AP – 64

STAGE 1 & 2 ABATEMENT PLAN

DATE: 10-25-06

AP-64
Stage 1 & 2
Abatement Plan
10-25-06

was IR0218

October 25, 2006

Stage 1 and 2 Abatement Plan

Hobbs F-29 SWD Redwood Tank and Emergency Overflow Pit Site

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

Hansen, Edward J., EMNRD

From: Price, Wayne, EMNRD
Sent: Wednesday, November 29, 2006 3:12 PM
To: Hansen, Edward J., EMNRD; VonGonten, Glenn, EMNRD
Subject: FW: F-29 SWD
Attachments: NOTICE OF PUBLICATION.doc

AP064

Who Has this one?

From: randall hicks [mailto:r@rthicksconsult.com]
Sent: Wednesday, November 29, 2006 3:09 PM
To: Price, Wayne, EMNRD
Cc: 'Carolyn Haynes'; 'Kristin Pope'
Subject: RE: F-29 SWD

Wayne

After NMOCD finds that the Stage 1&2 AP (transmitted to NMOCD on 10/27 and mailed soon thereafter) is administratively complete, we will begin the public notice process. To do so, ROC needs your approval of or comments on this public notice.

Thanks

Randall Hicks
Tel: 505-266-5004
Cell 505-238-9515

From: randall hicks [mailto:r@rthicksconsult.com]
Sent: Friday, October 27, 2006 4:56 PM
To: 'Price, Wayne, EMNRD'
Cc: 'Carolyn Haynes'; 'Kristin Pope'
Subject: F-29 SWD

Wayne

The attached letter transmits the Stage 1&2 Abatement Plan for the above-referenced site. I believe we are a day early with this submission!

Randall Hicks
Tel: 505-266-5004
Cell 505-238-9515

NOTICE OF PUBLICATION

State of New Mexico Energy, Minerals and Natural Resources Department
Oil Conservation Division

Notice is hereby given that pursuant to New Mexico Oil Conservation Division Regulations, the following Stage 1 and 2 Abatement Plan has been submitted to the Director of the Oil Conservation Division, 1220 S. St. Francis Dr., Santa Fe, New Mexico 87504, Telephone (505) 476-3440:

Rice Operating Company, Carolyn Doran Haynes, Engineering Manager, Telephone (505) 393-9174, 122 West Taylor, Hobbs, New Mexico 88240, has submitted a Stage 1 and 2 Abatement Plan for the F-29 SWD site, Hobbs Salt Water Disposal System (abandoned), located about 1.5 miles north of the intersection of NM State Highway 62 and the Truck By-Pass near Hobbs, NM in the NW 1/4, of Section 29, Township 18 South, Range 38 East, Lea County, New Mexico. Rice Operating Company operated a saltwater disposal system at the site. Chlorides and total dissolved solids have been observed in the ground water and remedial efforts have been ongoing since discovery. The Stage 1 and 2 Abatement Plan addresses further proposed actions for site closure.

Any interested person may obtain further information from the Oil Conservation Division and may submit written comments to the Director of the Oil Conservation Division at the address given above. The Stage 1 and 2 Abatement Plan Proposal may be viewed at the above address or at the Oil Conservation Division District Office, 1625 N. French Drive, Hobbs, New Mexico 88240, Telephone (505) 393-6161 between 8:00 a.m. and 4:00 p.m., Monday through Friday. Prior to ruling on any proposed Abatement Plan, the Director of the Oil Conservation Division shall allow at least thirty (30) days after the date of publication of this notice during which written comments may be submitted to him.

R. T. HICKS CONSULTANTS, LTD.

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

October 28, 2006

2006 NOV 17 AM 10 15

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

RE: NMOCD Case # 1R0218, F-29 SWD

Dear Mr. Price

In response to your e-mail of September 29, 2006, R.T. Hicks Consultants, Ltd. is pleased to submit a Stage 1&2 Abatement Plan for the above-referenced site on behalf of Rice Operating Company (ROC). You may download the report from our ftp site:

ftp://hicks:k6bbuufe@ftp.swcp.com/NMOCD

Early next week, we will print the report, create the DRAFT public notice and mail the report with attendant CDs that include our entire submission in electronic format to your office and the Hobbs Field Office. We have elected to forego posting the report appendices on the ftp site due to space restrictions and the fact that most of the data included in the Appendices are already in NMOCD files.

If you have any questions regarding this submission, please address them to Kristin Pope at Rice Operating Company.

Sincerely,
R.T. Hicks Consultants, Ltd.

Randall T. Hicks
Principal

Copy:
Rice Operating Company

October 25, 2006

Stage 1 and 2 Abatement Plan

Hobbs F-29 SWD Redwood Tank and Emergency Overflow Pit Site

R.T. Hicks Consultants, LTD

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

Table of contents

1.0 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 Hobbs F-29 SWD Redwood Tank and Emergency Overflow Pit site. Because ROC has implemented an NMOCD-approved vadose zone remedy, this Stage 1&2 Abatement Plan addresses ground water restoration only.

Field data, laboratory results, preliminary feasibility testing, and simple aquifer simulation modeling support a ground water restoration program that employs on-site pumping of ground water for use in nearby oil recovery operations plus natural dilution and dispersion. Installation of one additional down gradient monitoring/recovery well is an important element of this plan. Comparison against other possible restoration strategies shows that this approach:

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

The last criteria employed when evaluating any proposed remedy or investigative work is confirming that there is a reasonable relationship between the benefits created by the proposed remedy or assessment and the economic and social costs. The results of this cost/benefit analysis demonstrates that pump-and-use plus natural dilution and dispersion is the best remedy of the several candidates evaluated.

Upon NMOCD-approval of this plan, ROC will implement the proposed remedy and, when ground water restoration is complete, submit a closure report with final documentation.

Rice Operating Company (ROC) was the service provider (agent) for the Hobbs Saltwater Disposal System. ROC had no ownership of any portion of pipelines, which are the subject of the Hobbs SWD System Abandonment Project. The Hobbs System Pipelines are owned by a consortium of oil pro-

ducers, System Partners, who provide all operating capital on a percentage ownership/usage basis. Major projects require System Partner authorization of expenditures (AFE) approval and work begins as funds are received.

1.1 Data Summary

1. Since 2002, chloride and TDS have exceeded WQCC Standards in the on-site monitoring wells F-29 SWD MW-2 or MW-3 twice (257 mg/L at MW-2 and 272 mg/L at MW-3).
2. Since 2002 chloride in samples from the on-site monitoring well F-29 SWD MW-4 have ranged from 300 to 660 mg/L. TDS concentrations are similarly slightly above WQCC standards.
3. The up gradient monitoring well F-29 SWD MW-3 defines the background water quality entering the site. Since 2004, chloride concentrations in this well have ranged between 80 and 272 mg/L (average 140 mg/L)
4. Petroleum hydrocarbons are not detected in ground water samples from on-site wells or other nearby monitoring wells.
5. Ground water quality beneath the F-29 SWD site and at nearby wells is suitable for use in industrial and agricultural purposes.
6. Ground water flow at the site is east-southeast.
7. Episodic releases of fluids from the F-29 SWD site are one of many possible sources of chloride in the general area.
8. Data support a conclusion that water quality at the on-site well MW-4 is impaired due to episodic releases from the F-29 SWD site.

1.2 Proposed Remedy and Additional Characterization

1. Pumping ground water from the proposed recovery/monitoring well at a rate of 2100 GPD (50 barrels/day) for use in the nearby OXY waterflood program, the Liquid Resource Services Brine and Fresh Water Service, and/or other beneficial uses is the primary long-term ground water remedy.

2. Natural dilution and dispersion is the secondary ground water remedy.

3. Within 60-days of NMOCD and Office of the State Engineer approval, ROC will begin a two-month pump-and-use testing program at the proposed monitoring/recovery well located down gradient of the facility. The purpose of this pumping program is four-fold:

   a. Pumping for 2-months may remove sufficient chloride from beneath the site to restore ground water quality,

   b. In order to provide potential water users with information required by them prior to use, they must know the quantity and quality of water scheduled for delivery from this well.

   c. Data from this test pumping program (e.g. routine water level measurements from nearby monitoring wells) may be used to optimize the pumping and natural restoration remedy.

   d. Chemical characterization data obtained during this time will be employed to provide an estimate of the extent of ground water impairment caused by the episodic releases from the F-29 SWD site.

4. The first annual report for the F-29 SWD site, which is the first submission to NMOCD under this Abatement Plan, will provide an estimate of the extent of chloride and TDS impairment attributable to the F-29 SWD site, an evaluation of data from the two-month test pumping program and recommendations to optimize the ground water restoration strategy.

2.0 Chronology of Events

Table 1: Chronology of Events at F-29 SWD site

February/March 1999	ROC closed the Redwood Tanks and Emergency Overflow Pit (see November 4, 1999 Closure Report in Appendix A). The former tank and pit locations were excavated and a clay liner installed at a depth of about 6 to 10-feet below land surface.
March 1999	ROC conducted the initial definition of the magnitude of the release for the F-29 SWD Redwood Tank site by drilling and sampling MW-1, which was completed in boring B-1, located at the bottom of the redwood tank excavation and completing a second boring within the former pit excavation. Chloride concentrations in soil below the redwood tanks ranged from 70 mg/kg at 46 feet below ground surface (within the capillary fringe) to 1700 mg/kg at 26 feet below ground surface (bgs).
March 2000	Anomalous chloride concentrations and sand in the well suggested tampering of the well.
July 2000	Replacement well MW-2 installed less than 5-feet from original monitoring well, MW-1
August 2001	Pump and dispose program removed 3,280 gallons in July, 2001. Chloride had decreased from over 3000 mg/L in 2000 to less than 500 mg/L in March 2001.
December 2001	Up gradient well MW-3 and down gradient well MW-4 installed at the site.
January 2002	ROC proposes additional characterization to define down gradient extent of potential impact
2002	Low concentrations of chloride in on-site monitoring wells caused ROC to apply for closure of the regulatory file.
February 2003	Under contract to NMOCD, Intera Inc. begins a ground water quality study of the former Windmill Oil site located up gradient from the F-29 SWD facility. Intera sampled numerous wells in Section 29 as part of this study.
March 2004	R.T. Hicks Consultants submits work plan for the characterization of several Hobbs SWD System sites. The work plan proposes monitoring wells in Section 29 and near the F-29 SWD site.
March 2006	Field tour of Section 29 sites with ROC, Hicks Consultants and NMOCD. Agreement reached that NMOCD would request an Abatement Plan in the near future.
2000-2006	Monitoring and annual reporting

3.0 Background

3.1 Site location and land use

Plate 1 is a USGS Topographic map showing the location of the site relative to Hobbs, New Mexico. Plate 2 is an aerial photograph showing the monitoring wells, the truck by-pass, the Texland Petroleum water supply well and nearby monitoring wells. Also shown on Plate 2 is the OXY waterflood facility and the Liquid Resource Services brine and fresh water supply facility, which are possible users of the pump-and-use ground water restoration strategy. Plate 3 is an aerial photograph showing the locations of monitoring and water supply wells employed by Interra and ROC to define the water quality in the general area. Plates 2 and 3 demonstrate that the area adjacent to the site is used for oil and gas production.

3.2 Nature of the Release

Redwood tanks and the emergency overflow pit are a source of periodic releases of produced water. At most sites similar to the F-29 SWD site, these episodic releases can create a localized zone of impacted ground water and constituents of concern in the vadose zone can represent an ongoing threat to ground water quality. After the facility up grade in 1999, releases from the facility ceased. At most sites, when the ongoing releases cease, ground water quality returns to background conditions within a few years.

Data from the closure report (see Appendix A) show that chloride concentrations in the vadose zone are below 1000 mg/kg, except one sample from Boring 1 at a depth of 26 feet bgs (1700 mg/kg). Petroleum hydrocarbons were not present in soil samples obtained from the closure of the emergency overflow pit. Petroleum hydrocarbons were detected at a concentration of 3660 ppm (TPH) at a depth of 40 feet bgs. While ground water chloride concentrations exceed the 250 mg/L standard, regulated hydrocarbon constituents are generally not detected in ground water samples and concentrations have always been well below ground water standards.

In 1999, ROC installed a clay infiltration barrier within the excavations associated with the tanks and the pit. The low mass of constituents of concern in the vadose zone combined with this infiltration barrier effectively mitigates any threat to ground water quality posed by the vadose zone.

3.3 Water well inventory

Appendix B provides well logs of nearby wells that were obtained from the New Mexico Office of the State Engineer (OSE). Plate 4 plots all wells within the general area of the F-29 SWD facility that are registered in the OSE database.

4.0 Regional Hydrogeology

This document does not provide information on surface water hydrogeology because drainages do not exist near the site. Detailed descriptions of the vadose zone are not included in this report because the F-29 SWD site has undergone an NMOCD-approved vadose zone remedy (see Appendix A). This section of the Abatement Plan provides information on the saturated zone.

4.1 Characteristics of the Ogallala Aquifer

The saturated zone is the Ogallala Aquifer. Well logs from the area characterize the saturated zone as well-sorted, fine-grained sand or fine sand with thin layers of caliche and cemented sand. Plate 5 is the lithologic log for the nearby monitoring well cluster at F-29-1a, one of the deeper wells in the area for which we have a high quality lithologic log. While Plate 5 provides a good description of the upper Ogallala, the base of the Ogallala is seldom penetrated in or near the site. 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 the area of the Hobbs SWD System 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 F-29 SWD site, the saturated hydraulic conductivity of the uppermost saturated zone is assumed as 75 feet/day.

To create a potentiometric surface map for the region, USGS gauging data from 1996 was employed (Plate 6). Ground water flows east-southeast in the area under a hydraulic gradient of approximately 0.0036.

Figures 1 and 2 present two hydrographs of nearby USGS wells showing that ground water elevations near the area of the Hobbs SWD System have decreased by 10 feet since 1985. One of these wells is near the airport and the other is located at the southern city limit of Hobbs.

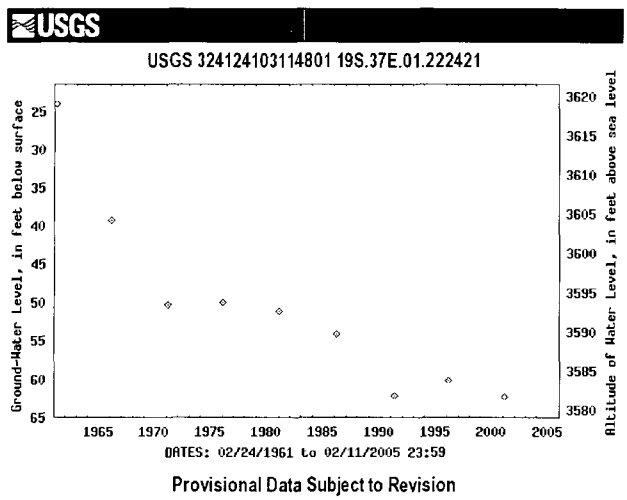

Figure 1

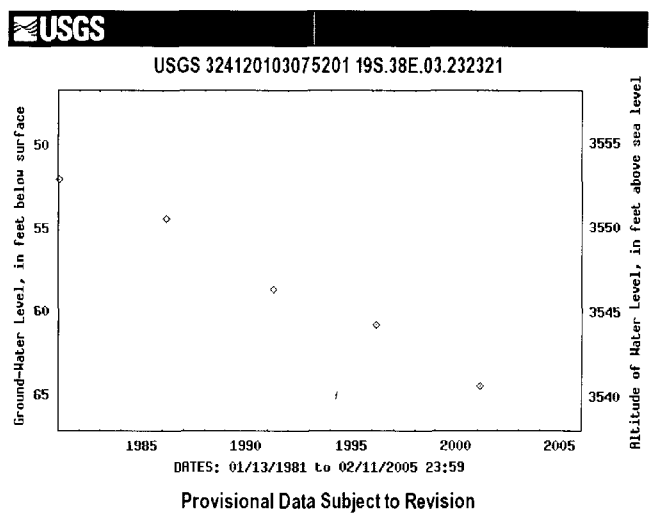

Figure 2

4.2 Ground Water Near F-29 SWD

Data from the Intera report (2003) indicated no petroleum hydrocarbons were detected in ground water in the general area during the Intera sampling event. Chloride is above the Water Quality Control Commission standard of 250 mg/L in many samples near the F-29 SWD site.

Plate 7 presents the chloride concentrations for wells sampled by Intera (2003), ROC (2003-2006) and the Office of the State Engineer (various dates from the Go-Tech site, http://octane.nmt.edu/waterquality/data). As Plate 7 and Figure 3 of the 2003 Intera report show, chloride concentration in the area generally range between about 60 ppm and 140 ppm. Within the area displayed in Plate 7, 12 wells exceed the Water Quality Control Commission ground water standard of the 250 ppm Chloride. These wells are geographically distributed throughout area. Up gradient and down gradient from wells that exceed the 250 ppm chloride standard are other wells that fall within the 60-140 ppm range that typifies the remainder of the area. The variation in chloride concentration expressed in map view (Plate 7) might be explained if well screen intervals were known for these domestic supply wells. Unfortunately, well construction data for most of the sampled wells does not exist.

4.3 Site Ground Water Flow

Plate 8 shows the most recent potentiometric surface based upon data from the on-site monitoring wells and monitoring wells installed by ROC in Sections 29, 32 and 33. These data suggest an east-southeast ground water flow direction. Plate 6 shows the potentiometric surface of the Hobbs area using USGS monitoring data from 1996. Plate 6 shows that northwest of Hobbs, the regional ground water flow is to the southeast but in the area of Hobbs, ground water flows east-southeast. Plate 9 is a copy of a portion of the potentiometric surface map in the Nicholson and Clebsch (1960) report, again showing an east-southeast ground water flow direction in our area of interest.

Although regional data (Plates 6 and 9) and recent data (Plate 8) document an east-southeast ground water flow direction, maps that employ only data from the F-29 SWD site can show flow east, southeast and northeast. Plates 10a and 10b, which display data from 2004 and 2005 respectively, suggest a

east-northeast ground water flow direction.
Plate 10c shows data from 2006 at the same scale as Plates 10a and 10b. Using these limited data, Plate 10c suggests ground water flow is east. However, when these same data are employed with data from Sections 32 and 33, the east-southeast flow direction is more obvious. R.T. Hicks Consultants concludes that ground water beneath the site flows east-southeast.

4.4 Site Ground Water Quality

Table 2 presents the results of the water quality monitoring at the site for MW-2 (aka MW-1R), MW-3 and MW-4. Also shown in Table 2 are results from the nearby well F-29-1 MW-1 and MW-2 (deep and shallow respectively). With respect to the quality of data from MW-1, we refer the reader to a September 7, 2001 letter from ROC to NMOCD and an August 29, 2001 Report (Safety and Environmental Solutions, Inc.) for a more complete discussion (see Appendix C for these referenced documents). As suggested in the Chronology of Events table, ROC caused the replacement of MW-1 with MW-2 due to data quality concerns.

Figure 3 summarizes the chloride data for the site. From the patterns of Figure 3 we can draw several hypotheses. First, MW-3, the up gradient well, establishes a background chloride concentration in ground water of about 150 ppm, which is generally consistent with the water quality in Section 29

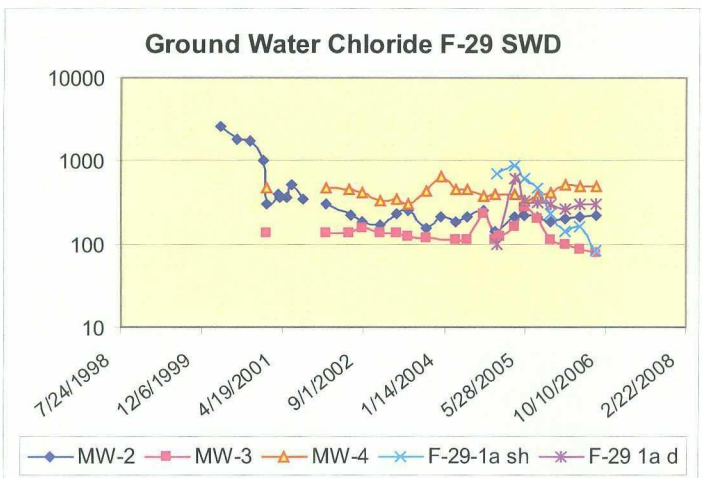

Figure 3 summarizes the chloride data for the site.

(see Plate 7). Third, the average chloride concentration of MW-4 (430 ppm), which is southeast of the former Redwood Tanks, demonstrates that releases from the site have caused a slight elevation of chloride in ground water. Fourth, the original chloride concentration in MW-1 (194 ppm) and the analyses observed in MW-2 since June 2002 (average 201) suggest this western area of the site is slightly impacted but not impaired (i.e. above background but below the WQCC Standard of 250 ppm) by historic releases from the site.

Figure 4, which presents the data from 2001-2006 on a logarithmic scale, shows that chloride concentrations in the background monitoring well (MW-3) varies by more than 200 mg/L.

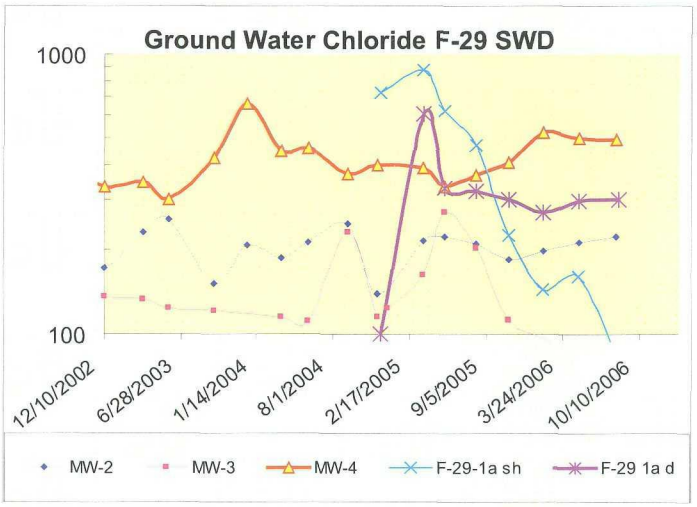

Figure 4 shows concentrations in the background monitoring well (MW-3) varies by more than 200 mg/L.

ROC conducted a specific capacity test and recovery test of MW-2 in October of 2006. Appendix D presents the protocols followed in these tests and their results. Pumping 2 GPM at this well, which penetrates only 8-feet of the aquifer, created a drawdown of about 3-feet. This well could not support a pumping rate of 4 GPM. These data support a conclusion that the specific capacity of a partially-penetrating well is about 0.75 GPM/foot of drawdown.
The recovery data allows one to estimate the hydraulic conductivity of the uppermost saturated zone . Using the Cooper-Jacob method, the data suggest a hydraulic conductivity of 3.8 E-4 meters/sec, which is consistent with the data employed by Musharrafieh, G. and Chudnoff, M., (1999) for this area of their model.

5.0 Stage 1 Abatement Plan

Although existing data are not sufficient to provide an estimate of the extent of ground water impairment at the site, the data are adequate to allow evaluation and design of an effective ground water abatement option. This Abatement Plan assumes that episodic releases of produced water from the F-29 SWD site caused localized ground water impairment. The work elements described herein are designed to monitor the efficacy of the proposed ground water restoration program and to determine the down gradient extent of ground water impairment caused by releases from the F-29 SWD site.

5.1 Down Gradient Recovery/Monitoring Well

Figure 5 shows the proposed location of a down gradient recovery/monitoring well. The documented due east-southeast flow direction and the fact that the former Redwood Tanks and Emergency Overflow Pit were located slightly north of MW-4 allows us to propose a location for a monitoring/recovery well within the box shown in figure 5. The exact location of this proposed well is subject to field checking and clearance by One Call.

Plate 11 shows the proposed construction details of the 4-inch well which is designed for recovery of ground water but can serve to monitor ground water quality in the uppermost 15 feet of the aquifer. The proposed design of this well is based upon the following considerations:

A. A pump-and-use ground water restoration strategy requires a 4-inch well.

B. Water levels in this area are declining at a rate of about 1-foot per year and a long effective screen length is required to ensure water users that the supply will last for a period of years.

C. Separate phase hydrocarbons are not present in any monitoring wells. Therefore placing the top of the screen slightly below the water table is appropriate.

The 15-foot screened interval not only provides a relatively long effective screen length but also permit focusing the pumping stresses. The specific capacity and recovery testing described above suggest that pumping 2000 gallons per day (50 barrels/day or 1.5 GPM) can create as much as 2- to 3-feet of drawdown at a well which has an 8-foot effective screen length.

This drawdown can permit a strategically located well to capture a large portion of the chloride mass at the F-29 SWD site. Preliminary simulation modeling shows that a pumping well with a very long screened interval (e.g. throughout the upper 50-feet of the aquifer) distributes the pumping stresses. The predicted drawdown (and attendant capture zone) of such a well is small (predicted drawdown is less than 0.05 meters). Therefore, R.T. Hicks rejected a recovery well design that employed a fully screened well in favor of one small screened interval. This design allows the operators to focus the pumping in the aquifer such that the well will capture the largest mass of chloride possible.

Figure 5 shows the proposed location of a down gradient recovery/monitoring well.

While sample data from this monitoring/recovery well will be very useful to determine the distribution of chloride and TDS in the aquifer near the site, we do not intend to employ data from this well for compliance with Rule 19. The well is principally designed for restoration of ground water quality.

5.2 Two Month Test Pumping

Within 60-days of NMOCD approval of this plan and any requisite approval from the Office of the State Engineer, ROC will begin a two-month pump-and-use testing program at the proposed monitoring/recovery well located

down gradient of the facility. The purpose of this pumping program is four-fold:

a. Pumping for 2-months may remove sufficient chloride from beneath the site to restore ground water quality.

b. In order to provide potential water users with information required by them prior to use, they must know the quantity and quality of water scheduled for delivery from this well.

c. Data from this test pumping program (e.g. routine water level measurements from nearby monitoring wells) may be used to optimize the pumping and natural restoration remedy.

d. Chemical characterization data obtained during this time will be employed to provide an estimate of the extent of ground water impairment caused by the episodic releases from the F-29 SWD site.

6.0 Stage 2 Abatement Plan

Ground water at MW-4 exceeds the WQCC Standards for chloride and total dissolved solids. The purpose of this ground water abatement plan is to restore ground water at the F-29 SWD site via a pump and use restoration strategy. Natural dilution and dispersion will abate any impairment of ground water located down gradient of the proposed recovery well that is attributed to the F-29 SWD site.

The quality of ground water beneath and near the F-29 SWD site is suitable for industrial and agricultural uses. In fact, the quality of ground water is better than the drinking water supplied by many municipalities. Because treatment of ground water to improve quality produces waste (e.g. reverse osmosis reject) and the existing water quality is suitable for the uses proposed in this plan, R.T. Hicks Consultants rejected abatement plan strategies that employed ground water treatment. The proposed ground water restoration strategy is pump-and-use coupled with natural restoration.

6.1 Pump and Use

A pump-and-use ground water extraction system is the primary ground water restoration strategy. Water recovered by the proposed well can be used for:

1. Fresh water for oil and gas drilling.
2. Make-up water for producing brine for oil and gas well drilling.
3. Make-up water for enhanced oil recovery or pressure maintenance operations.

ROC had identified several water users in the area who are currently using Ogallala water for these purposes. ROC is discussing providing water from the proposed recovery well for their use in lieu of withdrawing higher quality ground water. Producing water for beneficial use from the proposed recovery well will require a permit application with the OSE that limits water withdrawal to 3 acre-feet per year (about 2500 gallons/day). This limitation on water withdrawal and preliminary communications with potential water users is the reason that this plan calls for pumping of no more than 50 barrels/day. ROC must also arrange to transport the water from the proposed recovery well to the end user.

6.2 Natural Ground Water Quality Restoration

The proposed location of the recovery well will not cause the capture chloride that is down gradient from the well. The recovery well will capture chloride from the F-29 SWD site and will accelerate the natural process of dilution and dispersion and thereby reduce chloride concentrations down gradient from the site.

The Texland Petroleum water supply, located about 3000 feet down gradient from the site, may capture chloride molecules released from the F-29 SWD site. Capture of chloride at the Texland well will further accelerate natural restoration of the aquifer down gradient from the F-29 SWD site. Natural dilution and dispersion is the secondary water restoration strategy.

6.3 Monitoring and Reporting

During the 2-month pumping period of the recovery well, ROC will collect water samplesfrom on-site and nearby wells for chemical characterization. The purpose of this characterization program is to better define the extent of chloride and TDS impairment caused by episodic releases from the F-29 SWD site.

On a monthly basis:

1. Determine depth to water in F-29 SWD MW-2, MW-3, MW-4, Recovery well and other nearby wells as appropriate.
2. Determine ground water withdrawal from the F-29 SWD Recovery Well.

On a quarterly basis:

3. Collect ground water samples for chloride and TDS from F-29 SWD MW-4 and the recovery well.
4. Obtain depth to water measurements in other ROC wells in Section 29, 32 and 33 and other wells as appropriate.

On an annual basis:

5. Collect ground water samples from F-29 SWD MW-2, MW-3 and the Recovery Well.

6. Provide a report to NMOCD that includes:

   a. A potentiometric surface map of the area (Section 29, 32 and 33) for each quarter.

   b. An update of the water quality database for the area.

   c. Graphs that show chloride concentration v. time for the proposed compliance well, F-29 SWD MW-4.

   d. A description of the efficacy of the ground water restoration strategy.

If three quarters of monitoring shows that samples from MW-4 and the proposed recovery well are less than the WQCC Standards for chloride, pumping at the recovery well will cease and post-operational quarterly monitoring will begin. Post-operational monitoring consists of collecting quarterly ground water samples from F-29 SWD MW-4 and the recovery well.

If chloride concentrations in post-operational samples from MW-4 or the recovery well increase and exceed the WQCC Standards for two consecutive quarters, the ground water pump-and-use strategy will re-activate as described above.

Monitoring of other wells associated with the Hobbs SWD Abandonment program will undoubtedly continue during the ground water restoration program described herein. Data from this other monitoring program will be incorporated into the annual report for the F-29 SWD site as appropriate.

7.0 Criteria for Site Closure

When eight quarters of post-operational ground water monitoring demonstrate that ground water quality meets the WQCC standards in MW-4, ROC will submit a final closure report.

Proposed Abatement Plan Schedule:

- Install the proposed recovery well 30 days after NMOCD approval of the location.
- Submit required application to the OSE within 10 days of NMOCD approval of the recovery well location.
- Begin the ground water pump-and-use strategy after approval of the Supplemental Well Permit by the OSE, which should be about 60 days after NMOCD approval of this plan.
- Submit the first annual report on or before April 1, 2007.

8.0 References

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

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

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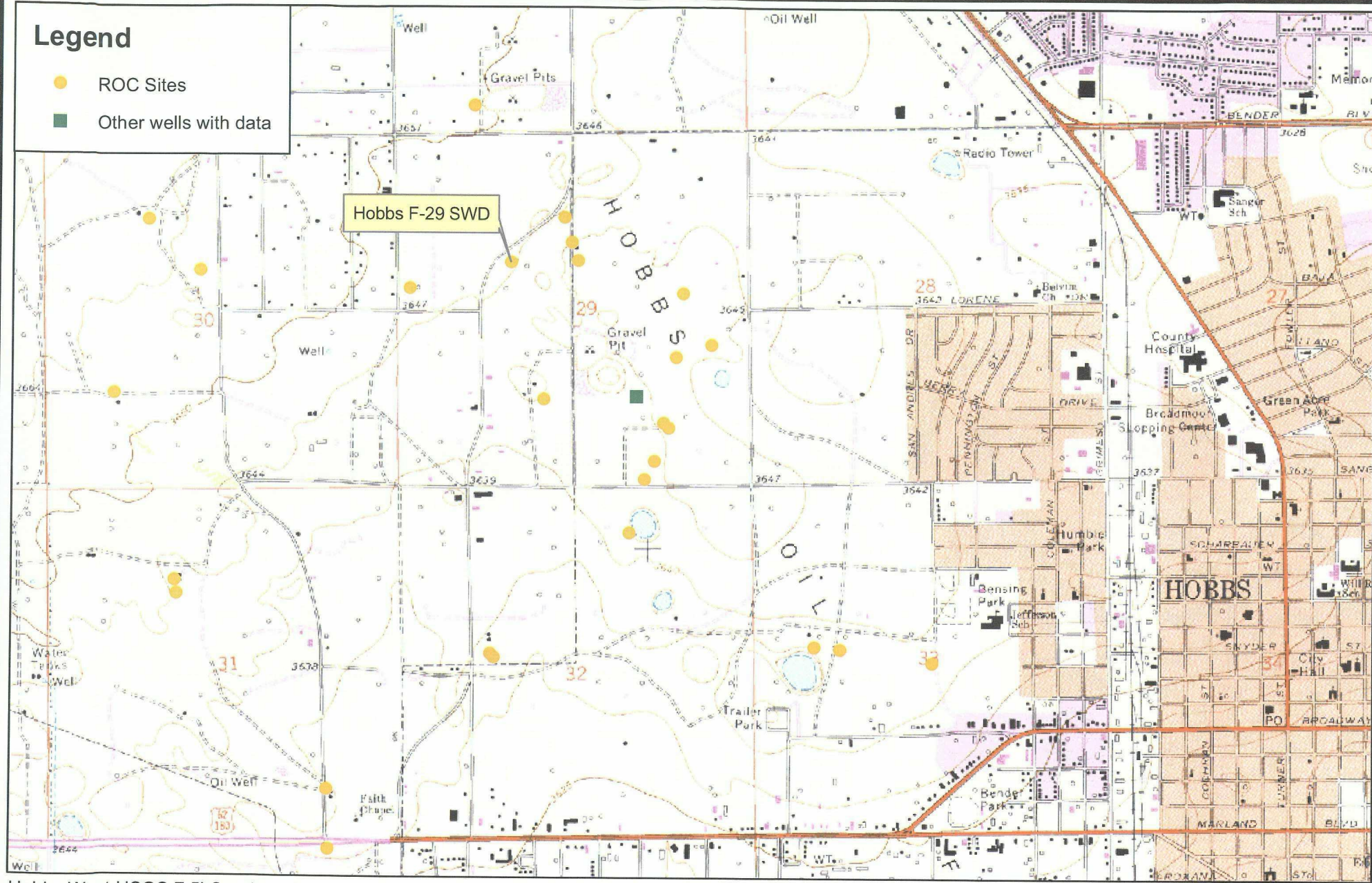
Plates



Hobbs West USGS 7.5' Quad

0 0.5 1 2 Miles

R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Location of Hobbs F-29 SWD relative to Hobbs, NM	Plate 1
	Rice Operating Company: Hobbs F-29 SWD (OCD File #: 1R0218)	October 2006

N
W E
S

R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	2004 aerial photograph showing the location of Hobbs F-29 SWD and nearby wells	Plate 2
	Rice Operating Company: Hobbs F-29 SWD (OCD File #: 1R0218)	October 2006

N
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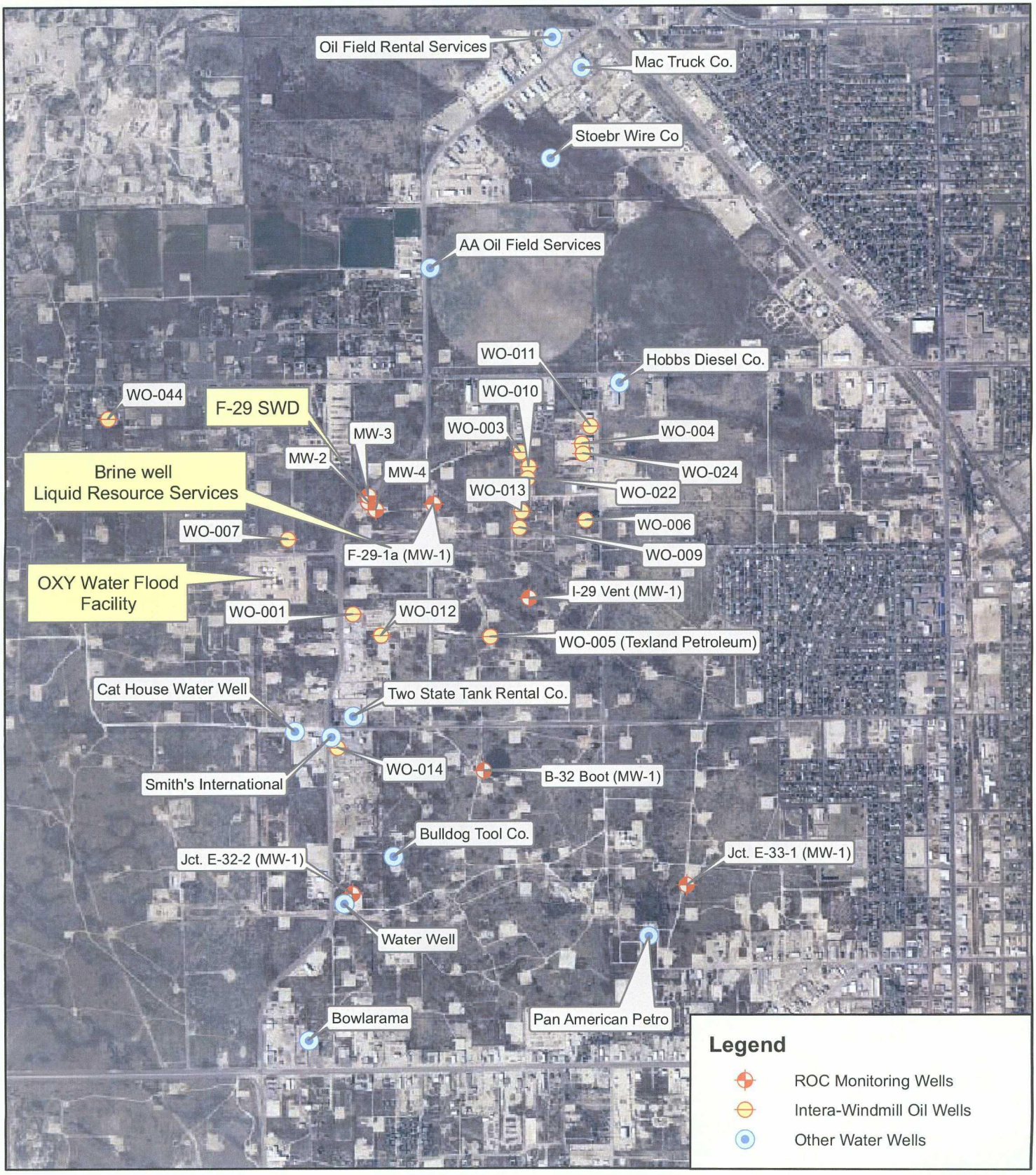
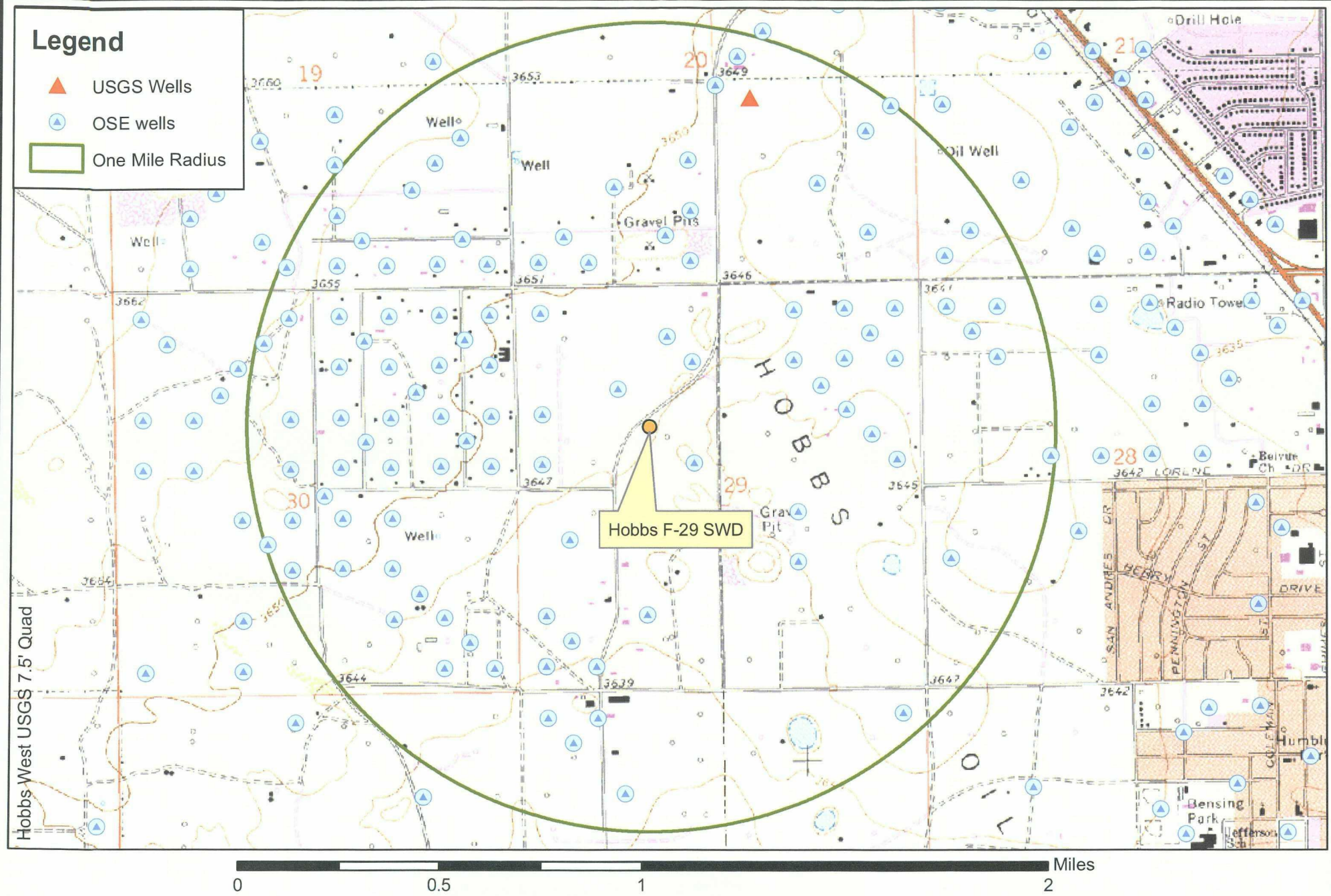


Aerial Souce: http://rgis.unm.edu

0 0.5 1 2 Miles

N W E S

R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	2004 aerial photograph showing location of wells employed by ROC and Intera to define water quality in the general area	Plate 3
	Rice Operating Company: Hobbs F-29 SWD (OCD Case #: 1R0218)	October 2006



R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	OSE and USGS water supply wells listed in databases within 1-mile of Hobbs F-29 SWD	Plate 4
	Rice Operating Company: Hobbs F-29 SWD (OCD File #: 1R0218)	October 2006

N
W E
S

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

Depth (feet)	Description	Lithology	Comments	Well Construction	Field data: Depth	Chloride mg/kg	PID
0.0	Surface, 0 - 1 feet			Cement, 0-3 feet			
2.0	Caliche, clay, sand , moist, 1 - 13 feet, Some hydrocarbon impact						
4.0							
6.0					6.0	203	547
8.0							
10.0					11.0	174	1575
12.0	Caliche, fine grained sand, silt, light tan, 13 - 18 feet						
14.0							
16.0					16.0	106	1060
18.0	Caliche, well indurated , 18 - 21 feet		Some odor				
20.0	Caliche with some well indurated layers, 21 - 24 feet				21.0	73	1242
22.0					22.0	78	1290
24.0	Very fine grained sand, silt, light reddish tan, 24 - 36 feet			Hydrated bentonite, 3-50 feet			
26.0					26.0	91	1006
28.0			At 30 feet: Some hydrocarbon impact, strong odor				
30.0					31.0	83	1290
32.0							
34.0							
36.0	Some caliche, 36 - 36.5 feet				36.0	85	403
38.0	Very fine grained sand, silt, tan - red, 36.5 - 48 feet						
40.0					41.0	92	432
42.0							
44.0							
46.0					46.0	92	354
48.0	Caliche layer, 48 - 48.5 feet						
50.0	Very fine grained sand, silt, tan - red, 48.5 - 59 feet				51.0	72	527
52.0							
54.0					56.0	87	479
56.0							
58.0			At 59 feet: Bore collapsing, Probe is wet. Drilled with water below 59 feet	Sand, 50-74 feet Screen 52-72 feet	59.0	94	414
60.0	Very fine grained sand, silt, tan - red, 59 - 102 feet						
62.0							
64.0							
66.0							
68.0							
70.0							
72.0							
74.0				Hydrated bentonite, 74-92 feet			
76.0							
78.0							
80.0							
82.0							
84.0							
86.0							
88.0							
90.0							
92.0				Sand, 92-99 feet Screen 94 99 feet			
94.0							
96.0							
98.0			Slump filled hole				
100.0			from 99-102 feet	Slump			
102.0							

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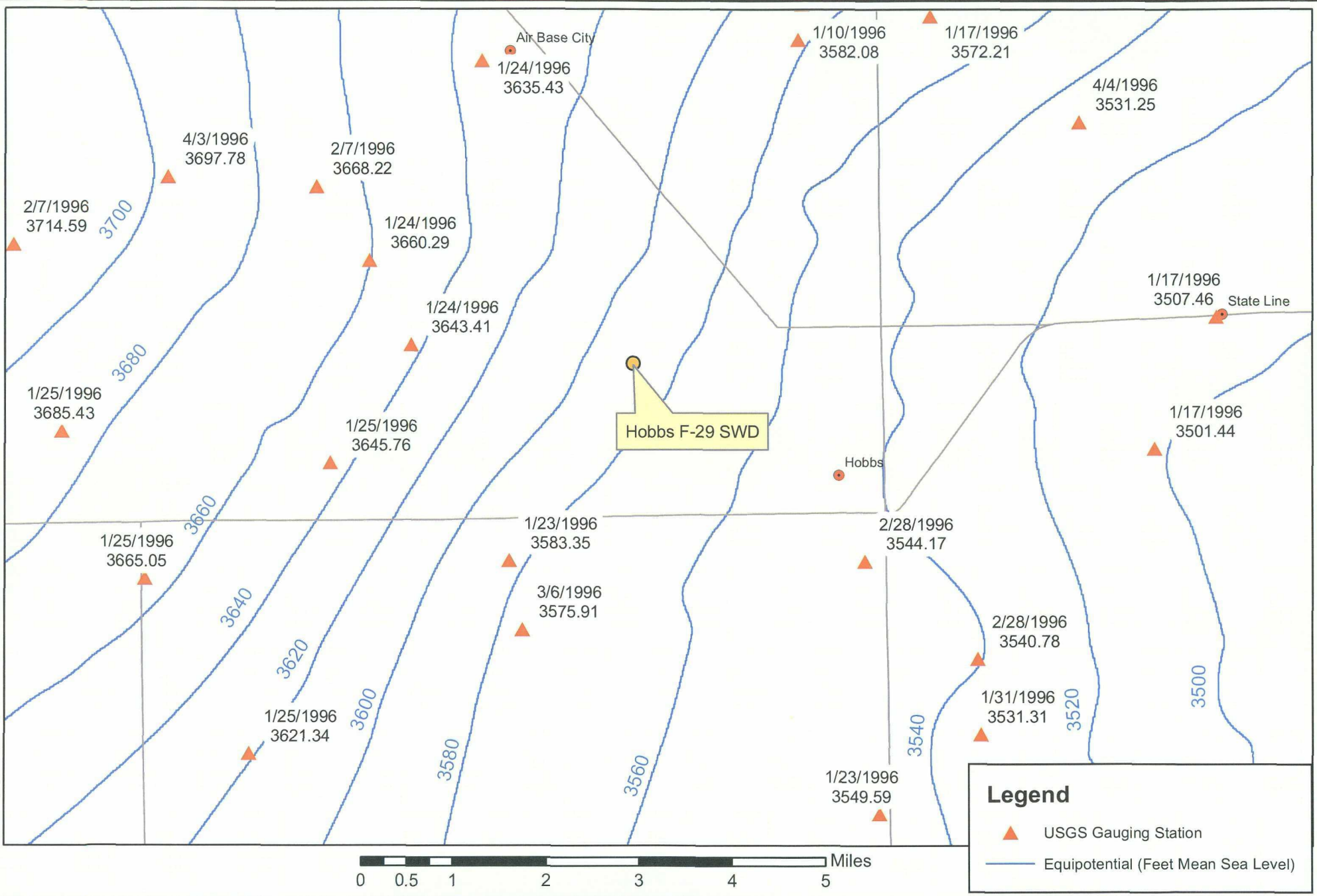
Albuquerque, NM 87104
505-266-5004

Hobbs F-29-1A Site	**Plate 5**
Monitoring Well Boring	**September 2005**



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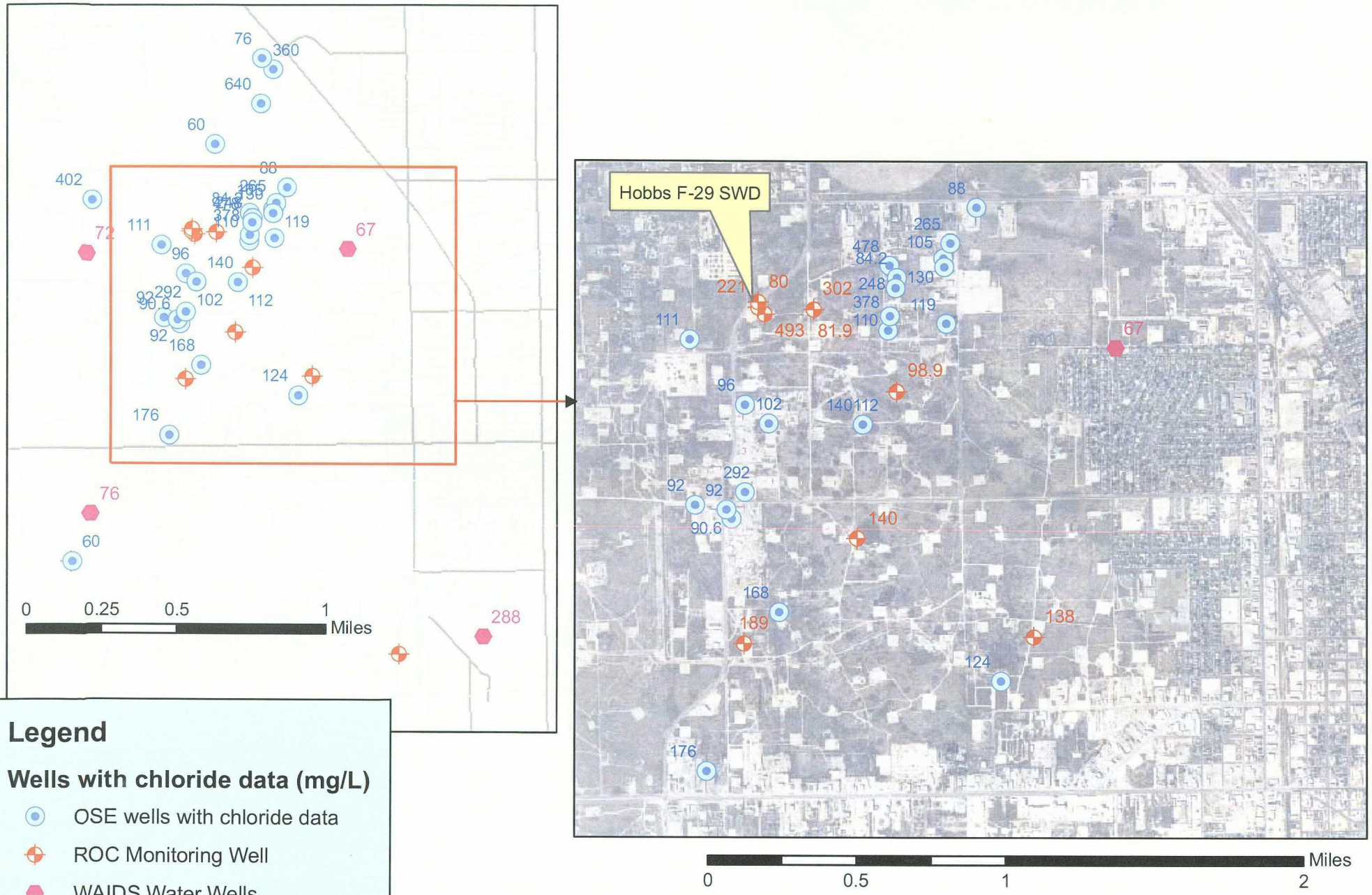
Regional Potentiometric Surface (USGS 1996)

Plate 6

Rice Operating Company: Hobbs F-29 SWD
(OCD File #: 1R0218)

October
2006



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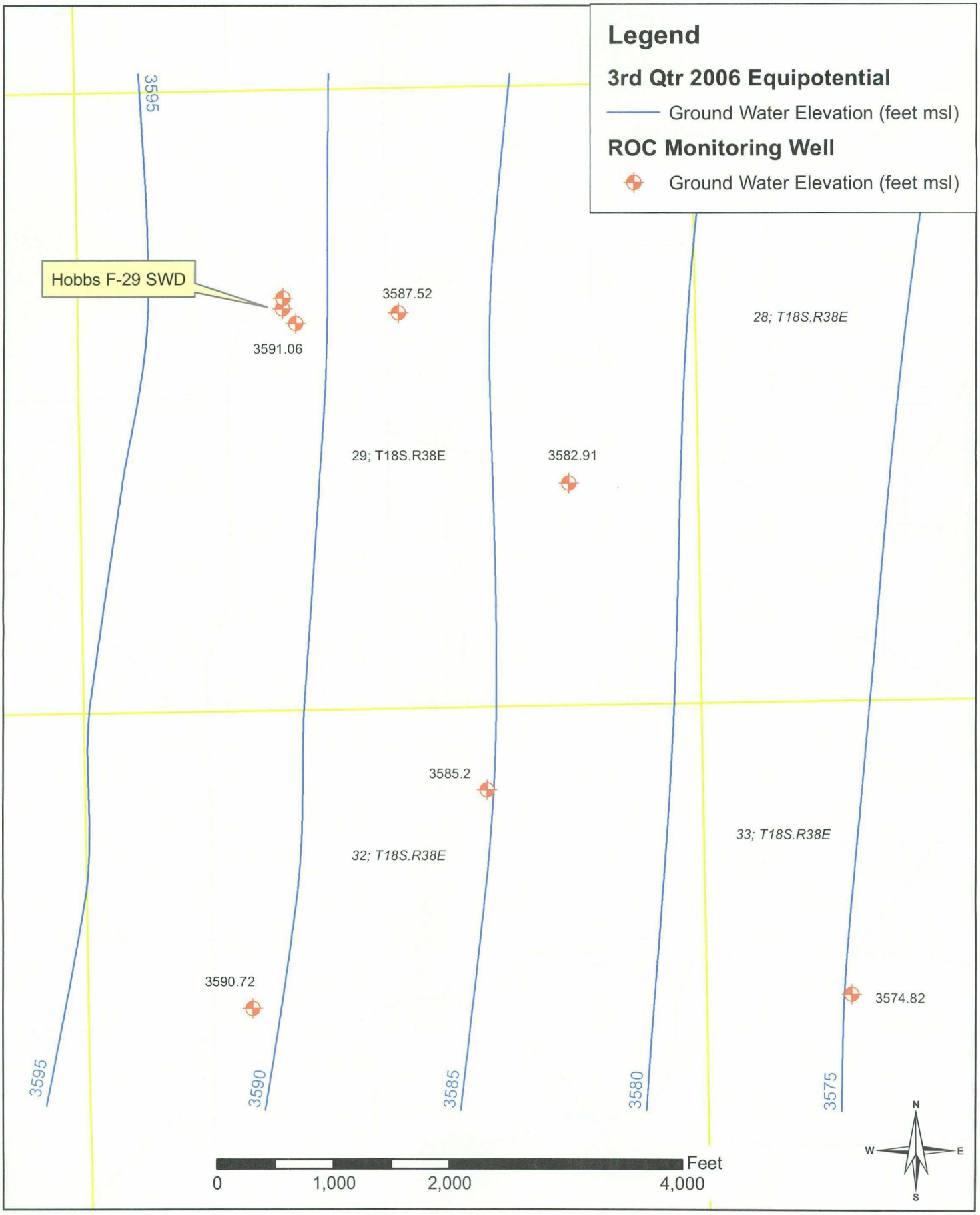
Albuquerque, NM 87104
Ph: 505.266.5004

Chloride Concentration Map (mg/L)

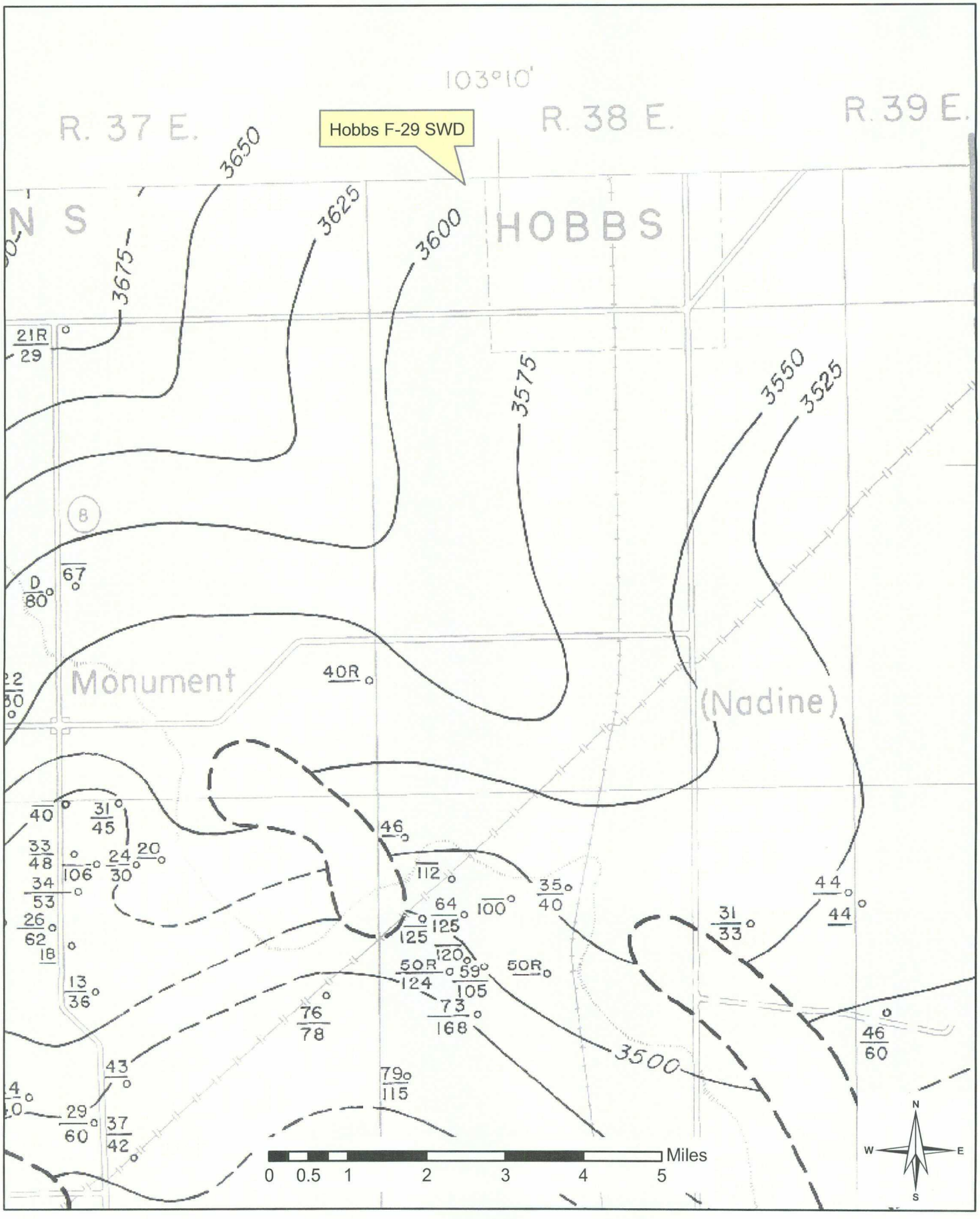
Plate 7

Rice Operating Company: Hobbs F-29 SWD
(OCD Case #: 1R0218)

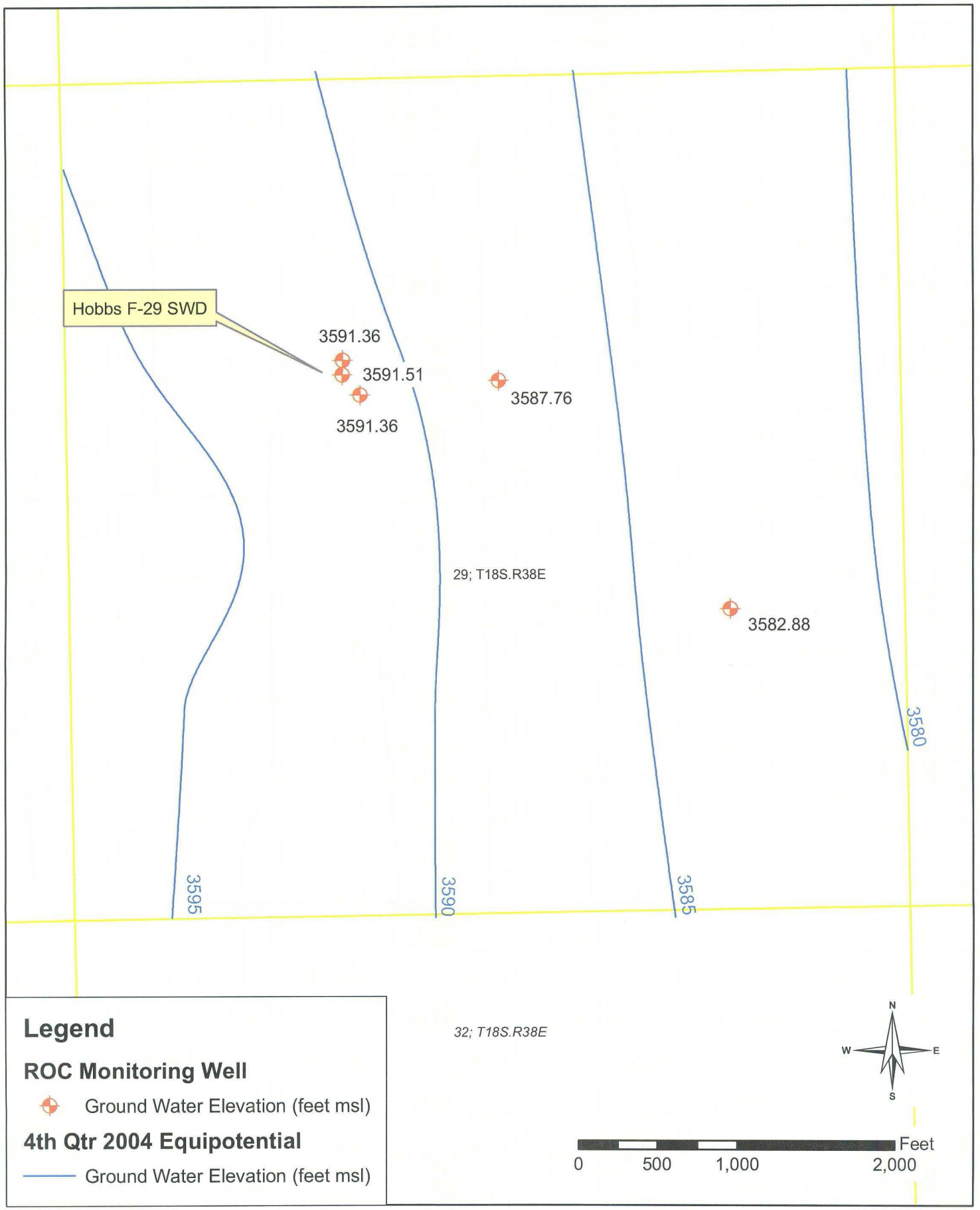
October 2006



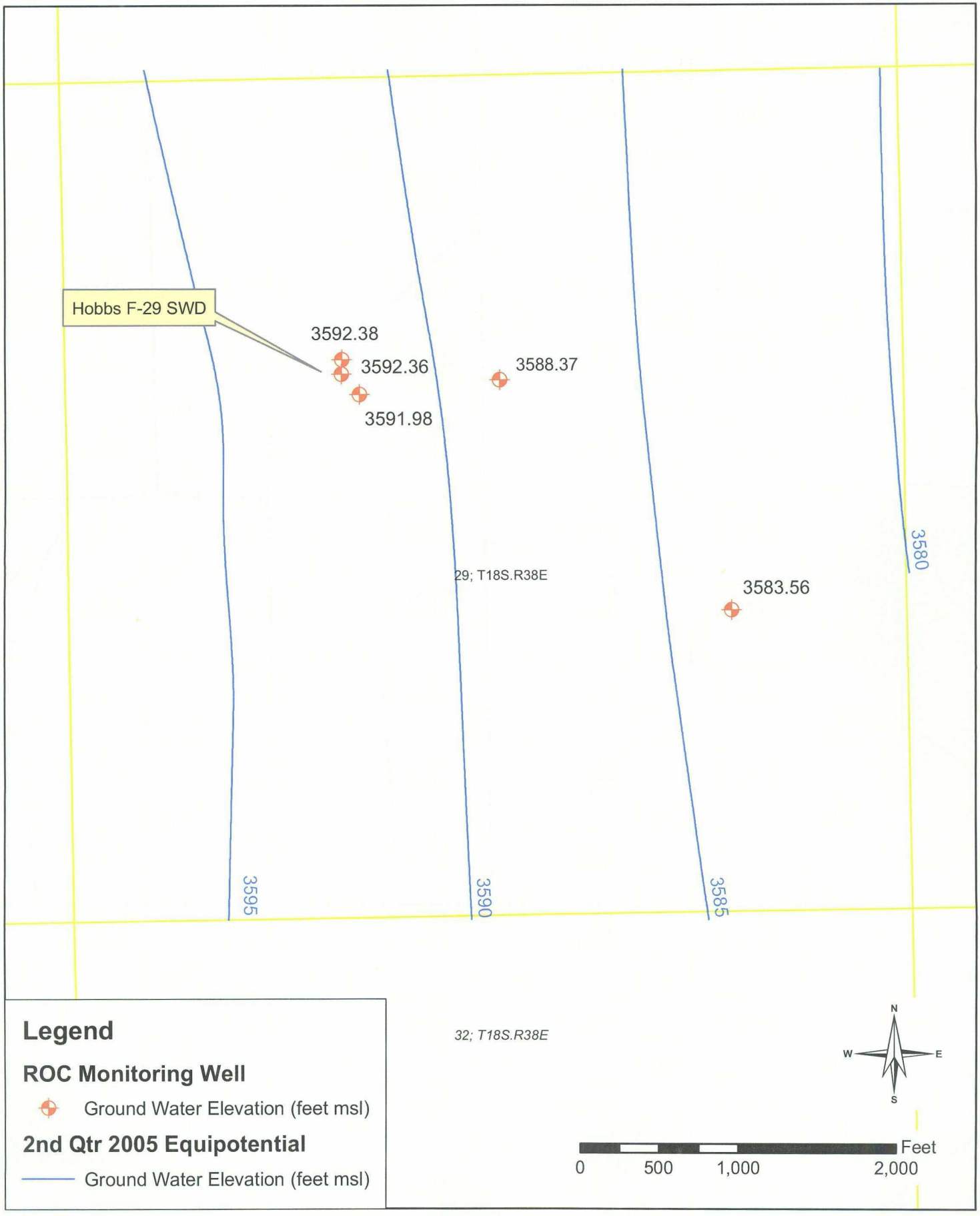
R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	3rd Qtr 2006 Potentiometric Surface	Plate 8
	Rice Operating Company: Hobbs F-29 SWD (NMOCD File # : 1R0218)	October 2006



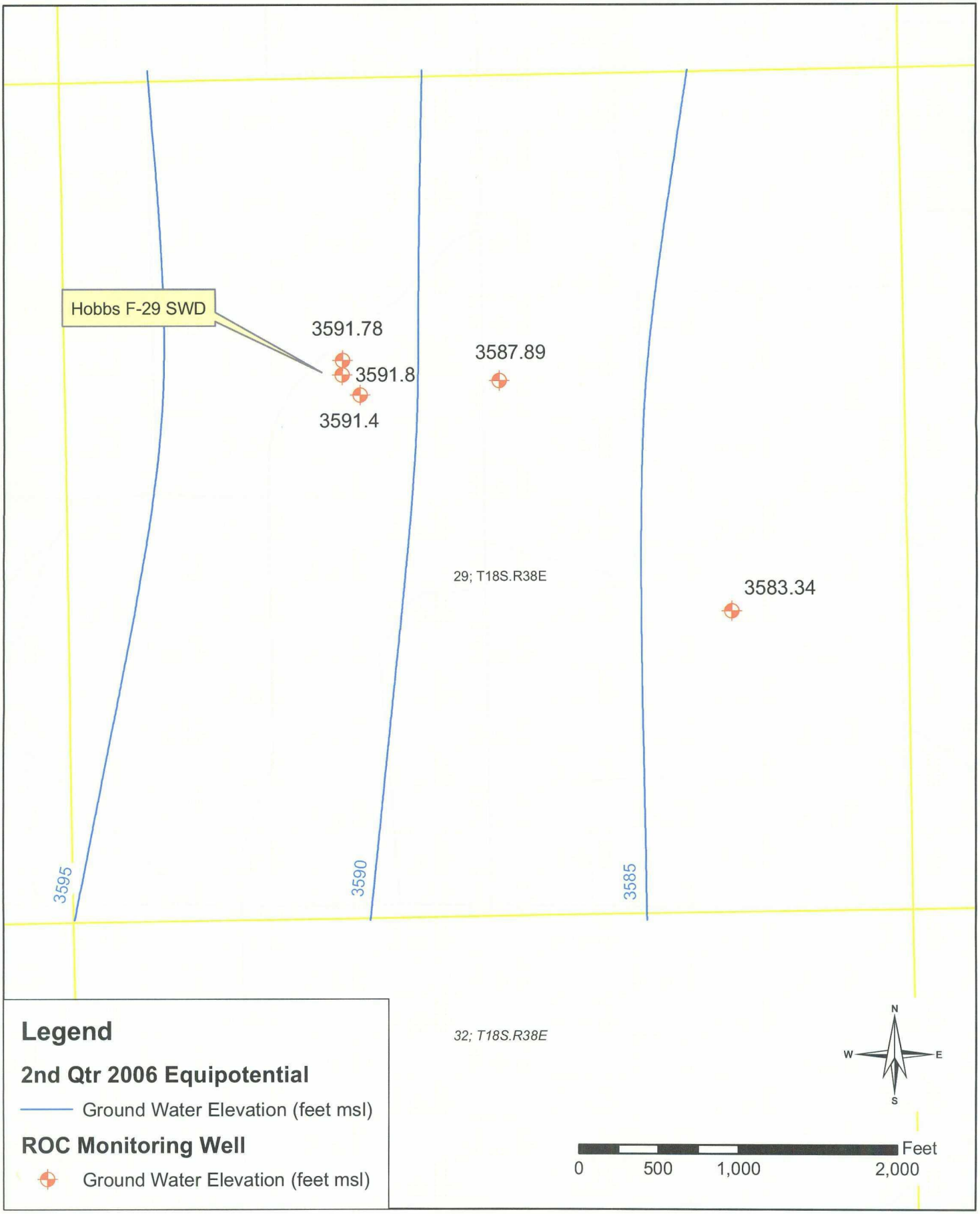
R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Portion of the potentiometric surface map in the Nicholson and Clebsch (1960) report	Plate 9
	Rice Operating Company: Hobbs F-29 SWD (NMOCD File # : 1R0218)	October 2006



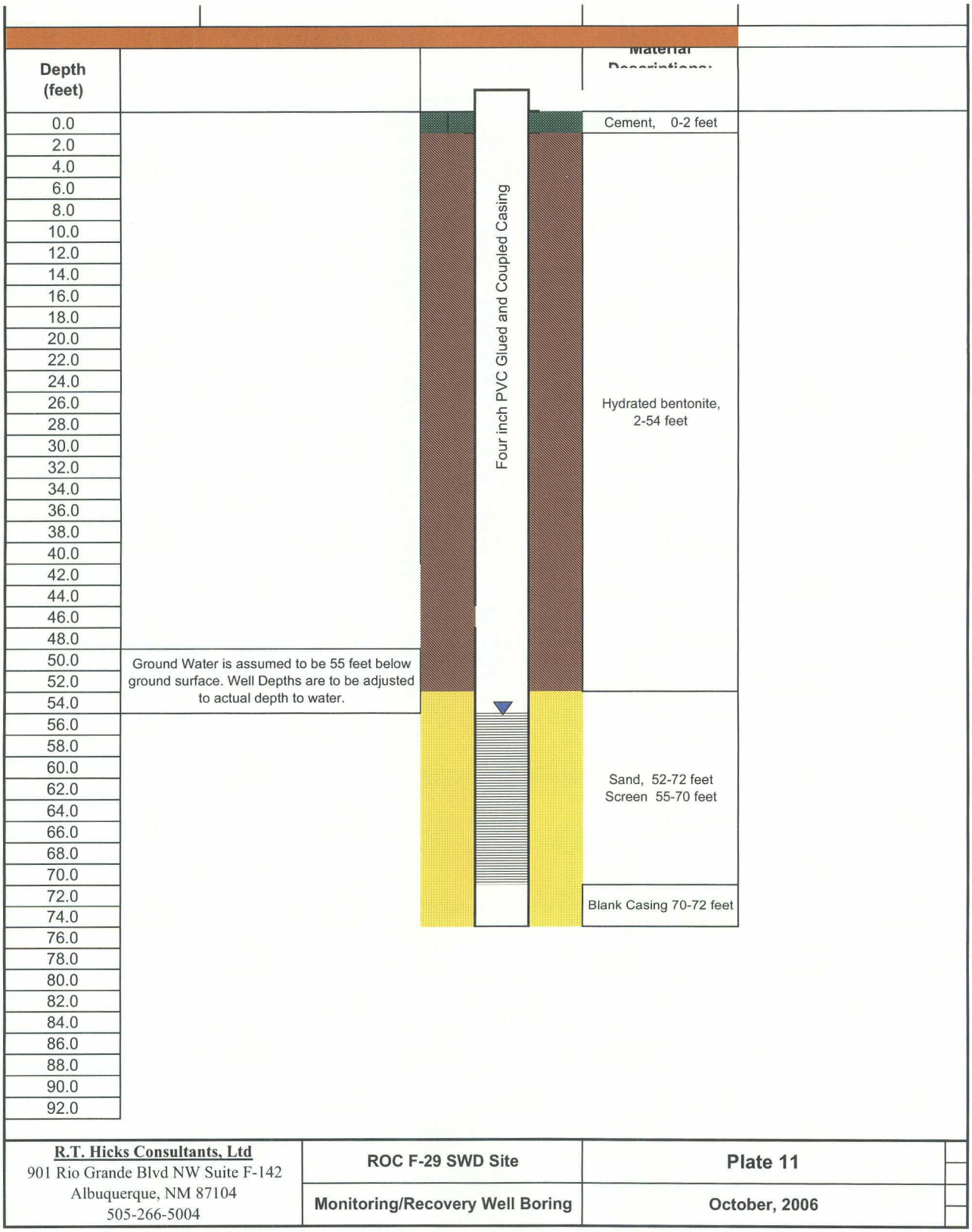
R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	4th Qtr 2004 Potentiometric Surface	Plate 10a
	Rice Operating Company: Hobbs F-29 SWD (NMOCD File # : 1R0218)	October 2006



R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	2nd Qtr 2005 Potentiometric Surface	Plate 10b
	Rice Operating Company: Hobbs F-29 SWD (NMOCD File # : 1R0218)	October 2006



R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	2nd Qtr 2006 Local Potentiometric Surface	Plate 10c
	Rice Operating Company: Hobbs F-29 SWD (NMOCD File # : 1R0218)	October 2006



R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 505-266-5004	**ROC F-29 SWD Site**	**Plate 11**
	Monitoring/Recovery Well Boring	**October, 2006**

Table 2

Site_Name	Well_Name	sampledate	GWelev	depthtowater	cl	tds	benzene	toluene	ethylbenzene	totalxylenes	sulfate
Hobbs F-29 SWD	MW-2	3/21/2000		XXX	2564	6660	XXX	XXX	XXX	XXX	XXX
Hobbs F-29 SWD	MW-2	7/10/2000	3596.71	49.00	1829	3470	<0.002	<0.002	<0.002	<0.006	XXX
Hobbs F-29 SWD	MW-2	9/27/2000	3596.45	49.26	1748	3032	<0.002	<0.002	<0.002	<0.006	XXX
Hobbs F-29 SWD	MW-2	12/12/2000	3596.1	49.61	1027	2586	<0.002	<0.002	<0.002	<0.006	XXX
Hobbs F-29 SWD	MW-2	1/4/2001		XXX	308	1114	XXX	XXX	XXX	XXX	XXX
Hobbs F-29 SWD	MW-2	3/16/2001		XXX	396	1373	XXX	XXX	XXX	XXX	XXX
Hobbs F-29 SWD	MW-2	3/23/2001		XXX	368	1312	XXX	XXX	XXX	XXX	XXX
Hobbs F-29 SWD	MW-2	5/7/2001		XXX	365	1272	XXX	XXX	XXX	XXX	XXX
Hobbs F-29 SWD	MW-2	6/8/2001		XXX	513	1796	XXX	XXX	XXX	XXX	XXX
Hobbs F-29 SWD	MW-2	8/14/2001		XXX	340	1385	XXX	XXX	XXX	XXX	XXX
Hobbs F-29 SWD	MW-2	12/29/2001	3594.58	51.13		XXX	XXX	XXX	XXX	XXX	XXX
Hobbs F-29 SWD	MW-2	1/4/2002	3594.55	51.16	308	1114	XXX	XXX	XXX	XXX	XXX
Hobbs F-29 SWD	MW-2	6/6/2002		XXX	221	XXX	<0.001	<0.001	<0.001	<0.001	135
Hobbs F-29 SWD	MW-2	8/14/2002	3593.64	52.07	186	806	<0.001	<0.001	<0.001	<0.001	144
Hobbs F-29 SWD	MW-2	12/11/2002	3593.13	52.58	172	738	<0.002	<0.002	<0.002	<0.006	106
Hobbs F-29 SWD	MW-2	3/21/2003	3592.77	52.94	230	XXX	<0.001	<0.001	<0.001	<0.001	140
Hobbs F-29 SWD	MW-2	5/28/2003	3592.56	53.15	257	804	<0.001	<0.001	<0.001	<0.001	138
Hobbs F-29 SWD	MW-2	9/22/2003	3592	53.71	151	700	<0.001	<0.001	<0.001	<0.001	173
Hobbs F-29 SWD	MW-2	12/18/2003	3591.61	54.10	208	815	<0.002	0.003	<0.002	0.014	71
Hobbs F-29 SWD	MW-2	3/15/2004	3591.38	54.33	186	607	<0.001	<0.001	<0.001	<0.001	103
Hobbs F-29 SWD	MW-2	5/27/2004		XXX	213	830	<0.001	<0.001	<0.001	<0.001	138
Hobbs F-29 SWD	MW-2	9/8/2004	3591.11	54.60	248	946	0.00464	0.000412	0.000979	0.001199	129
Hobbs F-29 SWD	MW-2	11/23/2004	3591.51	54.20	139	888	0.00448	<0.001	<0.001	0.000714	125
Hobbs F-29 SWD	MW-2	3/22/2005	3592.32	53.39	214	914	<0.001	<0.001	<0.001	<0.001	196
Hobbs F-29 SWD	MW-2	5/18/2005	3592.36	53.35	223	930	<0.001	<0.001	<0.001	<0.001	131
Hobbs F-29 SWD	MW-2	8/8/2005	3592.16	53.55	210	799	<0.001	<0.001	<0.001	<0.001	130
Hobbs F-29 SWD	MW-2	10/31/2005	3591.9	53.81	185	762	<0.001	<0.001	<0.001	<0.001	100
Hobbs F-29 SWD	MW-2	1/30/2006	3591.82	53.89	198	904	<0.001	<0.001	<0.001	<0.001	89.4
Hobbs F-29 SWD	MW-2	5/1/2006	3591.8	53.91	212	904	<0.001	<0.001	<0.001	<0.001	91.3
Hobbs F-29 SWD	MW-2	8/9/2006	3591.48	54.23	221	914	<0.001	<0.001	<0.001	<0.001	109
Hobbs F-29 SWD	MW-3	1/4/2001		XXX	136	1013	XXX	XXX	XXX	XXX	XXX
Hobbs F-29 SWD	MW-3	12/29/2001	3594.56	51.20		XXX	XXX	XXX	XXX	XXX	XXX
Hobbs F-29 SWD	MW-3	1/4/2002	3594.52	51.24	136	1013	XXX	XXX	XXX	XXX	XXX
Hobbs F-29 SWD	MW-3	5/24/2002		XXX	137	917	<0.001	<0.001	<0.001	<0.001	158
Hobbs F-29 SWD	MW-3	8/14/2002	3593.64	52.12	151	998	<0.001	<0.001	<0.001	<0.001	284
Hobbs F-29 SWD	MW-3	12/11/2002	3593.12	52.64	136	1069	0.005	<0.002	<0.002	<0.006	201
Hobbs F-29 SWD	MW-3	3/21/2003	3592.78	52.98	133	XXX	<0.001	<0.001	<0.001	<0.001	266
Hobbs F-29 SWD	MW-3	5/28/2003	3592.06	53.70	124	1120	<0.001	<0.001	<0.001	<0.001	240
Hobbs F-29 SWD	MW-3	9/22/2003	3592.02	53.74	120	881	<0.001	<0.001	<0.001	<0.001	238

Site_Name	Well_Name	sampledate	GWelev	depthtowater	cl	tds	benzene	toluene	ethylbenzene	totalxylenes	sulfate
Hobbs F-29 SWD	MW-3	3/15/2004	3591.41	54.35	115	1140	<0.001	<0.001	<0.001	<0.001	248
Hobbs F-29 SWD	MW-3	5/27/2004		XXX	111	810	<0.001	<0.001	<0.001	<0.001	171
Hobbs F-29 SWD	MW-3	9/8/2004	3591.16	54.60	230	937	<0.001	<0.001	<0.001	<0.001	186
Hobbs F-29 SWD	MW-3	11/23/2004	3591.36	54.40	115	925	<0.001	<0.001	<0.001	<0.001	183
Hobbs F-29 SWD	MW-3	12/18/2004	3591.17	54.59	124	852	<0.002	<0.002	<0.002	<0.006	73
Hobbs F-29 SWD	MW-3	3/22/2005	3592.36	53.40	162	796	<0.001	<0.001	<0.001	<0.001	126
Hobbs F-29 SWD	MW-3	5/18/2005	3592.38	53.38	272	1050	<0.001	<0.001	<0.001	<0.001	92
Hobbs F-29 SWD	MW-3	8/8/2005	3591.86	53.90	203	945	<0.001	<0.001	<0.001	<0.001	122
Hobbs F-29 SWD	MW-3	10/31/2005	3592.19	53.57	113	732	<0.001	<0.001	<0.001	<0.001	116
Hobbs F-29 SWD	MW-3	1/30/2006	3591.84	53.92	97.3	650	<0.001	<0.001	<0.001	j[0.000562]	120
Hobbs F-29 SWD	MW-3	5/1/2006	3591.78	53.98	85.3	704	<0.001	<0.001	<0.001	<0.001	111
Hobbs F-29 SWD	MW-3	8/9/2006	3591.47	54.29	80	594	<0.001	<0.001	<0.001	<0.001	150
Hobbs F-29 SWD	MW-4	1/4/2001			464	1781	XXX	XXX	XXX	XXX	XXX
Hobbs F-29 SWD	MW-4	12/29/2001	3594.25	51.51		XXX	XXX	XXX	XXX	XXX	XXX
Hobbs F-29 SWD	MW-4	1/4/2002	3594.2	51.56	464	1781	XXX	XXX	XXX	XXX	XXX
Hobbs F-29 SWD	MW-4	5/24/2002			461	1520	<0.001	<0.001	<0.001	<0.001	286
Hobbs F-29 SWD	MW-4	8/14/2002	3593.26	52.50	416	1660	<0.001	<0.001	<0.001	<0.001	303
Hobbs F-29 SWD	MW-4	12/11/2002	3592.76	53.00	336	1302	0.003	<0.002	<0.002	<0.006	170
Hobbs F-29 SWD	MW-4	3/21/2003	3592.35	53.41	346	XXX	<0.001	<0.001	<0.001	<0.001	289
Hobbs F-29 SWD	MW-4	5/28/2003	3592.51	53.25	301	742	<0.001	<0.001	<0.001	<0.001	269
Hobbs F-29 SWD	MW-4	9/22/2003	3591.55	54.21	425	1640	<0.001	<0.001	<0.001	<0.001	271
Hobbs F-29 SWD	MW-4	12/18/2003	3591.64	54.12	660	1902	<0.002	<0.002	<0.002	<0.006	123
Hobbs F-29 SWD	MW-4	3/15/2004	3590.92	54.84	452	1510	<0.001	<0.001	<0.001	<0.001	290
Hobbs F-29 SWD	MW-4	5/27/2004			461	1600	<0.001	<0.001	<0.001	<0.001	174
Hobbs F-29 SWD	MW-4	9/8/2004	3590.96	54.80	372	1300	<0.001	<0.001	<0.001	<0.001	260
Hobbs F-29 SWD	MW-4	11/23/2004	3591.36	54.40	401	1550	<0.001	<0.001	<0.001	<0.001	217
Hobbs F-29 SWD	MW-4	3/22/2005	3592	53.76	392	1220	<0.001	<0.001	<0.001	<0.001	196
Hobbs F-29 SWD	MW-4	5/18/2005	3591.98	53.78	336	1230	<0.001	<0.001	<0.001	<0.001	169
Hobbs F-29 SWD	MW-4	8/8/2005	3591.78	53.98	370	1230	<0.001	<0.001	<0.001	<0.001	171
Hobbs F-29 SWD	MW-4	10/31/2005	3591.94	53.82	411	1560	<0.001	J[0.000774]	J[0.000385	J[0.000842]	156
Hobbs F-29 SWD	MW-4	1/30/2006	3591.45	54.31	523	1780	<0.001	<0.001	j[0.000332]	j[0.001064]	182
Hobbs F-29 SWD	MW-4	5/1/2006	3591.4	54.36	501	1800	<0.001	<0.001	<0.001	<0.001	144
Hobbs F-29 SWD	MW-4	8/9/2006	3591.06	54.7	493	1870	<0.001	<0.001	<0.001	<0.001	185

Well Pump Test

Company	RICE Operating
Well ID	Hobbs F-29
Date	October 16, 2006
Field Personnel	Rozanne
Well Size	4-inch

WELL INFORMATION

Depth of Well	59.80
Depth to Water	54.13
Water Column in	5.67
Gallons in Well	3.69

FIELD PARAMETERS

Time	Gallons Pumped	Depth to Water	Drawdown/ft
BEGINNING PUMPING RATE 0.5 GPM			
	Start Pumping	54.13	0.00
1 Minute	0.5 Gallons	54.51	0.38
2 Minute	1 Gallons	54.48	0.35
3 Minute	1.5 Gallons	54.46	0.33
4 Minute	2 Gallons	54.42	0.29
5 Minute	2.5 Gallons	54.41	0.28
6 Minute	3 Gallons	54.41	0.28
7 Minute	3.5 Gallons	54.41	0.28
8 Minute	4 Gallons	54.41	0.28
9 Minute	4.5 Gallons	54.41	0.28
10 Minute	5 Gallons	54.41	0.28
INCREASED RATE			
1 Minute	6 Gallons	54.70	0.57
2 Minute	7 Gallons	54.73	0.60
3 Minute	8 Gallons	54.75	0.62
4 Minute	9 Gallons	54.77	0.64
5 Minute	10 Gallons	54.77	0.64
6 Minute	11 Gallons	54.77	0.64
7 Minute	12 Gallons	54.77	0.64
8 Minute	13 Gallons	54.77	0.64
9 Minute	14 Gallons	54.77	0.64
10 Minute	15 Gallons	54.77	0.64
INCREASED RATE			
1 Minute	17 Gallons	55.10	0.97
2 Minute	19 Gallons	55.50	1.37
3 Minute	21 Gallons	55.90	1.77
4 Minute	23 Gallons	56.19	2.06
5 Minute	25 Gallons	56.30	2.17
6 Minute	27 Gallons	56.39	2.26
7 Minute	29 Gallons	56.45	2.32
8 Minute	31 Gallons	56.53	2.40
9 Minute	33 Gallons	56.60	2.47
10 Minute	35 Gallons	56.69	2.56
11 Minute		56.74	2.61
12 Minute		56.81	2.68
13 Minute		56.85	2.72
14 Minute		56.87	2.74
15 Minute	45 Gallons	56.88	2.75
16 Minute		56.89	2.76
17 Minute		56.89	2.76
18 Minute		56.89	2.76
19 Minute		56.90	2.77
20 Minute	55 Gallons	56.90	2.77

Time	Gallons Pumped	Depth to Water	Drawdown/ft
INCREASED			
>1 Minute	>1 Gallons	59.36	5.23
Well Pumped Off			
WELL RECHARGE RATE			
15 Seconds		58.45	4.32
30 Seconds		58.26	4.13
45 Seconds		57.10	2.97
1 Minute		55.30	1.17
1 Minute15 Sec.		55.10	0.97
1 Minute 30 Sec		55.00	0.87
1 Minute 45 Sec.		54.70	0.57
2 Minutes		54.60	0.47
2 Minutes 25 Sec		54.65	0.52
2 Minutes 45 Sec.		54.50	0.37
3 Minutes		54.46	0.33
3 Minutes 15 Sec.		54.43	0.30
3 Minutes 30 Sec.		54.40	0.27
3 Minutes 45 Sec.		54.38	0.25
4 Minutes		54.37	0.24
4 Minutes 15 Sec.		54.36	0.23
4 Minutes 30 Sec.		54.35	0.22
4 Minutes 45 Sec.		54.34	0.21
5 Minutes		54.33	0.20
5 Minutes 30 Sec.		54.30	0.17
6 Minutes		54.27	0.14
6 Minutes 30 Sec.		54.23	0.10
7 Minutes		54.19	0.06
8 Minutes		54.14	0.01
9 Minutes		54.13	0

Arc Environmental, LLC - P.O Box 1772 - Lovington, New Mexico 88260 (505) 631-9310 rozanne@valornet.com

Appendix A

RICE Operating Company
122 West Taylor • Hobbs, New Mexico 88240
Phone: (505)393-9174 • Fax: (505) 397-1471

CERTIFIED MAIL
RETURN RECEIPT NO. Z 577 009 524

November 4, 1999

Mr. Wayne Price
State of NM Energy and Minerals Dept.
Oil Conservation Division
2040 South Pacheco Street
Santa Fe, NM 87505

Re: PIT REMEDIATION AND CLOSURE REPORT
Emergency Overflow Pit (Permit No. H-64)
Below-Ground Redwood Tank Excavation
SWD F-29 Facility
NW/4, Unit Letter F, Sec. 29, T18S, R38E
Lea County, NM

Dear Mr. Price:

Rice Operating Company (ROC) sincerely appreciates your consideration and response concerning finalizing the closure plans for the emergency overflow pit and the below-ground redwood tanks that are located at the F-29 Facility.

ROC has completed the clay layer installation as per NMOCD specifications and has backfilled the excavation and installed a berm around the storage tank area. The site pad has been graded and the facility has been returned to full service.

A sample of the clay used for the moisture barrier was submitted to Trinity Engineering Testing Corporation for the Proctor Test and permeability test. Trinity also conducted the field test of the in-situ clay layer. These results are attached to the Pit Remediation and Closure Report.

ROC has committed to a two-year, quarterly sampling plan to monitor groundwater at this site with results reported annually to the NMOCD. The ground water will be tested for BTEX, pH, TDS, Conductivity, T-Alkalinity, and routine major cations and anions: Na, Ca, Mg, K, Cl, SO_4, CO_3, HCO_3. The completed wellbore in the west part of the excavation has been extended to the surface, with a concrete pad poured around the well casing and a protective locking device installed on the casing. The well will be sampled pursuant to NMOCD specifications.

The source of contamination is removed, the moisture-barrier will be in place to prevent any percolation of contaminates downward, and natural attenuation will be relied upon to remediate the hydrocarbons remaining in the vadose zone over the foreseeable future.

At this time, ROC applies for closure at this facility and submits the Pit Remediation and Closure final report. As always, Rice Operating Company will appreciate timely consideration in this matter.

If you have any questions, please call.

Carolyn Doran Haynes

Carolyn Doran Haynes
Operations Engineer

Enclosures: Pit Remediation and Closure Report
- Clay Test Data
- Property Deed Copy
- Photos of Clay Layer Installation

Proposal of June 25, 1999 consisting of:
- Revised Closure Plan Emergency Overflow Pit (Permit H-64) SWD F-29
- Revised Closure Plan Below Ground Redwood Tanks SWD F-29
- Pit Inventory Permit H-64
- Maps and Analytical Data
- Disposal Manifests

Cc: KH, LBG, file, Donna Williams
OCD Hobbs District
1625 N. French Drive
Hobbs, NM 88240

District I
1625 N. French Drive, Hobbs, NM 88240
District II
811 South First, Artesia, NM 88210
District III
1000 Rio Brazos, Aztec, NM 87410
District IV
2040 South Pacheco, Santa Fe, NM 87505

State of New Mexico
Energy, Minerals & Natural Resources Department
OIL CONSERVATION DIVISION
2040 South Pacheco
Santa Fe, NM 87505

Nov 4 mailing also Included copy 3 6-25-99 report

PIT REMEDIATION AND CLOSURE REP

Operator: RICE OPERATING COMPANY Telephone: 505-393-9174

Address: 122 West Taylor, Hobbs, NM 88240

Facility or: SWD F-29
Well Name

Location: Unit or Qtr/Qtr Sec SE/4 NW/4 Sec 29 T 18S R 38E County Lea

Pit type: Emergency Overflow Pit Permit # H-64: 2 Below-Ground Redwood Terminal Tanks (not permitted)

Land Type: BLM ____ State ____ Fee ____ Other Owned by Rice Operating Company

Pit Location Pit Dimensions: length 63' width 29' depth 3'
(Attach diagram)

Reference: wellhead yes other ____

Footage from reference: Center of pit is 60' West and then 30' North of wellhead

Direction from reference: ____ Degrees ____ East North ____
of
____ West South ____

Depth to Ground Water (Vertical distance from contaminants to seasonal high water elevation of ground water)	Less than 50 feet 50 feet to 99 feet Greater than 100 feet	(20 points) (10 points) (0 points)	20
Wellhead Protection Area (Less than 200 feet from a private domestic water source, or; less than 1000 feet from all other water sources)	Yes No	(20 points) (0 points)	0
Distance to Surface Water: (Horizontal distance to perennial lakes, ponds, rivers, streams, creeks, irrigation canals and ditches)	Less than 200 feet 200 feet to 1000 feet Greater than 1000 feet	(20 points) (10 points) (0 points)	0
		RANKING SCORE (TOTAL POINTS):	20

Date Remediation Started: January 1999 Date Completed: October 12, 1999

Remediation Method: (Check all appropriate sections) Excavation Yes Approx. cubic yards 534

Landfarmed No In-situ Bioremediation

Other Natural Attenuation

Remediation Location: (ie.: landfarmed onsite, name and location of offsite facility) Onsite Offsite Sundance Services, East of Eunice, NM

General Description of Remedial Action: Replaced below-grade redwood tanks with above ground steel tanks. Excavated and disposed of highly impacted soil at the redwoods site and the overflow pit site. Installed clay layer as moisture barrier to prevent downward migration of contaminantes remaining in place. Groundwater will be sampled quarterly for two years in order to assertain if contaminanents in place impact groundwater quality. Clay layer compaction meets the criteria requested in NMOCD letter from Wayne Price dated September 2, 1999, with test results and color photo reproductions attached. Backfilled excavations with caliche.

Ground Water Encountered: No Yes monitor well Depth 50 feet BGS

Final Pit Closure Sampling (if multiple samples, attach sample results and diagram of sample locations and depths)

Sample location See attached diagram. All analytical reports, CoC, etc., are included in the accompanying copy of the June 25, 1999 submitted report.

Sample depth

Sample date Sample time

Sample Results

Benzene (ppm)

Total BTEX (ppm)

Field headspace (ppm)

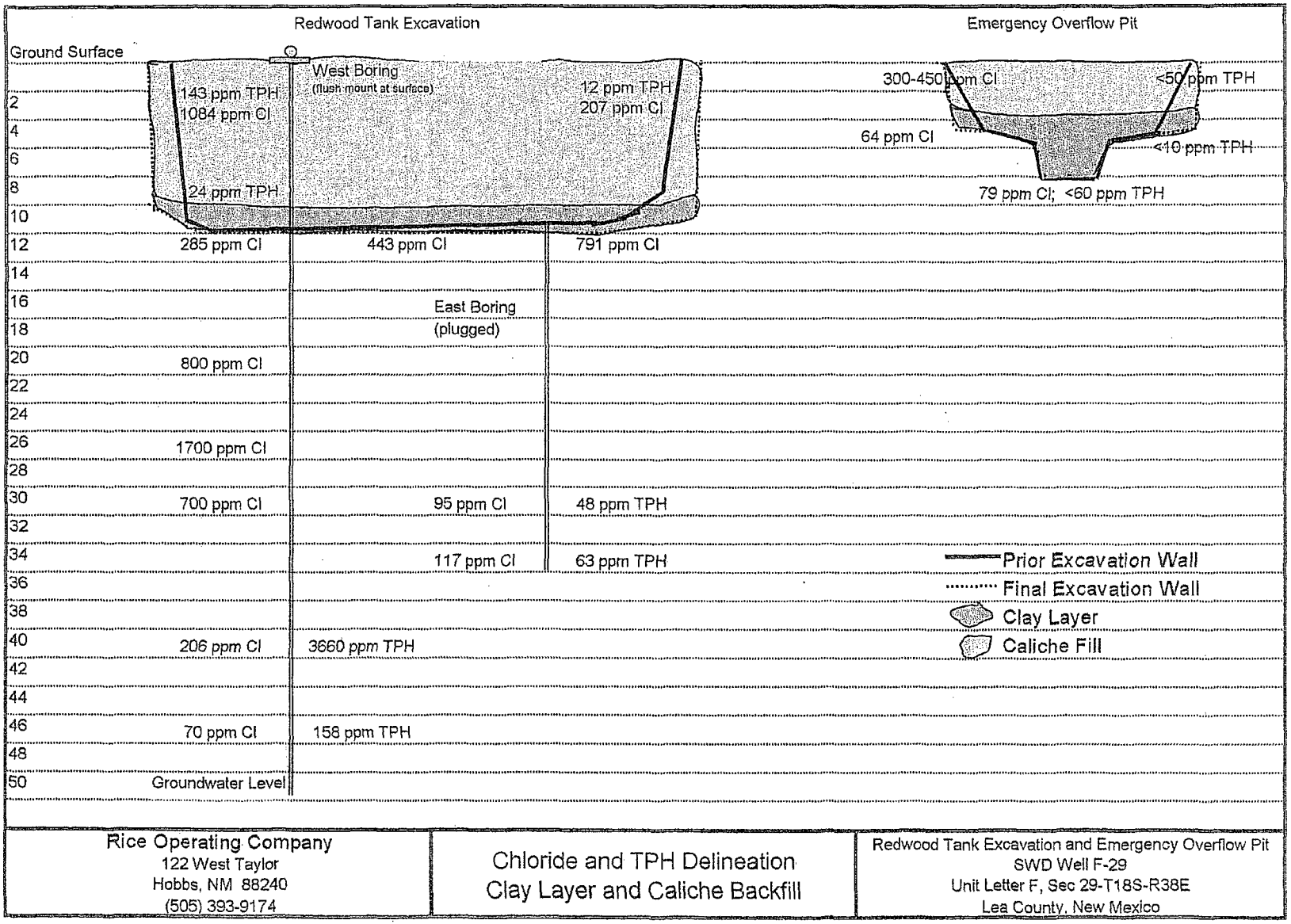
TPH

Ground Water Sample: Yes Yes No (If yes, attach sample results)

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

DATE November 4, 1999 PRINTED NAME CAROLYN DORAN HAYNES

SIGNATURE Carolyn Doran Haynes TITLE OPERATIONS ENGINEER



Rice Operating Company 122 West Taylor Hobbs, NM 88240 (505) 393-9174	Chloride and TPH Delineation Clay Layer and Caliche Backfill	Redwood Tank Excavation and Emergency Overflow Pit SWD Well F-29 Unit Letter F, Sec 29-T18S-R38E Lea County, New Mexico

Appendix B

Form WR-23 STATE ENGINEER OFFICE FIELD ENGR. LOG

WELL RECORD

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

Section 1

(A) Owner of well MOBAR OIL PROD. & DRILLING CORP.

Street and Number BOX 1919

City HOBBS State N.M.

Well was drilled under Permit No. L-6660 (E) and is located in the NE ¼ SW ¼ SW ¼ of Section 19 Twp. 18 S Rge. 38E

(B) Drilling Contractor ABBOTT BROS. License No. WD-46

Street and Number BOX 637

City HOBBS State N.M.

Drilling was commenced MARCH 23 19 70

Drilling was completed MARCH 23 19 70

(Plat of 640 acres)

Elevation at top of casing in feet above sea level Total depth of well 120'

State whether well is shallow or artesian shallow Depth to water upon completion 48

Section 2 PRINCIPAL WATER-BEARING STRATA

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

Section 3 RECORD OF CASING

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

Section 4 RECORD OF MUDDING AND CEMENTING

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

Section 5 PLUGGING RECORD

Name of Plugging Contractor License No.

Street and Number City State

Tons of Clay used Tons of Roughage used Type of roughage

Plugging method used Date Plugged 19

Plugging approved by:

Basin Supervisor

Cement Plugs were placed as follows:

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

FOR USE OF STATE ENGINEER ONLY

Date Received

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

Form WR-23 STATE ENGINEER OFFICE FIELD ENGR. LOG

WELL RECORD

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

Section 1

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

(Plat of 640 acres)

Elevation at top of casing in feet above sea level ____ Total depth of well 120'
State whether well is shallow or artesian shallow Depth to water upon completion 48

Section 2 PRINCIPAL WATER-BEARING STRATA

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

Section 3 RECORD OF CASING

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

Section 4 RECORD OF MUDDING AND CEMENTING

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

Section 5 PLUGGING RECORD

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

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

FOR USE OF STATE ENGINEER ONLY

Date Received ____

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

Section 6 LOG OF WELL

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

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

Well Driller

L-6601-Pook

Form WR-23 STATE ENGINEER OFFICE

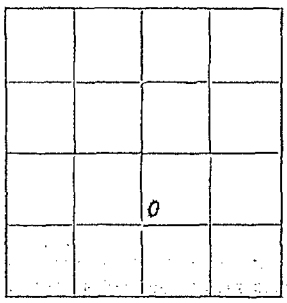
SHELL OIL CO., Mor[illegible]EY A #10

FIELD ENGR. LOG

WELL RECORD

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

Section 1



(Plat of 640 acres)

(A) Owner of well CAPITAN DRILLING COMPANY, Inc.

Street and Number P.O. Box 6725

City ODESSA 79760 State Texas

Well was drilled under Permit No. L-6337 and is located in the SW ¼ NE ¼ SE ¼ of Section 19 Twp. 18 S Rge. 38 E

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

Street and Number P.O. Box 637

City Hobbs 88240 State New Mexico

Drilling was commenced June 10 19

Drilling was completed June 10 19 68

Elevation at top of casing in feet above sea level Total depth of well 110

State whether well is shallow or artesian shallow Depth to water upon completion 40

Section 2 PRINCIPAL WATER-BEARING STRATA

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

Section 3 RECORD OF CASING

Dia in.	Pounds ft.	Threads in	Depth Top	Depth Bottom	Feet	Type Shoe	Perforations From	Perforations To
7	21	10	0	91	91	open	28.8	91.0

Section 4 RECORD OF MUDDING AND CEMENTING

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

Section 5 PLUGGING RECORD

Name of Plugging Contractor License No.

Street and Number City State

Tons of Clay used Tons of Roughage used Type of roughage

Plugging method used Date Plugged 19

Plugging approved by:

Basin Supervisor

Cement Plugs were placed as follows:

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

FOR USE OF STATE ENGINEER ONLY

Date Received

[illegible] OFFICE

1968 NOV 17 AM 8:27

File No. L-6337 Use O and O Location No. 18.38.19423

Section 6

LOG OF WELL

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

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

Harrell Abbott Jr.
Well Driller

L-6337 back

Revised June 1972

STATE ENGINEER OFFICE

WELL RECORD

FIELD ENGR. LOG

Section 1. GENERAL INFORMATION

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

Street or Post Office Address 1312 Kiowa

City and State Hobbs, New Mexico 88240

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

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

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

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

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

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

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

Drilling Began 3/23/82 Completed 3/24/82 Type tools Cable Size of hole 8¾ in.

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

Completed well is [X] shallow [ ] artesian. Depth to water upon completion of well 49 ft.

Section 2. PRINCIPAL WATER-BEARING STRATA

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

Section 3. RECORD OF CASING

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

Section 4. RECORD OF MUDDING AND CEMENTING

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

Section 5. PLUGGING RECORD

Plugging Contractor ____

Address ____

Plugging Method ____

Date Well Plugged ____

Plugging approved by:

____ State Engineer Representative

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

FOR USE OF STATE ENGINEER ONLY

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

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

Section 6. LOG OF HOLE

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

Section 7. REMARKS AND ADDITIONAL INFORMATION

L- 8716 back

STATE ENGINEER
ROSWELL, NM
MAR 26 8 22 AM '02

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

Murrell Abbott
Driller

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

Revised June 1972

STATE ENGINEER OFFICE

WELL RECORD

FIELD ENGR. LOG

Section 1. GENERAL INFORMATION

(A) Owner of well A A Oilfield Owner's Well No. _____
Street or Post Office Address 1416 W. Broadway
City and State Hobbs, NM 88240

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

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

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

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

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

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

Address 2601 W. Bender Hobbs, NM 88240

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

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

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

Section 2. PRINCIPAL WATER-BEARING STRATA

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

Section 3. RECORD OF CASING

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

Section 4. RECORD OF MUDDING AND CEMENTING

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

Section 5. PLUGGING RECORD

Plugging Contractor _____
Address _____
Plugging Method _____
Date Well Plugged _____
Plugging approved by:
_____ State Engineer Representative

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

FOR USE OF STATE ENGINEER ONLY

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

File No. L-8851 Use D & S Location No. 18.38.20.23141
Temp. on N. E. Corner

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

Section 7. REMARKS AND ADDITIONAL INFORMATION

L-8851 back

JUL 9 8 55 AM '82

STATE ENGINEER ROSWELL, NM

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

Driller

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

Revised June 1972

STATE ENGINEER OFFICE

WELL RECORD

FIELD ENGR. LOG

Section 1. GENERAL INFORMATION

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

Street or Post Office Address 2139 French Dr.

City and State Hobbs, NM 88240

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

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

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

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

Subdivision, recorded in Lea County.

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

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

Address 2601 W. Bender Hobbs, NM 88240

Drilling Began 7-9-82 Completed 7-10-82 Type tools button bit Size of hole 8½ in.

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

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

Section 2. PRINCIPAL WATER-BEARING STRATA

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

Section 3. RECORD OF CASING

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

Section 4. RECORD OF MUDDING AND CEMENTING

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

Section 5. PLUGGING RECORD

Plugging Contractor _____

Address _____

Plugging Method _____

Date Well Plugged _____

Plugging approved by:

_____ State Engineer Representative

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

FOR USE OF STATE ENGINEER ONLY

Date Received August 23, 1982 Quad _____ FWL _____ FSL _____

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

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

Section 7. REMARKS AND ADDITIONAL INFORMATION

L-8867 bock

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

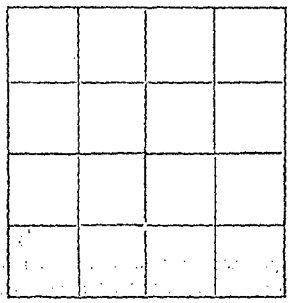
Larry Jeffries
Driller

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

WELL RECORD

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

Section 1



(Plat of 640 acres)

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

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

Section 2 PRINCIPAL WATER-BEARING STRATA

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

Section 3 RECORD OF CASING

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

Section 4 RECORD OF MUDDING AND CEMENTING

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

Section 5 PLUGGING RECORD

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

Cement Plugs were placed as follows:

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

____ Basin Supervisor

FOR USE OF STATE ENGINEER ONLY

Date Received ____

STATE ENGINEER OFFICE
OCT 24 AM 8:51 1972

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

Section 6

LOG OF WELL

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

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

O. R. Musselwhite

Well Driller

L - 7005 back

Revised June 1972

STATE ENGINEER OFFICE

WELL RECORD

FIELD ENGR. Lea

Section 1. GENERAL INFORMATION

(A) Owner of well Southwestern Drilling Mud Owner's Well No. _____
Street or Post Office Address P.O. Box 2477
City and State Midland, Texas 79701

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

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

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

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

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

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

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

Drilling Began 6/21/76 Completed 6/22/76 Type tools Cable Size of hole 8¾ in.

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

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

Section 2. PRINCIPAL WATER-BEARING STRATA

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

Section 3. RECORD OF CASING

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

Section 4. RECORD OF MUDDING AND CEMENTING

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

Section 5. PLUGGING RECORD

Plugging Contractor _____
Address _____
Plugging Method _____
Date Well Plugged _____
Plugging approved by: _____
State Engineer Representative

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

FOR USE OF STATE ENGINEER ONLY

Date Received

Quad _____ FWL _____ FSL _____

File No. _____ Use _____ Location No. _____

Section 6. LOG OF HOLE

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

'76 JUL 1 AM 10 41

STATE ENGINEER OFFICE
ROSWELL, N. M.

Section 7. REMARKS AND ADDITIONAL INFORMATION

L-7570 back

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

Murrell Abbott H.B.
Driller

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

Revised June 1972

STATE ENGINEER OFFICE

WELL RECORD

Section 1. GENERAL INFORMATION

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

Street or Post Office Address 777 main street suite 3200

City and State Fort Worth Tx 76102

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

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

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

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

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

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

Address PO BOX 1495 Seminole TX 79360

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

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

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

Section 2. PRINCIPAL WATER-BEARING STRATA

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

Section 3. RECORD OF CASING

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

Section 4. RECORD OF MUDDING AND CEMENTING

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

Section 5. PLUGGING RECORD

Plugging Contractor N/A

Address _____

Plugging Method _____

Date Well Plugged _____

Plugging approved by:

_____
State Engineer Representative

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

FOR USE OF STATE ENGINEER ONLY #21224

Date Received 08/10/01

Quad _____ FWL _____ FSL _____

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

Section 6. LOG OF HOLE

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

Section 7. REMARKS AND ADDITIONAL INFORMATION

L-11176 back

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

Driller

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

(This form to be executed in triplicate)

WELL RECORD

Date of Receipt _____ Permit No. L-2395

Name of permittee, Lovell Petroleum Corp.

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

1. Well location and description: The shallow (shallow or artesian) well is located in N.E. ¼, N.E. ¼, N.W. ¼ of Section 20, Township 18 S., Range 38 E.; Elevation of top of casing above sea level, _____ feet; diameter of hole, 7 inches; total depth, 87 feet; depth to water upon completion, 35 feet; drilling was commenced 8-31-53, 19__, and completed 8-31-53, 19__; name of drilling contractor L. K. Musselwhite; Address, Box 56, Hobbs, N. M.; Driller's License No. W.D. 99

2. Principal Water-bearing Strata:

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

3. Casing Record:

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

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

_____

_____

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

_____

_____

_____

SEP 21 1953

L-2395 CAP ELP

18.38.30.123

5. Log of Well:

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

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

O. B. Musselwhite
Licensed Well Driller

Instructions

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

L - 2395 back

Form WR-23 STATE ENGINEER OFFICE

FIELD ENGR. LOG

WELL RECORD

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

Section 1

(A) Owner of well Amerada Petroleum Corp.

Street and Number Drawer D

City Monument, State New Mexico

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

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

Street and Number Box 56

City Hobbs, State New Mexico

Drilling was commenced Feb. 10, 19 66

Drilling was completed Feb. 12, 19 66

(Plat of 640 acres)

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

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

Section 2 PRINCIPAL WATER-BEARING STRATA

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

Section 3 RECORD OF CASING

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

Section 4 RECORD OF MUDDING AND CEMENTING

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

Section 5 PLUGGING RECORD

Name of Plugging Contractor License No.

Street and Number City State

Tons of Clay used Tons of Roughage used Type of roughage

Plugging method used Date Plugged 19

Plugging approved by:

Basin Supervisor

Cement Plugs were placed as follows:

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

FOR USE OF STATE ENGINEER ONLY

Date Received

1966 APR -7 AM 8:41

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

Section 6

LOG OF WELL

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

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

O. R. Mauldin

Well Driller

L-5849 back

Form WR-23 STATE ENGINEER OFFICE

WELL RECORD

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

Section 1

(A) Owner of well Baker Oil Tools, Inc.
Street and Number Box 1295
City Hobbs, State New Mexico
Well was drilled under Permit No. L-2984 and is located in the
N.E.¼ S.W.¼ S.W.¼ of Section 32 Twp. 18S Rge. 38E
(B) Drilling Contractor O.R. Musselwhite License No. WD 99
Street and Number Box 56
City Hobbs, N State New Mexico
Drilling was commenced Sept. 10 19 55
Drilling was completed Sept. 11 19 55

(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 From	Depth in Feet To	Thickness in Feet	Description of Water-Bearing Formation
1	40	80	40	Sand & sand rock
2				
3				
4				
5				

Section 3 RECORD OF CASING

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

Section 4 RECORD OF MUDDING AND CEMENTING

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

Section 5 PLUGGING RECORD

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

Basin Supervisor

Cement Plugs were placed as follows:

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

FOR USE OF STATE ENGINEER ONLY

Date Received SEP 19 1955

RECEIVED
OFFICE
GROUND WATER SUPERVISOR
ROSWELL, NEW MEXICO

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

Section 6

LOG OF WELL

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

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

O. R. Musselwhite

Well Driller

L-2964 back

(This form to be executed in triplicate)

WELL RECORD

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

Name of permittee, Skelly Oil Co.

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

1. Well location and description: The Shallow (shallow or artesian) well is located in SW ¼, SW ¼, SW ¼ of Section 32, Township 18 S, Range 38 E; Elevation of top of casing above sea level, ... feet; diameter of hole, 8 inches; total depth, 116 feet; depth to water upon completion, 34 feet; drilling was commenced June 25, 19 54, and completed June 25, 1954; name of drilling contractor Ed. B. Burke Box 306; Address, Hobbs, New Mexico; Driller's License No. WD-111

2. Principal Water-bearing Strata:

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

3. Casing Record:

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

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

.....

.....

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

.....

.....

.....

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

L-2555

18.38.32.332

L - 2555 back

5. Log of Well:

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

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

15-38-32-333

Edward B Burke
Licensed Well Driller

Instructions

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

(This form to be executed in triplicate)

WELL RECORD

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

Name of permittee, Joe P. Dutton

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

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

2. Principal Water-bearing Strata:

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

3. Casing Record:

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

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

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

L-2232 N.M. 18.38.33.300 2

L-3232 back

5. Log of Well:

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

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

Edward B Burke
Licensed Well Driller

Instructions

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

Appendix C

RICE Operating Company
122 West Taylor • Hobbs, New Mexico 88240
Phone: (505)393-9174 • Fax: (505) 397-1471

CERTIFIED MAIL
RETURN RECEIPT NO. 7099 3220 0001 9928 4591

September 7, 2001

Mr. Wayne Price
NM Energy and Minerals Dept.
OCD Environmental Bureau
1220 S. St. Francis Drive
Santa Fe, NM 87504

Re: SWD F-29 Facility – Groundwater Monitoring
NW/4, Unit Letter F, Sec. 29, T18S, R38E
Lea County, NM

Dear Mr. Price:

Rice Operating Company (ROC) appreciates your consideration and response concerning the groundwater monitoring at the F-29 SWD Facility.

A brief background review: this facility operated with below-grade redwood tanks and an emergency overflow pit until 1999 when the facility was upgraded with fiberglass tanks and the overflow pit was closed. Site vertical delineation revealed that salt impact was arrested at 40' BGS at the west-redwood tank and 30' BGS at the east-redwood tank. The initial water analysis indicated no saltwater impact to the groundwater. ROC agreed to sample the monitor well for two years because an unexplained TPH pocket was found 40' BGS at the west-redwood location. (A full report of the delineation and closure activities was submitted to NMOCD June 25, 1999.)

A quarterly monitoring schedule was initiated and MW-1 was discovered to be full of sand, and the water analysis indicated an elevated chloride concentration. ROC received permission to complete an alternate well, MW-2, which also exhibited elevated chloride concentration. ROC verbally notified the NMOCD Santa Fe Office of this occurrence on August 1, 2000 and through email on September 11, 2000. After discussion on August 1, it was suggested that ROC drill and complete an up-gradient well to reference the groundwater quality in the area. ROC contacted the adjacent landowner, Mr. Gary Schubert of Grimes Land Company, for permission to drill and complete a monitor well, but Mr. Schubert respectfully declined permission.

As result of discussion with NMOCD in March 2001 of the F-29 Facility Annual Monitoring Report, ROC contracted with Safety & Environmental Solutions, Inc. (SESI) to "pump and

dispose" to attempt to remove the elevated-chloride groundwater in MW-2. A reduction in TDS concentration from 3470 ppm to 1385 ppm was realized from a purge of 18,355 gallons. At several points during the intensified effort (daily purge and test July 16 through July 30), the groundwater chloride concentration fell to 223ppm, below the WQCC level (250ppm). Enclosed with this letter is the fluid recovery report of F-29 Facility site activity and analytical results prepared by David Boyer of SESI.

Because the groundwater chloride concentration has fluctuated between 223 and 480ppm, depending on purge volume, ROC would like to expand the groundwater investigation with an up-gradient monitor well and a down-gradient monitor well, as depicted on the attached facility site map. Both of these wells will be located within the ROC property boundaries. All fluid produced from the monitor wells will be measured for volume and then disposed into the SWD Well F-29 Facility, a commercial disposal well owned and operated by ROC.

The monitor wells will be completed pursuant to NMOCD guidelines and sampled pursuant to NMOCD specifications for BTEX, pH, TDS, Conductivity, T-Alkalinity, and routine major cations and anions: Na, Ca, Mg, K, Cl, SO_4, CO_3, HCO_3. Upon receipt of the analytical results, ROC will contact the NMOCD for discussion of further action.

ROC would like to reiterate that this location is surrounded by the Occidental Permian North Hobbs Waterflood Unit and is adjacent to the historical "Windmill Oil Company" production and recovery area. ROC believes that because extensive vertical delineation results at this facility revealed salt-water impact to the vadose zone was arrested before groundwater was contacted, the elevated chloride and TDS concentrations are most likely the result of off-site historical events consistent with seventy-plus years of petroleum production.

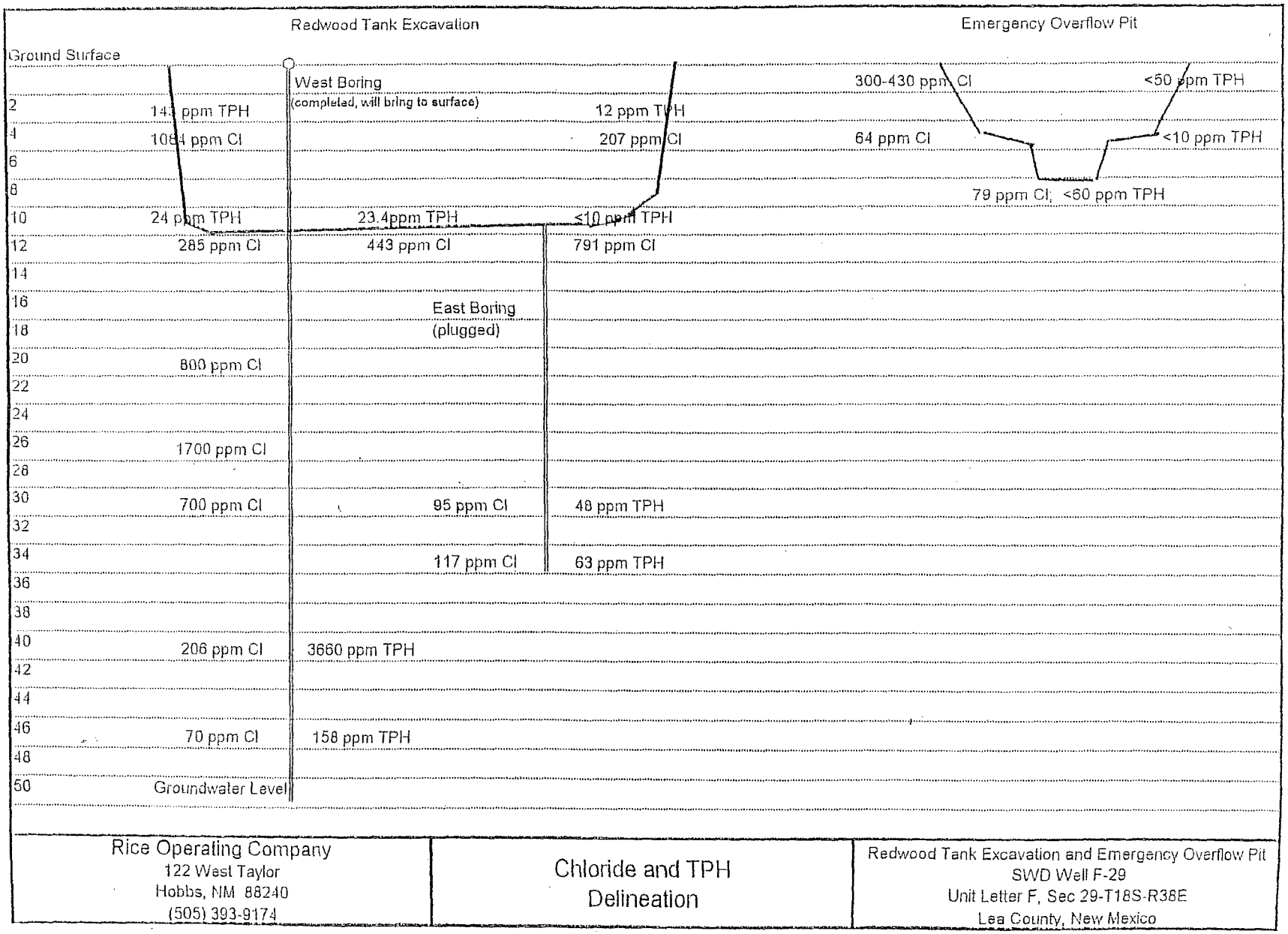
If you have any questions, please call. ROC looks forward to your reply.

RICE OPERATING COMPANY

Carolyn Doran Haynes

Carolyn Doran Haynes
Operations Engineer

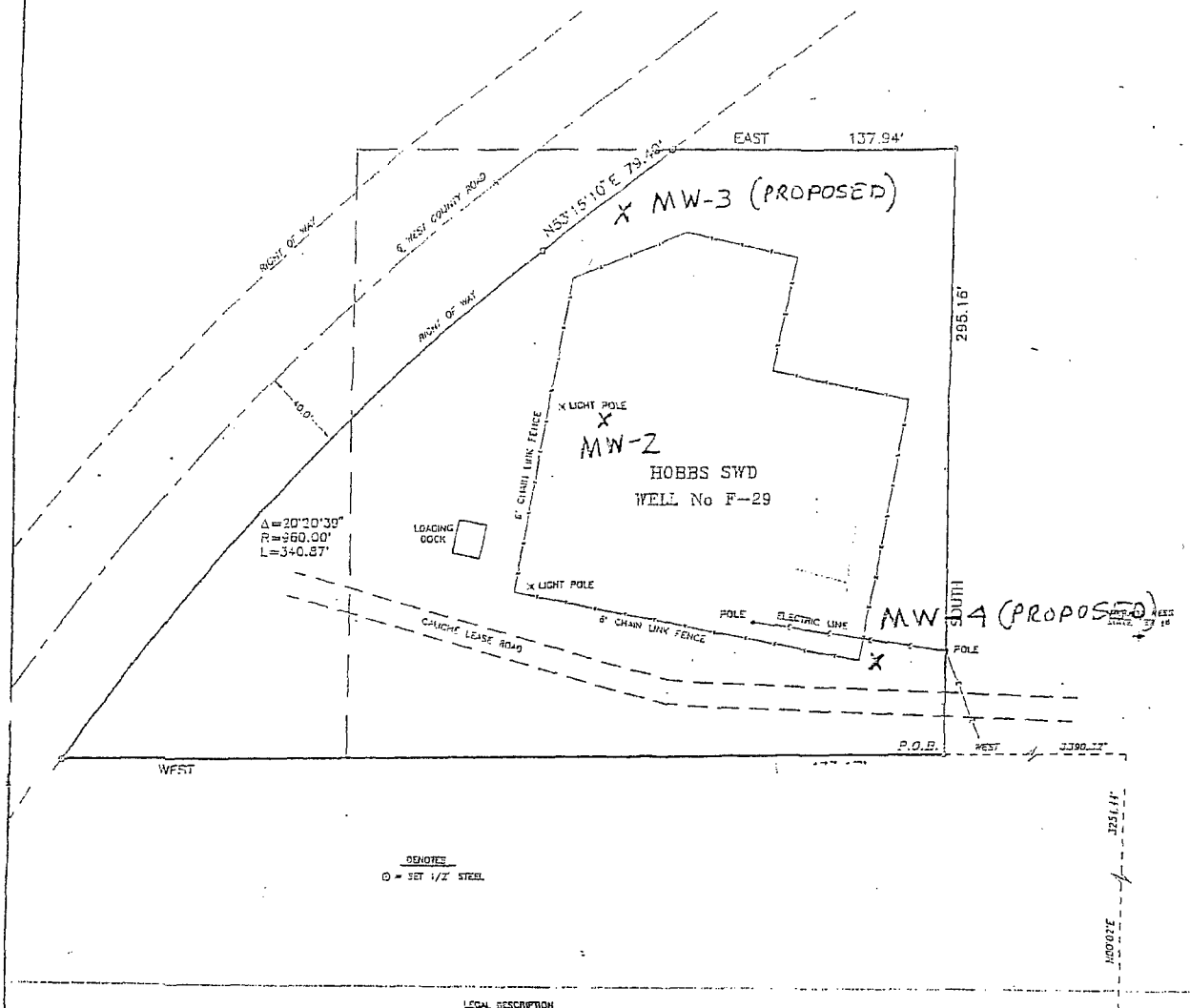
cc: LBG, file, Chris Williams
NMOCD Hobbs District 1
1625 N. French Drive
Hobbs, NM 88240



Rice Operating Company 122 West Taylor Hobbs, NM 88240 (505) 393-9174	Chloride and TPH Delineation	Redwood Tank Excavation and Emergency Overflow Pit SWD Well F-29 Unit Letter F, Sec 29-T18S-R38E Lea County, New Mexico

SECTION 29, TOWNSHIP 18 SOUTH, RANGE 38 EAST, N.M.P.M.,

LEA COUNTY, NEW MEXICO



DENOTES

⊙ = SET 1/2" STEEL

LEGAL DESCRIPTION

A TRACT OF LAND IN THE SE/4 OF THE NW/4 OF SECTION 29, TOWNSHIP 18 SOUTH, RANGE 38 EAST, N.M.P.M., LEA COUNTY, NEW MEXICO, BEING FULLY DESCRIBED AS FOLLOWS:

BEGINNING AT A POINT BEING N00°00'E, 3251.44 FEET AND WEST, 3390.32 FEET FROM SOUTHEAST CORNER OF SAID SECTION 29, THENCE WEST, 430.17 FEET TO A POINT ON THE EAST RIGHT OF WAY LINE OF WEST COUNTY ROAD BYPASS, ALSO A POINT ON A CURVE TO THE NORTHEAST, THENCE ALONG THIS CURVE (HAVING A CENTRAL ANGLE OF 20°20'39", A RADIUS OF 960.00 FEET AND A CHORD BEARING AND DISTANCE OF N43°04'45"E, 339.08 FEET) A LENGTH OF 340.87 FEET, THENCE N53°15'10"E, 79.40 FEET; THENCE EAST, 137.94 FEET; THENCE SOUTH, 295.16 FEET TO THE POINT OF BEGINNING. SAID TRACT CONTAINS 2.006 ACRES MORE LESS.

29 | 28
32 | 33

40 0 40 80 120 Feet

I HEREBY CERTIFY THAT THIS PLAT WAS PREPARED FROM FIELD NOTES OF AN ACTUAL SURVEY AND MEETS OR EXCEEDS ALL REQUIREMENTS FOR LAND SURVEYS AS SPECIFIED BY THIS STATE.

GARY L. JONES NEW MEXICO 7977 REGISTERED PROFESSIONAL SURVEYOR

JOHN W. WEST, N.M.P.E. & P.S. No. 676
TEXAS P.L.S. No. 1138
RONALD J. EIDSON, N.M. L.S. No. 3239
TEXAS P.L.S. No. 1983
GARY L. JONES N.M. P.S. No. 7977

RICE ENGINEERING CORP.

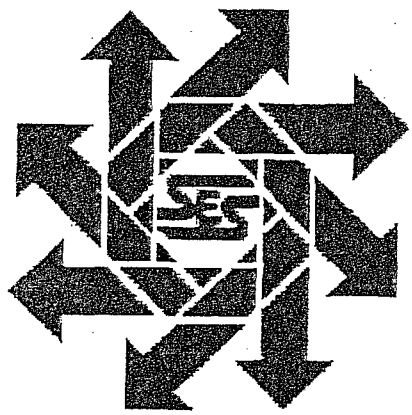
A TRACT OF LAND LOCATED IN
SECTION 29, TOWNSHIP 18 SOUTH, RANGE 38 EAST,
N.M.P.M., LEA COUNTY, NEW MEXICO

JOHN WEST ENGINEERING CO.
CONSULTING ENGINEERS & SURVEYORS – HOBBS, NEW MEXICO

Surveyed By: JASON	Drawn By: HOLMES	Last Rev. Date:	Drawing Number
Date Assmt: 8-20-93	Date: 8-27-93	Disk: JH No 51	D-319-1
Date Rev: 10-20-93	Approved By:	Sheet: 1 of 1 Sheets	
W.O. Number: 93-11-1555	File Name: DRAWINGS\RICE1555		

Rice Operating Company
F-29 Monitor Well Fluid Recovery Report
Section 29, T19S, R38E
Lea County, New Mexico

August 29, 2001



Prepared for:

Rice Operating Company
122 W. Taylor
Hobbs, New Mexico 88240

By:

Safety & Environmental Solutions, Inc.
703 E. Clinton, Suite 102
Hobbs, New Mexico 88240
(505) 397-0510

TABLE OF CONTENTS

I. Background

Safety & Environmental Solutions, Inc. (SESI) was engaged to perform sampling and data collection on a Rice Operating SWD System Well. The well is referred to as the F-29 monitor well. The subject area is located in Section 29, Township 19 S Range 38 E in Lea County, New Mexico. (See Figure 1. Location Map).

II. Work Performed

The well was scheduled for pumping by SESI for 8-hour periods every other day with a small capacity (~1 gpm) submersible pump. The fluid recovered from the well was placed in a holding provided by Rice Operating Company. Due to equipment problems, the pumping schedule was not met in June. Beginning in mid-July, a larger submersible pump capable of pumping 7-10 gpm was utilized. On July 31, generator and wiring problems prevented pumping that day. Due to an August 1 OCD deadline, no further pumping was performed. Table 1 provides the pumping record for July including field measurement of chloride concentrations using Hach Quantabs. A total of 3,280 gallons of fluid was removed during the current test period ending July 31. An approximate total of 18,355 gallons has been removed since the beginning of the pumping period on March 9, 2001.

On August 14, 2001 a SESI technician performed sampling of the well. Samples were taken from the well after pumping a short period with the repaired generator. The samples were obtained and placed in appropriate containers, preserved and transported under chain of custody to Cardinal Laboratories of Hobbs, New Mexico for analysis. The analysis performed on these samples was for detection of Major Cations and Anions. (See Analytical Results)

III. Analytical Results

Comparison tables of the analytical data are provided in Table 2 to show the differences before and after pumping fluid from the F-29 well. Analysis of the groundwater samples performed by Cardinal Laboratories are compared and summarized as shown in the table. A negative number indicates a decrease in constituent concentration from the previous sampling date.

The final sampling on August 14 shows chloride concentration (340 mg/L) exceeding the NM Water Quality Control Commission (WQCC) groundwater standard[1] (250 mg/L) by 90 mg/L. Although the chloride concentration exceeds the standard, it has decreased by an order of magnitude from sampling conducted in March of 2000. Figure 2 shows the decline in concentration from March 2000 to August 2001. The decline stopped and became generally asymptotic beginning in March of this year.

1 The NM Oil Conservation Division (OCD) utilizes the NM WQCC groundwater standards in administration of OCD rules and regulations.

In July, heavy pumping of the monitor well did not substantially change the concentration of chloride in the well and might have caused a slight increase (Figure 3). The fact that daily pumping could cause chloride concentration to fluctuate between 250 and 480 mg/L as it did on July 29 indicates the likelihood of a nearby source.

IV. Report Tables, Figures and Laboratory Results

Table 1. July 2001 Rice F-29 Monitor Well Pumping

Date	Sample Time	Tank Start (ft)	Tank Finish (ft)	Difference (ft.)	Approx. Volume Change (gal)	Time Pumped (min)	Avg. Pumping Rate (gpm)	Avg. Chloride (ppm)
07/05/01	--	--	--	--	410	8 hr	0.85	--
07/06/01	--	1.92	2.14	0.22	336	8 hr	0.7	--
07/16/01	12:00 PM	2.14	2.88	0.74 (?)	--	20	--	--
07/19/01	12:45 PM	--	--	--	--	--	--	333
07/20/01	8:36 AM	6.23	6.08	0.15	229	22	10.4	298
07/20/01	7:24 PM	7.12	6.99	0.13	198	25	7.9	298
07/21/01	10:24 AM	7.47	7.34	0.13	198	25	7.9	359
07/22/01	12:34 PM	7.35	7.26	0.09	137	20	6.9	258
07/23/01	8:49 AM	7.26	7.18	0.08	122	20	6.1	258
07/23/01	5:34 PM	7.18	7.09	0.09	137	20	6.9	321
07/24/01	8:29 AM	7.09	7.02	0.07	107	15	7.1	384
07/25/01	7:26 AM	7.03	6.96	0.07	107	16	6.7	414
07/26/01	7:20 AM	7.37	7.26	0.11	168	25	6.7	321
07/26/01	7:34 AM	--	--	--	--	--	--	445
07/27/01	7:07 AM	6.89	6.75	0.14	214	30	7.1	288
07/27/01	7:15 AM	--	--	--	--	--	7.0	249, 258
07/27/01	7:24 AM	--	--	--	--	--	--	398
07/27/01	7:34 AM	--	--	--	--	--	--	480
07/29/01	10:17 AM	7.24	7.02	0.22	336	60	5.6	384
07/29/01	10:25 AM	--	--	--	--	--	--	429
07/29/01	10:34 AM	--	--	--	--	--	--	223
07/29/01	10:44 AM	--	--	--	--	--	--	357
07/29/01	10:54 AM	--	--	--	--	--	--	258
07/29/01	11:04 AM	--	--	--	--	--	--	223
07/29/01	11:14 AM	--	--	--	--	--	--	398
07/29/01	7:20 PM	7.01	6.88	0.13	198	30	6.6	429
07/29/01	7:29 PM	--	--	--	--	--	--	278
07/29/01	7:39 PM	--	--	--	--	--	--	398
07/30/01	6:55 AM	7.53	7.41	0.12	183	30	6.1	298
07/30/01	7:04 AM	--	--	--	--	--	--	333
07/30/01	1:42 PM	--	--	--	--	--	--	462
07/30/01	7:20 PM	7.41	7.28	0.13	198	30	6.6	429
07/30/01	7:29 PM	--	--	--	--	--	--	370
07/30/01	7:39 PM	--	--	--	--	--	--	345
		July Total Volume Pumped:			**3,280**			
Tank strapped 7/25. Circumference 50.65 ft., radius 8.06 ft., area 204.12 ft^2								

Table 2. Summary of F-29 Chemical Analyses December 2000 to August 2001

F-29 Monitor Well	Na (mg/L)	Ca (mg/L)	Mg (mg/L)	K (mg/L)	Conductivity (µmhos/cm)	T-Alkalinity (mg $CaCO_3$/L)
December 12, 2000	500	250	51	15.16	4,239	246
March 16, 2001	167	142	49	12.65	2,146	228
Change	-333	-108	-2	-2.51	-2,093	-18
	Cl^- (mg/L)	SO_4 (mg/L)	CO_3 (mg/L)	HCO_3 (mg/L)	pH (s.u.)	TDS (mg/L)
December 12, 2000	1,027	127	0	300	7.32	2,586
March 16, 2001	396	221	0	279	7.32	1,373
Change	-631	94	0	-21	0	-1,213

F-29 Monitor Well	Na (mg/L)	Ca (mg/L)	Mg (mg/L)	K (mg/L)	Conductivity (µmhos/cm)	T-Alkalinity (mg $CaCO_3$/L)
March 16, 2001	167	142	49	12.65	2,146	228
March 23, 2001	226	142	41	11.00	1,823	228
Change	59	0	-8	-1.65	-323	0
	Cl^- (mg/L)	SO_4 (mg/L)	CO_3 (mg/L)	HCO_3 (mg/L)	pH (s.u.)	TDS (mg/L)
March 16, 2001	396	221	0	279	7.32	1,373
March 23, 2001	368	271	0	279	6.98	1,312
Change	-28	50	0	0	-0.34	-61

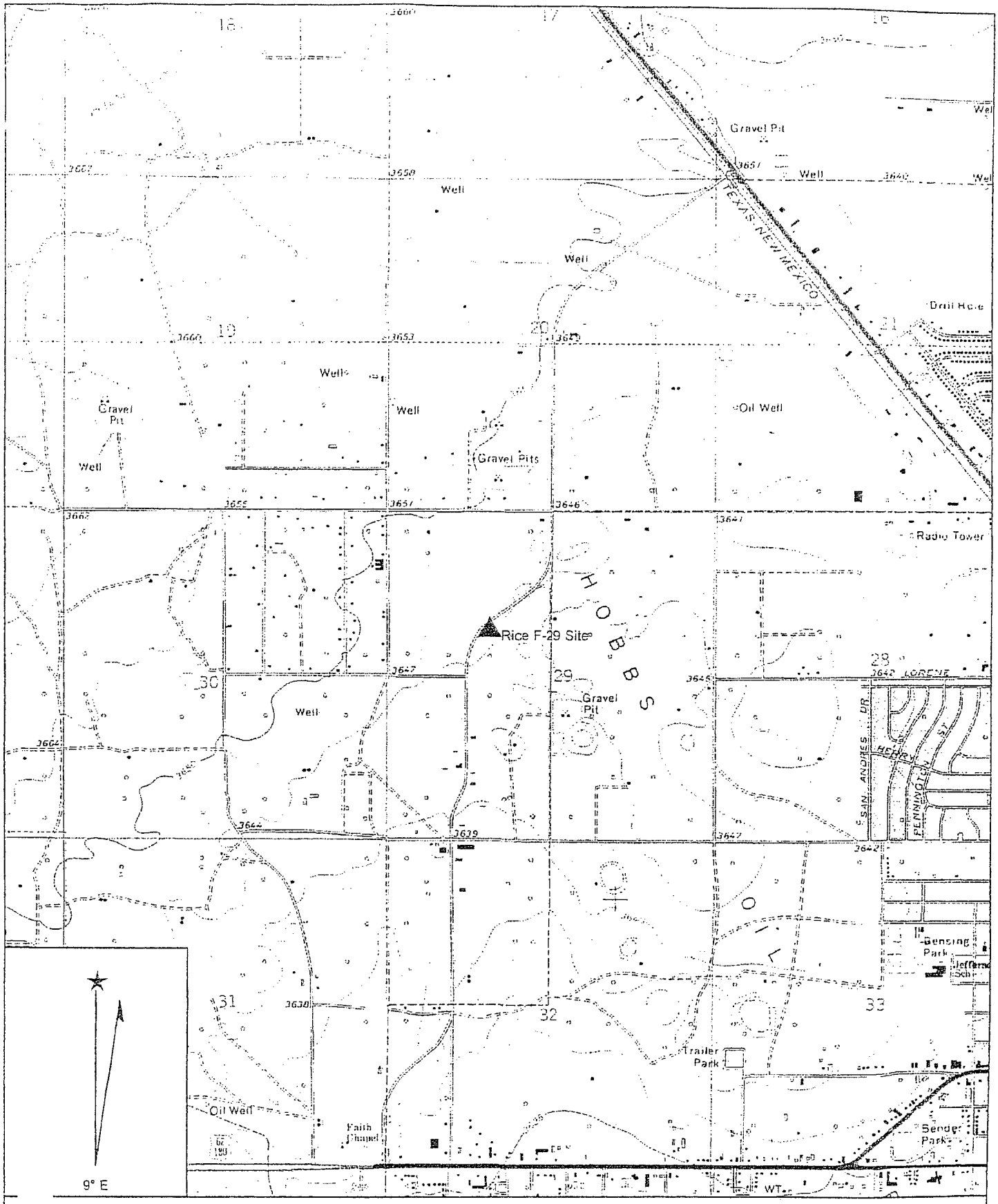
F-29 Monitor Well	Na (mg/L)	Ca (mg/L)	Mg (mg/L)	K (mg/L)	Conductivity (µmhos/cm)	T-Alkalinity (mg $CaCO_3$/L)
March 23, 2001	226	142	41	11.00	1,823	228
May 7, 2001	219	139	37	9.31	1,846	230
Change	-7	-3	-4	-1.69	23	2
	Cl^- (mg/L)	SO_4 (mg/L)	CO_3 (mg/L)	HCO_3 (mg/L)	pH (s.u.)	TDS (mg/L)
March 16, 2001	368	271	0	279	6.98	1,312
May 7, 2001	365	234	0	280	7.01	1,272
Change	-3	-37	0	1	0.03	-40

Table 2. Summary of F-29 Chemical Analyses December 2000 to August 2001 (concluded)

F-29 Monitor Well	Na (mg/L)	Ca (mg/L)	Mg (mg/L)	K (mg/L)	Conductivity (µmhos/cm)	T-Alkalinity (mg $CaCO_3$/L)
May 7, 2001	219	139	37	9.31	1,846	230
June 8, 2001	256	184	37	14.3	2,289	243
Change	37	45	0	4.99	443	13
	Cl (mg/L)	SO_4 (mg/L)	CO_3 (mg/L)	HCO_3 (mg/L)	pH (s.u.)	TDS (mg/L)
May 7, 2001	365	234	0	280	7.01	1,272
June 8, 2001	513	212	0	297	6.92	1,796
Change	148	-22	0	17	-0.09	524

F-29 Monitor Well	Na (mg/L)	Ca (mg/L)	Mg (mg/L)	K (mg/L)	Conductivity (µmhos/cm)	T-Alkalinity (mg $CaCO_3$/L)
June 8, 2001	256	184	37	14.3	2,289	243
August 14, 2001	171	124	31	7.46	1,854	217
Change	-85	-60	-6	-6.8	-435	-26
	Cl (mg/L)	SO_4 (mg/L)	CO_3 (mg/L)	HCO_3 (mg/L)	pH (s.u.)	TDS (mg/L)
June 8, 2001	513	212	0	297	6.92	1,796
August 14, 2001	340	133	0	264	6.76	1,385
Change	-173	-79	0	-33	-0.16	-411

Figure 1
Location Map



Name: HOBBS WEST
Date: 8/30/2001
Scale: 1 inch equals 2000 feet

Location: 032° 43' 17.1" N 103° 10' 23.0" W
Caption: Rice Operation Company
F-29 Monitor Well
Section 29, T19S, R38E

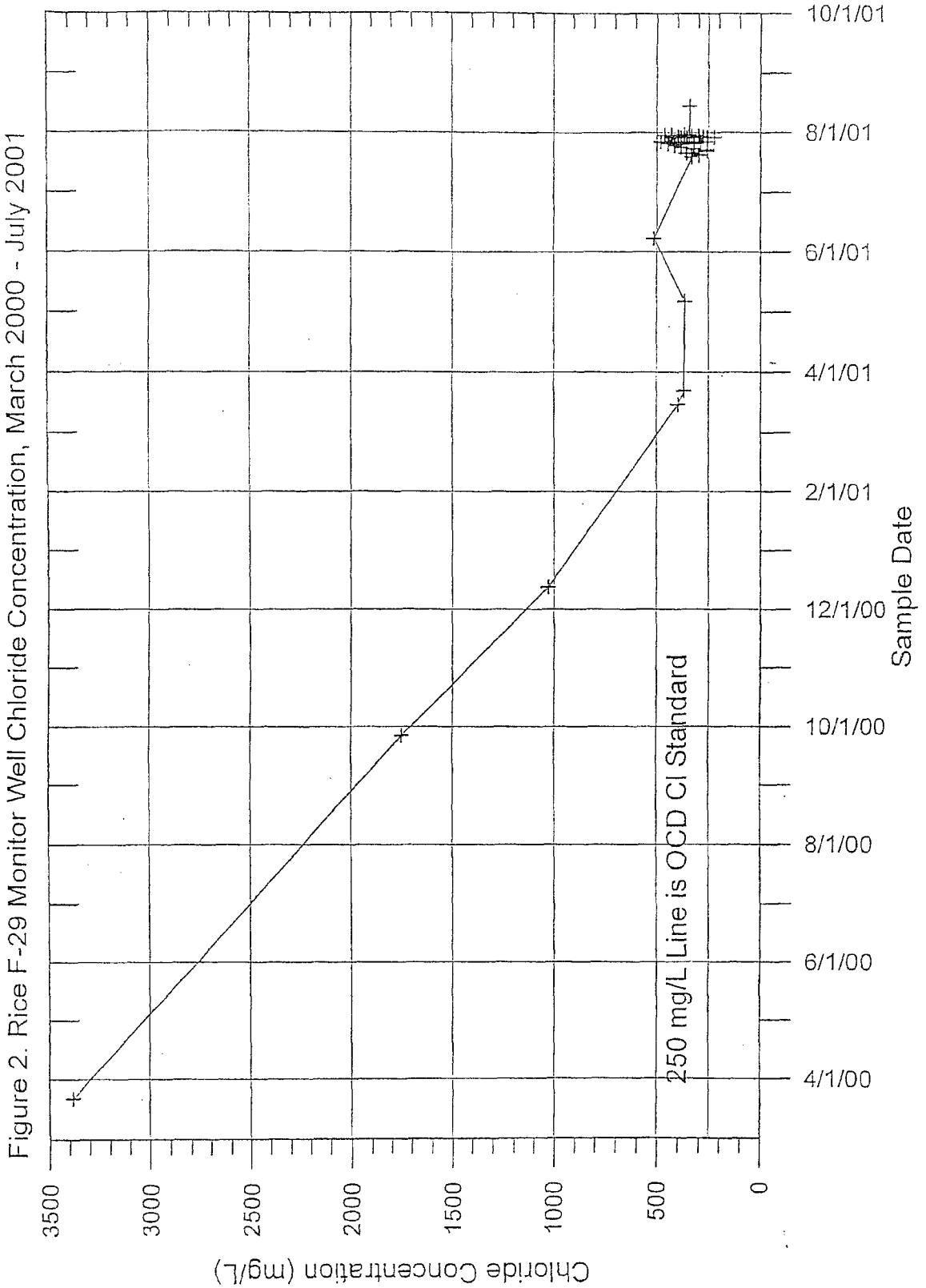


Figure 2. Rice F-29 Monitor Well Chloride Concentration, March 2000 - July 2001
Chloride Concentration (mg/L)
3500
3000
2500
2000
1500
1000
500
0
Sample Date
10/1/01
8/1/01
6/1/01
4/1/01
2/1/01
12/1/00
10/1/00
8/1/00
6/1/00
4/1/00
250 mg/L Line is OCD Cl Standard

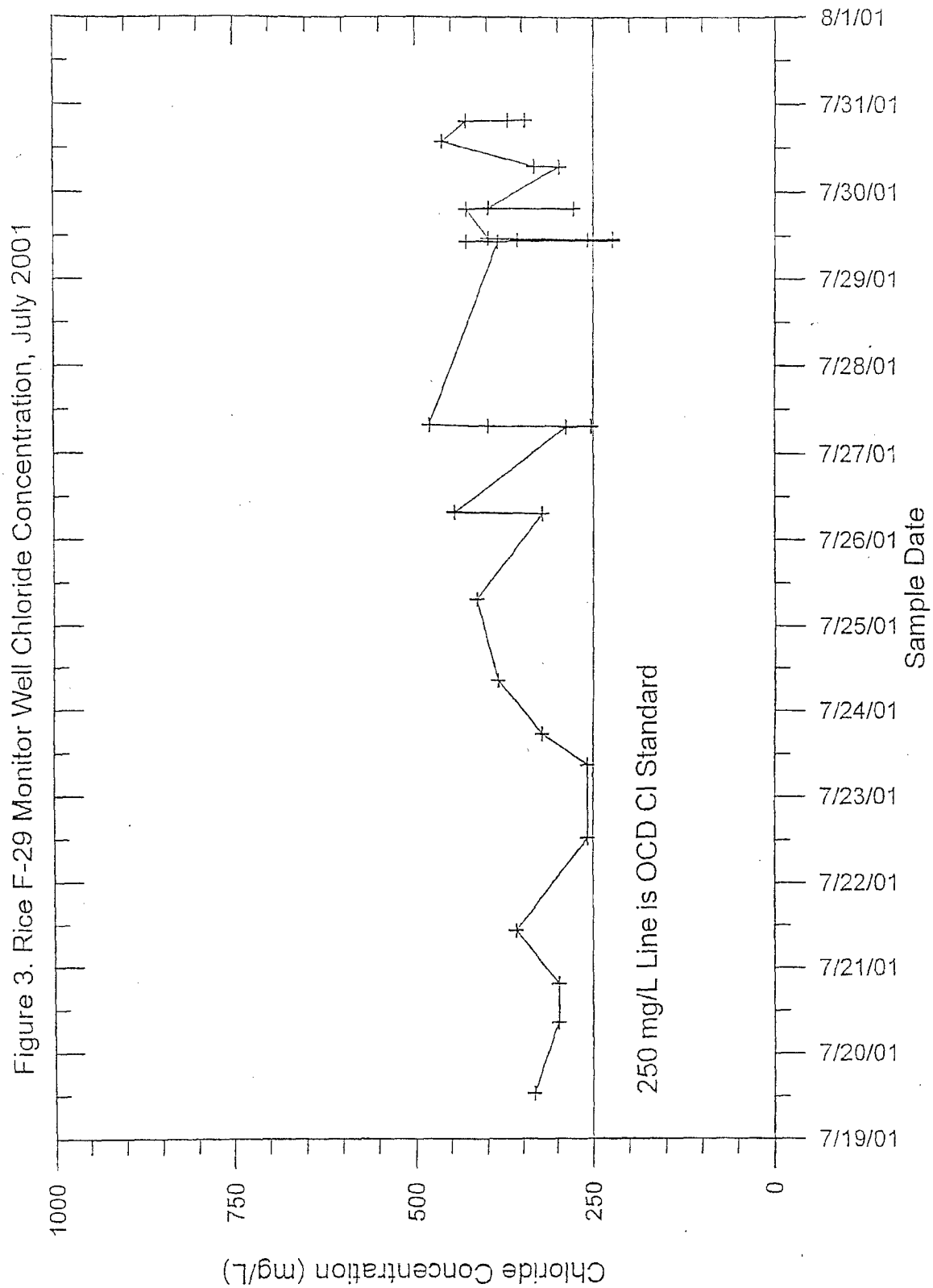


Figure 3. Rice F-29 Monitor Well Chloride Concentration, July 2001
Chloride Concentration (mg/L)
1000
750
500
250
0
250 mg/L Line is OCD Cl Standard
Sample Date
8/1/01
7/31/01
7/30/01
7/29/01
7/28/01
7/27/01
7/26/01
7/25/01
7/24/01
7/23/01
7/22/01
7/21/01
7/20/01
7/19/01

Copies of Laboratory Analytical Results

CARDINAL LABORATORIES

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

ANALYTICAL RESULTS FOR
SAFETY & ENVIRONMENTAL SOLUTIONS, INC.
ATTN: BOB ALLEN
703 E. CLINTON, STE 103
HOBBS, NM 88240
FAX TO: (505) 393-4388

Receiving Date: 08/14/01
Reporting Date: 08/16/01
Project Owner: RICE
Project Name: F-29
Project Location: WEST COUNTY ROAD

Sampling Date: 08/14/01
Sample Type: GROUNDWATER
Sample Condition: COOL & INTACT
Sample Received By: GP
Analyzed By: AH

LAB NUMBER SAMPLE ID	Na (mg/L)	Ca (mg/L)	Mg (mg/L)	K (mg/L)	Conductivity (u S/cm)	T-Alkalinity ($mgCaCO_3/L$)
ANALYSIS DATE:	08/15/01	08/15/01	08/15/01	08/15/01	08/15/01	08/15/01
H6077-1 WATER WELL	171	124	31	7.46	1854	217
Quality Control	1.076	47	44	5.02	1489	NR
True Value QC	1.000	50	50	5.00	1413	NR
% Recovery	108	94.9	88.5	100	105	NR
Relative Percent Difference	1.5	8.5	13.6	5.2	0.3	NR
METHODS:	273.1	3500-Ca-D	3500-Mg E	8049	120.1	310.1

LAB NUMBER SAMPLE ID	Cl^- (mg/L)	SO_4 (mg/L) 8/15/01	CO_3 (mg/L)	HCO_3 (mg/L)	pH (s.u.)	TDS (mg/L)
ANALYSIS DATE:	08/15/01	05/12/00	08/15/01	08/15/01	08/15/01	08/15/01
H6077-1 WATER WELL	340	133	0	264	6.76	1385
Quality Control	1001	51.06	NR	1011	6.86	NR
True Value QC	1000	50.00	NR	1000	7.00	NR
% Recovery	100	102	NR	101	98.0	NR
Relative Percent Difference	6.5	0	NR	0	0.6	NR
METHODS:	SM4500-Cl-B	375.4	310.1	310.1	150.1	160.1

Chemist

8-16-01
Date

H6077 Anal

CARDINAL LABORATORIES, INC.

2111 Beechwood, Abilene, TX 79603 (915) 673-7001 Fax (915) 673-7020
101 East Marland, Hobbs, NM 88240 (505) 393-2326 Fax (505) 393-2476

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

Company Name: SESI
Project Manager:
Address: 703 E. CLINTON, #103
City: HOBBS State: NM Zip: 88240
Phone #: (505) 397-0510
Fax #: (505) 393-4388
Project #: Project Owner: RICE
Project Name: F-29
Project Location: West County Rd.

BILL TO PO #:
Company: SAME
Attn:
Address:
City:
State: Zip:
Phone #:
Fax #:

ANALYSIS REQUEST: Major Cations + Anions

FOR LAB USE ONLY				MATRIX						PRES.			SAMPLING		
LAB I.D.	Sample I.D.	(G)RAB OR (C)OMP.	# CONTAINERS	GROUNDWATER	WASTEWATER	SOIL	OIL	SLUDGE	OTHER:	ACID:	ICE / COOL	OTHER:	DATE	TIME	
46077-1	WATER WELL		1	X							X		8-14-01	10:30 AM	X

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

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

Sampler Relinquished:	Date:	Received By:	Phone Result: ☐ Yes ☐ No Additional Fax #:
	Time:		Fax Result: ☐ Yes ☐ No
Relinquished By: Robert Hasbrey	Date: 8-14-01 Time: 1135 PM	Received By: (Lab Staff)	REMARKS:
Delivered By: (Circle One) Sampler - UPS - Bus - Other:	Sample Condition Cool: ☑ Yes ☐ No Intact: ☑ Yes ☐ No	CHECKED BY: (Initials)	

† Cardinal cannot accept verbal changes. Please fax written changes to 915-673-7020.

Appendix D

Appendix D: Test Pumping Data Collection and Analysis

On October 16, 2006 Arc Environmental performed a step-drawdown and recovery test on MW-2, the 4-inch monitoring well at the Hobbs F-29 SWD site. The results of the testing program are provided on the attached table.

The test results show that this well can maintain a pumping rate of no more than 2 gallons per minute. MW-2 had been pumped for many years and we do not believe that any well inefficiencies associated with clogging of the filter pack or screen affects the data. The fact that the well is partially penetrating and the observed drawdown reduces the saturated thickness exposed to the well will have an effect. We conclude that a partially-penetrating well screened across the water table will exhibit a specific capacity of no less than 0.7 gallons/foot of drawdown.

Based upon these data, a recovery well completed in the upper portion of the aquifer pumping 50 barrels per day (about 1.4 GPM) will create a cone of depression commensurate with a 2-foot drawdown in the pumping well.

Using Arc Environmental's data from the recovery test as input, we implement the software package Aquifer Test Professional (Versions 3.5, Waterloo Hydrogeologic) to estimate the hydraulic conductivity of the upper portion of the aquifer. The Cooper-Bredehoeft-Papadopulos test yielded the following results:

Hydraulic Conductivity: 3.84E-4 m/s (108.8 ft/day)
Transmissivity: 6.63E-4 m2/s
Storativity: 2.31E-5

The value derived from the Cooper-Bredehoeft-Papadopulos method agrees closely with the data employed in the Numerical simulation of groundwater flow for water rights administration in the Lea County underground water basin New Mexico (Musharrafief and Chudnoff, 1999). Musharrafief and Chudnoff estimates hydraulic conductivity of the general area at 81 to 100 feet/day. Fetter (2001) estimates hydraulic conductivities for silty to fine sands at 2.8E-2 to 2.8 ft/day and 2.83 to 283 ft/day for medium to course sands. The fact that the Ogallala is generally coarser-grained near the base of the formation and finer grained near the top of the formation supports a lower estimate of hydraulic conductivity for the uppermost portion of the aquifer. We conclude that the hydraulic conductivity of the upper portion of the aquifer beneath the Hobbs F-29 SWD site is approximately 75 ft/day.

References:

Fetter, C.W., 2001. Applied Hydrogeology, 4th Edition. Page 85, Table 3.7 Prentice Hall.
Musharrafief, G., and Chudnoff, M. 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.