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REPORTS

DATE:

May 18,2007

May 18, 2007

14-12-12

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.

Y

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

			1	BOX LOCAT	ION					
SWD SYSTEM	JUNCTION	UNIT	SECTION	TOWNSHIP	RANGE	COUNTY	BOX DI	MENSIONS	- FEET	
Hobbs	I-29 EOL boot	1	29	100	àor		Length	Width	Depth	
10005	1-29 EOL 0001	I	29	18S	38E	Lea	no box9	System aban	donment	1
LAND TYPE: BL	_M STA	.ΤE	FEE LAND	OWNER	Occidental I	Permian	OTHER			
Depth to Ground	dwater	65	_feet	NMOCD	SITE ASSE	ESSMENT R	ANKING S	CORE:	10	
Date Started _	11/4/20	04	Date Cor	mpleted	9/14/2006		D Witness		no	
Soil Excavated	466	cubic ya	rds Exc	avation Ler	ngth35	Width _	30	Depth	12	fee
Soil Disposed	70	cubic ya	rds Of	fsite Facility	Sunc	lance	Location	Eur	nice, NM	
eneral Description	n of Remedial /	Action:	As part of the	OCD-approve	ed Investigatio	n & Characteri	zation Plan su	ubmitted by R	.T. Hicks	
nsultants, a delineatio	on soil bore was ir	stalled at the	former junctio	n box site on 1	1/4/2004, Re	esults and a rer	nedy were sul	bmitted in a C	orrective/Ac	tion
n in October 2005.	OCD verbally appr	oved the CA	P on 3/30/200	6 with the conc	lition that the	excavation be	extended to 12	2 ft BGS; ema	ril	
nfirmation was receive	ed 5/2/2006. Exc	avation activit	ies as outlined	l in the CAP w	ere conducted	I AugSept. 20	06. The enc	losed Closu	re Report	
ay 2007) by Hicks d	locuments these	activities a	nd requests r	egulatory clo	sure of this f	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

4/30/2007

Kantin danna) Papa SIGNATURE

DATE

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



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Appendices

Appendix A: Field Data & Laboratory Analysis Appendix B: Correspondence Appendix C: Previous Reports Appendix D: Photo-Documentation and Disposal Manifests

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 borehole 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.

	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

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

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.

3.3 Evapotranspiration Barrier

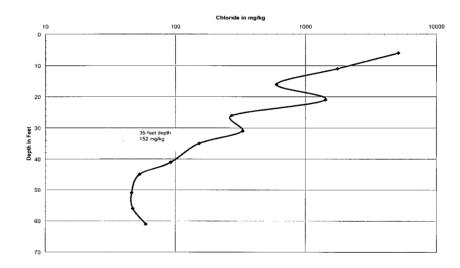
According to approved CAP, the ET Barrier installed by ROC in 2006 sequesters chloride and other salts in the upper vadose zone, eliminating any threat to fresh water, public health or the environment.

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

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



Final Closure Report: I-29 EOL Boot

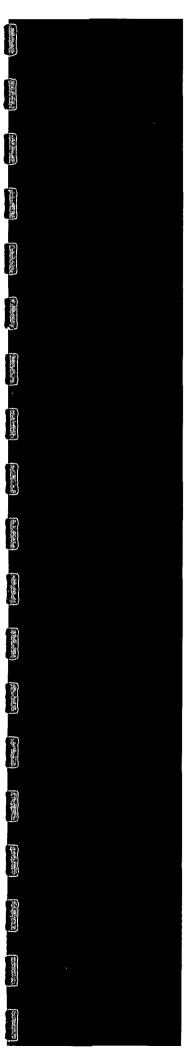
and installed the infiltration barrier in accordance with the NMOCD-approved plan. Appendix D and Figure 2 present photodocumentation of the installed ET

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

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.

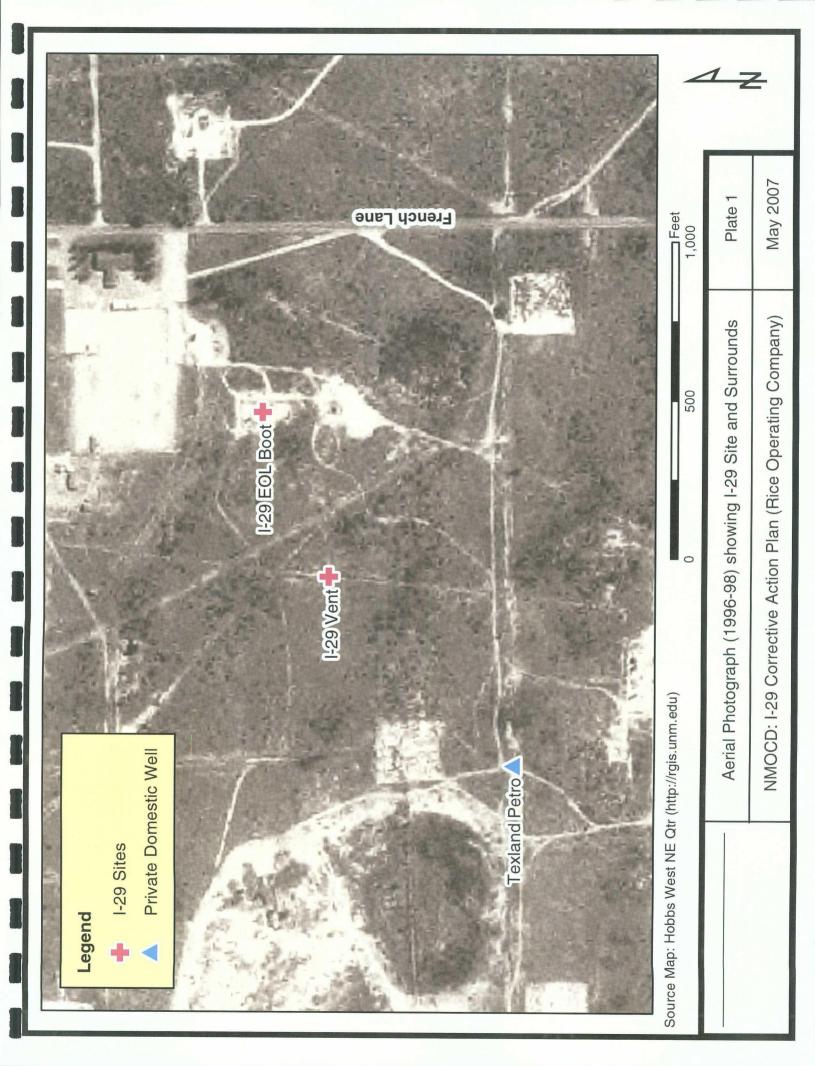




Plates

R.T. Hicks Consultants, Ltd.

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



Appendix A Field Data & Laboratory Analysis

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

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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

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

DRO

LAB NUMBER SAMPLE ID	(C ₆ -C ₁₀) (mg/Kg)	(>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

GRO

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

chARCorhi

Date

H11524A

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 client for 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 thirty (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.



PHONE (325) 673-7001 • 2111 BEECHWOOD • ABILENE, TX 79603

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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

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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

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 client for 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 thirty (30) days after completion of the applicable service: United Sources and any other cause whatsoever shall be deemed waived unless made in writing and received by Cardinal within thirty (30) days after completion of the applicable service: United Sources 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.

Logger:		David Hamilton		Client:	Boring ID:		
Driller: Ea		Eades Drilling		Rice Operating Company			•
Drillin	g Method:	Air Rotary		Project Name:			
Start Date: 11/4/2004 End Date: 11/4/2004		I-29 EOL Boot					
		Location:	Sec	ction 29 B-4 (62 f	eet)		
				T18S R38E			
				Section 29, Unit I			
Depth				_		Field data	
(feet)	C	Description	Lithology	Comments	Depth	Chloride mg/kg	PI
0.0	Su	urface, 0-3 feet		Boring started 2 feet bgs in trench	_		
2.0	Cond ailt	actions top 2.6 fact					
4.0	Sand Silt,	, caliche, tan, 3-6 feet			,		
6.0					6.0	5125	124
8.0							
10.0					11.0	1746	2.
12.0	Collishe	top to white 6 22 feet					
14.0	Caliche, I	tan to white, 6-22 feet				×	
16.0					16.0	596	2.
18.0		•					
20.0					21.0	1415	2.
22.0							
24.0	Very fine grained sand silt, tan, 22-30 feet						
26.0					26.0	271	6.
28.0		,					
30.0	Well indura	ited caliche, 30-33 feet		Hard drilling	31.0	328	7.
32.0	Sandston	ne, red-tan, 33-35 feet		Very hard drilling			
34.0		N			7		
36.0					35.0	152	35
38.0	Very fine graine	ed sand, tan-red, 35-45 feet					1
40.0					41.0	92	9.
42.0							
44.0		······		3			
46.0	Very fine grained	d sand, some caliche, 45-50 feet		8	45.0	53	7.
48.0		IEEL				·····	1
50.0		· · · · · · · · · · · · · · · · · · ·			51.0	46	4.
52.0							
54.0	Voor fing grained	I sand silt, tan red, 50-62 feet			56.0	47	8.
56.0	very me gramed	i sanu siit, tan reu, bu-oz teet					
58.0				Last sample 60-62 feet, moist. Hole			
60.0				backfilled with Bentonite	61.0	59	4.
62.0							
		licks Consultants, Ltd		I-29 EOL Boot		Plate 2	
		rande Blvd NW Suite F-142	2	· · · · · · · · · · · · · · · · · · ·			
	Alb	uquerque, NM 87104		Exploratory Boring		September, 2005	; [*]
		505-266-5004			1	• • • • •	

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 $\tilde{\eta}_{ij} = \frac{1}{2} \frac{\partial^2 \tilde{\eta}_{ij}}{\partial t} \frac{\partial^2 \tilde{\eta}_{ij}}{\partial t} = \frac{\partial^2 \tilde{\eta}_{ij}}{\partial t} = \frac{\partial^2 \tilde{\eta}_{ij}}{\partial t}$

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Appendix B Correspondence

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

Yes!

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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 <u>Hobbs I-29 EOL</u> 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

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R. T. HICKS CONSULTANTS, LTD.

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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

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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 1Collect 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 2Evaluate Chloride and BTEXN Concentrations in Soil at FiveSites, 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.29.0
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 3Evaluate 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).

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	Field Measurements, these sites are generally less than 30 feet in				
perpendicular to ground	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				

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

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 4Design 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.

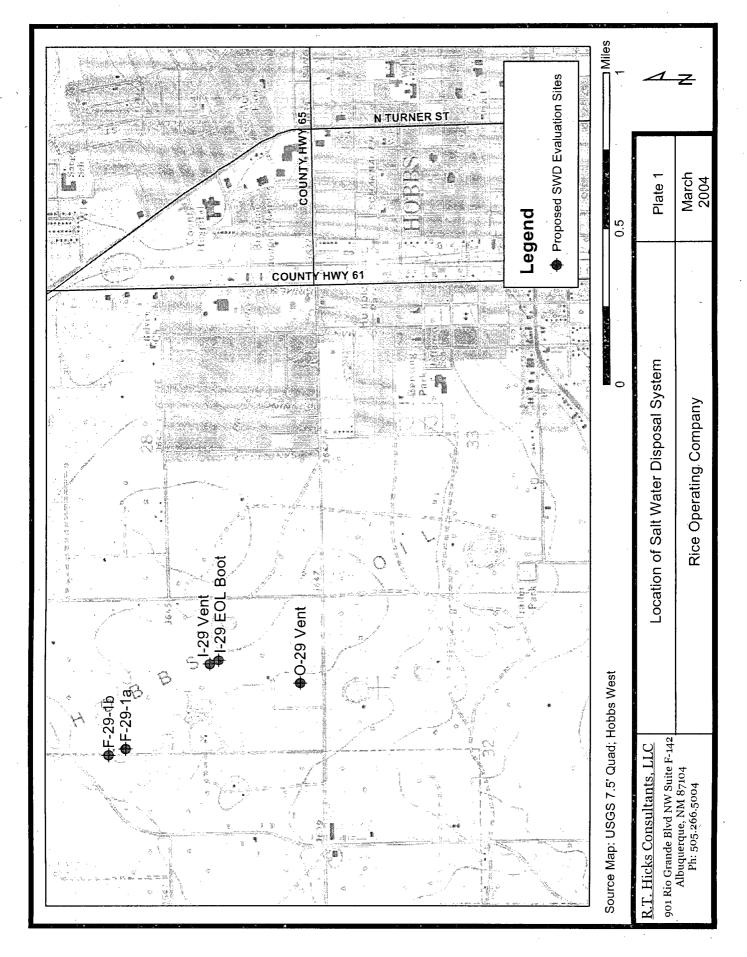
We plan to deliver a Corrective Action Plan that is similar to the Junction Box Replacement Program Plan. This type of submittal will allow ROC to evaluate each site, prioritize the restoration of each site based upon a risk profile, and then begin restoration of those sites that pose the highest risks. 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



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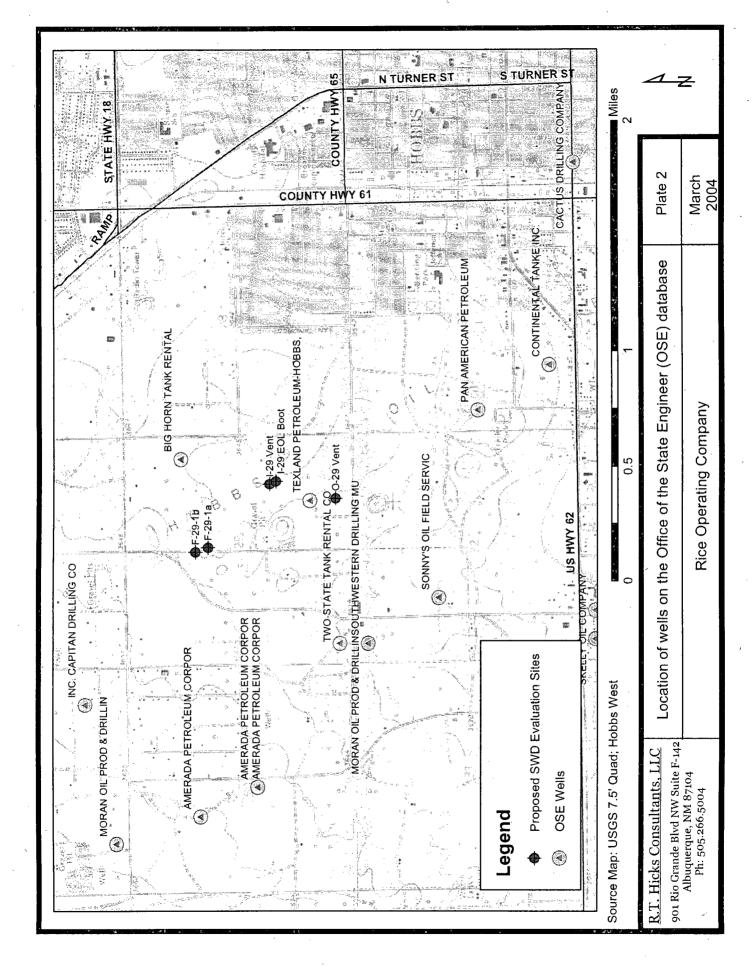
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				Table	le 1		
	HOBBS	Ju	nction Box Disclos	sures: Poto	HOBBS Junction Box Disclosures: Potential Groundwater Impact	er Impact	
These junction box sit outside the scope o	tes have be f the Rice (come Dpera	"disclosure" rather than ' ting Company Generic Ju	"closure" sites inction Box Pla	because significant TPH or an. Each of these sites ha	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	diation to be , based on
delineaton results. A monitored for gr	s noted, so oundwater	me of qualit	f the sites are confirmed to ty. These sites are being	o have groundv evaluated for ri	vater impact and have be isk-based corrective actio	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.	nd are being MOCD.
F-24-3 Vent	Hobbs	Ŀ	Sec 24, T18S, R37E	<50	MN	Initial evaluation only	1/31/2003
F-25 EOL	Hobbs	ĽL,	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 Pérmian	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
0-29 EOL	Hobbs	0	Sec 29, T18S, R38E	<50	Oxy Permian	Initial evaluation only	1/31/2003
O-29 Vent	Hobbs	0	Sec 29, T18S, R38E	<50	Oxy Permian	Initial evaluation only	1/31/2003
O-29-1 Vent	Hobbs	0	Sec 29, T18S, R38E	<50 ·	Oxy Permian	Initial evaluation only	1/31/2003
P-29 Vent	Hobbs	Ρ	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	В	Sec 32, T18S, R38E	<50	Óxy 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	Å	Sec 25, T18S, R37E	<50	NM	Initial evaluation only	1/31/2003
Jct. P-31	Hobbs	Ρ	Sec 31, T18S, R38E	<50	Kress Jones	Initial evaluation only	1/31/2003
Jct. F-24-1	Hobbs	Ĺ	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	1	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	Ы	Sec 32, T18S, R38E	<50	Oxy Permian	Primary Delineation only	1/31/2003
Jct. E-32-2	Hobbs	ш	Sec 32, T18S, R38E	<50	Oxy Permian	Primary Delineation only	1/31/2003
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Jct. E-33-1	Hobbs	Ē	Sec 33, T18S, R38E	<50	MN	Primary Delineation only	, 1/31/2003
Jct. N-4	Hobbs	N	Sec 4, T19S, R38E	<50	MN	Primary Delineation only	1/31/2003
0-5 Vent	Hobbs	0	Sec 5, T19S, R38E	<50	Dee Cochran	Primary Delineation only	1/31/2003
Jct. H-29	Hobbs	Н	Sec 29, T18S, R38E	<50.	Sage & Cottrell	Primary Delineation only	1/31/2003
Jct. E-4	Hobbs	Э	Sec 4, T19S, R38E	<50	MN	Primary Delineation only	1/31/2003
Jct. O-13 (N)	Hobbs	0	Sec 13, T18S, R37E	<50	Charles Seed Trst	Primary Delineation only	1/31/2003
G-9 Vent	Hobbs	Ð	Sec 9, T19S, R38E	<50	MN	Primary Delineation only	1/31/2003
Jct. A-6	Hobbs	Y	Sec 6, T19S, R38E	<50	MN	Primary Delineation only	1/31/2003
Jct. E-33-2	Hobbs	ы	Sec 33, T18S, R38E	<50	NM	Primary Delineation only	1/31/2003
vent M-4	Hobbs	Μ	Hobbs M Sec. 4, T19S, R38E	<50	J. A. Desoto	Initial evaluation only	9/11/2003
These Hobbs SWD S	ystem june	ction b	oxes, which have potenti	ial for ground	vater impact, are not yet	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	re. The Hobbs
SWD System Environmental Committee has directed Rice	imental C	ommitt	tee has directed Rice Opt	erating Compa	iny to prioritize the sites	Operating Company to prioritize the sites according to vadose zone and groundwater receptors,	vater receptors,
NMOCD score, lando	wner, surf	face us	e, etc. in order to coordin	nate the most e	ffective and timely use o	NMOCD score, landowner, surface use, etc. in order to coordinate the most effective and timely use of resources. The Hobbs SWD System Environmental	Environmental
Committee is commit	ted to con	npleting	g the abandonment of the	e Hobbs SWD	Gathering System, and p	Committee is committed to completing the abandonment of the Hobbs SWD Gathering System, and projects the remediation of these junction box sites to	on box sites to
be a long-term endeav	vor, possił	oly 7-1	0 years. Each of these si	ites have signi	ficant TPH and salt impa	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	ope of the Rice

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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.

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3/11/2004

Table 2: Selected Water Well Records from the OSE Database

SAN ULL FLUE ULL UL	DB File Nbr Use Div 06660 (E) PRO L 06337 PRO 1 06337 PRO	SELECTED VALIEF VVEIL Owner MORAN OIL PROD & DRIL INC. CAPITAN DRILLING	epth epth	Water Depth 48 40	Jatabase Well Number G CORP L 06660 (E) MPANY L 06337	Source Shallow Shallow	 ., ., .	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Date 3/23/1970 6/10/1968	Date 3/23/1970 6/10/1968
SAN A.A. OLLFIELD 120 54 L 08851 Shallow 183 38E 23 71/1382 SAN INC. HOBBS DISEL 167 60 L 08867 Shallow 185 38E 23 7/1/1382 SAN BIG HORN TAK REVTAL 207 50 L 07567 Shallow 185 38E 28 1 1/16/197 OBS CROWN CHEMICAL COMPANY 207 50 L 07567 Shallow 185 38E 3 3 8/1977 OBS CROWN CHEMICAL COMPANY 207 50 L 07507 Shallow 185 38E 3 3 3 3 3 3 3 3 1/1/176 SAN TICL L 117/176 Shallow 185 38E 3 1/1/1972 3 1/1/1972 FFO MEFAJDA FETROLEUM CORPOR 37 1/1/176 Shallow 185 38E 3 1/1/1972 FFO		OIL FIELD RENTAL SERVICE MACK TRUCK DEALERSHIP STOEHR WIRE ROPE OF TEXA	130 120 120	60 60	CO. L 08716 L 07810 S INC. L 09475	Shallow Shallow Shallow		000 000	3/23/1982 11/25/1977 5/7/1984	3/24/1982 11/27/1977 5/7/1984
SAN BIG HORN TANK RENTAL 120 52 L 08857 Shallow 185 38E 2 2 7/9/1987 0 RPDM OL PROD & DRILLING MU 120 50 L 07754 Shallow 185 38E 2 2 7/9/1975 0 MORANI OLL PROD & DRILLING MU 120 54 G CORPL 05610(E) Shallow 185 38 3 3//1/1975 0 NOVESTATE TANK RENTAL CO 150 50 L 077570 Shallow 185 38 3 3 1//177126 SAN TUCO-STATE TANK RENTAL CO 150 55 LL 1/1776 Shallow 185 38 3 1//1771201 RND MERADA PETROLEUM-ORPOR 37 30 ATION L 05849 Shallow 185 38 3 1//17195 PRO MINDMILL OIL COMPANY 52 42 100045 Shallow 185 38 3 1//17196 PRO MINDMILL OIL COMP		A.A. OILFIELD INC. HOBBS DIESEL		54 60	L 08851 L 08009	Shallow Shallow		- 10	3 7/1/1982 1/16/1979	7/2/1982 1/20/1979
Image: Dom Moran oll, PROD & DRILLIN 110 54 G CORP L 06570 (E) Shallow 183 38 29 3 6//1976 NON SUNTHWESTERN DRILLING 110 53 G CORP L 06570 (E) Shallow 183 38 5 3 5//1976 SNN TWO-STIATE TANK REITAL CO 150 56 LLC 11176 Shallow 183 38 3 1//1975 FRO AMERADA PETROLEUM-HOBBS, 220 55 LLC 11176 Shallow 183 38 3 1//1975 FRO AMERADA PETROLEUM-HOBBS, 220 55 LLC 11176 Shallow 183 38 3 1 1//1975 FRO AMERADA FETROLEUM-HOBBS, 220 55 LLC 10094 Shallow 183 38 1 1//1975 FRO AMINDMILL OIL COMPANY 52 42 10094 Shallow 183 38 4 1 10//1956 FRO WINDMILL OIL COMPANY		BIG HORN TANK RENTAL CROWN CHEMICAL COMPANY		52 50	L 08867 L 07754	Shallow Shallow		00	2 7/9/1982 1 9/8/1977	7/10/1982 9/14/1977
SAN TWO-STATE TANK RENTAL CO 150 50 L 07100 Shallow 185 38E 29 3 107147197 FRC AMERADA PETROLEUM-HOBBS, 220 65 LLC L 11176 Shallow 185 38E 29 3 107147195 FRC AMERADA PETROLEUM-HOBBS, 220 65 LLC L 11176 Shallow 185 38E 29 3 107147195 FRC AMERADA PETROLEUM CORPOR 38 34 ATION L 05848 Shallow 185 38E 29 4 1071795 FRC AMERADA FETROLEUM CORPOR 32 ATION L 05848 Shallow 185 38E 30 1 2 1707195 FRC WINDMILL OIL COMPANY 52 42 L 10037 Shallow 185 38E 30 4 1 1071795 FRC WINDMILL OIL COMPANY 52 42 L 100397 Shallow 185	_	MORAN OIL PROD & DRILLIN SOUTHWESTERN DRILLING MU		54 48	G CORP L 06570 (E) D L 07570	Shallow Shallow		 	8/5/1969 6/21/1976	8/5/1969 6/22/1976
PRO AMERADA PETROLEUM CORPOR 87 30 ATION L 02395 Shallow 185 38E 30 1 2 8/31/1955 PRO AMERADA PETROLEUM CORPOR 38 34 ATION L 05849 Shallow 185 38E 30 1 2 8/31/1955 PRO AMERADA PETROLEUM CORPOR 38 34 ATION L 05818 Shallow 185 38E 30 4 1 0/1/1985 PRO WINDMILL OIL COMPANY 52 42 L 10095 Shallow 185 38E 30 4 1 0/1/1985 PRO WINDMILL OIL COMPANY 52 42 L 10095 Shallow 185 38E 30 4 1 0/1/1985 PRO WINDMILL OIL COMPANY 52 42 1 0097 Shallow 185 38E 30 4 1 0/1/1985 PRO WINDMILL OIL COMPANY 52 42 L 0095 <td></td> <td>TWO-STATE TANK RENTAL CO TEXLAND PETROLEUM-HOBBS,</td> <td></td> <td>50 65</td> <td>LLC L 11176</td> <td>Shallow Shallow</td> <td></td> <td>ω 4 ω 4</td> <td>3 10/14/1972 7/31/2001</td> <td>10/18/1972 8/3/2001</td>		TWO-STATE TANK RENTAL CO TEXLAND PETROLEUM-HOBBS,		50 65	LLC L 11176	Shallow Shallow		ω 4 ω 4	3 10/14/1972 7/31/2001	10/18/1972 8/3/2001
PRO AMERIADA FETROLEUM CORPOR 32 ATION L 05818 Shallow 185 38 30 1 1/2/1989 PRO WINDMILL OIL COMPANY 52 42 L 10093 Shallow 185 38 30 1 1 10/2/1989 PRO WINDMILL OIL COMPANY 52 42 L 10095 Shallow 185 38 30 1 1 10/2/1989 PRO WINDMILL OIL COMPANY 52 42 L 10095 Shallow 185 38 30 1 1 10/2/1989 PRO WINDMILL OIL COMPANY 52 41 L 10095 Shallow 185 30 4 1 10/2/1989 PRO WINDMILL OIL COMPANY 52 41 L 10097 Shallow 185 30 4 1 10/2/1989 SAN STATTOOL COMPANY 125 41 1 10057 Shallow 185 32 1 10/		AMERADA PETROLEUM CORPOR		30 34	ATION L 02395	Shallow			2/10/1953	8/31/1953 2/12/1966
PRO WINDMILL OIL COMPANY 52 42 L 10093 Shallow 18S 38E 30 4 1 10/2/1989 PRO WINDMILL OIL COMPANY 52 42 L 10095 Shallow 18S 38E 30 4 1 10/2/1989 PRO WINDMILL OIL COMPANY 52 42 L 10095 Shallow 18S 38E 30 4 1 10/2/1989 PRO WINDMILL OIL COMPANY 52 42 L 10095 Shallow 18S 38E 30 4 1 10/3/1989 PRO WINDMILL OIL COMPANY 52 41 L 10095 Shallow 18S 38E 30 4 1 7/28/1987 PRO WINDMILL OIL COMPANY 52 41 L 10095 Shallow 18S 38E 30 4 1 7/28/1986 SAN BULL DOG TOOL 158 43 L 106574 Shallow		AMERADA PETROLEUM CORPOR		32	ATION L 05818	Shallow			12/15/1965	•
FRO WINDMILL OL COMPANY 52 42 L 10095 Shallow 185 36 1 10/0/1989 PRO WINDMILL OL COMPANY 52 42 L 10095 Shallow 185 36 4 1 10/0/1989 PRO WINDMILL OL COMPANY 52 42 L 10095 Shallow 185 38 30 4 1 10/0/1989 PRO WINDMILL OL COMPANY 52 42 L 10095 Shallow 185 38 30 4 1 10/0/1989 PRO WINDMILL OL COMPANY 52 41 L 10097 Shallow 185 38 30 4 1 10/0/1989 SAN BULL DOG TOOL 158 43 L 105578 5/11966 5/11966 SAN BULL DOG TOOL INC 156 65 L 10556 5/1106 5/11966 SAN BULL DOG TOOL INC 150 65 L 1055				42	L 10093	Shallow		4 4	10/2/1989	
PRO WINDMILL OIL COMPANY 52 42 L 10096 Shallow 18S 38E 30 4 1 10/6/1989 PRO WINDMILL OIL COMPANY 50 41 L 09936 Shallow 18S 38E 30 4 1 7/28/1987 PRO WINDMILL OIL COMPANY 52 41 L 09936 Shallow 18S 38E 30 4 1 7/28/1987 SAN STAR TOOL COMPANY 52 45 L 05874 Shallow 18S 38E 30 4 1 7/28/1989 SAN BULL DOG TOOL 158 43 L 10558 Shallow 18S 38E 32 1 3/2/17/1996 SAN BULL DOG TOOL 126 65 L 10558 Shallow 18S 38E 32 1 10/2/1988 SAN BULL DOG TOOL 120 65 L 10558 Shallow 18S 38E				4 4	L 10095	Shallow		44	10/4/1989	
PRO WINDMILL OLCOMPANY 52 41 L 0.0097 Shallow 103 0.0 1 10/3/1980 SAN STAR TOOL COMPANY 52 41 L 10097 Shallow 103 0.0 1 1 10/3/1980 SAN STAR TOOL COMPANY 52 41 L 10097 Shallow 183 36 1 1 10/3/1980 SAN BULL DOG TOOL 158 45 L 105574 Shallow 183 32 1 1 1/17/1966 SAN BULL DOG TOOL 158 43 L 10620 Shallow 183 32 1 3/2/1966 SAN BULL DOG TOOL 120 80 L 10620 Shallow 183 32 1 3/2/1966 SAN BULL DOG TOOL INC 120 80 L 10620 Shallow 183 32 1 10/20/1986 SAN BULL DOG TOOL INC 120 34 L 106558 Shallow 183 3 3/1/1967 SAN SONNYS OIL FIELD SERVIC				42	L 10096	Shallow		4 4	10/6/1989	10/6/1989 8/1/1087
SAN STAR TOOL COMPANY 125 45 L 05874 Shallow 18S 38E 32 1 3/2/1966 SAN BULL DOG TOOL 158 43 L 10620 Shallow 18S 38E 32 1 3/2/1966 SAN BULL DOG TOOL 158 43 L 10620 Shallow 18S 38E 32 1 3/2/17/1996 SAN BULL DOG TOOL INC 120 80 L 10558 Shallow 18S 38E 32 1 3/2/17/1996 SAN BULL DOG TOOL INC 120 80 L 10558 Shallow 18S 38E 32 1 3/2/17/1996 SAN SONNY'S OIL FIELD SERVIC 150 65 L 10035 Shallow 18S 38E 32 1 12/29/1967 DOM INC. BAKER OIL TOOLS 100 30 L 02964 Shallow 18S 38 3 3/0/1955 D		WINDMILL OIL COMPANY		4 4	L 10097	Shallow		t 4	10/3/1989	10/4/1989
SAN BULL DOG TOOL 158 43 L 10620 Shallow 185 38E 32 1 3 12/17/1996 SAN BULL DOG TOOL INC 120 80 L 10558 Shallow 185 38E 32 1 3 5/5/1996 SAN BULL DOG TOOL INC 120 80 L 10558 Shallow 185 38E 32 1 3 5/5/1996 SAN BULL DOG TOOL INC 120 30 E INC. L 065 L 10035 Shallow 18S 38E 32 1 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3		STAR TOOL COMPANY		45	L 05874	Shallow		-	3/2/1966	
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PRO CACTUS DRILLING COMPANY 106 45 L 03516 APPR Shallow 18S 38E 34 3 3 8/21/1956		CONTINENTAL TANKE INC.	112	56	L 02232	Shallow	•••	ლ ლ	6/23/1953	6/23/1953
		CACTUS DRILLING COMPANY	106	45	L 03516 APPR	Shallow	•••	ი ო	3 8/21/1956	8/22/1956

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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.

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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 NMOCDapproved 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.

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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.

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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).

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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 35feet bgs and 55-feet bgs, samples were collected from cuttings. This is the only material deviation from the NMOCD-approved workplan.

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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).

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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 wellindurated 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 5feet 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 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.

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Lal	boratory D	ata 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	

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

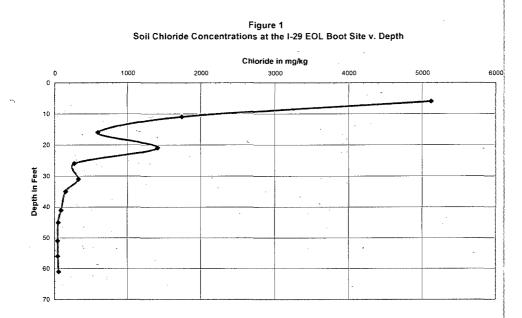
Boots within the gravity-flow pipelines of the system consisted of a T-like intersection of pipes, with an open vertical pipe above ground placed over a wooden catchment box. Some separation of gas from the produced water and entrained hydrocarbons occurred, and the resulting outflow has gravity flow. 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 evewitness 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 35feet 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.

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

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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

Hydrus Soil Profile 1 (Current Conditions)

-		•	
Description	Length (cm)	Dispersion (cm)	%of Profile length
Sandy Loam	60	50	2.778
Caliche-sand	520	30	1.667
Caliche	150	10	0.556
Sand-silt	1070	100	5.556
	Sandy Loam Caliche-sand Caliche	Sandy Loam60Caliche-sand520Caliche150	Sandy Loam6050Caliche-sand52030Caliche15010

Table 2. Input parameters for HYDRUS-1D simulations

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.

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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

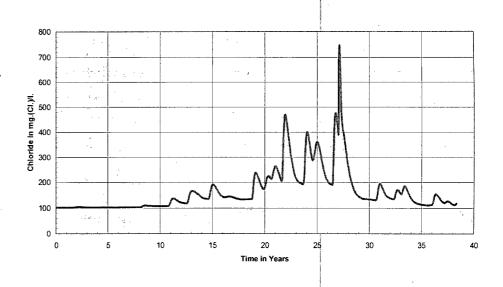


Figure 2. Chloride Concentration in the Aquifer for I-29 EOL Boot (Scenario 1)

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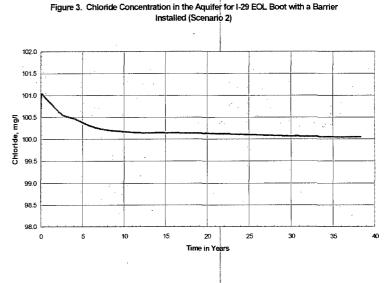
causes the moisture content in the profile to decline over time. Lower moisture content causes a commensurate reduction in unsaturated hydraulic conductivity. Without infiltration, the vadose zone flux into the aquifer is so diminished that chloride concentration in the aquifer is indistinguishable from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

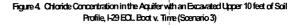
The second possible remedy, Scenario 3, evaluated the removal of the upper 10-feet of soil and replacement with clean fill assumed to contain a background chloride concentration of 80 mg/kg. To evaluate this alternative, a second HYDRUS-1D soil profile was used (see Appendix A and Plate 3) with this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

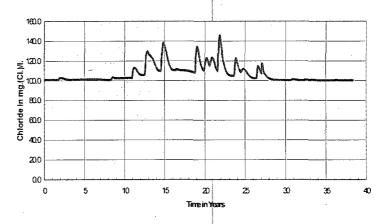
This second soil profile represents an excavated site by replacing the upper 19- feet of sand, caliche, and clay with sandy loam, which exhibits a higher hydraulic conductivity than the excavated material. This change accelerates the residual chloride and water flux into the aquifer. Because most of 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 4feet 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

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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).

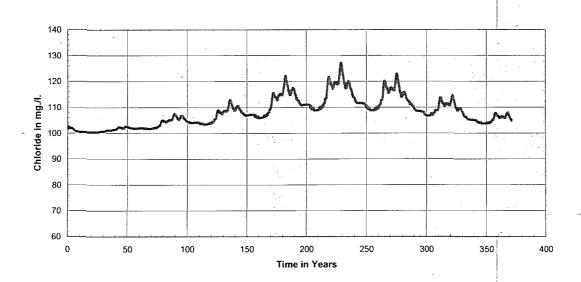


Figure 5. Chloride Concentration in the Aquifer for I-29 EOL with a Clay Cap v. Time, (Scenario 4)

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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.

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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.

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9.0 REFERENCES

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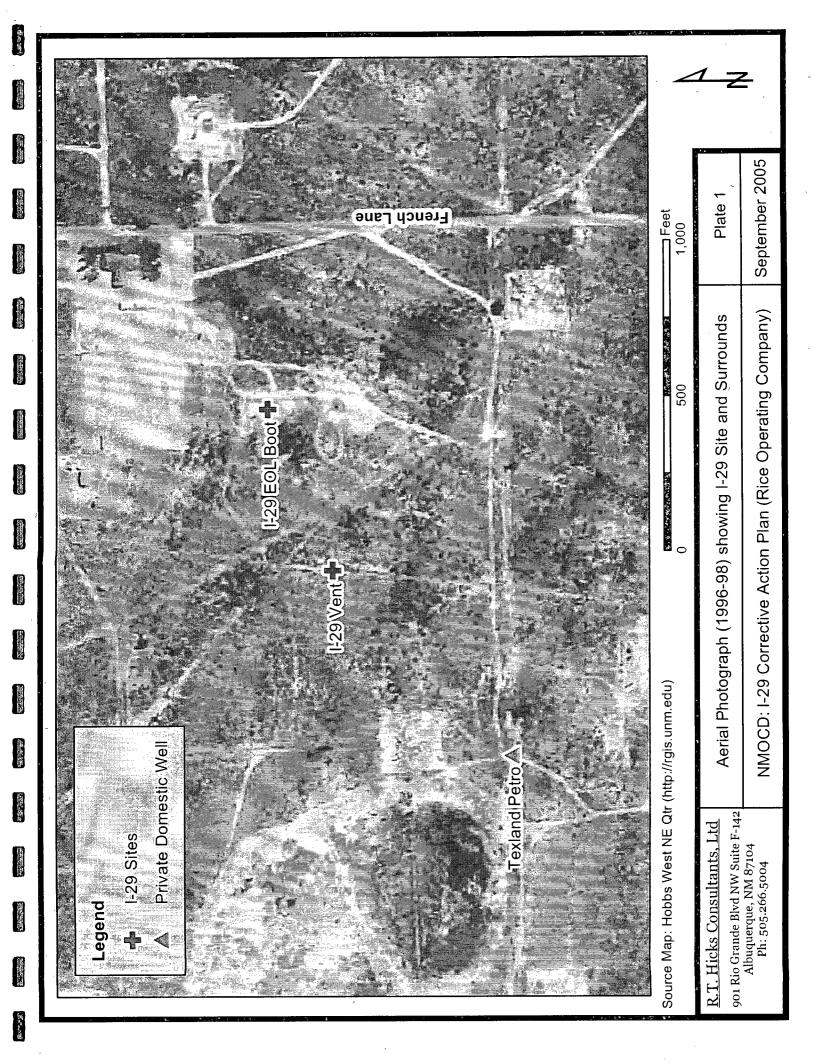
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Start Date: 11/4/2004		Rice Operating Company					
		Project Name:		1			
		I-29 EOL Boot					
			Location:	Sec	ction 29 B-4 (62 fe	eet)	
		T18S R38E	1				
				Section 29, Unit I			
					1		•
u.					-		
Depth			· ·	1		Field data	
(feet)		Description Li		Comments	Depth	Chloride mg/kg	PID
0.0		urface, 0-3 feet		Boring started 2 feet bgs in trench			[
2.0		-					
4.0	Sand silt	t, caliche, tan, 3-6 feet		8			
6.0		· · · · · · · · · · · · · · · · · · ·			6.0	5125	124.
8.0		· · ·					
10.0					11.0	1746	2.4
12.0					·····		<u></u>
14.0	Caliche,	tan to white, 6-22 feet					
16.0					16.0	596	2.3
18.0					10.0		
20.0					21.0	1415	2.8
22.0		· · · · · · · · · · · · · · · · · · ·		3	21.0		2.0
24.0	,						1
26.0	Very fine grain	ned sand silt, tan, 22-30 feet			26.0	271	6.7
28.0					20.0	2/1	0.7
30.0	Well indur	ated caliche, 30-33 feet		Hard drilling	31.0	328	7.5
32.0		ne, red-tan, 33-35 feet		Very hard drilling	01.0	020	7.5
34.0		·····	60066.066666666	very hard driming	-		
36.0					35.0	152	35.0
38.0	Verv fine grain	ed sand, tan-red, 35-45 feet			00.0	102	
40.0					41.0	92	9.7
40.0						32	5.1
44.0							
46.0	Very fine graine	ed sand, some caliche, 45-50			45.0	53	7.0
48.0		feet					,
50.0				9	51.0	46	4.3
52.0							
54.0					56.0	47	8.2
56.0	very fine grained	d sand silt, tan red, 50-62 feet					
58.0				Last sample 60-62 feet, moist. Hole			
60.0				backfilled with Bentonite	61.0	59	4.4
62.0		<u></u>				<u></u>	
		Hicks Consultants, Ltd		I-29 EOL Boot		Plate 2	
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HYDRUS-1D Profiles				Rice Operating Company		-
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				I-29 EOL Boot	1	
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Depth		Current			Excavated	Dep
(feet)	Description	Profile		Description	Profile	(fee
0.0	Sandy loam, 0 - 2 feet			Sandy loam 0-1 feet		0.0
2.0						2.0
4.0				· · · ·		4.0
6.0						6.0
8.0	Sand, caliche, 2-17 feet			Loamy sand, 1-19 feet		8.0
10.0				Eouny Sand, 1º 10 1001		10.
12.0						12.
14.0	×					- 14.
16.0	Caliche, 17-19 feet					16.
18.0	Sand, silt 19-20feet			Sand, silt 19-20feet	na se anna an an ann an ann an ann ann ann a	18.
20.0	Caliche, 20-22 feet			Caliche, 20-22 feet		20.
22.0						22.
24.0						24.
26.0	Sand, silt 22-34 feet			Sand, silt 22-34 feet		26.
28.0						28.
30.0						30.
32.0						32.
34.0	Caliche, 34-35 feet			Caliche, 34-35 feet		34.
36.0						36.
38.0	Sand, silt, 35-45 feet			Sand, silt, 35-45 feet		38.
40.0	, , , , , , , , , , , , , , , , , , ,					40.
42.0				· · · · · · · · · · · · · · · · · · ·		42.
44.0	Sand , caliche, 45-47 feet			Sand , caliche, 45-47 feet		44.
46.0						46.
48.0						48.
50.0						50.
52.0	Sand, silt, 47-59 feet			Sand, silt, 47-59 feet		52.
54.0						54.
56.0						56.0
58.0						58.
60.0					1	60.
,	R.T. Hicks Consultants,	Ltd			1	
90	01 Rio Grande Blvd NW Suit			Section 29 Sites	Plate 3	3
	Albuquerque, NM 8710		Hv	drus Profiles Developed		
	505-266-5004			om Exploratory Borings	September,	2005

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APPENDIX A

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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

APPENDIX A – ENVIRONMENTAL SETTING OF THE HOBBS SAET WATER DISPOSAL SYSTEM October 20, 2005

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.

APPENDIX A – ENVIRONMENTAL SETTING OF THE NOBBS SAIT WATER DISPOSAL SYSTEM October 20.2005 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.

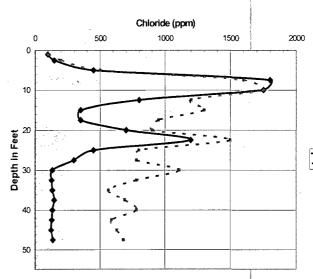
In summary, sites where chloride or other constituents of concern penetrated deep into the vadose zone probably experienced long-term

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.

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
- \cdot Sulfate

Chloride Concentration Profiles



Episodic, Unsaturated Flo

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

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.

APPENDIX A — ENVIRONMENTAL SETTING OF THE HOBBS GALT WATER DISPOSAL SYSTEM October 20, 2005

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.

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APPENDIX & - ENVIRONMENTAL SETTING OF THE HOBBS SAIT WATER DISPOSAL SYSTEM October 20, 2003

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 a 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.

APPENDIX A – ENVIRONMENTAL SETTING OF THE NOBES SALT WATER DISPOSAL SYSTEM October 20, 2005

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.

APPENDIX A – ENVIRONMENTAL SETTING OF THE HOBBS SALT WATER DISPOSAL SYSTEM October 20, 2005

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Freeze, R. A., and Cherry, J. A., 1979, Groundwater, Prentice-Hall, Inc.

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

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

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

APPENDIX A — Environmental Setting of the Hobbs Salt Water Disposal System October 20, 2005

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TABLES

Table A-1

				oysteri	Location	STATUS	GWelev CI	mqq_1;
18S.38E.20.M.VENT	670996		Vent	Hobbs	Sec 20, T18S, R38E	Monitoring Well		
18S.38E.29.E.VENT	670697	3621643 E-29 Vent	/ent	Hobbs	Sec 29, T18S, R38E	Monitoring Well		
18S.38E.29.F.JCT.1A	671472	3621766 Jct. F-29-1a	29-1a	Hobbs	Sec 29, T18S, R38E	Monitoring Well		
18S.38E.29.F.JCT.1A-DEEP	671472	3621766 Jct. F-	Jct. F-29-1a-Deep	Hobbs	Sec 29, T18S, R38E	Monitoring Well	3585	332
18S.38E.29.F.JCT.1A-SHALLOW	671472	3621766 Jct. F-29-1a-Shallow	29-1a-Shallow	Hobbs	Sec 29, T18S, R38E	Monitoring Well	3585	626
18S.38E.29.F.JCT.1B	671440	3621854 Jct. F-29-1b	29-1b	Hobbs	Sec 29, T18S, R38E	Soil Boring		
18S.38E.29.H.JCT	671949	3621622 Jct. H-29	29	Hobbs	Sec 29, T18S, R38E	Monitoring Well		
18S.38E.29.I.EOL BOOT	672076	3621394 I-29 E(I-29 EOL Boot	Hobbs	Sec 29, T18S, R38E	Soil Boring		
18S.38E.29.I.VENT	671917	3621330 I-29 Vent	ent	Hobbs	Sec 29, T18S, R38E	Monitoring Well	3583	104
18S.38E.29.K.EOL BOOT	671314	3621139 K-29 EOL Boot	OL Boot	Hobbs	Sec 29, T18S, R38E	Monitoring Well		
18S.38E.29.0.EOL	671861	3621031 O-29 EOL	TOL	Hobbs	Sec 29, T18S, R38E	Monitoring Well		
18S.38E.29.0.VENT	671818	3620861 O-29 Vent	/ent	Hobbs	Sec 29, T18S, R38E	Soil Boring		
18S 38E 29 P VENT	671883	3621009 P-29 Vent	/ent	Hobbs	Sec 29, T18S, R38E	Monitoring Well		
18S.38E.32.B.BOOT	671686	3620535 B-32 Boot	soot	Hobbs	Sec 32, T18S, R38E	Monitoring Well		
18S.38E.32.E.JCT.1	671077	3619959 Jct. E-32-1	32-1	Hobbs	Sec 32, T18S, R38E	Monitoring Well		
18S.38E.32.E.JCT.2	671075	3619976 Jct. E-	32-2	Hobbs	Sec 32, T18S, R38E	Monitoring Well		
18S.38E.33.E.JCT.1	672671	3620026 Jct. E-33-1	33-1	Hobbs 7	Sec 33, T18S, R38E	Monitoring Well		
18S.38E.33.F.VENT	673087	3619923 F-33 Vent	'ent	Hobbs	Sec 33, T18S, R38E	Monitoring Well		
INTERA.WO-001	671096	3621258 WO-001	21	Windmill Oil		Domestic Well		
INTERA WO-003	671878	3622011 WO-003	33	Windmill Oil		Domestic Well		478
INTERA.WO-004	672167	3622050 WO-004	24	Windmill Oil		Domestic Well		105
INTERA WO-005	671739	3621120 WO-005	75	Windmill Oil		Domestic Well		112
INTERA WO-006	672183	3621695 WO-006	90	Windmill Oil		Domestic Well		119
INTERA WO-007	670796	3621523 WO-007	27	Windmill Oil		Domestic Well		111
INTERA.WO-009	671872	3621659 WO-009	00	Windmill Oil		Domestic Well		110
INTERA WO-010	671917	3621945 WO-010	10	Windmill Oil		Domestic Well		84
INTERA.WO-011	672206	3622132 WO-011	11	Windmil! Oil		Domestic Well		265
INTERA.WO-012	671224	3621157 WO-012	12	Windmill Oil		Domestic Well		102
INTERA.WO-013	671881	3621737 WO-013	13	Windmill Oil		Domestic Well		378
INTERA WO-014	671023	3620640 WO-014	14	Windmill Oil		Domestic Well		91
INTERA.WO-022	671911	3621889 WO-022	22	Windmill Oil		Domestic Well		
INTERA.WO-024	672171	3622003 WO-024	24	Windmill Oil		Domestic Well		
INTERA.WO-044	669954	3622169 WO-044	44	Windmill Oil		Domestic Well		402
OCD AA Oil Field Services	671456	3622866 AA Oil Field Services	Field Services			Domestic Well		60
OCD.Cat House Water Well	670826	3620715 Cat House Water Wel	ouse Water Well	Domestic Well		Domestic Well		92
ROC.Bowlarama	670888	3619268 Bowlarama	rama	Domestic Well		Domestic Well		176
ROC.Buildog Tool Co.	670964	3620040 Bulldog Tool Co	g Tool Co.	Domestic Well		Domestic Well		168
ROC.F-29-BGB-01	671407	3621969 F-29-BGB-01	3GB-01	Hobbs		Soil Boring	_	
ROC F-29-MW-2	671163	3621786 F-29-MW-2	AW-2	Hobbs		Monitoring Well		223
ROC.F-29-MW-3	671164	3621813 F-29-MW-3	AW-3	Hobbs		Monitoring Well		272
ROC.F-29-MW-4	671197	3621748 F-29-MW-4	AW-4	Hobbs		Monitoring Well		336
ROC. Hobbs Diesel Co.	672343	3622328 Hobbs Diesel Co	Diesel Co.	Domestic Well		Domestic Well		88
ROC.Mac Truck Co.	672169	3623794 Mac Truck Co.	ruck Co.	Domestic Well		Domestic Well		360
ROC.Oil Field Rental Services	672031	3623935 Oil Fie	3623935 Oil Field Rental Services	Domestic Well		Domestic Well		76
ROC.Pan American Petro	672478	3619756 Pan Ai	Pan American Petro	Domestic Well		Domestic Well		124
ROC.Smith's International	670994	3620689 Smith':	Smith's International	Domestic Well		Domestic Well	,	92
ROC.Stoebr Wire Co	672147	3623586 Stoebr	Stoebr Wire Co	Domestic Well		Domestic Well		640
ROC. Texland Petro	671734	3621152 Texlan	Texland Petro	Domestic Well		Domestic Well		140
ite Tank Rental Co.	671070	3621007 Two S	3621007 Two State Tank Rental Co.	Domestic Well		Domestic Well		292

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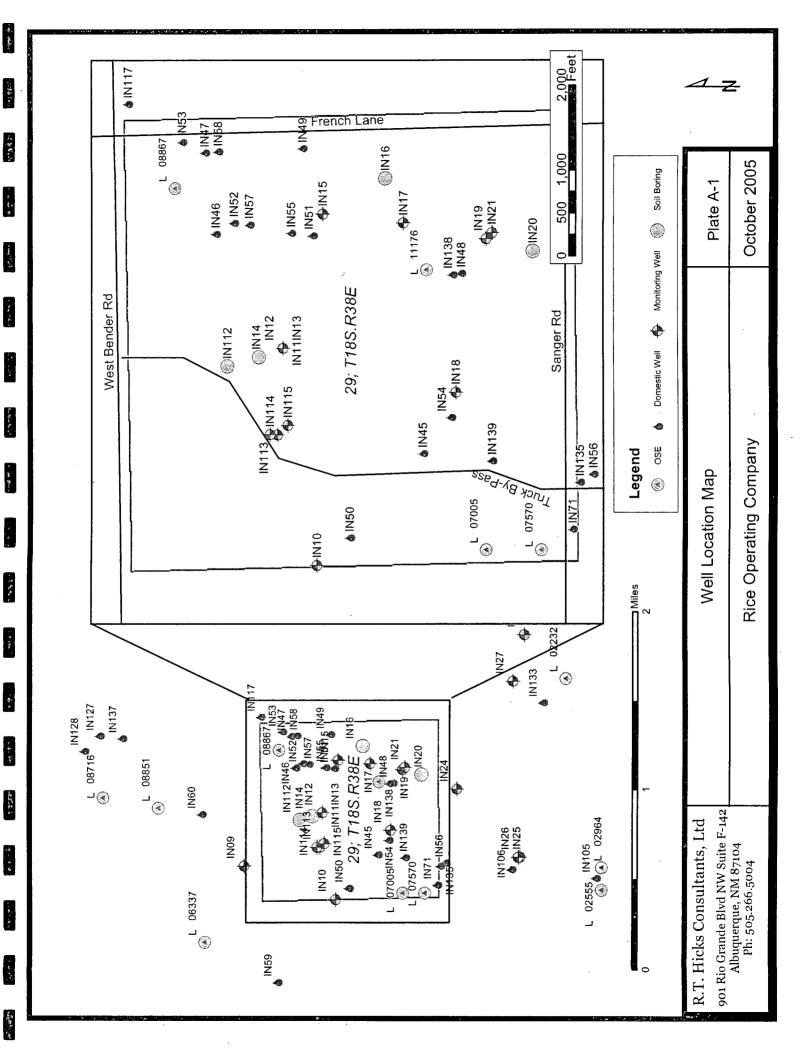
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	Logger:	David Hamilton	<u>וווייי</u>	Client:		· · · ·	Well ID:		
	Driller:	Eades Drilling			Operating (Company	4		
	Method:	Air Rotary		Project Name			4		
	Start Date:	11/3/2004			lobbs F-29	- IA	- F-2	9-1a B-2-1 (99 fe	et),
	End Date:	11/6/2004		Location:	T18S R38)E	- F-2	9-1a B-2-2 (72 fe	et)
				Se	ection 29, L		1		
					<u></u>		1		
Depth								Field data	
(feet)		Description	Lithology	Comments	Well	Construction	Depth	Chloride mg/kg	PID
0.0 2.0	S	urface, 0 - 1 feet				Cement, (3 feet	4		
4.0							1		
6.0		sand , moist, 1 - 13 feet, Some					6.0	203	547
8.0	ny ny	drocarbon impact							
10.0		·					11.0	174	1575
12.0	Caliche fine	grained sand, silt, light tan,							
14.0		13 - 18 feet							
16.0	Caliaba	vell indurated 18 21 fact		, 0 cm c			16.0	106	1060
18.0 20.0		vell indurated , 18 - 21 feet some well indurated layers,		Some odor			21.0	73 -	1242
20.0		21 - 24 feet					22.0	73 - 78	1242
24.0	[······································				Hydrated			
26.0						bentonite,	26.0	91	1006
28.0	Very fine grain	ed sand, silt, light reddish tan,	•	At 30 feet:		3-50 feet			
30.0		24 - 36 feet		Some hydrocarbo	n IIII - III		31.0	83	1290
32.0				impact,					
34.0 36.0	Some	caliche, 36 - 36.5 feet		strong odor			36.0	85	403
38.0							30.0	05	403
40.0							41.0	92	432
42.0	Very fine g	rained sand, silt, tan - red, 36.5 - 48 feet							
44.0		50.5 - 40 leel							
46.0		<u>ن با </u>					46.0	92	354
48.0	Calich	e layer, 48 - 48.5 feet					4		
50.0 52.0					 		51.0	72	527
54.0	Very fine gr	ained sand, silt, tan - red,					56.0	87	479
56.0		48.5 - 59 feet							475
58.0				At 59 feet:		Sand,	59.0	94	414
60.0		······································		Bore collapsing,		50-74 feet			·
62.0				Probe is wet.	ЬЦ	Screen 52-72 feet			
64.0				Drilled with water		52-12 leel			
66.0 68.0				below 59 feet					
70.0									
72.0									
74.0							1		
76.0									
78.0	Very fine g	rained sand, silt, tan - red,							
80.0 82.0		59 - 102 feet				Hydrated bentonite,			
82.0						74-92 feet			
86.0				·					
88.0									
90.0							1		
92.0						Sand,			
94.0 96.0						92-99 feet Screen 9			
96.0			*****			99 feet	-		
98.0 100.0				Slump filled hole from 99-102 feet	FILITITIE	Slump	-		
				1000 33- 102 TEEL			1		
10201	I	,							
102.0									
		<u>Hicks Consultants, Ltd</u>		Hoh	bs F-29.1	A Site		Plate A_2	
	901 Rio C	Hicks Consultants, Ltd Grande Blvd NW Suite F-14 Duquerque, NM 87104	2	Hob	bs F-29-1	A Site		Plate A-2	

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·			Client:		
	HYDRUS-1D Profiles	5	Rice Operating Company		
			Project Name:		·
			I-29 EOL Boot	-	
			Location:		
			T18S R38E		
			Section 29	-	
Depth		Composite		Excavated	Depth
(feet)	Description	Profile	Description	Profile	(feet)
0.0	Sandy loam, 0 - 2 feet		Sandy loam 0-1 feet		0.0
2.0					2.0
4.0					4.0
6.0			~		6.0
8.0	Sand, caliche, 2-17 feet		Loamy sand, 1-19 feet		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					22.0
24.0					24.0
26.0	Onu d. 114 00 04 fr at		Sand ailt 22 24 fact		26.0
28.0	Sand, silt 22-34 feet		Sand, silt 22-34 feet		28.0
30.0					30.0
32.0					32.0
34.0	Caliche, 34-35 feet		Caliche, 34-35 feet		34.0
36.0	· · · · · · · · · · · · · · · · · · ·				36.0
38.0	Orand all OF 45 from		Cond ailt 25 45 faat		38.0
40.0	Sand, silt, 35-45 feet		Sand, silt, 35-45 feet		40.0
42.0				ing transferences and the second second	42.0
44.0	Sand, caliche, 45-47 feet		Sand , caliche, 45-47 feet		44.0
46.0				Construction of the constr	46.0
48.0					48.0
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52.0	Sand, silt, 47-59 feet		Sand, silt, 47-59 feet		52.0
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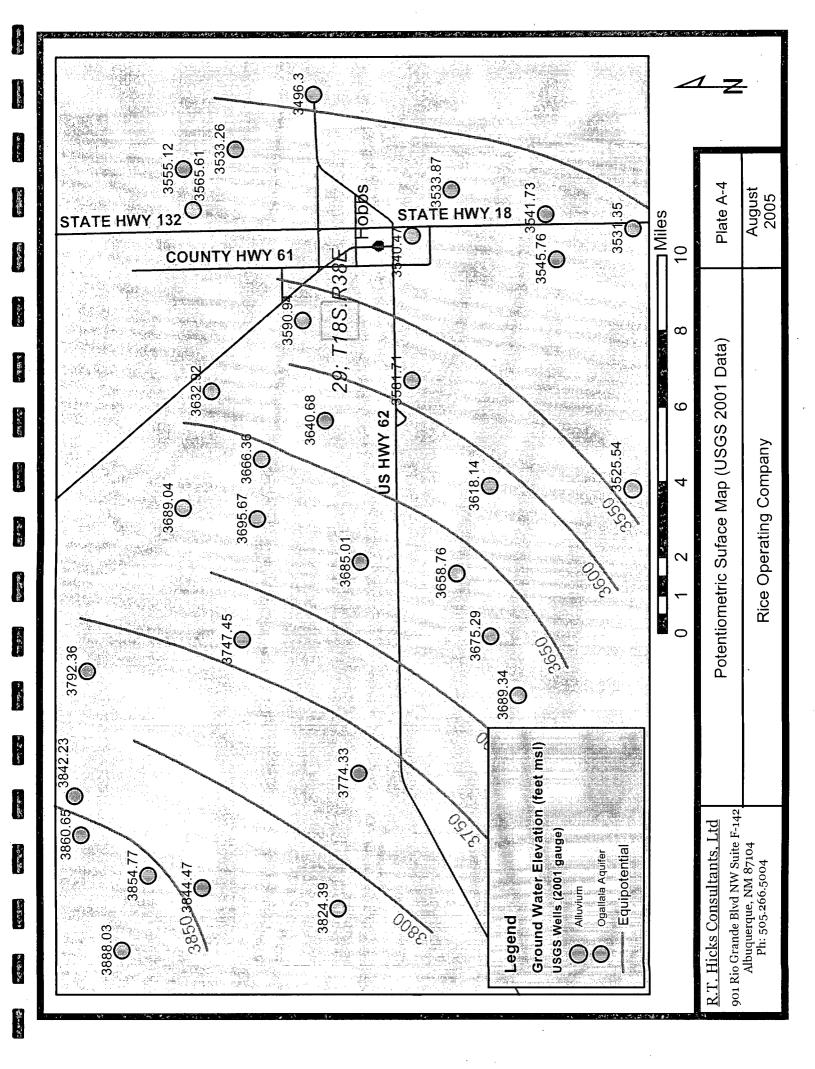
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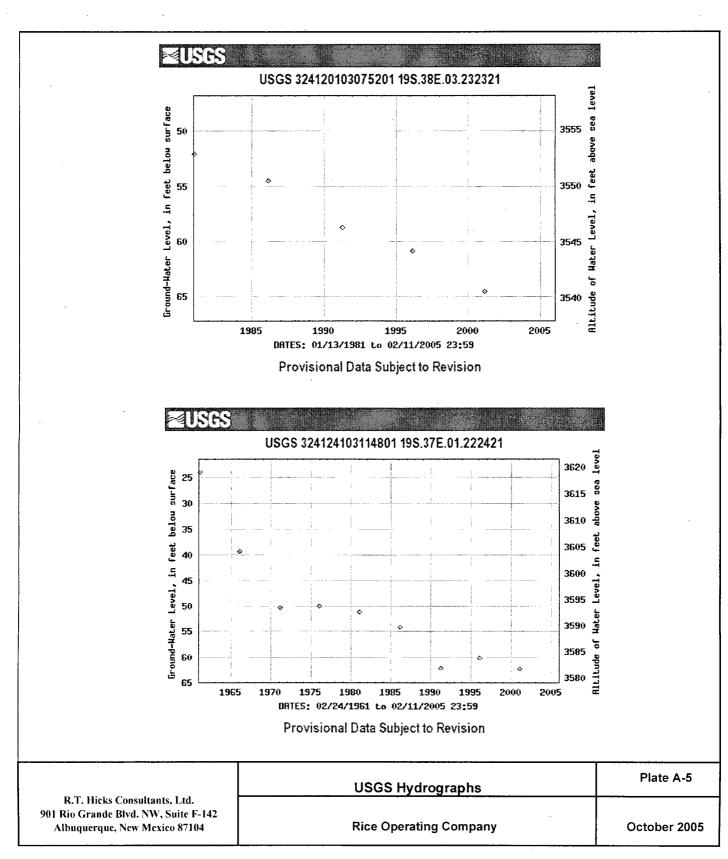
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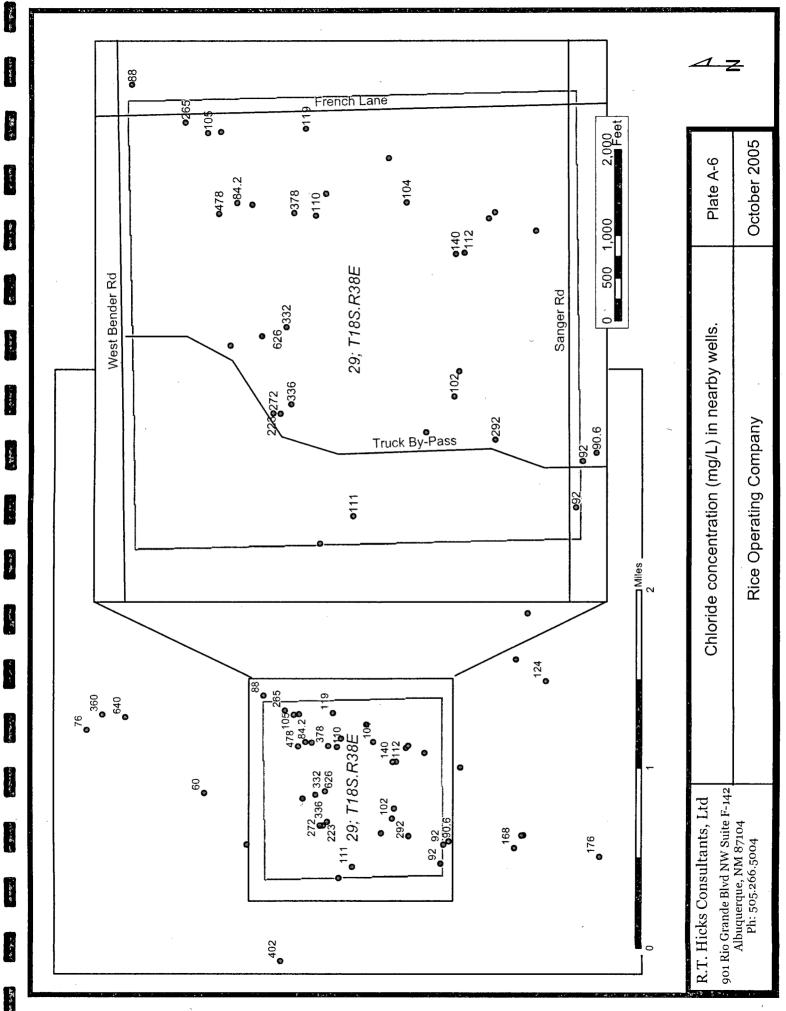
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STATE ENGINEER OFFICE

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.

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SIVER RECEIPTER OFFICE

WELL RECORD

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted in the nearost district office of the State Engineer. All sections, except Section 5, shell be answered as completely and accordely as possible when any well is drilled, repaired or despend. When this form is used as a plugging record, only Section 5 and Escien 5 need be completed.

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.				State
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SHELL OIL CO., Noi EY 1 #10 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

ap & that

	(A) Owner of well <u>GAPITAN DEILLING COEPANY</u> , Inc.	.
	Street and Number P.O. Box 6735	
	CityODESS479760State _Te:	X18
	Well was drilled under Permit NoL=0332and is	s located in the
		_Rge.38_F
	(B) Drilling Contractor (bbott Brothers License	No. 8'D-45
0	Street and Number P.O. Box 637	
	City Hobbs88240 State	ew Mextao
	Drilling was commencedJune_10	19
	Drilling was completedJune 10	19 68
(Plat of 640 acres)	The second s	• •

Section 3	2	
-----------	---	--

PRINCIPAL WATER-BEARING STRATA

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

Section 3 RECORD OF CASING

Dia	Pounds	Threads	Depth		Feet	. Turn Shan	Perforations		
in.	ít.	in	Top	Bottom	reet	Type Shoe	From	То	
7	21	10	0	91	91	open	28.3	91.0	
	1					·			

Section 4

RECORD OF MUDDING AND CEMENTING

Depth From	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:
 Cement Plugs were placed as follows:

		Depth of Plug		No. of Sacks Used
Basin Supervisor	No.	From	То	NB. OF SACES Used
FOR USE OF STATE ENGINEER ONLY				
Date Received				
File No <u>- 6 3 3 -</u> Use <u>6 6</u>	<u>. (</u>	2L		18.38.19.423

Section 6		LOG OF WELL						
Depth	in Feet	Thickness	Color	Type of Material Encountered				
From	To	in Feet	COIDI	Type of material Encountered				
	Ē	в		surface soil				
6	21			caltohe				
	20			sand, tight				
30	68	28		sand, water				
- 68	02	24		eand, tight				
	110_	18		sand				
			- <u>-</u>					
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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

L-6337 back

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And mere Abbard Hurrell Abbard Well Driller

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STATE ENG	INEER	OFFICE	
WELL	RECO	RD	

FIELD ENGR. LOG

Section 1. GENERAL INFORMATION

---- Owner's Well No. _____ L-8716 (A) Owner of well Oil Field Rental Service Co. Street or Post Office Address ______ 1312 Kiowa____ City and State _____ Hobbs, New Mexico 88240

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

. :

a. ____ 4 5/2 4 NW 4 NE 4 of Section 20 Township 18-5 Range 38-E N.M.P.M.

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

- Lot No. ______ of Block No. ______ of the ______ Subdivision, recorded in ______ I.ea _____ County. c. Lot No.____
- _____ feet, Y=_____ feet, N.M. Coordinate System ____ d. X= _ ____ Zone in the ____ Grant.

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

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

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

Elevation of land surface or ______ at well is______ ft. Total depth of well______ 1.30 ft.

Completed well is 😨 shallow 🗆 artesian. Depth to water upon completion of well _____ ft.

Section 2. PRINCIPAL WATER-BEARING STRATA

Depth From	in Feet To	Thickness in Feet	 Description of Water-Bearing Formation 	Estimated Yield (gallons per minute)
110m				
49	92	43	Sand	

Section 3, RECORD OF CASING

Pounds	Threads	Depth	in Feet	Length	Tune of Ches	Perforations	
per foot	per in.	Top	Bottom	(feet)	Type of 5110e	From	То
17	Welded	0	132	132	None	54	132
	per foot	per foot per in.	per foot per in. Top	per foot per in. Top Bottom	per foot per in. Top Bottom (feet)	per foot per in. Top Bottom (feet) Type of Shoe	per foot per in. Top Bottom (feet) Type of Shoe From

Section 4. RECORD OF MUDDING AND CEMENTING

Depth i	n Feet	Hole	Sacks	Cubic Feet	Method of Placement
From	То	Diameter	of Mud	of Cement	
.					
				 -	

Section 5. PLUGGING RECORD

Address	Tess		Depth	Cubic Feet	
Plugging Method		- No.	Тор	Bottom	of Cement
Date Well Plugged		- 1			
Plugging approved by:		2		1	
••		- 3			,
	State Engineer Representative	4			

FOR USE OF STATE ENGINEER ONLY

Date Received March 26, 1982

File No.____L-8716

		Quad	FW:	L	FSL
-8716	 Use	DTC	Location No	18,38,20,2	13344

			Section 6. LOG OF HOLE
	in Feet	Thickness	Color and Type of Material Encountered
From	To	in Feet	Constant type of Material Encountered
0	3	3	Surface soil
33	26	23	Caliche
26	49	23	Sand-tight
49	92	43	Sand-water
	110	18	Sand-tight
110	118		. Sand-rock
18	130	12	Sand
· · · ·			
			· · · · · · · · · · · · · · · · · · ·

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Section 7. REMARKS AND ADDITIONAL INFORMATION

L- 8716 back

STATE ENGINEER ROSWELL, NH HAR 26 8 22 AN 182

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 Oblott. Driller 2, B.

INSTAUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted resonance of the State Engineer. A tions, except Section 5, shall be answered as completely and accurat drilled, repaired or deepend. When this form is used as a plugging record, only Section 1(a) and Section need be completed.

Revised June 1972

STATE ENGINEER OFFICE

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WELL RECORD

EIELD ENGR. LOG

Section 1. GENERAL INFORMATION

(A)	Owner of well	Address 1416	W. Broadway				
	City and State	Hobbs	NM 88240				
Well	was drilled under Perr	mit No	L-8851	and is located is	n the:		
	a ½NW	<u>%_SW %_NE</u>	_ ½ of Section20	TownshipL	85 Rai	nge <u>3\$E</u>	Ŋ.M.P.M.
	9 b. Tract No	of Map No		the		·	···
		of Block No rded in			College	Park Industr	ial
		feut, Y=		N.M. Coordinate Sy			
(B)	Drilling Contractor_	Larry's D	rilling		License No	WD882	
Add.	ress	2601 W. B	ender H	<u>565. NM 88240</u>)		
Drill	ing Began7-1-	- 82 Complete	ed7-2-82	Type tools <u></u>	ricone	Size of hole	<u></u>
Elev	ation of land surface o	r	at v	well is	ft. Total depth	of well_ <u>120</u>	ft.
Com	ipleted well is 🖌 💭	shallow 🔲 artes	sian.	Depth to water u	pon completion	of well <u>54</u>	ſt.
		Section	2. PRINCIPAL WAT	ER-BEARING STR	ATA		
	Depth in Feet From To	Thickness in Feet	Description	of Water-Bearing For	rmation	Estimated 1 (galions per n	

From	rom To Inckness Description of Water-Bearing		Description of Water-Bearing Formation	(galions per minute)	
54	120.	66	sand & sandstone	28	
				· · ·	:
		1			
		<u> </u>			

Section 3. RECORD OF CASING

Diameter	Pounds	Threads	Depth in Feet		Length	Type of Shoe	Perfor	ations
(inches)	per foot 🧹	per in.	Тор	Bottom	(feet)	Type of Shoe	From	То
51%	160PVC		-1	120	121		100	120.
•								
		-						
				[

Section 4. RECORD OF MUDDING AND CEMENTING

	Cubic Feet	Sacks	Hole	n Feet	Depth in
Method of Placement	of Cement	of Mud	Diameter	To	From
					1

Section 5. PLUGGING RECORD

Address			No.	Depth	in Feet	Cubic Fee
Plugging Method	· · · · · · · · · · · · · · · · · · ·			Тор	Bottom	of Cement
Date Well Plugged			1 1		1	{
Plugging approved by:			2			
· · ·			3		1	
	State Engineer Re	presentative	4			
	FOR	USE OF STATE ENGINE	EER ONLY			
Date Received Tailar O		· .:				
Date Received July 9,		Quad		FWI		FSL
Date Received July 9, File No. L-8851		Quad Use D & S		1	8.38.20.23	141

ini ti

Depth in Feet	Thickness	Color and Type of Natarial Encountered
From To	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 6 sandstone
68 120	52	sand, think layers of sandstone
<u> </u>		
		the second se
		· · · · · · · · · · · · · · · · · · ·

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

l X Driller

Driver All ons, except Section 5, shall be answered as completely and accurate possible when any well is drilled, repaired or deepened, then this form is used as a plugging record, only Section 1(a) and Section 5, seed be completed.

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FIELD ENGR. LOG

STATE ENGINEER OFFICE

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WELL RECORD

ction 1. GENERAL INFORMATION

						FORMATIO				
(A) Owner o	f well Post Office Ad	<u>Big H</u>	orn Tank Erouch Dr	<u>Rental</u>				Owner's Wel	l No	
Street or City and	State	Hobbs	NM 8824	0		······				
Well was drille	d under Permit	NoL	-8867			and is locate	d in the:	÷		
a	½ ¼	NE %	NE % of Se	ction	29	Township	185	_ Range	38E	N.M.P.M.
	No									
	o vision, recorded							·•···		
	·						· Sustan			Zonain
							. Jystem			Grant.
(B) Drilling (Contractor	lar	ry's Dril	ting			License N	o(1172.8.)		
(B) Drilling (Address		260	- 1 (1) Rond	- 10 H	н	OPPY NH	88940			
Drilling Began	7-9-82		7-1	0-82	,					·
Elevation of la	nd surface or				at well :	is	ft. Total (lepth of wel	J 7	20 ft.
Completed wel	lis 🗶 st	nallow 🗋	artesian.		D	epth to wate	r upon comp	etion of wel	J	52 ft.
:		. Sec	tion 2. PRIN	CIPAL W	ATER-	BEARING S	TRATA			····
	in Feet	Thickness in Feet	5	Descrip tio	on of Wa	ater-Bearing	Formation	(9	Estimated allons per 1	1
From	To				····· •-					
60	108	48	<u>san</u>	<u>d s sa</u>	ndsto	ne			28	
							• •			
•			Sectio	n 3. REC	ORD O	F CASING				,
Diameter	Pounds	Threads		in Feet		Length	Type o	fShor	Perfo	rations
(inches)	per foot	per in.	Тор	Botto	m	(feet)			From	To
5½	160PVC		0	120		120			100	120
	<u></u>	Secti	on 4. RECO	RD OF M	UDDIN	IG AND CEN	AENTING			
	in Feet	Hole Diameter	Sac! of M	rs	Cub	ic Feet Cement		fethod of P	lacement	
From	То	Diametel								
		······································								
			<u> </u>							

Section 5. PLUGGING RECORD

Plugging Contractor					
Address	······	No.	Depth	in Feet	Cubic Feet
Plugging Method		140.	Тор	Bottom	of Cement
Date Well Plugged		1			
Plugging approved by:		2			
		3			
	State Engineer Representative	4			
				<i>_</i>	

FOR USE OF STATE ENGINEER ONLY

Date Received	August 23, 1982		Quad	FWL	FSL	
File No	8867	Use	D&S	Location No	18.38.29.22244	•
		•				

Depth	in Feet	Thickness	Color and Type of Material Encountered	
From	То	in Feet		
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	
				<u></u>
				<u>.</u>
		······································		
			· · · · · · · · · · · · · · · · · · ·	
<u>.</u>				4.
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Section 7. REMARKS AND ADDITIONAL INFORMATION

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AUG 23 8 38 NH 82

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

of the State Engineer. All drilled, repaired or deepene.

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INSTRUCTIONS: This form should be executed in (riplicate, preferably typewritten, and submitted to "~ appropriate district office ons, except Section 5, shall be answered as completely and accurate. en this form is used as a plugging record, only Section 1(a) and Section 5 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

Section 1	L 	 ,	(A) Owner of well Two tate Tank Hantal Co.
			Street and NumberBox 2305 CityBobbs,State New Marico
			City Notics State State State State Well was drilled under Permit No. L-7005 and is located in the nw 4 SW 4 of Section 29 Twp. 185 Rge. 385 (B) Drilling Contractor C. R. Nusslevhite License No. No. 1999 Street and Number Boz. 56 Street Street Street Street
			Street and Number Eobbs, State Mew Decico City Fobbs, State Mew Decico Drilling was commenced Cct. 14, 19.72 Drilling was completed Cct. 18, 19.72

(Plat of 640 acres)

Elevation at top of casing in feet above sea level______Total depth of well150______ State whether well is shallow or artesian Shellow______Depth to water upon completion_____50____

Section 2

PRINCIPAL WATER-BEARING STRATA

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

Section 3 RECORD OF CASING

Dia Pounds in. ft.	Pounds	Threads	De	pth	Feet	Type Shoe	··· Perforations		
	in	Top	Bottom			From	To		
5	. 13	8	0	150	150	none	110	150	
				<u> </u>					
		·							

Section 4 RECORD OF MUDDING AND CEMENTING

	Depth in Feet From To		Diameter Tons No. S Iole in in. Clay Ce		Methods Used
trom	To .	HOIE M. M.	City		
	· · ·				
	i ·				

Section 5

PLUGGING RECORD

Name of Plugging Contractor			License No					
		y						
Tons of Clay usedTons of Rou	ighage used			_Type of :	roughage			
Plugging method used			Date	Plugged_				
Plugging approved by:			Cement	Plugs wer	e placed as follows:			
		No.	Depth	of Plug	No. : - 6 Co-los YT 7	7		
Basin Super	visor		From	To	No. of Sacks Used			
FOR USE OF STATE ENGINEER ONI	x IS					40		
Date Received1S :8 WU 172 100 71	261]		
File No. 2 7.005	Use DT(か	Lo	cation No.	<u>18-38-29, 331</u>			

er 000.

		LOG OF WELL							
Depth i From	n Feet To	Thickness in Feet	Color	Type of Material Encountered					
<u>Э</u> :	· 2	2	Brown	Soil & rock					
2	27	25	Thite	Caliche & rock					
27	37	10	Crev	Eandy shale					
37	43	6	1:	Sand rock					
- 43	60	17	Red	Sand					
60	140	80	11	Send, sand rock shells					
140	150	10	Grey	Sand, course					
·									
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		. <u></u>							
}			· · · · · · · · · · · · · · · · · · ·	·····					
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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

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Well Driller

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STATE ENGINEER OFFICE

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WELL RECORD

			Section	I. GENER	KAL IN	FORMATI	ON			
Street o	Post Office A	uthwester ddress <u>P.O.</u> dland, Te	Box 2	2477			Owne	r's Well No.		
Well was drille	d under Permit	No	70			and is local	ted in the:			
a	%SW%	4 <u>.SW</u> 4 <u>.SW</u>	¼ of Se	ction	29	_ Township	<u>185</u> Ra	nge <u>3</u>	8E	N.M.P.M.
b. Tract	No	of Map No	~ <u>.</u>	1	of the .				.	
c. Lot M Subd	lo ivision, recorde	of Block No d in Lea		······································	of the_ Co	unty.				
		_ feet, Y=			et, N.M		te System			
(B) Drilling	Contractor	Abbott Br	os				License No,			
AddressF	0. Box	637, Hobb	s, Nev	<u>v Meri</u>	<u>co</u>	88240)			
Drilling Began	6/21/7	6 Comple	ted	5/22/7	6	Type tools	Cable	Size of [hole	8 <u>1</u> .in.
Elevation of la	nd surface or _				at well	is	ft. Total depth	of well 1	22	ft,
Completed we	ll is 🖾 s	hallow 🗋 art	esian.		·· - 1	epth to wa	ter upon completion	of well	48	ft.
Denth	in Feet	Sectio	on 2. PRIN	ICIPAL W	ATER	BEARING	STRATA	Ectim	nated 3	/jeld
From	To	in Feet		Descriptic	on of W	ater-Bearin	g Formation	(gallons		
48	122	74				•				·
							• • · · ·			
					• .		· • •			
·		1	Sectio	n 3. REC	ORD O	F CASING				
Diameter	Pounds	Threads		in Feet		Length	Type of Sho)e	Perfor	
(inches)	per foot	per in.	Тор	Botto	m	(feet)		Fr	om	To
6 5/8	15	welded	0	122		122	none	7	9	122
L	l	Section	4. RECO	RD OF M	ווסמט	IG AND CE	MENTING			J
Dep th From	in Feet To	Hole Diameter	Sac of M			ic Feet Cement	. Metho	od.of Placem	ent	
	10	Diameter								
							·····			
			Sectio	on 5. PLU	GGING	RECORD				
Plügging Contr Address	actor		·	<u> </u>		[:]	Den ek :	East		
Plugging Metho	od bc					No.	Depth in Top	Bottom		bic Feet Cement

Pounds	Threads	Depth in Feet		Length	Tune of these	Perforations	
per foot	per in.	Тор	Bottom	(feet)	1.900 01 51100	From	To
15	welded	0	122	122	none	79	122
	per foot	per foot per in.	per foot per in. Top	per foot per in, Top Bottom	per fool per in. Top Bottom (feet)	per fool per in. Top Bottom (feet) Type of Snoe	per foot per in. Top Bottom (feet) Type of Shoe From

Depth in Feet	Hole	Sacks	Cubic Feet	Method of Plac	ement	
From To	Diameter	of Mud	of Cement	metrod of flactificiti		
					· · · · · · · · · · · · · · · · · · ·	
		· · ·		1		

Address		No	Depth in Feet		Cubic Feet	
Plugging Method			Тор	Bottom	of Cement	
Date Well Plugged						
Plugging approved by:	· · · · · · · · · · · · · · · · · · ·	2				
		3				
	State Engineer Representative	4		1		
	FOR USE OF STAT	E ENGINEER ONLY				
Date Received		Quad	FWI		. FSL	
File No.	1151 CO.D.	<u> </u>			_	

			Section 6. LOG OF HOLE					
Depth From	in Feet To	Thickness in Feet	Color and Type of Material Encountered					
0	2	2	Surface soil					
2	35		Caliche					
35	48	13	Sand-tight					
48	116	68	Sand-water					
116	122	6	Sand-tight					
	<u>+ </u>	ÿ	Contraction of the second seco					
<u> </u>								
	•		1					
	·							
·····	•							
			· · · · · · · · · · · · · · · · · · ·					
		·						
	· · · · ·							
			· · · · · · · · · · · · · · · · · · ·					
-								
	<u>.</u>	·····	· · · · · · · · · · · · · · · · · · ·					
1		Section 7	2. REMARKS AND ADDITIONAL INFORMATION					
	AN 10 41	Dector						
	II II R OI	1						
			L-7570 back					
	- 1 E							
	STATE Eng							
	57.8 57.8							
	i	dec.						

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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 H.B. murrell.

INSTRUCTIONS: This for vould be executed in triplicate, preferably typewritten, and submitted appropriate district office of the State Engineer. A: tions, except Section 5, shall be answered as completely and accurate district office drilled, repaired or deepened When this form is used as a plugging record, only Section 1(a) and Section 1 need be completed.

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STATE ENGINEER OFFICE WELL RECORD

Revised June 1972

Section	1.	GENERAL	INFORMATION	

(A)	Owner of wellTex]	- Owner's Well No.	1			
	Street or Post Office Addres	<u>s 777 ma</u>	in street	suite 3200		
	Street or Post Office Addres City and State Fort	Worth Tx	76102			
	•		-			
พลห	was drilled under Barnit No.	1-11 176	Fynlore	and is loasted in thes		

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

a.S.E. 14 NW 14 S.E. 14 of Section 29 Township 18 South Range 38 past N.M.P.M.

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

- c. Lot No._____ of Block No. _____ Subdivision, recorded in _____ Lea _____ of the_ _ County.
- d. X= ... ___ feet, Y=__ ____ feet, N.M. Coordinate System_ .Zone in the _____ Grant.

License No. W D 1498 (B) Drilling Contractor Robinson Drilling -... Address PO BOX 1495 Seminole TX 79360

Drilling Began 7-31-01 Completed 8-3-01 Type tools <u>Rotary</u> Size of hole <u>18</u> in. 220 ft.

at well is_____ ft. Total depth of well_____ Elevation of land surface or _____

Depth to water upon completion of well _____65____ft. 🖾 shallow 🗀 artesian. Completed well is

Section 2. PRINCIPAL WATER-BEARING STRATA

.

Depth in Feet		Thickness	Dennis time of Water Box	ving Ensetion	Estimated Yield (gallons per minute)	
From	То	in Feet	Description of Water-Bea	Description of Water-Bearing Formation		
111	210	99	Sand & Gravel		Unknown	
	1			· · · · · · · · · · · · · · · · · · ·	<u></u>	
	· .			······································		
			Section 3 RECORD OF CASH	NG	<u>N</u>	

Section 3.	RECORD	OF CASING

Diameter	Pounds		hreads Depth in Feet		Length	Type of Shoe	Perforations	
(inches)	per foot		Тор	Bottom -	(feet)	Type of shoe	From	To
12 3/4		Welded	+1	220	221	none	.125	215
						s		1
		1				· · · · ·		
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Section 4. RECORD OF MUDDING AND CEMENTING

Depth in Feet		Hole Diameter	Sacks	Cubic Feet	Method of Placement		
From	From To Dia		of Mud of Cement				
		-		1			
					·		
		1					
	1						

Section 5. PLUGGING RECORD

Plugging ContractorN/A						
Address		- No	Depth in Feet		Cubic Fect	
Plugging Method			Тор	Bottom	of Cement	
Date Well Plugged						
Plugging approved by:		2		· · ·		
State	Engineer Representative					
Date Received 0 8/10/01	FOR USE OF STATE ENG	INEER ONLY		221220	24	
,,,,	Quad		FW:	L	FSL	
File No. 2-11, 176	Use SRC)L	ocation No.	18,38.20	1.41443	
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4-04; 5:13PM;NM. SIATE

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2- 4-1	/4; 5:13⊦ .'	PM (INM. SI	·	;505 623 8
			Section 6. LOG OF HOLE	
Depth From	To	Thickness in Feet	Color and Type of Mate countered	·····
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	<u>`</u>
52	108	56	Sand with sandstone streaks	
108		3	Rock	
	210	99	Sand&Gravel	
210	215.	5	Sandy: clay	
215	220	.5	Red Bed	
		<u> </u>		
·			· · · · · · · · · · · · · · · · · · ·	
	·		· · · · · · · · · · · · · · · · · · ·	
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Section 7. REMARKS AND ADDITIONAL INFORMATION

L-11176 back

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The undersigned here by certifies that, to the best of his knewledge and belief, the foregoing is a true and correct second of the abor described hole.

> Driller D

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the appropriate district offic 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

Dat	e of ReceiptPermit No. <u>L-2395</u>
	Name of permittee,
Stru	eet or P. O Braker B, City and State Bornmont, H
1,	Well location and description: The Shallow well is located in <u>1949</u> , <u>1949</u> , <u>1949</u> , <u>1949</u> , <u>1949</u> ,
	1
	casing above sea level, feet; diameter of hole, inches; total depth,37 feet;
	depth to water upon completion,39, feet; drilling was commenced9193, 19,
	and completed 2-31-53 19; name of drilling contractor Lusslatinite
	; Address, Box 56, Bubbe, Y, 12 ; Driller's License No. 11 19
2.	Principal Water-bearing Strain:

	Depth 1: From	a Fect To	Thickness	Description of Water-bearing Formation
No. 1	35	7 0	35	ed same course
No. 2	750 :15 2	÷5	10	lied sand con se hard
No. 3	85	37	3	Red send course hard
No. 4				
No. 5	······································			
				······································

3. Casing Record:

date of plugging

1-2395 chi iup

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Diameter in inches	Pounds per fi.	Threads per inch	Depih of Ca Top		Feet of Casing	Type of Shoe	Per From	forstion To	
7	20	10		<u> </u>		<u> none</u>	57	8'7	
		<u></u>	<u>·</u>				:		
			<u></u>						
						•			
			*******					·	

SEP 21 103

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THE T

of Section _____, Township _____, Range ____; name and address of plugging contractor,

..., 19......; describe how well was plugged: ...

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-5. Log of Well:

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Depit From	in Fees To	Thickness in fost	. Description of Formation				
6	l	ī	Sail				
2	6	5	Clazahie rock hard				
ί.	ىۋ	24	Cleachio				
30	35	5	tonal esale				
	70	2 277 35	ton cana course.				
70	75	<u>E</u>	Dock - Geerboate				
75	· 85	10	Fod send course hard				
85	87	3	ed cans course hard				
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The undersigned hereby certifies that, to the best of his knowledge and bellef, the foregoing is a true and correct record of the above described well.

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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

FIELD ENGR. LOG

STATE ENGINEER OFFICE

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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 Amerada Petroleum Corp.
	Street and Number D
	City Monument, State New Mexico
	Well was drilled under Permit No. L-5849 and is located in the SE SE 38E (B) Drilling Contractor 0. R. Musslewhite License No. Street and Number BOX 56 56
	City Hobbs, State New Mexico
	Drilling was commenced Feb. 10, 19
	Drilling was completed Feb. 12, 19
(Plat of 640 acres)	

Elevation at top of casing in feet above sea level Unkown Total depth of well <u>38</u> State whether well is shallow or artesian Shallow Depth to water upon completion <u>34</u>

Section 2

PRINCIPAL WATER-BEARING STRATA

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

Section	3			RECOR	ID OF CA	SING			
Dia	Pounds	Threads	Depth		Feet	Time Shee	Perforations		
in.	. ft.	ina	Top	Bottom	I Let	Type Shoe	Prom	То	
6 5/8	18	none	0	20	20	None	None		
	1	,		·					
				1					
			1		1		,		

Section 4

RECORD OF MUDDING AND CEMENTING

Depth From	in Feet	Diameter Hole in in.	Tons Clay	No. Sacks of Cement	Methods Used	
0	20	8		lį yds.	Dump remix around casing	
	1	· · ·				 .
	·			· ·		
	· ·				· ·	

Section 5 PLUGGING RECORD

Name of Plugging Contractor	· · · · · · · · · · · · · · · · · · ·	License No.	<u> </u>
Street and Number	<u> </u>	_ City State	
Tons of Clay used	Tons of Roughage u	sedType of roughage	· ·
Plugging method used		Date Plugged	
Plugging approved by:	·	Cement Plugs were placed as f	ollows:

Basin Supervisor	No.	Depth From	of Plug To	No. of Sacks Used
FOR USE OF STATE ENGINEER ONLY				
Date Received				1
1 竹 78 HY 2- Hdy 395;				
File No. 2-5849 Use Ourd		Lo	cation No.	18.38 30.144-

Depth	in Teet	Thickness	e e la parte de la compañía de la c					
From	To	in Feet	Color	Type of Material Encountered				
0	-2	2	Brown	Soil & rock				
2	5	3	White	Caliche rock				
5	20	15 . 1	White	Caliche				
20	25	5	White	Caliche rock				
25	29	4	Gray	Sandy shale & caliche rock				
29	38	9	Grey	Sand & sand rook				
			• • • • • • • • • • • • • • • • • • •	· · · · · · · · · · · · · · · · · · ·				
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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

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Well Driller

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

Sugar

S. Falles

······································	(A) Owner of well Baker 011 Tools	, Ino.
	Street and Number Box 1295	
	City Hobbs,	State New Newloo
	Well was drilled under Permit No. 1-29 W.E. 4 Sette 14 Sette 4 of Section	
	(B) Drilling Contractor. O.R. Missi such	License No. WD 99
	Street and Number Box 56	
	City Hobbs, &	State New Mexico
	Drilling was commenced.	ept. 10 19 55
	Drilling was completedS	ept. 11 19 55
(Plat of 640 acres)		

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		Thickness in	Description of Water-Bearing Formation		
140.	From	То	Feet			
1	40	80	40	Sanit & sand rook		
2				•		
3						
4						
5			1			

Section 3

RECORD OF CASING

Dia	Pounds	Threads	Depth		Feet	Type Shoe	Perforations		
in.	ťL.	in	Top	Bottom	reet	Type shoe	From	То	
8 5/8	18	8	0	100	100	Collar	70	100	
			· ·	•		· ·			

Section 4

RECORD OF MUDDING AND CEMENTING

	in Feet	Diameter	Tons	No. Sacks of	Methods Used
From	To	Hole in in.	Clay Cement		
			· ·	•	
			•		
<u> </u>					······································
	1	1			

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	Plugged19
Plugging approved by:	Cement	Plugs were placed as follows:

•	Basin Supervisor		No.	Depth From	of Plug To	No. of Sacks Used
FOR USE OF	STATE ENGINEER ONLY	-			····· • • ··· · ·	
Date Received	SEP 19 1955			·		
	OFFICE GEOURE WATELEUPERMS		}			
File No.	<u>2967</u> Use	Ao	ri-	J.o	cation No.	18. N. 32. 334

Section 6

Sec. Ber Ber

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LOG OF WELL

tion 6			LO0	G OF WELL
Depth From	in Feet To	Thickness in Feet	Color	Type of Material Encountered
0	7	1	Brown	Soti
1	28	87	White	Calechie & 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
				•
			······································	
			······································	
			<u> </u>	
	- P 1' F 10		anga ang ang ang ang ang ang ang ang ang	
		11		

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. Musileur Well Driller

Ju'sé

L-2964back

(This form to be executed in triplicate)

WELL RECORD

			W. well is located in
			of hole,8. inches; total depth,116 feet;
depth to water upo	n completion,		; drilling was commencedJune25, 19.54,
and completed	Ju	ne 25, 1954 ; na	ame of drilling contractor EdBBurke
Box 306	; Ad	dress,Ho.b.bs.,	New Mexico; Driller's License No. WD-111
2. Principal Water-b	-	:	
Beplh From	in Feet To	Thickness	Description of Water-Jearing Formation
No. 1 54	85	31	Water Sand
No. 2 101 1	<u>\$ 116</u>	- 15	Water Sand
No. 3			
No. 4 		-	
	1		
3. Casing Record:			
Diaméter Pou	ads Thread	5 Depth of Craing or	
in knokes per	11. per ine	h Top Bot	Liner Feet of Performation itom Casing Type of Shoe From To
in brokes per 6 <u>5/8</u> 20	fr. per ine	0 113	· · ·
		h Top Bot	· · ·
6 5/8 20	10	b Top Bot	· · ·
6 5/8 20	10	b Top Bot	<u>113 collar 85 113</u>
6 5/8 20	10	b Top Bot	<u>113 collar 85 113</u>
6 5/8 20 	10 mented f	b Top Bot 0 113 Prom 0 to 57	113 collar 85 113
6 5/8 20 Ce	10 mented f	b Top Bot O 113 Prom 0 to 57	113 collar 85 113
6 5/8 20 	10 mented f ion replaces o	b Top Bot 0 113 Prom 0 to 57 Id well to be aband hip	113 collar 85 113 ioned, give location:
6 5/8 20 	10 mented f ion replaces o	b Top Bot <u>0 113</u> <u>rom 0 to 57</u> Id well to be aband hip	113 collar 85 113
6 5/8 20 	10 mented f	b Top Bot O 113 CrOM O to 57	113 collar 85 113 ioned, give location: 113 113 iange ; name and address of plugging contractor,
6 5/8 20 	10 mented f	b Top Bot O 113 CrOM O to 57	113 collar 85 113
6 5/8 20 Ce	10 mented f	b Top Bot O 113 Prom 0 to 57 Id well to be aband hip, R 19	113 collar 85 113 ioned, give location: 113 113 iange ; name and address of plugging contractor,
6 5/8 20 	10 mented f	b Top Bot O 113 Prom 0 to 57 Id well to be aband hip, R 19	113 collar 85 113 boned, give location:
6 5/8 20 Ce	10 mented f	b Top Bot O 113 Prom 0 to 57 Id well to be aband hip, R 19	113 collar 85 113 ioned, give location: 113 113 iange ; name and address of plugging contractor,

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Depth Prom	in lect Tu	Thickness in teci	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
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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. (5 - 38 - 32 - 333)

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Ectivary B Buike

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)

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WELL RECORD

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Street or P.O.GONTI	nental Ta	nk Co.	, City and StateHol	bs.,-New-Me:	ci.co
1. Well location and	description: The	. shallow			3Ì
SW		(shallow or urtesian	Sec. 1	nd të un	
		for star	hip_18 South Range	1. (vation o
		2 . 4	of hole, 7inch		112
depth to water upo	on completion,	_561eet;	drilling was commenced	June 23	
and completedJ	une 23	, 19.53; n	ame of drilling contractor	Ed. B. Bur	ke
Box 637		idress, Hobbs	s, New Mexico	- U .	
2. Principal Water-be		laca hijita l	and d		
. Bepti	t in Fest			<u>1</u> 1	
From No. 1	To	Thickness	<u></u>	ater-bearing Formation	
63	70	7	Water sand		
No. 3	88	12	Water_sand_		
102	112	10	Water sand		<u> </u>
No. 4 .		<u></u>		- <u></u>	
No. 5					
3. Casing Record: Diameter Pou in inclus per 52 1	fi. per inch	Depth of Casing or L Top Dot 0 11	her Feet of Dro (Casian Dro (of Shoe Prom	-ioraticos
Dismeter Pou in inclus per	fi. per inch	Top Bot	tom Casing Type	of Shoe Prom	
Dismeter Pou in inclus per	fi. per inch	Top Bot	tom Casing Type (of Shoe Prom	
Dismeter Pou in inclus per	fi. per inch	Tep 1961	tom Casing Type (of Shoe Prom	1
Dismeter Pou in inclus per	fi. per inch	Tep 1961	tom Casing Type (of Shoe Prom	
Diameter Pau in inclues per 52 1	fl. per inch		tom Casing Type (ne 89])
Diameter Pau in inclues per 52 1	fl. per inch 78	Top Not 0 11	tom Casing Type (15 5hoe. From <u>Re</u> <u><u>89</u> <u>4</u>, <u>14</u>,</u>	
Diameter Pau in inclus per 52 17	fl. per inch 78	Top Not 0 11	it 111	15 5hoe. From <u>Re</u> <u><u>89</u> <u>4</u>, <u>14</u>,</u>	
Diameter Pau in inclus per 52 17	fl. per inch 78	Top Not 0 11	it 111	15 5hoe. From <u>Re</u> <u><u>89</u> <u>4</u>, <u>14</u>,</u>	
Diameter Pau in incluss per 52 17	11. per inch 7	Top Not 0 11 vcll to be abandone 	item Casing Type (ne 89]]
Diameter Pau in inclus per 52 17	11. per inch 7	Top Not 0 11 vcll to be abandone 	it 111	ne 89]]
Diameter Pau in incluss per 52 17	11. per inch 7	Top Not 0 11 vcll to be abandone 	item Casing Type (ne 89]]
Diameter Pau in incluss per 52 17	11. per inch 7	Top Not 0 11 vcll to be abandone 	item Casing Type of 1 111	ne <u>89</u>]]
Diameter Pau in incluss per 52 17	11. per inch 7	Top Not 0 11 vcll to be abandone 	item Casing Type of 1 111	ne 89	1]
Diameter Pau in incluss per 52 17	11. per inch 7	Top Not 0 11 vcll to be abandone 	item Casing Type of 1 111	ne <u>89</u>	1]
Diameter Pau in incluss per 52 17	11. per inch 7	Top Not 0 11 vcll to be abandone 	item Casing Type of 1 111	of Shoe From ne 89	1]

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L-2232 back

Bepth in From	ieet To	Thickness in fost	<u></u>	·	Descript	ian of Formatio	es den	
_0 ;=	1	1		Top st	<u>511</u>		<u> </u>	
	22	21		calich	16	<u> </u>		
22	38 <u>38</u>	16		pack s	sand			. .
5114 38	42	4	•	hard s	and roo	<u>.</u>		• • •
42	/∷ .∋. 63	21		pack s	and			
	70	- i i i i i i i i i i i i i i i i i i i			5 - C	1	ອກມີດີ	
222-04 70	76	60. 6	ro i wi	water aso hard s	and roo	k		
76	88	12		water				· · · ·
88	102	4	-	tight				
102	112	Seorgi	reser	water		୍କ	2	
		Erias	zon		5.1	33	6	· ` `}
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The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and cor-

rect record of the above described well.

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Instructions

This form shell 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

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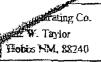
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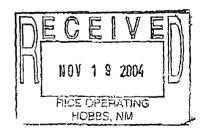
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Project: 1-29 col Project Number: None Given Project Manager: Roy Rascon

General Chemistry Parameters by EPA / Standard Methods

Environmental Lab of Texas

Amalyte	Result	Reporting Limit Units	Dilution	Batch	Prepared	Analyzed	Method	,	Nate
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	11/30/04	11/11/04	SW 846 9253		
% Moisture	4,0	96	I	EK41101	11/10/04	11/11/04	% calculation		



Environmental Lab of Texas

The results in this report apply to the samples analyzed in accordance with the samples received in the laboratory, This analytical report must be reproduced in its entirely, with written approval of Environmental Lab of Texas.

Page 3 of 10

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

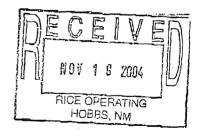
W. Taylor Hobbs NM, 88240 ~

Project: I-29 eol Project Number: None Given Project Manager: Roy Rascon

Fax: (505) 397-1471 Reported: 11/15/04 16:40

Organics by GC Environmental Lab of Texas Reporting Analyte Result Limit Units Dilution Batch Prepared Analyzed Method Note SB @ 6' (4K10009-01) Soil 0.0250 mg/kg dry Benzene ND 25 11/12/04 EK41501 11/12/04 EPA 8021B Toluene J [0.0139] 0.0250 1 Ethylbenzene 0.0416 0.0250 п Xylene (p/m) 0.0550 0.0250 * n 0.0298 Xylene (o) 0.0250 41 ... Surrogate: a, a, a-Trifluorotoluene 85.2 % 80-120 " " п ... Surrogate: 4-Bromofluorobenzene 94.1 % 80-120 ø . Gasoline Range Organics C6-C12 12.1 10.0 mg/kg dry EK40906 11/10/04 11/11/04 EPA 8015M 1 Diesel Range Organics >C12-C35 52.**B** 10.0 ... × R) Total Hydrocarbon C6-C35 64.9 10.0 ٧ ¥ Surrogale: 1-Chlorooctane 98.0 % 70-130 IJ a a ĸ Surrogate: 1-Chlorooctadecane 109% 70-130 ,, SB @ 61' (4K10009-02) Soil Benzene ND 0.0250 mg/kg dry EK41501 11/12/04 11/12/04 EPA 8021B 25 Toluene 0.0250 d, ND Ethylbenzene ND 0.0250 0.0250 Xylene (p/m) ND 0.0250 n Xylene (0) ND n ,, N n 80-120 Surrogate: a, a, a-Trifluorotoluene 89.8 % 96.9 % 80-120 Surrogate: 4-Bromofluorobenzene Gasoline Range Organics C6-C12 ND 10.0 mg/kg dry 11/10/04 11/11/04 EPA 8015M EK41006

Diesel Range Organics >C12-C35 ND 10.0 ND н ... 10.0 Total Hydrocarbon C6-C35 " ,, 100 % 70-130 . ., Surrogate: J-Chlorooctane 117% 70-130 Surrogate: 1-Chlorooctadecane



Environmental Lab of Texas

The results in this report apply to the samples analyzed in accordance with the samples received in the laboratory. This analytical report must be reproduced in its entirely, with written approval of Environmental Lab of Texas.

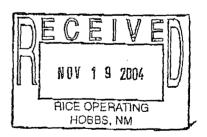
Page 2 of 10

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

Rice Operating Co. Project: 1-29 col 122 W. Taylor Project Number: None Given Hobbs NM, 88240 Project Manager: Roy Rascon

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



Page 1 of 10

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

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APPENDIX C

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RNG	38E	38E	38E	38E	38E	38E	38E	38E	38E	38E	38E	38E	38E	38E	38E	38E	38E	38E	38E	38E	38E	38E	38E	38E	38E	386	38E	38E	38E	38E	38E	38E
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Appendix D Photodocumentation & Disposal Manifests

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Figure 1: Excavating east wall

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Figure 2: Digging out abandoned lines



Figure 3: Backfilling excavation with blended soil

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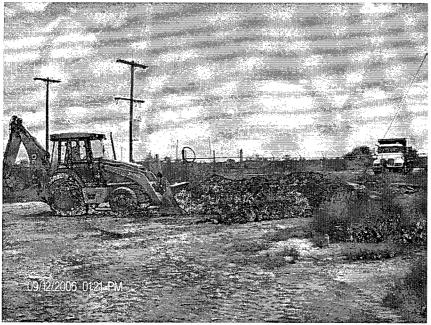


Figure 4: Loading clay for placement in excavation



Figure 5: Measuring top of placed clay

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Figure 6: Compacting clay with equipment



Figure 7: Placement of Clay in Excavation

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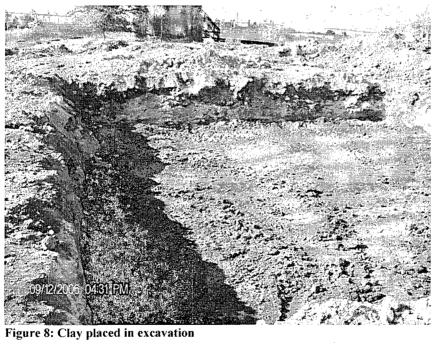


Figure 9: Completed infiltration barrier with caliche cap

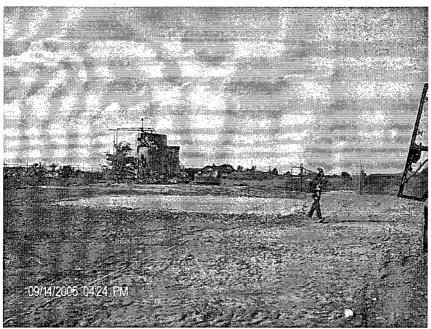


Figure 10: Completed barrier with caliche cap

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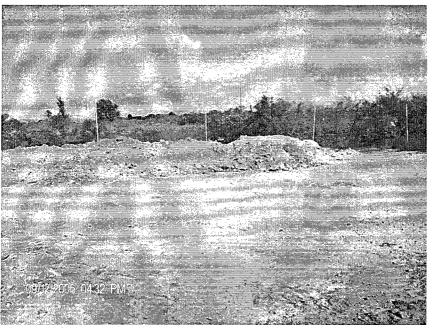


Figure 11: Segrated material for disposal

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		(505) 394±2541			
	Lease Operator/Shipper/Company		Ticket #		
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	Charge To:	TYPE OF MATERI			
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	Other Materials	. BS&W Content:			
	Description:	BBLS	CALLOUT		
	AS A CONDITION TO SUNDANCE SEF JOB TICKET OPERATOR SHIPPER REPRESE MATERIAL EXEMPT FROM THE RESOURCE	VICES TNC'S ACCEPTANCE OF NTS AND WARRANTS THAT TH	THE MATERIALS SHIPPED E WASTE MATERIAL SHIPP	ED HEREWITH IS	
	TIME 40 U.S.C. 6901, ET SEQ. THE NMIHEA BY VIRTUE OF THE EXEMPTION AFFORDED WITH THE EXPLORATION DEVELOPMENT	ETH AND SAF. CODE 361 001 ET O DRILLING FLUIDS, PRODUCE OR PRODUCTION OF CRUDE O	SEQ: AND REGULATIONS D WATERS, AND OTHER W IL OR NATURAL GAS OR - C	RELATED THERETO, ASTE ASSOCIATED EOTHERMAL ENERGY.	
	ALSO AS A CONDITION TO SUNDAM TICKET TRANSPORTER REPRESENTS AND TRANSPORTER IS NOW DELIVERED BY TR THIS WILL CERTIFY that the	WARRANTS THAT ONLY THE M ANSPORTER TO SUNDANCE SE	IATERIAL DELIVERED BY (RVICES, INC.'S FACILITY F	PERATOR/SHIPPER TO DR DISPOSAL	
	Statement at the above described loca certify that no additional materials v incident.	tion, and that it was tender	ed by the above describ	ed shipper. This will	
	DRIVER:				
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P.O. Box 1737 ★ Eunice, New Mexico 88231 (505) 394-2511

Ticket # Lease Operator/Shipper/Company: Lease Name: Transporter Company AM/PM Time Date: Vehicle No. Driver No. Charge To: TYPE OF MATERIAL **Produced Water** Drilling Fluids **Completion Fluids** Tank Bottoms Contaminated Soil C-117 No . 68 **Other Materials** <u>کا</u> **BS&W** Content: JETOUT Π

VOLUME OF MATERIAL

the brown

- 3rt

Description:

BBLS

CALLOUT

AS A CONDITION TO SUNDANCE SERVICES, INC. IS 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, FT.SEQ., THE NM HEALTH AND SAF, CODE 361001 ET SEQ. AND REGULATIONS RELATED THERETO, BY VIRTUE OF THE EXEMPTION AFFORDED DRILLING FEUIDS, 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. SFACILITY 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:

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ease Operator/Shipper/Com	pany:			
ease Name:				
ransporter Company:		Time	AM/PM	na ang Situng
Date:	Vehicle No	Driver No		R. P North
Charge To:				
	TYPE OF N	IATERIAL		
Produced Water	Drilling	Fluids 👘 🗘	Completion Fluids	e se
Tank Bottoms	Contam	iinated Soil 💿 🛛	-117 No.:	
Other:Materials	BS&W	Content:		
		comem.		
Description:			TOUT ALLOUT	
OLUME OF MATERIAL	BBLS.	ARDS		
AS A CONDITION TO SUNDANC		na si ka ka si		ikan ing k
IME: 40 U.S.C. 6901, ET SFQ. THENN Y MIRTUE OF THE EXEMPTION AFF(TTH THE EXPLORATION: DEVELOPY ALSO AS A CONDITION TO SUN ICKET, TRANSPORTER REPRESENTS RANSPORTER IS NOW DELIVERED I THIS WILL CERTIFY that talementrat the above described ertify that no additional inder- neident.	ORDED DRILLING FLUIDS MENT OR PRODUCTION O DANCE SERVICES INC.'S AND WARRANTS THAT O BY TRANSPORTER TO SUN I the above Transporte Plocation, and that it m	PRODUCED WATERS AND O F CRUDE OIL OR NATURAL O ACCEPTANCE OF THE MATE NLY THE MATERIAL DELIVE IDANCE SERVICES, INC. S FA In Joaded the material rep vas tendered by the above is load, and that the ma	THER WASTE ASSOCIA AS OR GEOTHERMAL I RIALS SHIPPED WITH TI RED BY OPERATOR SHI CILITY FOR DISPOSAL. ICSENTED by this Tran described shipper: I	TED ENERGY HIS JOB PPER TO <i>ISPOTICT</i> This will
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A CONTRACTOR AND A CONTRACTOR A		Ticket #	~2.2
Lease Operator/Shipper/Comp	pany:		N. Carlos
Lease Name:			
Transporter Company:		Time	_AM/PM
Date: V	/ehicle No.	Driver No.	
Charge To:			
	TYPE OF MATE	BIAL	
a anti-anti-anti-anti-anti-anti-anti-anti-			Anne - Car
Produced Water	Drilling Fluids		ion Fluids
Tank Bottoms	Contaminated	l Soil 🔄 C-117 No).:
Other Materials	BS&W Conter	ıl:	
		JETOUT	Se Holder Services
Description:		CALLOUT	
	BBLS	ARDS	
JOB TICKET, OPERATOR SHIPPER REPR MATERIAL EXEMPT FROM THE RESOU	RCE, CONSERVATION AND REC	THE WASTE MATERIAL SHIPP OVERY ACT OF 1976, AS AMEN	ED HEREWITH DED FROM TIM
JOB TICKET, OPERATOR/SHIPPER REPR	ESENTS AND WARRANTS THAT RCE, CONSERVATION AND REC MEALTH AND SAF, CODE 961.00 RDED DRILLING FLUIDS, PRODU ENT OR PRODUCTION OF CRUD MANCE SERVICES, INC 'S ACCEP AND WARRANTS THAT ONLY TH	THE WASTE MATERIAL SHIPP OVERY ACT OF 1976. AS AMEN ET SEQ. AND REGULATIONS ICED WATERS, AND OTHER W E OIL OR NATURAL GAS OR C TANCE OF THE MATERIALS SF E MATERIAL DELIVERED BY (ED HEREWITH DED FROM LIK RELATED THEI ASTE ASSOCIAT IEOTHERMAL I IEPPED WITH TI IPPED WITH TI IPPERATOR SHII
JOB TICKET, OPERATOR/SHIPPER REPR MATERIAL EXEMPT FROM THE RESOU TIME, 40 U.S.C. 6901, ET SEQ., THE NM 1 BY VIRTUE OF THE EXEMPTION AFFOR WITH THE EXPLORATION, DEVELOPMI ALSO/ASI/ACONDITION TO SUND TICKET, TRANSPORTER REPRESENTS, A TRANSPORTER IS NOW DELIVERED BY THIS WILL CERTIFY that I Statement at the above, described I certify, that no additional materia	ESENTS AND WARRANTS THAT RCE. CONSERVATION AND REC HEALTH AND SAF. CODE 761.00 RDED.DRILLING FLUIDS. PRODI ENT OR PRODUCTION OF CRUE ANCE SERVICES. INC 'S ACCEP AND WARRANTS THAT ONLY TH TRANSPORTER TO SUNDANCE the above Transporter Toad location, and that it was ten	THE WASTE MATERIAL SHIPP OVERY ACT OF 1976. AS AMEN 1 ET SEQ. AND REGULATIONS JCED WATERS, AND OTHER W. E OIL OR NATURAL GAS OR C TANCE OF THE MATERIALS SF E MATERIAL DELIVERED BY C SERVICES, INC. STACLUTY F Cat the material represented dered by the above describ	ED HEREWITH DED FROM HIN RELATED THEI ASTE ASSOCIAT BEOTHERMAL I UPPED WITH TI PRERATOR/SHII DR/DISPOSAL I by this Trun ed shipper, I
JOB FICKET, OPERATOR/SHIPPER REPR MALERIAL EXEMPT FROM THE RESOU FIME, 40 U.S.C. 6901, ET SEQ., THE NM I BY VIRTUE OF THE EXEMPTION AFT OF WITH THE EXPLORATION, DEVELOPMI ALSO ASIA CONDITION TO SUND FICKET TRANSPORTER REPRESENTS A FRANSPORTER IS NOW DELIVERED BY <i>THIS WILL CERTIFY that it</i> Statement at the above described 1 settify that no additional materia neidem.	ESENTS AND WARRANTS THAT RCE. CONSERVATION AND REC HEALTH AND SAF. CODE 761.00 RDED.DRILLING FLUIDS. PRODI ENT OR PRODUCTION OF CRUE ANCE SERVICES. INC 'S ACCEP AND WARRANTS THAT ONLY TH TRANSPORTER TO SUNDANCE the above Transporter Toad location, and that it was ten	THE WASTE MATERIAL SHIPP OVERY ACT OF 1976. AS AMEN 1 ET SEQ. AND REGULATIONS JCED WATERS, AND OTHER W. E OIL OR NATURAL GAS OR C TANCE OF THE MATERIALS SF E MATERIAL DELIVERED BY C SERVICES, INC. STACLUTY F Cat the material represented dered by the above describ	ED HEREWITH DED FROM TIN RELATED THEI ASTE ASSOCIA EOTHERMAL I UPPED WITH TI PRERATOR/SHIL DR/DISPOSAL I by this Tran- ed shipper. I
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JOB FICKET, OPERATOR/SHIPPER REPR MAJERIAL EXEMPT FROM THE RESOU TIME, 40 U.S.C. 6901. ET SEQ. THE NM I BY VIRTUE OF THE EXEMPTION AFT OF WITH THE EXPLORATION, DEVELOPMI ALSO ASIA CONDITION TO SUND TICKET. TRANSPORTER REPRESENTS, A TRANSPORTER IS NOW DELIVERED BY <i>THIS WILL CERTIFY that I</i> Statement at the above described I certify that no additional material meident.	ESENTS AND WARRANTS THAT RCE. CONSERVATION AND REC HEALTH AND SAF. CODE 761.00 RDED.DRILLING FLUIDS. PRODI ENT OR PRODUCTION OF CRUE ANCE SERVICES. INC 'S ACCEP AND WARRANTS THAT ONLY TH TRANSPORTER TO SUNDANCE the above Transporter Toad location, and that it was ten	THE WASTE MATERIAL SHIPP OVERY ACT OF 1976. AS AMEN 1 ET SEQ. AND REGULATIONS JCED WATERS, AND OTHER W. E OIL OR NATURAL GAS OR C TANCE OF THE MATERIALS SF E MATERIAL DELIVERED BY C SERVICES, INC. STACLUTY F Cat the material represented dered by the above describ	ED HEREWITH DED FROM HIN RELATED THEI ASTE ASSOCIAT BEOTHERMAL I UPPED WITH TI PRERATOR/SHII DR/DISPOSAL I by this Trun ed shipper, I
JOB. FICKET, OPERATOR/SHIPPER REPR MATERIAL EXEMPT FROM THE RESOU TIME, 40 U.S.C. 6901, ET SEQ., THE NM I BY WIRTUE OF THE EXEMPTION AFT OF WITH THE EXPLORATION, DEVELOPMI ALSO ASIA CONDITION TO SUND TICKET! TRANSPORTER REPRESENTS, A TRANSPORTER IS NOW DELIVERED BY	ESENTS AND WARRANTS THAT RCE. CONSERVATION AND REC HEALTH AND SAF. CODE 761.00 RDED.DRILLING FLUIDS. PRODI ENT OR PRODUCTION OF CRUE ANCE SERVICES. INC 'S ACCEP AND WARRANTS THAT ONLY TH TRANSPORTER TO SUNDANCE the above Transporter Toad location, and that it was ten	THE WASTE MATERIAL SHIPP OVERY ACT OF 1976. AS AMEN 1 ET SEQ. AND REGULATIONS JCED WATERS, AND OTHER W. E OIL OR NATURAL GAS OR C TANCE OF THE MATERIALS SF E MATERIAL DELIVERED BY C SERVICES, INC. STACLUTY F Cat the material represented dered by the above describ	ED HEREWITH DED FROM HIN RELATED THEI ASTE ASSOCIAT BEOTHERMAL I UPPED WITH TI PRERATOR/SHII DR/DISPOSAL I by this Trun ed shipper, I

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

(505) 394-2511

Lease Operator/Shipper/Compa	inv:		et #	<u>92</u> 560 0
Lease Name:				
Transporter Company:		Time	AM/PM	
	hicle No.	Driver No		
Charge To:				
	TYPE OF MATE	RIAL		
Produced Water	Drilling Fluids	Cor	npletion Fluids	
Tank Bottoms	Contaminated	Soil C-1	17 No.:	
Other Materials	BS&W Conten	L		
		JETC	UTT STATE	
Description:				
VOLUME OF MATERIAL	BBLS	ARDS		
AS A CONDITION TO SUNDANCES	ERVICES, INC 'S ACCEPTANCE	OF THE MATERIALS SH	IPPED WITH THIS	
IOB TICKET OPERATOR SHIPPER REPRE MATERIAL EXEMPT FROM THE RESOUR	CE. CONSERVATION AND RECO	VERY ACT OF 1976. AS	AMENDED FROM TIME TO	
TIME 40 U.S.C. 6901. ET SEQ., THE NM HI BY VIRTUE OF THE EXEMPTION AFFORE	EALTH AND SAF CODE 361.001	ET SEQ., AND REGULAT	IONS RELATED THERETO.	
WITH THE EXPLORATION, DEVELOPMEN				θY.
ALSO AS A CONDITION TO SUNDA	NCE SERVICES. INC.'S ACCEPT	ANCE OF THE MATERIA	LS SHIPPED WITH THIS JO	B
TICKET, TRANSPORTER REPRESENTS AN TRANSPORTER IS NOW DELIVERED BY, T	D WARRANTS THAT ONLY TH FRANSPORTER TO SUNDANCE	: MATERIAL DELIVEREI SERVICES INC 'S FACIL	DBY OPERATOR/SHIPPER/I ITY FOR DISPOSAL.	ro I
THIS WILL CERTIFY that th	e above Transporter loade	d the material cences	ented by this Transport	er
Statement at the above described lo	cation, and that it was tend	lered by the above de	escribed shipper. This w	ill
certify that no additional materials incident.	s were added to this load,	and that the mater.	al was delivered with	out
DRIVER:				
FACILITY REPRESENTATIVE:				
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Lease Operator/Shipper/Comp	any:			-
Transporter Company:	/ehicle No.	Time	AM/PM	
Charge To:		Driver No.		2
Produced Water	TYPE OF MATE		etion Fluids	
Tank Bottoms	Contaminate		No:	
Description:		e jetovi Calloi		
VOLUME OF MATERIAL	BBLS	ARDS		
AS ACONDITION TO SUNDANCE TOB TICKET, OPERATOR SHIPPER REPR MATERIAL EXEMPT FROM THE RESOU TIME, 40 U.S.C. 6901, ET SEQ. THE NM I BY VIKTUE OF THE EXEMPTION AFFOR WITH THE EXPLORATION, DEVELOPMI	ESENTS AND WARRANTS THA RCE: CONSERVATION AND REC HEALTHAND SAF, CODE 361 00 RDED DRIFTING FLUIDS, PROD	CTHE WASTE MATERIAL SHI OVERY ACT OF 1976, AS AM I FT SEQ., AND REGULATION UCED WATERS, AND OTHER	PPED HEREWITH IS ENDED FROM TIME TO NS RELATED THERETO, WASTE ASSOCIATED	
ALSO AS A CONDITION TO SUND TICKET, TRANSPORTER REPRESENTS A TRANSPORTER IS NOW DELIVERED BY	ND WARRANTS THAT ONLY TH	IE MATERIAL DELIVERED B	Y OPERATOR/SHIPPER TO	
THIS WILL CERTIFY that is Statement at the above described (certify that no additional materia incident.	location, and that it was ter	idered by the above desci	ihed shipper. This will	
DRIVER:				
FACILITY REPRESENTATIVE:				

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Lease Onereter/Chile			Ticket #	<u>238998</u>	-
Lease Operator/Shippe	r/company;		andra star in the second s Second second		
Lease Name:					
Transporter Company:		Tim	e	AM/PM	
Date:	Vehicle No.	Dri	ver No.		
			/er NU		
Charge To:				an dana ang tang tang tang tang tang tang ta	
	TYPE OF I	VATERIAL			
Produced Water	n Drilling	j Fluids	Completion	n Fluids	
Tank Bottoms		ta yang ang ang ang ang ang ang ang ang ang			
	L Contan	ninated Soil	C-117 No.:	an a	
Other Materials	🗌 BS&W	Content:			
			JETOUT		
Description:				in de la company de la companya de La companya de la com	
					1
VOLUME OF MATERIAL	BBLS	<u>AR</u>	DS		
ASA CONDITION TO SU	NDANCE SERVICES, INC.'S ACCE	PTANCE OF THE MAT		UTH THE]
JOB TICKET, OPERATOR/SHIPP	ER REPRESENTS AND WARRANT	IS THAT THE WASTE	MATERIAL SHIPPET	PHEREWITH IS	
11ME.40 U.S.C. 6901, ET SEQ.,	ERESOURCE, CONSERVATION A) THE NM HEALTH AND SAF, CODI	361 001 ET SEO., ANI	D REGULATIONS RE	ATED THERETO	
BY VIRTUE OF THE EXEMPTIC	N AFFORDED DRILLING FLUIDS /ELOPMENT OR PRODUCTION O	PRODUCED WATERS	AND OTHER WAS	TEASSOCIATED	
	O SUNDANCE SERVICES, INC 25				
UCKI-I, FRANSPORTER REPRE	SENTS AND WARRANTS THAT O	NLY THE MATERIAL	DELIVERED BY OPI	FRATOR/SHIPPER TO	
	ERED BY TRANSPORTER TO SUN				
THIS WILL CERTIF	Y that the above Transporte cribed location and that it	r loaded the mater	ial represented b	v this Transporter	
certify that no additional	cribed location, and that it m materials were added to th	is-load, and that i	he material was	shipper: This will delivered without	
incident.			and the second		
DRIVER:					
ACILITY REPRESENTATIV					
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				and the second	
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	nternalistic program (* 1937) 2003 (* 1937) Verscher State (* 1938)		a an tai a		
	n 1999 an				