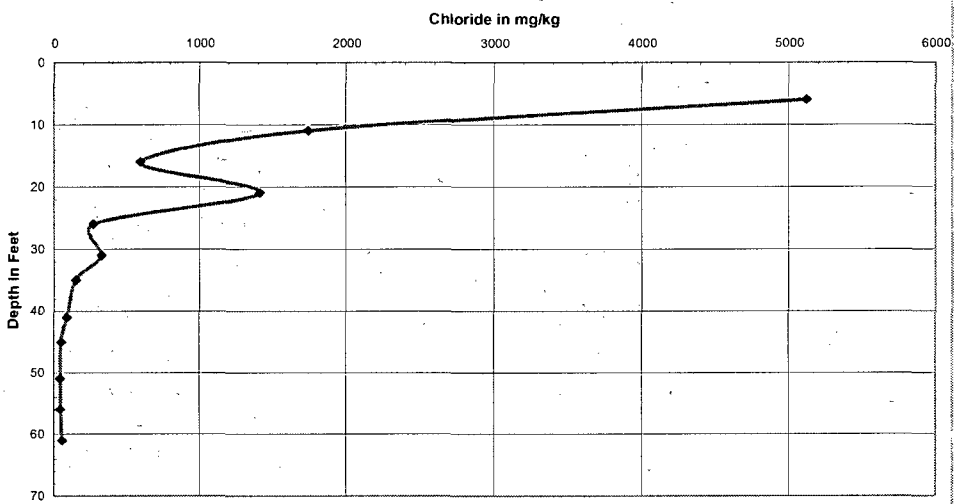
Because field evidence demonstrated that the chloride mass remains in the upper vadose zone and no evidence of material hydrocarbon impact was observed at the site; R.T. Hicks Consultants concluded that any releases from this boot did not flow to ground water and there was no need to install a monitoring well at the site.

4.2 CONCEPTUAL MODEL OF SUBSURFACE PRODUCED WATER RELEASE

Boots within the gravity-flow pipelines of the system consisted of a T-like intersection of pipes, with an open vertical pipe above ground placed over a wooden catchment box. Some separation of gas from the produced water and entrained hydrocarbons occurred, and the resulting outflow has gravity flow. The conceptual model presented in Appendix A discusses how produced water releases generally occur within gravity driven water disposal systems, such as the Hobbs SWD. The conceptual model relies upon eyewitness accounts of recent releases and observations of subsurface chemistry.

From discussions with individuals familiar with these systems and from field inspection of the surface soils, R. T. Hicks Consultants concluded that periodic overflow events occurred at the I-29 EOL Boot site. ROC field chloride concentration measurements and laboratory data demonstrate that the mass of constituents of concern remains above 35-feet bgs (see Figure 1 and Appendix B). Although these samples were from cuttings associated with the air-rotary drilling process, Hicks Consultants believes they represent the chemistry of the vadose zone. These data support a release model where saturated conditions between the surface and ground water did not exist.

Figure 1
Soil Chloride Concentrations at the I-29 EOL Boot Site v. Depth



5.0 SIMULATION OF VERTICAL CHLORIDE FLUX

5.1 METHODS OF EVALUATION

As described in the NMOCD-approved workplan, HYDRUS-1D simulated flow through the vadose zone. The HYDRUS-1D output becomes the input to a simple ground water mixing model to simulate chloride concentration in a hypothetical well immediately down gradient of the site. Section 3.0 of Hendrickx and Others, *Modeling Study of Produced Water Release Scenarios*, (2005), provides a general description of this modeling approach (see References Section at the end of this document).

For subsurface releases like those within the Hobbs SWD System, the chloride vadose zone profile (Figure 1) was installed in lieu of attempting to re-create the specific release history for model input. 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.

5.2 INPUT FOR SIMULATIONS

Inputs for the HYDRUS-1D modeling are synopsized in Table 3. The soil profile is based upon the results from this site and five other borings completed within Section 29 (see Appendix A).

Because of R.T. Hicks Consultants' recent experience with similar soils south of Lovington, New Mexico, 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 Appendix A, a dispersion length less than 6 % of the model thickness was installed (Table 2 presents the specific dispersion lengths for each lithology).

HYDRUS-1D calculated initial soil moisture of the Section 29 soil profile by running a simulation for 45 years using the weather data from the Pearl Weather station on a "dry" soil column. Because soils are

Table 2. Input parameters for HYDRUS-1D simulations

Hydrus Soil Profile 1 (Current Conditions)				
Material	Description	Length (cm)	Dispersion (cm)	%of Profile length
1	Sandy Loam	60	50	2.778
2	Caliche-sand	520	30	1.667
3	Caliche	150	10	0.556
4	Sand-silt	1070	100	5.556

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.

The calculation of soil moisture content begins with using professional judgment as an initial input then running sufficient years of weather data 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, 45 years was considered more than sufficient to establish the initial moisture condition. Soil profiles hydrated in this manner were used in all simulations of chloride movement discussed later in this report.

As mentioned earlier, 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.

As the Boot is oriented vertically, the effected area is small. Significant lateral impacts were not observed; and therefore, length of release parallel to ground water flow was concluded to be less than or equal to 20-feet.

Weather data used in the predictive modeling was 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 I-29 Vent

Table 3. Input parameters for HYDRUS-1D simulations

Input Parameter	Source
Vadose Zone Thickness - 60 feet	Section 29 Bore Logs
Vadose Zone Texture (Plate 2 and Appendix A)	See Section 29 B-2 Well Log and App. A
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 - 20 feet	Field Estimate
Background Chloride in Ground Water 100 ppm	Intera Report (see Section 9.0 References)
Ground Water Flux - 8.6 cm/day	Calculated from published data
Aquifer Thickness - 10-feet	From Well Chloride data at Section 29 sites

site featuring sufficiently complete weather data for the HYDRUS-1D input files. Only more recent data from the Hobbs Airport is complete enough to be used for HYDRUS-1D input.

As described in Appendix A, a ground water flux of 8.6 cm/day was calculated.

Field data observed within Section 29 demonstrates that the aquifer is greater than 40-feet thick in this area. Persistent vertical differences in chloride concentrations in other wells installed in Section 29 suggest restrictions to vertical flow within the Ogallala aquifer (see Appendix A). Accordingly, a restricted aquifer thickness of 10 feet was employed in the mixing model as a conservative measure to cause over-estimation of chloride concentration in the imaginary monitoring well.

6.0 PROPOSED REMEDY

Four scenarios were modeled by coupling HYDRUS-1D output to a ground water mixing model. The scenarios are:

Scenario 1 - Modeling of current conditions from the November 2004 field program.

Scenario 2 - Removal of the upper two feet of the soil profile, placement of a synthetic barrier overlain with two feet of clean fill on top of the barrier.

Scenario 3 - Excavation of the upper 10 feet of the soil profile and replacement with 10 feet of clean fill.

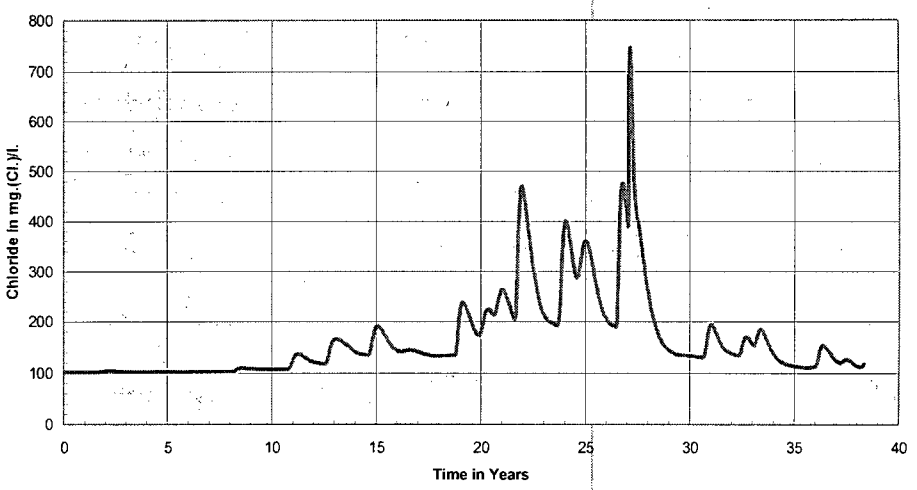
Scenario 4 - Excavation of the upper four feet of the soil profile, placement of one foot of clean clay between 4 feet bgs and 3 feet bgs, and placement of 3 feet of a clean sandy loam.

6.1 ALTERNATIVES EXAMINED

Modeling of the current condition (Scenario 1) indicates that chloride concentrations in ground water may exceed 250 mg/l during the time from 21 years through 29 years from now (Figure 2). Scenario 1 establishes a baseline condition to which possible remedies may be compared.

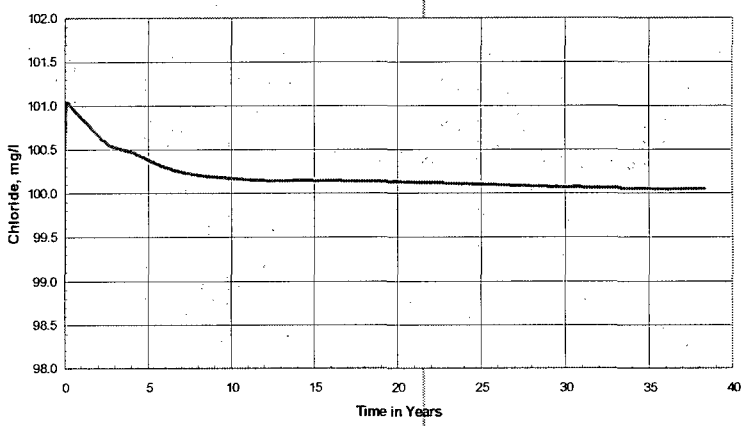
Three remedial alternatives were examined with the modeling. The first remedy evaluated, Scenario 2, simulated the removal of the upper 2-feet of the soil profile and replacement of this material with an impermeable barrier, such as a synthetic liner. Despite no infiltration, gravity causes the residual vadose zone moisture to move downward. However, the lack of infiltration

Figure 2. Chloride Concentration in the Aquifer for I-29 EOL Boot (Scenario 1)



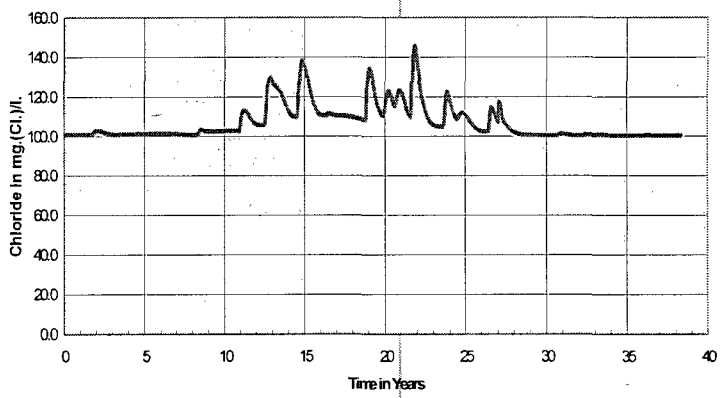
causes the moisture content in the profile to decline over time. Lower moisture content causes a commensurate reduction in unsaturated hydraulic conductivity. Without infiltration, the vadose zone flux into the aquifer is so diminished that chloride concentration in the aquifer is indistinguishable from background concentration (Figure 3).

Figure 3. Chloride Concentration in the Aquifer for I-29 EOL Boot with a Barrier Installed (Scenario 2)



The second possible remedy, Scenario 3, evaluated the removal of the upper 10-feet of soil and replacement with clean fill assumed to contain a background chloride concentration of 80 mg/kg. To evaluate this alternative, a second HYDRUS-1D soil profile was used (see Appendix A and Plate 3) with this adjusted chloride load.

Figure 4. Chloride Concentration in the Aquifer with an Excavated Upper 10 feet of Soil Profile, I-29 EOL Boot v. Time (Scenario 3)

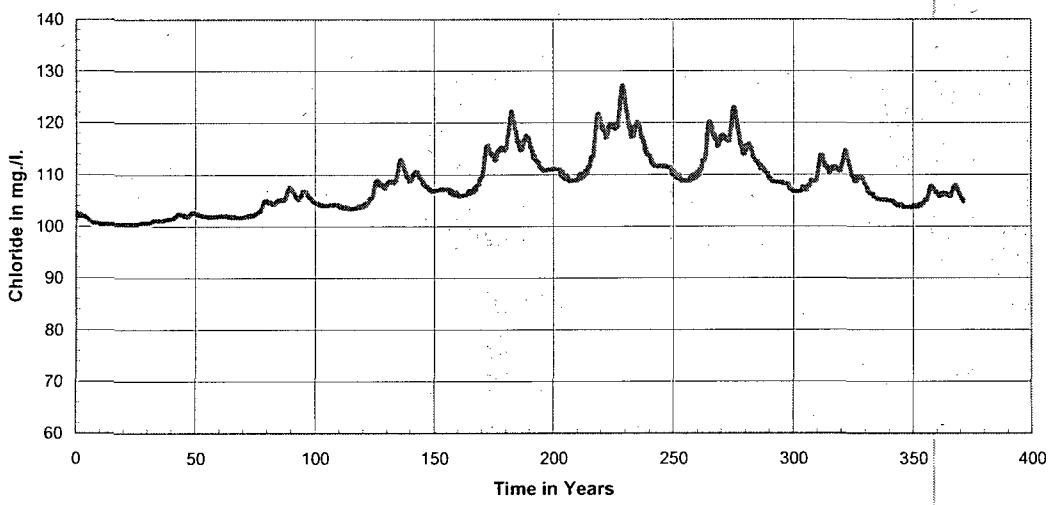


This second soil profile represents an excavated site by replacing the upper 19- feet of sand, caliche, and clay with sandy loam, which exhibits a higher hydraulic conductivity than the excavated material. This change accelerates the residual chloride and water flux into the aquifer. Because most of the chloride currently at the site is contained within the upper 10-feet of the soil profile and is exported in this remedy, the resulting peak chloride concentration in the aquifer is less than 150 ppm about 22 years from now (Figure 4). This simulation does not consider re-vegetation of the ground surface, which would occur and reduce infiltration.

The third remedy, Scenario 4, simulated the excavation of the upper 4-feet of material, placement of a 1-foot thick low-permeability clay layer from 4-feet bgs to 3-feet bgs and filling the remaining 3-feet of the excavation with a sandy loam topsoil mixture. Again, the second HYDRUS-1D soil profile was used with the suitably adjusted chloride load. This choice permits the model to over estimate the potential impact

to ground water quality (see Appendix A). Figure 5 presents the result of this simulation showing that the chloride mass enters ground water through a diminished flux because of lowered infiltration. Ground water chloride concentrations are increased less than 30 ppm above background concentrations (100 ppm).

Figure 5. Chloride Concentration in the Aquifer for I-29 EOL with a Clay Cap v. Time, (Scenario 4)



7.0 PROPOSED REMEDY

R. T. Hicks Consultants recommends that ROC remove the upper 4-feet of soil at this site and replace this with 1-foot of clay and 3-feet of top fill installed with a slight crown to promote surface runoff (Scenario 4). The maximum predicted chloride concentration in ground water is represented in Figure 5.

8.0 CRITERIA FOR CLOSURE

Vadose zone samples demonstrate no presence of toxic pollutant(s) as defined in 20.6.2.7 NMAC. Existing vadose zone samples are proposed to serve as closure samples.

With installation of a clay cap and top soil fill at the site, modeling predicts no reasonable probability of ground water impairment using the initial vadose zone samples as the closure samples. Upon installation of the proposed clay cap, R.T. Hicks Consultants recommends that NMOCD close this site.

9.0 REFERENCES

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

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

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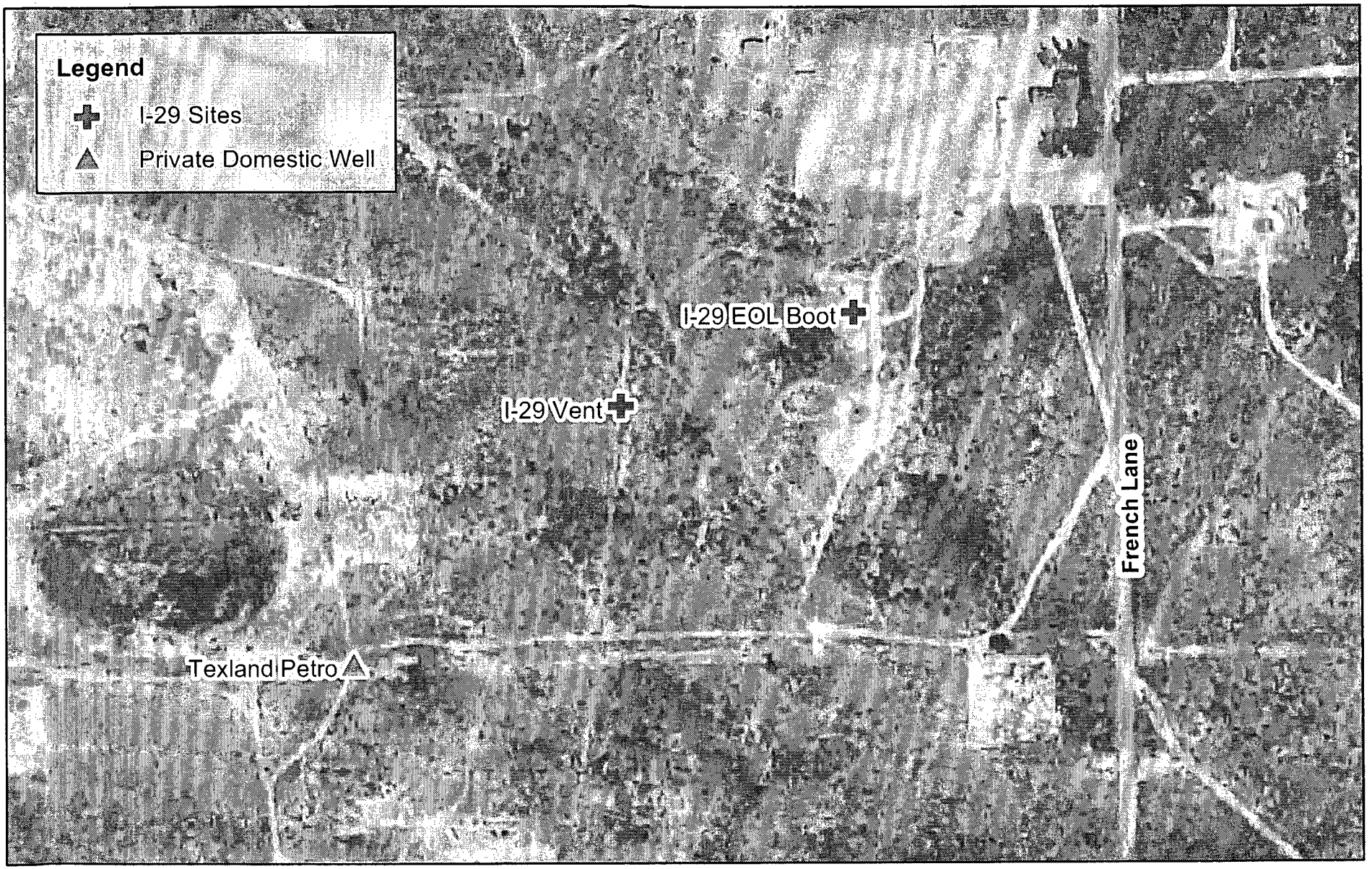
PLATES



Source Map: Hobbs West NE Qtr (http://rgis.unm.edu)

0 500 1,000 Feet

N

R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Aerial Photograph (1996-98) showing I-29 Site and Surrounds	Plate 1
	NMOCD: I-29 Corrective Action Plan (Rice Operating Company)	September 2005

Logger:	David Hamilton	**Client:**	**Boring ID:**
Driller:	Eades Drilling	Rice Operating Company	
Drilling Method:	Air Rotary	**Project Name:**	
Start Date:	11/4/2004	I-29 EOL Boot	**Section 29 B-4 (62 feet)**
End Date:	11/4/2004	**Location:**	
		T18S R38E	
		Section 29, Unit I	

Depth (feet)	Description	Lithology	Comments	Field data		
				Depth	Chloride mg/kg	PID
0.0	Surface, 0-3 feet		Boring started 2 feet bgs in trench			
2.0	Sand silt, caliche, tan, 3-6 feet					
4.0						
6.0	Caliche, tan to white, 6-22 feet			6.0	5125	124.0
8.0						
10.0				11.0	1746	2.4
12.0						
14.0						
16.0				16.0	596	2.3
18.0						
20.0				21.0	1415	2.8
22.0	Very fine grained sand silt, tan, 22-30 feet					
24.0						
26.0				26.0	271	6.7
28.0						
30.0	Well indurated caliche, 30-33 feet		Hard drilling	31.0	328	7.5
32.0	Sandstone, red-tan, 33-35 feet		Very hard drilling			
34.0	Very fine grained sand, tan-red, 35-45 feet					
36.0				35.0	152	35.0
38.0						
40.0				41.0	92	9.7
42.0						
44.0	Very fine grained sand, some caliche, 45-50 feet					
46.0				45.0	53	7.0
48.0						
50.0	Very fine grained sand silt, tan red, 50-62 feet			51.0	46	4.3
52.0						
54.0				56.0	47	8.2
56.0						
58.0						
60.0			Last sample 60-62 feet, moist. Hole backfilled with Bentonite	61.0	59	4.4
62.0						

R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 505-266-5004	**I-29 EOL Boot**	**Plate 2**
	Exploratory Boring	**September, 2005**

HYDRUS-1D Profiles	Client: Rice Operating Company Project Name: I-29 EOL Boot Location: T18S R38E Section 29	

Depth (feet)	Description	Current Profile	Description	Excavated Profile	Depth (feet)
0.0	Sandy loam, 0 - 2 feet		Sandy loam 0-1 feet		0.0
2.0	Sand, caliche, 2-17 feet		Loamy sand, 1-19 feet		2.0
4.0					4.0
6.0					6.0
8.0					8.0
10.0					10.0
12.0					12.0
14.0					14.0
16.0	Caliche, 17-19 feet				16.0
18.0	Sand, silt 19-20feet		Sand, silt 19-20feet		18.0
20.0	Caliche, 20-22 feet		Caliche, 20-22 feet		20.0
22.0	Sand, silt 22-34 feet		Sand, silt 22-34 feet		22.0
24.0					24.0
26.0					26.0
28.0					28.0
30.0					30.0
32.0					32.0
34.0	Caliche, 34-35 feet		Caliche, 34-35 feet		34.0
36.0	Sand, silt, 35-45 feet		Sand, silt, 35-45 feet		36.0
38.0					38.0
40.0					40.0
42.0					42.0
44.0	Sand , caliche, 45-47 feet		Sand , caliche, 45-47 feet		44.0
46.0	Sand, silt, 47-59 feet		Sand, silt, 47-59 feet		46.0
48.0					48.0
50.0					50.0
52.0					52.0
54.0					54.0
56.0					56.0
58.0					58.0
60.0					60.0

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Section 29 Sites	Plate 3
Hydrus Profiles Developed from Exploratory Borings	September, 2005

APPENDIX A

1.0 CONCEPTUAL MODEL OF SUBSURFACE PRODUCED WATER RELEASES

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 1,000 barrels/day flowed through the system until operations ceased in 2002.

People familiar with the site suggest that soil staining and other evidence of produced water leakage at various sites typically dates to the time when the system was operating at capacity. Accidental releases to the environment at many sites ceased in the 1990s and natural restoration has mitigated the effects of any past releases. At most release sites, no vegetation stress that can be attributed to past releases exists.

The System operated by gravity flow of produced water through pipelines, junction boxes, boots, tanks and disposal through injection into wells. Releases occur periodically due to gradual failures of seals, overflow of vent lines, or sudden and accidental releases. The length of time that produced water flows to the subsurface was short for sudden and accidental releases or vent overflow incidents. A failure of a seal or a small crack in a pipeline may have allowed a release to the subsurface for months or longer. Because of the efforts of ROC to routinely identify system failures and because the flow in the Hobbs SWD System materially declined during the past decade, only minor subsurface releases occurred in the Hobbs SWD System until operations ceased in 2002.

The distribution of constituents of concern (primarily chloride, secondarily BTEX) in the surface soil and vadose zone is different for each release scenario. Releases of relatively large water volumes over long periods create saturated conditions between the release site and ground water. Where this type of release occurs, borehole data show a relatively constant chloride concentration of 2-4 times background concentration throughout the vadose zone. Due to the natural processes of sorption and biodegradation, petroleum hydrocarbons may not impact ground water even at sites where large volumes were released over long periods.

Episodic releases of small volumes of produced water will not always create saturation of the vadose zone. Where episodic releases occur in junction boxes or similar enclosures, spills of produced water and entrained crude oil infiltrate the vadose zone. After the spill ceases and the

produced water drains into the vadose zone, the entrained crude oil follows similar paths as the produced water with the difference that the higher viscosity and surface tension limits the depth of infiltration. After deposition of the oil within the near surface vadose zone pore spaces, volatilization of the lighter hydrocarbons from the crude oil and the aging process in general causes the formation of an asphaltic-sand that reduces or eliminates subsequent infiltration through that same flow path.

This conceptual model of produced water releases accounts for the distribution of chloride and regulated hydrocarbons observed at this and others salt water disposal systems. The depth of penetration of produced water depended primarily upon the size and frequency of releases, how quickly crude filled the pore spaces and reduced permeability, and the nature of the subsurface. At some sites, these three factors allowed produced water to penetrate less than 10 feet. At other sites where a relatively large volume of produced water entered the subsurface, penetration to depths much greater than 10 feet occurred due to unsaturated and saturated flow. At sites where crude was not released with produced water to reduce the permeability of the subsurface, relatively small episodic releases could reach ground water.

Because the system operated under gravity flow, the produced water releases were generally episodic, being caused by temporary over-pressuring at a given location (e.g. a vent). The lack of constant pressure within the system typically caused releases of relatively small volumes. If the total volume released was relatively small, then one could observe relatively high chloride concentrations in the unsaturated zone with no impairment of ground water quality.

Improved operational and environmental practices of the 1980s and 1990s plus the clogged pore spaces caused by previously released crude caused saturated flow conditions, which may have existed at some sites, to change to much slower unsaturated flow. With this type of release, one could observe high concentrations of constituents throughout the vadose zone but no current impairment of ground water quality.

Impairment of ground water quality occurs only where the mass of constituents of concern in produced water entered ground water at a sufficient rate to overwhelm natural dilution and dispersion. Therefore, high concentrations of constituents in the vadose zone are not the only factor that determines if ground water is impaired; it is the flux of these constituents to ground water. However, if a soil column contains only low concentrations of constituents, then one may conclude that there is insufficient mass of constituents to impair ground water quality regardless of the flux.

In the absence of vadose zone saturation, the arid climate of New Mexico creates such a low flux to ground water that one can observe sequestration of the constituents of concern in the upper vadose zone (10-20 feet below land surface) for many years. Borehole data from these types of releases show high concentrations of chloride below the release site and a relatively sharp decline in chloride concentration to background conditions with depth. If the release is not recent, natural processes can reduce the concentrations of any residual hydrocarbons and eliminate any environmental risk to ground water. Figure 1 presents schematic representations of field chloride analyses that are common for saturated and unsaturated release scenarios.

In summary, sites where chloride or other constituents of concern penetrated deep into the vadose zone probably experienced long-term releases of relatively large volumes of water; or crude was not released with the water and the filling of soil pores with asphaltic material did not occur. Where penetration of the vadose zone was less than 20-30 feet, the release was episodic and consisted of a relatively small volume of fluid.

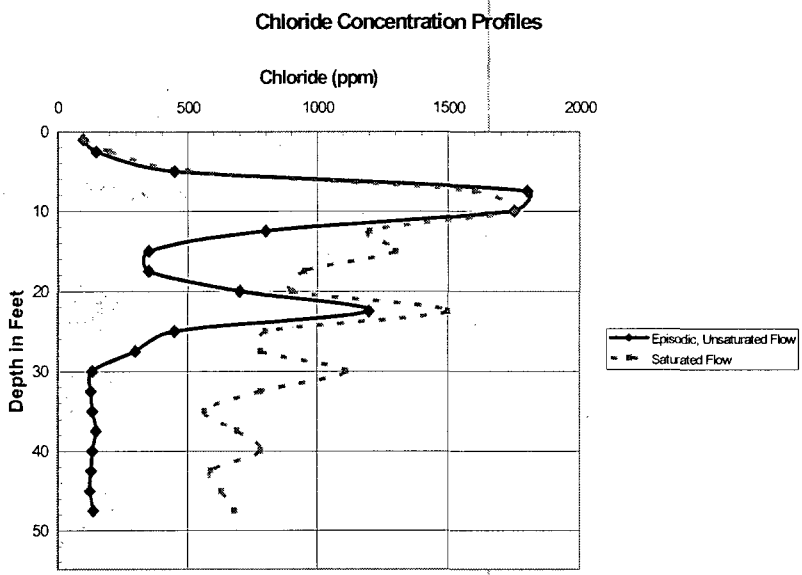

Figure 1. *Schematic representations of field chloride analyses that are common for the two different release scenarios.*

Produced water potentially released to the environment from the Hobbs SWD System is expected to contain the following regulated constituents:

- Benzene
- Ethylbenzene
- Toluene
- Xylenes
- Naphthalenes
- Total Dissolved Solids
- Chloride
- Sulfate

Because the fate and transport of released chloride is essentially identical to that of TDS and sulfate, soil samples can be evaluated for chloride only; and one may remain confident that concentrations of chloride will indicate the presence of similar concentrations of other non-hydrocarbon constituents.

The regulated hydrocarbon constituents can behave independently of each other due to different rates of biodegradation and sorption. Field measurements of total organic vapors are very useful in providing a qualitative measure of the concentration of volatile organic constituents (e.g. benzene) in soil, and therefore, this field measurement is employed to identify which samples will undergo laboratory analysis.

2.0 HYDROGEOLOGY OF SECTION 29

2.1 CHARACTERISTICS OF THE VADOSE ZONE IN SECTION 29

Plate A-1 with Table A-1 shows:

- The location of monitoring wells and soil borings installed by ROC within Section 29,
- Private supply wells sampled by ROC,
- Supply wells with water sample data from the Intera's *Windmill Oil Site Ground Water Sampling Results* (2003), and
- Water supply wells that have lithologic information in Exhibit A-1 collected from the Office of the State Engineer (OSE).

Plate A-2 is the well log from the F 29-1a site, which is typical of the area. As is common in the Ogallala Formation throughout the High Plains, caliche dominates the uppermost vadose zone from 5 feet below surface to a depth of more than 20 feet. Below the caliche horizon, the boring penetrated tan and red very fine-grained sand and silt to the water table. Interbedded with the sand and silt are thin layers of caliche. The water table was intercepted between 60 and 65 feet.

Driller's logs on file with the OSE and published descriptions of the upper Ogallala Formation (Nicholson and Clebsch, 1961; Ash, 1963) generally agree with the lithologic profile presented in Plate A-2. Beneath the thin layer of topsoil, caliche is present in the uppermost vadose zone to a depth of 24-28 feet. Below this caliche layer, several supply well logs report penetration of a clay/shale zone, which was not observed in the F-29-1a boring but may exist elsewhere in Section 29. As Plate A-2 shows, R.T. Hicks Consultant's lithologic logs describe very fine grained sand and silt with thin layers of caliche between the surface and a depth of 24 feet and primarily a sand-silt to the total depth (102 feet). In the supply well logs, "sandstone" (which R.T. Hicks Consultants describes as "caliche") dominates the upper vadose zone to depth of about 25 feet; "sand" (which R.T. Hicks Consultants describes as "very fine grained sand-silt") dominates the lower vadose zone to a depth of about 65 feet.

Plate A-3 (see Composite Profile 1), which is a composite lithologic profile based upon available data, is considered to adequately represent the texture of the vadose zone and upper saturated zone throughout Section 29. The driller's logs that describe a clay/shale zone below the uppermost caliche suggest the uppermost vadose zone could be locally finer-grained than described in Plate A-2.

Plate A-3 also contains a second composite profile representing an excavated soil profile in Section 29, which is representative of sites where ROC removed portions of the upper vadose zone during the abandonment program. In this profile, the upper 19 feet (the maximum reach of a backhoe) of sand and caliche is replaced with a loamy sand. As the loamy sand has a higher hydraulic conductivity than the caliche and sand it replaces, overstating depth of excavation is conservative of ground water quality from a modeling viewpoint.

2.2 CHARACTERISTICS OF THE SATURATED ZONE IN SECTION 29

The saturated zone is the Ogallala Aquifer. Plate A-2 characterizes the saturated zone as well-sorted, fine-grained sand with thin layers of caliche and cemented sand. The base of the Ogallala is seldom penetrated in or near Section 29. The single well log on file at the OSE that extends to the top of the "Red Bed" (Dockum Group) does not describe a basal sand and gravel unit that is characteristic of the Ogallala throughout Lea County and the High Plains in general (Nicholson and Clebsch, 1961). The basal sand and gravel unit is probably present throughout the area, despite the lack of site-specific evidence.

Based upon the lithology of the saturated zone, the number and spacing of supply wells, and the size and use of several of these wells (e.g. 12 inches or more), R.T. Hicks Consultants believes that the hydraulic conductivity of the saturated zone in Section 29 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. More recently, Musharrafieh and Chudnoff (1999) employed values for hydraulic conductivity within this area of interest between 81 and 100 ft/day for their simulation. According to Freeze and Cherry (1979), these values correspond to clean sand, which agrees with the site lithologic description of the saturated zone.

For the Hobbs System sites, the saturated hydraulic conductivity of the uppermost saturated zone is assumed as 75 feet/day.

To create a potentiometric surface map for the site, USGS gauging data from 2001-2002 was employed. Table A-1 presents the water level data, and Plate A-4 is the result. Ground water flows east-southeast in Section 29 under a hydraulic gradient of approximately 0.0036. Locally, within Section 29, ground water flows east. In general, ground water flow in Section 29 is concluded to be east-southeast with a hydraulic gradient of 0.003.

Plate A-5 presents two hydrographs of nearby USGS wells showing that ground water elevations near Section 29 have decreased by 10 feet since 1985. Plate A-1 shows the locations of these two wells: near the airport and at the southern city limit of Hobbs.

3.0 REFERENCES

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

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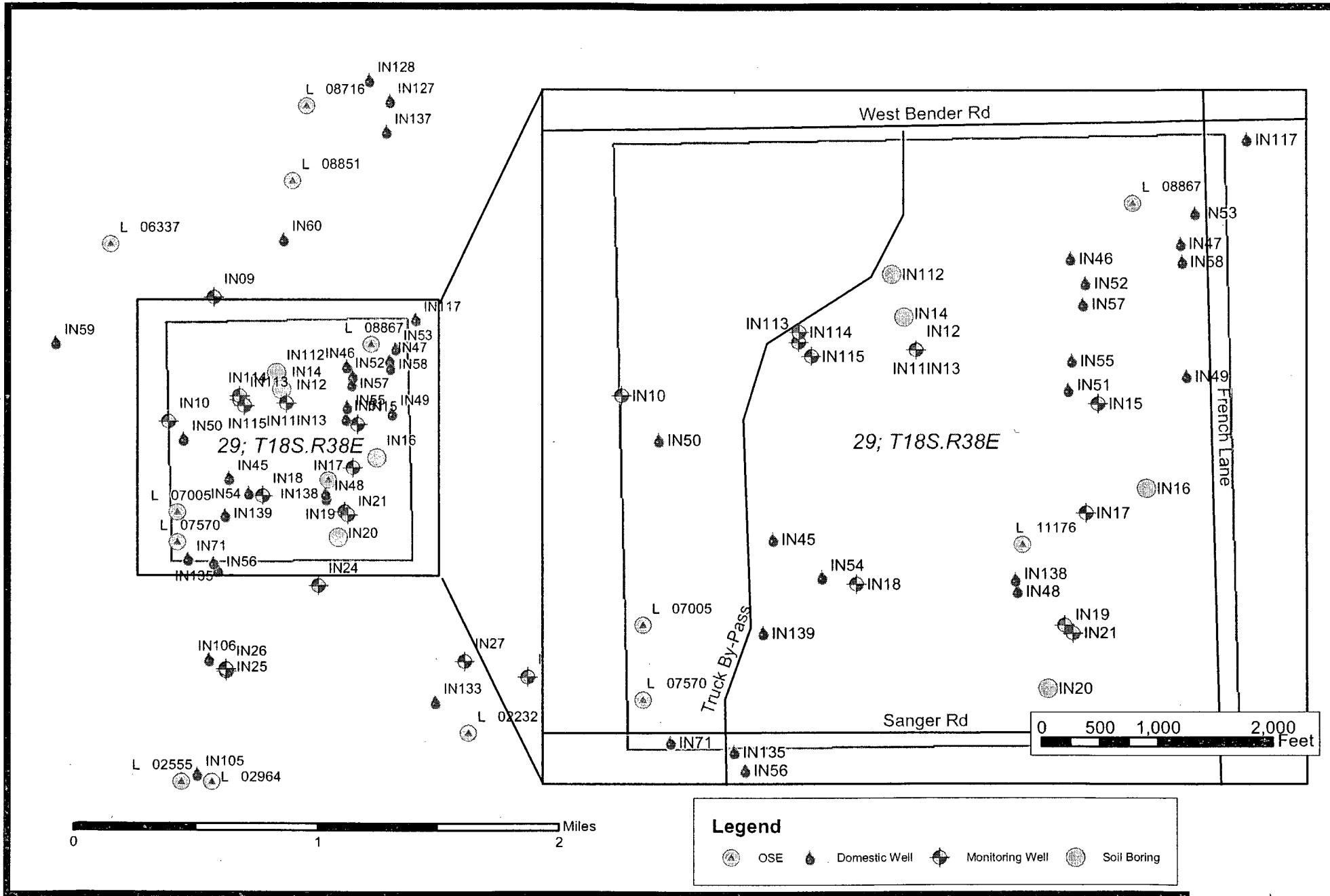
Nicholson Jr., A. and Clebsch, A., 1961, Geology and Ground Water Conditions of Southern Lea County, New Mexico, Ground Water Report 6, US Geological Survey, New Mexico Bureau of Mines and Mineral Resources

TABLES

Table A-1

In_NO	Site_ID	X_UTM83	Y_UTM83	Loc_ID	System	Location	STATUS	GWelev	Cl_ppm
IN009	18S.38E.20.M.VENT	670996	3622479	M-20 Vent	Hobbs	Sec 20, T18S, R38E	Monitoring Well		
IN010	18S.38E.29.E.VENT	670697	3621643	E-29 Vent	Hobbs	Sec 29, T18S, R38E	Monitoring Well		
IN011	18S.38E.29.F.JCT.1A	671472	3621766	Jct. F-29-1a	Hobbs	Sec 29, T18S, R38E	Monitoring Well		
IN012	18S.38E.29.F.JCT.1A-DEEP	671472	3621766	Jct. F-29-1a-Deep	Hobbs	Sec 29, T18S, R38E	Monitoring Well	3585	332
IN013	18S.38E.29.F.JCT.1A-SHALLOW	671472	3621766	Jct. F-29-1a-Shallow	Hobbs	Sec 29, T18S, R38E	Monitoring Well	3585	626
IN014	18S.38E.29.F.JCT.1B	671440	3621854	Jct. F-29-1b	Hobbs	Sec 29, T18S, R38E	Soil Boring		
IN015	18S.38E.29.H.JCT	671949	3621622	Jct. H-29	Hobbs	Sec 29, T18S, R38E	Monitoring Well		
IN016	18S.38E.29.I.EOL BOOT	672076	3621394	I-29 EOL Boot	Hobbs	Sec 29, T18S, R38E	Soil Boring		
IN017	18S.38E.29.I.VENT	671917	3621330	I-29 Vent	Hobbs	Sec 29, T18S, R38E	Monitoring Well	3583	104
IN018	18S.38E.29.K.EOL BOOT	671314	3621139	K-29 EOL Boot	Hobbs	Sec 29, T18S, R38E	Monitoring Well		
IN019	18S.38E.29.O.EOL	671861	3621031	O-29 EOL	Hobbs	Sec 29, T18S, R38E	Monitoring Well		
IN020	18S.38E.29.O.VENT	671818	3620861	O-29 Vent	Hobbs	Sec 29, T18S, R38E	Soil Boring		
IN021	18S.38E.29.P.VENT	671883	3621009	P-29 Vent	Hobbs	Sec 29, T18S, R38E	Monitoring Well		
IN024	18S.38E.32.B.BOOT	671686	3620535	B-32 Boot	Hobbs	Sec 32, T18S, R38E	Monitoring Well		
IN025	18S.38E.32.E.JCT.1	671077	3619959	Jct. E-32-1	Hobbs	Sec 32, T18S, R38E	Monitoring Well		
IN026	18S.38E.32.E.JCT.2	671075	3619976	Jct. E-32-2	Hobbs	Sec 32, T18S, R38E	Monitoring Well		
IN027	18S.38E.33.E.JCT.1	672671	3620026	Jct. E-33-1	Hobbs	Sec 33, T18S, R38E	Monitoring Well		
IN028	18S.38E.33.F.VENT	673087	3619923	F-33 Vent	Hobbs	Sec 33, T18S, R38E	Monitoring Well		
IN045	INTERA.WO-001	671096	3621258	WO-001	Windmill Oil		Domestic Well		
IN046	INTERA.WO-003	671878	3622011	WO-003	Windmill Oil		Domestic Well		478
IN047	INTERA.WO-004	672167	3622050	WO-004	Windmill Oil		Domestic Well		105
IN048	INTERA.WO-005	671739	3621120	WO-005	Windmill Oil		Domestic Well		112
IN049	INTERA.WO-006	672183	3621695	WO-006	Windmill Oil		Domestic Well		119
IN050	INTERA.WO-007	670796	3621523	WO-007	Windmill Oil		Domestic Well		111
IN051	INTERA.WO-009	671872	3621659	WO-009	Windmill Oil		Domestic Well		110
IN052	INTERA.WO-010	671917	3621945	WO-010	Windmill Oil		Domestic Well		84
IN053	INTERA.WO-011	672206	3622132	WO-011	Windmill Oil		Domestic Well		265
IN054	INTERA.WO-012	671224	3621157	WO-012	Windmill Oil		Domestic Well		102
IN055	INTERA.WO-013	671881	3621737	WO-013	Windmill Oil		Domestic Well		378
IN056	INTERA.WO-014	671023	3620640	WO-014	Windmill Oil		Domestic Well		91
IN057	INTERA.WO-022	671911	3621889	WO-022	Windmill Oil		Domestic Well		
IN058	INTERA.WO-024	672171	3622003	WO-024	Windmill Oil		Domestic Well		
IN059	INTERA.WO-044	669954	3622169	WO-044	Windmill Oil		Domestic Well		402
IN060	OCD.AA Oil Field Services	671456	3622866	AA Oil Field Services			Domestic Well		60
IN071	OCD.Cat House Water Well	670826	3620715	Cat House Water Well	Domestic Well		Domestic Well		92
IN105	ROC.Bowlarama	670888	3619268	Bowlarama	Domestic Well		Domestic Well		176
IN106	ROC.Bulldog Tool Co.	670964	3620040	Bulldog Tool Co.	Domestic Well		Domestic Well		168
IN112	ROC.F-29-BGB-01	671407	3621969	F-29-BGB-01	Hobbs		Soil Boring		
IN113	ROC.F-29-MW-2	671163	3621786	F-29-MW-2	Hobbs		Monitoring Well		223
IN114	ROC.F-29-MW-3	671164	3621813	F-29-MW-3	Hobbs		Monitoring Well		272
IN115	ROC.F-29-MW-4	671197	3621748	F-29-MW-4	Hobbs		Monitoring Well		336
IN117	ROC.Hobbs Diesel Co.	672343	3622328	Hobbs Diesel Co.	Domestic Well		Domestic Well		88
IN127	ROC.Mac Truck Co.	672169	3623794	Mac Truck Co.	Domestic Well		Domestic Well		360
IN128	ROC.Oil Field Rental Services	672031	3623935	Oil Field Rental Services	Domestic Well		Domestic Well		76
IN133	ROC.Pan American Petro	672478	3619756	Pan American Petro	Domestic Well		Domestic Well		124
IN135	ROC.Smith's International	670994	3620689	Smith's International	Domestic Well		Domestic Well		92
IN137	ROC.Stoebr Wire Co	672147	3623586	Stoebr Wire Co	Domestic Well		Domestic Well		640
IN138	ROC.Texland Petro	671734	3621152	Texland Petro	Domestic Well		Domestic Well		140
IN139	ROC.Two State Tank Rental Co.	671070	3621007	Two State Tank Rental Co.	Domestic Well		Domestic Well		292

PLATES



R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Well Location Map	Plate A-1
	Rice Operating Company	October 2005

Logger:	David Hamilton	**Client:**	**Well ID:**
Driller:	Eades Drilling	Rice Operating Company	
Drilling Method:	Air Rotary	**Project Name:**	
Start Date:	11/3/2004	Hobbs F-29-1A	**F-29-1a B-2-1 (99 feet), F-29-1a B-2-2 (72 feet)**
End Date:	11/6/2004	**Location:**	
		T18S R38E	
		Section 29, Unit F	

Depth (feet)	Description	Lithology	Comments	Well Construction
0.0	Surface, 0 - 1 feet			Cement, 0-3 feet
2.0	Caliche, clay, sand , moist, 1 - 13 feet, Some hydrocarbon impact			
4.0				
6.0				
8.0				
10.0				
12.0	Caliche, fine grained sand, silt, light tan, 13 - 18 feet			
14.0				
16.0				
18.0	Caliche, well indurated , 18 - 21 feet		Some odor	
20.0	Caliche with some well indurated layers, 21 - 24 feet			
22.0				
24.0	Very fine grained sand, silt, light reddish tan, 24 - 36 feet		At 30 feet: Some hydrocarbon impact, strong odor	Hydrated bentonite, 3-50 feet
26.0				
28.0				
30.0				
32.0				
34.0				
36.0	Some caliche, 36 - 36.5 feet			
38.0	Very fine grained sand, silt, tan - red, 36.5 - 48 feet			
40.0				
42.0				
44.0				
46.0				
48.0	Caliche layer, 48 - 48.5 feet			
50.0	Very fine grained sand, silt, tan - red, 48.5 - 59 feet			
52.0				
54.0				
56.0				
58.0			At 59 feet: Bore collapsing, Probe is wet. Drilled with water below 59 feet	Sand, 50-74 feet Screen 52-72 feet
60.0	Very fine grained sand, silt, tan - red, 59 - 102 feet			
62.0				
64.0				
66.0				
68.0				
70.0				
72.0				
74.0				Hydrated bentonite, 74-92 feet
76.0				
78.0				
80.0				
82.0				
84.0				
86.0				
88.0				
90.0				
92.0				Sand, 92-99 feet Screen 94 99 feet
94.0				
96.0				
98.0			Slump filled hole from 99-102 feet	
100.0				Slump
102.0				

Field data		
Depth	Chloride mg/kg	PID
6.0	203	547
11.0	174	1575
16.0	106	1060
21.0	73	1242
22.0	78	1290
26.0	91	1006
31.0	83	1290
36.0	85	403
41.0	92	432
46.0	92	354
51.0	72	527
56.0	87	479
59.0	94	414

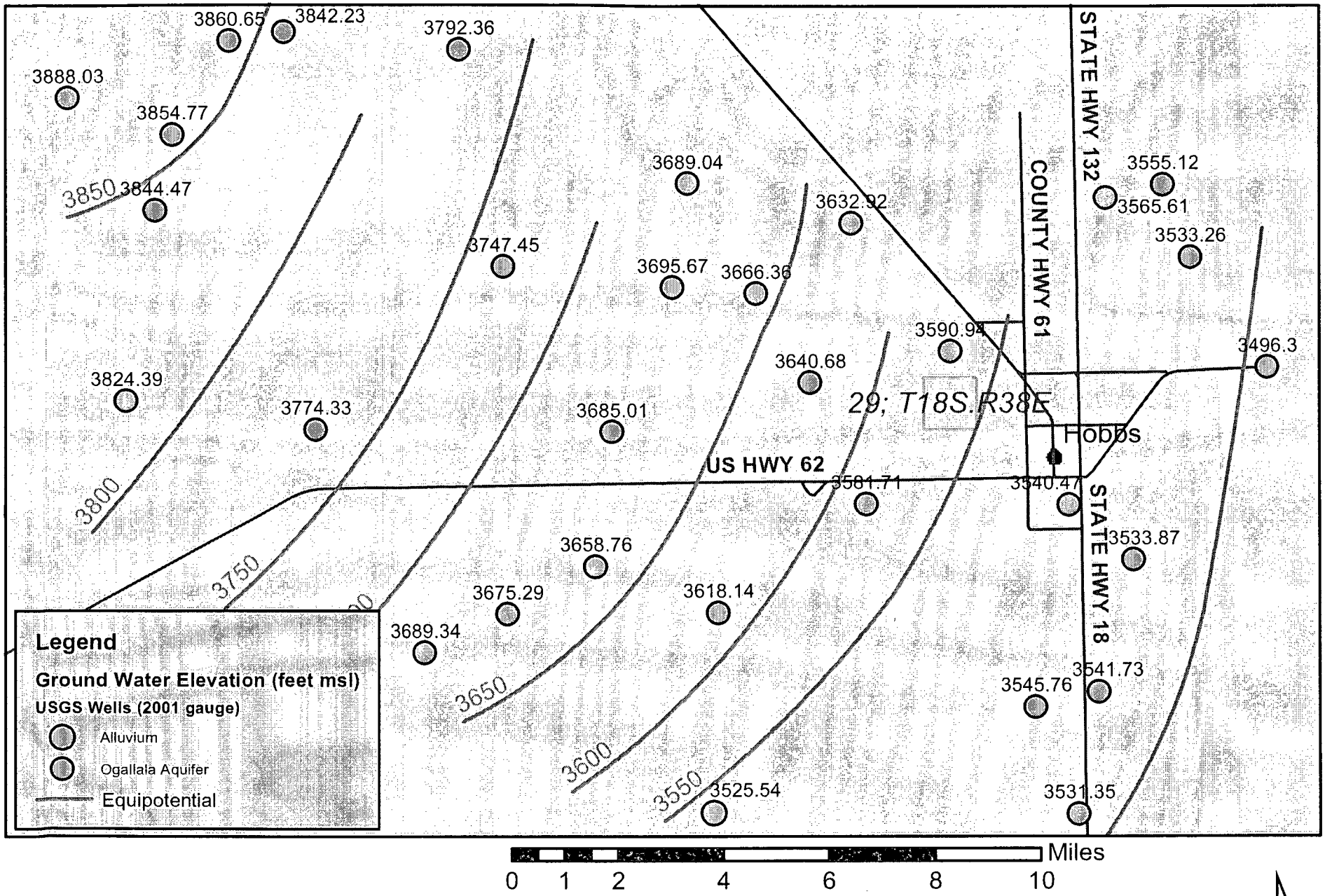
R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 505-266-5004	**Hobbs F-29-1A Site**	**Plate A-2**
	Monitoring Well Boring	**October 2005**

HYDRUS-1D Profiles	Client:
	Rice Operating Company
	Project Name:
	I-29 EOL Boot
	Location:
	T18S R38E
	Section 29

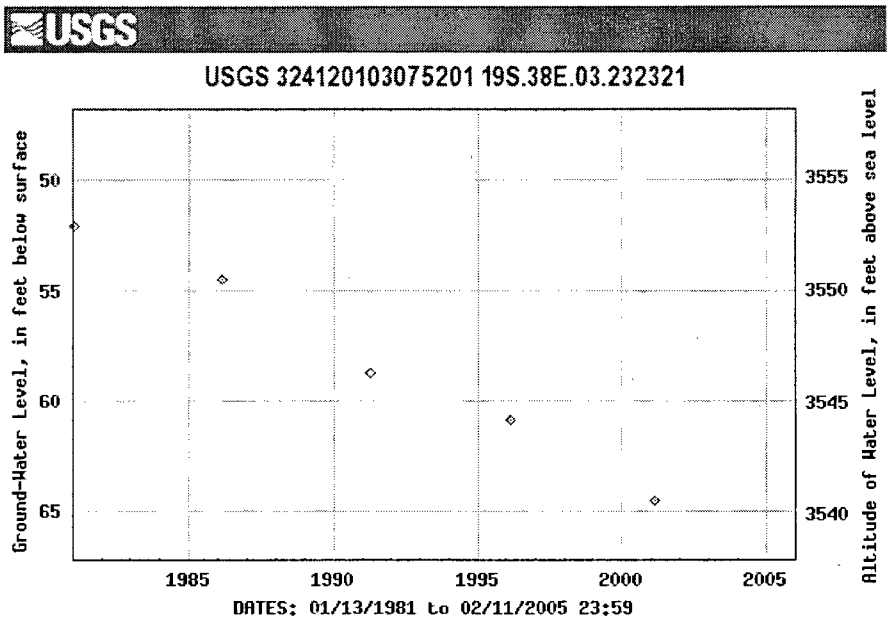
Depth (feet)	Description	Composite Profile	Description	Excavated Profile	Depth (feet)
0.0	Sandy loam, 0 - 2 feet		Sandy loam 0-1 feet		0.0
2.0	Sand, caliche, 2-17 feet		Loamy sand, 1-19 feet		2.0
4.0					4.0
6.0					6.0
8.0					8.0
10.0					10.0
12.0					12.0
14.0					14.0
16.0	Caliche, 17-19 feet				16.0
18.0	Sand, silt 19-20feet		Sand, silt 19-20feet		18.0
20.0	Caliche, 20-22 feet		Caliche, 20-22 feet		20.0
22.0	Sand, silt 22-34 feet		Sand, silt 22-34 feet		22.0
24.0					24.0
26.0					26.0
28.0					28.0
30.0					30.0
32.0					32.0
34.0	Caliche, 34-35 feet		Caliche, 34-35 feet		34.0
36.0	Sand, silt, 35-45 feet		Sand, silt, 35-45 feet		36.0
38.0					38.0
40.0					40.0
42.0					42.0
44.0	Sand , caliche, 45-47 feet		Sand , caliche, 45-47 feet		44.0
46.0	Sand, silt, 47-59 feet		Sand, silt, 47-59 feet		46.0
48.0					48.0
50.0					50.0
52.0					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

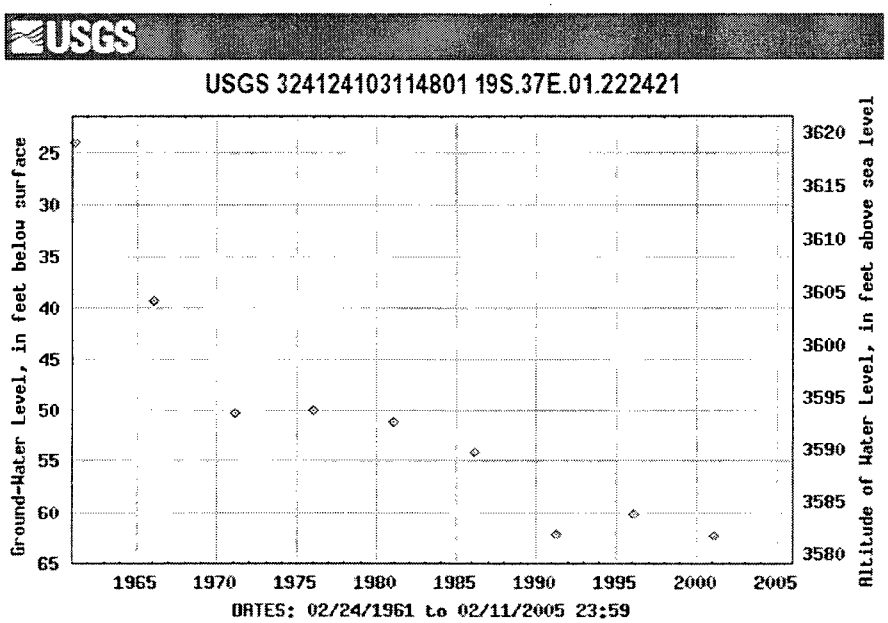
Section 29 Sites	Plate A-3
Hydrus Profiles Developed from Exploratory Borings	October, 2005



R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Potentiometric Suface Map (USGS 2001 Data)	Plate A-4
	Rice Operating Company	August 2005

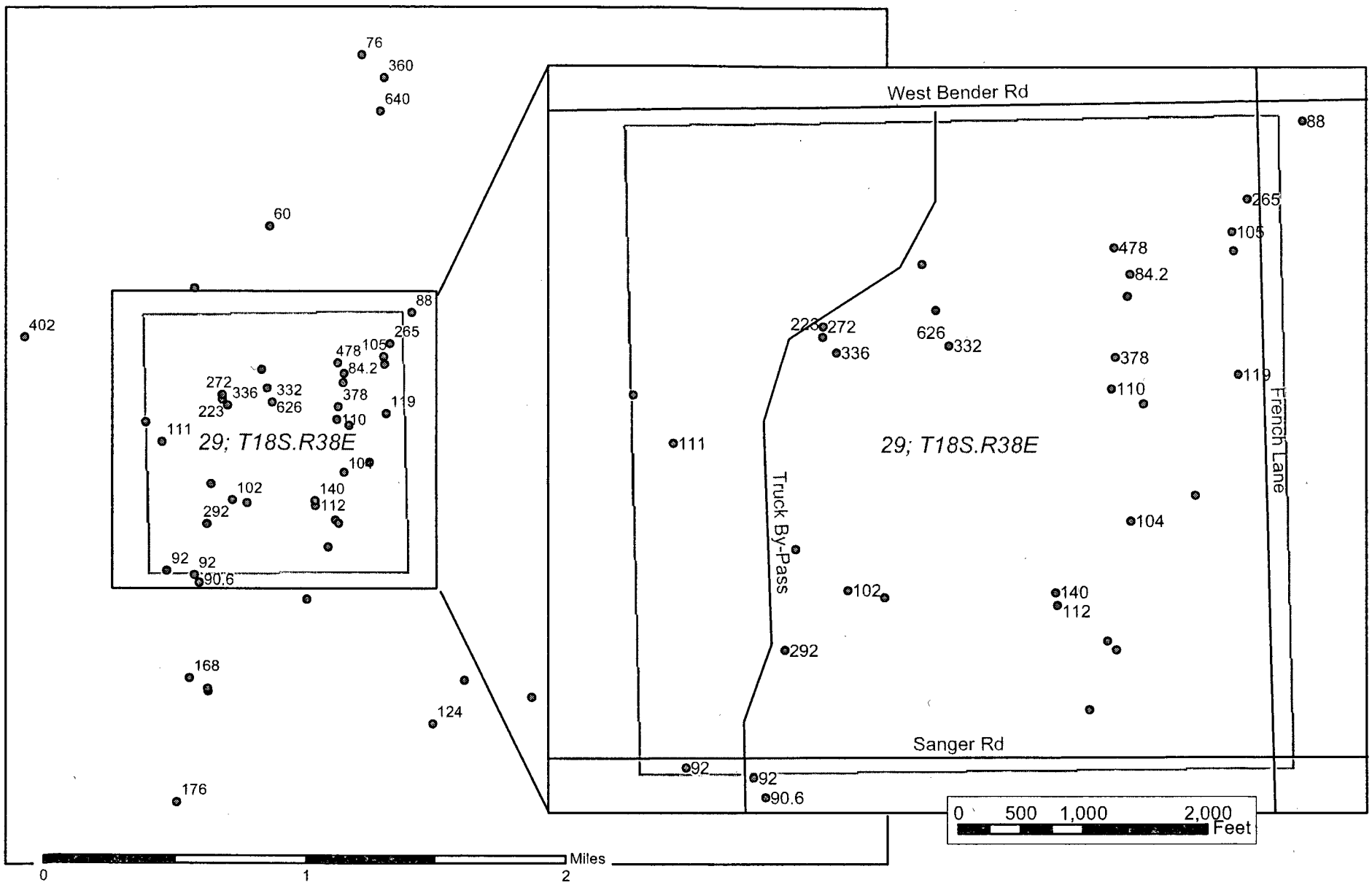


Provisional Data Subject to Revision



Provisional Data Subject to Revision

R.T. Hicks Consultants, Ltd. 901 Rio Grande Blvd. NW, Suite F-142 Albuquerque, New Mexico 87104	USGS Hydrographs	Plate A-5
	Rice Operating Company	October 2005



R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Chloride concentration (mg/L) in nearby wells.	Plate A-6
	Rice Operating Company	October 2005

EXHIBIT A-1

Form WR-23 STATE ENGINEER OFFICE FIELD ENGR. LOG

WELL RECORD

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the nearest district office of the State Engineer. All sections, except Section 5, shall be answered as completely and accurately as possible when any well is drilled, repaired or deepened. When this form is used as a plugging record, only Section 1A and Section 5 need be completed.

Section 1

(A) Owner of well MORAN OIL PROD. & DRILLING CORP.
Street and Number BOX 1919
City HOBBS State N.M.
Well was drilled under Permit No. L-6660 (E) and is located in the NE ¼ SW ¼ SW ¼ of Section 19 Twp. 18 S Rge. 38E
(B) Drilling Contractor ABBOTT BROS. License No. WD-46
Street and Number BOX 637
City HOBBS State N.M.
Drilling was commenced MARCH 23 19 70
Drilling was completed MARCH 23 19 70

(Plat of 640 acres)

Elevation at top of casing in feet above sea level ____ Total depth of well 120'
State whether well is shallow or artesian shallow Depth to water upon completion AB

Section 2 PRINCIPAL WATER-BEARING STRATA

No.	Depth in Feet From	Depth in Feet To	Thickness in Feet	Description of Water-Bearing Formation
1	48	92	44	sand water
2	114	120	6	sand water
3				
4				
5				

Section 3 RECORD OF CASING

Dia in.	Pounds ft.	Threads in	Depth Top	Depth Bottom	Feet	Type Shoe	Perforations From	Perforations To
7	23	10	1	120	120	none	75'	120'

Section 4 RECORD OF MUDDING AND CEMENTING

Depth in Feet From	Depth in Feet To	Diameter Hole in in.	Tons Clay	No. Sacks of Cement	Methods Used

Section 5 PLUGGING RECORD

Name of Plugging Contractor ____ License No. ____
Street and Number ____ City ____ State ____
Tons of Clay used ____ Tons of Roughage used ____ Type of roughage ____
Plugging method used ____ Date Plugged ____ 19____
Plugging approved by: ____ Basin Supervisor

Cement Plugs were placed as follows:

No.	Depth of Plug From	Depth of Plug To	No. of Sacks Used

FOR USE OF STATE ENGINEER ONLY

Date Received ____

File No. L-6660(E) Use OWD Location No. 18.38.19.33.23

Section 6

LOG OF WELL

Depth in Feet From	Depth in Feet To	Thickness in Feet	Color	Type of Material Encountered
0	2	2	brown	surface dirt & rock
2	22	20	gray	caliche
22	24	2	brown	sand (tight)
24	92	68	brown	sand (water)
92	94	2	brown	sand (rock)
94	112	18	brown	sand tight
112	114	2	brown	sand rock
114	120	6	brown	sand water

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described well.

Well Driller

SHELL OIL CO., Mat EY A #10

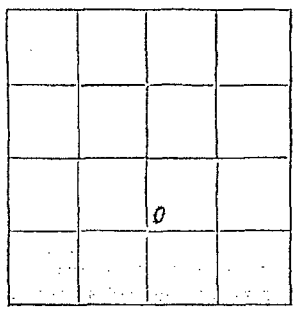
Form WR-23 STATE ENGINEER OFFICE

FIELD ENGR. LOG

WELL RECORD

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the nearest district office of the State Engineer. All sections, except Section 5, shall be answered as completely and accurately as possible when any well is drilled, repaired or deepened. When this form is used as a plugging record, only Section 1A and Section 5 need be completed.

Section 1



(Plat of 640 acres)

(A) Owner of well CAPITAN DRILLING COMPANY, Inc.
Street and Number P.O. Box 6725
City ODESSA 79760 State Texas
Well was drilled under Permit No. L-6332 and is located in the
SW ¼ NE ¼ SE ¼ of Section 19 Twp. 18 S Rge. 38 E
(B) Drilling Contractor Abbott Brothers License No. WD-46
Street and Number P.O. Box 637
City Hobbs 88240 State New Mexico
Drilling was commenced June 10 19
Drilling was completed June 10 19 68

Elevation at top of casing in feet above sea level Total depth of well 110
State whether well is shallow or artesian shallow Depth to water upon completion 40

Section 2 PRINCIPAL WATER-BEARING STRATA

No.	Depth in Feet From	Depth in Feet To	Thickness in Feet	Description of Water-Bearing Formation
1	40	68	28	sand, water
2	92	110	18	sand
3				
4				
5				

Section 3 RECORD OF CASING

Dia in.	Pounds ft.	Threads in	Depth Top	Depth Bottom	Feet	Type Shoe	Perforations From	Perforations To
7	21	10	0	91	91	open	88.8	91.0

Section 4 RECORD OF MUDDING AND CEMENTING

Depth in Feet From	Depth in Feet To	Diameter Hole in in.	Tons Clay	No. Sacks of Cement	Methods Used

Section 5 PLUGGING RECORD

Name of Plugging Contractor License No.
Street and Number City State
Tons of Clay used Tons of Roughage used Type of roughage
Plugging method used Date Plugged 19
Plugging approved by:

Basin Supervisor

Cement Plugs were placed as follows:

No.	Depth of Plug From	Depth of Plug To	No. of Sacks Used

FOR USE OF STATE ENGINEER ONLY

Date Received

File No. L-6332 Use O & O Location No. 18.38.19423

Section 6

LOG OF WELL

Depth in Feet From	Depth in Feet To	Thickness in Feet	Color	Type of Material Encountered
0	6	6		surface soil
6	21	15		caliche
21	40	19		sand, tight
40	68	28		sand, water
68	92	24		sand, tight
92	110	18		sand

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described well.

Murrell Abbott Jr.
Well Driller

L-6337 back

Revised June 1972

STATE ENGINEER OFFICE

WELL RECORD

FIELD ENGR LOG

Section 1. GENERAL INFORMATION

(A) Owner of well Oil Field Rental Service Co. Owner's Well No. L-8716

Street or Post Office Address 1312 Kiowa

City and State Hobbs, New Mexico 88240

Well was drilled under Permit No. L-8716 and is located in the:

a. ____ ¼ S½ ¼ NW ¼ NE ¼ of Section 20 Township 18-S Range 38-E N.M.P.M.

b. Tract No. 8 of Map No. ____ of the First Unit of College Park Industrial

c. Lot No. ____ of Block No. ____ of the ____ Subdivision, recorded in Lea County.

d. X= ____ feet, Y= ____ feet, N.M. Coordinate System ____ Zone in the ____ Grant.

(B) Drilling Contractor Abbott Bros. Drilling License No. WD-46

Address P.O. Box 637, Hobbs, New Mexico 88240

Drilling Began 3/23/82 Completed 3/24/82 Type tools Cable Size of hole 8¼ in.

Elevation of land surface or ____ at well is ____ ft. Total depth of well 130 ft.

Completed well is ☒ shallow ☐ artesian. Depth to water upon completion of well 49 ft.

Section 2. PRINCIPAL WATER-BEARING STRATA

Depth in Feet From	Depth in Feet To	Thickness in Feet	Description of Water-Bearing Formation	Estimated Yield (gallons per minute)
49	92	43	Sand	

Section 3. RECORD OF CASING

Diameter (inches)	Pounds per foot	Threads per in.	Depth in Feet Top	Depth in Feet Bottom	Length (feet)	Type of Shoe	Perforations From	Perforations To
6 5/8	17	Welded	0	132	132	None	54	132

Section 4. RECORD OF MUDDING AND CEMENTING

Depth in Feet From	Depth in Feet To	Hole Diameter	Sacks of Mud	Cubic Feet of Cement	Method of Placement

Section 5. PLUGGING RECORD

Plugging Contractor ____

Address ____

Plugging Method ____

Date Well Plugged ____

Plugging approved by:

State Engineer Representative

No.	Depth in Feet Top	Depth in Feet Bottom	Cubic Feet of Cement
1			
2			
3			
4			

FOR USE OF STATE ENGINEER ONLY

Date Received March 26, 1982 Quad ____ FWL ____ FSL ____

File No. L-8716 Use DTC Location No. 18.38.20.213344

Section 6. LOG OF HOLE

Depth in Feet From	Depth in Feet To	Thickness in Feet	Color and Type of Material Encountered
0	3	3	Surface soil
3	26	23	Caliche
26	49	23	Sand-tight
49	92	43	Sand-water
92	110	18	Sand-tight
110	118	8	Sand-rock
118	130	12	Sand

Section 7. REMARKS AND ADDITIONAL INFORMATION

L - 8716 back

MAR 26 8 22 AM '82

STATE ENGINEER
ROSWELL, NM

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

Murrell Abbott
Driller

N.B.

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the appropriate district office of the State Engineer. All sections, except Section 5, shall be answered as completely and accurately as possible when any well is drilled, repaired or deepened. When this form is used as a plugging record, only Section 1(a) and Section need be completed.

Revised June 1972

STATE ENGINEER OFFICE

WELL RECORD

FIELD ENGR. LOG

Section 1. GENERAL INFORMATION

(A) Owner of well A A Oilfield Owner's Well No. _____

Street or Post Office Address 1416 W. Broadway

City and State Hobbs, NM 88240

Well was drilled under Permit No. L-8851 and is located in the:

a. _____ ¼ NW ¼ SW ¼ NE ¼ of Section 20 Township 18S Range 38E N.M.P.M.

b. Tract No. 9 of Map No. _____ of the _____

c. Lot No. _____ of Block No. _____ of the 2 Unit College Park Industrial Subdivision, recorded in Lea County.

d. X= _____ feet, Y= _____ feet, N.M. Coordinate System _____ Zone in the _____ Grant.

(B) Drilling Contractor Larry's Drilling License No. WD882

Address 2601 W. Bender Hobbs, NM 88240

Drilling Began 7-1-82 Completed 7-2-82 Type tools tricone Size of hole 8¼ in.

Elevation of land surface or _____ at well is _____ ft. Total depth of well 120 ft.

Completed well is ☒ shallow ☐ artesian. Depth to water upon completion of well 54 ft.

Section 2. PRINCIPAL WATER-BEARING STRATA

Depth in Feet From	Depth in Feet To	Thickness in Feet	Description of Water-Bearing Formation	Estimated Yield (gallons per minute)
54	120	66	sand & sandstone	28

Section 3. RECORD OF CASING

Diameter (inches)	Pounds per foot	Threads per in.	Depth in Feet Top	Depth in Feet Bottom	Length (feet)	Type of Shoe	Perforations From	Perforations To
5½	160PVC		-1	120	121		100	120

Section 4. RECORD OF MUDDING AND CEMENTING

Depth in Feet From	Depth in Feet To	Hole Diameter	Sacks of Mud	Cubic Feet of Cement	Method of Placement

Section 5. PLUGGING RECORD

Plugging Contractor _____

Address _____

Plugging Method _____

Date Well Plugged _____

Plugging approved by:

_____

State Engineer Representative

No.	Depth in Feet Top	Depth in Feet Bottom	Cubic Feet of Cement
1			
2			
3			
4			

FOR USE OF STATE ENGINEER ONLY

Date Received July 9, 1982 Quad _____ FWL _____ FSL _____

File No. L-8851 Use D & S Location No. 18.38.20.23141

Temp. on N. E. Corner

Section 6. LOG OF HOLE

Depth in Feet From	Depth in Feet To	Thickness in Feet	Color and Type of Material Encountered
0	2	2	topsoil
2	38	36	caliche
38	60	22	sand & sandstone
60	68	8	hard red rock sand & sandstone
68	120	52	sand, think layers of sandstone

Section 7. REMARKS AND ADDITIONAL INFORMATION

L-8851 back

JUL 9 9 35 AM '82
STATE ENGINEER
ROSWELL, NM

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

Driller

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the appropriate district office of the State Engineer. All sections, except Section 5, shall be answered as completely and accurately as possible when any well is drilled, repaired or deepened. When this form is used as a plugging record, only Section 1(a) and Section 5 need be completed.

Revised June 1972

STATE ENGINEER OFFICE

WELL RECORD

FIELD ENGR. LOG

Section 1. GENERAL INFORMATION

(A) Owner of well Big Horn Tank Rental Owner's Well No. _____

Street or Post Office Address 2139 French Dr.

City and State Hobbs, NM 88240

Well was drilled under Permit No. L-8867 and is located in the:

a. _____ ¼ _____ ¼ NE ¼ NE ¼ of Section 29 Township 18S Range 38E N.M.P.M.

b. Tract No. _____ of Map No. _____ of the _____

c. Lot No. _____ of Block No. _____ of the _____

Subdivision, recorded in Lea County.

d. X= _____ feet, Y= _____ feet, N.M. Coordinate System _____ Zone in the _____ Grant.

(B) Drilling Contractor Larry's Drilling License No. WD882

Address 2601 W. Bender Hobbs, NM 88240

Drilling Began 7-9-82 Completed 7-10-82 Type tools button bit Size of hole 8¼ in.

Elevation of land surface or _____ at well is _____ ft. Total depth of well 120 ft.

Completed well is [X] shallow [ ] artesian. Depth to water upon completion of well 52 ft.

Section 2. PRINCIPAL WATER-BEARING STRATA

Depth in Feet From	Depth in Feet To	Thickness in Feet	Description of Water-Bearing Formation	Estimated Yield (gallons per minute)
60	108	48	sand & sandstone	28

Section 3. RECORD OF CASING

Diameter (inches)	Pounds per foot	Threads per in.	Depth in Feet Top	Depth in Feet Bottom	Length (feet)	Type of Shoe	Perforations From	Perforations To
5½	160PVC		0	120	120		100	120

Section 4. RECORD OF MUDDING AND CEMENTING

Depth in Feet From	Depth in Feet To	Hole Diameter	Sacks of Mud	Cubic Feet of Cement	Method of Placement

Section 5. PLUGGING RECORD

Plugging Contractor _____

Address _____

Plugging Method _____

Date Well Plugged _____

Plugging approved by:

_____ State Engineer Representative

No.	Depth in Feet Top	Depth in Feet Bottom	Cubic Feet of Cement
1			
2			
3			
4			

FOR USE OF STATE ENGINEER ONLY

Date Received August 23, 1982

Quad _____ FWL _____ FSL _____

File No. L-8867 Use D & S Location No. 18.38.29.22244

Section 6. LOG OF HOLE

Depth in Feet From	Depth in Feet To	Thickness in Feet	Color and Type of Material Encountered
0	27	27	caliche
27	33	6	gray clay
33	35	2	hard red rock
35 m	47	12	sand
47	63	16	sand & sandstone
63	67	4	hard red rock
67	108	41	sand & sandstone
108	120	12	hard red rock

Section 7. REMARKS AND ADDITIONAL INFORMATION

L-8867 bock

STATE ENGINEER
ROSWELL, NM
AUG 23 8 38 AM '02

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

Larry Dickson
Driller

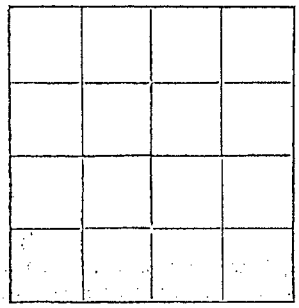
INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the appropriate district office of the State Engineer. All ons, except Section 5, shall be answered as completely and accurate possible when any well is drilled, repaired or deepene en this form is used as a plugging record, only Section 1(a) and Section ed be completed.

Form WR-23 STATE ENGINEER OFFICE FIEL ..NGR. LOG

WELL RECORD

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the nearest district office of the State Engineer. All sections, except Section 5, shall be answered as completely and accurately as possible when any well is drilled, repaired or deepened. When this form is used as a plugging record, only Section 1A and Section 5 need be completed.

Section 1



(Plat of 640 acres)

(A) Owner of well Two State Tank Rental Co.
Street and Number Box 2305
City Hobbs, State New Mexico
Well was drilled under Permit No. L-7005 and is located in the
NW ¼ SW ¼ SW ¼ of Section 29 Twp. 18S Rge. 38E
(B) Drilling Contractor C. R. Musselwhite License No. WD99
Street and Number Box 56
City Hobbs, State New Mexico
Drilling was commenced Oct. 14, 19 72
Drilling was completed Oct. 18, 19 72

Elevation at top of casing in feet above sea level ____ Total depth of well 150
State whether well is shallow or artesian Shallow Depth to water upon completion 50

Section 2 PRINCIPAL WATER-BEARING STRATA

No.	Depth in Feet From	Depth in Feet To	Thickness in Feet	Description of Water-Bearing Formation
1	60	150	90	Sand, sand rock
2				
3				
4				
5				

Section 3 RECORD OF CASING

Dia in.	Pounds ft.	Threads in	Depth Top	Depth Bottom	Feet	Type Shoe	Perforations From	Perforations To
5	13	8	0	150	150	none	110	150

Section 4 RECORD OF MUDDING AND CEMENTING

Depth in Feet From	Depth in Feet To	Diameter Hole in in.	Tons Clay	No. Sacks of Cement	Methods Used

Section 5 PLUGGING RECORD

Name of Plugging Contractor ____ License No. ____
Street and Number ____ City ____ State ____
Tons of Clay used ____ Tons of Roughage used ____ Type of roughage ____
Plugging method used ____ Date Plugged ____ 19 ____
Plugging approved by:

Basin Supervisor

Cement Plugs were placed as follows:

No.	Depth of Plug From	Depth of Plug To	No. of Sacks Used

FOR USE OF STATE ENGINEER ONLY

Date Received ____

STATE ENGINEER OFFICE
RECEIVED
1972 OCT 24 AM 8:51

File No. L-7005 Use DTC Location No. 18.38.29.331

Section 6

LOG OF WELL

Depth in Feet From	Depth in Feet To	Thickness in Feet	Color	Type of Material Encountered
0	2	2	Brown	Soil & rock
2	27	25	White	Caliche & rock
27	37	10	Grey	Sandy shale
37	43	6	"	Sand rock
43	60	17	Red	Sand
60	140	80	"	Sand, sand rock shells
140	150	10	Grey	Sand, course

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described well.

O. R. Musselwhite

Well Driller

L - 7005 back

Revised June 1972

STATE ENGINEER OFFICE

WELL RECORD

FIELD ENGR. USE

Section 1. GENERAL INFORMATION

(A) Owner of well Southwestern Drilling Mud Owner's Well No. _____

Street or Post Office Address P.O. Box 2477

City and State Midland, Texas 79701

Well was drilled under Permit No. L-7570 and is located in the:

a. _____ ¼ SW ¼ SW ¼ SW ¼ of Section 29 Township 18S Range 38E N.M.P.M.

b. Tract No. _____ of Map No. _____ of the _____

c. Lot No. _____ of Block No. _____ of the _____
Subdivision, recorded in Lea County.

d. X= _____ feet, Y= _____ feet, N.M. Coordinate System _____ Zone in the _____ Grant.

(B) Drilling Contractor Abbott Bros. License No. WD-46

Address P.O. Box 637, Hobbs, New Mexico 88240

Drilling Began 6/21/76 Completed 6/22/76 Type tools Cable Size of hole 8½ in.

Elevation of land surface or _____ at well is _____ ft. Total depth of well 122 ft.

Completed well is ☒ shallow ☐ artesian. Depth to water upon completion of well 48 ft.

Section 2. PRINCIPAL WATER-BEARING STRATA

Depth in Feet From	Depth in Feet To	Thickness in Feet	Description of Water-Bearing Formation	Estimated Yield (gallons per minute)
48	122	74		

Section 3. RECORD OF CASING

Diameter (inches)	Pounds per foot	Threads per in.	Depth in Feet Top	Depth in Feet Bottom	Length (feet)	Type of Shoe	Perforations From	Perforations To
6 5/8	15	welded	0	122	122	none	79	122

Section 4. RECORD OF MUDDING AND CEMENTING

Depth in Feet From	Depth in Feet To	Hole Diameter	Sacks of Mud	Cubic Feet of Cement	Method of Placement

Section 5. PLUGGING RECORD

Plugging Contractor _____

Address _____

Plugging Method _____

Date Well Plugged _____

Plugging approved by: _____
State Engineer Representative

No.	Depth in Feet Top	Depth in Feet Bottom	Cubic Feet of Cement
1			
2			
3			
4			

FOR USE OF STATE ENGINEER ONLY

Date Received

Quad _____ FWL _____ FSL _____

File No. _____ Use _____ Location No. _____

Section 6. LOG OF HOLE

Depth in Feet From	Depth in Feet To	Thickness in Feet	Color and Type of Material Encountered
0	2	2	Surface soil
2	35	33	Caliche
35	48	13	Sand-tight
48	116	68	Sand-water
116	122	6	Sand-tight

'76 JUL 1 AM 10 41
STATE ENGINEER OFFICE
ROSWELL, N. M.

Section 7. REMARKS AND ADDITIONAL INFORMATION

L-7570 back

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

Murrell Abbott H.B.
Driller

INSTRUCTIONS: This fo ould be executed in triplicate, preferably typewritten, and submitted t appropriate district office of the State Engineer. A: ions, except Section 5, shall be answered as completely and accurate possible when any well is drilled, repaired or deepened When this form is used as a plugging record, only Section 1(a) and Section 2 need be completed.

Revised June 1972

STATE ENGINEER OFFICE

WELL RECORD

Section 1. GENERAL INFORMATION

(A) Owner of well Texland Petroleum- Hobbs LLC Owner's Well No. 1

Street or Post Office Address 777 main street suite 3200

City and State Fort Worth Tx 76102

Well was drilled under Permit No. L-11 176 Explore and is located in the:

a. SE ¼ NW ¼ ¼ SE ¼ of Section 29 Township 18 south Range 38 east N.M.P.M.

b. Tract No. _____ of Map No. _____ of the _____

c. Lot No. _____ of Block No. _____ of the _____

Subdivision, recorded in Lea County.

d. X= _____ feet, Y= _____ feet, N.M. Coordinate System _____ Zone in the _____ Grant.

(B) Drilling Contractor Robinson Drilling License No. W D 1498

Address PO BOX 1495 Seminole TX 79360

Drilling Began 7-31-01 Completed 8-3-01 Type tools Rotary Size of hole 18 in.

Elevation of land surface or _____ at well is _____ ft. Total depth of well 220 ft.

Completed well is [X] shallow [ ] artesian. Depth to water upon completion of well 65 ft.

Section 2. PRINCIPAL WATER-BEARING STRATA

Depth in Feet From	Depth in Feet To	Thickness in Feet	Description of Water-Bearing Formation	Estimated Yield (gallons per minute)
111	210	99	Sand & Gravel	Unknown

Section 3. RECORD OF CASING

Diameter (inches)	Pounds per foot	Threads per in.	Depth in Feet Top	Depth in Feet Bottom	Length (feet)	Type of Shoe	Perforations From	Perforations To
12 3/4		Welded	+1	220	221	none	125	215

Section 4. RECORD OF MUDDING AND CEMENTING

Depth in Feet From	Depth in Feet To	Hole Diameter	Sacks of Mud	Cubic Feet of Cement	Method of Placement

Section 5. PLUGGING RECORD

Plugging Contractor N/A

Address _____

Plugging Method _____

Date Well Plugged _____

Plugging approved by:

_____ State Engineer Representative

No.	Depth in Feet Top	Depth in Feet Bottom	Cubic Feet of Cement
1			
2			
3			
4			

FOR USE OF STATE ENGINEER ONLY #21224

Date Received 08/10/01

Quad _____ FWL _____ FSL _____

File No. L-11,176 Use SRO Location No. 18.38.29.41443

Section 6. LOG OF HOLE

Depth in Ft. From	Depth in Ft. To	Thickness in Feet	Color and Type of Mate. ncountered
0	2	2	TOpsoil
2	4	2	Rock
4	18	14	Calichi
18	21	3	Rock
21	28	7	Calichi
28	52	24	Sandy clay with Rock Ledges
52	108	56	Sand with sandstone streaks
108	111	3	Rock
111	210	99	Sand&Gravel
210	215	5	Sandy clay
215	220	5	Red Bed

Section 7. REMARKS AND ADDITIONAL INFORMATION

L-11176 back

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the abo described hole.

Driller

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the appropriate district offi of the State Engineer. All sections, except Section 5, shall be answered as completely and accurately as possible when any well drilled, repaired or deepened. When this form is used as a plugging record, only Section 1(a) and Section 5 need be completed.

(This form to be executed in triplicate)

WELL RECORD

Date of Receipt _____ Permit No. L-2395

Name of permittee, Amerada Petroleum Corp.

Street or P. O. Drawer D, City and State Monument, N. M.

1. Well location and description: The shallow (shallow or artesian) well is located in N.E. ¼, N.E. ¼, N.W. ¼ of Section 20, Township 18 S, Range 38 E; Elevation of top of casing above sea level, _____ feet; diameter of hole, 7 inches; total depth, 87 feet; depth to water upon completion, 30 feet; drilling was commenced 8-31-53, 19__, and completed 8-31-53, 19__; name of drilling contractor J. E. Lusk Lusk White; Address, Box 56, Hobbs, N. M.; Driller's License No. W-949

2. Principal Water-bearing Strata:

	Depth in Feet From	To	Thickness	Description of Water-bearing Formation
No. 1	35	70	35	Red sand course
No. 2	75	85	10	Red sand course hard
No. 3	85	87	3	Red sand course hard
No. 4				
No. 5				

3. Casing Record:

Diameter in inches	Pounds per ft.	Threads per inch	Depth of Casing or Liner Top	Depth of Casing or Liner Bottom	Feet of Casing	Type of Shoe	Perforation From	Perforation To
7	20	10			87	none	57	87

4. If above construction replaces old well to be abandoned, give location: ____ ¼, ____ ¼, ____ ¼ of Section ____, Township ____, Range ____; name and address of plugging contractor, _____

_____

_____

date of plugging _____, 19__; describe how well was plugged: _____

_____

_____

_____

SEP 21 1953

L-2395 OK to WP

18.38.30.123

5. Log of Well:

Depth in Feet From	To	Thickness in feet	Description of Formation
0	1	1	Soil
1	6	5	Cleachle rock hard
6	30	24	Cleachle
30	35	5	Sand shale
35	70	~~225~~ 35	Red sand course.
70	75	5	Rock & Carbonate
75	85	10	Red sand course hard
85	87	3	ed sand course hard

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described well.

O. R. Musselwhite
Licensed Well Driller

Instructions

This form shall be executed, preferably typewritten, in triplicate and filed with the State Engineer's Office at Roswell, New Mexico, within 10 days after drilling has been completed. Data on water-bearing strata and on all formations encountered should be as complete and accurate as possible.

L - 2395 back

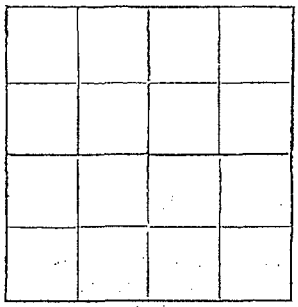
Form WR-23 STATE ENGINEER OFFICE

FIELD ENGR. LOG

WELL RECORD

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the nearest district office of the State Engineer. All sections, except Section 5, shall be answered as completely and accurately as possible when any well is drilled, repaired or deepened. When this form is used as a plugging record, only Section 1A and Section 5 need be completed.

Section 1



(Plat of 640 acres)

(A) Owner of well Amerada Petroleum Corp.

Street and Number Drawer D

City Monument, State New Mexico

Well was drilled under Permit No. L-5849 and is located in the SE ¼ SE ¼ NW ¼ of Section 30 Twp. 18S Rge. 38E

(B) Drilling Contractor O. R. Musslewhite License No. WD99

Street and Number Box 56

City Hobbs, State New Mexico

Drilling was commenced Feb. 10, 19 66

Drilling was completed Feb. 12, 19 66

Elevation at top of casing in feet above sea level Unkown Total depth of well 38

State whether well is shallow or artesian Shallow Depth to water upon completion 34

Section 2 PRINCIPAL WATER-BEARING STRATA

No.	Depth in Feet From	Depth in Feet To	Thickness in Feet	Description of Water-Bearing Formation
1	34	38	4	Sand & sand rock
2				
3				
4				
5				

Section 3 RECORD OF CASING

Dia in.	Pounds ft.	Threads in	Depth Top	Depth Bottom	Feet	Type Shoe	Perforations From	Perforations To
6 5/8	18	none	0	20	20	None	None	

Section 4 RECORD OF MUDDING AND CEMENTING

Depth in Feet From	Depth in Feet To	Diameter Hole in in.	Tons Clay	No. Sacks of Cement	Methods Used
0	20	8		1½ yds.	Dump remix around casing

Section 5 PLUGGING RECORD

Name of Plugging Contractor License No.

Street and Number City State

Tons of Clay used Tons of Roughage used Type of roughage

Plugging method used Date Plugged 19

Plugging approved by:

Basin Supervisor

Cement Plugs were placed as follows:

No.	Depth of Plug From	Depth of Plug To	No. of Sacks Used

FOR USE OF STATE ENGINEER ONLY

Date Received

1966 APR -7 AM 8 41

File No. L-5849 Use Quad Location No. 18.38.30.144

Section 6 LOG OF WELL

Depth in Feet From	Depth in Feet To	Thickness in Feet	Color	Type of Material Encountered
0	2	2	Brown	Soil & rock
2	5	3	White	Caliche rock
5	20	15	White	Caliche
20	25	5	White	Caliche rock
25	29	4	Gray	Sandy shale & caliche rock
29	38	9	Grey	Sand & sand rock

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described well.

O. R. Musselwhite
Well Driller

L-5849 back

Form WR-23 STATE ENGINEER OFFICE

WELL RECORD

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the nearest district office of the State Engineer. All sections, except Section 5, shall be answered as completely and accurately as possible when any well is drilled, repaired or deepened. When this form is used as a plugging record, only Section 1A and Section 5 need be completed.

Section 1

(Plat of 640 acres)

(A) Owner of well Baker Oil Tools, Inc.

Street and Number Box 1295

City Hobbs, State New Mexico

Well was drilled under Permit No. L-2954 and is located in the NE¼ SW¼ SW¼ of Section 32 Twp. 18S Rge. 38E

(B) Drilling Contractor O.R. Musselwhite License No. WD 99

Street and Number Box 56

City Hobbs, N State New Mexico

Drilling was commenced Sept. 10 19 55

Drilling was completed Sept. 11 19 55

Elevation at top of casing in feet above sea level ..... Total depth of well 100

State whether well is shallow or artesian shallow Depth to water upon completion 30

Section 2 PRINCIPAL WATER-BEARING STRATA

No.	Depth in Feet From	Depth in Feet To	Thickness in Feet	Description of Water-Bearing Formation
1	40	80	40	Sand & sand rock
2				
3				
4				
5				

Section 3 RECORD OF CASING

Dia in.	Pounds ft.	Threads in	Depth Top	Depth Bottom	Feet	Type Shoe	Perforations From	Perforations To
6 5/8	18	8	0	100	100	Collar	70	100

Section 4 RECORD OF MUDDING AND CEMENTING

Depth in Feet From	Depth in Feet To	Diameter Hole in in.	Tons Clay	No. Sacks of Cement	Methods Used

Section 5 PLUGGING RECORD

Name of Plugging Contractor ..... License No. .....

Street and Number ..... City ..... State .....

Tons of Clay used ..... Tons of Roughage used ..... Type of roughage .....

Plugging method used ..... Date Plugged ..... 19 .....

Plugging approved by:

..... Basin Supervisor

Cement Plugs were placed as follows:

No.	Depth of Plug From	Depth of Plug To	No. of Sacks Used

FOR USE OF STATE ENGINEER ONLY

Date Received SEP 19 1955

OFFICE GROUND WATER SUPERVISOR

File No. L-2964 Use Dom Location No. 18.38.32.334

Section 6 LOG OF WELL

Depth in Feet From	Depth in Feet To	Thickness in Feet	Color	Type of Material Encountered
0	1	1	Brown	Soil
1	28	27	White	Caleohie & rock
28	35	7	Grey	Sandy shale
35	40	5	Brown	Quartrite
40	80	40	Red	Sand & sand rock
80	100	20	Red	Sand, fine

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described well.

O. R. Musselwhite
Well Driller

L-2964 back

(This form to be executed in triplicate)

WELL RECORD

Date of Receipt ..... Permit No. L-2555

Name of permittee, Skelly Oil Co.

Street or P. O. Drawer D, City and State Hobbs, New Mexico

1. Well location and description: The Shallow (shallow or artesian) well is located in SW ¼, SW ¼, SW ¼ of Section 32, Township 18 S, Range 38 E; Elevation of top of casing above sea level, ... feet; diameter of hole, 8 inches; total depth, 116 feet; depth to water upon completion, 34 feet; drilling was commenced June 25, 19 54, and completed June 25, 1954; name of drilling contractor Ed. B. Burke

Box 306; Address, Hobbs, New Mexico; Driller's License No. WD-111

2. Principal Water-bearing Strata:

	Depth in Feet From	To	Thickness	Description of Water-bearing Formation
No. 1	54	85	31	Water Sand
No. 2	101 ~~116~~	116	15	Water Sand
No. 3				
No. 4				
No. 5				

3. Casing Record:

Diameter in Inches	Pounds per ft.	Threads per inch	Depth of Casing or Liner Top	Depth of Casing or Liner Bottom	Feet of Casing	Type of Shoe	Perforation From	Perforation To
6 5/8	20	10	0	113	113	collar	85	113
	Cemented from 0 to 57							

4. If above construction replaces old well to be abandoned, give location: ¼, ¼, ¼ of Section ....., Township ....., Range .....; name and address of plugging contractor,

.....

.....

date of plugging ....., 19.....; describe how well was plugged: .....

.....

.....

.....

FILED
JUL 1 1954
OFFICE
GROUND WATER SUPERVISOR
ROSWELL, NEW MEXICO

L-2555

18.38.32.333

L - 2555 back

5. Log of Well:

Depth in feet From	Depth in feet To	Thickness in feet	Description of Formation
0	4	4	Top Soil
4	25	21	Caliche
25	34	9	Pack Sand
34	39	5	Water Sand (weak)
39	54	15	Pack Sand
54	85	31	Water Sand
85	94	9	Hard Sand Rock
94	101	7	Tight Sand
101	116	15	Water Sand

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described well.

15-38-32-333

Edward B Burke
Licensed Well Driller

Instructions

This form shall be executed, preferably typewritten, in triplicate and filed with the State Engineer's Office at Roswell, New Mexico, within 10 days after drilling has been completed. Data on water-bearing strata and on all formations encountered should be as complete and accurate as possible.

(This form to be executed in triplicate)

WELL RECORD

Date of Receipt July 9, 1953 Permit No. L— 2232

Name of permittee, Joe P. Dutton

Street or P.O. Continental Tank Co., City and State Hobbs, New Mexico

1. Well location and description: The shallow (shallow or artesian) well is located in ¼, S½ X SW ¼ of Section 33, Township 18 South Range 38 East; Elevation of top of casing above sea level, ____ feet; diameter of hole, 7 inches; total depth, 112 feet; depth to water upon completion, 56 feet; drilling was commenced June 23, 19 53, and completed June 23, 19 53; name of drilling contractor Ed. B. Burke Box 637; Address, Hobbs, New Mexico; Driller's License No. WD-111

2. Principal Water-bearing Strata:

	Depth in Feet From	To	Thickness	Description of Water-bearing Formation
No. 1	63	70	7	Water sand
No. 2	76	88	12	Water sand
No. 3	102	112	10	Water sand
No. 4				
No. 5				

3. Casing Record:

Diameter in inches	Pounds per ft.	Threads per inch	Depth of Casing or Liner Top	Depth of Casing or Liner Bottom	Feet of Casing	Type of Shoe	Perforations From	Perforations To
5½	17	8	0	111	111	none	89	111

4. If above construction replaces old well to be abandoned, give location: ____ ¼, ____ ¼, ____ ¼ of Section ____, Township ____, Range ____; name and address of plugging contractor, ____

date of plugging ____, 19 ____; describe how well was plugged: ____

RECEIVED JUL 9 1953

L-2232 N.M.O. 18.38.33.300

L-2232 back

5. Log of Well:

Depth in feet From	To	Thickness in feet	Description of Formation
0	1	1	Top soil
1	22	21	caliche
22	38	16	pack sand
38	42	4	hard sand rock
42	63	21	pack sand
63	70	7	water sand
70	76	6	hard sand rock
76	88	12	water sand
88	102	4	tight sand
102	112	10	water sand

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described well.

Edward B Burke
Licensed Well Driller

Instructions

This form shall be executed, preferably typewritten, in triplicate and filed with the State Engineer's Office at Roswell, New Mexico, within 10 days after drilling has been completed. Data on water-bearing strata and on all formations encountered should be as complete and accurate as possible.

APPENDIX B

I-29 eol

Soil Bore

System: Hobbs Location: I-29 eol GW: 61' Landowner: Oxy

Soil Bore: @ I-29 eol GPS: Coord. System UTM 13 672070 E

UL I Sec. 29 T 18 R 38 Map Datum Nad83 3621387 N

Depth	Cl.		PID		Color	Time
6'	5125		124		Tan caliche some sand	12:24
11'	1746		2.4		white caliche	
16'	596		2.3		white caliche with hard rock	
21'	1415		2.8		" "	
26'	271		6.7		" "	
31'	328		7.5		" "	
35'	152		35.0		Red sand with rock	
41'	92		9.7		Tan Sand	
45'	53		7.0		" "	
51'	46		4.3		" "	
56'	47		8.2		" "	
61'	59		4.4		Tan Sand with rock some moisture	2:11

Notes: Had some moisture @ 61'. Cl. were low. Took pictures @ bore

Signature [illegible] Date 11/4/04

Location Oil [illegible]

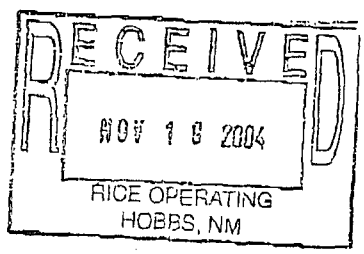
General Chemistry Parameters by EPA / Standard Methods
Environmental Lab of Texas

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
SB @ 6' (4K10009-01) Soil									
Chloride	4890	20.0	mg/kg Wet	2	EK41209	11/10/04	11/11/04	SW 846 9253	
% Moisture	14.0		%	1	EK41101	11/10/04	11/11/04	% calculation	
SB @ 61' (4K10009-02) Soil									
Chloride	ND	20.0	mg/kg Wet	2	EK41209	11/10/04	11/11/04	SW 846 9253	
% Moisture	4.0		%	1	EK41101	11/10/04	11/11/04	% calculation	

Organics by GC

Environmental Lab of Texas

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
SB @ 6' (4K10009-01) Soil									
Benzene	ND	0.0250	mg/kg dry	25	EK41501	11/12/04	11/12/04	EPA 8021B	
Toluene	J [0.0139]	0.0250	"	"	"	"	"	"	J
Ethylbenzene	0.0416	0.0250	"	"	"	"	"	"	
Xylene (p/m)	0.0550	0.0250	"	"	"	"	"	"	
Xylene (o)	0.0298	0.0250	"	"	"	"	"	"	
Surrogate: a,a,a-Trifluorotoluene		*85.2 %*	*80-120*		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		*94.1 %*	*80-120*		"	"	"	"	
Gasoline Range Organics C6-C12	12.1	10.0	mg/kg dry	1	EK40906	11/10/04	11/11/04	EPA 8015M	
Diesel Range Organics >C12-C35	52.8	10.0	"	"	"	"	"	"	
Total Hydrocarbon C6-C35	64.9	10.0	"	"	"	"	"	"	
Surrogate: 1-Chlorooctane		*98.0 %*	*70-130*		"	"	"	"	
Surrogate: 1-Chlorooctadecane		*109 %*	*70-130*		"	"	"	"	
SB @ 61' (4K10009-02) 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		*89.8 %*	*80-120*		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		*96.9 %*	*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		*100 %*	*70-130*		"	"	"	"	
Surrogate: 1-Chlorooctadecane		*117 %*	*70-130*		"	"	"	"	

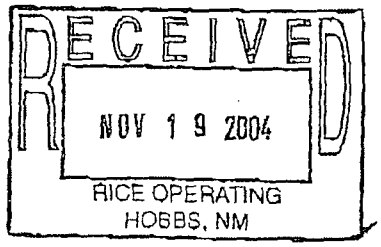


12600 West I-20 East - Odessa, Texas 79705 - (432) 563-1800 - Fax (432) 563-1713

Rice Operating Co.	Project: I-29 col	Fax: (505) 397-1471
122 W. Taylor	Project Number: None Given	Reported:
Hobbs NM, 88240	Project Manager: Roy Rascon	11/15/04 16:40

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
SB @ 6'	4K10009-01	Soil	11/04/04 12:24	11/10/04 07:50
SB @ 61'	4K10009-02	Soil	11/04/04 14:11	11/10/04 07:50



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

APPENDIX C

DB_FILE_NB	USE	WELL_NUMBE	X_COORD	Y_COORD	TWS	RNG	SEC	Q	Q2	Q3	EASTING	NORTHING	START_DATE	FINISH_DAT	DEPTH_WELL	DEPTH_WATE
L 01325	PRO	L 01325 APPRO	672170	3620647	18S	39E	32	2	2	2	672219	3620445	12/18/1952	12/19/1952	115	40
L 01937	IRR	L 01937 S	672335	3622469	18S	38E	21	3	3	3	672385	3622267			202	0
L 01937	IRR	L 11176	671752	3621246	18S	38E	29	4	1	4	671801	3621044	7/31/2001	8/3/2001	220	65
L 02316	DOM	L 02316	673280	3620569	18S	38E	33	2	1		673329	3620367	1/15/1954	1/18/1954	110	46
L 02316	DOM	L 02316 APPRO	673280	3620569	18S	38E	33	2	1		673329	3620367	1/15/1954	1/18/1954	110	46
L 02512	DOM	L 02512 APPRO	673187	3620264	18S	38E	33	2	3	1	673236	3620062	3/30/1954	3/30/1954	150	55
L 02588	DOM	L 02588	673356	3621677	18S	38E	28	2	3	4	673406	3621475	8/2/1960	8/2/1960	130	53
L 02588	DOM	L 02588 APPRO	673356	3621677	18S	38E	28	2	3	4	673406	3621475	7/2/1954	7/8/1954	80	40
L 02588	DOM	L 02588 REPAR	673356	3621677	18S	38E	28	2	3	4	673406	3621475	8/2/1960	8/2/1960	130	53
L 02660	DOM	L 02660	670535	3621628	18S	38E	30	2	4	4	670584	3621426	10/27/1954	11/1/1954	60	33
L 02660	DOM	L 02660 APPRO	670535	3621628	18S	38E	30	2	4	4	670584	3621426	10/27/1954	11/1/1954	60	33
L 02780	DOM	L 02780	670535	3621628	18S	38E	30	2	4	4	670584	3621426	2/25/1955	2/27/1955	85	26
L 02780	DOM	L 02780 APPRO	670535	3621628	18S	38E	30	2	4	4	670584	3621426	2/25/1955	2/27/1955	85	26
L 02873	DOM	L 02873 APPRO	670535	3621628	18S	38E	30	2	4	4	670584	3621426	5/17/1955	5/18/1955	60	26
L 03160	DOM	L 03160	672753	3621670	18S	38E	28	1	4	3	672803	3621468	3/30/1956	3/30/1956	119	45
L 03160	DOM	L 03160 APPRO	672753	3621670	18S	38E	28	1	4	3	672803	3621468	3/30/1956	3/30/1956	119	45
L 03266	PRO	L 03266 APPRO	673141	3622484	18S	38E	21	4	3	3	673191	3622282	7/23/1956	7/23/1956	116	42
L 03312	DOM	L 03312	672542	3622266	18S	38E	28	1	1	2	672592	3622064	11/28/1956	11/29/1956	108	45
L 03312	DOM	L 03312 APPRO	672542	3622266	18S	38E	28	1	1	2	672592	3622064	11/28/1956	11/29/1956	108	45
L 03651	DOM	L 03651	672839	3622577	18S	38E	21	3	4		672889	3622375	8/21/1957	8/22/1957	118	60
L 03651	DOM	L 03651 APPRO	672839	3622577	18S	38E	21	3	4		672889	3622375	8/21/1957	8/22/1957	118	60
L 04321	DOM	L 04321	670960	3620626	18S	38E	32	1	1	2	671009	3620424	4/18/1960	4/20/1960	110	45
L 04321	DOM	L 04321 APPRO	670960	3620626	18S	38E	32	1	1	2	671009	3620424	4/18/1960	4/20/1960	110	45
L 04547	DOM	L 04547	670738	3621835	18S	38E	29	1	3	1	670787	3621633	11/4/1960	11/4/1960	110	70
L 04547	DOM	L 04547 APPRO	670738	3621835	18S	38E	29	1	3	1	670787	3621633	11/4/1960	11/4/1960	110	70
L 05107	DOM	L 05107	671831	3622757	18S	38E	20	4	0		671881	3622555	5/13/1963	5/14/1963	100	40
L 05489	DOM	L 05489	672637	3622771	18S	38E	21	3	0		672687	3622569	10/15/1964	10/16/1964	200	43
L 05736	SAN	L 05736	671069	3620325	18S	38E	32	1	0		671118	3620123	8/20/1965	8/25/1965	89	70
L 05874	SAN	L 05874	670861	3620527	18S	38E	32	1	1		670910	3620325	3/2/1966	3/3/1966	125	45
L 05877	DOM	L 05877	673667	3621383	18S	38E	28	4	2		673717	3621181	3/20/1966	3/21/1966	100	55
L 06245	SAN	L 06245	671069	3620325	18S	38E	32	1	0		671118	3620123	12/29/1967	12/30/1967	150	34
L 06348	DOM	L 06348	673148	3622281	18S	38E	28	2	1	1	673198	3622079	8/8/1968	8/16/1968	360	320
L 06570 (E)	PRO	L 06570 (E)	670753	3620830	18S	38E	29	3	3	3	670802	3620628	8/5/1969	8/5/1969	110	54
L 06574 (E)	PRO	L 06574 (E)	672380	3620050	18S	38E	33	1	3	3	672429	3619848	8/18/1969	8/19/1969	120	52
L 06717	DOM	L 06717	672048	3621757	18S	38E	29	2	4		672098	3621555	10/6/1970	10/8/1970	130	55
L 07005	SAN	L 07005	670753	3621030	18S	38E	29	3	3	1	670802	3620828	10/14/1972	10/18/1972	150	50
L 07017	DOM	L 07017	670854	3620931	18S	38E	29	3	3		670903	3620729	12/9/1972	12/11/1972	150	60
L 07100	DOM	L 07100	671227	3622549	18S	38E	20	3	4		671277	3622347	7/23/1973	7/24/1973	120	50
L 07163	DOM	L 07163	671234	3622146	18S	38E	29	1	2		671284	3621944	2/1/1974	2/4/1974	110	67
L 07427	DOM	L 07427	672048	3621757	18S	38E	29	2	4		672098	3621555	9/16/1975	9/18/1975	130	60
L 07432	DOM	L 07432	672048	3621757	18S	38E	29	2	4		672098	3621555	9/24/1975	9/26/1975	125	55
L 07434	DOM	L 07434	672147	3621656	18S	38E	29	2	4	4	672197	3621454	9/28/1975	9/30/1975	125	55
L 07570	DOM	L 07570	670753	3620830	18S	38E	29	3	3	3	670802	3620628	6/21/1976	6/22/1976	122	48
L 07656	DOM	L 07656	673348	3622081	18S	38E	28	2	1	4	673398	3621879	2/24/1977	2/26/1977	110	68
L 07673	DOM	L 07673	672139	3622259	18S	38E	29	2	2	2	672189	3622057	2/5/1978	2/10/1978	125	50
L 07678	DOM	L 07678	673348	3622081	18S	38E	28	2	1	4	673398	3621879	4/17/1977	4/19/1977	110	68
L 07679	DOM	L 07679	673356	3621877	18S	38E	28	2	3	2	673406	3621675	4/20/1977	4/23/1977	110	68
L 07754	OBS	L 07754	672048	3621757	18S	38E	29	2	4		672098	3621555	9/8/1977	9/14/1977	207	50
L 07825	DOM	L 07825	671939	3622259	18S	38E	29	2	2	1	671989	3622057	1/18/1978	1/18/1978	105	45
L 07826	DOM	L 07826	671939	3622059	18S	38E	29	2	2	3	671989	3621857	1/16/1978	1/16/1978	110	45
L 07903	DOM	L 07903	672033	3622563	18S	38E	20	4	4		672083	3622361	5/25/1978	5/28/1978	125	70
L 08009	SAN	L 08009	672342	3622266	18S	38E	28	1	1	1	672392	3622064	1/16/1979	1/20/1979	167	60
L 08024	DOM	L 08024	671326	3622448	18S	38E	20	3	4	4	671376	3622246	12/28/1979	12/29/1979	90	52

DB_FILE_NB	USE	WELL_NUMBE	X_COORD	Y_COORD	TWS	RNG	SEC	Q	Q2	Q3	EASTING	NORTHING	START_DATE	FINISH_DAT	DEPTH_WELL	DEPTH_WATE
L 08131	DOM	L 08131	670846	3621333	18S	38E	29	3	1		670895	3621131	8/18/1979	8/23/1979	110	60
L 08135	DOM	L 08135	672048	3621757	18S	38E	29	2	4		672098	3621555	8/15/1979	8/18/1979	130	62
L 08191	SAN	L 08191	672139	3622259	18S	38E	29	2	2	2	672189	3622057	1/5/1980	1/20/1980	120	120
L 08192	SAN	L 08192	672342	3622266	18S	38E	28	1	1	1	672392	3622064	12/11/1979	12/13/1979	175	61
L 08228	SAN	L 08228	671736	3622052	18S	38E	29	2	1	4	671786	3621850	3/10/1980	3/11/1980	115	68
L 08229	DOM	L 08229	671947	3621856	18S	38E	29	2	4	1	671997	3621654	3/8/1980	3/9/1980	115	68
L 08370	SAN	L 08370	672139	3622059	18S	38E	29	2	2	4	672189	3621857	10/20/1980	10/20/1980	120	60
L 08408	DOM	L 08408	672025	3622965	18S	38E	20	4	2		672075	3622763	2/6/1981	2/7/1981	160	48
L 08429	DOM	L 08429	671752	3621446	18S	38E	29	4	1	2	671801	3621244	8/10/1981	8/11/1981	120	62
L 08446	DOM	L 08446	671845	3621951	18S	38E	29	2	0		671895	3621749	5/3/1981	5/7/1981	120	42
L 08448	SAN	L 08448	671947	3621856	18S	38E	29	2	4	1	671997	3621654	11/18/1981	11/20/1981	130	38
L 08485	SAN	L 08485	672443	3622167	18S	38E	28	1	1		672493	3621965	6/11/1981	6/13/1981	120	61
L 08737	DOM	L 08737	672048	3621757	18S	38E	29	2	4		672098	3621555	4/7/1982	4/7/1982	132	60
L 08860	SAN	L 08860	671845	3621951	18S	38E	29	2	0		671895	3621749	12/12/1983	12/12/1983	130	39
L 08867	SAN	L 08867	672040	3622160	18S	38E	29	2	2		672090	3621958	7/9/1982	7/10/1982	120	52
L 09116	DOM	L 09116	673566	3621482	18S	38E	28	4	2	1	673616	3621280	3/30/1983	3/31/1983	130	68
L 09586	DOM	L 09586	672048	3621757	18S	38E	29	2	4		672098	3621555	11/26/1984	11/28/1984	120	76
L 09682	SAN	L 09682	671939	3622059	18S	38E	29	2	2	3	671989	3621857	9/29/1985	9/30/1985	120	45
L 09684	DOM	L 09684	672953	3621670	18S	38E	28	1	4	4	673003	3621468	5/14/1985	5/19/1985	120	65
L 09705	SAN	L 09705	670953	3620830	18S	38E	29	3	3	4	671002	3620628	7/19/1985	7/19/1985	135	65
L 09777	SAN	L 09777	671040	3621937	18S	38E	29	1	0		671089	3621735	1/10/1986	1/13/1986	150	84
L 09807	DOM	L 09807	673379	3620668	18S	38E	33	2	1	2	673428	3620466	3/15/1986	3/16/1986	140	60
L 10035	SAN	L 10035	671069	3620325	18S	38E	32	1	0		671118	3620123	10/20/1988	10/20/1988	150	65
L 10325	SAN	L 10325	671326	3622448	18S	38E	20	3	4	4	671376	3622246	4/26/1993	4/30/1993	102	75
L 10340	DOM	L 10340	670923	3622441	18S	38E	20	3	3	4	670973	3622239	7/14/1994	7/14/1994	158	114
L 10842	SAN	L 10842	671326	3622648	18S	38E	20	3	4	2	671376	3622446	5/23/1998	5/26/1998	120	51
L 10860	DOM	L 10860	670730	3622238	18S	38E	29	1	1	1	670780	3622036	7/20/1998	7/21/1998	160	39
L 10913	DOM	L 10913	670738	3621635	18S	38E	29	1	3	3	670787	3621433			160	0
L 11171	SAN	L 11171	671156	3621036	18S	38E	29	3	4	1	671205	3620834	4/19/2001	4/19/2001	206	0
L 11176		L 11176	671752	3621246	18S	38E	29	4	1	4	671801	3621044	7/31/2001	8/3/2001	220	65
L 11274	DOM	L 11274	673379	3620668	18S	38E	33	2	1	2	673428	3620466	11/21/2001	11/21/2001	230	0
L 11365	PRO	L 11365	671341	3621642	18S	38E	29	1	4	4	671390	3621440	8/11/2002	8/12/2002	120	55

Appendix D

Photodocumentation & Disposal Manifests

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

Figure 1: Excavating east wall

Figure 2: Digging out abandoned lines

Figure 3: Backfilling excavation with blended soil

Figure 4: Loading clay for placement in excavation

Figure 5: Measuring top of placed clay

Figure 6: Compacting clay with equipment

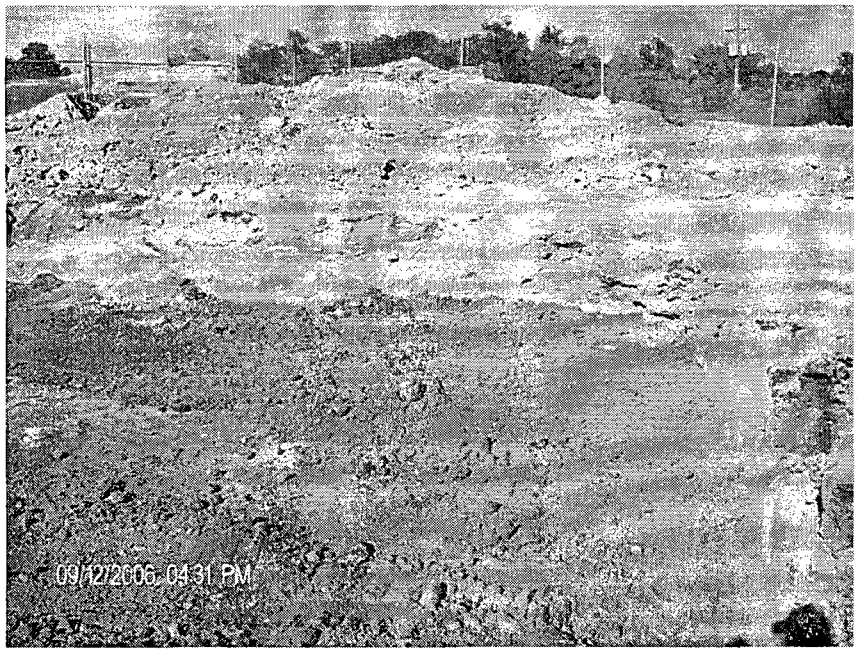


Figure 7: Placement of Clay in Excavation

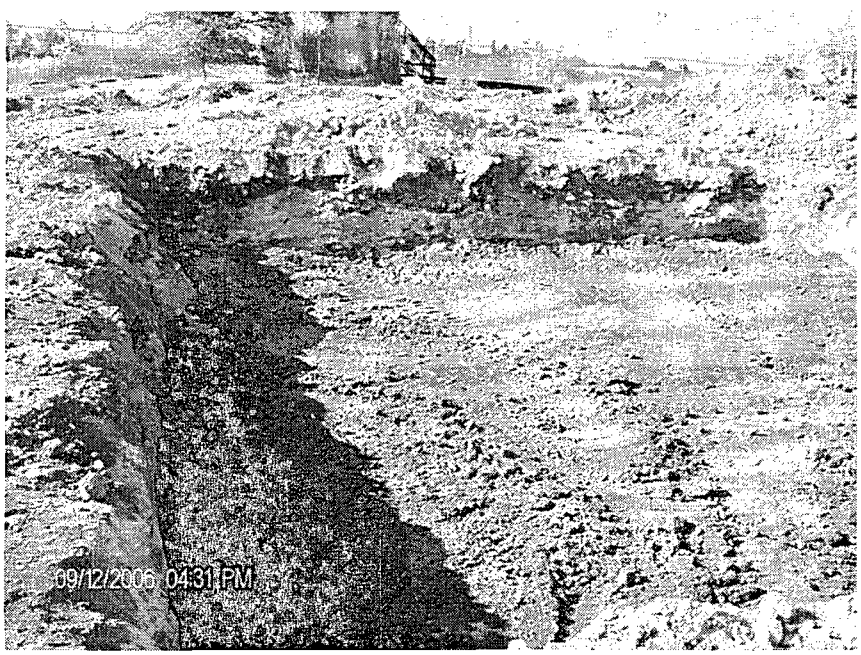


Figure 8: Clay placed in excavation

Figure 9: Completed infiltration barrier with caliche cap

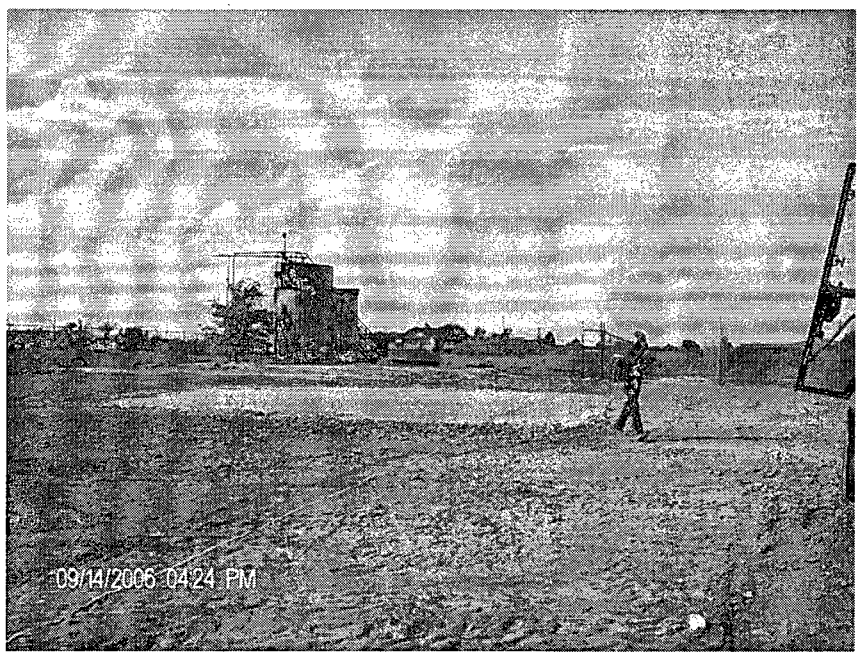


Figure 10: Completed barrier with caliche cap

Figure 11: Segrated material for disposal

Sundance Services, Inc.

P.O. Box 1737 ★ Eunice, New Mexico 88231

(505) 394-2511

Ticket # 23394

Lease Operator/Shipper/Company:

Lease Name:

Transporter Company: Time AM/PM

Date: Vehicle No. Driver No.

Charge To:

TYPE OF MATERIAL

- ☐ Produced Water
- ☐ Drilling Fluids
- ☐ Completion Fluids
- ☐ Tank Bottoms
- ☑ Contaminated Soil
- ☐ C-117 No.:
- ☐ Other Materials
- ☐ BS&W Content:

Description:

- ☐ JETOUT
- ☐ CALLOUT

VOLUME OF MATERIAL BBLS YARDS

AS A CONDITION TO SUNDANCE SERVICES, INC.'S ACCEPTANCE OF THE MATERIALS SHIPPED WITH THIS JOB TICKET, OPERATOR/SHIPPER REPRESENTS AND WARRANTS THAT THE WASTE MATERIAL SHIPPED HEREWITH IS MATERIAL EXEMPT FROM THE RESOURCE, CONSERVATION AND RECOVERY ACT OF 1976, AS AMENDED FROM TIME TO TIME, 40 U.S.C. 6901, ET SEQ., THE NM HEALTH AND SAF. CODE 361-001 ET SEQ., AND REGULATIONS RELATED THERETO, BY VIRTUE OF THE EXEMPTION AFFORDED DRILLING FLUIDS, PRODUCED WATERS, AND OTHER WASTE ASSOCIATED WITH THE EXPLORATION, DEVELOPMENT OR PRODUCTION OF CRUDE OIL OR NATURAL GAS OR GEOTHERMAL ENERGY.

ALSO AS A CONDITION TO SUNDANCE SERVICES, INC.'S ACCEPTANCE OF THE MATERIALS SHIPPED WITH THIS JOB TICKET, TRANSPORTER REPRESENTS AND WARRANTS THAT ONLY THE MATERIAL DELIVERED BY OPERATOR/SHIPPER TO TRANSPORTER IS NOW DELIVERED BY TRANSPORTER TO SUNDANCE SERVICES, INC.'S FACILITY FOR DISPOSAL.

THIS WILL CERTIFY that the above Transporter loaded the material represented by this Transporter Statement at the above described location, and that it was tendered by the above described shipper. This will certify that no additional materials were added to this load, and that the material was delivered without incident.

DRIVER:

FACILITY REPRESENTATIVE:

Sundance Services, Inc.

P.O. Box 1737 ★ Eunice, New Mexico 88231

(505) 394-2511

Ticket # 21394

Lease Operator/Shipper/Company: _____

Lease Name: _____

Transporter Company: _____ Time _____ AM/PM

Date: _____ Vehicle No. _____ Driver No. _____

Charge To: _____

TYPE OF MATERIAL

- ☐ Produced Water
- ☐ Drilling Fluids
- ☐ Completion Fluids
- ☐ Tank Bottoms
- ☐ Contaminated Soil
- ☐ C-117 No.:
- ☐ Other Materials
- ☐ BS&W Content:

Description:

- ☐ JETOUT
- ☐ CALLOUT

VOLUME OF MATERIAL BBLS YARDS

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ALSO AS A CONDITION TO SUNDANCE SERVICES, INC.'S ACCEPTANCE OF THE MATERIALS SHIPPED WITH THIS JOB TICKET, TRANSPORTER REPRESENTS AND WARRANTS THAT ONLY THE MATERIAL DELIVERED BY OPERATOR/SHIPPER TO TRANSPORTER IS NOW DELIVERED BY TRANSPORTER TO SUNDANCE SERVICES, INC.'S FACILITY FOR DISPOSAL.

THIS WILL CERTIFY that the above Transporter loaded the material represented by this Transporter Statement at the above described location, and that it was tendered by the above described shipper. This will certify that no additional materials were added to this load, and that the material was delivered without incident.

DRIVER: _____

FACILITY REPRESENTATIVE: _____

Sundance Services, Inc.

P.O. Box 1737 ★ Eunice, New Mexico 88231

(505) 394-2511

Ticket # 29270

Lease Operator/Shipper/Company: _____

Lease Name: _____

Transporter Company: _____ Time _____ AM/PM

Date: _____ Vehicle No. _____ Driver No. _____

Charge To: _____

TYPE OF MATERIAL

- ☐ Produced Water
- ☐ Drilling Fluids
- ☐ Completion Fluids
- ☐ Tank Bottoms
- ☐ Contaminated Soil
- ☐ C-117 No.:
- ☐ Other Materials
- ☐ BS&W Content:

Description:

- ☐ JETOUT
- ☐ CALLOUT

VOLUME OF MATERIAL BBLS. YARDS

AS A CONDITION TO SUNDANCE SERVICES, INC.'S ACCEPTANCE OF THE MATERIALS SHIPPED WITH THIS JOB TICKET, OPERATOR/SHIPPER REPRESENTS AND WARRANTS THAT THE WASTE MATERIAL SHIPPED HEREWITH IS MATERIAL EXEMPT FROM THE RESOURCE, CONSERVATION AND RECOVERY ACT OF 1976, AS AMENDED FROM TIME TO TIME, 40 U.S.C. 6901, ET SEQ., THE NM HEALTH AND SAF. CODE 361.001 ET SEQ., AND REGULATIONS RELATED THERETO, BY VIRTUE OF THE EXEMPTION AFFORDED DRILLING FLUIDS, PRODUCED WATERS, AND OTHER WASTE ASSOCIATED WITH THE EXPLORATION, DEVELOPMENT OR PRODUCTION OF CRUDE OIL OR NATURAL GAS OR GEOTHERMAL ENERGY.

ALSO AS A CONDITION TO SUNDANCE SERVICES, INC.'S ACCEPTANCE OF THE MATERIALS SHIPPED WITH THIS JOB TICKET, TRANSPORTER REPRESENTS AND WARRANTS THAT ONLY THE MATERIAL DELIVERED BY OPERATOR/SHIPPER TO TRANSPORTER IS NOW DELIVERED BY TRANSPORTER TO SUNDANCE SERVICES, INC.'S FACILITY FOR DISPOSAL.

THIS WILL CERTIFY that the above Transporter loaded the material represented by this Transporter Statement at the above described location, and that it was tendered by the above described shipper. This will certify that no additional materials were added to this load, and that the material was delivered without incident.

DRIVER: _____

FACILITY REPRESENTATIVE: _____

Sundance Services, Inc.

P.O. Box 1737 ★ Eunice, New Mexico 88231

(505) 394-2511

Ticket # 22696

Lease Operator/Shipper/Company: _____

Lease Name: _____

Transporter Company: _____ Time _____ AM/PM

Date: _____ Vehicle No. _____ Driver No. _____

Charge To: _____

TYPE OF MATERIAL

☐ Produced Water ☐ Drilling Fluids ☐ Completion Fluids

☐ Tank Bottoms ☐ Contaminated Soil ☐ C-117 No.:

☐ Other Materials ☐ BS&W Content:

Description: ☐ JETOUT ☐ CALLOUT

VOLUME OF MATERIAL _____ BBLS _____ YARDS

AS A CONDITION TO SUNDANCE SERVICES, INC.'S ACCEPTANCE OF THE MATERIALS SHIPPED WITH THIS JOB TICKET, OPERATOR/SHIPPER REPRESENTS AND WARRANTS THAT THE WASTE MATERIAL SHIPPED HEREWITH IS MATERIAL EXEMPT FROM THE RESOURCE, CONSERVATION AND RECOVERY ACT OF 1976, AS AMENDED FROM TIME TO TIME, 40 U.S.C. 6901, ET SEQ., THE NM HEALTH AND SAF. CODE 361.001 ET SEQ., AND REGULATIONS RELATED THERETO, BY VIRTUE OF THE EXEMPTION AFFORDED DRILLING FLUIDS, PRODUCED WATERS, AND OTHER WASTE ASSOCIATED WITH THE EXPLORATION, DEVELOPMENT OR PRODUCTION OF CRUDE OIL OR NATURAL GAS OR GEOTHERMAL ENERGY.

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DRIVER: _____

FACILITY REPRESENTATIVE: _____

Sundance Services, Inc.

P.O. Box 1737 ★ Eunice, New Mexico 88231

(505) 394-2511

Ticket # 2639

Lease Operator/Shipper/Company: _____

Lease Name: _____

Transporter Company: _____ Time _____ AM/PM

Date: _____ Vehicle No. _____ Driver No. _____

Charge To: _____

TYPE OF MATERIAL

- ☐ Produced Water
- ☐ Drilling Fluids
- ☐ Completion Fluids
- ☐ Tank Bottoms
- ☐ Contaminated Soil
- ☐ C-117 No.:
- ☐ Other Materials
- ☐ BS&W Content:

Description:

- ☐ JETOUT
- ☐ CALLOUT

VOLUME OF MATERIAL _____ BBLS. _____ YARDS

AS A CONDITION TO SUNDANCE SERVICES, INC.'S ACCEPTANCE OF THE MATERIALS SHIPPED WITH THIS JOB TICKET, OPERATOR/SHIPPER REPRESENTS AND WARRANTS THAT THE WASTE MATERIAL SHIPPED HEREWITH IS MATERIAL EXEMPT FROM THE RESOURCE, CONSERVATION AND RECOVERY ACT OF 1976, AS AMENDED FROM TIME TO TIME, 40 U.S.C. 6901, ET SEQ., THE NM HEALTH AND SAF. CODE 361.001 ET SEQ., AND REGULATIONS RELATED THERETO, BY VIRTUE OF THE EXEMPTION AFFORDED DRILLING FLUIDS, PRODUCED WATERS, AND OTHER WASTE ASSOCIATED WITH THE EXPLORATION, DEVELOPMENT OR PRODUCTION OF CRUDE OIL OR NATURAL GAS OR GEOTHERMAL ENERGY.

ALSO AS A CONDITION TO SUNDANCE SERVICES, INC.'S ACCEPTANCE OF THE MATERIALS SHIPPED WITH THIS JOB TICKET, TRANSPORTER REPRESENTS AND WARRANTS THAT ONLY THE MATERIAL DELIVERED BY OPERATOR/SHIPPER TO TRANSPORTER IS NOW DELIVERED BY TRANSPORTER TO SUNDANCE SERVICES, INC.'S FACILITY FOR DISPOSAL.

THIS WILL CERTIFY that the above Transporter loaded the material represented by this Transporter Statement at the above described location, and that it was tendered by the above described shipper. This will certify that no additional materials were added to this load, and that the material was delivered without incident.

DRIVER: _____

FACILITY REPRESENTATIVE: _____

Sundance Services, Inc.

P.O. Box 1737 ★ Eunice, New Mexico 88231

(505) 394-2511

Ticket # 20949

Lease Operator/Shipper/Company: _____

Lease Name: _____

Transporter Company: _____ Time _____ AM/PM

Date: _____ Vehicle No. _____ Driver No. _____

Charge To: _____

TYPE OF MATERIAL

- [X] Produced Water
- [ ] Drilling Fluids
- [ ] Completion Fluids
- [ ] Tank Bottoms
- [X] Contaminated Soil
- [X] C-117 No.:
- [ ] Other Materials
- [ ] BS&W Content:

Description:

- [X] JETOUT
- [ ] CALLOUT

VOLUME OF MATERIAL BBLS YARDS

AS A CONDITION TO SUNDANCE SERVICES, INC.'S ACCEPTANCE OF THE MATERIALS SHIPPED WITH THIS JOB TICKET, OPERATOR/SHIPPER REPRESENTS AND WARRANTS THAT THE WASTE MATERIAL SHIPPED HEREWITH IS MATERIAL EXEMPT FROM THE RESOURCE CONSERVATION AND RECOVERY ACT OF 1976, AS AMENDED FROM TIME TO TIME, 40 U.S.C. 6901 ET SEQ., THE NM HEALTH AND SAF. CODE 361.001 ET SEQ., AND REGULATIONS RELATED THERETO, BY VIRTUE OF THE EXEMPTION AFFORDED DRILLING FLUIDS, PRODUCED WATERS, AND OTHER WASTE ASSOCIATED WITH THE EXPLORATION, DEVELOPMENT OR PRODUCTION OF CRUDE OIL OR NATURAL GAS OR GEOTHERMAL ENERGY.

ALSO AS A CONDITION TO SUNDANCE SERVICES, INC.'S ACCEPTANCE OF THE MATERIALS SHIPPED WITH THIS JOB TICKET, TRANSPORTER REPRESENTS AND WARRANTS THAT ONLY THE MATERIAL DELIVERED BY OPERATOR/SHIPPER TO TRANSPORTER IS NOW DELIVERED BY TRANSPORTER TO SUNDANCE SERVICES, INC.'S FACILITY FOR DISPOSAL.

THIS WILL CERTIFY that the above Transporter loaded the material represented by this Transporter Statement at the above described location, and that it was tendered by the above described shipper. This will certify that no additional materials were added to this load, and that the material was delivered without incident.

DRIVER: _____

FACILITY REPRESENTATIVE: _____

Sundance Services, Inc.

P.O. Box 1737 ★ Eunice, New Mexico 88231

(505) 394-2511

Ticket # 23[illegible]

Lease Operator/Shipper/Company: _____

Lease Name: _____

Transporter Company: _____ Time _____ AM/PM

Date: _____ Vehicle No. _____ Driver No. _____

Charge To: _____

TYPE OF MATERIAL

- [X] Produced Water
- [ ] Drilling Fluids
- [ ] Completion Fluids
- [ ] Tank Bottoms
- [ ] Contaminated Soil
- [ ] C-117 No.:
- [ ] Other Materials
- [ ] BS&W Content:

Description:

- [X] JETOUT
- [ ] CALLOUT

VOLUME OF MATERIAL BBLS YARDS

AS A CONDITION TO SUNDANCE SERVICES, INC.'S ACCEPTANCE OF THE MATERIALS SHIPPED WITH THIS JOB TICKET, OPERATOR/SHIPPER REPRESENTS AND WARRANTS THAT THE WASTE MATERIAL SHIPPED HEREWITH IS MATERIAL EXEMPT FROM THE RESOURCE, CONSERVATION AND RECOVERY ACT OF 1976, AS AMENDED FROM TIME TO TIME, 40 U.S.C. 6901 ET SEQ., THE NM HEALTH AND SAF. CODE 361001 ET SEQ., AND REGULATIONS RELATED THERETO, BY VIRTUE OF THE EXEMPTION AFFORDED DRILLING FLUIDS, PRODUCED WATERS, AND OTHER WASTE ASSOCIATED WITH THE EXPLORATION, DEVELOPMENT OR PRODUCTION OF CRUDE OIL OR NATURAL GAS OR GEOTHERMAL ENERGY.

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DRIVER: _____

FACILITY REPRESENTATIVE: _____