1R - 160

GENERAL CORRESPONDENCE

YEAR(S):

1981 - 1987

District Manager

PO Box 728
Hobbs, NM 88240
505 393 7191

October 12, 1987

New Mexico Oil Conservation Division
Mr. William J. LeMay, Director
P. O. Box 2088
Santa Fe, NM 87504-2088

Dear Mr. LeMay:

Enclosed in this letter is some additional information Mr. David Boyer and his staff requested from Texaco during the meeting with Mr. Manuel Sirgo and Mr. Tim Tipton on September 24, 1987. First of all, it was requested that Texaco investigate the possibility that the salt water volumes reported by Amerada Hess for their percolation pit west of Texaco's NM "BO" State No. 3-SWD, are erroneous.

Oilcut vs. cumulative oil plots were constructed for the combined NM "BO" and "BR" State Leases and the combined Robinson and Robinson "A" Leases. The slope of each plot was determined considering only production data prior to June 1, 1958.

The combined NM "BO" and "BR" State Lease plot shows that water production increased twice as fast during this time period than the combined Robinson and Robinson "A" Lease plot. This type of behavior would not be expected when considering the location of the leases in the Moore Devonian Reservoir. The attached structure map shows that the Robinson and Robinson "A" Leases lie on the fringe of a strong water drive reservoir, while the NM "BO" and "BR" State Leases are more nearly towards the top of structure. It is not conceivable that the NM "BO" and "BR" State Leases would produce water at a faster rate than the Robinson and Robinson "A" Leases, in the time period prior to June 1958. Therefore, it can be concluded that Amerada Hess was inaccurate in reporting at least half of the volume of water disposed of in its pit due west of NM "BO" State Well No. 3.

Cumulative oil vs. time plot were constructed for the two sets of combined leases noting the cumulative oil produced prior to June 1, 1958. Also, cumulative water vs. cumulative oil plots were constructed for the two sets of combined leases demonstrating the impact of strong water drive reservoirs.

Another request Mr. Boyer made was concerning heat transfer from the disposal well into the Ogallala reservoir. Attached to this letter are heat transfer calculations showing that the temperature anomaly surrounding Hamilton's observation well (TH-20) can be explained with heat convection and heat conduction theories. Note that the thermal resistance for the annular space between the 5-1/2" and 8-5/8" casings considers a water filled annulus. During the week of September 28, 1987 this annulus was checked and found to have fluid at the surface at a pressure of 240 psi. This pressure bled off to 0 psi in a few minutes producing a few gallons of fluid. The composition of this fluid was found to be inhibited water. The source of this fluid is currently under investigation. Pressure on this annulus has previously been recorded by the NMOCD and it is suspected that it is a gradual build-up over time originating from the exposed open hole interval below the 8-5/8" casing point and the cement top behind the 5-1/2" casing. Once the source has been identified, your office will be notified and any necessary corrective action will be done.

And finally, the current disposal water temperature is 117°F measured at the water station during the week of September 28, 1987.

If this office can be of any further assistance do not hesitate to contact me.

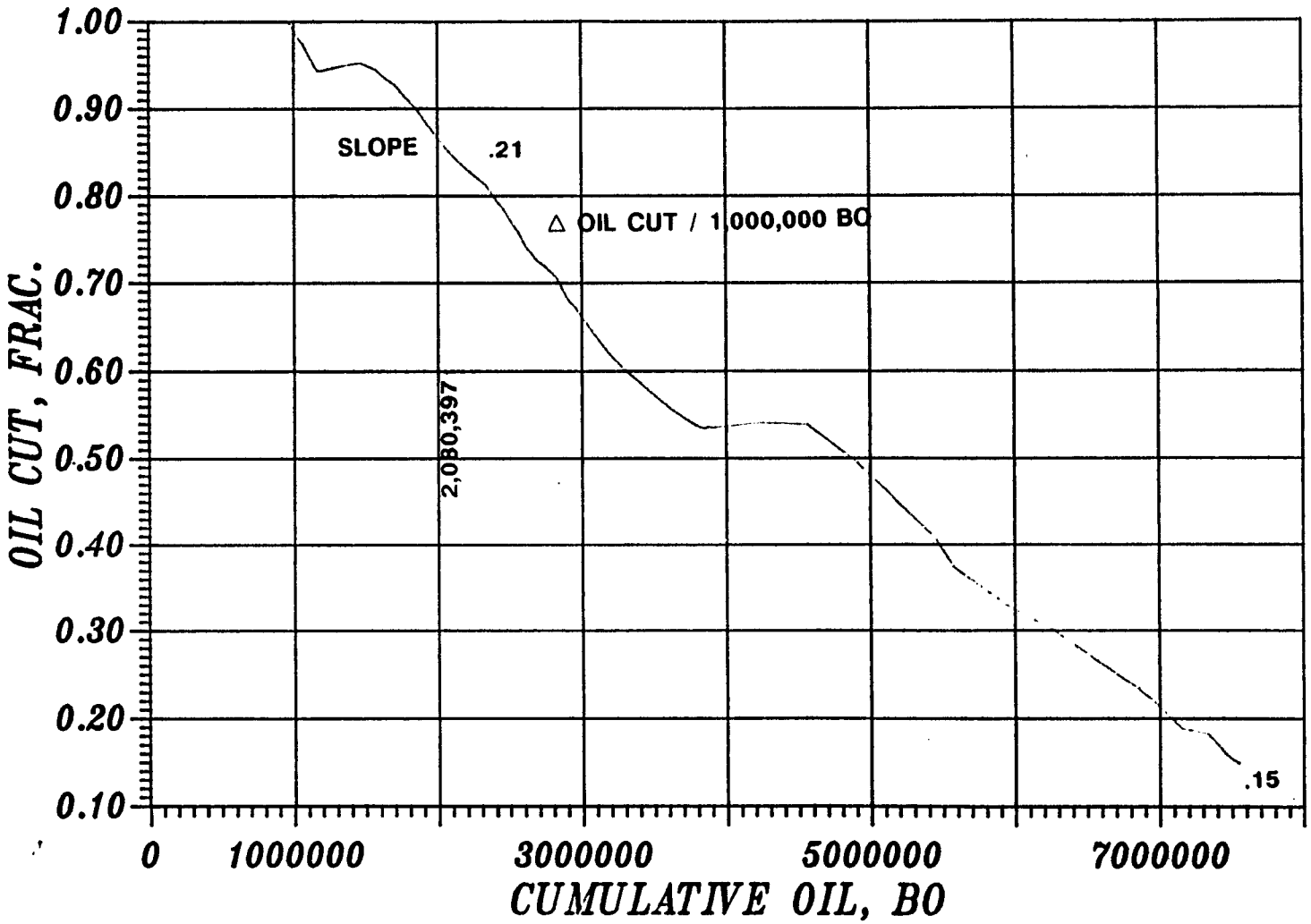
Yours very truly,

Joe E Kings Jus

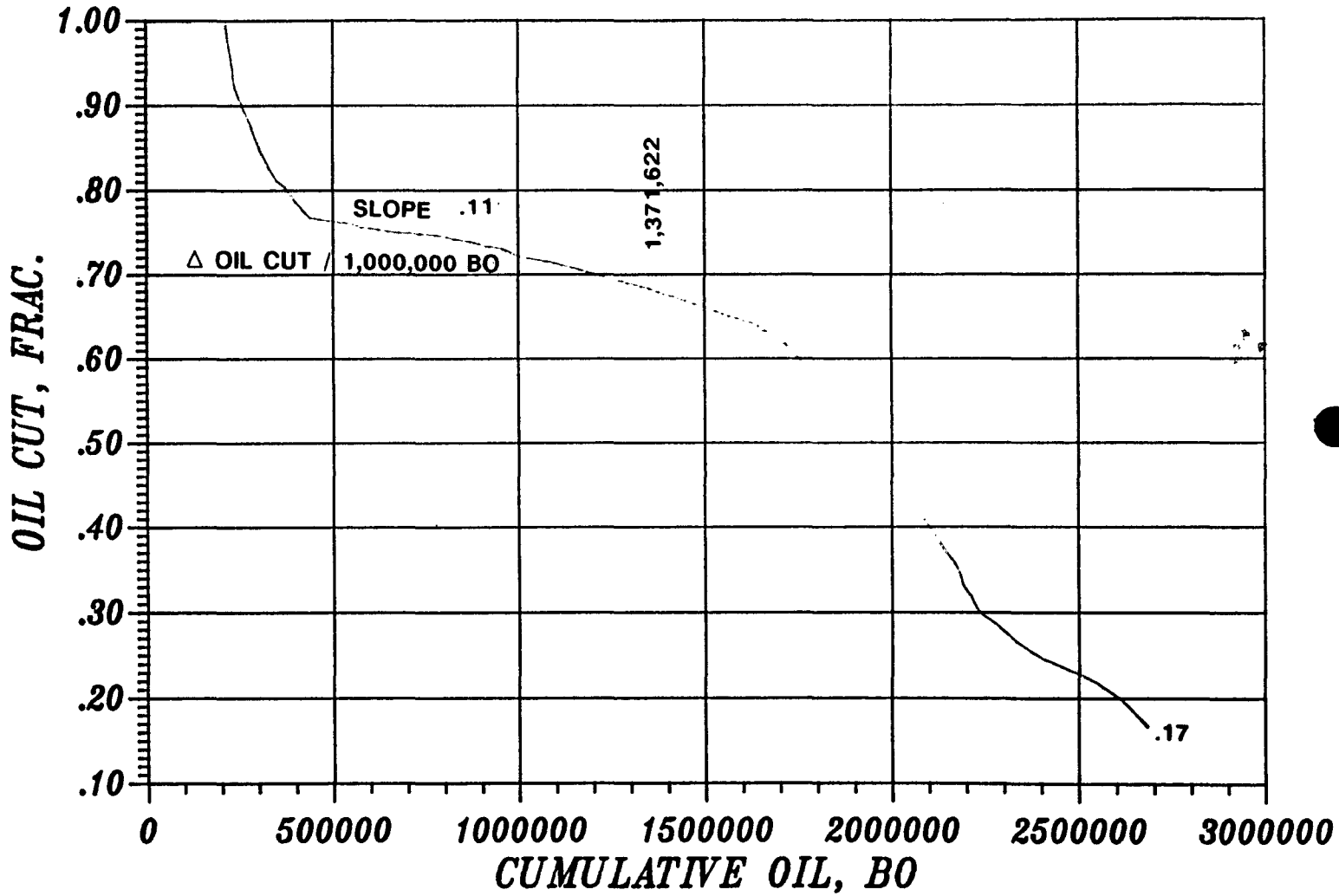
TLT:mad

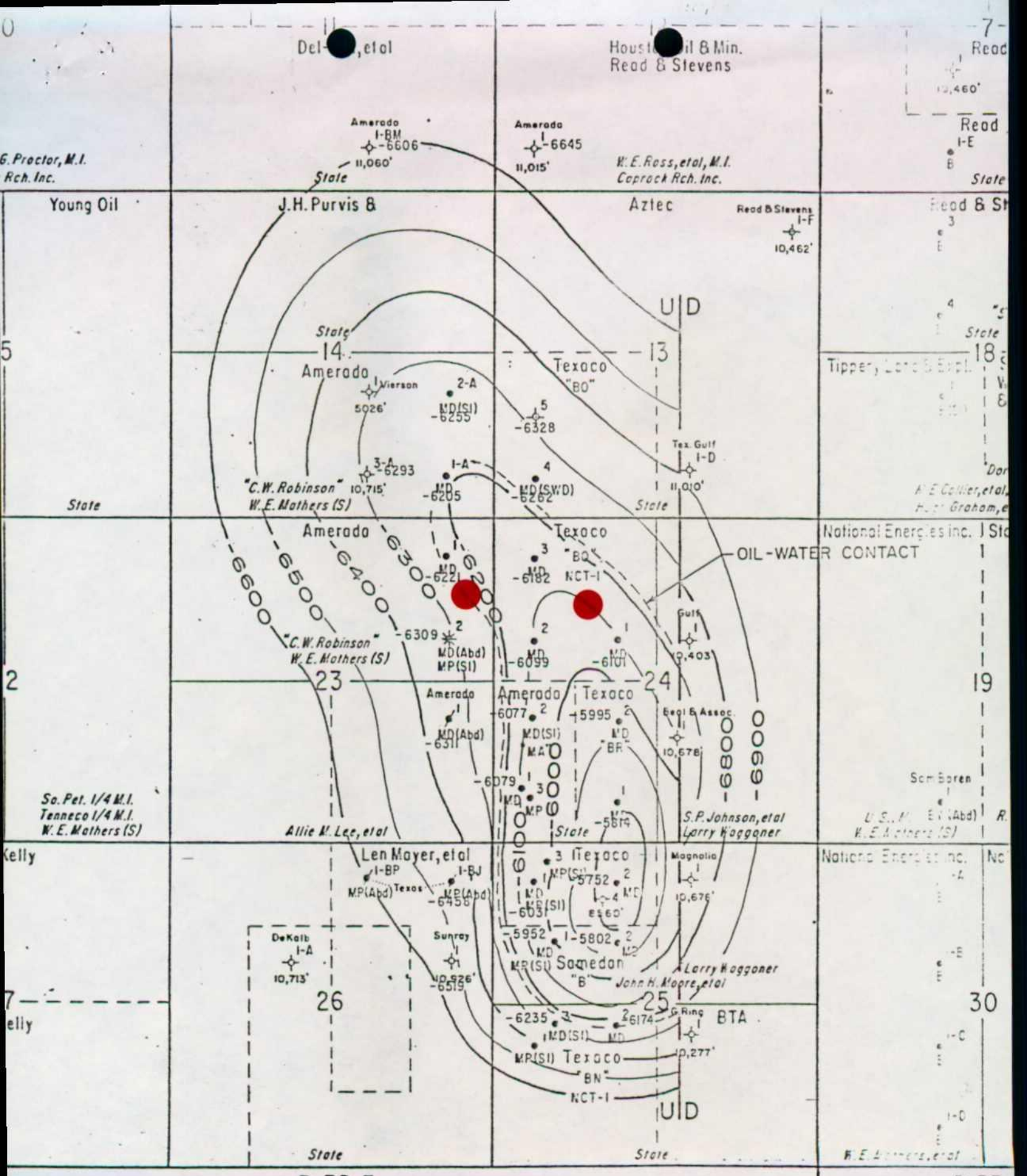
Attachments

TEXACO INC.
NM "BO" AND "BR" STATE LEASES



AMERADA HESS
ROBINSON AND ROBINSON "A" LEASES





MOORE

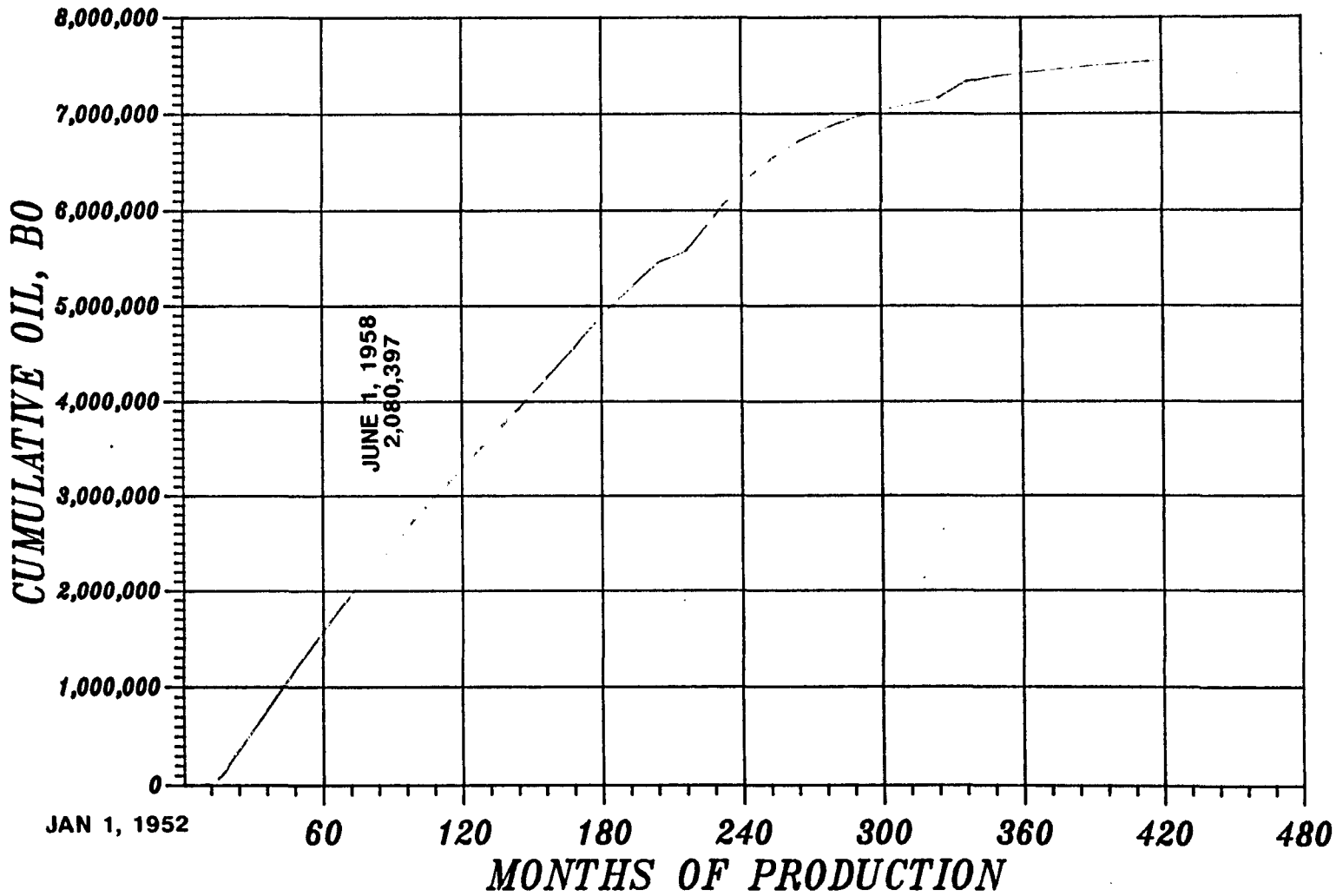
STRUCTURE MAP

TOP OF DEVONIAN

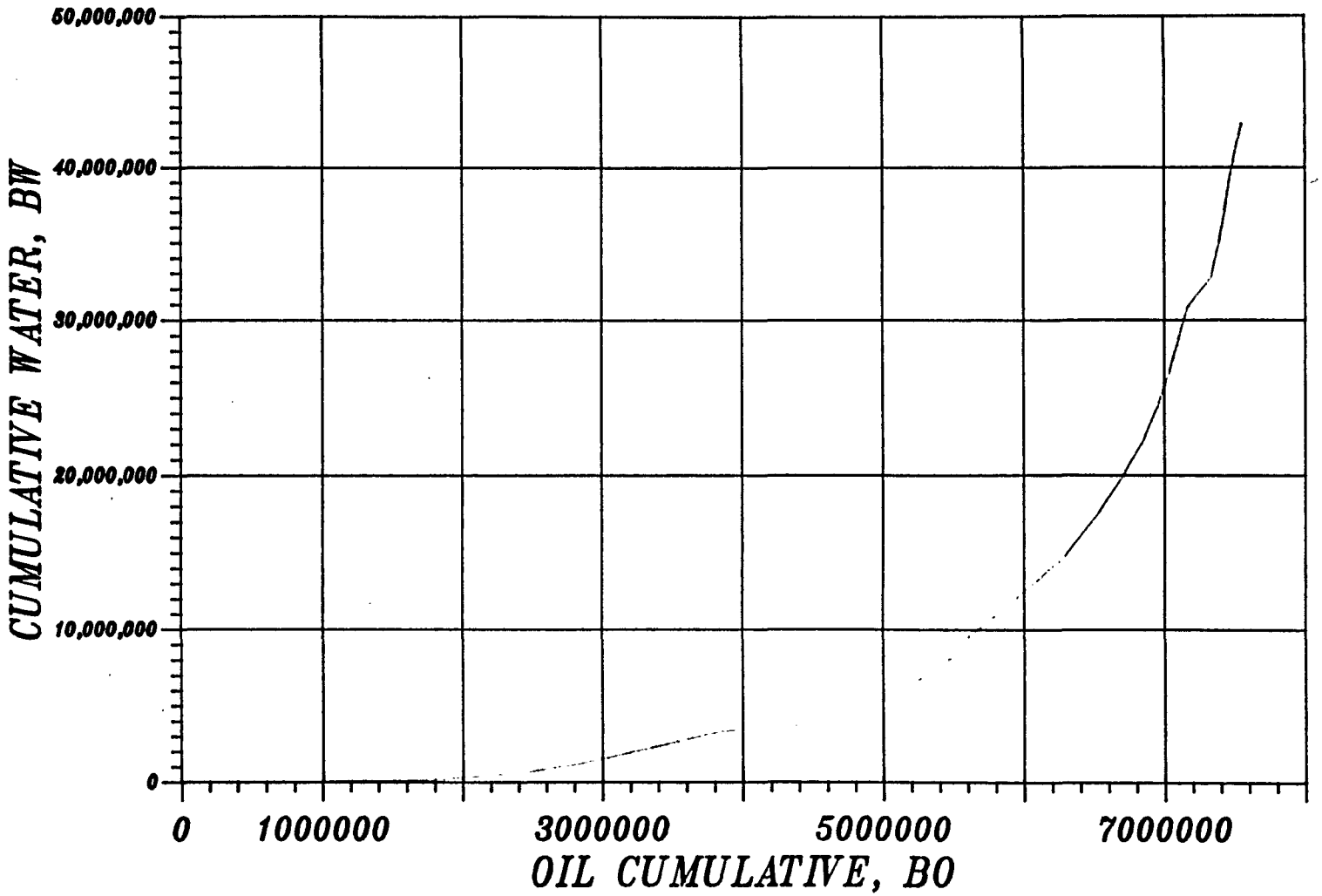
SWD PIT

CPC 6-20-72

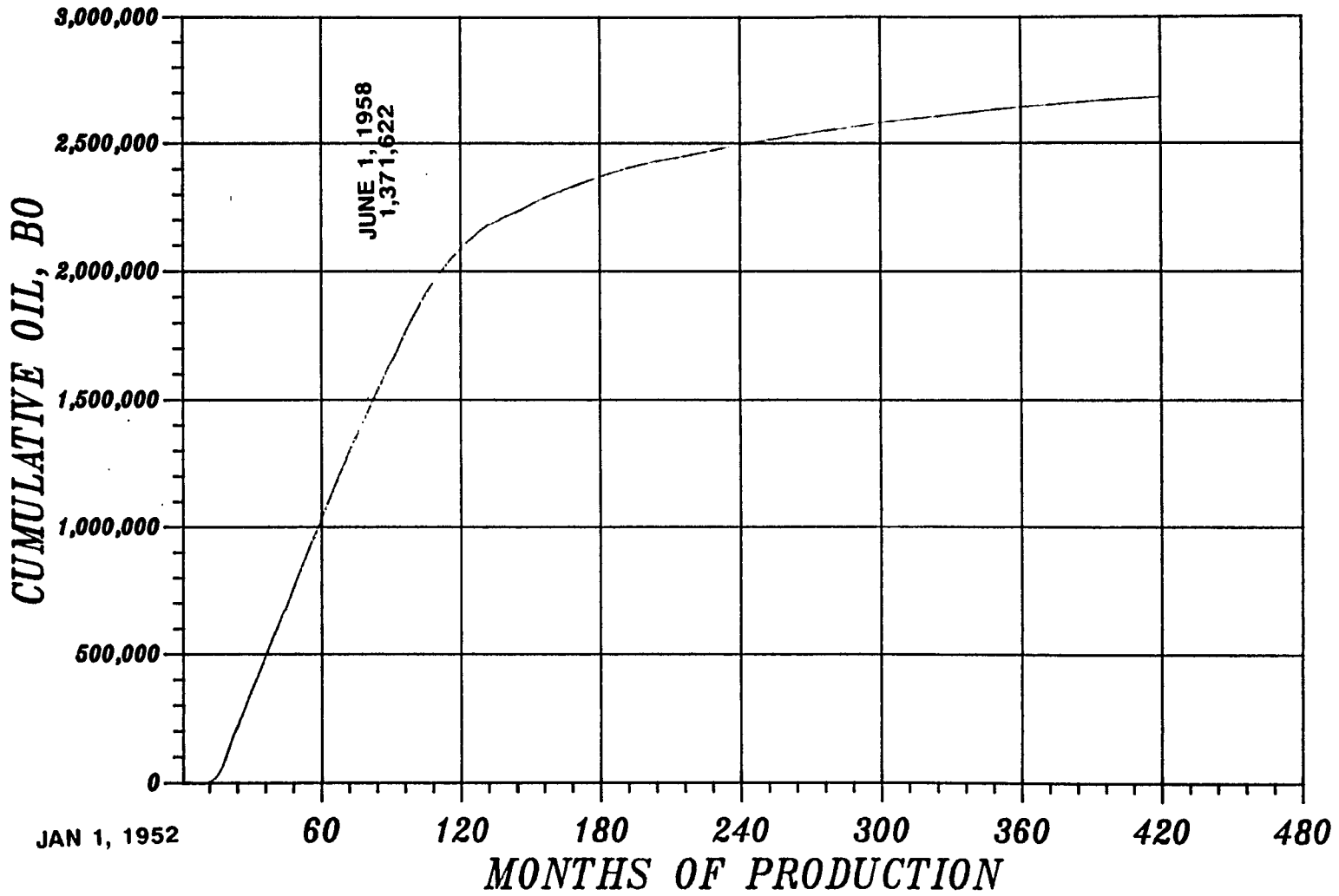
TEXACO INC
NM "BO" AND "BR" STATE LEASES



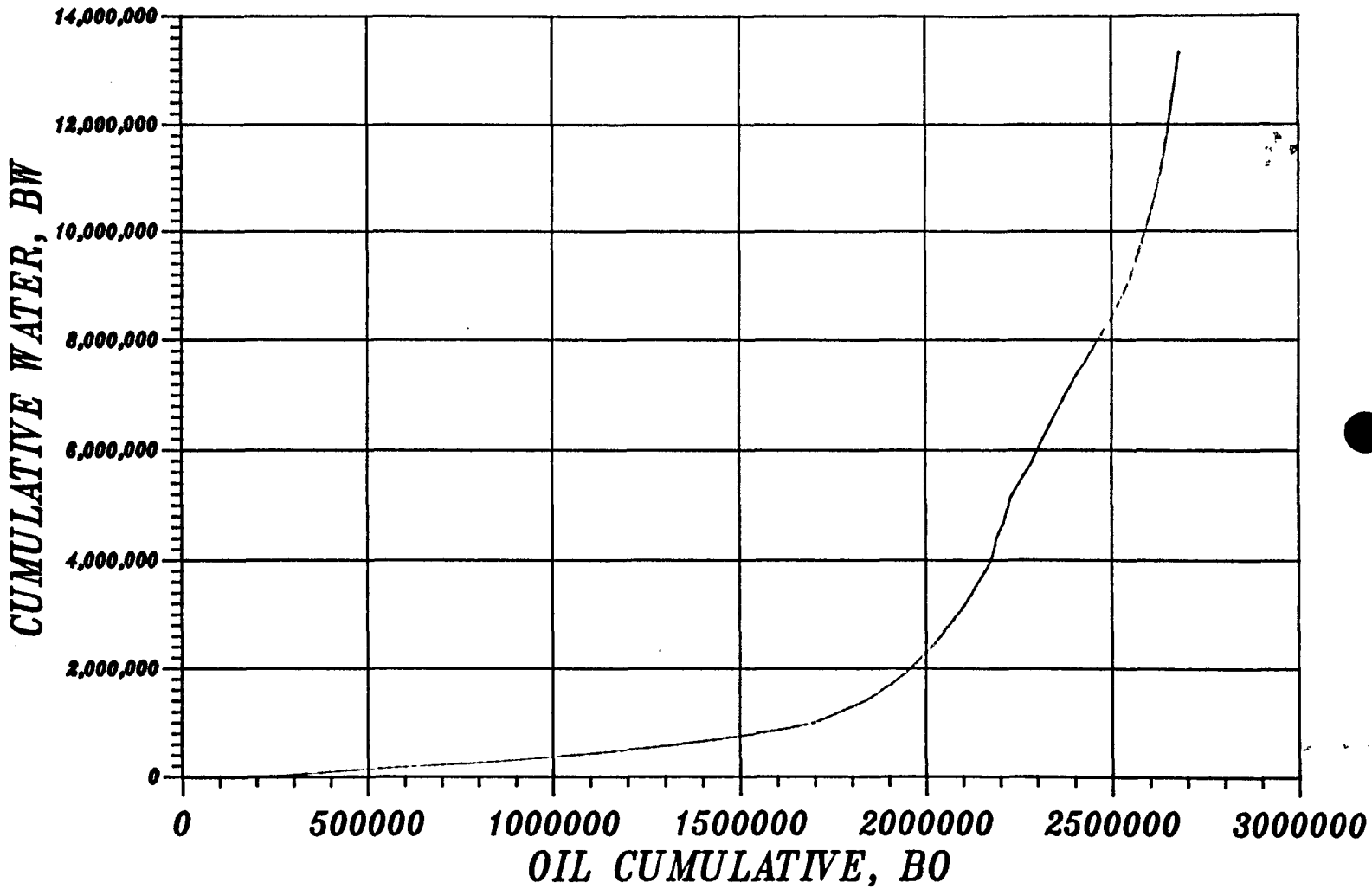
TEXACO INC.
NM "BO" AND "BR" STATE LEASES



AMERADA HESS
ROBINSON AND ROBINSON "A" LEASES



AMERADA HESS
ROBINSON AND ROBINSON "A" LEASES



HEAT TRANSFER CALCULATIONS

$$Q = \frac{T_{iw} - T_b}{R_T}$$

$$R_T = \frac{1}{h_{iw} 2\, r_1 L} \left| \begin{array}{l} \text{Injection} \\ \text{Water in} \\ \text{Tubing} \end{array} \right| + L_n \frac{r_2}{r_1} \left(\frac{1}{2\, K_s L}\right) \left| \begin{array}{l} \text{Tubing} \\ \text{Resistance} \end{array} \right|$$

$$+ L_n \frac{r_3}{r_2} \left(\frac{1}{2\, K_w L}\right) \left| \begin{array}{l} \text{Water} \\ \text{between} \\ \text{Tbg \& Csg} \end{array} \right| + L_n \frac{r_4}{r_3} \left(\frac{1}{2\, K_s L}\right) \left| \begin{array}{l} \text{Casing} \\ \\ \text{Resistance} \end{array} \right|$$

$$+ L_n \frac{r_5}{r_4} \left(\frac{1}{2\, R_w L}\right) \left| \begin{array}{l} \text{Water} \\ \text{between} \\ \text{Casing} \end{array} \right| + L_n \frac{r_6}{r_5} \left(\frac{1}{2\, K_s L}\right) \left| \begin{array}{l} \text{Casing} \\ \\ \text{Resistance} \end{array} \right|$$

$$+ L_n \frac{r_7}{r_6} \left(\frac{1}{2\, R_c L}\right) \left| \begin{array}{l} \text{Cement} \\ \text{between} \\ \text{Casings} \end{array} \right| + L_n \frac{r_8}{r_7} \left(\frac{1}{2\, K_s L}\right) \left| \begin{array}{l} \text{Casing} \\ \\ \text{Resistance} \end{array} \right|$$

$$+ L_n \frac{r_9}{r_8} \left(\frac{1}{2\, K_c L}\right) \left| \begin{array}{l} \text{Cement} \\ \text{between} \\ \text{Csg \& Hole} \end{array} \right| + L_n \frac{r_{10}}{r_9} \left(\frac{1}{2\, K_f L}\right) \left| \begin{array}{l} \text{Distance to} \\ \text{observation} \\ \text{Well} \end{array} \right|$$

District Manager

PO Box 728
Hobbs NM 88240
505 393 7191

September 23, 1987

Mr. William J. LeMay, Director
Oil Conservation Division
P. O. Box 2088
Santa Fe, New Mexico 87504-2088

Re: New Mexico "BO" State Well No. 3
EPA Damage Case Assessment
Interim Report To Congress
Production Waste Study

Gentlemen:

In response to your request concerning the subject well, I would like to offer the following in regard to both the temperature and chloride anomalies relative to the subject well.

At the 1982 trial, Dr. Daniel Stephens presented as Exhibit 3, (Attachment 1), a water level contour map of the Ogallala along with temperature readings from five test wells. The "nose" around the Texaco disposal well was construed by Dr. Stephens as a recharge point in the aquifer. Data points were limited west of the injection well.

In a report published by Dr. Stephens in 1984, a similar map was presented utilizing new data, particularly west of the Texaco well (Attachment 2). The undulation shown around the Texaco well in 1982 has shifted to the west to encompass the old Amerada pit area in Section 23. Apparently, Dr. Stephens recognized that the later data shows the Amerada pit suspect of contributing to the contamination. He states such a conclusion in the body of his published report.

In the same report, Dr. Stephens presents a chloride contour map (Attachment 3). Here he has also encompassed the Amerada pit, indicating concentrations in excess of 10,000 ppm based on the new data. The chloride contour map comports with data Texaco secured early on relative to chloride concentrations of produced water in pits in the area. The map supports our position that the plume of contamination originated from the percolation pits and has migrated south-southeast following the direction and flow shown in the John Runyan study in 1978 (Attachment 4). The Texaco well happens to be in the crestal path of the water flow in the Ogallala.

In regard to the temperature readings shown on Dr. Stephens' Exhibit 3 (Attachment 1), the higher temperature near the injection well is not unusual. The well fluids going down the tubing leave the wellhead at 120° F and are at a much higher temperature than the subsurface media and reservoir fluids. At the Ogallala level, the temperature has probably not changed but a few degrees, perhaps down to 115° F. This produces a heat transfer effect to the Aquifer, causing a thermal high in the vicinity of the wellbore. The velocity of movement in the Ogallala causes a distension of this effect which follows the general geometry of the flow lines in the Aquifer. Continuous injection at 500-600 psi produces a rather effective hot water heater through the Ogallala section.

Unfortunately, much of the above data was developed after the second trial of the Hamilton case. No transcript of testimony was ever ordered because the case was not appealed. Texaco did not appeal this case because the judgement awarded the plaintiff fell well below the dollar amount Texaco had previously offered to settle this case based upon plaintiff's claim that Texaco's pits were a possible source of contamination. Under these circumstances, Texaco simply chose to pay the judgement instead of incurring the cost and expense of a lengthy appeal and retrial of the suit. Texaco's decision not to appeal should not be viewed as an admission that its well was a source of contamination, especially in light of the later evidence. We believe the study by Dr. Stephens in 1984 supports our original contention that the percolation pits, which were authorized at that time, caused the contamination of the Ogallala Aquifer.

The EPA report to Congress alleges that the New Mexico UIC program is deficient compared to the Texas program (p. IV-56). The test pressure requirement of 300 psi in New Mexico versus 500 psi in Texas in and of itself is not significant. The 10 per cent falloff applied to the differential of 200 psi would equate to 20 psi. This is hardly a pressure falloff value which would identify the presence of a leak or failed MIT. The EPA contractor is obviously unfamiliar with pressure testing in the oilfield.

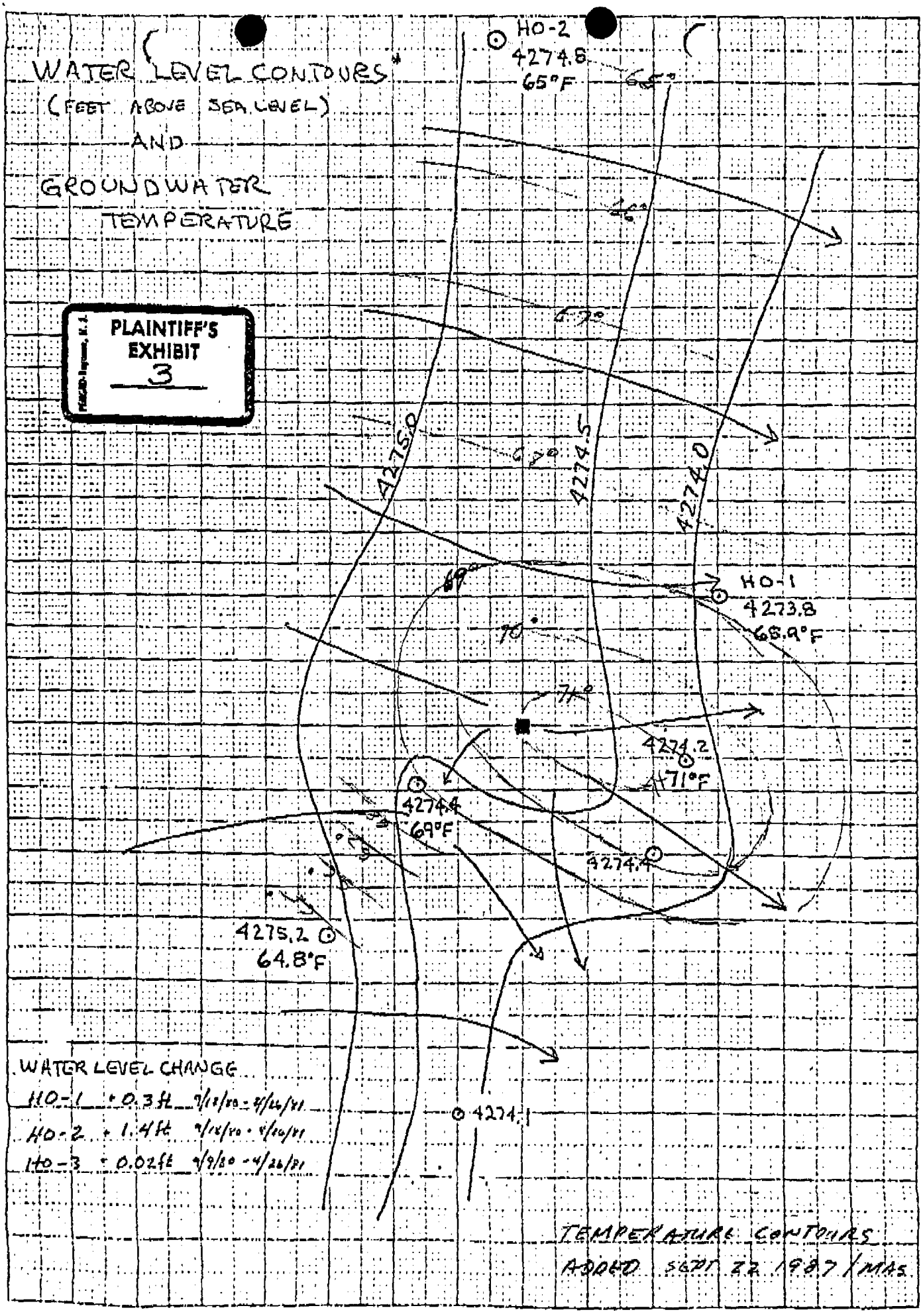
This damage case has produced a great deal of consternation by both your office and Texaco. I hope the above explanation will be helpful in your analysis. Please feel free to call me at your convenience to discuss this issue further.

Yours very truly,

Joe E. King

JOE E. KING
District Manager

MAS:mg-pdh


WATER LEVEL CONTOURS
(FEET ABOVE SEA LEVEL)
AND
GROUNDWATER
TEMPERATURE
PLAINTIFF'S EXHIBIT 3
HO-2
4274.8
65°F
HO-1
4273.8
68.9°F
4274.2
71°F
4274.4
69°F
4274.4
4275.2
64.8°F
4274.1
4275.0
4274.5
4274.0
65°
66°
67°
68°
69°
70°
71°
WATER LEVEL CHANGE
HO-1 + 0.3 ft 7/12/90 - 4/26/91
HO-2 + 1.4 ft 7/12/90 - 4/26/91
HO-3 + 0.02 ft 9/9/80 - 4/26/91
TEMPERATURE CONTOURS
ADDED SEPT 22 1987 / MAS

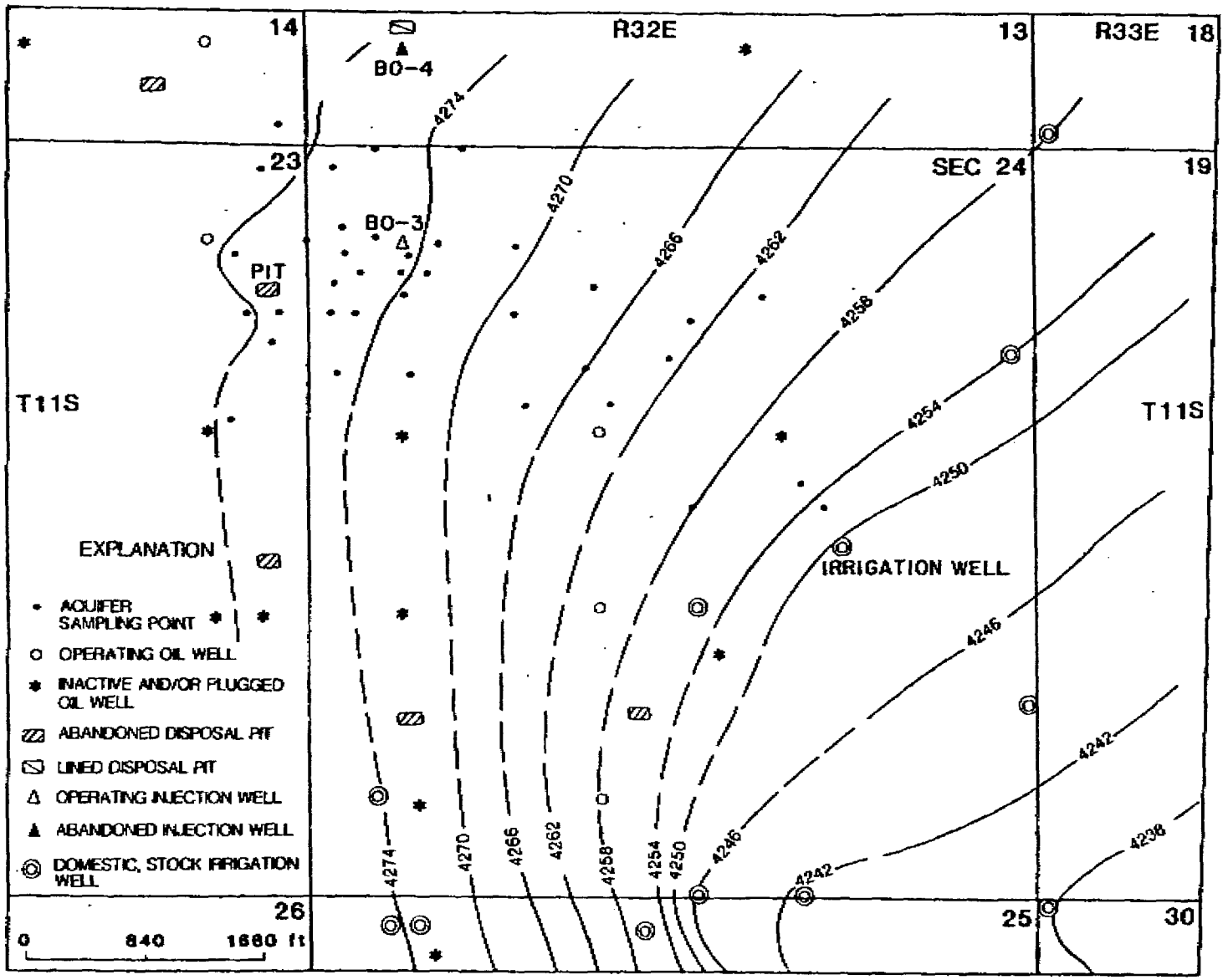


Figure 1. Water table contour map May 27, 1978 and well locations (modified from S.E. Galloway, NM State Engineers Office, Roswell)

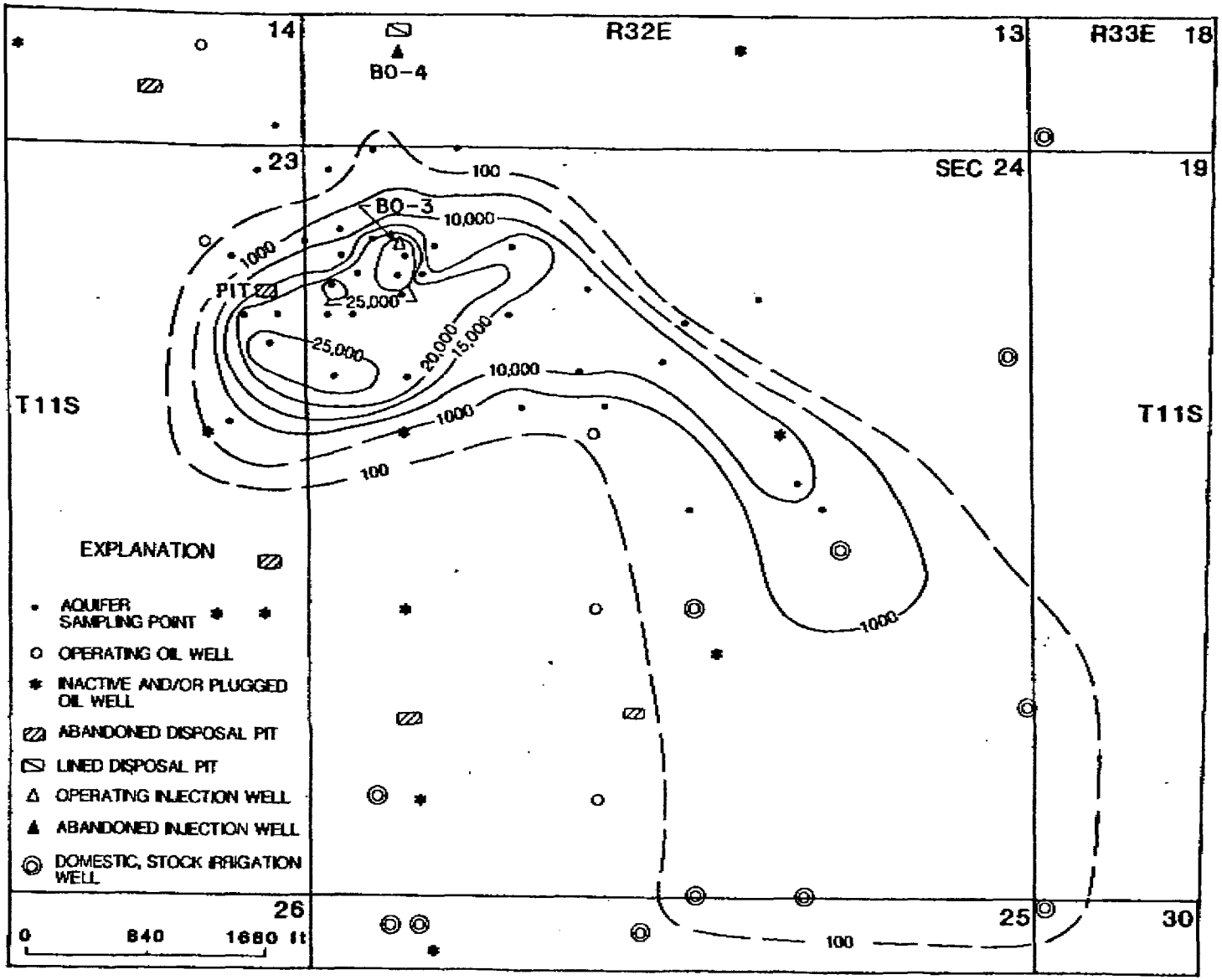
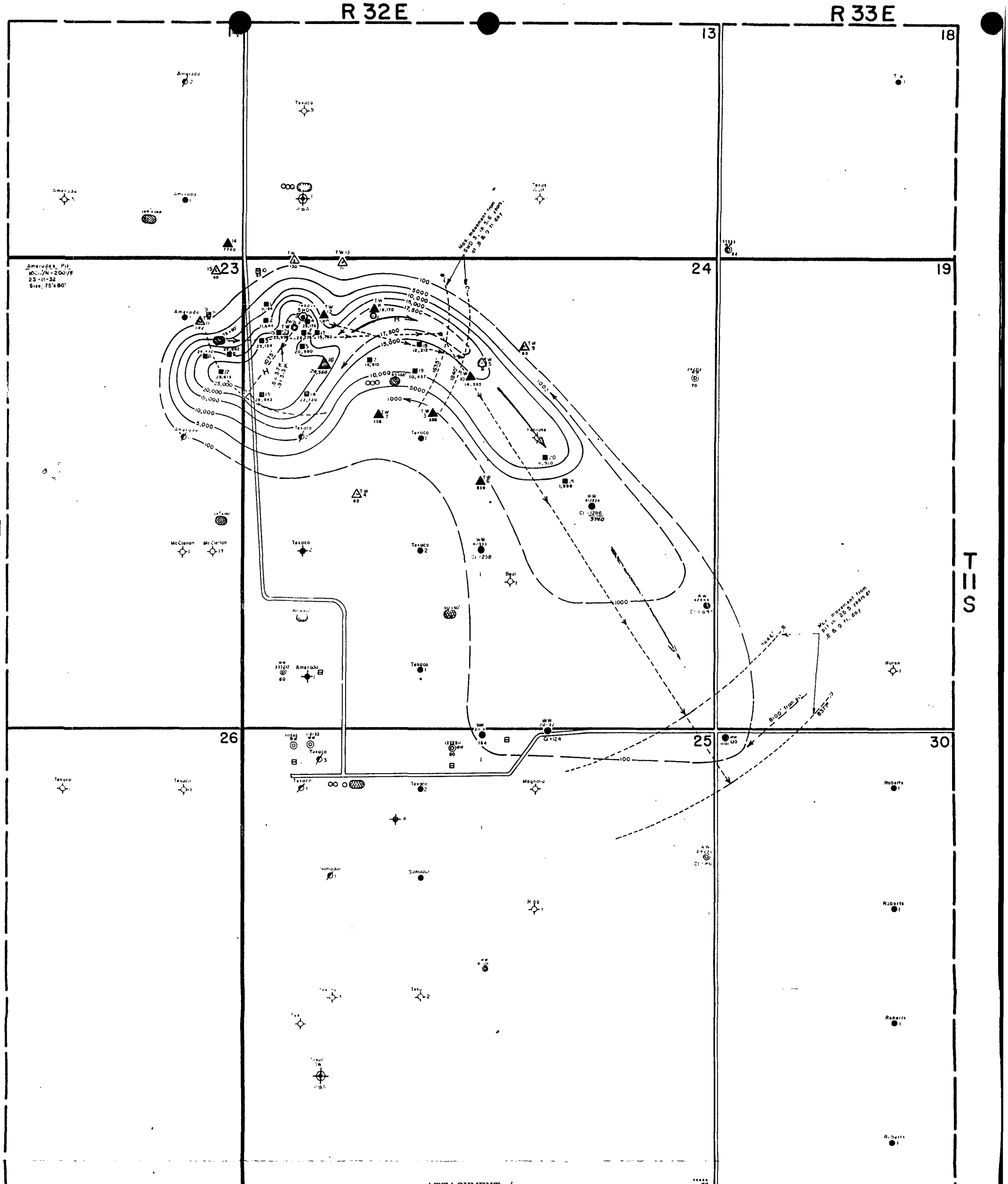


Figure 3. Chloride concentration contour map May 25, 1978 (modified from J. Runyan, NM Oil Conservation Division)



ATTACHMENT 4

PAUL HAMILTON WATER CONTAMINATION STUDY

MOORE DEVONIAN POOL

MAP SCALE: 1 inch = 500 feet

LEGEND:
- WATER TEST WELL - HAMILTON.
- WATER TEST WELL - TEXACO.
- WATER WELL.
- HOUSE.
- OIL WELL.
- TEMP. ABD. OIL WELL.
- P&A OIL WELL.
- P&A SWD WELL.
- SWD WELL.
- OPEN BATTERY.
- ABD. (Covered) BATT. PIT.

WATER RATE & MOVEMENT MAP

BASED ON WATER MOVEMENT RATES OF .8 & .9 FEET PER DAY FROM TWO POSSIBLE SOURCES OF CONTAMINATION

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION
HOBBS, NEW MEXICO

JOHN W. RUNYAN - GEOLOGIST
May 1, 1978
Revised May 24, 1978

District Manager

PO Box 728
Hobbs NM 88240
505 393 7191

September 22, 1987

William J. LeMay, Director
Oil Conservation Division
P. O. Box 2088
Santa Fe, NM 87504-2088

RE: Chronology of Events
Texaco Inc.
New Mexico "BO" State Well #3-SWD
Moore Field
Lea County, New Mexico

Dear Mr. LeMay:

Enclosed in this letter you will find a chronological summary of events that have taken place in Texaco's NM "BO" State Well No. 3 since its initial completion in May, 1953 to the present. After reviewing these events I am confident that you will find that the integrity of this salt water disposal well to be above reproach since its conversion in September, 1972. If you have any questions or comments concerning the subject well please contact me at this office.

Yours very truly,

TLT:mad

Attachments

12/19/85 Fish tubing and old packer; run new IPC tubing and packer. Pressured casing/tubing annulus to 500# and held for 30 minutes.

12/30/85 Ran injection profile indicating 79 % of injectant going below loggers TD of 10,650' and no upwards channel around casing shoe at 10,600' or 5-1/2" packer at 8372'.

9/12/85 Replaced injection packer; set packer at 8524'; pressured casing/tubing annulus to 500# and held.

2/21/82 Replaced injection packer (set at 8530') pressured casing/tubing annulus to 600# and held for 33 minutes.

11/3/81 Ran 6 casing/tubing annulus tests; five tests pressured up to 600# and recorded pressure leak-off over period of 30 minutes; final pressures ranged from 400# to 500#; the sixth pressure test was at 400# bleeding off to 0# after 2 hours and 35 minutes.

8/27/81 Replaced tubing string; set injection packer at 8860'; pressure tested casing/tubing annulus to 600# for 30 minutes.

4/23/80 Corrected tubing leak at 2745'; set injection packer at 8637'; pressured casing/tubing annulus to 500# for 30 minutes.

1/10/80 Corrected tubing leak at 2806'; set injection packer at 8387'.

4/9/79 Replaced tubing string; set packer at 8454'; pressure tested casing/tubing annulus to 600# for 30 minutes.

5/4/78 Conducted fluid level test; shutdown injection pumps at 12:30 pm; a stabilized fluid level of 1550' was established after 6 hours.

4/20/78 Conducted casing/tubing annulus test; pressured up to 600# for 30 minutes; pressured up to 560# for 40 minutes-final pressure 530#.

3/25/78 Conducted a casing test; pressured up casing/tubing annulus to 500#; bled to 400# after 75 minutes; no pressure on 8-5/8" and 13-3/8" casing strings. annulus bled to zero. Repressured annulus to 400# and again no pressure on the 8-5/8" and 13-3/8" casing string; pressure bled off to 340# after 15-1/2 hours.

2/10/78 Changed out injection packer; set at 8400'.

12/8/77 Ran injection profile; no upward channelling of injectant; all injectant going into open hole section or below TD.

9/22/77 Installed risers on all casing strings with valves above ground; 100# on casing/tubing annulus and 525# on 8-5/8" casing; both pressures bled down completely.

10/6/77 Obtained a water sample from water supply well near subject well; total hardness 1330 ppm and chlorides 1051 ppm.

3/3/76 Change out injection packer and acidize open hole section. (10,600'-10,767').

5/5/75 Change out injection packer; set at 8265'.

1/3/75 Acidize open hole section (10,600'-10,767') with 2000 gals acid.

3/27/74 Corrected tubing leak at 3000'; set injection packer at 7952'.

9/19/72 Squeeze perforations 10,536'-10,556' with 75 sacks cement; drilled deeper from 10,600' to 10,767'; acidized open hole with 1000 gals acid; ran injection tubing and packer; set at 8660'; convert to water disposal.

August/56 Squeeze perforations 10,565'-10,600'; re-perf from 10,536' to 10,556'.

May/53 Well was initially completed from perforations 10,565' to 10,600'.

13-3/8" casing set at 318' in a 17-1/4" hole with 350 sacks cement; cement circulated at surface.

8-5/8" casing set at 3504' in an 11" hole with 2300 sacks of cement; cement circulated at surface.

5-1/2" casing set at 10,600' in a 7-7/8" hole with 600 sacks cement; cement top at 7910' log temperature survey.

G F Rome
Senior Vice President
Producing Department

Texaco USA

1111 Rusk Avenue
Houston TX 77002
713 [illegible]

August 5, 1987

Mr. William J. LeMay, Director
Oil Conservation Division
Post Office Box 2088
Santa Fe, New Mexico 87504-2088

Re: EPA Interim Report to Congress
Damage Case Assessment
Production Waste Study

Dear Sir:

As you are aware, Texaco has participated in the subject review through the API effort. Moreover, we have visited your offices and visited your staff in gathering data for the API response.

I am enclosing a copy of the API comments as they apply to the New Mexico cases. In particular, I wish to address the NMOI case wherein the EPA contractor alleges the Texaco, State of New Mexico Well BO-3, in the Moore-Devonian Oil Field, contributed to the contamination of the Ogallala aquifer in that area. The history of this case is summarized with the API comments.

Texaco's position has been, from the beginning, that the BO-3 well does not leak and has not contributed to the alleged groundwater contamination. The well has passed the New Mexico Mechanical Integrity Testing program as prescribed by the Underground Injection Regulations.

I know you are concerned that this case is used by EPA as an example of groundwater contamination via underground injection well operations. I share your concern. To allay those fears, I am enclosing copies of the radioactive injectivity surveys performed in 1985 and 1986 as required by your Hobbs office. Apparently the EPA contractor did not see fit to gather <u>all</u> of the necessary information to make the assessment. The surveys show that <u>all</u> injected fluids are being injected into the target disposal zones. There are no casing or tubing leaks and no leakage behind pipe.

Please feel free to use these data as you may deem appropriate. Thank you for your assistance in this matter.

Very truly yours,

G F Rome

MAS:maq

Enclosures

Texaco USA
PO Box 52332
Houston TX 77052
713 650 4000

July 15, 1987

Mr. David Boyer,
Bureau Chief
State of New Mexico
Energy & Minerals Department
Box 2088
State Land Office Building
Santa Fe, New Mexico 87501

Dear Dave:

I am pleased to furnish you copies of API's comments on the New Mexico damage cases. In conversation with Jamie, she indicated you were interested in an additional study on Case #1. I am not aware of anything more recent than those studies furnished by your office during our review time in Santa Fe.

If after reviewing API's input, you find a reference I can help secure, please call me at 713-650-5572.

Best regards,

Manny

MANUEL A. SIRGO, JR.

MAS:maq

Attachments

Dan Stephens 835-5313 4/21/81
MITs a pressure test
[illegible] of P/t [illegible] "leak"

GW in mon. wells [illegible] warmer than should be

[illegible] gen = hydro[illegible] for MW 45' away from BC-3;
4/22/80 blip occurred [illegible] Texaco did a repair job. [illegible]
[illegible] tied [illegible] consultant.

rad. iodine tests [illegible] critical data (i.e. whether [illegible] or
2 [illegible] pumps were operating) No leak w/ one pump; leak w/
2 pu[illegible]

Chapter 3 - Damage Cases - New Mexico

Major Issues -

Unlined Produced Water and Oilfield Waste Pit Contents Leaching Into Ground Water.

The New Mexico cases cited in this portion of the report fail to acknowledge the fact that these incidents occurred long before the present disposal regulations took effect. In the Duncan Oil Field (MM02), the practice of using unlined pits for disposal has been banned. In those vulnerable aquifer areas identified by the New Mexico Health and Environmental Department along with the New Mexico Oil Conservation Division (OCD), disposal into unlined pits is either banned entirely or severely restricted, i.e., 1/2 to 5 bwpd.

EPA's report cites finding benzene concentrations of 100 ppb above New Mexico Water Quality Control Commission standards of 10 ppb.
The EPA report is incorrect. The report was amended by the New Mexico Health and Environment Department to read, "Volatile aromatic hydrocarbons in concentrations below ground water health standards were found in water samples. However, benzene concentrations of 0.1 ppb were found in two (2) test pits. All other test pits showed benzene values as "undetectable."

EPA's cited value of 110 ppb is 110,000 times the actual values identified in ground water in this flood plain area.

(Ref: Hydrocarbons and Aromatic Hydrocarbons in Groundwater Surrounding an Earthen Waste Disposal Pit for Produced Water in the Duncan Oil Field of New Mexico by G. A. Viceman, J. T. McCannon, Musad Zaman, Chas Shvey and Douglas Earp, September 1985).

In the case of the Lee Acres landfill (NM05) the contamination found in the landfill was apparently caused by disposal practices presently banned in New Mexico. This site has been closed and over 8000 cubic yards of wastes were removed prior to closure. The case is in litigation.

Damage to Ground Water From Leaking Injection Wells

EPA cites a case of alleged aquifer contamination by a salt water disposal well operated by Texaco. The agency implies that Texaco continues to operate the well although a cash settlement to a rancher was paid following a lawsuit. The well continues to operate because it continues to pass the Mechanical Integrity Tests prescribed by New Mexico UIC regulations.

EPA's contractor chose to cite this case as described in the reference document which was prepared by Dr. Daniel B. Stephens, the same consulting hydrogeologist who represented the plaintiff in the subject court case.

Ref: Oil Field Brine Contamination - A case study, Lea Co., N. M. - D. B. Stephens, NMIMT, Socorro, N. M.

Dr. Stephens' mass balance plume calculations are speculative based on an assumption that injection operations had caused contamination in the irrigation well as opposed to the prior long term, permitted disposal in the surface pits in the area. Owing to the proximity of the injection well to the irrigation well, contamination stemming from the injection well operations would seemingly have occurred much sooner than actually witnessed. Dr. Stephens' study acknowleges contamination may be from surface pit percolation.

EPA implies the Texaco well is the source of contamination and is still allowed to operate. They ignore the state record of continuous monitoring of pressures in the well and the constancy of volume and pressure values reported by the operator.

Finally, the EPA contractor implies there is a significant difference in MIT requirements between Texas and New Mexico. Both states are primacy states under the UIC program promulgated by EPA regulations. New Mexico requires a test pressure of 300 psi whereas Texas requires 500 psi. The well operates above 500 psi injection pressure. The pressure difference of 200 psi between states is not significant enough to cause concern in failing an MIT. In 1977 the well was tested to 525 psi with no leakoff observed. Information was furnished on October 13, 1977 to NMOCC.

Contamination of Ground Water From Improperly Completed Oil and Gas Wells

EPA cites NM03 Case concerning the Flora Vista Water Users Association wherein it is alleged that Flora Vista water wells were contaminated by production from a natural gas well. Without all the facts in this case it is difficult to create a reservoir mechanics scenario where flowing production from a gas well can be directed upgradient by virtue of water well pumping action. In a report by the New Mexico Conservation Division (OCD), entitled "Final Report on Flora Vista Contamination Study, October 1986", OCD cites possible sources of contaminants as:

1) produced water discharges less than 5bwpd

2) water drained from one oil storage tank

3) leaking fiberglass tank which has been replaced

4) drilling pits which may have received well test fluids

The case is in litigation.

EPA cites a final case (NM04) of contamination related to surface pit seepage and leakage from production and injection well casings in and around Hobbs, New Mexico. This instance is related to old practices which are no longer allowed.

13

Damage Cases

File Farm: NM 01 | State: NM

yes | Nearest City or Town: Caprock

Region: 9 | County/Parish: Lea

Proof Category: Administrative [ ] Legal [1] Scientific/technical [1] — 0 = no 1 = yes

Description of Operation

Production Area	Moore-Devonian Oil Field	(basin, region, etc.)
Production Type	Injection well/oil	(oil, gas, injection well, etc.)
Production Category	Production	(exploration, development, production, or other)

Description of Operation

A saltwater injection well, BO-3, is used for brine disposal for the Moore-Devonian oil field in S.E. New Mexico. Injection occurs at about 10,000 ft. In 1972, the BO-4 injection well, very similar in physical characteristics to BO-3, was found to be so corroded that repair was not practical. The well was plugged and abandoned. From 1953 to 1958 752,000 barrels of brine were disposed of in open unlined pits. The Ogallala aquifer, overlying the oil field, is the sole source of potable ground water in much of southwestern New Mexico. Texaco still uses the BO-3 well, unaltered, as a disposal well for oilfield brines inspite of a lawsuit in which they paid a cash settlement to a rancher for damages incurred due to the leaks and subsequent groundwater contamination from BO-3.

API COMMENT: THE WELL CONTINUES TO OPERATE NOT IN SPITE OF, BUT IN COMPLIANCE WITH NM UIC REGULATIONS.

Description of Waste and Damage

Pathway of Contamination (yes/no) — Ground Water: yes; Surf Water: [ ]; Soil: yes

Damage Source	Injection Well	(reserve, holding or emergency pit; tank, well, battery; spill; injection well; blowdown, etc.)
Area Extent		
Waste Stream	Brine	(mud, brine, produced water, workover fluid, frac fluid, etc.)
Waste Analysis	Hydrogeologic configuration illustrating plume of contamination, water analysis, chlorides as high as 25,000ppm in aquifer around BO-3 well. Analysis of irrigation well shows chlorides of 1200 ppm.	(describe nature of available analysis, cite key numbers if available)

API Comment: Volumetric plume calculations are speculative - Hydrologist's study acknowleges source as surface pit percolation just west of injection well. Operator suggests past disposal in surface pit is more likely the source of contamination.

Waste Volume Released	20 million barrels of brine	(barrels, gallons, etc.)

3/4/87&

Areal Extent: [illegible] long, 160 acres of ranch rendered unirrigable (acres)

Date of Release: Oct 1972 - May 1977 (release may be ongoing recently reported etc)

Duration: Five years (comment as needed)

Affected Biota (yes/no) Fauna [ ] Flora [yes] Human Health [ ]

Damage Description: In 1973, an irrigation well was completed on the ranch of Mr. Paul Hamilton. In 1977, the well began producing water with chlorides of 1200ppm. His crops were severely damaged and the farm property was foreclosed on. There is no evidence of crop damage prior to 1977. Mr. Hamilton's hydrologist proved that old pits in the vicinity previously used for saltwater disposal had caused the contamination, high chloride levels would have been detected in the irrigation well prior to 1977. It was proven in a court of law that the SO-3 injection well adjacent to his property had leaked into the groundwater, causing chloride contamination of the Ogallala aquifer from which he irrigated. Mr. Hamilton won a cash settlement from Texaco for damages sustained by the east injection well. The well is still in operation.

API Comment: THE JUDGMENT AWARDED MR. HAMILTON WAS SUBSEQUENTLY REDUCED BY 50% SINCE PLAINTIFF [redacted] RECEIVED CASH SETTLEMENT FROM OFFSET OPERATOR WHERE PETROLATE PIT IS LOCATED. THE WELL STILL OPERATES BECAUSE IT CONTINUES TO PASS THE NM MECHANICAL INTEGRITY TESTS PRESCRIBED BY THE UIC REGULATIONS.

Violations State Regs. [0] (0=No 1=Yes) at time of damage

Compliance Issues: The injection well was not in violation of New Mexico UIC rules and is still in operation despite of the lawsuit Texaco lost. The issue here is how differently the states interpret pressure tests and MIT's on injection wells. Texas, this well would have been condemned.

API Comment: THERE IS NO DIFFERENCE BETWEEN THE NEW MEXICO AND TEXAS GENERIC UIC REGULATIONS. THE MAX. TEST PRESSURES DIFFER BY 200psi. A TEN-PERCENT FALLOFF BETWEEN THESE PRESSURES IS NOT SIGNIFICANT IN RUNNING MECHANICAL INTEGRITY TESTS. EPA'S COMMENT IS WITHOUT FOUNDATION.

Documentation: "Oil-Field Brine Contamination - A Case Study, Lea Co. New Mexico", from Selected papers on water quality and pollution in New Mexico - 1984.

3/4 37&

ANALYSIS OF EPA'S DAMAGE CASE NO. NM01
MOORE-DEVONIAN OIL FIELD
LEA COUNTY, NEW MEXICO

Summary

Texaco has operated a SWD well since 1972 in subject field. A Mr. Hamilton, farmer/rancher, filed suit in 1977 following alleged crop damages stemming from his contaminated irrigation well. The New Mexico Oil Conservation Commission held two administrative hearings in 1978 wherein Texaco produced cement bond logs, injection surveys and pressure test data on tubing, tubing-casing annulus and casing-casing annulus showing disposal confined to the permitted disposal zone. No tubing, casing or cement failures were found which would allow for fluid migration to the Ogallala aquifer. The NMOCC ruled in Texaco's favor at both hearings.

The case was tried in the U. S. District Court in 1979. At that time, Texaco entered evidence that the probable source of contamination was the disposal of approximately 752,000 barrels of brine in unlined surface pits by Texaco and Amerada Petroleum from 1952 to 1958. Surface disposal was lawful during this time interval. On November 15, 1979, upon jury verdict, the court issued a judgment in favor of Texaco in the case.

Mr. Hamilton then hired Dr. Daniel B. Stephens as a consulting hydrogeologist in the case. Dr. Stephens analyzed past data and collected more data, including the results of an electrical resistivity geophysical survey conducted under a contract from the U. S. Environmental Protection Agency. Dr. Stephens concluded that the Texaco SWD well New Mexico "BO" State Well No. 3 was a source of contamination to the Ogallala aquifer.

In November 1980, Mr.Hamilton filed a motion for a new trial in the case based on the new evidence. In the U. S. District Court in 1982, Dr. Stephens discounted Texaco's demonstrations of mechanical integrity with postulations that channels in the cement bond in the casing-borehole annulus or vertical bedrock fractures could exist which technology is not now capable of detecting.

The jury verdict in favor of Mr. Hamilton resulted in a $75,000 award to Mr. Hamilton. Texaco managed a reduction in the award to $37,500 as a result of Mr. Hamilton's prior acceptance of a settlement with Amerada for all claims arising from their surface disposal operations. Amerada was adjudged a joint tortfeasor with Texaco in the case. Therefore, Texaco's portion of the award was reduced to 50% of the original award. As the court award was substantially lower than what Texaco had offered to pay Mr. Hamilton previously in an out of court settlement attempt, the case was pursued no further.

The New Mexico "BO" State Well No. 3 has continued to operate as a salt water disposal well. The well has 13 3/8" casing set at 318 feet with cement circulated in the 17 1/4" hole, 8 5/8" casing set at 3504 feet with cement circulated in the 11" hole, 5 1/2" production casing set at 10,600 feet and cemented with 600 sx. Top of cement behind the 5 1/2" casing is at 7910 feet. Injection is into the Lower Devonian open hole at 10,600'-10,768'. Injection is through 3 1/2" plastic coated tubing below a packer set at 8368'.

EPA Damage Case Assessment (Legal/Scientific Basis)

Operations A saltwater injection well, BO-3, is used for brine disposal for the Moore-Devonian oil field in S.E. New Mexico. Injection occurs at about 10,000 ft. In 1972, the BO-4 injection well, very similar in physical characteristics to BO-3, was found to be so corroded that repair was not practical. The well was plugged and abandoned. From 1953 to 1958 752,000 barrels of brine were disposed of in open unlined pits. The Ogallala aquifer, overlying the oil field, is the sole source of potable ground water in much of southwestern New Mexico. Texaco still uses the BO-3 well, unaltered, as a disposal well for oilfield brines in spite of a lawsuit in which they paid a cash settlement to a rancher for damages incurred due to the leaks and subsequent groundwater contamination from BO-3.

Waste Analysis Hydrogeologic configuration illustrating plume of contamination, water analysis, chlorides as high as 25,000ppm in aquifer around BO-3 well. Analysis of irrigation well shows chlorides of 1200ppm.

Damage Description In 1973, an irrigation well was completed on the ranch of Mr. Paul Hamilton. In 1977, the well began producing water with chlorides of 1200ppm. His crops were severely damaged and the farm property was foreclosed on. There is no evidence of crop damage prior to 1977. Mr. Hamilton's hydrologist proved that if old pits in the vicinity previously used for saltwater disposal had caused the contamination, high chloride levels would have been detected in the irrigation well prior to 1977. It was proven in a court of law that the BO-3 injection well adjacent to his property had leaked into the groundwater, causing chloride contamination of the Ogallala aquifer from which he irrigated. Mr. Hamilton won a cash settlement from Texaco for damages sustained by the leaking injection well. The well is still in operation.

Compliance Issues The injection well was not in violation of New Mexico UIC rules and is still in operation in spite of the lawsuit which Texaco lost. The issue here is how differently the states interpret pressure tests and MIT's on injection wells. In Texas, this well would have been condemned.

Documentation "Oil-Field Brine Contamination - A Case Study, Lea Co. New Mexico," from selected papers on water quality and pollution in New Mexico - 1984.

Conclusions

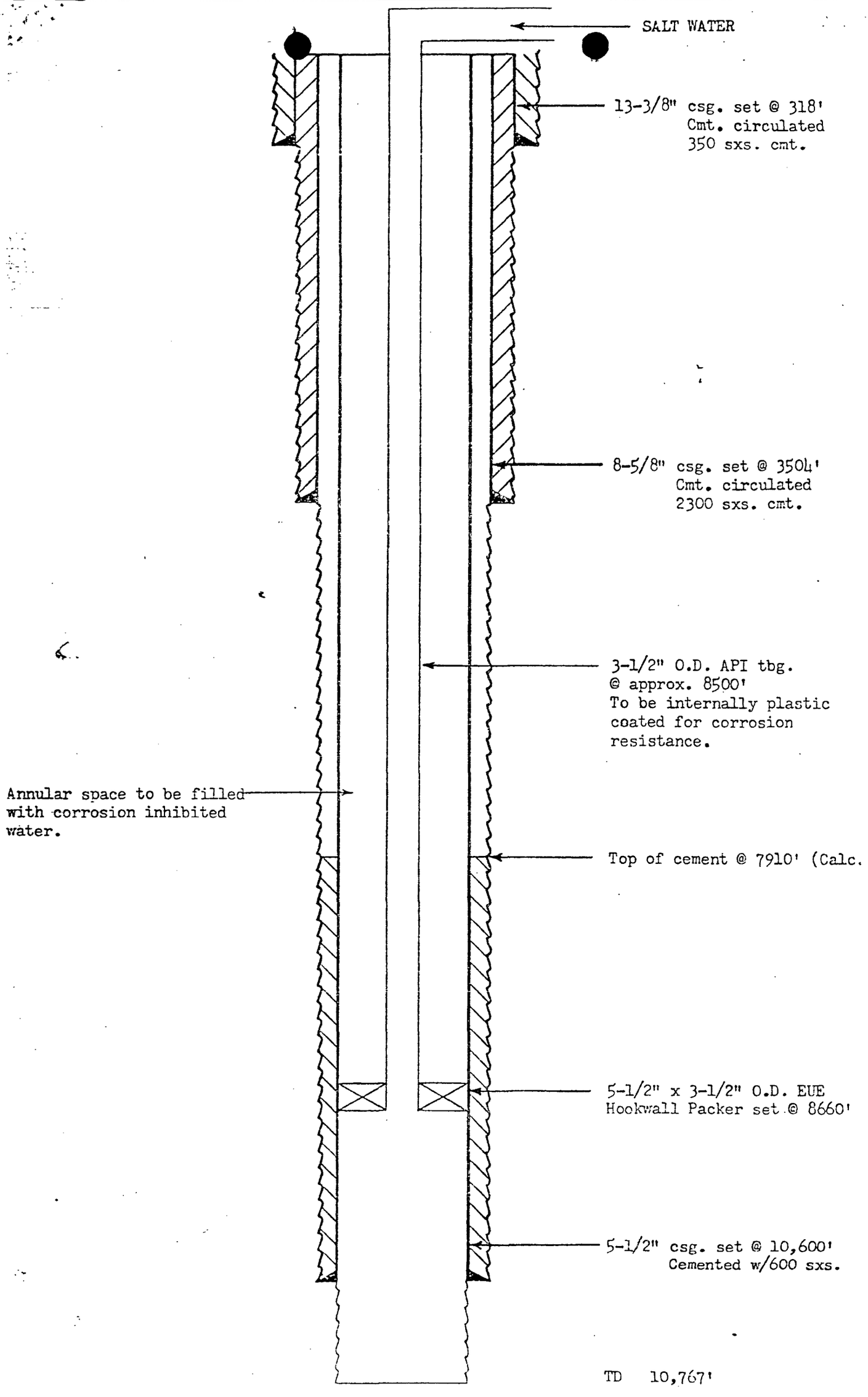
EPA's contractor chose to cite this case as described in the reference document which was prepared by Dr. Daniel B. Stephens, the same consulting hydrogeologist who represented the plaintiff in the subject court case.

Dr. Stephens' mass balance plume calculations are flawed based on his assumption that injection operations had caused contamination in the irrigation well as opposed to the prior long term, allowed, disposal in the surface pits in the area. Owing to the proximity of the injection well to the irrigation well, contamination stemming from the injection well operations would have occurred much sooner than actually witnessed. Dr. Stephens failed to recognize the transport time impact from surface percolation versus an instantaneous release from a leaking SWD well via cement channelling.

EPA implies the Texaco well is the source of contamination and is still allowed to operate. They ignore the state record of continuous monitoring of pressures in the well as well as the constancy of volumes and pressures reported by the operator.

Finally, the EPA contractor implies there is a significant difference in MIT requirements between Texas and New Mexico. Both states are primacy states under the UIC program promulgated by EPA regulations under the Office of Drinking Water. New Mexico requires a test pressure of 300psi whereas Texas requires 500psi. The well operates above 500psi injection pressure. The pressure difference of 200psi between states is not significant enough to cause concern in failing an MIT. In 1977 the well was tested to 525psi with no leakoff observed. Information was furnished on October 13, 1977 to NMOCC.

MAS:maq
5/29/87



TEXACO Inc.
NEW MEXICO "BO" ST. NO. 3
SWD WELL
MOORE DEVONIAN FIELD
[illegible] COUNTY, NEW MEXICO

File Ref# 13.102 State NM

yes Nearest City or Town Shiprock

Region 9 County Parish San Juan

Proof Category Administrative [ ] Legal [ ] Scientific/technical [1] 0 = no 1 = yes

Description of Operation

Production Area: Duncan Oil Field (basin, region, etc.)

Production Type: Oil/Disposal pit (oil, gas, injection well, etc.)

Production Category: Production (exploration, development, production, or other)

Description of Operation

The study area is located in northwest New Mexico in the San Juan basin in a region referred to as the Hogback Oil Field(Duncan is the operator in the study area). The oil field is situated in a flood plain of the San Juan River. The site chosen was similar to at least 1500 other nearby wells in the flood plain. Test pits were dug around the disposal pit on the chosen site. These test pits were placed above gradient and down gradient of the disposal pit, at 25 and 50 meter intervals. A total of 9 pits were dug to a depth of 2 meters and soil and groundwater samples were obtained from each pit. Volatile aromatic hydrocarbons were found in both the soil and water samples.

PI COMMENT: EPA MISINTERPRETED REFERENCE DOCUMENT RESULTS

Description of Waste and Damage

Pathway of Contamination (yes/no) Ground Water [yes] Surf. Water [ ] Soil [yes]

Damage Source: Produced water disposal pit (reserve, holding or emergency pit; tank, well, battery; spill; injection well; blowdown, etc.)

Areal Extent:

Waste Stream: Produced water (mud, brine, produced water, workover fluid, frac fluid, etc.)

Waste Analysis: Extensive and complex analysis of water and soil samples for VOC's. Also proof of extensive mobility of these compounds in the groundwater and surrounding sandy soil. (describe nature of available analysis, cite key numbers if available)

PI EPA MISINTERPRETED REFERENCE DOCUMENT RESULTS

Waste Volume Released: 161/hr (barrels, gallons, etc.)

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Areal Extent NA (acres)

Date of Release Ongoing? (release may be ongoing, recently reported, etc.)

Duration Ongoing? (comment as needed)

Affected Biota (yes/no) *Fauna* [ ] *Flora* [ ] *Human Health* [ ]

Damage Description Damage can be summarized as contamination of shallow groundwater due to leaching from an unlined produced water disposal pit. Benzene was found in concentrations of 100ppb. above New Mexico Water Quality Control Commission standards of 10ppb. Concentrations of ethylbenzene, xylenes and larger hydrocarbon molecules were found. No contamination was found in test pits placed above gradient from the disposal pit. Physical signs of contamination were also present including black, oily staining of sands above water table and black oily film on the water itself. Hydrocarbon odor was also present.

API COMMENTS: EPA MISINTERPRETED STUDY RESULTS. ANALYSES SHOW BENZENE CONCENTRATIONS AT .001 PPb, NOT, 100 PPb. NM HEALTH AND ENVIRONMENTAL DEPARTMENT ADVISED EPA OF THIS ERROR IN REPORTING BY LETTER DATED APRIL 24, 1987. NM ~~CC~~ STANDARD IS 10 PPb OR 10,000 TIMES GREATER THAN CONCENTRATIONS IDENTIFIED IN TEST PITS. NEAR SAN JUAN RIVER.

Violations State Regs. [0] *(0=No 1=Yes) at time of damage*

Compliance Issues Continued legal use of unlined reserve pits in San Juan basin for disposal of up to five barrels of brine per day per well. This is still permitted inspite of proof that this practice contaminates groundwater with aromatic hydrocarbons which will possibly migrate to the San Juan River.

API COMMENT: SEE COMMENTS UNDER "DAMAGE DESCRIPTION". THE PRESENT RULE OF ALLOWING UP TO 5BWPD DISPOSAL IN UNLINED PITS REPRESENTS A SIGNIFICANT REDUCTION IN PERCOLATION VOLUMES.

Documentation "Hydrocarbons and Aromatic Hydrocarbons in Groundwater Surrounding an Earthen Waste Disposal Pit for Produced Water in the Duncan Oil Field of New Mexico", by G. A. Eiceman, J.T. McConnon, Masud Zaman, Chris Shuey and Douglas Eearp, Sept. 16, 1985. "Polycyclic Aromatic Hydrocarbons in Soil at Groundwater Level Near an Earthen Pit for Produced Water in the Duncan Oil Field", by B. Davani, K. Lindley and G.A. Eiceman, 1986. Oil Conservation Commission (New Mexico) Hearing to define vulnerable aquifers, comments on the hearing record by Intervenor Chris Shuey, Case No. 8224.

File Refs [NM 03] State NM

yes Nearest City or Town Flora Vista

Region 9 County/Parish San Juan

Proof Category Administrative [1] Legal [ ] Scientific/technical [ ] 0 = no 1 = yes

Description of Operation

Production Area San Juan Basin (basin, region, etc.)

Production Type Oil and gas (oil, gas, injection well, etc.)

Production Category Production (exploration, development, production, or other)

Description of Operation

The Flora Vista Water Users Association operates a community water system, serving 1500 residents and small businesses. The system was placed in service in 1983 with two wells, each capable of delivering 60-70 gallons per minute. In 1980 Manana Gas, Inc. drilled the Mary Wheeler No. 1-E, and began producing natural gas and oil. The production site is less than 300 ft. from one of the Flora Vista water wells. In 1982, the Manana well produced 39,584 million cubic ft. of gas and 1022 barrels of oil. 76.6 thousand gallons of produced water is brought up each year. In 1983, one water supply well was contaminated with oil and grease and was taken out of service. The underlying alluvium consists of sand, gravel and boulders and is thus highly porous, allowing for high groundwater permeability.

Description of Waste and Damage

Pathway of Contamination (yes/no) Ground Water [yes] Surf. Water [ ] Soil [Yes]

Damage Source Mary Wheeler No. 1-E Manana Production site (reserve, holding or emergency pit; tank; well, battery; spill; injection well; blowdown, etc.)

Areal Extent

Waste Stream Oil and grease (mud, brine, produced water, workover fluid, frac fluid, etc.)

Waste Analysis Water analysis done on water wells affected as well as on five monitor wells. Analysis shows hydrocarbon contamination of groundwater. Pumping tests were also done to ascertain source of pollution. Although the gas well lies down gradient from the water well, it was demonstrated that pumping of the water well drew the oil and grease upgradient, thus contaminating the water well. (describe nature of available analysis, cite key numbers if available)

Waste Volume Released NA (barrels, gallons, etc.)

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Areal Extent NA (acres)

Date of Release Ongoing? (release may be ongoing, recently reported, etc.)

Duration Ongoing? (comment as needed)

Affected Biota (yes=1) Fauna [ ] Flora [ ] Human Health [ ]

Damage Description Damage can be summarized as contamination of shallow groundwater due to leaching from an unlined produced water disposal pit. Benzene was found in concentrations of 100ppb. above New Mexico Water Quality Control Commission standards of 10ppb. Concentrations of ethylbenzene, xylenes and larger hydrocarbon molecules were found. No contamination was found in test pits placed above gradient from the disposal pit. Physical signs of contamination were also present including black, oily staining of sands above water table and black oily film on the water itself. Hydrocarbon odor was also present.

API COMMENTS: EPA MISINTERPRETED STUDY RESULTS. ANALYSES SHOW BENZENE CONCENTRATIONS AT .001 PPb, NOT, 100 PPb. NM HEALTH AND ENVIRONMENTAL DEPARTMENT ADVISED EPA OF THIS ERROR IN REPORTING BY LETTER DATED APRIL 24, 1987. NM STANDARD IS 10 PPb OR 10,000 TIMES GREATER THAN CONCENTRATIONS IDENTIFIED IN TEST PITS NEAR SAN JUAN RIVER.

Violations State Regs. [ ] (0=No 1=Yes) at time of damage

Compliance Issues Continued legal use of unlined reserve pits in San Juan basin for disposal of up to five barrels of brine per day per well. This is still permitted inspite of proof that this practice contaminates groundwater with aromatic hydrocarbons which will possibly migrate to the San Juan River.

API COMMENT: SEE COMMENTS UNDER "DAMAGE DESCRIPTION." THE PRESENT RULE OF ALLOWING UP TO 5 BWPD DISPOSAL IN UNLINED PITS REPRESENTS A SIGNIFICANT REDUCTION IN PERCOLATION VOLUMES

Documentation "Hydrocarbons and Aromatic Hydrocarbons in Groundwater Surrounding an Earthen Waste Disposal Pit for Produced Water in the Duncan Oil Field of New Mexico", by G. A. Eiceman, J.T. McConnon, Masud Zaman, Chris Shuey and Douglas Eearp, Sept. 16, 1985. "Polycyclic Aromatic Hydrocarbons in Soil at Groundwater Level Near an Earthen Pit for Produced Water in the Duncan Oil Field", by B. Davani, K. Lindley and G.A. Eiceman, 1986. Oil Conservation Commission (New Mexico) Hearing to define vulnerable aquifers comments on the hearing record by Intervenor Chris Shuey, Case No. 8224.

3/4/87 &

File Ref's NM 04 State NM

yes Nearest City or Town Hobbs

Region 9 County/Parish Lea

Proof Category Administrative [1] Legal [ ] Scientific/technical [1] 0 = no 1 = yes

Description of Operation

Production Area Southeastern NM (basin, region, etc.)

Production Type Oil (oil, gas, injection well, etc.)

Production Category Production (exploration, development, production, or other)

Description of Operation

Lea County has been an area of major hydrocarbon production for a number of decades. Oil field contamination of fresh water sources became apparent as early as the 1950's. Contamination of the fresh water aquifer has resulted from surface pit seepage and leakage from production and injection well casings. Over 120 domestic water wells have in the town of Hobbs have been contaminated so as to preclude further use of the well for domestic or irrigation purposes. Residents have been using bottled water for a decade or more as a result of the contamination. Leakage from oil wells has been so great in some areas as to allow ranchers to produce oil from the top of the Ogallala aquifer using windmill pumps attached to contaminated water wells. Around 400,000 barrels have been pumped off the top of the Ogallala to date, although production is decreasing due to repair of large leaks in adjacent oil production wells.

Description of Waste and Damage

Pathway of Contamination (yes/no) Ground Water YES Surf. Water [ ] Soil [ ]

Damage Source Unlined brine disposal pits, leaking oil wells, leaking injection wells. (reserve, holding or emergency pit; tank, well, battery; spill, injection well; blowdown, etc.)

Areal Extent

Waste Stream Brine, oil (mud, brine, produced water, workover fluid, frac fluid, etc.)

Waste Analysis Water analysis on numerous Hobbs water wells showing high levels of chloride, TDS, phenols, benzene and aromatic hydrocarbons. (describe nature of available analysis, cite key numbers if available)

Waste Volume Released NA (barrels, gallons, etc.)

3/4/87 &

Areal Extent NA *acres)*

Date of Release Ongoing *release may be ongoing, recently reported, etc.)*

Duration Decades *comment as needed*

Affected Beta (yes no) *Fauna* [ ] *Flora* [Yes] *Human Health* [Yes]

Damage Description Damages include extensive, permanent contamination of groundwater with high levels of chlorides and a variety of organic compounds. Groundwater is the only source of drinking water in the area. Over 100 domestic water wells have documented contamination in the town of Hobbs. The potential for casing leaks on oil wells and injection wells remains high due to the high chloride content of the native brine co-produced with the oil. (High chloride levels in water corrode well casing.) It is therefore assumed that contamination is ongoing.

Violations State Regs. [ ] *(0=No 1=Yes) at time of damage*

Compliance Issues Need more stringent control of injection wells in area, as injection well casing is very vulnerable to corrosion due to high chloride content of native brine being injected. Need more frequent testing of injection well integrity

SEE BELOW

Documentation Sampling data from residential wells in Ogallala aquifer in Lea County, N.M. Report: ORGANIC WATER CONTAMINANTS IN NEW MEXICO, by Dennis McQuillan, 1984. "Windmills in the Oil Field", by Jolly Schram circa 1965.

The EPA Damage Case fails to mention that New Mexico environmental regulations now require the lining of produced water pits. It is only when the gas well produces 5 barrels or less a day of produced water that the lining requirement is not enforced. It is important that EPA indicate that the New Mexico OCD is conducting a study regarding the impact of disposing produced waters in unlined pits in areas outside of the so-called "vulnerable areas". The vulnerable areas are those areas close to the San Juan, Animas and La Plata Rivers. Therefore, if this incident caused the contamination of a water supply source, it should not be interpreted as present practice for disposal of produced waters in New Mexico.

3.4.87&

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Damage Cases

File Ref# NM 05 — State NM

yes — Nearest City or Town Farmington

Region 9 — County/Parish San Juan

Proof Category — Administrative [ ] Legal [ ] Scientific/technical [ ] 0 = no 1 = yes

Description of Operation

Production Area: San Juan Basin (basin, region, etc.)

Production Type: Landfill-gas (oil, gas, injection well, etc.)

Production Category: Production/ (exploration, development, production, or other)

Description of Operation

Lee Arces landfill is located two miles E-SE of Farmington, N.M. It is owned by BLM. The landfill is comprised of 4 unlined liquid-waste lagoons or pits. Since 1981, a variety of liquid wstes associated with the oil and gas industry have been disposed of here including produced water, septage and "VOCs". Use of the pits ceased in 4/19/85. 8,800 cubic yards of waste were disposed of prior to closure. Site is 20 acres in size.

Description of Waste and Damage

Pathway of Contamination (yes/no) — Ground Water [yes] Surf. Water [no] Soil [yes]

Damage Source: The damage source is the leachate from the four unlined pits at the landfill. (reserve, holding or emergency pit; tank, well, battery; spill; injection well; blowdown, etc.)

Areal Extent:

Waste Stream: drilling muds, brine, workover fluids, septage. (mud, brine, produced water, workover fluid, frac fluid, etc.)

Waste Analysis: Extnesive water analysis has been done on the pits and the contaminationed water wells. High levels of Na, Cl, Pb, Cr, benzene, toluene, xylenes, chloroethane and trichloroethylene were found in pits. High levels of chlondes and VOCs were found in downgracient monitoring well. Complete analysis is in file. One domestic well was sampled extensively and found to contain extremely high levels of chloride and elevated levels of chlonnated VOC's, including trichloroethane. Except for benzene, the contaminates found in this well (Reynold's well) are not characteristic of the contaminats generated by the nearby refinery. (describe nature of available analysis, cite key numbers if available)

Waste Volume Released: 8,800 cubic yards (barrels, gallons etc.)

3/4/87 &

Areal Extent The plu[redacted]as move down gradient 3-4 mile, unimpeded fl[redacted]ll eventually enter the San Juan R., 1 1/2 miles away. *(acres)*

Date of Release 1981-1985 *(release may be ongoing, recent, reported, etc)*

Duration 4 years *(comment as needed)*

Affected Biota (yes,no) *Fauna* [ ] *Flora* [ ] *Human Health* [yes]

Damage Description The unlined pits at Lee Acres landfill have allowed percolation of numerous contaminants into the groundwater source of domestic water for the Lee Acres haousing development, several private wells have been contammated with high levels of chlondes and VOCs. The Sate has ordered BLM t provide public watger to residnets affected by the contamination, develop a groundwater monitonng system, and investigate type of drilling, drilling procedure, well construction methods. BLM Submitted a motion to stay the order as to include Giant Oil Co. and El Paso Natural Gas in cleanup operations. The motion was denied.and the case is pending may end up in court.

Violations State Regs. [ ] *(0=No 1=Yes) at time of damage*

Compliance Issues No concrete compliance issue other than that the BLM did not monitor dump site and handle. was: properly.

API Comment: however, it needs to be emphasized that since April of 1985 the policies for disposal of waste waters and solid waste in New Mexico have been changed and the public can no longer indiscriminately dispose waste in public or private lands.

Documentation Administrative Order No. 1005 - State of N.M. (Contains water analysis for open pits, nmonitor wells and impacted domestic wells.); Motion to stay Order No. 1005; Denial of motion to stay.; Newspaper articles.; Southwest Research and Information Center, Response to hearing 12/2/86, before Water Quality Control Commission.

3 4 87&

Texaco USA

P O Box 730
Hobbs NM 88240
505 397 3571

December 17, 1985

Mr. Jerry Sexton
Oil Conservation Division
P. O. Box 1980
Hobbs, New Mexico 88241

SUBJECT: New Mexico "BO" State #3-D in 24-11-32

Dear Mr. Sexton:

This letter concerns the restoration of the above mentioned SWD well to active injection status. On December 17, 1985 the subject well was cleaned out to a total depth of 10,662' and a pipe analysis log was run. The log indicated deteriorated pipe below a depth of 8500' to TD. Based upon this finding it is requested that Texaco be authorized to set a Baker "R" packer in good pipe between 8350' and 8400'. The casing above 8339' was pressure tested to 1500 psi on November 25, 1985 with no leakoff and the top of cement is at 7910' (Determined by a Temperature Survey). Furthermore, Texaco agrees to run an injection survey on the subject well upon commencement of water injection and yearly thereafter. The NMOCD will be notified prior to running the survey. If the NMOCD has any further stipulations or questions please contact Mr. Dan Westover or myself at 397-3571. Your consideration in this matter is appreciated.

Sincerely,

D. R. Crockett
Hobbs Area Superintendent

DOW:CLP

cc: W. B. Cade
KGC

Example
CALIBRATED CHARTS
NM BO #3 SWD
8:00 PM
12-18-85
BR-2221
B 0-1000#
60 minute chart
DAY
PRINTED IN U.S.A.

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

TONEY ANAYA
GOVERNOR

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87501
(505) 827-5800

May 22, 1984

Daniel B. Stephens, Associate Professor
NM Institute of Mining and Technology
Department of Geoscience
Socorro, NM 87801

Dear Mr. Stephens:

I am sorry it has taken so long to respond to your letter of April 24. I will have to plead the press of business as my excuse.

I believe that most of the actual tracer surveys run relative to the Hamilton case reside at our Hobbs office. There may be something in the case file here as well but I have not had the time to look. You should feel free to avail yourself of either of these possible sources of data.

It is hoped that we will have an environmental engineer on board after the first of July. His or her plate is expected to be full for sometime with bringing assigned projects up to speed. However, after a few months we might all visit on any specific proposals you may wish to make.

Sincerely,

R. L. Stamets
Technical Support Chief

cc: Jerry Sexton

RLS/bok

NEW MEXICO INSTITUTE
OF MINING AND TECHNOLOGY
SOCORRO 87801
DEPARTMENT OF GEOSCIENCE
505-835-5634

April 24, 1984

Mr. Richard L. Stamets
P. O. Box 2088
State Land Office Building
Santa Fe, NM 87501

Dear Mr. Stamets:

Thank you for your letter of April 19, 1984 regarding the Hamilton case. It was always my intent to be fair and objective, even in the initial draft. I believe the point that shallow ground water monitoring also can protect and benefit operators is the strength of the article; thus, I chose to place less emphasis on technical issues.

In regard to technical issues you raised, I agree the shape of the plume is somewhat unusual. The map is based on existing data (contours by J. Runyon) which did not include any observations in an area south-southeast of the pit and about 1000 feet south of BO-3; that is, the southern limit of chloride concentration is poorly defined. There are also few data near BO-4. The redbed configuration and the presence of clay in the lower Ogallala probably affect the movement of chloride; however, more accurate geologic logs, field permeability tests and profile sampling of fluids are needed to assess the importance of these controls.

The magnitude of the leak in BO-3 can be estimated on the basis of the mass of chloride in the Ogallala in 1978. Assume an affective porosity of 20%, that all the chloride between contours is contained within the lower 14 feet of the Ogallala (from depth profiles of chloride at Texaco wells 3 and 4 and HO-2), and that all of the 0.75×10^6 bbl of pit water entered the Ogallala. From this, the amount of chloride from a source other than the pit would be approximately 9×10^5 bbl, at 26,000 mg/l. If the total volume of brine injected at BO-3 was 22×10^6 bbl in 1978, then a loss of only about 4% of the total injected volume would be required to make up for the extra chloride.

I do not recall examining details of the tracer surveys. However, I have examined some of the mechanical integrity tests, and it seems clear that there was a tubing or packer leak. To comment on the tracer survey you refer to, I would have to have the information provided to me. I would be glad to take a look at it if you can put it in the mail, or it may be possible for me to visit with you in Santa Fe. One of the most important aspects of the tracer test is the field operating condition; that is, if only one injection pump was operating, there was probably not sufficient bottom hole pressure to cause upward movement outside the casing - either along the cement or through bedrock fractures. If movement outside the casing occurs, it does seem that some fluid should enter strata other than the Ogallala. One may also expect that if such fluid contacted the halite and anhydrite section, then the chemistry of the contamination should be different than observed.

Regarding other explanations, when I first entered the case, I thought that one source of contamination could be an abandoned or improperly plugged well which acted as a conduit between the injection zone and Ogallala. Our magnetometer survey only located what may be a pot in a seismic shot hole. I also found some evidence for a leaky production well, on the basis of slightly elevated aquifer temperatures and grey, foul-smelling saline water sampled in the vicinity of the old pit; as I recall, Eddy Seay was with us at the time of this sampling. I also do not know where brine disposal occurred between about 1958 and 1963; can you provide any details? There are a half dozen other possibilities, but I believe that BO-3 contributed to the problem at some time.

I believe that an objective research program is required to gain a complete understanding of the problem. It is possible that even with a substantial effort, little definitive information can be collected. On the other hand, there is a great potential to make substantial progress in predicting the fate of aquifer contaminants, particularly in oil fields, given the paucity of good case studies. I urge you to consider an expanded effort to continue monitoring this site, and to design an aquifer restoration plan. I have enclosed a hydrograph of the NM State Engineer recorder well which is located southwest of BO-3. Note the nearly one-year period in 1979 when water levels were unchanged; the period prior to this may show recovery from the Hamilton irrigation wells and/or injection leakage, whereas the subsequent rise could indicate injection leakage. Monitoring like this, at other locations, along with properly designed observation wells for fluid chemistry, would be a good first step in continuing to study the problem.

If I can be of any help, or if you would like to discuss any aspect of this or related problems, please feel free to call me. Should your travels bring you through Socorro, please come by to visit or to give an informal talk to our hydrology group.

Sincerely,

Dan Stephens

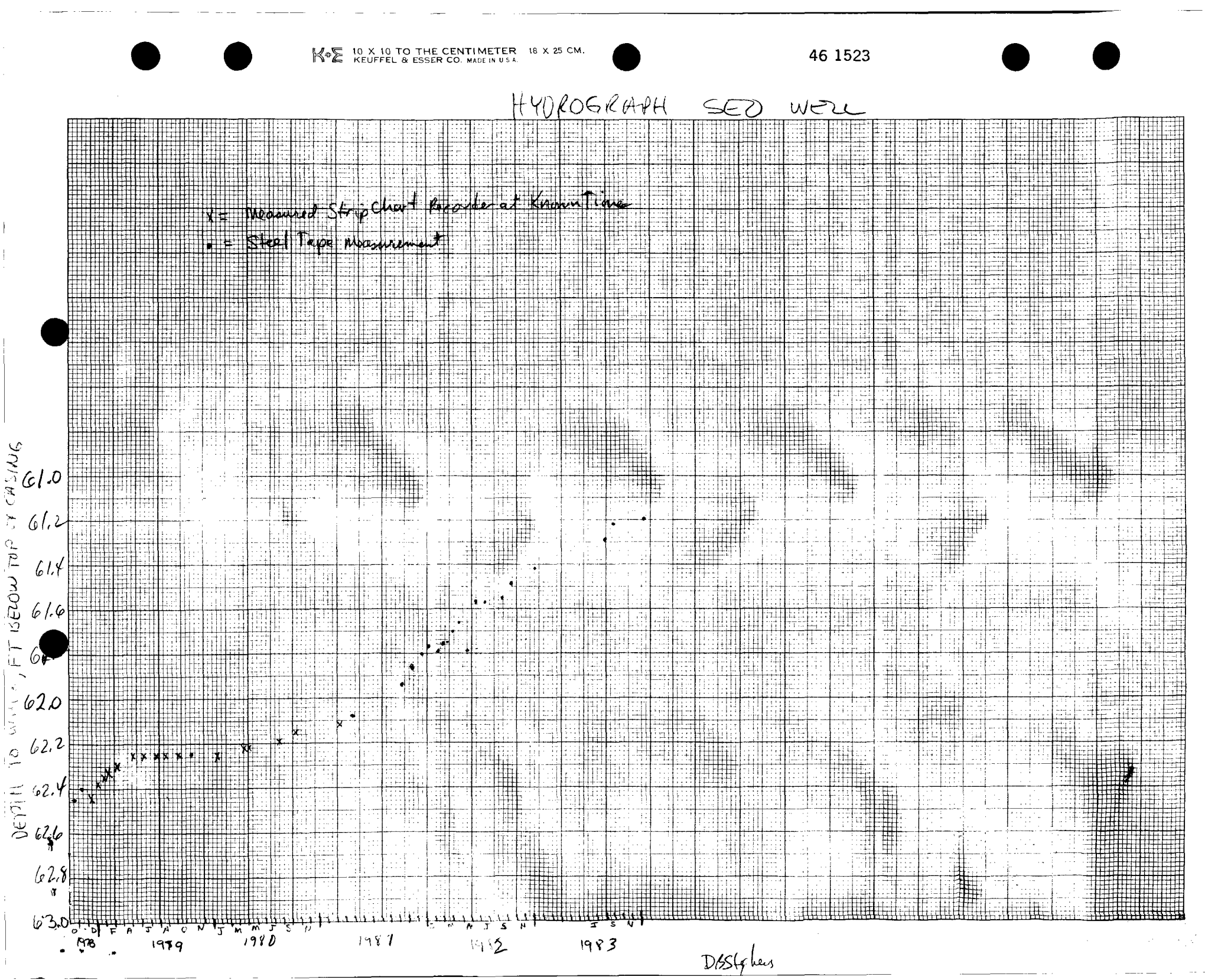
Daniel B. Stephens
Associate Professor of Hydrology

DBS/jm

HYDROGRAPH SED WELL

X = Measured Strip Chart Recorder at Known Time

• = Steel Tape Measurement



STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

TONEY ANAYA
GOVERNOR

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87501
(505) 827-5800

April 19, 1984

Daniel B. Stephens
Associate Professor of Hydrology
NM Institute of Mining and Technology
Campus Station
Socorro, NM 87801

Dear Mr. Stephens:

I have just finished reviewing your paper "Oil Field Brine Contamination - A Case Study, Lea County, NM" presented at Socorro on April 12, 1984.

I was pleased to see that the final product did a better job of presenting more than one aspect of this very complex problem. There are still a couple of issues which concern me about this matter; these are:

(1) Doesn't the shape of the contours on Figure 3 indicate that an unusual flow regime exists at this site? Might this not contribute to much slower movement of the brine from the old pit than one would normally expect?

(2) I still find no estimate of the volume of fluid which would have had to have leaked from the BO-3 injection well to have resulted in the contamination seen today. As you no doubt know, a number of tracer surveys were run on the well and none showed fluid movement up the annulus behind the pipe. If the volume of fluid which had to have leaked was known, some determination could perhaps be made that the tracer surveys would or would not have shown such movement.

In addition to the above, one must wonder why any fluid migrating at very slow rates behind the pipe would not enter one of the porous zones between the top of the cement on the 5 1/2 inch casing at 7910 feet and the base of the intermediate casing 3504 feet.

If you should run across or develop any usefull answers or theories on any of the above, I would appreciate hearing about them.

Sincerely,

R. L. Stamets,
Technical Support Chief

cc: Jerry Sexton

January 26, 1984

Daniel B. Stephens
Associate Professor of Hydrology
New Mexico Institute of Mining
and Technology
Department of Geoscience
Socorro, New Mexico 87801

Dear Mr. Stephens:

Your proposed publication relative to the Moore-Devonian water contamination case forwarded in your letter of January 19, 1984, was received in this office on January 25. The report has been reviewed by Mr. Jerry Sexton, Mr. Joe Ramey, and myself.

Based on this review, there are serious questions with the proposed publication. Some of the problems with the report are as follows:

1) The report fails to note that new owners are now irrigating the property from a well located outside the plume area.

2) The report fails to note that the OCD performs annual mechanical integrity tests on all salt water disposal wells in Southeast New Mexico. This expanded test program began in 1978.

3) The report fails to mention the numerous hearings conducted on this matter before the Oil Conservation Division, the expert witnesses appearing, the expert testimony presented, and the findings of the Commission that there was no definitive evidence that the salt water disposal well in question was the source of the contamination. The order of the Commission was never challenged in court by Mr. Hamilton.

4) In the third paragraph of the discussion you indicate that a slow rate of leakage over a long

time could account for the contamination near the BO-3 well. However, I see no calculations of the volume of water necessary to have created the plume and at what rate the "slow leak" would have had to have been in order to have pumped that volume of salt water into the Ogallala and whether or not such a rate could have been detected by the tracer surveys run.

5) There was no discussion of the nature and extent of the tracer surveys run on the well and their results.

6) You indicate that mud pits, producing oil wells, improperly plugged and abandoned oil wells, etc. are sources of saline seepage to shallow aquifers. This implies that contamination is occurring from these sources but you offer no scientific proof. There is a world of difference between being a potential source and an actual source.

Because of the apparent superficial nature of the report, I cannot endorse any part of it. Futher, I am appalled at what appears to be a one-sided unscientific approach to a very complex problem.

Sincerely,

RICHARD L. STAMETS
Technical Support Chief

RLS/dp

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...30 feet on the Llano and from 0 to about 40 feet on rocks of the Dockum group. The material overlying the Ogallala formation is off-white to light brown and was derived from the Ogallala on the Llano; the material overlying the Dockum group is mostly red because it was derived from the red beds of Triassic age.

The Ogallala formation of Pliocene age and the alluvium, soil, and sand of Pleistocene and Recent ages form a single hydrologic unit and in this atlas their hydrologic characteristics will be discussed together.

Ground water in the formations of Cenozoic age is unconfined and occurs mainly in the unconsolidated or poorly consolidated sand and gravel of the Ogallala formation beneath the caliche cap rock. The water-bearing properties of the formation vary vertically and horizontally. The vertical variation is due chiefly to the amount of calcium carbonate cement in the Ogallala. As a rule, the amount of calcium carbonate cement decreases downward and is practically negligible at depths of 35 to 50 feet below the surface. The porosity and permeability increase downward as the cementation decreases. Lateral variations in the water-bearing properties of the sand and gravel below the zones of cementation are the result of variations in the coarseness and degree of sorting of the particles.

The yield of wells, or the amount of water pumped in gallons per minute, ranges widely throughout the area. The maximum yield recorded in normal operation of the pumps in 1953 was about 1,700 gpm. Some wells used for irrigation pump as little as 200 gpm but wells yielding less than about 300 gpm are generally considered unsatisfactory for irrigation use. The yields of wells differ greatly in relatively short distances and may be attributed to formation differences or differences in well construction. The low yield in some wells may be due in part to poor development or construction of these wells, inasmuch as wells of higher yield have been developed nearby.

Perched ground water is found in beds of caliche that have a honeycomb-like structure. These beds have bedding planes enlarged by solution and are locally referred to as "honeycombed rock" or "water rock" (Nye, 1930, p. 372). The quantity of ground water derived from this type of reservoir is small.

Irrigation wells tap the alluvium in the area south of the Mescalero Ridge in the vicinity of Nadine and Monument. Stock wells have been constructed in the alluvium at Sand Gate, but no large-production wells have been drilled, so the potential of the aquifer there is unknown. Generally the alluvium on the Llano is above the water table although perched ground water could occur in those places where the alluvium is relatively thick and overlies an impervious section of caliche.

INTERIOR—GEOLOGICAL SURVEY, WASHINGTON, D. C.—62289

QUALIFICATIONS OF SERVICE COMPANIES

Teledyne Isotopes of Westwood, New Jersey, is an independent company, not associated with Texaco Inc. Teledyne specializes in radioactive tracer analysis for tracking the flow of fluids. Teledyne maintains its laboratory in New Jersey.

Petroleum Tracers, Inc. of Dallas, Texas, is a private company not associated with Texaco Inc. Petroleum Tracers specializes in placing radioactive isotopes in fluid systems for the purpose of tracking the flow paths of fluids. They have had over twelve years experience all over the world in placing radioactive material into various types of oilfield systems for the express purpose of identifying possible contamination by oilfield fluid systems of fresh water sources.

DISCUSSION OF RADIOACTIVE MATERIAL

The radioactive material is Iodine isotope 125 (I-125) which has a half-life of 2 months. Approximately ten millicuries (10 mc) of I-125 were ejected. This radioactivity level had been designed by Teledyne Isotopes, Inc., of Westwood, N. J., to be sufficient for detection at the observation well at least 8 weeks after placement in "BO" Well No. 3 should communication exist between these wells. There was a minimum design factor of 10 times the detection limit of Teledyne Isotopes' equipment--that is, there was at least 10 times as much radioactivity used as was required for Teledyne to detect it.

The design of the necessary radioactivity for detection was based on a maximum dilution volume of 1.7 million barrels. This is the radial volume of pore space in a 60' radius around the disposal Well No. 3 (encompassing the observation well) and extending two miles vertically from the surface of the ground to the top of the Devonian injection interval at 10,600'. This volume is considered far in excess of what actual dilution could have occurred.

RADIOACTIVE TRACER TEST PROCEDURE - N. M. "BO" STATE NO. 3

(Note: Normal operations of the Moore SWD System is to inject all water coming into the system. This entails injecting with one or two J-150 triplex pumps, depending on the supply of produced water. Injection with one pump occurs at a vacuum; injection with two pumps occurs at approximately 700 psi, mostly due to friction pressure. The annual average injection rate for 1976, 1977, and 1978 ranged between 11,061 BPD and 12,242 BPD.)

1. Background water samples were collected from both the Ogallala observation well and the produced water tank feeding the disposal pumps, and were mailed to Teledyne Isotopes in Westwood, N. J., to ascertain native levels of I-125 isotope and the elemental iodide anion. No significant I-125 was found. Sufficient iodide anion was found to be an adequate carrier of the I-125 isotope to be ejected for the test.

2. Disposal water was injected normally @ 700 psi prior to test date.

3. On September 28, 1978, injection was halted to allow Petroleum Tracers, Inc. to connect their ejection tool to the wellhead of Texaco's N. M. "BO" St. No. 3.

4. Ejection of ten millicuries of radioactive iodine isotope I-125 was done by Mr. Bobby Fletcher of Petroleum Tracers, Inc. at 10:45 a. m.

5. Both injection pumps were turned on and injecting at a rate of between 12,000 and 13,000 barrels of water per day by 10:46 a. m.

6. Injection continued for 33 minutes, until 11:19 a. m. (At the lower rate of 12,000 BPD, the total volume of the tubing and casing from the surface to the Devonian at 10,600 feet will be displaced twice in 29½ minutes.)

7. At 11:19 a. m., the pumps were shut down to allow Petroleum Tracers to disconnect their ejection tool from the wellhead and Texaco to reconnect their fittings. Injection with two pumps was then resumed at 12,000-13,000 BPD at approximately 700 psi.

8. Both injection pumps ran 24 hours per day and injected water volumes approximating 13,000 BPD until about October 6th. Thereafter, volumes decreased to a range between 11,000-12,000 BPD. Injection continued at this rate throughout and beyond the test period of 8 weeks designated by the Oil Conservation Division, with injection volumes averaging 12,122 BPD in October, 1978, and 11,590 BPD in November, 1978. (December, 1978 injection was 11,800 BPD; January, 1979 injection was 12,058 BPD.)

9. Water samples were collected from the Ogallala observation well located 50'-60' southeast of N. M. "BO" State No. 3, beginning September 29, 1978, and continuing every day through October 6, 1978. Thereafter, sampling continued every Monday, Wednesday, and Friday, from October 9th through November 24, 1978.

10. Texaco caught and mailed three quarts each sampling day to Teledyne Isotopes in Westwood, N. J. Mr. Paul Hamilton caught and mailed eight liters on every other sampling day to Eberline Instrument Corp. in Santa Fe, N. M.

11. The ejection of the isotope, and the collection and mailing of water samples were witnessed by representatives of the O. C. D., Texaco, and Mr. Paul Hamilton.

RESULTS OF RADIOACTIVE TRACER TEST

The following three exhibits are from Teledyne Isotopes of Westwood, N. J.

1. Teledyne's letter of September 14, 1978, to Texaco, discussing background samples and design of test. Statement is made that: "we will have ample analytical sensitivity to provide unambiguous detection of the tracer should it appear." Also: "we anticipate no difficulty in observing I-125 in any sample containing tagged injection water should breakthrough to the Observation Well occur."

2. Teledyne's letter of December 21, 1978, to Texaco enclosing the final tabulation of all test results. Statement is made: "There has been no detectable Iodine-125 present in the Ogallala potable water above our detection limit."

3. Teledyne's tabulation of test results from 29 samples. Readings vary from "less than 0.1 picocuries per liter" to "less than 0.4 picocuries per liter."

DONALD F. SCHUTZ, President

TELEDYNE ISOTOPES
50 VAN BUREN AVENUE
WESTWOOD, NEW JERSEY 07675
(201) 664-7070 TELEX: 13-4474

14 September 1978
DFS-821

Mr. J. V. Gannon
TEXACO Inc.
P O Box 728
Hobbs, New Mexico 88240

Dear Mr. Gannon: Re. W. O. #3-1977

I am pleased to enclose our Report of Analysis for samples submitted for analysis prior to the injection of ^{125}I tracer in the New Mexico "BO" State Well No. 3. Sample No. 55688 from the Observation Well at the base of the Ogallala showed no significant ^{125}I activity at a sensitivity level of 0.8 picocuries per liter.

You will recall that we have designed the project so that if there is dilution of the ^{125}I tracer in the entire volume of water located within a 60 foot radius of the test well, there would be a concentration of 20 picocuries per liter. We feel, therefore, that we will have ample analytical sensitivity to provide unambiguous detection of the tracer should it appear.

We also examined the injection water and found that there is no significant ^{125}I at the same level of sensitivity, so we do not anticipate any interference from natural radioactivity in carrying out the project. We examined two samples from the Observation Well and two samples of injection water for the presence of iodide ion. The injection water has about 6.8 mg per liter iodide which will provide an ample amount of carrier for the ^{125}I tracer. The water from the base of the Ogallala gave two readings of 2.2 and 5.3 mg per liter, so there is ample iodine in that water also to serve as a carrier for the ^{125}I tracer. The iodide anion has been found to move well through geologic formations without carrier, so we anticipate no difficulty in observing ^{125}I in any sample containing tagged injection water should breakthrough to the Observation Well occur.

According to your instructions, I am distributing copies of this letter and the analytical reports to the interested parties listed.

Please let me know if you have any questions regarding the format of our report or the significance of the data.

Yours truly,

Donald F. Schutz
President

DFS:mm
enclosures

cc: S. E. Schlarb, Texaco Inc. w/enclosure
J. Sexton, District Supervisor, Oil Conservation Div. w/enclosure
Donald Brown, P O Box 776, Roswell, w/enclosure
Harold Hensley, P O Box 10, Roswell, w/enclosure
Petroleum Tracers Inc., Dallas w/enclosure

9-19-78

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TELEDYNE
ISOTOPES

50 VAN BUREN AVENUE
WESTWOOD, NEW JERSEY 07675
(201) 664-7070 TELEX 13-4474

copy to RSB 12/29/78

21 December 1978

Mr. Douglas Sprague
Texaco, Inc.
P. O. Box 728
Hobbs, NM 88240

Re: W.O. No. 3-2511

Dear Mr. Sprague:

Enclosed is the Report of Analysis for the above referenced work order. Also enclosed is a completed Tele-tracer Data Summary Sheet.

There has been no detectable Iodine-125 present in the Ogallala potable water above our detection limit.

Should you require any additional information on this, or any future project, please do not hesitate to call us.

We enjoyed working with you on this tracer experiment and hope you found our service satisfactory to your needs.

Yours truly,

Andrew Carmichael

Andrew Carmichael
Tele-Trace Project Coordinator

AC:hp
enclosures

cc: Mr. Donald Brown, Roswell, NM w/encl.
Mr. Jerry Sexton, Hobbs, NM w/encl.
Mr. Harold Hensley, Jr., Roswell, NM w/encl.
Mr. Tom Calhoun II, Dallas, TX w/encl.

TELE-TRACER DATA SUMMARY - TEXACO, INC. - MOORE FIELD - ^{125}I in 60' OBS - WELL

COLLECTION DATE		TI #	^{125}I pCi/ℓ	W.O. No.
Fri.	29 Sept. 1978	57570	less than 0.2	3- 2229
Sat.	30 " "	57656	" 0.3	3- 2238
Sun.	1 Oct. 1978	57632	" 0.2	3- 2236
Mon.	2 " "	57633	" 0.4	3- 2238
Tues.	3 " "	57634	" 0.2	3- 2238
Wednes.	4 " "	57943	" 0.2	3- 2258
Thurs.	5 " "	57906	" 0.2	3- 2252
Fri.	6 " "	58004	" 0.3	3- 2281
Mon.	9 " "	58225	" 0.3	3- 2337
Wednes.	11 " "	58226	" 0.1	3- 2337
Fri.	13 " "	58062	" 0.3	3- 2240
Mon.	16 " "	58130	" 0.3	3- 2311
Wednes.	18 " "	58227	" 0.2	3- 2357
Fri.	20 " "	58263	" 0.4	3- 2342
Mon.	23 " " [1]	58331	" 0.2	3- 2346
Wednes.	25 " "	58510	" 0.3	3- 2379
Fri.	27 " "	58511	" 0.4	3- 2379
Mon.	30 " "	58664	" 0.3	3- 2408
Wednes.	1 Nov. 1978 [1]	58848	" 0.3	3- 2450
Fri.	3 " "	58849	" 0.3	3- 2430
Mon.	6 " " [2]	58998	" 0.3	3- 2455
Wednes.	8 " "	59280	" 0.3	3- 2493
Fri.	10 " "	59171	" 0.2	3- 2474
Mon.	13 " "	59281	" 0.2	3- 2493
Wednes.	15 " "	59423	" 0.2	3- 2505
Fri.	17 " "	59458	" 0.3	3- 2511
Mon.	20 " " [3]	59529	" 0.2	3- 2534
Wednes.	22 " " [4]	59620	" 0.2	3- 2543
Fri.	24 " "	59621	" 0.3	3- 2543

Note:

✓ - Analysis in Progress

1 - No Collection Date on Bottles - Inferred Date

2 - Labeled 6 October - Assumed 6 November

3- " 20 " - " 20 "

4- " 22 " - " 22 "

FORM NO. 1127 GOLDSMITH BROS., N. Y. 10038 (212) 267-7800

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ENERGY AND MINERALS DEPARTMENT

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Form C-103
Revised 10-1-78

5a. Indicate Type of Lease: State [X] Fee [ ]

5. State Oil & Gas Lease No.: B-9639

SUNDRY NOTICES AND REPORTS ON WELLS

(DO NOT USE THIS FORM FOR PROPOSALS TO DRILL OR TO DEEPEN OR PLUG BACK TO A DIFFERENT RESERVOIR. USE "APPLICATION FOR PERMIT —" (FORM C-101) FOR SUCH PROPOSALS.)

1. OIL WELL [ ] GAS WELL [ ] OTHER- Salt Water Disposal Well

7. Unit Agreement Name:

2. Name of Operator: Texaco Inc.

8. Farm or Lease Name: NM "BO" State

3. Address of Operator: P. O. Box 728 Hobbs, NM 88240

9. Well No.: 3

4. Location of Well: UNIT LETTER D, 660 FEET FROM THE North LINE AND 660 FEET FROM THE West LINE, SECTION 24 TOWNSHIP 11S RANGE 32E NMPM.

10. Field and Pool, or Wildcat: Moore Devonian

15. Elevation (Show whether DF, RT, GR, etc.): 4348' DF

12. County: Lea

16. Check Appropriate Box To Indicate Nature of Notice, Report or Other Data

NOTICE OF INTENTION TO:		SUBSEQUENT REPORT OF:	
PERFORM REMEDIAL WORK [ ]	PLUG AND ABANDON [ ]	REMEDIAL WORK [ ]	ALTERING CASING [ ]
TEMPORARILY ABANDON [ ]		COMMENCE DRILLING OPNS. [ ]	PLUG AND ABANDONMENT [ ]
PULL OR ALTER CASING [ ]	CHANGE PLANS [ ]	CASING TEST AND CEMENT JOB [ ]	
OTHER [ ]		OTHER Fish tubing and old packers; Run new IPC tubing and packer [X]	

17. Describe Proposed or Completed Operations (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work) SEE RULE 1103.

11/06/85 - MIRU pulling unit. Pull on stuck 3½" tubing inside 5½" casing.
11/07/85 - Ran free point. Chemical cut 3½" tbg @ 8338'. Pull 8338' of 3¼' tbg.
11/08/85-11/14/85 - Jar on fish.
11/15/85 - Ran 2 5/8" notchco shoe. Recovered iron sulfide. POH.
11/16/85 - ITH w/1 13/16" OD Kut Rite Concave Mill on 2 7/8" tbg. Circ. and wash from 8307' to 8505'. TOH.
11/17/85 - TIH w/5½" pkr and 2 7/8" tbg to 8313'. Set pkr. Press tbg to 1500#-no drop. TOH.
11/18-23/85 - TIH w/1 5/8" drill pipe and 2 7/8" tbg. Drill pipe kept plugging. POH.
11/25/85 - Ran RBP and pkr on 2 7/8" tbg. Tagged top of fish @ 8348'. Set RBP @ 8339'. Tested casing to 1500#-OK.
11/26/85 - POH.
11/27/85 - Ran collar log through fish. Top of fish @ 8350'. Chemical cut 3½" tbg @ 8427'. Jarred fish loose. POH w/77' of fish.
11/29/85 - Chemical cut 3½" tubing @ 8493'. Recovered 66' of fish.
11/30/85 - TIH w/tbg and overshot. No recovery.
12/02/85 - RIH w/shoe, washpipe, and 2 7/8" tbg. Rec cement, formation and small pieces of grapple.
12/03/85 - RIH w/overshot on 2 7/8" tbg. Caught fish @ 8493'. Jarred on fish. Jarred loose. POH.
12/04/85 - TIH w/shoe and tbg. POH. **SEE BACK**

18. I hereby certify that the information above is true and complete to the best of my knowledge and belief.

SIGNED W. B. [illegible] TITLE Dist. Oper. Mgr. DATE 02/14/86

APPROVED BY Jerry Sexton TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

12/05/85 - TIH w/CutRite shoe on 2 7/8" tbg. Milled from 8511' to 8512½. POH.
12/06/85 - Ran 4 5/8" mill. Tag Model "D" pkr @ 8513'. Mill 1 hr. Fell free to 8540'. Second Model "D" pkr @ 8540'. POH.
12/07/85 - RIH w/shoe and tbg. Rec 2 pieces of junk.
12/09/85 - RIH w/tapered tap on tbg. Tag pkr @ 8550'. Pkr fell down hole. Tag pkr @ 10,153'.
12/10/85 - POH. Rec 6" of pkr. Seal assembly.
12/11/85 - TIH w/shoe. Washed down to 10,170'. Recovered packer. Left seal assembly in hole.
12/12/85 - RIH w/shoe and tbg.
12/13/85 - Washed down from 10,170'-10,339'.
12/14/85 - Wash down from 10,335'-10,555'. POH. Rec seal assembly.
12/15/85 - Ran Schlumberger Pipe Analysis Log from 10,575' to surface.
12/18/85 - RIH w/Kut-Rite shoe. Washed from 10,555'-10,662'. At 10,652', well went on vacuum. POH.
12/19/85 - RIH w/5½" x 2½" Model R single grip plastic coated packer on new 3½" 9.3# N-80 EUE 8 rd. IPC tubing. Displaced hole with inhibited water. Set packer at 8368'. NMOCD in Hobbs approved of setting packer between 8350'-8400'. Tested casing to 500 psi for 30 min. - OK. Place well back on salt water disposal into Devonian formation.
12/20/85 - Acidized well with 1,000 gals 15% acid.
12/30/85 - By Cardinal Surveys, ran injection profile (RA tracer and Temp Survey). Injection profile indicated: (1) 79% of fluid going below logger's TD @ 10,650', and (2) no upward channels around casing shoe @ 10,600' or 5½" packer @ 8372'.

Letter to NMOCD attached. 12/17/85

An Injection Profile will br run annually to monitor injected fluids and verify that the fluids are staying in-zone.

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Form C-103
Revised 10-1-73

5a. Indicate Type of Lease: State [XX] Fee [ ]

5. State Oil & Gas Lease No.: B-9639

SUNDRY NOTICES AND REPORTS ON WELLS

(DO NOT USE THIS FORM FOR PROPOSALS TO DRILL OR TO DEEPEN OR PLUG BACK TO A DIFFERENT RESERVOIR. USE "APPLICATION FOR PERMIT —" (FORM C-101) FOR SUCH PROPOSALS.)

7. Unit Agreement Name:

OIL WELL [ ] GAS WELL [ ] OTHER- Water Disposal Well

Name of Operator: TEXACO Inc.

8. Farm or Lease Name: New Mexico "BO" State

Address of Operator: P.O. Box 728, Hobbs, New Mexico 88240

9. Well No.: 3

Location of Well: UNIT LETTER D, 660 FEET FROM THE North LINE AND 660 FEET FROM THE West LINE, SECTION 24, TOWNSHIP 11S, RANGE 32E, NMPM.

10. Field and Pool, or Wildcat: Moore Devonian

15. Elevation (Show whether DF, RT, GR, etc.): 4348' DF

12. County: Lea

Check Appropriate Box To Indicate Nature of Notice, Report or Other Data

NOTICE OF INTENTION TO:		SUBSEQUENT REPORT OF:	
PERFORM REMEDIAL WORK [ ]	PLUG AND ABANDON [ ]	REMEDIAL WORK [ ]	ALTERING CASING [ ]
TEMPORARILY ABANDON [ ]		COMMENCE DRILLING OPNS. [ ]	PLUG AND ABANDONMENT [ ]
PULL OR ALTER CASING [ ]	CHANGE PLANS [ ]	CASING TEST AND CEMENT JOB [ ]	
		OTHER Change Packer	[XX]
OTHER [ ]			

Describe Proposed or Completed Operations (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work) SEE RULE 1103.

MIRU. Pull tubing. Found hole. Pull and change packer. GIH w/tubing and packer. Set new Baker Model "D" packer at 8524'. Put 500# on casing, tubing and packer. Held pressure. Well returned to injecting water 9/12/84.

I hereby certify that the information above is true and complete to the best of my knowledge and belief.

SIGNED W. B. Crum TITLE Dist. Opr. Mgr. DATE 5/9/85

APPROVED BY [signature] TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT

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LAND OFFICE		
OPERATOR		

OIL CONSERVATION DIVISION
P. O. BOX 2088
SANTA FE, NEW MEXICO 87501

Form C-103
Revised 10-1-78

5a. Indicate Type of Lease: State [x] Fee [ ]

5. State Oil & Gas Lease No.: B-9639

SUNDRY NOTICES AND REPORTS ON WELLS

(DO NOT USE THIS FORM FOR PROPOSALS TO DRILL OR TO DEEPEN OR PLUG BACK TO A DIFFERENT RESERVOIR. USE "APPLICATION FOR PERMIT —" (FORM C-101) FOR SUCH PROPOSALS.)

1. OIL WELL [ ] GAS WELL [ ] OTHER- Water Disposal Well

7. Unit Agreement Name: -

2. Name of Operator: TEXACO Inc.

8. Farm or Lease Name: New Mexico 'BO' State

3. Address of Operator: P. O. Box 728, Hobbs, New Mexico 88240

9. Well No.: 3

4. Location of Well: UNIT LETTER D, 660 FEET FROM THE North LINE AND 660 FEET FROM THE West LINE, SECTION 24 TOWNSHIP 11-S RANGE 32-E NMPM.

10. Field and Pool, or Wildcat: Moore Devonian

15. Elevation (Show whether DF, RT, GR, etc.): 4348' (DF)

12. County: Lea

16. Check Appropriate Box To Indicate Nature of Notice, Report or Other Data

NOTICE OF INTENTION TO:		SUBSEQUENT REPORT OF:	
PERFORM REMEDIAL WORK [ ]	PLUG AND ABANDON [ ]	REMEDIAL WORK [ ]	ALTERING CASING [ ]
TEMPORARILY ABANDON [ ]		COMMENCE DRILLING OPNS. [ ]	PLUG AND ABANDONMENT [ ]
PULL OR ALTER CASING [ ]	CHANGE PLANS [ ]	CASING TEST AND CEMENT JOB [ ]	
OTHER [ ]		OTHER Replace tubing	[x]

17. Describe Proposed or Completed Operations (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work) SEE RULE 1103.

1. Rigged up. Pulled tubing & packer.
2. Ran 2 3/8" OD Plastic coated tubing w/nickel plated Loc-Set Packer & set @ 8637'.
3. Load annulus w/inhibited water.
4. Test & return to disposal, 4-23-80.

RECEIVED
MAY 20 1980
OIL CONSERVATION DIVISION
SANTA FE

18. I hereby certify that the information above is true and complete to the best of my knowledge and belief.

SIGNED [signature] TITLE Asst. Dist. Supt. DATE 5-12-80

APPROVED BY [signature] TITLE Geologist DATE MAY 15 1980

CONDITIONS OF APPROVAL, IF ANY:

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NEW MEXICO OIL CONSERVATION COMMISSION

Form C-103
Supersedes Old C-102 and C-103
Effective 1-1-65

5a. Indicate Type of Lease: State [X] Fee [ ]

5. State Oil & Gas Lease No.

SUNDRY NOTICES AND REPORTS ON WELLS

(DO NOT USE THIS FORM FOR PROPOSALS TO DRILL OR TO DEEPEN OR PLUG BACK TO A DIFFERENT RESERVOIR. USE "APPLICATION FOR PERMIT —" (FORM C-101) FOR SUCH PROPOSALS.)

1. OIL WELL [ ] GAS WELL [ ] OTHER- Salt Water Disposal

7. Unit Agreement Name

2. Name of Operator: TEXACO INC.

8. Farm or Lease Name: New Mexico "BO" State

3. Address of Operator: P. O. Box 728 - Hobbs, New Mexico 88240

9. Well No.: 3

4. Location of Well: UNIT LETTER D, 660 FEET FROM THE North LINE AND 660 FEET FROM THE West LINE, SECTION 24 TOWNSHIP 11-S RANGE ~~22~~ 23-E NMPM.

10. Field and Pool, or Wildcat: Moore Devonian

15. Elevation (*Show whether DF, RT, GR, etc.*): 4348' (DF)

12. County: Lea

16. Check Appropriate Box To Indicate Nature of Notice, Report or Other Data

NOTICE OF INTENTION TO:		SUBSEQUENT REPORT OF:	
PERFORM REMEDIAL WORK [ ]	PLUG AND ABANDON [ ]	REMEDIAL WORK [ ]	ALTERING CASING [ ]
TEMPORARILY ABANDON [ ]		COMMENCE DRILLING OPNS. [ ]	PLUG AND ABANDONMENT [ ]
PULL OR ALTER CASING [ ]	CHANGE PLANS [ ]	CASING TEST AND CEMENT JOB [ ]	
OTHER [ ]		OTHER Casing string identification [X]	

17. Describe Proposed or Completed Operations (*Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work*) SEE RULE 1103.

1. Well shut in 24 hrs.

2. Risers installed on all casing strings with valves above ground and labeled for future identification. 9/22/77

3. Inspected by Melvin Crossland - O.C.C.

4. Casing Strings:

SIZE	SET AT	SX. CEMENT USED
13-3/8"	318	350
8-5/8"	3,504	2,300
5-1/2"	10,600	600

5. 100# on annulus. 525# on 8-5/8". Bled down completely.

18. I hereby certify that the information above is true and complete to the best of my knowledge and belief.

SIGNED [signature] TITLE Asst. District Superintendent DATE October 13, 1977

APPROVED BY [signature] TITLE DISTRICT SUPERVISOR DATE OCT 18 1977

CONDITIONS OF APPROVAL, IF ANY:

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NEW MEXICO OIL CONSERVATION COMMISSION

Form C-103
Supersedes Old C-102 and C-103
Effective 1-1-65

5a. Indicate Type of Lease
State [X] Fee [ ]

5. State Oil & Gas Lease No.
B-9639

SUNDRY NOTICES AND REPORTS ON WELLS

(DO NOT USE THIS FORM FOR PROPOSALS TO DRILL OR TO DEEPEN OR PLUG BACK TO A DIFFERENT RESERVOIR. USE "APPLICATION FOR PERMIT —" (FORM C-101) FOR SUCH PROPOSALS.)

1. OIL WELL [X] GAS WELL [ ] OTHER-

7. Unit Agreement Name

2. Name of Operator
TEXACO Inc.

8. Farm or Lease Name
New Mexico 'BO' State

3. Address of Operator
P.O. Box 728, Hobbs, New Mexico 88240

9. Well No.
3

4. Location of Well
UNIT LETTER D, 660 FEET FROM THE North LINE AND 660 FEET FROM THE West LINE, SECTION 24 TOWNSHIP 11S RANGE 32-E NMPM.

10. Field and Pool, or Wildcat
Moore Devonian

15. Elevation *(Show whether DF, RT, GR, etc.)*
4348' DF

12. County
Lea

16. Check Appropriate Box To Indicate Nature of Notice, Report or Other Data

NOTICE OF INTENTION TO:		SUBSEQUENT REPORT OF:	
PERFORM REMEDIAL WORK [ ]	PLUG AND ABANDON [ ]	REMEDIAL WORK [ ]	ALTERING CASING [ ]
TEMPORARILY ABANDON [ ]		COMMENCE DRILLING OPNS. [ ]	PLUG AND ABANDONMENT [ ]
PULL OR ALTER CASING [ ]	CHANGE PLANS [ ]	CASING TEST AND CEMENT JOB [ ]	
OTHER [ ]		OTHER Convert to Water Disposal [X]	

17. Describe Proposed or Completed Operations *(Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work)* SEE RULE 1103.

1. Squeezed perforations 10,536 - 10,556' w/75 sx cement.
2. Drilled deeper from 10,600 - 10,767'.
3. Acidized open hole 10,600 - 10,767' w/1000 gals 20% Acid.
4. Ran 3-1/2" tubing w/packer set @8660'.
5. Converted to water disposal 9-19-72.

18. I hereby certify that the information above is true and complete to the best of my knowledge and belief.

SIGNED [signature] TITLE Assistant District Superintendents DATE 10-26-72

APPROVED BY [signature] TITLE SUPERVISOR DISTRICT I DATE OCT 27 1972

CONDITIONS OF APPROVAL, IF ANY:

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OPERATOR		

NEW MEXICO OIL CONSERVATION COMMISSION

Form C-103
Supersedes Old C-102 and C-103
Effective 1-1-65

5a. Indicate Type of Lease
State [X] Fee [ ]

5. State Oil & Gas Lease No.
B-9639

SUNDRY NOTICES AND REPORTS ON WELLS

(DO NOT USE THIS FORM FOR PROPOSALS TO DRILL OR TO DEEPEN OR PLUG BACK TO A DIFFERENT RESERVOIR. USE "APPLICATION FOR PERMIT —" (FORM C-101) FOR SUCH PROPOSALS.)

CHANGE OK

1. OIL WELL [X] GAS WELL [ ] OTHER-

7. Unit Agreement Name
-

2. Name of Operator
TEXACO Inc.

8. Farm or Lease Name
New Mexico 'BO' State

3. Address of Operator
P.O. Box 728 - Hobbs, New Mexico 88240

9. Well No.
3

4. Location of Well
UNIT LETTER D, 660 FEET FROM THE North LINE AND 660 FEET FROM THE West LINE, SECTION 24 TOWNSHIP 11-S RANGE 32-E NMPM.

10. Field and Pool, or Wildcat
Moore Devonian

15. Elevation *(Show whether DF, RT, GR, etc.)*
4348' DF

12. County
Lea

16. Check Appropriate Box To Indicate Nature of Notice, Report or Other Data

NOTICE OF INTENTION TO:		SUBSEQUENT REPORT OF:	
PERFORM REMEDIAL WORK [ ]	PLUG AND ABANDON [ ]	REMEDIAL WORK [ ]	ALTERING CASING [ ]
TEMPORARILY ABANDON [ ]		COMMENCE DRILLING OPNS. [ ]	PLUG AND ABANDONMENT [ ]
PULL OR ALTER CASING [ ]	CHANGE PLANS [ ]	CASING TEST AND CEMENT JOB [ ]	
OTHER [ ]		OTHER Status Change [X]	

17. Describe Proposed or Completed Operations *(Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work)* SEE RULE 1103.

Please change the status of subject well from pumping to ASD (Abandoned Salvage Deferred) effective 4-12-72.

18. I hereby certify that the information above is true and complete to the best of my knowledge and belief.

SIGNED [signature] TITLE Assistant District Superintendent DATE April 21, 1972

APPROVED BY [signature] TITLE SUPERVISOR DISTRICT I DATE APR 25 1972

CONDITIONS OF APPROVAL, IF ANY:

NEW MEXICO OIL CONSERVATION COMMISSION
SANTA FE, NEW MEXICO

Form C-110
Revised 7/1/55

CHANGE OK

(File the original and 4 copies with the appropriate district office)

CERTIFICATE OF COMPLIANCE AND AUTHORIZATION TO TRANSPORT OIL AND NATURAL GAS

Company or Operator TEXACO Inc. Lease [redacted] NM"BO" STATE NCT-1

Well No. 3 Unit Letter D S 24 T 11S R 32E Pool Moore(Devonian)

County Lea Kind of Lease (State, Fed. or Patented) State

If well produces oil or condensate, give location of tanks: Unit F S 24 T 11S R 32E

Authorized Transporter of Oil or Condensate Texas-New Mexico Pipe Line Company

Address Box 1510, Midland, Texas
(Give address to which approved copy of this form is to be sent)

Authorized Transporter of Gas None

Address ______ Date Connected ______
(Give address to which approved copy of this form is to be sent)

If Gas is not being sold, give reasons and also explain its present disposition:

Casinghead gas flared due to lack of market.

Reasons for Filing: (Please check proper box) New Well ( )

Change in Transporter of (Check One): Oil ( ) Dry Gas ( ) C'head ( ) Condensate ( )

Change in Ownership ( ) Other Name Change (X)

Remarks: (Give explanation below)

Change of Corporate name from The Texas Company
to TEXACO Inc. effective May 1, 1959

The undersigned certifies that the Rules and Regulations of the Oil Conservation Commission have been complied with.

Executed this the 30 day of April 1959

By [signature]

Approved ______ 19__

Title District Accountant

OIL CONSERVATION COMMISSION

Company The Texas Company

By ______

Address Box 352, Midland, Texas

Title ______

(Form C-102)
(Revised 7/1/52)

NEW MEXICO OIL CONSERVATION COMMISSION

Santa Fe, New Mexico

ORIGINAL

RECEIVED OIL CONSERVATION COMMISSION HOBBS OFFICE OCC.

MISCELLANEOUS NOTICES

Submit this notice in TRIPLICATE to the District Office, Oil Conservation Commission, before the work specified is to begin. A copy will be returned to the sender on which will be given the approval, with any modifications considered advisable, or the rejection by the Commission or agent, of the plan submitted. The plan as approved should be followed, and work should not begin until approval is obtained. See additional instructions in the Rules and Regulations of the Commission.

Indicate Nature of Notice by Checking Below

Notice of Intention to Change Plans		Notice of Intention to Temporarily Abandon Well		Notice of Intention to Drill Deeper	
Notice of Intention to Plug Well		Notice of Intention to Plug Back		Notice of Intention to Set Liner	
Notice of Intention to Squeeze	X	Notice of Intention to Acidize	X	Notice of Intention to Shoot (Nitro)	
Notice of Intention to Gun Perforate	X	Notice of Intention (Other)		Notice of Intention (Other)	

OIL CONSERVATION COMMISSION
SANTA FE, NEW MEXICO

Midland, Texas (Place) August 31, 1956 (Date)

Gentlemen:

Following is a Notice of Intention to do certain work as described below at the State of New Mexico "BO"

The Texas Company (Company or Operator) Well No. 3 in D (Unit)

NW ¼ NW ¼ (40-acre Subdivision) of Sec. 24, T. 11-S, R. 32-E, NMPM., Moore Devonian Pool

Lea County.

FULL DETAILS OF PROPOSED PLAN OF WORK
(FOLLOW INSTRUCTIONS IN THE RULES AND REGULATIONS)

TD-10,600
5½" Casing Set @ 10,600'

In order to shut off water and increase well's producing capacity we desire to:

1. Set cast iron retainer at 10560' and squeeze perforations from 10565'-10600' with 100 sacks of cement.
2. Perforate 5½" casing from 10536'-10556' with 4 shots per foot.
3. Acidize perforations from 10536'-10556' with 500 gals mud acid and return well to production.

Approved ....., 19.....
Except as follows:

Approved
OIL CONSERVATION COMMISSION

By: O. M. Ludy

Title:

The Texas Company
Company or Operator

By:

Position: Asst. Dist. Superintendent

Send Communications regarding well to:

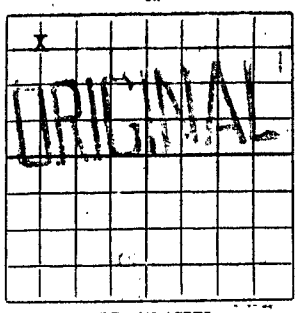
Name: The Texas Company

Address: Box 1270 Midland, Texas

NMOCC
Box 2045
Hobbs, N.M.

(Revised 7/1/52)
(Form C-105)

N.



AREA 640 ACRES
LOCATE WELL CORRECTLY

NEW MEXICO OIL CONSERVATION COMMISSION

Santa Fe, New Mexico

RECEIVED
OIL CONSERVATION COMMISSION
HOBBS, NEW MEXICO
MAY 28 1953

WELL RECORD

Mail to District Office, Oil Conservation Commission, to which Form C-101 was sent not later than twenty days after completion of well. Follow instructions in the Rules and Regulations of the Commission. Submit in QUINTUPLICATE.

The Texas Company (Company or Operator) State of New Mexico "BO" (Lease)

Well No. 3, in NW ¼ of NW ¼, of Sec. 24, T. 11-S, R. 32-E, NMPM.

Moore Devonian Pool, Lea County.

Well is 660 feet from North line and 660 feet from West line of Section 24. If State Land the Oil and Gas Lease No. is B-9639

Drilling Commenced January 31, 1953. Drilling was Completed May 8, 1953

Name of Drilling Contractor Frank Wood Associates Inc.

Address First National Bank Building, Wichita Falls, Texas

Elevation above sea level at Top of Tubing Head 4348 (DF) The information given is to be kept confidential until ....., 19.....

OIL SANDS OR ZONES

No. 1, from --- to --- No. 4, from ..... to .....

No. 2, from ..... to ..... No. 5, from ..... to .....

No. 3, from ..... to ..... No. 6, from ..... to .....

OIL CONSERVATION COMMISSION
SANTA FE, NEW MEXICO
RECEIVED
JUN 1 1953

IMPORTANT WATER SANDS

Include data on rate of water inflow and elevation to which water rose in hole.

No. 1, from --- to --- feet.

No. 2, from ..... to ..... feet.

No. 3, from ..... to ..... feet.

No. 4, from ..... to ..... feet.

CASING RECORD

SIZE	WEIGHT PER FOOT	NEW OR USED	AMOUNT	KIND OF SHOE	CUT AND PULLED FROM	PERFORATIONS	PURPOSE
13-3/8"	48#	New	303	National	----		
8-5/8"	32#	New	3494	Hallib	----		
5-1/2"	17 & 20#	New	10589	Larkin	----	10565-10600	Production

MUDDING AND CEMENTING RECORD

SIZE OF HOLE	SIZE OF CASING	WHERE SET	NO. SACKS OF CEMENT	METHOD USED	MUD GRAVITY	AMOUNT OF MUD USED
17-1/4"	13-3/8"	318	350	Hallib	----	----
11"	8-5/8"	3504	2300	Hallib	----	----
7-7/8"	5-1/2"	10600	600	Hallib	----	----

RECORD OF PRODUCTION AND STIMULATION

(Record the Process used, No. of Qts. or Gals. used, interval treated or shot.)

Well was drilled to a total depth of 10,600'. Casing was perforted from 10565' to 10,600' with 4 shots per foot, and perforations were washed with 500 gallons of mud acid.

Result of Production Stimulation Well flowed 240 bbls. of oil in 5 hours.

Depth Cleaned Out 10,600

RECORD OF DRILL-STEM AND SPECIAL TESTS

If drill-stem or other special tests or deviation surveys were made, submit report on separate sheet and attach hereto

TOOLS USED

Rotary tools were used from 0 feet to 10,600 feet, and from ____ feet to ____ feet.

Cable tools were used from ____ feet to ____ feet, and from ____ feet to ____ feet.

PRODUCTION

Put to Producing May 8, 1953.

OIL WELL: The production during the first 6 hours was 260 barrels of liquid of which 100 % was was oil; ____ % was emulsion; ____ % water; and ____ % was sediment. A.P.I. Gravity 45

GAS WELL: The production during the first 24 hours was ____ M.C.F. plus ____ barrels of liquid Hydrocarbon. Shut in Pressure ____ lbs.

Length of Time Shut in ____

PLEASE INDICATE BELOW FORMATION TOPS (IN CONFORMANCE WITH GEOGRAPHICAL SECTION OF STATE):

Southeastern New Mexico		Northwestern New Mexico	
T. Anhy	T. Devonian	T. Ojo Alamo	
T. Salt	T. Silurian	T. Kirtland-Fruitland	
B. Salt	T. Montoya	T. Farmington	
T. Yates	T. Simpson	T. Pictured Cliffs	
T. 7 Rivers	T. McKee	T. Menefee	
T. Queen	T. Ellenburger	T. Point Lookout	
T. Grayburg	T. Gr. Wash	T. Mancos	
T. San Andres	T. Granite	T. Dakota	
T. Glorieta	T. ____	T. Morrison	
T. Drinkard	T. ____	T. Penn	
T. Tubbs	T. ____	T. ____	
T. Abo	T. ____	T. ____	
T. Penn	T. ____	T. ____	
T. Miss	T. ____	T. ____	

FORMATION RECORD

From	To	Thickness in Feet	Formation
0	150	150	Sand & Caliche
150	250	100	Red Bed & Shells
250	722	472	Red Bed
722	1533	811	Red Bed & Shells
1533	1737	204	Red Bed & Anhy
1737	2629	892	Anhy & Salt
2629	2956	327	Anhy & Gyp
2956	3112	156	Anhy & Salt
3112	3217	105	Anhy
3217	3328	111	Anhy & Lime
3328	3457	129	Anhy
3457	3499	42	Anhy & Lime
3499	6888	3389	Lime
6888	6923	35	Lime & Gyp
6923	7048	125	Lime & Shale
7048	7683	635	Shale
7683	7701	18	Shale & Gyp
7701	7872	171	Lime & Sh
7872	9171	1299	Lime
9171	9218	47	Lime& Sh
9218	9696	478	Lime
9696	9763	67	Lime & Sh
9763	9853	90	Lime & Dol.
9853	9885	32	Lime
9885	10082	197	Lime & Shale
10082	10087	5	Lime & Chert
10087	10114	27	Sandy Lime
10114	10151	37	Dolonite & Lime
10151	10515	364	Lime & Shale
10515	10540	25	Lime
10540	10544	4	Chert
10544	10600	56	Lime & Chert
	10600		Total Depth

OIL CONSERVATION COMMISSION
HOBBS DISTRICT OFFICE
No. Copies Received
Operator
State Land Office
Transporter
U. S. G. S.
File

ATTACH SEPARATE SHEET IF ADDITIONAL SPACE IS NEEDED

I hereby swear or affirm that the information given herewith is a complete and correct record of the well and all work done on it so far as can be determined from available records., so far as furnished

May 16, 1953 (Date)

Company or Operator The Texas Company Address Box 1270, Midland, Texas

Name [signature] Position or Title Asst. Dist. Supt.

(Form C-103)
(Revised 7/1/52)

NEW MEXICO OIL CONSERVATION COMMISSION
Santa Fe, New Mexico

RECEIVED
MAY 25 1953
OIL CONSERVATION COMMISSION

MISCELLANEOUS REPORTS ON WELLS

Submit this report in TRIPLICATE to the District Office, Oil Conservation Commission, within 10 days after the work specified is completed. It should be signed and filed as a report on Beginning Drilling Operations, Results of test of casing shut-off, result of plugging of well, result of well repair, and other important operations, even though the work was witnessed by an agent of the Commission. See additional instructions in the Rules and Regulations of the Commission.

Indicate Nature of Report by Checking Below

REPORT ON BEGINNING DRILLING OPERATIONS		REPORT ON RESULT OF TEST OF CASING SHUT-OFF		REPORT ON REPAIRING WELL	
REPORT ON RESULT OF PLUGGING WELL		REPORT ON RECOMPLETION OPERATION		REPORT ON (Other) Acidize & Perforating	X

May 20, 1953 (Date) Midland, Texas (Place)

Following is a report on the work done and the results obtained under the heading noted above at the

The Texas Company (Company or Operator) State of New Mexico "BO" (Lease)

Frank Wood Drilling Company (Contractor), Well No. 3 in the NW ¼ NW ¼ of Sec. 24,

T. 11-S, R. 32-E, NMPM., Moore Devonian Pool, Lea County.

The Dates of this work were as folows: May 9, 1953

Notice of intention to do the work (was) [redacted] submitted on Form C-102 on May 8 (Cross out incorrect words), 1953,

and approval of the proposed plan (was) ([redacted] obtained.

RECEIVED
OIL CONSERVATION COMMISSION
SANTA FE, NEW MEXICO
JUN 1 1953

DETAILED ACCOUNT OF WORK DONE AND RESULTS OBTAINED

TD:10,600 - Lime

5-1/2" casing set at 10,600'.

Casing was perforated from 10,565' to 10,600' with 4 shots per foot, and perforations were washed with 500 gallons of mud acid.

Well flowed 260 bbls. of oil in 6 hours through a 18/64" choke.

Witnessed by ..... (Name) ..... (Company) ..... (Title)

Approved:
OIL CONSERVATION COMMISSION

H. L. Kendrick (Name)

Oil & Gas Inspector (Title)

MAY 25 1953 (Date)

I hereby certify that the information given above is true and complete to the best of my knowledge.

Name [signature]

Position Asst. Dist. Supt.

Representing The Texas Company

Address Box 1270, Midland, Texas

(Form C-104)
(Revised 7/1/52)

NEW MEXICO OIL CONSERVATION COMMISSION
Santa Fe, New Mexico

REQUEST FOR (OIL) - (GAS) ALLOWABLE

New Well
Recompletion

This form shall be submitted by the operator before an initial allowable will be assigned to any completed Oil or Gas well. Form C-104 is to be submitted in QUADRUPLICATE to the same District Office to which Form C-101 was sent. The allowable will be assigned effective 7:00 A.M. on date of completion or recompletion, provided this form is filed during calendar month of completion or recompletion. The completion date shall be that date in the case of an oil well when oil is delivered into the stock tanks. Gas must be reported on 15.025 psia at 60° Fahrenheit.

Midland, Texas (Place) May 14, 1953 (Date)

WE ARE HEREBY REQUESTING AN ALLOWABLE FOR A WELL KNOWN AS:

The Texas Company St of NM "BO" (Company or Operator) (Lease), Well No. 3, in NW ¼ NW ¼,
D (Unit), Sec. 24, T. 11-S, R. 32-E, NMPM., Moore Devonian Pool
Lea County. Date Spudded 1-31-53, Date Completed 5-8-53

Please indicate location:

X			

Elevation 4348 (DF) Total Depth 10600, P.B. ---

Top oil/gas pay 10,524 Prod. Form. ---

Casing Perforations: 10,565-10,600 or

Depth to Casing shoe of Prod. String 10,600

Natural Prod. Test No Test BOPD

based on ____ bbls. Oil in ____ Hrs. ____ Mins.

Test after acid ~~xxxxxx~~ 1040 BOPD

Based on 260 bbls. Oil in 6 Hrs. ____ Mins.

Gas Well Potential ---

Size choke in inches 18/64"

Date first oil run to tanks or gas to Transmission system: 5-8-53

Transporter taking Oil or Gas: Texas-New Mexico P/L Co.

Casing and Cementing Record

Size	Feet	Sax
13-3/8	303	350
8-5/8	3494	2300
5-1/2	10589	600

OIL CONSERVATION COMMISSION
SANTA FE
MAY 21 1953

Remarks: ____

I hereby certify that the information given above is true and complete to the best of my knowledge.

Approved ____, 19____

OIL CONSERVATION COMMISSION

By: ____

Title Oil & Gas Inspector

The Texas Company
(Company or Operator)

By: ____
(Signature)

Title Asst. Dist. Supt.

Send Communications regarding well to:

Name The Texas Company

Address Box 1270, Midland, Texas

(Form C-103)
(Revised 7/1/52)

ORIGINAL

NEW MEXICO OIL CONSERVATION COMMISSION

Santa Fe, New Mexico

RECEIVED
MAY 14
OIL CONSERVATION COMMISSION
HOBBS, OFFICE

MISCELLANEOUS REPORTS ON WELLS

Submit this report in TRIPLICATE to the District Office, Oil Conservation Commission, within 10 days after the work specified is completed. It should be signed and filed as a report on Beginning Drilling Operations, Results of test of casing shut-off, result of plugging of well, result of well repair, and other important operations, even though the work was witnessed by an agent of the Commission. See additional instructions in the Rules and Regulations of the Commission.

Indicate Nature of Report by Checking Below

REPORT ON BEGINNING DRILLING OPERATIONS		REPORT ON RESULT OF TEST OF CASING SHUT-OFF	X	REPORT ON REPAIRING WELL	
REPORT ON RESULT OF PLUGGING WELL		REPORT ON RECOMPLETION OPERATION		REPORT ON (Other)	

May 8, 1953 (Date) Midland, Texas (Place)

Following is a report on the work done and the results obtained under the heading noted above at the

The Texas Company (Company or Operator) State of New Mexico "BC" (Lease)

Frank Woods Drilling Co. (Contractor), Well No. 3 in the NW ¼ NW ¼ of Sec. 24,

T. 11-S, R. 32-E, NMPM., Moore Devonian Pool, Lea County.

The Dates of this work were as folows: See Below

Notice of intention to do the work (~~was~~) (was not) submitted on Form C-102 on (Cross out incorrect words), 19..,

and approval of the proposed plan (~~was~~) (was not) obtained.

OIL CONSERVATION COMMISSION
SANTA FE, NEW MEXICO
MAY 18 1953

DETAILED ACCOUNT OF WORK DONE AND RESULTS OBTAINED

TD:10,600-Lime

Ran & cemented 324 joints 10,589'of 5-1/2" casing at 10,600' with 600 sacks. Completed 12:00 P.M. 5-4-53.

Commenced drilling cement plug at 12:30 P.M. 5-6-53. Tested casing by pressure ethod before and after drilling. Tested okay.

Witnessed by ..... (Name) ..... (Company) ..... (Title)

Approved:
OIL CONSERVATION COMMISSION

R. L. Yarbrough
(Name)

(Title) (Date)

I hereby certify that the information given above is true and complete to the best of my knowledge.

Name .....

Position Asst. Dist. Supt.

Representing The Texas Company

Address Box 1270, Midland, Texas

(Form C-102)
(Revised 7/1/52)

NEW MEXICO OIL CONSERVATION COMMISSION

Santa Fe, New Mexico

MISCELLANEOUS NOTICES

Submit this notice in TRIPLICATE to the District Office, Oil Conservation Commission, before the work specified is to begin. A copy will be returned to the sender on which will be given the approval, with any modifications considered advisable, or the rejection by the Commission or agent, of the plan submitted. The plan as approved should be followed, and work should not begin until approval is obtained. See additional instructions in the Rules and Regulations of the Commission.

Indicate Nature of Notice by Checking Below

Notice of Intention to Change Plans		Notice of Intention to Temporarily Abandon Well		Notice of Intention to Drill Deeper	
Notice of Intention to Plug Well		Notice of Intention to Plug Back		Notice of Intention to Set Liner	
Notice of Intention to Squeeze		Notice of Intention to Acidize	X	Notice of Intention to Shoot (Nitro)	
Notice of Intention to Gun Perforate	X	Notice of Intention (Other)		Notice of Intention (Other)	

OIL CONSERVATION COMMISSION
SANTA FE, NEW MEXICO

Midland, Texas (Place) May 8, 1953 (Date)

Gentlemen:

Following is a Notice of Intention to do certain work as described below at the State of New Mexico "BO"

The Texas Company (Company or Operator) Well No. 3 in D (Unit)

NW ¼ NW ¼ (40-acre Subdivision) of Sec. 24, T. 11-S, R. 32-E, NMPM., Moore Devonian Pool

Lea County.

OIL CONSERVATION COMMISSION SANTA FE, NEW MEXICO RECEIVED MAY 18 1953

FULL DETAILS OF PROPOSED PLAN OF WORK
(FOLLOW INSTRUCTIONS IN THE RULES AND REGULATIONS)

TD:10,600-Lime

5-1/2" casing set at 10,600'

We now desire to perforate casing from 10,565' to 10,600' with 4 jet shots per foot and wash perforations with 500 gallons of mud acid.

Approved ....., 1953
Except as follows:

The Texas Company
Company or Operator

By .....

Position Asst. Dist. Supt.

Send Communications regarding well to:

Approved
OIL CONSERVATION COMMISSION

By .....

Title .....

Name The Texas Company

Address Box 1270, Midland, Texas

(Form C-110)
(Revised 7/1/52)

NEW MEXICO OIL CONSERVATION COMMISSION
Santa Fe, New Mexico

It is necessary that Form C-104 be approved before this form can be approved an an *initial* allowable be assigned to any completed Oil or Gas well. Submit this form in QUADRUPLICATE.

CERTIFICATE OF COMPLIANCE AND AUTHORIZATION TO TRANSPORT OIL AND NATURAL GAS

Company or Operator The Texas Company Lease State of New Mexico "BO"

Address Box 1270 Midland, Texas (Local or Field Office) Box 1720, Fort Worth, Texas (Principal Place of Business)

Unit D, Well(s) No. 3, Sec. 24, T. 11-S, R. 32-E, Pool Moore Devonian

County Lea Kind of Lease: State

If Oil well Location of Tanks On Lease

Authorized Transporter Texas-New Mexico Pipe Line Company Address of Transporter

Box 1510 Midland, Texas (Local or Field Office), Houston, Texas (Principal Place of Business)

Per cent of Oil or Natural Gas to be Transported 100 Other Transporters authorized to transport Oil or Natural Gas from this unit are

%

REASON FOR FILING: (Please check proper box)

NEW WELL ☒ CHANGE IN OWNERSHIP ☐

CHANGE IN TRANSPORTER ☐ OTHER (Explain under Remarks) ☐

REMARKS:

OIL CONSERVATION COMM.
SANTA FE, NEW MEXICO
RECEIVED
MAY 21 1953

The undersigned certifies that the Rules and Regulations of the Oil Conservation Commission have been complied with.

Executed this the 14th day of May, 1953

The Texas Company

Approved May 15, 1953

OIL CONSERVATION COMMISSION

By [illegible] Oil & Gas Inspector

Title

By [signature]

Title Asst. Dist. Supt.

(See Instructions on Reverse Side)

(Form C-110)
(Revised 7/1/52)

INSTRUCTIONS

This form shall be executed and filed in QUADRUPLICATE with the District Office of the Oil Conservation Commission, covering each unit from which oil or gas is produced. A separate certificate shall be filed for each transporter authorized to transport oil or gas from a unit. After said certificate has been approved by the Oil Conservation Commission, one copy shall be forwarded to the transporter, one copy returned to the producer, and two copies retained by the Oil Conservation Commission.

A new certificate shall be filed to cover each change in operating ownership and each change in the transporter, except that in the case of a temporary change in the transporter involving less than the allowable production for one proration period, the operator shall in lieu of filing a new certificate notify the Oil Conservation Commission District Office, and the transporter authorized by certificate on file with the Commission, by letter of the estimated amount of oil or gas to be moved by the transporter temporarily moving oil or gas from the unit and the name of such temporary transporter and a copy of such notice shall also be furnished such temporary transporter. Such temporary transporter shall not move any more oil or gas than the estimated amount shown in said notice.

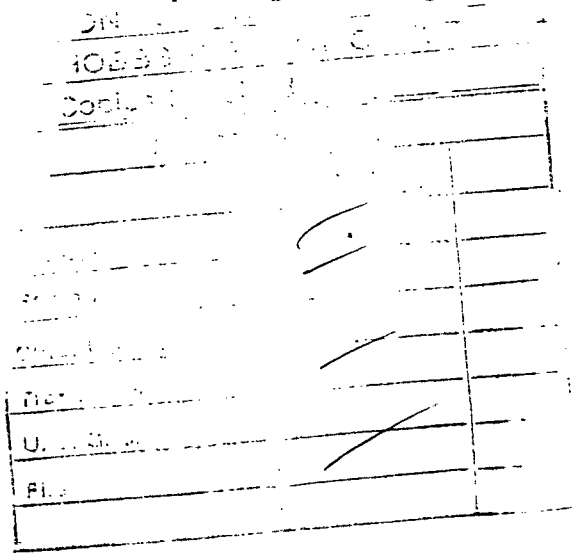
This certicate when properly executed and approved by the Oil Conservation Commission shall constitute a permit for pipe line connection and authorization to transport oil and gas from the property named therein and shall remain in full force and effect until

(a) Operating ownership changes
(a) The transporter is changed or
(c) The permit is cancelled by the Commission.

If any of the rules and regulations of the Oil Conservation Commission have not been complied with at the same time this report is filed, explain fully under the heading "REMARKS."

In all cases where this certificate is filed to cover a change in operating ownership or a change in the transporter designated to move oil or gas, show under "REMARKS" the previous owner or operator and the transporter previously authorized to transport oil or gas.

A separate report shall be filed to cover each producing unit as designated by the Oil Conservation Commission.



NMOCC
Box 2045
Hobbs, N.M.

(Form C-103)
(Revised 7/1/52)

NEW MEXICO OIL CONSERVATION COMMISSION
Santa Fe, New Mexico

MISCELLANEOUS REPORTS ON WELLS

Submit this report in TRIPLICATE to the District Office, Oil Conservation Commission, within 10 days after the work specified is completed. It should be signed and filed as a report on Beginning Drilling Operations, Results of test of casing shut-off, result of plugging of well, result of well repair, and other important operations, even though the work was witnessed by an agent of the Commission. See additional instructions in the Rules and Regulations of the Commission.

Indicate Nature of Report by Checking Below

REPORT ON BEGINNING DRILLING OPERATIONS		REPORT ON RESULT OF TEST OF CASING SHUT-OFF	X	REPORT ON REPAIRING WELL	
REPORT ON RESULT OF PLUGGING WELL		REPORT ON RECOMPLETION OPERATION		REPORT ON (Other)	

February 13, 1953 (Date) Midland, Texas (Place)

Following is a report on the work done and the results obtained under tne heading noted above at the

The Texas Company (Company or Operator) State of New Mexico "BO" (Lease)

Frank Wood Associates, Ins. (Contractor), Well No. 3 in the NW ¼ NW ¼ of Sec. 24,

T. 11-S., R. 32-E., NMPM., Moore Devonian Pool, Lea County.

The Dates of this work were as follows: See below

Notice of intention to do the work ~~(was not)~~ submitted on Form C-102 on ..... (Cross out incorrect words), 19.....,

and approval of the proposed plan ~~(was not)~~ obtained.

DETAILED ACCOUNT OF WORK DONE AND RESULTS OBTAINED

TD: 3505 - Lime

Ran and cemented 110 jts. 3498' of 8-5/8" casing at 3504' with 2300 sacks. Cement circulated. Completed at 6:00 am 2-9-53.

Commenced drilling cement at 7:00 pm 2-10-53. Tested cement job by pressure method before and after drilling. Tested okay.

OIL CONSERVATION COMMISSION SANTA FE, NEW MEXICO RECEIVED FEB 19 1953

Witnessed by ..... (Name) ..... (Company) ..... (Title)

Approved:
OIL CONSERVATION COMMISSION

Roy Yarbrough (Name)

..... (Title) ..... (Date)

I hereby certify that the information given above is true and complete to the best of my knowledge.

Name [signature]

Position Asst. Dist. Supt.

Representing The Texas Company

Address Box 1270, Midland, Texas

NMOCC
Box 2045
Hobbs, N.M.

(Form C-103)
(Revised 7/1/52)

NEW MEXICO OIL CONSERVATION COMMISSION

Santa Fe, New Mexico

MISCELLANEOUS REPORTS ON WELLS

Submit this report in TRIPLICATE to the District Office, Oil Conservation Commission, within 10 days after the work specified is completed. It should be signed and filed as a report on Beginning Drilling Operations, Results of test of casing shut-off, result of plugging of well, result of well repair, and other important operations, even though the work was witnessed by an agent of the Commission. See additional instructions in the Rules and Regulations of the Commission.

Indicate Nature of Report by Checking Below

REPORT ON BEGINNING DRILLING OPERATIONS		REPORT ON RESULT OF TEST OF CASING SHUT-OFF	X	REPORT ON REPAIRING WELL	
REPORT ON RESULT OF PLUGGING WELL		REPORT ON RECOMPLETION OPERATION		REPORT ON (Other)	

February 3, 1953 (Date) Midland, Texas (Place)

Following is a report on the work done and the results obtained under tne heading noted above at the

The Texas Company (Company or Operator) State of New Mexico "BC" (Lease)

Frank Wood Drilling Co (Contractor), Well No. 3 in the NW ¼ NW ¼ of Sec. 24,

T. 11-S, R. 32-E, NMPM., Moore Devonian Pool, Lea County.

The Dates of this work were as folows: See below

Notice of intention to do the work (~~XX~~) (was not) submitted on Form C-102 on ..... (Cross out incorrect words), 19.....,

and approval of the proposed plan (~~XX~~) (was not) obtained.

DETAILED ACCOUNT OF WORK DONE AND RESULTS OBTAINED

TD: 322 - Red Beds
Ran and cemented 10 jts. 303' of 13-3/8" casing at 318' with 350 sacks. Cement circulated. Completed at 11:45 pm 1-31-53.

Commenced drilling cement at 11:30 pm 2-2-53. Tested cement job by pressure method before and after drilling. Tested okay.

OIL CONSERVATION COMMISSION SANTA FE, NEW MEXICO. RECEIVED FEB 9 - 1953

Witnessed by ..... (Name) ..... (Company) ..... (Title)

Approved:
OIL CONSERVATION COMMISSION

Roy Yarbrough (Name)

..... (Title) ..... (Date)

I hereby certify that the information given above is true and complete to the best of my knowledge.

Name [signature]

Position Asst. Dist. Supt.

Representing The Texas Company

Address Box 1270, Midland, Texas

Lease #89431

(Form C-101)
(Revised 7/1/52)

NEW MEXICO OIL CONSERVATION COMMISSION
Santa Fe, New Mexico

NOTICE OF INTENTION TO DRILL OR RECOMPLETE

Notice must be given to the District Office of the Oil Conservation Commission and approval obtained before drilling or recompletion begins. If changes in the proposed plan are considered advisable, a copy of this notice showing such changes will be returned to the sender. Submit this notice in QUINTUPLICATE. One copy will be returned following approval. See additional instructions in Rules and Regulations of the Commission.

Fort Worth, Texas (Place) January 16, 1953 (Date)

OIL CONSERVATION COMMISSION
SANTA FE, NEW MEXICO

OIL CONSERVATION COMMISSION
SANTA FE, NEW MEXICO
RECEIVED
JAN 21 1953

Gentlemen:

You are hereby notified that it is our intention to commence the (Drilling) (Recompletion) of a well to be known as

The Texas Company (Company or Operator)

State of New Mexico "BO" (Lease), Well No. 3, in "D" (Unit). The well is located 660 feet from the North line and 660 feet from the West line of Section 24, T. 11-S, R. 32-E, NMPM.

(GIVE LOCATION FROM SECTION LINE) Moore Devonian Pool, Lea County

D	C	B	A
E	F	G	H
L	K	J	I
M	N	O	P

If State Land the Oil and Gas Lease is No. B-9639

If patented land the owner is -

Address -

We propose to drill well with drilling equipment as follows: Rotary

The status of plugging bond is $10,000 blanket surety bond of Maryland Casualty Co. has been filed with State Geologist.

Drilling Contractor Not Known at present

We intend to complete this well in the Devonian formation at an approximate depth of 10,600 feet.

CASING PROGRAM

We propose to use the following strings of Casing and to cement them as indicated:

Size of Hole	Size of Casing	Weight per Foot	New or Second Hand	Depth	Sacks Cement
17-1/4"	13-3/8"	48#	New	325'	350
11"	8-5/8"	32#	New	3485'	2300
7-7/8"	5-1/2"	17 & 20#	New	10,600'	450

If changes in the above plans become advisable we will notify you immediately.

ADDITIONAL INFORMATION (If recompletion give full details of proposed plan of work.)

FORMATIONS EXPECTED:

Top of Anhydrite	1450'	Top of Tubbs	6250'	Top of Mississippian	9800'
Top of Yates	2172'	Top of Abo	7040'	Top of Devoniah	10,250'
Top of San Andres	3435'	Top of Wolfcamp	8200'	Total Depth	10,600'
Top of Glorieta	4830'				

Approved ....., 19.....
Except as follows:

OIL CONSERVATION COMMISSION

By .....

Title .....

ams

Sincerely yours,

THE TEXAS COMPANY (Company or Operator)

By J.J.Velten

Position Division Civil Engineer

Send Communications regarding well to

Name The Texas Company

Address P.O.Box 1720,
Fort Worth, Texas

A study was undertaken by the Columbia National Fisheries Research Laboratory of the U. S. Fish and Wildlife Service to determine the effect of continuous discharge of low-level oil effluent into a stream, and the resulting effect on the aquatic community in the stream. The discharges to the stream contained 5.6 mg/l total hydrocarbons. Total hydrocarbons in the receiving sediment were 979 mg/l to 2,515 mg/l. During the study, samples were taken upstream and downstream from the discharge. Species diversity, and community structure were studied. Water analysis was done on upstream and downstream samples. The study found a decrease in species diversity of the macrobenthos community (fish) downstream from the discharge, further characterized by total elimination of some species and drastic alteration of community structure. The study found that the downstream community was characterized by only one dominant species, while the upstream community was dominated by three species. Total hydrocarbon concentrations in water and sediment increased 40 to 55 fold below the discharge of produced water. The authors of the study stated that "...based on our findings, the fisheries and aquatic resources would be protected if discharge of oil into fresh water were regulated to prevent concentrations in receiving streams water and sediment that would alter structure of macrobenthos communities." (WY 07)[69]

SOUTHERN MOUNTAIN

The Southern Mountain zone includes the States of Nevada, Utah, Arizona, Colorado, and New Mexico. All five States have some oil and gas production, but New Mexico's is the most significant. The discussion below is limited to New Mexico.

Operations

Although hydrocarbon production is scattered throughout the State, most comes from two distinct areas within New Mexico: the Permian Basin in the southeast corner, and the San Juan Basin in the northwest corner.

Permian Basin production is primarily oil, and it is derived from several major fields. There are numerous large capital-and energy-intensive enhanced recovery projects within the basin that make extensive use of CO2 flooding. The area also contains some small fields in which production is derived from marginal stripper operations. This

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[69] References for case cited: Petroleum Hydrocarbon Concentrations in a Salmonid Stream Contaminated by Oil Field Discharge Water and Effects on the Macrobenthos Community, by D. F. Woodward and R. G. Riley, U.S. Department of the Interior, Fish and Wildlife Service, Columbia National Fisheries Research Laboratory, Jackson, Wyoming, 1980; submitted to Transactions of the American Fisheries Society.

is a mature production area which is unlikely to see extensive exploration in the future. The Tucumcari Basin to the north of the Permian may, however, experience extensive future exploration if economic conditions are favorable.

The San Juan Basin is, for the most part, a large mature field that produces primarily gas. Significant gas finds are still made, including many on Indian Reservation lands. As Indian lands are gradually opened to oil and gas development, exploration and development of the basin as a whole will continue, and possibly increase.

Much of the State has yet to be explored for oil and gas. The average depth of new wells drilled in 1985 was 6,026 feet. The number of new wells drilled in 1985 was 1,747, of which 281 were exploratory.

Types of Operators

The capital- and energy-intensive enhanced recovery projects in the Permian Basin, as well as the exploratory activities under way around the State, are conducted by the major oil companies. Overall, however, the most numerous operators are small and medium-sized independents. Small independents dominate marginal stripper production in the Permian Basin. Production in the San Juan Basin is dominated by mid-sized independent operators.

Major Issues

Produced Water Pit and Oilfield Waste Pit Contents Leaching into Ground Water

New Mexico, unlike most other States, still permits the use of unlined pits for disposal of produced water. This practice has the potential for contamination of ground water.

- In July 1985, a study was undertaken in the Duncan Oil Field in the San Juan Basin by faculty members in the Department of Chemistry at New Mexico State University, to analyze the potential for unlined produced water pit contents, including hydrocarbons and aromatic hydrocarbons, to migrate into the ground water. The oil field is situated in a flood plain of the San Juan River. The site chosen for investigation by the study group was similar to at least 1500 other nearby production sites in the flood plain. The study group dug test pits around the disposal pit on the chosen site. These test pits were placed abovegradient and downgradient of the disposal pit, at 25-and 50-meter intervals. A total of 9 test pits were dug to a depth of 2 meters, and soil and ground water samples were obtained from each test pit. Upon analysis, the study group found volatile aromatic hydrocarbons were present in both the soil and water samples of test pits down gradient, demonstrating migration of unlined produced water pit contents into the ground water.

  Environmental impact was summarized by the study group as contamination of shallow ground water with produced water pit contents due to leaching from an unlined produced water disposal pit. Benzene was found in concentrations of .01 ppb. New Mexico Water Quality Control Commission standard is .10 ppb. Concentrations of ethylbenzene, xylenes, and larger hydrocarbon molecules were found. No contamination was found in test pits placed above gradient from the disposal pit. Physical signs of contamination were also present, including black, oily staining of sands above the water table downgradient from the disposal pit and black oily film on the water itself. Hydrocarbon odor was also present. (NM 02)[70]

As a result of this study, the use of unlined produced water pits was limited by the State to wells producing no more than five barrels per day of produced water. While this is a more stringent requirement than the previous rule, there still exists the potential for contamination of ground water with hydrocarbons and chlorides. It is estimated by individuals familiar with the industry in the State that 20,000 unlined produced water disposal pits are still in existence in the San Juan Basin area of New Mexico.[71]

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[70] References for case cited: "Hydrocarbons and Aromatic Hydrocarbons in Groundwater Surrounding an Earthen Waste Disposal Pit for Produced Water in the Duncan Oil Field of New Mexico," by G. A. Eiceman, J.T. McConnon, Masud Zaman, Chris Shuey and Douglas Eearp, 9/16/85. "Polycyclic Aromatic Hydrocarbons in Soil at Groundwater Level Near an Earthen Pit for Produced Water in the Duncan Oil Field," by B. Davani, K. Lindley, and G.A. Eiceman, 1986. New Mexico Oil Conservation Commission hearing to define vulnerable aquifers, comments on the hearing record by Intervenor Chris Shuey, Case No. 8224.

[71] Governor Carruthers refutes this, and states that "Unlined pits in fresh water areas in Southeast New Mexico were banned beginning in 1956, with a general prohibition adopted in 1967." EPA notes that New Mexico still permits unlined pits to be used for disposal of produced water if the pit does not receive more than five barrels of produced water per day.

- New Mexico has experienced problems that may be due to centralized oil field waste disposal facilities:

Lee Acres "modified" landfill (meaning refuse is covered weekly instead of daily as is done in a "sanitary" landfill) is located 4.5 miles E-SE of Farmington, New Mexico. It is owned by the U.S. Bureau of Land Management (BLM). The landfill is approximately 60 acres in size and includes four unlined liquid-waste lagoons or pits, three of which were actively used. Since 1981, a variety of liquid wastes associated with the oil and gas industry have been disposed of in the lagoons. The predominant portion of liquid wastes disposed of in the lagoons was produced water, which is known to contain aromatic volatile organic compounds (VOCs). According to the New Mexico Department of Health and Environment, Environmental Improvement Division, 75 to 90 percent of the produced water disposed of in the lagoons originated from Federal and Indian oil and gas leases managed by BLM. Water produced on these leases was hauled from as far away as Nageezi, which is 40 miles from the Lee Acres site. Disposal of produced water in these unlined pits was, according to New Mexico State officials, in direct violation of BLM's rule NTL-2B, which prohibits without prior approval, disposal of produced waters into unlined pits, originating on Federally owned leases. The Department of the Interior states that disposal in the lagoons was "...specifically authorized by the State of New Mexico for disposal of produced water." The State of New Mexico states that "There is no truth whatsoever to the assertion that the landfill lagoons were specifically authorized by the State of New Mexico for disposal of produced water." Use of the pits ceased on 4/19/85; 8,800 cubic yards of waste were disposed of prior to closure.

New Mexico's Environmental Improvement Division (NMEID) asserts that leachate from the unlined waste lagoons that contain oil and gas wastes has contributed to the contamination of several water wells in the Lee Acres housing subdivision located downgradient from the lagoons and down- gradient from a refinery operated by Giant, located nearby. NMEID has on file a soil gas survey that documents extensive contamination with chlorinated VOCs at the landfill site. High levels of sodium, chlorides, lead, chromium, benzene, toluene, xylenes, chloroethane, and trichloroethylene were found in the waste lagoons. An electromagnetic terrain survey of the Lee Acres landfill site and surrounding area, conducted by NMEID, located a plume of contaminated groundwater extending from the landfill. This plume runs into a plume of contamination known to exist emanating from the refinery. The plumes have become mixed and are the source of contamination of the ground water serving the Lee Acres housing subdivision.[72] One domestic well was sampled extensively by NMEID and was found to contain extremely high levels of chlorides and elevated levels of chlorinated VOCs, including trichloroethane. (Department of Interior (DOI) states that it is unaware of any violations of New Mexico ground water standards involved in this case. New Mexico states that State ground water standards for chloride, total dissolved solids, benzene, xylenes, 1,1-dichloroethane and ethylene dichloride have been violated as a result of the plume of contamination. In addition, the EPA Safe Drinking Water Standard for trichloroethylene has been violated.) New Mexico State

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[72] In a letter dated 8/20/87, Giant Refining Company states that "Benzene, toluene and xylenes are naturally occurring compounds in crude oil, and are consequently in high concentrations in the produced water associated with that crude oil. The only gasoline additive used by Giant that has been found in the water of a residential well is DCA [ethylene dichloride] which has also been found in the landfill plume." Giant also notes that the refinery leaks in the last two years resulted in less than 30,000 gallons of diesel being released rather than the 100,000 gallons stated by the Department of Interior in a letter to EPA of 8/11/87.

officials state that "The landfill appears to be the principal source of chloride, Total Dissolved Solids and most chlorinated VOCs, while the refinery appears to be the principal source of aromatic VOCs and ethylene dichloride."

During the period after disposal operations ceased and before the site was closed, access to the lagoons was essentially unrestricted. While NMEID believes that it is possible that non-oil and gas wastes illegally disposed of during this period may have contributed to the documented contamination, the primary source of ground water contamination appears to be from oil and gas wastes.

The State has ordered BLM to provide public water to residents affected by the contamination, develop a groundwater monitoring system, and investigate types of drilling, drilling procedures, and well construction methods that generated the waste accepted by the landfill. BLM submitted a motion-to-stay the order so as to include Giant Oil Co. and El Paso Natural Gas in cleanup operations. The motion was denied. The case went into litigation. According to State officials, "The State of New Mexico agreed to dismiss its lawsuit only after the Bureau of Land Management agreed to conduct a somewhat detailed hydrogeologic investigation in a reasonably expeditious period of time. The lawsuit was not dismissed because of lack of evidence of contamination emanating from the landfill." The refinery company has completed an extensive hydrogeologic investigation and has implemented containment and cleanup measures.[73] (NM 05)[74]

Damage to Ground Water from Inadequately Maintained Injection Wells

As in other states, New Mexico has experienced problems with injection wells.

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[73] Comments in the Docket from BLM and the State of New Mexico pertain to NM 05. BLM states that the refinery upgradient from the subdivision is responsible for the contamination because of their "...extremely sloppy housekeeping practices..." which resulted in the loss of "...hundreds of thousands of gallons of refined product through leaks in their underground piping system." The Department of Interior states that "There is, in fact, mounting evidence that the landfill and lagoons may have contributed little to the residential well contamination in the subdivisions." DOI states "...we strongly recommend that this case be deleted from the Damage Cases [Report to Congress]. "New Mexico states that "EID [Environmental Improvement Division] strongly believes that the Lee Acres Landfill has caused serious ground water contamination and is well worth inclusion in the Oil and Gas Damage Cases chapter of your [EPA] Report to Congress on Oil, Gas and Geothermal Wastes."

[74] References for case cited: State of New Mexico Administrative Order No. 1005; contains water analysis for open pits, monitor wells and impacted domestic wells. Motion-to-stay Order No. 1005. Denial of motion to stay. Newspaper articles. Southwest Research and Information Center, Response to Hearing before Water Quality Control Commission, 12/2/86. Letter to Dan Derkics, EPA from Department of Interior, refuting Lee Acres damage case, 8/11/87. Letter to Dan Derkics, EPA from NMEID, refuting Department of Interior letter of 8/11/87, dated 8/18/87. Letter to Dan Derkics, EPA from Giant Refining Company, 8/20/87.

A saltwater injection well, the BO-3, operated by Texaco, is used for brine disposal for the Moore-Devonian oil field in S.E. New Mexico. Injection occurs at about 10,000 ft. The Ogallala aquifer, overlying the oil production formation, is the sole source of potable ground water in much of southeastern New Mexico. Dr. Daniel B. Stephens, Associate Professor of Hydrology at the New Mexico Institute of Mining and Technology, concluded that injection well BO-3 has contributed to a saltwater plume of contamination in the Ogallala aquifer. The plume is nearly one mile long and contains chloride concentrations of up to 26,000 ppm.

A local rancher sustained damage to crops after irrigating with water contaminated by this saltwater plume. In 1973, an irrigation well was completed satisfactorily on the ranch of Mr. Paul Hamilton, and, in 1977, the well began producing water with chlorides of 1,200 ppm. Mr. Hamilton's crops were severely damaged, resulting in heavy economic losses, and his farm property was foreclosed on. There is no evidence of crop damage from irrigation prior to 1977. Mr. Hamilton initiated a private law suit against Texaco for damages sustained to his ranch.

Texaco argued that the saltwater plume was the result of leachate of brines from unlined brine disposal pits, now banned in the area. Dr. Stephens proved that if old pits in the vicinity, previously used for saltwater disposal, had caused the contamination, high chloride levels would have been detected in the irrigation well prior to 1977. Dr. Stevens also demonstrated that the BO-3 injection well had leaked some 20 million gallons of brine into the fresh ground water, causing chloride contamination of the Ogallala aquifer from which Mr. Hamilton drew his irrigation water. Based on this evidence a jury awarded Mr. Hamilton a cash settlement from Texaco for damages sustained both by the leaking injection well and by the abandoned disposal pits. The well is still in operation. (NM 01)[75]

The well in the above case was tested for mechanical integrity several times during the course of the trial, during which the plaintiff's hydrologist, after contacting the Texas Railroad Commission, discovered that this injection well would have been classed as a failed well using criteria established by the State of Texas for such tests. However, the well did not fail the test using criteria established by the State of New Mexico, and the well is still in operation. Both States have primacy under the UIC program.

WEST COAST

The West Coast zone includes Washington, Oregon, and California. Of the three states, California has the most significant hydrocarbon production; Washington and Oregon have only minor oil and gas activity. Damage cases were collected only in California.

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[75] References for case cited: "Oil-Field Brine Contamination - A Case Study, Lea Co. New Mexico," from "Selected Papers on Water Quality and Pollution in New Mexico - 1984"; proceedings of a symposium, New Mexico Bureau of Mines and Resources.

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION
HOBBS DISTRICT OFFICE

Bruce King
GOVERNOR

Larry Kehoe
SECRETARY

January 5, 1982

POST OFFICE BOX 1980
HOBBS, NEW MEXICO 88240
(505) 393-6161

Mr. Alvin F. Jones
P.O. Box 598
Roswell, NM 88201

Dear Mr. Jones:

I have received your letter of December 18, 1981, indicating you were puzzled and confused over not being notified when water samples are taken. This practice has been going on for some time and neither Paul or Texaco notify me when samples are taken, but talk directly to the secretary or field inspector. Eddie Seay, our field inspector, indicates there has been times when Texaco was not on location when Paul obtained samples. Also, you are fully aware that all records are open to the public.

Primarily, I feel we are on location to be a neutral observer so that either party can check the quality of work on each side, since the OCD is the only party that has a water sample which could not be tampered with. I would not send OCD people out when water samples were taken if it were not for this, as we have our own testing schedule on these wells. We are under no obligation to do the sampling when we are called to witness obtaining of samples, but take the samples as a courtesy to the parties involved and I might add it was started primarily for Paul's benefit.

Since it is clear that you do not understand the position or authority of the District I OCD Office, I am requesting a meeting in Hobbs with you, Paul, Texaco and their attorney so everyone involved will know where our authority starts and stops and our position in this case. At this meeting if you or Texaco have suggestions or recommendations for sampling procedures of the observation wells, they can be discussed and acted upon at that time.

Please let me know as soon as possible when you and Paul will be available for a meeting and I will contact Texaco for their approval of the time.

Very truly yours,

OIL CONSERVATION DIVISION

Jerry Sexton
Supervisor, District I

JS/ed

STATE OF NEW MEXICO

ENERGY AND MINERALS DEPARTMENT

OIL CONSERVATION DIVISION

November 30, 1981

BRUCE KING
GOVERNOR

LARRY KEHOE
SECRETARY

P.O. BOX 1980
HOBBS, NEW MEXICO 88240
(505) 393-6161

Mr. Alvin F. Jones
P.O. Box 598
Roswell, New Mexico 88201

RE: Hamilton vs. Texaco

Dear Mr. Jones:

Your letter requesting permission for a test hole to be drilled 30 feet from the Texaco BO-3 salt water disposal well was received today. As previously discussed by phone, this is not an Oil Conservation Division decision as we do not permit water wells.

I did talk this matter over with Texaco, the operator of the SWD well, as to whether the drilling of this well would interfere with their operations and the Texaco Office in Hobbs thought it would interfere with operations. However, they were going to talk to their Midland Office, and since that conversation, I have heard nothing else from Texaco concerning this matter.

As you know, Paul, Texaco, and the Oil Conservation Division have all drilled test wells in the area. I am sure you realize that 30 feet from the disposal well is closer than any of the above have drilled an observation well and potentially could effect the operation of the disposal well. For this reason, I do not feel the OCD has the authority to approve or make recommendations on a well to be drilled at this distance.

I am sending a copy of your letter and my reply to Mr. John Gannon with Texaco and I am sure if you check with him he will advise you on Texaco's position. If you get approval from Texaco and Mr. Moore, we will be glad to take samples and analyze them for you as we are presently doing on the other observation wells.

Very truly yours,

OIL CONSERVATION DIVISION

Jerry Sexton
Supervisor, District I

JS/ed

cc: Mr. John Gannon, Box 728, Hobbs, NM 88240
Mr. Joe D. Ramey, OCD Santa Fe
File

ALVIN F. JONES, LTD.
ATTORNEY AT LAW
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Roswell, New Mexico 88201

P.O. BOX 598

(505) 622-7663

November 25, 1981

Mr. Jerry Sexton
District Supervisor
Oil Conservation Division
P. O. Box 1980
Hobbs, New Mexico 88240

RE: Hamilton vs. Texaco

Dear Mr. Sexton:

This is a formal request that Mr. Hamilton be allowed to complete a further test hole approximately 30 feet southeast of the Texaco BO-3 salt water disposal well in the Moore-Devonian Pool.

This has been discussed in the past and we do need a definitive response to this request promptly.

Best regards.

Sincerely yours,

ALVIN F. JONES

AFJ/plk