GROUND WATER INVESTAGATION

CAUDILL RANCH

GROUND WATER INVESTIGATION

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August 6, 1991

EXECUTIVE SUMMARY

In November and December 1990, the Oil Conservation Division (OCD) investigated a citizen complaint of a contaminated livestock well on the Caudill Ranch in eastern Chaves County. The OCD visited the ranch, measured well water levels, and collected water samples from several wells. In February, 1991, OCD obtained production and injection water samples from a nearby oil production facility. After analyses of water samples for both inorganic and organic substances, the OCD found that a stock water well was contaminated with a calcium chloride salt while the production brine from the oil wells was a sodium chloride salt. The domestic water well was unaffected.

The OCD has concluded that the contamination was from a source other than brine from oil production activities. The contamination likely occurred as a result of a spill or improper disposal of calcium chloride fluids or solids which are commonly used in the oilfield industry. Calculations using water levels in the wells indicate that contaminants from an unknown source were likely discharged into the drainage adjacent to the ranch road.

INTRODUCTION

The Caudill Ranch is located in eastern Chaves County approximately 20 miles north of Maljamar (Map 1). The ranch headquarters is located in the NE/4 NW/4 of Section 34, Township 13 East, Range 31 South, about 0.6 miles west of New Mexico Highway 172 and at the base of the topographic feature called the Mescalero Ridge, known locally as the Caprock. The Caprock is the western edge of the Ogallala formation which is the major ground water aquifer for Lea County and eastern New Mexico.

In October, 1990, Mr. E. P. Caudill, the ranch owner, visited OCD's Hobbs office regarding a stock water well at his ranch headquarters. A sample of the water from stock well had been collected on October 24 and analyzed for chlorides by the State Engineers Office in Roswell. The result showed 2622 milligram per liter (ppm) or greater than 10 times the recommended drinking water standard of 250 ppm. Several subsequent analyses in late October and November, 1990, showed chlorides ranging between 1562 and 6035 ppm (Table 1). A sample from the nearby well in domestic use showed 99 ppm chlorides.

Because of the proximity of the fresh water wells to oil and gas production operations and a salt water disposal well, the OCD Environmental Bureau was requested to investigate the problem to determine a possible source and whether the contamination could impact the other nearby fresh water wells.

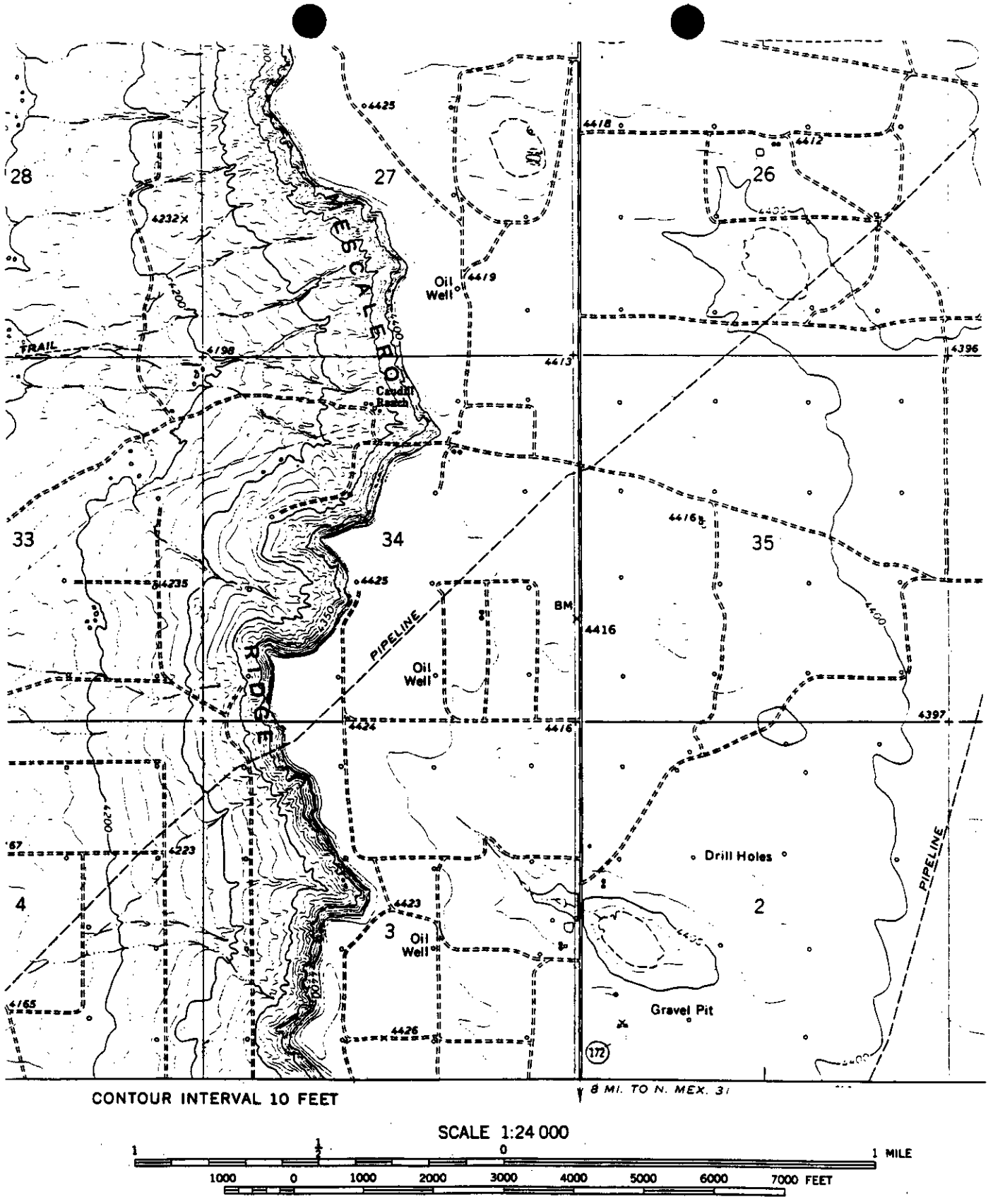
HYDROGEOLOGICAL SETTING

The Caudill Ranch headquarters is 800 feet west and 120 feet lower than the Mescalero Ridge. This feature is the western-most surface expression of the Ogallala formation of eastern New Mexico. The Ogallala, of Pliocene age, consists mostly of fine to very-fine sand with minor quantities of clay, silt, coarse sand, and gravel. Lower zones contain increasing amounts of coarser material. Immediately west of the caprock feature, the Ogallala has eroded and forms alluvial sediments that are thickest near the caprock.

Table 1

Chloride Analyses - Caudill Stock Well

Date	Time	Chloride Value (mg/l)	Analysis by:
10-24-90	--	2622	State Engineer - Roswell
10-31-90	--	1562	OCD - Hobbs Office
11-1-90	--	1695	City of Hobbs
11-5-90	--	6035	OCD - Hobbs Office
11-13-90	11:20 AM	2343	OCD - Hobbs Office
(pumping well)	2:15 PM	1562	OCD - Hobbs Office
11-14-90	10:15 AM	2769	OCD - Hobbs Office
(pumping well)	2:40 PM	3195	OCD - Hobbs Office
11-16-90	--	2059	OCD - Hobbs Office
11-19-90	--	1740	OCD - Hobbs Office
11-29-90	--	1600	ANA-LAB, Kilgore, Texas



Map 1. Location of Caudill Ranch Study Area

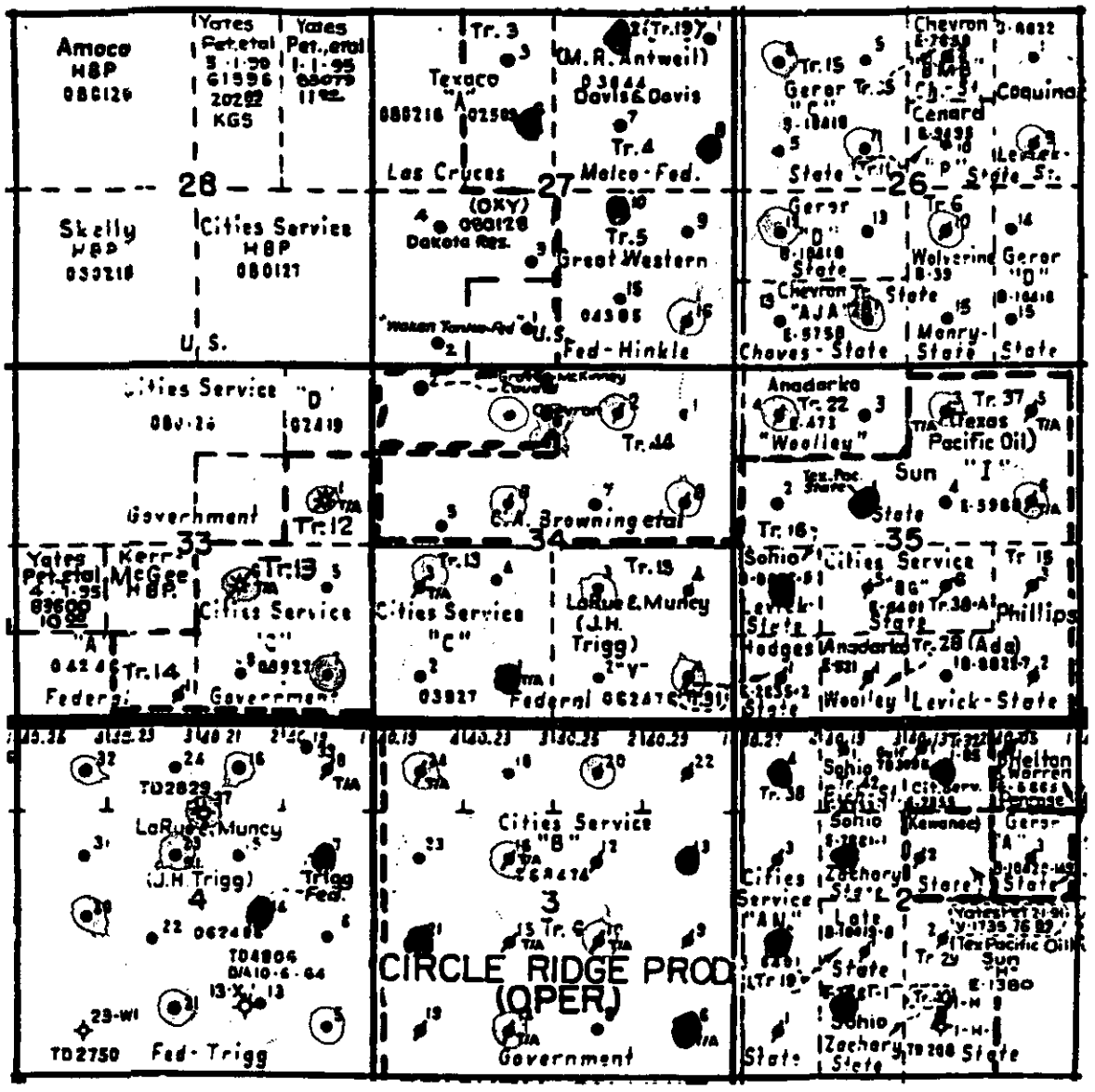
Underlying the Ogallala and outcropping at surface where the Ogallala is absent are rocks of the Dockum group. Near-surface sediments of these Triassic age rocks are predominantly composed of reddish shales and other fine grained materials. Lower rocks are mainly sandstones but contain some shales and limestones. Thickness of the sandstones reaches 600 feet while the overlying fine-grained rocks are reported to be up to 1200 feet thick. When not exposed at the surface, the rocks are overlain by alluvium up to 40 feet thick.

The Ogallala formation is the principal aquifer for southeast New Mexico and supplies large quantities of water to wells in east central Lea County. However, on its western edge near the Caudill Ranch saturated thickness of the aquifer is less than thirty feet. For example, 1986 State Engineer Office measurement of a well a mile southeast of the ranch house (T13S, R31E, Sec 35.143412) shows a water level of 171.6 feet and a total well depth of 198 feet for a water depth of 26 feet. Since most wells are completed only to the top of the Dockum redbeds, this is likely the effective saturated thickness of ground water at this location unless the depth of the well has decreased due to siltation.

To the west of the caprock escarpment, the alluvium immediately thins. Well depths at the Caudill Ranch near the caprock are less than 80 feet with saturated thickness less than 20 feet as reported by the State Engineer. Further to the west, usable ground water is generally limited to thin, perched zones on top of the redbeds or to the sandstone zones of the Dockum group.

OCD OIL WELL INVESTIGATION

Oil production occurs in the vicinity of the ranch headquarters. Produced with the oil is a salt brine which is injected for both secondary recovery of oil and water disposal. Water disposal occurs in formations which are beneath any fresh water in the area. Four oil companies operate within 1 mile of the study area: Circle Ridge Production Company, La Rue & Muncy, Dakota Resources Inc., and Grover-McKinney Oil Company (Map 2). In Section 34, Grover-McKinney operates in the N/2 of the NW/4, La Rue & Muncy in the SE/4, and Circle Ridge operates in the remainder of the section. No Dakota Resources wells are located in this section.



1 - Caudill House Well
2 - Caudill Stock Well

Salt Water Disposal Well

Water Injection Well
(secondary recovery)

Wells Temporarily Abandoned,
or Plugged and Abandoned

40-ACRE TRACTS WITHIN A SQUARE-MILE SECTION

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

Map 2. Location of Oil and Gas Wells

Of the 16 oil wells in this section, eight are production wells (unit letters A, D, E, G, I, K, M, O), six are water injection wells (B, F, H, J, L, P), one is a salt water disposal well (C) and one listed as temporarily abandoned (N). Of the four wells closest to the ranch headquarters, two are water injection (B, F), one salt water disposal (C) and one production (G).

Tests were run on surface casing (Bradenhead tests) of all wells within one mile of the area on November 15, 16 and 20, 1990 and no test failures were reported. Pressure tests are conducted at least every five years on injection wells in the area. One test did reveal a problem on the Circle Ridge Rock Queen Unit Injection Well 34-2 (unit letter B). Although the casing had a leak, the packer was holding and injection fluids were reaching only the intended formation. This well was repaired and injection recommenced in September, 1990.

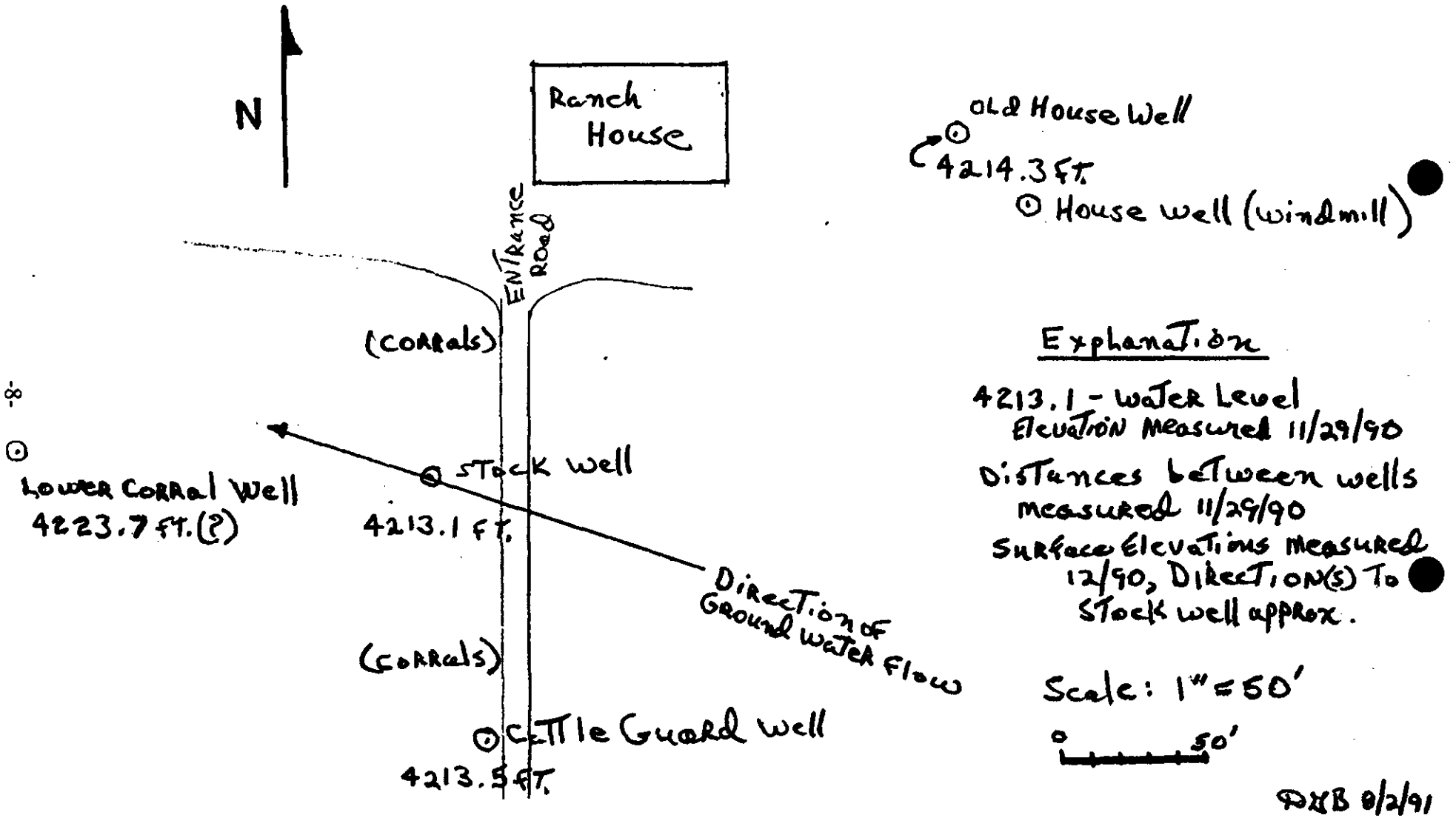
GROUND WATER INVESTIGATION

On November 29, 1990, David Boyer of OCD Santa Fe and Eddie Seay of the OCD Hobbs District Office visited the ranch to measure water levels, and sample the water wells. During the visit the ranch foreman, Mr. Ron Kenmore, pointed out the locations of the various wells (Map 3) and discussed the contamination problem which he said first was noticed in the summer of 1989 in the Stock well.

Table 2 provides current information on the Caudill Ranch water wells. In addition, Mr. Kenmore provided historical information on the use of the wells which is summarized below:

Stock Well - Located in the east corral, hand dug, at least 80 years old. Originally about 76 feet deep, 5 feet wide on the surface. Well cased with 50 feet of corrugated pipe, then open hole.

House Well - East of ranch house, windmill temporarily inoperative at time of visit. Domestic supply well supplemented by two other wells on top of caprock and east of highway.



Map 3. Location of Caudill Ranch Water Wells

Table 2

Caudill Ranch Water Wells

OCD Name	SEO Location	Depth	Water Level/ Date	Use	Distance and Direction From Stock Well	Comment
Stock Well	T13S,R31E, Sec. 34.124231	66 feet	60.1 ft/11-90	Stock	---	Windmill(sumersible pump available)
House Well	T13S,R31E, Sec. 34.124242	---	---	Domestic	250 feet(est.), northeast	Windmill, temporarily in-operative at time of visit
Old House Well	T13S,R31E, Sec. 34.124224	78 feet	71.8 ft/11-90	Unused	219 feet, northeast	Open cased hole 6 feet north of pump house
Cattle Guard Well	---	76 feet	66.7 ft/11-90	Abandoned	94.5 feet, south	Covered wellbore several feet west of cattle guard
Lower Corral Well	---	61 feet	53.2 ft/11-90	Unused	146 feet, west	Open cased hole beneath metal windmill frame

Old House Well - Unused domestic well six feet north of pump house with pressure tank.

Cattle Guard Well - Abandoned open hole well covered by plate and several inches of dirt on west wide of cattle guard at entrance to ranch. Age may be greater than 50 years.

Lower Corral Well - Located under windmill frame in lower corral 146 feet west of stock well. Drilled approximately 1975 but not used because of little water.

Water level measurements were taken in November on all wells except the House windmill which was inaccessible for measuring. In December the ranch was revisited and well surface elevations measured so that a water level map could be drawn. All distances were measured with a hundred foot tape. One well, the lower corral well, had a calculated elevation higher than the contaminated stock well although it is topographically lower. This well was not resurveyed and the elevation was not used in the calculation of ground water flow direction. Map 3 shows only the relative locations of the wells, since elevations but not directions were surveyed.

The results of the mapping show generally westerly (18° N of west) ground water movement at a downward gradient of 0.0085 or about one foot drop per 120 feet. This contrasts with the generally southeasterly direction of ground water flow found on top of the caprock. The two opposite flow directions indicate that a ground water divide occurs on top of the caprock, probably within a mile east of the caprock edge. Since water flows in both directions from this divide, the only source of recharge water is the several playa depressions along, and just east, of the escarpment. Since the playas are the source of recharge, it is important that they be protected from contamination, and that fluids from any surface spill of brine water be immediately recovered.

WATER QUALITY STUDY

During the site visit on November 29, 1990, OCD sampled all wells which were accessible for obtaining a water sample. Although the domestic water well windmill pump was temporarily inoperative during this visit, OCD had obtained a sample the previous month. Results of the water well sampling program are shown on Table 3. Analyses of Circle Ridge production and injection water taken in February 1991, and are also shown on Table 3. Copies of the complete analyses are provided in the Appendix.

Examination of the chemical analysis results shows the Stock well and Cattle Guard well to be contaminated with elevated levels of sodium, calcium, chloride and total dissolved solids. The Circle Ridge samples also contain these contaminants but at much higher concentrations. However, when the contaminated well water and Circle Ridge water is compared, the relative proportions of sodium and calcium are reversed. This is shown in Figures 1 through 3.

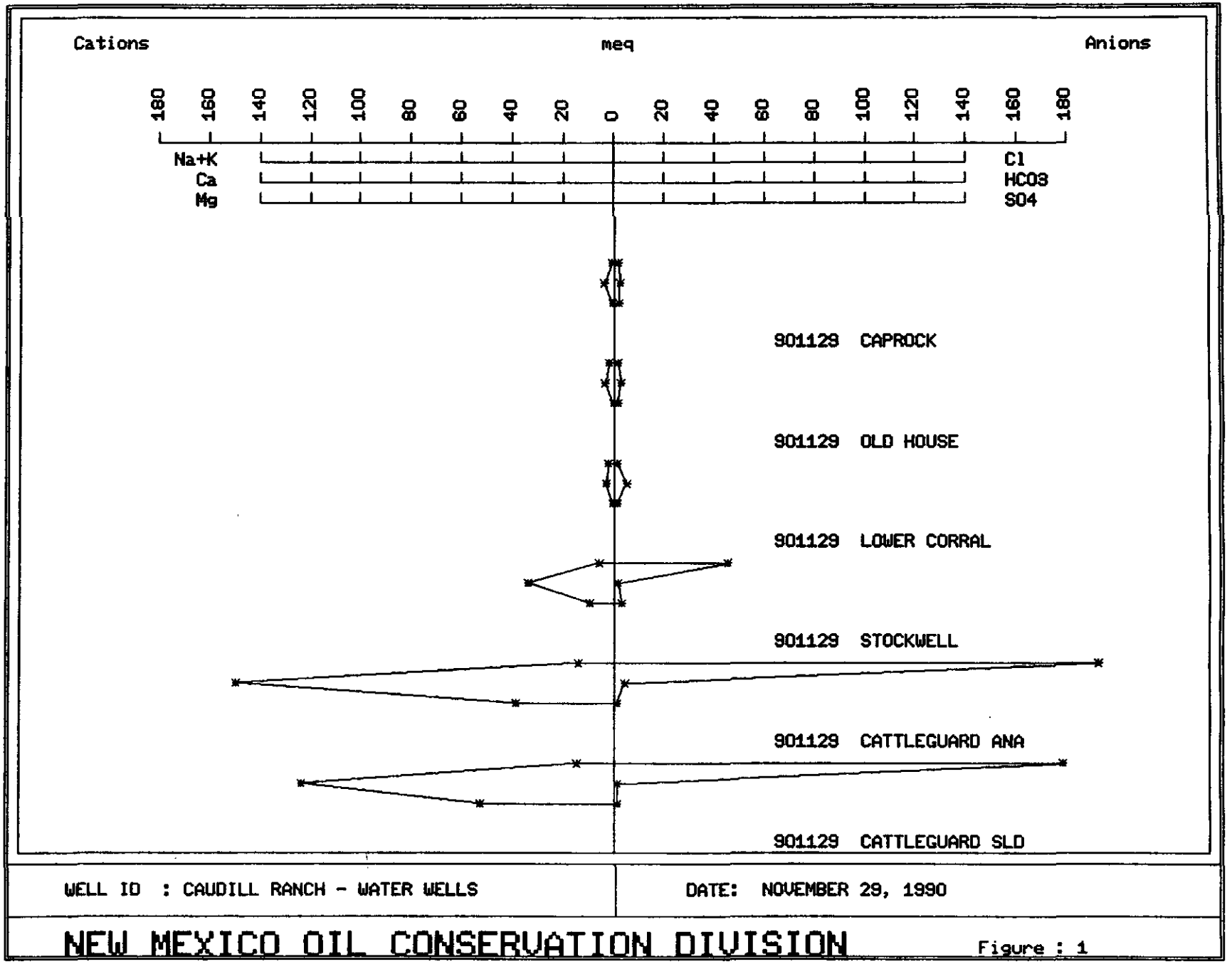
Natural waters are composed of equal amounts of positively and negatively charged particles called "ions". Ions with positive charges are called "cations" and include sodium, potassium, calcium, magnesium, and the heavy metals (such as iron) which are usually present only in trace amounts. Negatively charged ions are called "anions" and include chloride, sulfate, carbonate/bicarbonate, plus other anions such as nitrate usually only present in small amounts. Cations and anions are present in equal amounts in water. To be complete, a laboratory analysis should include a calculation comparing positive and negative ions. This is done by converting the element weight in water (milligrams per liter or parts per million) to chemical equivalents in water (milliequivalents per liter), adding cation and anion concentrations separately, and then comparing the totals.

Figures 1 and 2, which are commonly referred to as "Stiff diagrams", graphically compare the totals. The figures show that three different types of water are present in the vicinity of the Caudill Ranch. In Figure 1, the upper three analyses do not show any one type of chemical constituent predominant over another. The lower three analyses, one from the stock well and

Table 3 - Results of Water Well Chemical Analyses[1]

OCD Name	Sample Date	Sodium (mg/l)	Calcium (mg/l)	Chloride (mg/l)	Total Dissolved Solids (mg/l)	Organics[5] (type and concentration)
Stock Well	11-29-90	140	690	1600	2950	NS
Old House Well[2]	11-29-90	53	78	60	400	NS
Cattle Guard Well						
NMSLD[3]	11-29-90	336	2480	6300	11274	NS
ANA-LAB	11-29-90	320	3000	6800	11000	NS
Lower Corral Well	11-29-90	64	74	40	500	NS
Top Caprock Water (from Pipe to Tank)	11-29-90	27	88	60	400	NS
House Water (from pumphouse)						
NMSLD[3]	11-29-90	NS	NS	NS	NS	ND
ANA-LAB	11-29-90	NS	NS	NS	NS	ND
Circle Ridge						
Production Water	2-1-91	96,000	2800	165,000	290,000	NS
Injection Water	2-1-91	100,000	3000	180,000	280,000	NS
Field Blank[4]	11-28-90	NS	NS	NS	NS	ND
EPA Drinking Water Standard	--	None	None	250	500	Various levels for differing compounds but none should be present.

1. Analyses by ANA-LAB, Kilgore, Texas unless otherwise shown.
2. Domestic water well ("House Well") had an inoperative windmill pump on date of sampling; chlorides on 10-31-90 were 99.4 ppm (OCD sampling).
3. NM Scientific Laboratory Division, Albuquerque.
4. Deionized water transported from Santa Fe; sample taken from carboy in field.
5. NS-Not Sampled; ND-Not Detected at laboratory limit of detection. Compounds analysed included Benzene, Tolune, Ethylebenzene and Xylenes.



WELL ID : CAUDILL RANCH - WATER WELLS

DATE: NOVEMBER 29, 1990

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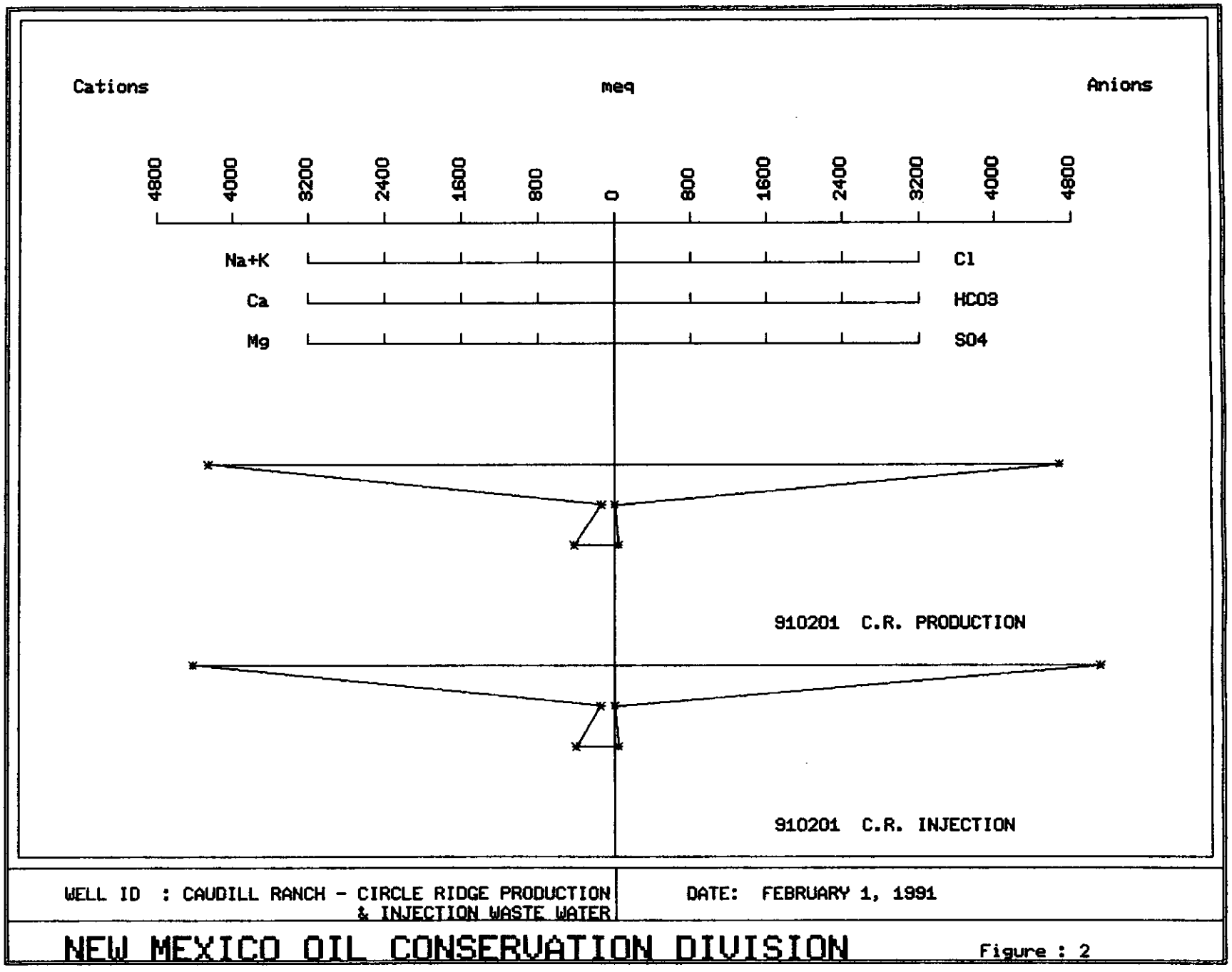
Figure : 1



WELL ID : CAUDILL RANCH - CIRCLE RIDGE PRODUCTION & INJECTION WASTE WATER

DATE: FEBRUARY 1, 1991

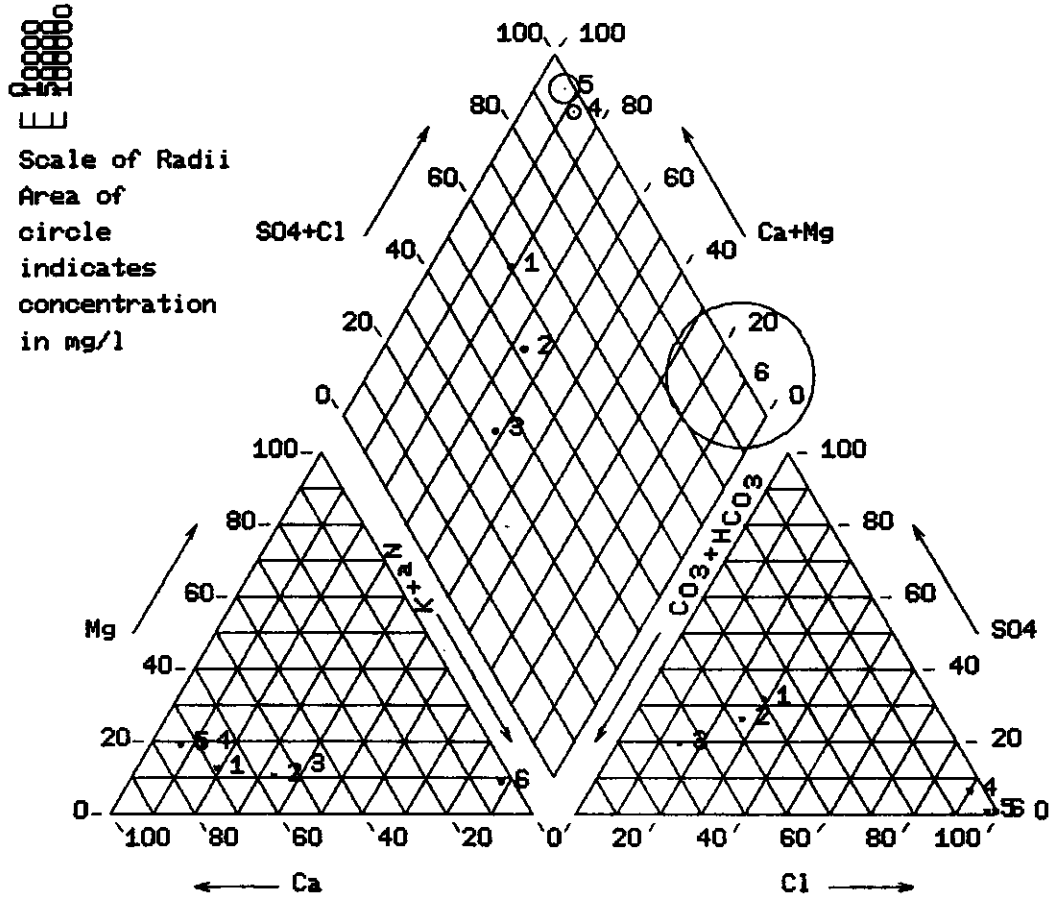
NEW MEXICO OIL CONSERVATION DIVISION

Figure : 2

two from the cattle guard well, show high levels of chlorides and low levels of the other anions (bicarbonate and sulfate). Calcium and magnesium are the predominant cations with sodium and potassium being only a minor component. However, Figure 2 is a Stiff diagram of Circle Ridge waters and shows that while chlorides are again predominant, sodium and potassium are about 10 times greater than calcium and magnesium. When compared together, the figures show that the contaminated well water is of a different composition than the Circle Ridge salt water.

Figure 3 presents this information using another graphical method called a "Trilinear Diagram". This method first plots relative concentrations of cations and anions in separate triangles and then projects the plotted points to an upper block where the cation and anion values are combined into a single point. For the six waters identified in the figure, the left and right triangles show different characteristics of the water. Looking only at the right triangle, waters 4, 5 and 6 could be interpreted to be similarly contaminated, in this case with chloride. However, the left triangle shows waters 4 and 5 (the Stock and Cattle Guard wells) to be at an opposite corner of the triangle from water 6 and not too much different from the composition of waters 1, 2 and 3. When the points are projected into the upper field, three different types of waters are identified. Waters 1, 2 and 3 are in the center of the field indicating that their relative chemical proportions are generally balanced. Waters 4 and 5 are in the upper center corner and water 6 (the Circle Ridge water) stands alone in the right corner. Waters 4 and 5 are calcium-magnesium chloride waters while Circle Ridge water is sodium-potassium chloride water. The concentrations of the chemicals are indicated by the radius of the circle around each point. The figure graphically shows that waters are different and not from the same source, nor a mixture from several sources.

In addition to the analyses discussed above, a sample was taken of the water combined from several sources and used for domestic purposes. An organic analysis was performed to show whether petroleum hydrocarbons are present in the water, mostly likely from a leak or spill. The sample was analyzed for dissolved concentrations benzene, toluene, ethylbenzene and xylenes, all common constituents in crude oil. None of these chemicals were detected in either of the samples sent to the State Scientific Laboratory or to OCD's contract laboratory, ANA-LAB.



#	Date YYMMDD	Zone	Well I.D.
1	901129	1,4,9	CAPROCK
2	901129	1,4,9	OLD HOUSE
3	901129	1,3,5	LOWER CORRAL
4	901129	1,4,6	STOCKWELL
5	901129	1,4,6	CATTLEGUARD
6	910201	2,4,7	C.R. PROD.

WELL ID : CAUDILL RANCH - WATER WELLS AND OIL PRODUCTION WASTE WATER	DATE: NOVEMBER 1990; FEBRUARY 1991

NEW MEXICO OIL CONSERVATION DIVISION

Figure : 3

LOCATION OF THE CONTAMINATION

The water quality study determined that salt water brine did not cause the contamination. When that possibility is excluded, a surface source for the problem can be postulated. Using the water level data, direction of ground water movement, and other available information, the possible location and maximum age of ground water contamination can be estimated.

Published data (Hart and McAda) list a range of hydraulic conductivities (K) for the Ogallala sediments of between 25 and 135 feet per day with an average of 50 feet per day. Porosity (n) of well-sorted, sandy material ranges between 0.25 and 0.50. Using this information and the ground water gradient (I) determined from water level measurements, seepage velocity (V) of the water is calculated using the formula $V = KI/n$. The velocities range between 0.43 and 4.6 feet per day, with the most likely velocity being about 1 foot per day.

From the apparent direction of water movement, it can be concluded that any discharges to the drainage along the road would have a likely impact on the wells nearest the drainage. A discharge of liquids would move very quickly downward though the sandy alluvium to ground water, especially since no caliche cap is present. However, a spill of calcium chloride salt solids would require sufficient rain or runoff water to dissolve the salt before vertical percolation could occur.

The nearby drainage extends only to the top of the caprock, a distance of about 1000 feet from the Stock well. The maximum time for ground water from that distance to reach the wells, assuming the slowest seepage velocity, is 6.4 years. Based on the ranch foreman's recollection that bad water was first noticed in the summer of 1989, a discharge of liquids would likely have occurred no earlier than 1983. However, if the release was non-liquid salt, no date can be assigned because of the uncertainty of the time necessary to dissolve the salt, and the travel time required to move the salt downward through the unsaturated alluvial sediments.

CONCLUSIONS

Examination of the chemical analyses of the water samples shows that the contamination is not from salt water produced with the crude oil. Since the characteristics are greatly different from either the natural water or salt water, some suggestions can be made as to the possible source of the contamination.

Calcium chloride is a common chemical that is routinely used in the oil industry. When drilling oil wells, it is usually added as an accelerant to cement which is circulated downhole to cement casing. Less commonly, it is also used as a downhole drilling fluid in place of sodium or potassium chloride. If the chemical was used in the vicinity of the Caudill Ranch, the most likely scenario for it to get into the ground water would be as a result of a spill or illegal disposal of unused fluid or solid salt into the drainageway adjacent to the ranch road. Because the salts don't chemically decompose, they remain in the soil until moved downward with subsequent rainfall or runoff.

Although the date, location, and volume of spilled material is unknown, the fact that higher concentrations of the chemical were found in the Cattle Guard well, lends credence to the hypothesis that the discharge occurred along the ranch road. Since the saturated thickness of the water zone is only several feet in this area, a spill upgradient of the water wells could do severe damage to water quality. Without further investigation, it is unknown whether the bulk of the contamination plume has reached and moved past the wells, or whether the contamination will remain or even increase in severity.

Since the House well is upgradient of the Stock well and out of the apparent path of any contamination, it should remain unaffected by this incident. However, because of the limited saturated thickness of the aquifer, the domestic supply could be threatened by future spills, especially if such spills occur near the west edge of the caprock and in the vicinity of the major arroyos. Likewise production spills, especially from corrosion of lines and tanks, should be

prevented and water from any such spills kept from reaching nearby caprock playas which are the source of recharge for the aquifer.

RECOMMENDATIONS

The quality of water in both the Stock well and the House windmill should be monitored on a routine basis over the next several years. Both wells should have water samples taken four times each year. The samples should have specific conductance (conductivity) and temperature measured at the time of collection, and then be analyzed for chlorides. The water supplying the ranch house should be tested for petroleum hydrocarbons in the event it develops a taste or odor problem.

The monitoring of the Stock well for chlorides and conductivity will effectively determine the level of contamination and show any improvement in water quality. If a party potentially responsible for the contamination can be identified, the ranch owners and/or OCD may wish to pursue legal action on the matter.

REFERENCES

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APPENDIX

Water Quality Analyses,
Caudill Ranch

ANA-LAB CORP.
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01/28/91

Environmental Bureau NM Oil D.
PO Box 2088
Santa Fe, NM 87504

Sample Identification: #9011291440 Caudill Stockwell
Collected By: Boyer/OCS
Date & Time Taken: 11/29/90 1440

Lab Sample Number: 177423 **Received:** 12/03/90 **Client:** SNM1

PARAMETER	RESULTS	UNITS	TIME	DATE	METHOD	BY
Alkalinity	110	mg/l	0800	12/19/90	EPA Method 310.1	DG
Cation-Anion Balance	50.50/ 50.76	meq/meq	1500	01/18/91		NT
Carbonate	< 0.5	mg/l	1300	01/10/91	APHA Method 263	DG
Chloride	1600	mg/l	0900	12/13/90	EPA Method 325.3	DG
Specific Conductance	5.0	Micromhos	1620	12/12/90	EPA Method 120.1	GS
Bicarbonate	100	mg/l	1300	01/10/91	APHA Method 263	DG
Sulfate	160	mg/l	1500	01/08/91	EPA Method 375.4	HG
Total Dissolved Solids	2950	mg/l	1000	01/09/91	EPA Method 160.1	BC
pH	7.3	SU	1200	12/11/90	EPA Method 150.1	CSL
Dissolved Calcium	690	mg/l	1030	12/13/90	EPA Method 6010	NT
Dissolved Iron	<.1	mg/l	1030	12/13/90	EPA Method 6010	NT
Dissolved Potassium	4.5	mg/l	2100	12/21/90	EPA Method 6010	GK
Dissolved Magnesium	120	mg/l	1030	12/13/90	EPA Method 6010	NT
Dissolved Sodium	140	mg/l	1030	12/13/90	EPA Method 6010	NT

Quality Assurance for the SET with Sample 177423

Sample #	Description	Result	Units	Dup/Std Value	Spk Conc.	Percent	Time	Date	By

Alkalinity

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Quality Assurance for the SET with Sample 177423

Sample #	Description	Result	Units	Dup/Std Value	Spk Conc.	Percent	Time	Date	By
	Standard	2245	mg/l	2358		105	0800	12/19/90	DG
177411	Duplicate	230	mg/l	230		100	0800	12/19/90	DG
177411	Spike		mg/l		2	98	0800	12/19/90	DG
				Chloride					
	Standard	71	mg/l	71		100	0900	12/13/90	DG
177466	Duplicate	93	mg/l	91		102	0900	12/13/90	DG
177466	Spike		mg/l		1000	101	0900	12/13/90	DG
				Specific Conductance					
	Standard	1441	Micromhos	1413		102	1620	12/12/90	GS
177411	Duplicate	507	Micromhos	499		102	1620	12/12/90	GS
				Sulfate					
	Standard	96	mg/l	100		104	1500	01/08/91	HG
177423	Duplicate	140	mg/l	170		119	1500	01/08/91	HG
				pH					
	Standard	Calibrate	SU	7.0			1200	12/11/90	CSL
	Standard	Calibrate	SU	4.0			1200	12/11/90	CSL
	Standard	6.0	SU	6.0		100	1200	12/11/90	CSL
				Dissolved Calcium					
	Blank	.2	mg/l				1030	12/13/90	NT
	Standard	10	mg/l	10		100	1030	12/13/90	NT
	Standard	50	mg/l	50		100	1030	12/13/90	NT
177411	Duplicate	72	mg/l	72		100	1030	12/13/90	NT
				Dissolved Iron					
	Blank	<.1	mg/l				1030	12/13/90	NT
	Standard	1.0	mg/l	1.0		100	1030	12/13/90	NT
	Standard	5.1	mg/l	5.0		102	1030	12/13/90	NT
177411	Duplicate	<.1	mg/l	<.1		100	1030	12/13/90	NT
				Dissolved Potassium					
	Blank	<.04	mg/l				2100	12/21/90	GK
	Standard	.53	mg/l	.50		106	2100	12/21/90	GK
	Spike		mg/l		.50	99	2100	12/21/90	GK
				Dissolved Magnesium					
	Blank	<.1	mg/l				1030	12/13/90	NT
	Standard	10	mg/l	10		100	1030	12/13/90	NT
	Standard	50	mg/l	50		100	1030	12/13/90	NT
177411	Duplicate	27	mg/l	27		100	1030	12/13/90	NT
				Dissolved Sodium					
	Blank	<1	mg/l				1030	12/13/90	NT
	Standard	10	mg/l	10		100	1030	12/13/90	NT
	Standard	50	mg/l	50		100	1030	12/13/90	NT
177411	Duplicate	6.0	mg/l	5.6		107	1030	12/13/90	NT

Bill Lee

C. H. Whiteside, Ph.D., President

ANA-LAB CORP.
THE COMPLETE SERVICE LAB

2600 DUDLEY ROAD — KILGORE, TEXAS 75662 — 903/984-0551

Analytical Chemistry • Utility Operations • Equipment Sales

01/28/91

Environmental Bureau NM Oil D.
PO Box 2088
Santa Fe, NM 87504

Sample Identification: #9011291525 Caudill Old House
Collected By: Boyer/OCS
Date & Time Taken: 11/29/90 1525
Other:
pH 6.5 Temp. 15.5 Cond. 430

Lab Sample Number: 177420 **Received:** 12/03/90 **Client:** SNM1

PARAMETER	RESULTS	UNITS	TIME	DATE	METHOD	BY
Alkalinity	200	mg/l	0800	12/19/90	EPA Method 310.1	DG
Cation-Anion Balance	6.97/ 6.71	meq/meq	1500	01/18/91		NT
Carbonate	2	mg/l	1300	01/10/91	APHA Method 263	DG
Chloride	60	mg/l	0900	12/13/90	EPA Method 325.3	DG
Specific Conductance	662	Micromhos	1620	12/12/90	EPA Method 120.1	GS
Bicarbonate	180	mg/l	1300	01/10/91	APHA Method 263	DG
Sulfate	80	mg/l	1500	01/08/91	EPA Method 375.4	HG
Total Dissolved Solids	400	mg/l	1000	01/09/91	EPA Method 160.1	BC
pH	7.5	SU	1200	12/11/90	EPA Method 150.1	CSL
Dissolved Calcium	78	mg/l	1030	12/13/90	EPA Method 6010	NT
Dissolved Iron	.2	mg/l	1030	12/13/90	EPA Method 6010	NT
Dissolved Potassium	1	mg/l	2100	12/11/90	EPA Method 6010	GK
Dissolved Magnesium	9	mg/l	1030	12/13/90	EPA Method 6010	NT
Dissolved Sodium	53	mg/l	1030	12/13/90	EPA Method 6010	NT

Quality Assurance for the SET with Sample 177420

Sample #	Description	Result	Units	Dup/Std Value	Spk Conc.	Percent	Time	Date	By

Alkalinity

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2600 DUDLEY ROAD — KILGORE, TEXAS 75662 — 903/984-0551

Analytical Chemistry • Utility Operations • Equipment Sales

Quality Assurance for the SET with Sample 177420

Sample #	Description	Result	Units	Dup/Std Value	Spk Conc.	Percent	Time	Date	By
	Standard	2245	mg/l	2358		105	0800	12/19/90	DG
177411	Duplicate	230	mg/l	230		100	0800	12/19/90	DG
177411	Spike		mg/l		2	98	0800	12/19/90	DG
				Chloride					
	Standard	71	mg/l	71		100	0900	12/13/90	DG
177466	Duplicate	93	mg/l	91		102	0900	12/13/90	DG
177466	Spike		mg/l		1000	101	0900	12/13/90	DG
				Specific Conductance					
	Standard	1441	Micromhos	1413		102	1620	12/12/90	GS
177411	Duplicate	507	Micromhos	499		102	1620	12/12/90	GS
				Sulfate					
	Standard	96	mg/l	100		104	1500	01/08/91	HG
177423	Duplicate	140	mg/l	170		119	1500	01/08/91	HG
				pH					
	Standard	Calibrate	SU	7.0			1200	12/11/90	CSL
	Standard	Calibrate	SU	4.0			1200	12/11/90	CSL
	Standard	6.0	SU	6.0		100	1200	12/11/90	CSL
				Dissolved Calcium					
	Blank	.2	mg/l				1030	12/13/90	NT
	Standard	10	mg/l	10		100	1030	12/13/90	NT
	Standard	50	mg/l	50		100	1030	12/13/90	NT
177411	Duplicate	72	mg/l	72		100	1030	12/13/90	NT
				Dissolved Iron					
	Blank	<.1	mg/l				1030	12/13/90	NT
	Standard	1.0	mg/l	1.0		100	1030	12/13/90	NT
	Standard	5.1	mg/l	5.0		102	1030	12/13/90	NT
177411	Duplicate	<.1	mg/l	<.1		100	1030	12/13/90	NT
				Dissolved Potassium					
	Blank	<.04	mg/l				2100	12/11/90	GK
	Standard	.51	mg/l	.50		102	2100	12/11/90	GK
177411	Duplicate	.86	mg/l	.86		100	2100	12/11/90	GK
177412	Spike		mg/l		.50	107	2100	12/11/90	GK
				Dissolved Magnesium					
	Blank	<.1	mg/l				1030	12/13/90	NT
	Standard	10	mg/l	10		100	1030	12/13/90	NT
	Standard	50	mg/l	50		100	1030	12/13/90	NT
177411	Duplicate	27	mg/l	27		100	1030	12/13/90	NT
				Dissolved Sodium					
	Blank	<1	mg/l				1030	12/13/90	NT
	Standard	10	mg/l	10		100	1030	12/13/90	NT
	Standard	50	mg/l	50		100	1030	12/13/90	NT
177411	Duplicate	6.0	mg/l	5.6		107	1030	12/13/90	NT

C. H. Whiteside, Ph.D., President

WATER CHEMISTRY ANALYTICAL REQUEST FORM

SCIENTIFIC LABORATORY DIVISION
700 CAMINO DE SALUD, ALBUQUERQUE, NM 87106
Water Chemistry Section - Telephone: (505) 841-2555

SLD No. 1

Date Received:

Request ID No. 012064-B

2 User Code #: 7 10 13 12 10

3 Request ID No.:

4 Priority Code #: 3 (If "1" or "2", call EID-SLD Coordinator)

5 Facility Name: Caudill Ranch

6 County: Chaves

7 City:

8 State: NM

9 Sample Location: CATTLE GUARD WELL

10 Collected By: David BOYER (First / Last) On: 90/11/25 (Date: YY/MM/DD) At: 1 4 5 7 hrs. (Time: 24 hr. clock, 3:00 pm = 1500 hrs.)

11 Codes: Submitter / WSS # / Organization

12 Latitude (DDMMSS) ° ' "
Longitude (DDDMMSS) ° ' "
2 Digit ID (if needed)

13 Report To: Name: David G. Boyer

14 Phone #: (505) 827-5812

Address: New Mexico Oil Conservation Division
P. O. 2088
City, State Zip: Santa Fe, New Mexico 87504-2088

15 Sampling Information:
Sample Purpose:
- ☐ Compliance
- ☐ Check
- ☒ Monitoring
- ☐ Special

- ☒ Grab
- ☐ Composite _____ (Composite time Period)
- ☐ Flow Proportioned
- ☐ Equal Aliquot
- ☐ Sample Split w/Permittee
- ☐ Chain of Custody

16 Field Data: pH: 6.5, Conductivity: 9000 umhos @ 17.5 °C, Temperature: _____ °C, Chlorine Residual: _____ mg/l, Flow: _____

17 Sample Source:
- ☐ Stream
- ☐ Lake
- ☐ Drain
- ☐ Pool
- ☐ WWTP
- ☒ Well; Depth: 75.92'
- ☐ Spring
- ☐ Distribution
- ☐ Point-of-Entry
- ☐ Other: _____

18 Field Notes/ Sample #:
T13S, R31E Sec 34, 124

19 Sample Type: ☒ Water, ☐ Soil, ☐ Food, ☐ Wastewater, ☐ Other _____
This form accompanies a single sample consisting of:
✓ - 1 liter cubitainers (1 quart)
_____ - 4 liter cubitainers (1 gallon)
_____ - _____

20 Preservation:
- ☐ WNF Water Not Preserved; Filtered
- ☒ WNN Water Not Preserved; Not Filtered
- ☐ WPF Water Preserved with Sulfuric Acid (H2SO4); Filtered
- ☐ WPN Water Preserved with Sulfuric Acid; Not Filtered
- ☐ WNL Water Not Preserved in Field; Please Add H2SO4 at Lab
- ☐ ICE Water Iced
- ☐ Other _____

21 Analyses Requested: Please check the appropriate box(es) below to indicate the type of analyses required.

Group Analyses:
- ☐ (854) SDWA Group II (Nitrate as N)
- ☐ (861) SDWA Group III (Fluoride)
- ☐ (860) SDWA Complete Secondary
- ☐ (859) SWQB SS Anion - Cation Group +
- ☐ (868) SWQB NPS Anion, Cation, Physical + TSS
- ☐ (869) SWQB Nutrient Analysis Group +
- ☒ (867) Major Anions & Cations

Cations:
- ☐ Calcium (as Ca) _____
- ☐ Magnesium (as Mg) _____
- ☐ Potassium (as K) _____
- ☐ Sodium (as Na) _____
- ☐ Total Hardness (as CaCO3) _____

Anions:
- ☐ Alkalinity (as CaCO3) _____
- ☐ Bicarbonate (as HCO3) _____
- ☐ Carbonate (as CO3) _____
- ☐ Chloride (as Cl) _____
- ☐ Fluoride (as F) _____
- ☐ Sulfate (as SO4) _____
- ☒ Ion Charge Balance _____

Physical Parameters:
- ☐ Color _____
- ☒ Conductance (Micromhos @ 25 C) _____
- ☐ Odor _____
- ☒ pH _____
- ☐ Surfactants _____
- ☒ Total Dissolved Solids _____
- ☐ Turbidity _____

Other:
- ☐ _____ _____
- ☐ _____ _____
- ☐ _____ _____
- ☐ _____ _____

Surface and Waste Water:
- ☐ Biological Oxygen Demand _____
- ☐ Total Suspended Solids _____
- ☐ Chemical Oxygen Demand _____
- ☐ Total Organic Carbon _____
- ☐ Cyanide _____

Nutrients:
- ☐ Nitrate + Nitrite (as N) _____
- ☐ Ammonia (as N) _____
- ☐ Total Kjeldahl (as N) _____
- ☐ Nitrite (as N) _____
- ☐ Orthophosphate (as P) _____
- ☐ Total Phosphorus (as P) _____

Remarks:

SLD 8912-WC Form New 12/89 This Form Will NOT Be Returned With Your Results. Please RETAIN A COPY!

STATE OF NEW MEXICO HEALTH AND ENVIRONMENT DEPARTMENT
SCIENTIFIC LABORATORY DIVISION
P.O. Box 4700 700 Camino de Salud, NE
Albuquerque, NM 87196-4700 [505]-841-2500
WATER CHEMISTRY SECTION [505]-841-2555

January 9, 1991

Request ID No. 012064

ANALYTICAL REPORT
SLD Accession No. WC-90-4109

Distribution
(_) User 70320
(■) Submitter 995
(※) SLD Files

To: D.G. Boyer
~~Auto. Assign from WSS Table by Update Program (cron) when wss > 99 & dtout<800000~~
~~WSS's Field Off, NM 87106~~
NM OCD
Box 2088
Santa Fe, NM 87504-2088

From: Water Chemistry Section
Scientific Laboratory Div.
700 Camino de Salud, NE
Albuquerque, NM 87106

Re: **A water,Nonpres/No sample submitted to this laboratory on November 30, 1990**

DEMOGRAPHIC DATA

COLLECTION
On: 29-Nov-90 *By:* Boy . . .
At: 14:27 hrs. *In/Near:* Chaves County

LOCATION
Cattle Guard Well

ANALYTICAL RESULTS

Analysis	Value	D. Lmt.	Units
calcium	2480.00		mG/L
magnesium	644.00		mG/L
potassium	18.00		mG/L
sodium	336.00		mG/L
hardness	8850.00		mG/L
bicarbonate	79.50		mG/L
carbonate	0.00		mG/L
chloride	6300.00		mG/L
sulfate	56.90		mG/L
Ion Balance	106.00		%
conductance	16719.00		uS/cm
pH	6.97		pH units
total diss resid	11274.00		mG/L

Reviewed By:
John A. Finney 01/09/91
Supervisor, Water Chemistry Section

RECEIVED
JAN 15 1991
OIL CONSERVATION DIV.
SANTA FE

ANA-LAB CORP.
THE COMPLETE SERVICE LAB

2600 DUDLEY ROAD — KILGORE, TEXAS 75662 — 903/984-0551

Analytical Chemistry • Utility Operations • Equipment Sales

01/28/91

Environmental Bureau NM Oil D.
PO Box 2088
Santa Fe, NM 87504

Sample Identification: #9011291427 Cattle Guard
Collected By: Boyer/OCS
Date & Time Taken: 11/29/90 1427
On Site Data: Caudill Cattle Guard Well
Other:
pH 6.5 Temp. 17.5 Cond. 9000

Lab Sample Number: 177422 **Received:** 12/03/90 **Client:** SNM1

PARAMETER	RESULTS	UNITS	TIME	DATE	METHOD	BY
Alkalinity	280	mg/l	0800	12/19/90	EPA Method 310.1	DG
Cation-Anion Balance	202.6/ 197.8	meq/meq	1500	01/18/91		NT
Carbonate	< 0.5	mg/l	1300	01/10/91	APHA Method 263	DG
Chloride	6800	mg/l	0900	12/13/90	EPA Method 325.3	DG
Specific Conductance	17	Micromhos	1620	12/12/90	EPA Method 120.1	GS
Bicarbonate	260	mg/l	1300	01/10/91	APHA Method 263	DG
Sulfate	69	mg/l	1500	01/08/91	EPA Method 375.4	HG
Total Dissolved Solids	11000	mg/l	1100	01/09/91	EPA Method 160.1	BC
pH	6.9	SU	1200	12/11/90	EPA Method 150.1	CSL
Dissolved Calcium	3000	mg/l	1030	12/13/90	EPA Method 6010	NT
Dissolved Iron	<.1	mg/l	1030	12/13/90	EPA Method 6010	NT
Dissolved Potassium	14	mg/l	2100	12/11/90	EPA Method 6010	GK
Dissolved Magnesium	470	mg/l	1030	12/13/90	EPA Method 6010	NT
Dissolved Sodium	320	mg/l	1030	12/13/90	EPA Method 6010	NT

Quality Assurance for the SET with Sample 177422

Sample #	Description	Result	Units	Dup/Std Value	Spk Conc.	Percent	Time	Date	By

Alkalinity

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THE COMPLETE SERVICE LAB

2600 DUDLEY ROAD — KILGORE, TEXAS 75662 — 903/984-0551

Analytical Chemistry • Utility Operations • Equipment Sales

Quality Assurance for the SET with Sample 177422

Sample #	Description	Result	Units	Dup/Std Value	Spk Conc.	Percent	Time	Date	By
	Standard	2245	mg/l	2358		105	0800	12/19/90	DG
177411	Duplicate	230	mg/l	230		100	0800	12/19/90	DG
177411	Spike		mg/l		2	98	0800	12/19/90	DG
				Chloride					
	Standard	71	mg/l	71		100	0900	12/13/90	DG
177466	Duplicate	93	mg/l	91		102	0900	12/13/90	DG
177466	Spike		mg/l		1000	101	0900	12/13/90	DG
				Specific Conductance					
	Standard	1441	Micromhos	1413		102	1620	12/12/90	GS
177411	Duplicate	507	Micromhos	499		102	1620	12/12/90	GS
				Sulfate					
	Standard	96	mg/l	100		104	1500	01/08/91	HG
177423	Duplicate	140	mg/l	170		119	1500	01/08/91	HG
				Total Dissolved Solids					
	Standard	80	MG/L	100		122	1100	01/09/91	BC
179052	Duplicate	10	MG/L	12		118	1100	01/09/91	BC
178511	Duplicate	3100	mg/l	3000		103	1100	01/09/91	BC
179052	Duplicate	10	mg/l	12		118	1100	01/09/91	BC
				pH					
	Standard	Calibrate	SU	7.0			1200	12/11/90	CSL
	Standard	Calibrate	SU	4.0			1200	12/11/90	CSL
	Standard	6.0	SU	6.0		100	1200	12/11/90	CSL
				Dissolved Calcium					
	Blank	.2	mg/l				1030	12/13/90	NT
	Standard	10	mg/l	10		100	1030	12/13/90	NT
	Standard	50	mg/l	50		100	1030	12/13/90	NT
177411	Duplicate	72	mg/l	72		100	1030	12/13/90	NT
				Dissolved Iron					
	Blank	<.1	mg/l				1030	12/13/90	NT
	Standard	1.0	mg/l	1.0		100	1030	12/13/90	NT
	Standard	5.1	mg/l	5.0		102	1030	12/13/90	NT
177411	Duplicate	<.1	mg/l	<.1		100	1030	12/13/90	NT
				Dissolved Potassium					
	Blank	<.04	mg/l				2100	12/11/90	GK
	Standard	.51	mg/l	.50		102	2100	12/11/90	GK
177411	Duplicate	.86	mg/l	.86		100	2100	12/11/90	GK
177412	Spike		mg/l		.50	107	2100	12/11/90	GK
				Dissolved Magnesium					
	Blank	<.1	mg/l				1030	12/13/90	NT
	Standard	10	mg/l	10		100	1030	12/13/90	NT
	Standard	50	mg/l	50		100	1030	12/13/90	NT
177411	Duplicate	27	mg/l	27		100	1030	12/13/90	NT
				Dissolved Sodium					

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Quality Assurance for the SET with Sample 177422

Sample #	Description	Result	Units	Dup/Std Value	Spk Conc.	Percent	Time	Date	By
	Blank	<1	mg/l				1030	12/13/90	NT
	Standard	10	mg/l	10		100	1030	12/13/90	NT
	Standard	50	mg/l	50		100	1030	12/13/90	NT
177411	Duplicate	6.0	mg/l	5.6		107	1030	12/13/90	NT

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Analytical Chemistry • Utility Operations • Equipment Sales

01/28/91

Environmental Bureau NM Oil D.
PO Box 2088
Santa Fe, NM 87504

Sample Identification: #9011291451 Lower Corral Well
Collected By: Boyer/OCS
Date & Time Taken: 11/29/90 1451
On Site Data: Caudill Ranch
Other:
pH 6.5 Temp. 16.5 Cond. 550

Lab Sample Number: 177421 **Received:** 12/03/90 **Client:** SNM1

PARAMETER	RESULTS	UNITS	TIME	DATE	METHOD	BY
Alkalinity	360	mg/l	0800	12/19/90	EPA Method 310.1	DG
Cation-Anion Balance	7.54/ 7.83	meq/meq	1500	01/18/91		NT
Carbonate	1	mg/l	1300	01/10/91	APHA Method 263	DG
Chloride	40	mg/l	0900	12/13/90	EPA Method 325.3	DG
Specific Conductance	698	Micromhos	1620	12/12/90	EPA Method 120.1	GS
Bicarbonate	300	mg/l	1300	01/10/91	APHA Method 263	DG
Sulfate	70	mg/l	1500	01/08/91	EPA Method 375.4	HG
Total Dissolved Solids	500	mg/l	1000	01/09/91	EPA Method 160.1	BC
pH	7.4	SU	1200	12/11/90	EPA Method 150.1	CSL
Dissolved Calcium	74	mg/l	1030	12/13/90	EPA Method 6010	NT
Dissolved Iron	<.1	mg/l	1030	12/13/90	EPA Method 6010	NT
Dissolved Potassium	3	mg/l	2100	12/11/90	EPA Method 6010	GK
Dissolved Magnesium	12	mg/l	1030	12/13/90	EPA Method 6010	NT
Dissolved Sodium	64	mg/l	1030	12/13/90	EPA Method 6010	NT

Quality Assurance for the SET with Sample 177421

Sample #	Description	Result	Units	Dup/Std Value	Spk Conc.	Percent	Time	Date	By

Alkalinity

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THE COMPLETE SERVICE LAB

2600 DUDLEY ROAD — KILGORE, TEXAS 75662 — 903/984-0551

Analytical Chemistry • Utility Operations • Equipment Sales

Quality Assurance for the SET with Sample 177421

Sample #	Description	Result	Units	Dup/Std Value	Spk Conc.	Percent	Time	Date	By
	Standard	2245	mg/l	2358		105	0800	12/19/90	DG
177411	Duplicate	230	mg/l	230		100	0800	12/19/90	DG
177411	Spike		mg/l		2	98	0800	12/19/90	DG
				Chloride					
	Standard	71	mg/l	71		100	0900	12/13/90	DG
177466	Duplicate	93	mg/l	91		102	0900	12/13/90	DG
177466	Spike		mg/l		1000	101	0900	12/13/90	DG
				Specific Conductance					
	Standard	1441	Micromhos	1413		102	1620	12/12/90	GS
177411	Duplicate	507	Micromhos	499		102	1620	12/12/90	GS
				Sulfate					
	Standard	96	mg/l	100		104	1500	01/08/91	HG
177423	Duplicate	140	mg/l	170		119	1500	01/08/91	HG
				pH					
	Standard	Calibrate	SU	7.0			1200	12/11/90	CSL
	Standard	Calibrate	SU	4.0			1200	12/11/90	CSL
	Standard	6.0	SU	6.0		100	1200	12/11/90	CSL
				Dissolved Calcium					
	Blank	.2	mg/l				1030	12/13/90	NT
	Standard	10	mg/l	10		100	1030	12/13/90	NT
	Standard	50	mg/l	50		100	1030	12/13/90	NT
177411	Duplicate	72	mg/l	72		100	1030	12/13/90	NT
				Dissolved Iron					
	Blank	<.1	mg/l				1030	12/13/90	NT
	Standard	1.0	mg/l	1.0		100	1030	12/13/90	NT
	Standard	5.1	mg/l	5.0		102	1030	12/13/90	NT
177411	Duplicate	<.1	mg/l	<.1		100	1030	12/13/90	NT
				Dissolved Potassium					
	Blank	<.04	mg/l				2100	12/11/90	GK
	Standard	.51	mg/l	.50		102	2100	12/11/90	GK
177411	Duplicate	.86	mg/l	.86		100	2100	12/11/90	GK
177412	Spike		mg/l		.50	107	2100	12/11/90	GK
				Dissolved Magnesium					
	Blank	<.1	mg/l				1030	12/13/90	NT
	Standard	10	mg/l	10		100	1030	12/13/90	NT
	Standard	50	mg/l	50		100	1030	12/13/90	NT
177411	Duplicate	27	mg/l	27		100	1030	12/13/90	NT
				Dissolved Sodium					
	Blank	<1	mg/l				1030	12/13/90	NT
	Standard	10	mg/l	10		100	1030	12/13/90	NT
	Standard	50	mg/l	50		100	1030	12/13/90	NT
177411	Duplicate	6.0	mg/l	5.6		107	1030	12/13/90	NT

Bill Reed

C. H. Whiteside, Ph.D., President

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2600 DUDLEY ROAD — KILGORE, TEXAS 75662 — 903/984-0551

Analytical Chemistry • Utility Operations • Equipment Sales

01/28/91

Environmental Bureau NM Oil D.
PO Box 2088
Santa Fe, NM 87504

Sample Identification: #9011291513 Caudill Top Water
Collected By: Boyer/OCS
Date & Time Taken: 11/29/90 1513
On Site Data: Water From Top Of Coprock
Other:
pH 6.5 Temp. 11oC Cond 350

Lab Sample Number: 177419 **Received:** 12/03/90 **Client:** SNM1

PARAMETER	RESULTS	UNITS	TIME	DATE	METHOD	BY
Alkalinity	140	mg/l	0800	12/19/90	EPA Method 310.1	DG
Cation-Anion Balance	6.44/ 6.27	meq/meq	1500	01/18/91		NT
Carbonate	1	mg/l	1300	01/10/91	APHA Method 263	DG
Chloride	60	mg/l	0900	12/13/90	EPA Method 325.3	DG
Specific Conductance	627	Micromhos	1620	12/12/90	EPA Method 120.1	GS
Bicarbonate	140	mg/l	1300	01/10/91	APHA Method 263	DG
Sulfate	90	mg/l	1500	01/08/91	EPA Method 375.4	HG
Total Dissolved Solids	400	mg/l	1000	01/09/91	EPA Method 160.1	BC
pH	7.8	SU	1200	12/11/90	EPA Method 150.1	CSL
Dissolved Calcium	88	mg/l	1030	12/13/90	EPA Method 6010	NT
Dissolved Iron	<.1	mg/l	1030	12/13/90	EPA Method 6010	NT
Dissolved Potassium	2	mg/l	2100	12/11/90	EPA Method 6010	GK
Dissolved Magnesium	10	mg/l	1030	12/13/90	EPA Method 6010	NT
Dissolved Sodium	27	mg/l	1030	12/13/90	EPA Method 6010	NT

Quality Assurance for the SET with Sample 177419

Sample #	Description	Result	Units	Dup/Std Value	Spk Conc.	Percent	Time	Date	By

Alkalinity

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2600 DUDLEY ROAD — KILGORE, TEXAS 75662 — 903/984-0551

Analytical Chemistry • Utility Operations • Equipment Sales

Quality Assurance for the SET with Sample 177419

Sample #	Description	Result	Units	Dup/Std Value	Spk Conc.	Percent	Time	Date	By
	Standard	2245	mg/l	2358		105	0800	12/19/90	DG
177411	Duplicate	230	mg/l	230		100	0800	12/19/90	DG
177411	Spike		mg/l		2	98	0800	12/19/90	DG
				Chloride					
	Standard	71	mg/l	71		100	0900	12/13/90	DG
177466	Duplicate	93	mg/l	91		102	0900	12/13/90	DG
177466	Spike		mg/l		1000	101	0900	12/13/90	DG
				Specific Conductance					
	Standard	1441	Micromhos	1413		102	1620	12/12/90	GS
177411	Duplicate	507	Micromhos	499		102	1620	12/12/90	GS
				Sulfate					
	Standard	96	mg/l	100		104	1500	01/08/91	HG
177423	Duplicate	140	mg/l	170		119	1500	01/08/91	HG
				pH					
	Standard	Calibrate	SU	7.0			1200	12/11/90	CSL
	Standard	Calibrate	SU	4.0			1200	12/11/90	CSL
	Standard	6.0	SU	6.0		100	1200	12/11/90	CSL
				Dissolved Calcium					
	Blank	.2	mg/l				1030	12/13/90	NT
	Standard	10	mg/l	10		100	1030	12/13/90	NT
	Standard	50	mg/l	50		100	1030	12/13/90	NT
177411	Duplicate	72	mg/l	72		100	1030	12/13/90	NT
				Dissolved Iron					
	Blank	<.1	mg/l				1030	12/13/90	NT
	Standard	1.0	mg/l	1.0		100	1030	12/13/90	NT
	Standard	5.1	mg/l	5.0		102	1030	12/13/90	NT
177411	Duplicate	<.1	mg/l	<.1		100	1030	12/13/90	NT
				Dissolved Potassium					
	Blank	<.04	mg/l				2100	12/11/90	GK
	Standard	.51	mg/l	.50		102	2100	12/11/90	GK
177411	Duplicate	.86	mg/l	.86		100	2100	12/11/90	GK
177412	Spike		mg/l		.50	107	2100	12/11/90	GK
				Dissolved Magnesium					
	Blank	<.1	mg/l				1030	12/13/90	NT
	Standard	10	mg/l	10		100	1030	12/13/90	NT
	Standard	50	mg/l	50		100	1030	12/13/90	NT
177411	Duplicate	27	mg/l	27		100	1030	12/13/90	NT
				Dissolved Sodium					
	Blank	<1	mg/l				1030	12/13/90	NT
	Standard	10	mg/l	10		100	1030	12/13/90	NT
	Standard	50	mg/l	50		100	1030	12/13/90	NT
177411	Duplicate	6.0	mg/l	5.6		107	1030	12/13/90	NT

C. H. Whiteside, Ph.D., President

ORGANIC CHEMISTRY ANALYTICAL REQUEST FORM

SCIENTIFIC LABORATORY DIVISION
700 CAMINO DE SALUD N.E., ALBUQUERQUE, NM 87106
Organic Chemistry Section - Telephone: (505) 841-2570

SLD No. 1 _____

Date Received: _____

Request ID No. 012065-C

2 User Code #: 7 0 3 2 0	3 Request ID No.:	4 Priority Code #: 3 [If "1" or "2", call EID-SLD Coordinator]	
5 Facility Name: Caudill Ranch	6 County: Chaves	7 City:	8 State: NM
9 Sample Location: HOUSE WATER-PUMP HOUSE			
10 Collected By: DAVID BOYER (First / Last)	On: 90/11/29 (Date: YY/MM/DD)	At: 1 1 5 2 2 hrs. (Time: 24 hr. clock, 3:00 pm = 1500 hrs.)	

11 Codes: Submitter _____ - WSS # _____ Organization _____

12 Latitude (DDMMSS) ° ' "
Longitude (DDDMMSS) ° ' "
2 Digit ID (if needed)

13 Report To: Name: David G. Boyer
Address: New Mexico Oil Conservation Division
P. O. Box 2088
City, State Zip: Santa Fe, New Mexico 87504-2088

14 Phone #: (505) 827-5812

15 Sample Purpose:
- [ ] Compliance
- [ ] Check
- [x] Monitoring
- [ ] Special

Sampling Information:
- [x] Grab
- [ ] Composite _____ (Composite Time Period)
  - [ ] Flow Proportioned
  - [ ] Equal Aliquot
- [ ] Sample Split w/Permittee
- [ ] Chain of Custody

16 Field Data: pH: 6.5, Conductivity: 350 umhos @ 11 °C, Temperature: _____ °C, Chlorine Residual: _____ mg/l, Flow: _____

17 Sample Source:
- [ ] -Stream
- [ ] -Lake
- [ ] -Drain
- [ ] -Pool
- [ ] -WWTP
- [ ] -Well; Depth: _____
- [ ] -Spring
- [ ] -Distribution
- [x] -Point-of-Entry
- [ ] -Other: _____

18 Field Notes/ Sample #:
T 13 S, R 31 E Sec 34, 12 4

19 Sample Type: [x] -Water, [ ] -Soil, [ ] -Food, [ ] -Wastewater, [ ] -Other _____
This form accompanies a single sample consisting of:
2 - septum vial(s) (volume = 40ml)
_____ - glass jugs (volume = _____)
_____ - _____ (volume = _____)

20 Preservation:
- [ ] -NP No Preservation; Sample stored at room temperature
- [x] -P-Ice Sample stored in an ice bath (Not Frozen)
- [ ] -P-TS Sample Preserved with Sodium Thiosulfate to remove chlorine residual
- [ ] -P-HCl Sample Preserved with Hydrochloric Acid (2 drops/40 ml)
- [ ] -Other _____

21 Analyses Requested: Please check the appropriate box(es) below to indicate the type of analytical screen(s) required. Whenever possible, list specific compounds suspected or required.

Volatile Screens:

- [ ] - (753) Aliphatic Headspace (1-5 Carbons)
- [x] - (754) Aromatic & Halogenated Purgeables (EPA 601 & 602)
- [ ] - (765) Mass Spectrometer Purgeables (EPA 624)
- [ ] - (766) SDWA Total Trihalomethanes (EPA 501.1)
- [ ] - (774) SDWA VOC's I [8 Regulated +] (EPA 502.2)
- [ ] - (775) SDWA VOC's II [EDB & DBCP] (EPA 504)

Other Specific Compounds or Classes:

- [ ] - ( ) _____
- [ ] - ( ) _____
- [ ] - ( ) _____

Semivolatile Screens:

- [ ] - (763) Acid Extractables
- [ ] - (751) Aliphatic Hydrocarbons
- [ ] - (755) Base/Neutral Extractables (EPA 625)
- [ ] - (756) Base/Neutral/Acid Extractables (EPA 8270)
- [ ] - (758) Herbicides, Chlorophenoxy Acid
- [ ] - (759) Herbicides, Triazines
- [ ] - (760) Organochlorine Pesticides
- [ ] - (761) Organophosphate Pesticides
- [ ] - (767) Polychlorinated Biphenyls (PCB's)
- [ ] - (764) Polynuclear Aromatic Hydrocarbons
- [ ] - (762) SDWA Pesticides & Herbicides

Remarks:

STATE OF NEW MEXICO HEALTH AND ENVIRONMENT DEPARTMENT
SCIENTIFIC LABORATORY DIVISION
P.O. Box 4700 700 Camino de Salud, NE
Albuquerque, NM 87196-4700 [505]-841-2500
ORGANIC CHEMISTRY SECTION [505]-841-2570

December 14, 1990

Request ID No. 012065

ANALYTICAL REPORT
SLD Accession No. OR-90-3310

Distribution
(_) User 70320
(■) Submitter 260
(※) SLD Files

To: David Boyer
NM Oil Consv. Div.
State Land Office Bldg.
P.O. Box 2088
Santa Fe, NM 87504-2088

From: Organic Chemistry Section
Scientific Laboratory Div.
700 Camino de Salud, NE
Albuquerque, NM 87106

Re: **A water,Purgeable sample submitted to this laboratory on November 30, 1990**

DEMOGRAPHIC DATA

COLLECTION		*LOCATION*
On: 29-Nov-90	*By:* Boy . . .	House Water Pump House
At: 15:22 hrs.	*In/Near:* Chaves County	

ANALYTICAL RESULTS: Aromatic & Halogenated Purgeable [EPA-601/2] Screen {754}

Parameter	Value	Note	MDL	Units
Halogenated Purgeables (33)	0.00	N	1.00	ppb

See Laboratory Remarks for Additional Information

Notations & Comments:

MDL = Minimal Detectable Level.

A = Approximate Value; N = None Detected above Detection Limit; P = Compound Present, but not quantified;
T = Trace (<Detection Limit); U = Compound Identity Not Confirmed.

Evidentiary Seals: Not Sealed☒; Intact: No☐, Yes☐ & Broken By: _____ Date: _____

Laboratory Remarks:

One late eluting compounds in the C3 substituted benzene region at approximately 3 ppb detected by the photoionization detector, but not identified.

QUALITY CONTROL SUMMARY FOR VOLATILES SCREEN

METHOD BLANK: A laboratory method blank was analyzed along with this sample to assure the absence of interfering contaminants from lab reagents, instruments, or the general laboratory environment. Unless listed below, no contaminants were detected in this blank above the reported detection limit.

COMPOUND DETECTED	CONCENTRATION (PPB)
None detected	

(Continued on page 2.)

SURROGATE RECOVERIES:

SURROGATE	CONCENTRATION	% RECOVERY
Fluorobenzene	25.0 ppb	88.0
2-Bromo-1-chloropropane	15.0 ppb	98.0

SPIKE RECOVERY: The % recoveries for compounds in the batch spike were from 80% to 120% with the exception of the compounds listed below:

COMPOUND	CONCENTRATION	% RECOVERY
Vinyl chloride	25.0 ppb	52.4

Analyst: Gary C. Eden 12/10/90
Gary C. Eden — Analysis Date
Analyst, Organic Chemistry

Reviewed By: Mark Ikers 12/18/90
Richard F. Meyerhein 12/14/90
Supervisor, Organic Chemistry Section

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Analytical Chemistry • Utility Operations • Equipment Sales

01/18/91

Environmental Bureau NM Oil D.
PO Box 2088
Santa Fe, NM 87504

Sample Identification: #9011291522 Caudill House
Collected By: Boyer/OCS
Date & Time Taken: 11/29/90 1522
On Site Data: Caudill House Water

Lab Sample Number: 177418 **Received:** 12/03/90 **Client:** SNM1

PARAMETER	RESULTS	UNITS	TIME	DATE	METHOD	BY
Benzene	<.2	ppb	0800	01/03/91	EPA Method 8020	KB
Ethyl benzene	<.4	ppb	0800	01/03/91	EPA Method 8020	KB
Toluene	<.2	ppb	0800	01/03/91	EPA Method 8020	KB
Xylenes	<.2	ppb	0800	01/03/91	EPA Method 8020	KB
Acrolein	ND(100) *	ug/l	2304	12/19/90	EPA Method 8240	PM
Acrylonitrile	ND(100) *	ug/l	2304	12/19/90	EPA Method 8240	PM
Benzene	ND(4.4) *	ug/l	2304	12/19/90	EPA Method 8240	PM
Bromoform	ND(4.7) *	ug/l	2304	12/19/90	EPA Method 8240	PM
Bromomethane	ND(10) *	ug/l	2304	12/19/90	EPA Method 8240	PM
Carbon Tetrachloride	ND(2.8) *	ug/l	2304	12/19/90	EPA Method 8240	PM
Chlorobenzene	ND(6.0) *	ug/l	2304	12/19/90	EPA Method 8240	PM
Chloroethane	ND(10) *	ug/l	2304	12/19/90	EPA Method 8240	PM
2-Chloroethylvinyl ether	ND(10) *	ug/l	2304	12/19/90	EPA Method 8240	PM
Chloroform	ND(1.6) *	ug/l	2304	12/19/90	EPA Method 8240	PM
Chloromethane	ND(10) *	ug/l	2304	12/19/90	EPA Method 8240	PM
Dibromochloromethane	ND(3.1) *	ug/l	2304	12/19/90	EPA Method 8240	PM

Continued

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PARAMETER	RESULTS	UNITS	TIME	DATE	METHOD	BY
Bromodichloromethane	ND(2.2) *	ug/l	2304	12/19/90	EPA Method 8240	PM
1,1-Dichloroethane	ND(4.7) *	ug/l	2304	12/19/90	EPA Method 8240	PM
1,2-Dichloroethane	ND(2.8) *	ug/l	2304	12/19/90	EPA Method 8240	PM
1,1-Dichloroethene	ND(2.8) *	ug/l	2304	12/19/90	EPA Method 8240	PM
trans-1,2-Dichloroethene	ND(1.6) *	ug/l	2304	12/19/90	EPA Method 8240	PM
1,2-Dichloropropane	ND(6.0) *	ug/l	2304	12/19/90	EPA Method 8240	PM
cis-1,3-Dichloropropene	ND(5.0) *	ug/l	2304	12/19/90	EPA Method 8240	PM
Ethyl benzene	ND(7.2) *	ug/l	2304	12/19/90	EPA Method 8240	PM
Methylene Chloride	ND(2.8) *	ug/l	2304	12/19/90	EPA Method 8240	PM
1,1,2,2-Tetrachloroethane	ND(6.9) *	ug/l	2304	12/19/90	EPA Method 8240	PM
Tetrachloroethene	ND(4.1) *	ug/l	2304	12/19/90	EPA Method 8240	PM
Toluene	ND(6.0) *	ug/l	2304	12/19/90	EPA Method 8240	PM
1,1,1-Trichloroethane	ND(3.8) *	ug/l	2304	12/19/90	EPA Method 8240	PM
1,1,2-Trichloroethane	ND(5.0) *	ug/l	2304	12/19/90	EPA Method 8240	PM
Trichloroethene	ND(1.9) *	ug/l	2304	12/19/90	EPA Method 8240	PM
Vinyl Chloride	ND(10) *	ug/l	2304	12/19/90	EPA Method 8240	PM
trans-1,3-Dichloropropene	ND(10) *	ug/l	2304	12/19/90	EPA Method 8240	PM
Xylenes	ND(10) *	ug/l	2304	12/19/90	EPA Method 8240	PM

* Reported detection limits are EPA published detection limits. Actual limits may vary with matrix.

Quality Assurance for the SET with Sample 177418

Sample #	Description	Result	Units	Dup/Std Value	Spk Conc.	Percent	Time	Date	By

Benzene

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Quality Assurance for the SET with Sample 177418

Sample #	Description	Result	Units	Dup/Std Value	Spk Conc.	Percent	Time	Date	By
	Blank	<5	ppb				0800	01/03/91	KB
	Standard	97	ppb	100		103	0800	01/03/91	KB
177418	Duplicate	<.2	ppb	<.2		100	0800	01/03/91	KB
177418	Spike		ppb		50	117	0800	01/03/91	KB
				Ethyl benzene					
	Blank	<5	ppb				0800	01/03/91	KB
	Standard	109	ppb	100		109	0800	01/03/91	KB
177418	Duplicate	<.4	ppb	<.4		100	0800	01/03/91	KB
177418	Spike		ppb		50	104	0800	01/03/91	KB
				Toluene					
	Blank	<5	ppb				0800	01/03/91	KB
	Standard	104	ppb	100		104	0800	01/03/91	KB
177418	Duplicate	<.2	ppb	<.2		100	0800	01/03/91	KB
177418	Spike		ppb		50	119	0800	01/03/91	KB
				Xylenes					
	Blank	<5	ppb				0800	01/03/91	KB
	Standard	113	ppb	100		112	0800	01/03/91	KB
177418	Duplicate	<.2	ppb	<.2		100	0800	01/03/91	KB
177418	Spike		ppb		50	94	0800	01/03/91	KB

C. H. Whiteside, Ph.D., President

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Analytical Chemistry • Utility Operations • Equipment Sales

03/15/91

Environmental Bureau NM Oil D.
PO Box 2088
Santa Fe, NM 87504

Sample Identification: CIRCLE RIDGE PRODUCTION
Collected By: EWS
Date & Time Taken: 02/01/91
On Site Data: G-34-13-31
Other:
PRODUCTION WATER TRACT 44

Lab Sample Number: 181403 **Received:** 02/11/91 **Client:** SNM1

PARAMETER	RESULTS	UNITS	TIME	DATE	METHOD	BY
Alkalinity	54	mg/l	1100	02/13/91	EPA Method 310.1	BC
Bromide	550	mg/l	1100	03/03/91		ES
Cation-Anion Balance	4800/4700	meq/meq	0800	03/14/91		SK
Carbonate	<.5	mg/l	0900	02/27/91	APHA Method 263	BC
Chloride	165,000	mg/l	0945	02/18/91	EPA Method 325.3	SW
Specific Conductance	>50,000	Micromhos	1020	02/15/91	EPA Method 120.1	GS
Fluoride	<1	mg/l	1315	02/21/91	EPA Method 340.1	GS
Bicarbonate	50	mg/l	0900	02/27/91	APHA Method 263	BC
Sulfate	2000	mg/l	0815	02/19/91	EPA Method 375.4	DG
Total Dissolved Solids	290,000	mg/l	1100	02/25/91	EPA Method 160.1	BC
pH	6.1	SU	1600	02/14/91	EPA Method 150.1	LW
Dissolved Calcium	2800	mg/l	0830	02/15/91	EPA Method 215.1	GK
Dissolved Iron	.47	mg/l	0830	02/15/91	EPA Method 236.1	GK
Dissolved Potassium	2500	mg/l	0830	02/15/91	EPA Method 258.1	GK
Dissolved Magnesium	5200	mg/l	0830	02/15/91	EPA Method 242.1	GK

Continued

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PARAMETER	RESULTS	UNITS	TIME	DATE	METHOD	BY
Dissolved Sodium	96,000	mg/l	0830	02/15/91	EPA Method 273.1	GK

Quality Assurance for the SET with Sample 181403

Sample #	Description	Result	Units	Dup/Std Value	Spk Conc.	Percent	Time	Date	By
				Alkalinity					
	Standard	2088	mg\l	2358		112	1100	02/13/91	BC
181397	Duplicate	210	mg\l	210		100	1100	02/13/91	BC
181397	Spike		mg\l		100	99	1100	02/13/91	BC
181397	Spike		mg\l		100	99	1100	02/13/91	BC
				Bromide					
	Blank	<5	ppm				1100	03/03/91	ES
	Standard	96	ppm	100		104	1100	03/03/91	ES
181403	Duplicate	572	ppm	527		108	1100	03/03/91	ES
				Chloride					
	Standard	70	mg/l	71		101	0945	02/18/91	SW
181594	Duplicate	23	mg/l	23		100	0945	02/18/91	SW
181594	Spike		mg/l		100	100	0945	02/18/91	SW
				Specific Conductance					
	Standard	1423	Micromhos	1413		101	1020	02/15/91	GS
181397	Duplicate	1681	Micromhos	1677		100	1020	02/15/91	GS
				Fluoride					
181397	Spike		mg/l		.5	96	1315	02/21/91	GS
				Sulfate					
	Standard	50	mg/l	50		100	0815	02/19/91	DG
181509	Duplicate	32	mg/l	32		100	0815	02/19/91	DG
181511	Duplicate	47	mg/l	47		100	0815	02/19/91	DG
				Total Dissolved Solids					
	Blank	0.0000	g				1100	02/25/91	BC
	Standard	96	mg/l	100		104	1100	02/25/91	BC
182090	Duplicate	212	mg/l	174		120	1100	02/25/91	BC

I hereby certify that these results were obtained using the methods specified in this report.

C. H. Whiteside, Ph.D., President

ANA-LAB CORP.
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2600 DUDLEY ROAD — KILGORE, TEXAS 75662 — 903/984-0551

Analytical Chemistry • Utility Operations • Equipment Sales

03/15/91

Environmental Bureau NM Oil D.
PO Box 2088
Santa Fe, NM 87504

'91 MAR 19 AM 11 02

OIL CONSERV. ..N DIVISION
RECEIVED

Sample Identification: CIRCLE RIDGE PRODUCTION
Collected By: EWS
Date & Time Taken: 02/01/91
On Site Data: D-26-13-31
Other:
INJECTING WATER DRICKY QUEEN UNIT.

Lab Sample Number: 181402 **Received:** 02/11/91 **Client:** SNM1

PARAMETER	RESULTS	UNITS	TIME	DATE	METHOD	BY
Alkalinity	65	mg/l	1100	02/13/91	EPA Method 310.1	BC
Bromide	950	mg/l	1100	03/03/91		ES
Cation-Anion Balance	4970/5130	meq/meq	0800	03/14/91		SK
Carbonate	<.5	mg/l	0900	02/27/91	APHA Method 263	BC
Chloride	180,000	mg/l	0945	02/18/91	EPA Method 325.3	SW
Specific Conductance	>50,000	Micromhos	1020	02/15/91	EPA Method 120.1	GS
Fluoride	<1	mg/l	1315	02/21/91	EPA Method 340.1	GS
Bicarbonate	60	mg/l	0900	02/27/91	APHA Method 263	BC
Sulfate	2000	mg/l	0815	02/19/91	EPA Method 375.4	DG
Total Dissolved Solids	280,000	mg/l	1100	02/25/91	EPA Method 160.1	BC
pH	6.2	SU	1600	02/14/91	EPA Method 150.1	LW
Dissolved Calcium	3000	mg/l	0830	02/15/91	EPA Method 215.1	GK
Dissolved Iron	.46	mg/l	0830	02/15/91	EPA Method 236.1	GK
Dissolved Potassium	2200	mg/l	0830	02/15/91	EPA Method 258.1	GK
Dissolved Magnesium	5000	mg/l	0830	02/15/91	EPA Method 242.1	GK

Continued

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181402 Continued

PARAMETER	RESULTS	UNITS	TIME	DATE	METHOD	BY
Dissolved Sodium	100,000	mg/l	0830	02/15/91	EPA Method 273.1	GK

Quality Assurance for the SET with Sample 181402

Sample #	Description	Result	Units	Dup/Std Value	Spk Conc.	Percent	Time	Date	By
				Alkalinity					
	Standard	2088	mg\l	2358		112	1100	02/13/91	BC
181397	Duplicate	210	mg\l	210		100	1100	02/13/91	BC
181397	Spike		mg\l		100	99	1100	02/13/91	BC
181397	Spike		mg\l		100	99	1100	02/13/91	BC
				Bromide					
	Blank	<5	ppm				1100	03/03/91	ES
	Standard	96	ppm	100		104	1100	03/03/91	ES
181403	Duplicate	572	ppm	527		108	1100	03/03/91	ES
				Chloride					
	Standard	70	mg/l	71		101	0945	02/18/91	SW
181594	Duplicate	23	mg/l	23		100	0945	02/18/91	SW
181594	Spike		mg/l		100	100	0945	02/18/91	SW
				Specific Conductance					
	Standard	1423	Micromhos	1413		101	1020	02/15/91	GS
181397	Duplicate	1681	Micromhos	1677		100	1020	02/15/91	GS
				Fluoride					
181397	Spike		mg/l		.5	96	1315	02/21/91	GS
				Sulfate					
	Standard	50	mg/l	50		100	0815	02/19/91	DG
181509	Duplicate	32	mg/l	32		100	0815	02/19/91	DG
181511	Duplicate	47	mg/l	47		100	0815	02/19/91	DG
				Total Dissolved Solids					
	Blank	0.0000	g				1100	02/25/91	BC
	Standard	96	mg/l	100		104	1100	02/25/91	BC
182090	Duplicate	212	mg/l	174		120	1100	02/25/91	BC

I hereby certify that these results were obtained using the methods specified in this report.

C. H. Whiteside

C. H. Whiteside, Ph.D., President

ANA-LAB CORP.
THE COMPLETE SERVICE LAB

2600 DUDLEY ROAD — KILGORE, TEXAS 75662 — 903/984-0551

Analytical Chemistry • Utility Operations • Equipment Sales

01/18/91

Environmental Bureau NM Oil D.
PO Box 2088
Santa Fe, NM 87504

Sample Identification: #9011281240 Field Blank
Collected By: Boyer/OCS
Date & Time Taken: 11/28/90 1240

Lab Sample Number: 177415 **Received:** 12/03/90 **Client:** SNM1

PARAMETER	RESULTS	UNITS	TIME	DATE	METHOD	BY
Benzene	<.2	ppb	0800	01/03/91	EPA Method 8020	KB
Ethyl benzene	<.4	ppb	0800	01/03/91	EPA Method 8020	KB
Toluene	<.2	ppb	0800	01/03/91	EPA Method 8020	KB
Xylenes	<.2	ppb	0800	01/03/91	EPA Method 8020	KB
Acrolein	ND(100) *	ug/l	2221	12/19/90	EPA Method 8240	PM
Acrylonitrile	ND(100) *	ug/l	2221	12/19/90	EPA Method 8240	PM
Benzene	ND(4.4) *	ug/l	2221	12/19/90	EPA Method 8240	PM
Bromoform	ND(4.7) *	ug/l	2221	12/19/90	EPA Method 8240	PM
Bromomethane	ND(10) *	ug/l	2221	12/19/90	EPA Method 8240	PM
Carbon Tetrachloride	ND(2.8) *	ug/l	2221	12/19/90	EPA Method 8240	PM
Chlorobenzene	ND(6.0) *	ug/l	2221	12/19/90	EPA Method 8240	PM
Chloroethane	ND(10) *	ug/l	2221	12/19/90	EPA Method 8240	PM
2-Chloroethylvinyl ether	ND(10) *	ug/l	2221	12/19/90	EPA Method 8240	PM
Chloroform	ND(1.6) *	ug/l	2221	12/19/90	EPA Method 8240	PM
Chloromethane	ND(10) *	ug/l	2221	12/19/90	EPA Method 8240	PM
Dibromochloromethane	ND(3.1) *	ug/l	2221	12/19/90	EPA Method 8240	PM
Bromodichloromethane	ND(2.2) *	ug/l	2221	12/19/90	EPA Method 8240	PM

Continued

ANA-LAB CORP.
THE COMPLETE SERVICE LAB

2600 DUDLEY ROAD — KILGORE, TEXAS 75662 — 903/984-0551

Analytical Chemistry • Utility Operations • Equipment Sales

PARAMETER	RESULTS	UNITS	TIME	DATE	METHOD	BY
1,1-Dichloroethane	ND(4.7) *	ug/l	2221	12/19/90	EPA Method 8240	PM
1,2-Dichloroethane	ND(2.8) *	ug/l	2221	12/19/90	EPA Method 8240	PM
1,1-Dichloroethene	ND(2.8) *	ug/l	2221	12/19/90	EPA Method 8240	PM
trans-1,2-Dichloroethene	ND(1.6) *	ug/l	2221	12/19/90	EPA Method 8240	PM
1,2-Dichloropropane	ND(6.0) *	ug/l	2221	12/19/90	EPA Method 8240	PM
cis-1,3-Dichloropropene	ND(5.0) *	ug/l	2221	12/19/90	EPA Method 8240	PM
Ethyl benzene	ND(7.2) *	ug/l	2221	12/19/90	EPA Method 8240	PM
Methylene Chloride	ND(2.8) *	ug/l	2221	12/19/90	EPA Method 8240	PM
1,1,2,2-Tetrachloroethane	ND(6.9) *	ug/l	2221	12/19/90	EPA Method 8240	PM
Tetrachloroethene	ND(4.1) *	ug/l	2221	12/19/90	EPA Method 8240	PM
Toluene	ND(6.0) *	ug/l	2221	12/19/90	EPA Method 8240	PM
1,1,1-Trichloroethane	ND(3.8) *	ug/l	2221	12/19/90	EPA Method 8240	PM
1,1,2-Trichloroethane	ND(5.0) *	ug/l	2221	12/19/90	EPA Method 8240	PM
Trichloroethene	ND(1.9) *	ug/l	2221	12/19/90	EPA Method 8240	PM
Vinyl Chloride	ND(10) *	ug/l	2221	12/19/90	EPA Method 8240	PM
trans-1,3-Dichloropropene	ND(10) *	ug/l	2221	12/19/90	EPA Method 8240	PM
Xylenes	ND(10) *	ug/l	2221	12/19/90	EPA Method 8240	PM

* Reported detection limits are EPA published detection limits. Actual limits may vary with matrix.

Quality Assurance for the SET with Sample 177415

Sample #	Description	Result	Units	Dup/Std Value	Spk Conc.	Percent	Time	Date	By
			Benzene						
	Blank	<5	ppb				0800	01/03/91	KB
	Standard	97	ppb	100		103	0800	01/03/91	KB

ANA-LAB CORP.
THE COMPLETE SERVICE LAB

2600 DUDLEY ROAD — KILGORE, TEXAS 75662 — 903/984-0551

Analytical Chemistry • Utility Operations • Equipment Sales

Quality Assurance for the SET with Sample 177415

Sample #	Description	Result	Units	Dup/Std Value	Spk Conc.	Percent	Time	Date	By
177418	Duplicate	<.2	ppb	<.2		100	0800	01/03/91	KB
177418	Spike		ppb		50	117	0800	01/03/91	KB
				Ethyl benzene					
	Blank	<5	ppb				0800	01/03/91	KB
	Standard	109	ppb	100		109	0800	01/03/91	KB
177418	Duplicate	<.4	ppb	<.4		100	0800	01/03/91	KB
177418	Spike		ppb		50	104	0800	01/03/91	KB
				Toluene					
	Blank	<5	ppb				0800	01/03/91	KB
	Standard	104	ppb	100		104	0800	01/03/91	KB
177418	Duplicate	<.2	ppb	<.2		100	0800	01/03/91	KB
177418	Spike		ppb		50	119	0800	01/03/91	KB
				Xylenes					
	Blank	<5	ppb				0800	01/03/91	KB
	Standard	113	ppb	100		112	0800	01/03/91	KB
177418	Duplicate	<.2	ppb	<.2		100	0800	01/03/91	KB
177418	Spike		ppb		50	94	0800	01/03/91	KB

Bill Reey

C. H. Whiteside, Ph.D., President

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

BRUCE KING
GOVERNOR

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87504
(505) 827-5800

August 7, 1991

Mr. Robert Love, Attorney
P. O. Box 1099
Hobbs, New Mexico 88240

RE: CAUDILL RANCH GROUND WATER INVESTIGATION

Dear Mr. Love:

Enclosed for your use is the final report on our Caudill Ranch Ground Water Investigation. I appreciate your patience during the past several weeks while I was completing the report.

As I previously told you by phone, the water quality results show calcium chloride versus sodium chloride contamination. The former is not associated with oil well salt water production or disposal activities, but may be due to improper handling or disposal of common oil field chemicals by a service company. The specific circumstances relating to spill location, date, and responsible party remain unknown, but I believe the discharge occurred in the drainageway adjacent to the ranch road between the cattleguard and the top of the caprock.

If you have any questions on the report, or if you need further information, please contact me at 827-5812.

Sincerely,

David G. Boyer, Hydrogeologist
Environmental Bureau Chief

DGB/sl

Attachment

cc: E. P Caudill (w/report)
Ken Fresquez, State Engineer Office Roswell (w/report)
Sandra Porenta, BLM - Roswell (w/report)

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

'91 JAN 4 AM 9 10

GARREY CARRUTHERS
GOVERNOR

January 2, 1991

POST OFFICE BOX 1980
HOBBS, NEW MEXICO 88241-1980
(505) 393-6161

Bureau of Land Management
Roswell Resource Area
P.O. Box 1857
Roswell, NM 88202

Attn: Sandra Porenta

Dear Ms. Porenta:

The Oil Conservation Division ran bradenhead surveys on all wells within a 1 mile radius from the contaminated well and found 1 bad well. The LaRue & Muncy (attached is a map showing what area was tested). This well has been shut in for sometime because of problems.

During the past years pressure tests were run on the injection wells in the area. This is where the problem on 34-2 was found while it was determined the packer was holding, the casing did have problems and was repaired as your letter indicated.

The new T.A. program will eventually take care of the wells such as the LaRue & Muncy well, which will eliminate a lot of speculation on problems.

Dave Boyer a Hydrologist and Bureau Chief of our Environmental Bureau is now doing a study of the area and will be in charge of the problem. I have sent him a copy of your letter and we went ahead and tested all wells including Federal wells within a 2 mile radius of the contaminated well.

We greatly appreciate your cooperation with this problem.

Yours very truly,

JERRY SEXTON
District I Supervisor

JS/sad

cc: Mr. Caudill
Dave Boyer

Enclosure

OIL CONSERVATION DIVISION
BRADENHEAD TEST SCHEDULE

OPERATOR: GROVER-MCKINNEY OIL CO. Number of wells to be tested 2

Meet OCD Field Inspector at: 9:30 am November 15, 1990
At the Caudill SWD #1-C, 34-13-31

Wells to be tested:

LEASE	WELL #	S-T-R	PRESS LIMIT
Caudill SWD	1-C	34-13-31	574
Caudill	2-D	"	

Steve Painter--Pumper 915-683-4215

OIL CONSERVATION DIVISION
BRADENHEAD TEST SCHEDULE

OPERATOR: LARUE & MUNCY Number of wells to be tested 4

Meet OCD Field Inspector at: 1:ØØ PM November 15, 199Ø

Wells to be tested:

LEASE	WELL #	S-T-R	PRESS LIMIT
Federal V	1-P	34-13-31	
"	2-O	"	
"	3-J	"	
"	4-I	"	

Phone 746-6651

OIL CONSERVATION DIVISION

BRADENHEAD TEST SCHEDULE

OPERATOR: DAKOTA RESOURCES INC. Number of wells to be tested 4

Meet OCD Field Inspector at: 10:30 AM, November 15, 1990

At your Wakan Tanka Federal Tank Battery

Wells to be tested:

LEASE	WELL #	S-T-R	PRESS LIMIT
Wakan Tanka Federal	1-N	27-13-31	
"	2-M	"	
"	3-K	"	
"	4-L	"	

Steve Painter--Pumper 915-687-0501

OIL CONSERVATION DIVISION
BRADENHEAD TEST SCHEDULE

OPERATOR: CIRCLE RIDGE PROD CO. Number of wells to be tested 36

Meet OCD Field Inspector at: _____

Wells to be tested:

LEASE	WELL #	S-T-R	PRESS LIMIT
Drickey Qu Ut Tr 6	16-F	3-14-31	
"	18-C	"	
"	20-B	"	
"	24-D	"	
" Tr 12	1-H	33-13-31	
" Tr 13	1-N	34-13-31	
"	2-M	"	
"	3-L	"	
"	4-K	"	
"	5-I	33-13-31	
"	6-J	"	
"	7-P	"	
"	8-O	"	
" Tr 37	2-E	35-13-31	
Rock Queen Ut Sec 26	3-C	26-13-31	
"	4-D	"	
"	5-E	"	
"	6-F	"	
"	11-K	"	
"	12-L		
"	13-M	"	
"	14-N	"	
" Sec 27	1-A	27-13-31	
"	3-C	"	
"	7-G	"	
"	9-J	"	
"	15-O	"	
"	16-P	"	

Rock Qu Ut	Sec 34	1-A	34-13-31
"		2-B	"
"		5-E	"
"		6-F	"
"		7-G	"
"		8-H	"
"	Sec 35	3-C	35-13-31
"		4-D	"

GENERAL INFORMATION

Mr. Caudill came into our office on Tuesday, October 30, complaining about a water well which had high chlorides and was bad.

A copy of the water analysis from the State Engineer's Office showed 2622 ppm Cl. In addition, a copy of lab results obtained from the EID office showed high bacteria in the well. Copies of both are within.

The location of the water well is just below the Caprock Area in Sec.34-T13S-R31E, Chaves County. The well is approximately 150 yards SE of Grover McKinney Oil Co. - Caudill SWD #1, NE/NW Sec.34-T13S-R31E (SWD #359). No water analyses were obtained for application.

The house well is located approximately 50 yards to the NE of the bad water well, which is located in the corral and used for livestock.

> Well #1 - House well was drilled with water well rig, cased properly and is powered by a windmill.
>
> Well #2 - Bad well; was an old hand-dug well, with only short conductor pipe and 10 to 15 ft. in diameter at base. Both wells are 65 to 70 ft. deep.

Well #2 is powered by both windmill and submergible pump. Due to the limited amount of water in the area the submergible pump will pump off in approximately 3 hours and take 5 to 6 hours to regenerate, pumping at a rate of approximately 1/2 gallon per minute.

These water wells are located within oil producing area, with production and water injection on all sides. Four companies operate within 1 mile of this area - Circle Ridge, LaRue & Muncy, Dakota Resources, and Grover McKinney Oil Co. A map was constructed of the area, and wells were prepared for bradenhead tests, testing all wells within 1 mile of the area. Bradenhead tests were run on the 15th, 16th and 20th of November, with no bad wells encountered.

The well is located in the corral and down gradient from the house - approximately 40 yards. The house is said to have two cesspools.

The water system for the house and livestock are also connected to two wells on top of the Caprock - one with a windmill and one with a submergible pump. The water there tested good. Considering the low volumes of water, it takes all wells to maintain 180 head of cattle.

Enclosed is: a copy of map, list of Chlorides, and copies of analyses from EID and State Engineer.

WATER ANALYSIS - CAUDILL
Sec.34-T13S-R31E

1985	State Engineer tested house well only. 50 mg/L Cl	
10/31/90	House Well Stock Well	99.4 ppm Cl 1562 ppm Cl
11/1/90	Stock Well	1695 ppm Cl Hobbs City Lab Nitrates 8.8 mg/L
11/5/90	Stock Well Pump well over the weekend.	6035 ppm Cl
11/13/90	(While pumping well) Stock Well 11:20 AM 2:15 PM	 2343 ppm Cl 1562 ppm Cl
11/14/90	(While pumping well) Stock Well 10:15 AM 2:40 PM	 2769 ppm Cl 3195 ppm Cl
11/16/90	Stock Well Water well in Sec. 35 approx. 1 mile East 85.2 ppm Cl on top of Caprock.	2059 ppm Cl
11/19/90	Stock Well Nitrates Bacteria Count	1740 ppm Cl 4.2 mg/L 7200 Non-coloform/3 coloform

HOBBS CITY LAB

10/24/90	State Engineer Office Analysis	2622 ppm Cl
10/15/90	Copies of EID analysis and recommendations to treat well.	

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

MEMORANDUM OF MEETING OR CONVERSATION

☑ Telephone ☐ Personal	Time 1015	Date 11/27/90

Originating Party	Other Parties
Bill Olson - OCD Santa Fe	Eddie Seay - OCD Hobbs

Subject

E.P. Cottel Ranch Ground Water Contamination

Discussion

Eddie has been testing water almost every day, Bacterial count in in water high, Cl^- ≈ 1500 - 1700 mg/l
Cottels have been in ongoing legal actions against Circle Ridge for 5 yrs. Circle Ridge has water rights up on caprock and supplies water for 5 ranches

E.P. Cottel well location sec 34 T 13S R31E unit E

Conclusions or Agreements

Dave Boyer will meet with him at Hobbs office Thurs. morning 11/29/90. Eddie said he would go to site with Dave

Distribution

Signed Bill Olson

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

MEMORANDUM OF MEETING OR CONVERSATION

☑ Telephone ☐ Personal | Time | Date 11/15/90

Originating Party: Bill Olson – OCD Santa Fe

Other Parties: Mrs. Cottel (Ranch) 676-4472 Hom 392-5676

Subject: E.P. Cottel Ranch Ground Water Contamination

Discussion: Discussed contamination of stock well.
Chloride in well = 50 mg/l in 1985
" " " = 2622 mg/l in 1990
Specific conductivity = 7890 micromhos/cm " "
They believe Circle Ridge injection well responsible. She was told well was shut down by OCD this last year cause well was leaking at 200' depth. Injection well is up on caprock above them. There is also a production well in the area. The injection well has since been reworked and put back in service. I told her that Phyllis Boyer would contact them the week of 11/26 and meet with them onsite to investigate. I told her that past agreements btw Circle Ridge and Cottels are private agreements over which OCD has no authority. I suggested that Cottels work with Circle Ridge on water supply. She stated that they also have a well 150' away from contamination well that is OK. They are currently running both well water on ground hoping that other well doesn't get contaminated

Conclusions or Agreements

Distribution

Signed: Bill Olson

DGB

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

MEMORANDUM OF MEETING OR CONVERSATION

☑ Telephone ☐ Personal	Time	Date 11/14/90

Originating Party	Other Parties
Bill Olson - OCD Santa Fe	E.P. Cottel - Ranch owner (Ranch) 676-4472 (Home) 392-5676

Subject

E.P. Cottel Ranch Ground Water Contamination

Discussion

No answer

Conclusions or Agreements

Distribution

Signed Bill Olson

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

MEMORANDUM OF MEETING OR CONVERSATION

☑ Telephone ☐ Personal	Time	Date 11/14/90

Originating Party	Other Parties
Rep. Earlene Roberts 396-5354	Bill Olson - OCD Santa Fe

Subject

E.P. Cottel Ranch Ground Water Contamination

Discussion

Problem with high chloride in E.P. Cottel Ranch stock well off the caprock. E.P. Cottel believes Circle Ridge Oil Co. injection well is responsible. Chloride in well = 2622 mg/l as measured by SEO and OCD (Eddie). Well was ok in past

In the past Circle Ridge has provided water to ranch, but the ranch currently gets no water from them. She requested OCD to make Circle Ridge supply them with water.
I told her that unless it has been proved that Circle Ridge injection well has contaminated the well OCD cannot make them supply water. Past water supply was a private agreement btw Circle Ridge + E.P. Cottel and OCD has no authority over it. Dave Boyer will investigate week of 10/26. He will call Mr. Cottel prior to site visit. I will call ASAP to talk with Cottels

Conclusions or Agreements

E.P. Cottel (Ranch) 676-4472 Ranch Foreman - Ron Kenemore
(Home) 392-5676

Distribution

DGB

Signed Bill Olson

NEW MEXICO
HEALTH AND ENVIRONMENT
DEPARTMENT

1190 St. Francis Drive
Santa Fe, New Mexico 87503

ENVIRONMENTAL IMPROVEMENT DIVISION
James Murray State Office Building
2120 N. Alto Drive
Hobbs, NM 88240
(505) 397-5250

GARREY CARRUTHERS
Governor

DENNIS BOYD
Secretary

MICHAEL J. BURKHART
Deputy Secretary

TO WHOM IT MAY CONCERN:

Interpretation of laboratory results of #90-5-0 Well #1 ML Ranch, Lea Co. Taken 10/15/90

Based on criteria specified out in the New Mexico Regulations Governing Water Supplies by personnel of the Environmental Improvement Division.

☑ Coliform bacteria count of sample complies with the regulations.

☐ Excessive coliform bacteria count of sample does not comply with the regulations. Please contact local EID office.*

☐ Not valid, please contact local EID office.*

William D. Hale 11/20/90
NAME DATE

*Environmental Improvement Division
2120 N. Alto St.
Hobbs, NM 88240
(505) 397-5250

NEW MEXICO
HEALTH AND ENVIRONMENT
DEPARTMENT

1190 St. Francis Drive
Santa Fe, New Mexico 87503

ENVIRONMENTAL IMPROVEMENT DIVISION
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(505) 397-5250

GARREY CARRUTHERS
Governor

DENNIS BOYD
Secretary

MICHAEL J. BURKHART
Deputy Secretary

TO WHOM IT MAY CONCERN:

Interpretation of laboratory results of 90-06 Well #2 ML Ranch Lea Co taken 10/15/90

Based on criteria specified out in the New Mexico Regulations Governing Water Supplies by personnel of the Environmental Improvement Division.

☐ Coliform bacteria count of sample complies with the regulations.

☑ Excessive coliform bacteria count of sample does not comply with the regulations. Please contact local EID office.*

☐ Not valid, please contact local EID office.*

William D. Hale 11/20/90
NAME DATE

*Environmental Improvement Division
2120 N. Alto St.
Hobbs, NM 88240
(505) 397-5250

City of Hobbs
300 N Turner
Hobbs, NM 88240

MICROBIOLOGICAL WATER REPORT

RECEIVED
OCT 15 1990
CITY OF HOBBS N.M.
UTILITIES
W.W.T.P.

RECEIVE
OCT 16 1990
HOBBS OFFICE

Time Test Started 1:30 Date OCT 15 1990

Time Test Ended 1:25 Date OCT 16 1990

SAMPLE IDENTIFICATION

Quality Control No.	County
9060	LEA
Water Supply System Name	**WSS Code No.**
ML RANCH	

COLLECTION INFORMATION

Date Collected Mo. Day Yr.	Time Collected	Collected By
10-15-90	8:00 AM	RONNIE KENEMORE

Collection Point: E.P. Caudill, Inc ML Corral Windmill Well #2

TYPE OF SYSTEM

Check One

- [ ] Public Non-Community
- [ ] Swimming Pool
- [ ] Public Community
- [x] Private Well

Disinfected [ ] Yes [ ] No

Residual: _____ mg/l (required for fecal test)

REASON FOR SAMPLING

Check One

- [ ] Routine Sample
- [x] Special Sample
- [ ] Check Sample
- [ ] Monitor Sample

TESTING REQUIRED

Check One

- [x] Potability (MF)-Sample required for Safe Drinking Water Act
- [ ] MPN

RESULTS OF COLIFORM TESTING

Coliform per 100 ml

TEST	Presumptive 24 hrs	Confirmed 48 hrs	Completed 48-72 hrs
MF	36		
MPN			

Non-Coliform per 100 ml

non-coliforms 41 colonies

FOR INTERPRETATION OF RESULTS PLEASE CALL THE ENVIRONMENTAL IMPROVEMENT DIVISION AT 397-5250.

Bacteriologist

[ ] Unsatisfactory Sample

SEND REPORT AND BILL TO THE FOLLOWING

NAME E. P CAUDILL, INC

COMPANY _____

ADDRESS EAST STAR RT BOX 205
LOVINGTON, N.M. 88260

A FEE OF $10.00 PLUS TAX IS CHARGED FOR EACH TEST.

OFFICE USE ONLY

LAB WORK

SAMPLE ID Field Cudill Ranch

DATE SAMPLED 11-19-90 TIME SAMPLED 8:30

SAMPLED BY Eddie Seay
State Oil Com

RECEIVED BY RB DATE 11-19-90 TIME AM

REPORT TO Eddie Seay

ANALYTE	RESULTS
Chlorides	1740 mg/L
Nitrate	4.2 mg/L
Bacteria Count	7200 Non-coliform / 3 coliform

IF YOU HAVE ANY QUESTIONS LET ME KNOW.

ROZ

STATE OF NEW MEXICO

STATE ENGINEER OFFICE

Carl L. Slingerland
STATE ENGINEER

ROSWELL

1900 W. 2nd
DISTRICT II
ROSWELL, NEW MEXICO 88202

622-6521

October 29, 1990

E. P. Caudill
East Star Route, Box 205
Lovington, New Mexico 88260

Dear Mr. Caudill:

Please be advised that the analysis of water sample collected from your well has yielded the following results:

LOCATION	CHLORIDE CONTENT (p.p.m.)	SPECIFIC CONDUCTANCE (mic.at 25C)	DATE COLLECTED
13.31.34.12423 1 NW¼SW¼NE¼SE¼NE¼NW¼	2622	7890	10-24-90

The total dissolved solids content of the above cited water sample can be approximated by multiplying the specific(electrical) condutance by 0.65. Chloride content results may be expressed as mg/L sodium chloride by multiplying the mg/L chloride by 1.65.

Very truly yours,

Ken Fresquez by LC

Ken Fresquez
Field Engineering Unit

KF/lc
cc: Santa Fe

E.P. Caudill - owner
East Star Route, Box 205
Lovington 88260
392-5676

Ron Kenmore - foreman
676-4472
Box 101
Maljamar 88264

~~Eddie Joe~~
Ken Pressley 622-6521
Mary Nunley

Stock well - bad 1½ yrs ago

Which wells Tested by SEO

"Hand dug well" - 80 yrs old (at least) Here in 1910
~~Seventy~~ 76 ft deep
5 ft wide on surface
50 ft corrugated casing - then open hole. 4 ft saturated Thickness at bottom.

Lower stock well - Tower in place.
Drilled appox 1975 - Not used, little water

Covered well - by cattle guard
50 yrs (?) old

Openhole well - 6 ft north of pumphouse

House windmill - connected to caprock water - one well at highway, 2nd well, Jay Tuck's land.

Stock well - Section 35 187 ft deep
State Eng measured 11/28/62

① Stock Well
TD ≈ 65 + 0.77 = 66 ft
measuring point - South End of concrete casing top
Hold 62.00 63.00
1.94 2.94
901128 1440 C/A
Sp. 2900 @ 16.5 pH 6.5
Salty when pumped steady
a little so when first turned on

② Cattle Guard Well
Well 75 ft W of CG, 3' N. of fence
TD - 75.92
MP - North End of casing
Hold 73.00 70.00
6.28 3.28
DTW 66.72 66.72

94.5' Stockwell to C.G Well
901129 1427 C/A
Sp. cond 9000 @ 17.5
pH 6.5 C/A

③ Lower Corral Well
146.4 ft Stockwell to LCW
901129 1445 C/A
MP - west end of casing
TD 60.2 + .77 = 60.97
Hold 55.00 56.00
1.83 2.82
Sp cond 550 @ 16.5 pH 6.5

④ Old House Well (concrete pad, open) pH 6.5
901129 ~~1400~~ 1525 Sp. cond 430 @ 15.5, C/A
TD = 77.48 + .77
Hold 73.00 75.00 76.00
1.22 3.22 4.20
MP - North end of casing Stovepipe
219.1 ft to Stockwell

⑤ House Wind Mill - Dry Hose
901129 1507 C/A No Sample

⑥ Caudill Top Water
901129 1513 C/A
350 μmhos @ 11°C, pH 6.5

⑦ Caudill House Well - VOA
901129 1522 - Sample from Tap in well house ~~bottom~~ bottom of pressure tank

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

...ON DIVISION
...VED

'90 DEC 3 AM 9 27

LABORATORY SAMPLE RECORD

Analysis Received 1/28/91 AWB

PROJ. NO.	PROJECT NAME
	S.E. NM

SAMPLERS: (Signature)
Boyer/OCD

DATE	TIME	STATION LOCATION	NO. OF CONTAINERS	VOA-Collect	Cation/Anion	Heavy Metals				REMARKS
9/11/28	1010	Hood 901128 1010	3	X	X	X				
9/11/28	1150	Ballard #2 901128 1150	3	X	X	X				
9/11/28	1235	Ballard #3 901128 1235	3	X	X	X				
9/11/28	1055	Smart 901128 1055	3	X	X	X				
9/11/28	1240	Blank 901128 1240	1	X						
9/11/28	1625	Jennings 901128 1625	1		X					
9/11/28	1545	Wood Pond 901128 1545	1		X					
9/11/29	1522	Caudill House 901129 1522	1	X						
9/11/29	1513	Caudill Top 901129 1513	1		X					
9/11/29	1525	Caudill o/b House 901129 1525	1		X					
9/11/29	1451	Caudill Lower Corral 901129 1451	1		X					
9/11/29	1427	Caudill Cattle Guard 901129 1427	1		X					
9/11/29	1440	Caudill Stockwell 901129 1440	1		X					

Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)

: (Signature)

SEALS INTACT ☐ YES ☐ NO

: (Signature)

Date / Time

Remarks

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

LABORATORY SAMPLE RECORD

PROJ. NO.	PROJECT NAME	NO. OF CONTAINERS	VOC	CATION	HM	REMARKS
SAMPLERS: (Signature) DAVID BOYER						
DATE TIME	STATION LOCATION					
901129 1427	Caudill Cattle Guard Well 1	1	X	X		
1522	Caudill House Water	2	X	X		
901128 1150	Bolton Well #2	4	X	X	✓	
1235	" Well #3	4	X	X	✓	

Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)

SEALS INTACT ☐ YES ☐ NO

: (Signature)

: (Signature)

Date / Time

Remarks

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

Snml

LABORATORY SAMPLE RECORD

PROJ. NO.	PROJECT NAME	SAMPLERS: (Signature)	DATE	TIME	STATION LOCATION	NO. OF CONTAINERS	VOA-Cations/Anions	Cations/Anions	Heavy Metals	VOA	MET	REMARKS
	S.E. NM	Boyer/OCD	9/11/28	1010	Hood 901128 1010	3	X	X	X			177411
			9/11/28	1150	Ballard #2 901128 1150	3	X	X	X			177412
			9/11/28	1235	Ballard #3 901128 1235	3	X	X	X			177413
			9/11/28	1055	Smart 901128 1055	3	X	X	X			177414
			9/11/28	1240	Blant 901128 1240	1	X					177415
			9/11/28	1625	Jennings 901128 1625	1 ?		X				177416
			9/11/28	1545	Wood Pond 901128 1545	1 ?		X				177417
			9/11/29	1522	Caudill House 901129 1522	1	X					177418
			9/11/29	1513	Caudill Top 901129 1513	1 ?		X				177419
			9/11/29	1525	Caudill old House 901129 1525	1 ?		X				177420
			9/11/29	1451	Caudill Lower Corral 901129 1451	1 ?		X				177421
			9/11/29	1427	Caudill Cattle Guard 901129 1427	1 ?		X				177422
			9/11/29	1440	Caudill Stockwell 901129 1440	1 ?		X				177423

Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)
		Janice Branch

SEALS INTACT ☑ YES ☐ NO

: (Signature)

: (Signature)

Date / Time: 12/3/90

Remarks

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

ANA-LAB CORP.
THE COMPLETE SERVICE LAB

2600 DUDLEY ROAD — KILGORE, TEXAS 75662 — 903/984-0551

Analytical Chemistry • Utility Operations • Equipment Sales

03/14/91

Environmental Bureau NM Oil D.
PO Box 2088
Santa Fe, NM 87504

Sample Identification: CIRCLE RIDGE PRODUCTION
Collected By: EWS
Date & Time Taken: 02/01/91
On Site Data: G-34-13-31
Other:
PRODUCTION WATER TRACT 44

Lab Sample Number: 181403 **Received:** 02/11/91 Client: SNM1

PARAMETER	RESULTS	UNITS	TIME	DATE	METHOD	BY
Alkalinity	54	mg/l	1100	02/13/91	EPA Method 310.1	BC
Bromide	550	mg/l	1100	03/03/91		ES
Cation-Anion Balance	4800/4700	meq/meq	0800	03/14/91		SK
Carbonate	<.5	mg/l	0900	02/27/91	APHA Method 263	BC
Chloride	165,000	mg/l	0945	02/18/91	EPA Method 325.3	SW
Specific Conductance	>50,000	Micromhos	1020	02/15/91	EPA Method 120.1	GS
Fluoride	<1	mg/l	1315	02/21/91	EPA Method 340.1	GS
Bicarbonate	50	mg/l	0900	02/27/91	APHA Method 263	BC
Sulfate	2000	mg/l	0815	02/19/91	EPA Method 375.4	DG
Total Dissolved Solids	290,000	mg/l	1100	02/25/91	EPA Method 160.1	BC
pH	6.1	SU	1600	02/14/91	EPA Method 150.1	LW
Dissolved Calcium	2800	mg/l	0830	02/15/91	EPA Method 215.1	GK
Dissolved Iron	.47	mg/l	0830	02/15/91	EPA Method 236.1	GK
Dissolved Potassium	2500	mg/l	0830	02/15/91	EPA Method 258.1	GK
Dissolved Magnesium	5200	mg/l	0830	02/15/91	EPA Method 242.1	GK

Continued

ANA-LAB CORP.
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2600 DUDLEY ROAD — KILGORE, TEXAS 75662 — 903/984-0551

Analytical Chemistry • Utility Operations • Equipment Sales

PARAMETER	RESULTS	UNITS	TIME	DATE	METHOD	BY
Dissolved Sodium	96,000	mg/l	0830	02/15/91	EPA Method 273.1	GK

Quality Assurance for the SET with Sample 181403

Sample #	Description	Result	Units	Dup/Std Value	Spk Conc.	Percent	Time	Date	By
				Alkalinity					
	Standard	2088	mg\l	2358		112	1100	02/13/91	BC
181397	Duplicate	210	mg\l	210		100	1100	02/13/91	BC
181397	Spike		mg\l		100	99	1100	02/13/91	BC
181397	Spike		mg\l		100	99	1100	02/13/91	BC
				Bromide					
	Blank	<5	ppm				1100	03/03/91	ES
	Standard	96	ppm	100		104	1100	03/03/91	ES
181403	Duplicate	572	ppm	527		108	1100	03/03/91	ES
				Chloride					
	Standard	70	mg/l	71		101	0945	02/18/91	SW
181594	Duplicate	23	mg/l	23		100	0945	02/18/91	SW
181594	Spike		mg/l		100	100	0945	02/18/91	SW
				Specific Conductance					
	Standard	1423	Micromhos	1413		101	1020	02/15/91	GS
181397	Duplicate	1681	Micromhos	1677		100	1020	02/15/91	GS
				Fluoride					
181397	Spike		mg/l		.5	96	1315	02/21/91	GS
				Sulfate					
	Standard	50	mg/l	50		100	0815	02/19/91	DG
181509	Duplicate	32	mg/l	32		100	0815	02/19/91	DG
181511	Duplicate	47	mg/l	47		100	0815	02/19/91	DG
				Total Dissolved Solids					
	Blank	0.0000	g				1100	02/25/91	BC
	Standard	96	mg/l	100		104	1100	02/25/91	BC
182090	Duplicate	212	mg/l	174		120	1100	02/25/91	BC

I hereby certify that these results were obtained using the methods specified in this report.

Bill Reeny

C. H. Whiteside, Ph.D., President

ANA-LAB CORP.
THE COMPLETE SERVICE LAB

2600 DUDLEY ROAD — KILGORE, TEXAS 75662 — 903/984-0551

Analytical Chemistry • Utility Operations • Equipment Sales

03/14/91

Environmental Bureau NM Oil D.
PO Box 2088
Santa Fe, NM 87504

Sample Identification: CIRCLE RIDGE PRODUCTION
Collected By: EWS
Date & Time Taken: 02/01/91
On Site Data: D-26-13-31
Other:
INJECTING WATER DRICKY QUEEN UNIT.

Lab Sample Number: 181402 **Received:** 02/11/91 Client: SNM1

PARAMETER	RESULTS	UNITS	TIME	DATE	METHOD	BY
Alkalinity	65	mg/l	1100	02/13/91	EPA Method 310.1	BC
Bromide	950	mg/l	1100	03/03/91		ES
Cation-Anion Balance	4970/5130	meq/meq	0800	03/14/91		SK
Carbonate	<.5	mg/l	0900	02/27/91	APHA Method 263	BC
Chloride	180,000	mg/l	0945	02/18/91	EPA Method 325.3	SW
Specific Conductance	>50,000	Micromhos	1020	02/15/91	EPA Method 120.1	GS
Fluoride	<1	mg/l	1315	02/21/91	EPA Method 340.1	GS
Bicarbonate	60	mg/l	0900	02/27/91	APHA Method 263	BC
Sulfate	2000	mg/l	0815	02/19/91	EPA Method 375.4	DG
Total Dissolved Solids	280,000	mg/l	1100	02/25/91	EPA Method 160.1	BC
pH	6.2	SU	1600	02/14/91	EPA Method 150.1	LW
Dissolved Calcium	3000	mg/l	0830	02/15/91	EPA Method 215.1	GK
Dissolved Iron	.46	mg/l	0830	02/15/91	EPA Method 236.1	GK
Dissolved Potassium	2200	mg/l	0830	02/15/91	EPA Method 258.1	GK
Dissolved Magnesium	5000	mg/l	0830	02/15/91	EPA Method 242.1	GK

Continued

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2600 DUDLEY ROAD — KILGORE, TEXAS 75662 — 903/984-0551

Analytical Chemistry • Utility Operations • Equipment Sales

PARAMETER	RESULTS	UNITS	TIME	DATE	METHOD	BY
Dissolved Sodium	100,000	mg/l	0830	02/15/91	EPA Method 273.1	GK

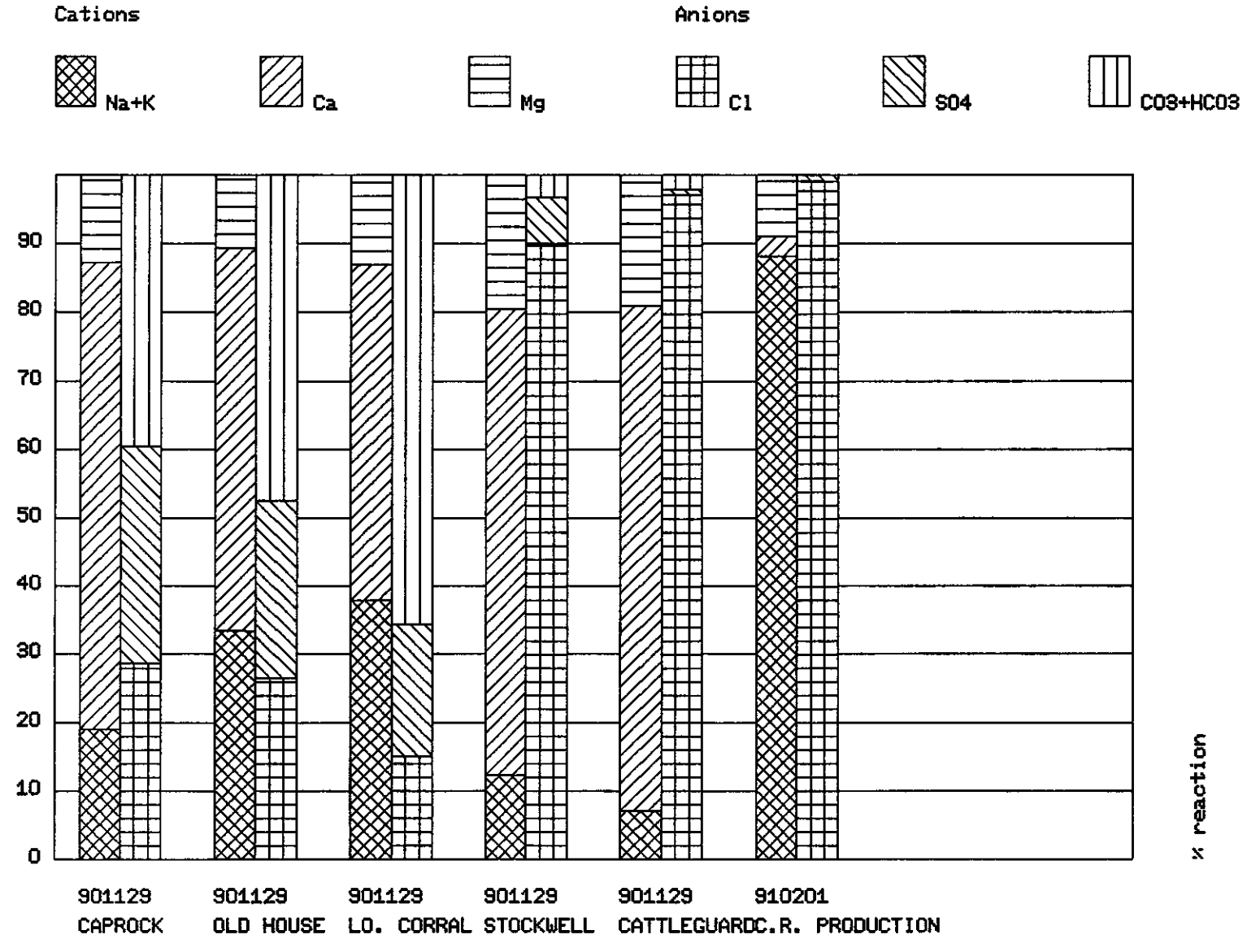
Quality Assurance for the SET with Sample 181402

Sample #	Description	Result	Units	Dup/Std Value	Spk Conc.	Percent	Time	Date	By
				Alkalinity					
	Standard	2088	mg\l	2358		112	1100	02/13/91	BC
181397	Duplicate	210	mg\l	210		100	1100	02/13/91	BC
181397	Spike		mg\l		100	99	1100	02/13/91	BC
181397	Spike		mg\l		100	99	1100	02/13/91	BC
				Bromide					
	Blank	<5	ppm				1100	03/03/91	ES
	Standard	96	ppm	100		104	1100	03/03/91	ES
181403	Duplicate	572	ppm	527		108	1100	03/03/91	ES
				Chloride					
	Standard	70	mg/l	71		101	0945	02/18/91	SW
181594	Duplicate	23	mg/l	23		100	0945	02/18/91	SW
181594	Spike		mg/l		100	100	0945	02/18/91	SW
				Specific Conductance					
	Standard	1423	Micromhos	1413		101	1020	02/15/91	GS
181397	Duplicate	1681	Micromhos	1677		100	1020	02/15/91	GS
				Fluoride					
181397	Spike		mg/l		.5	96	1315	02/21/91	GS
				Sulfate					
	Standard	50	mg/l	50		100	0815	02/19/91	DG
181509	Duplicate	32	mg/l	32		100	0815	02/19/91	DG
181511	Duplicate	47	mg/l	47		100	0815	02/19/91	DG
				Total Dissolved Solids					
	Blank	0.0000	g				1100	02/25/91	BC
	Standard	96	mg/l	100		104	1100	02/25/91	BC
182090	Duplicate	212	mg/l	174		120	1100	02/25/91	BC

I hereby certify that these results were obtained using the methods specified in this report.

Bill Peery

C. H. Whiteside, Ph.D., President

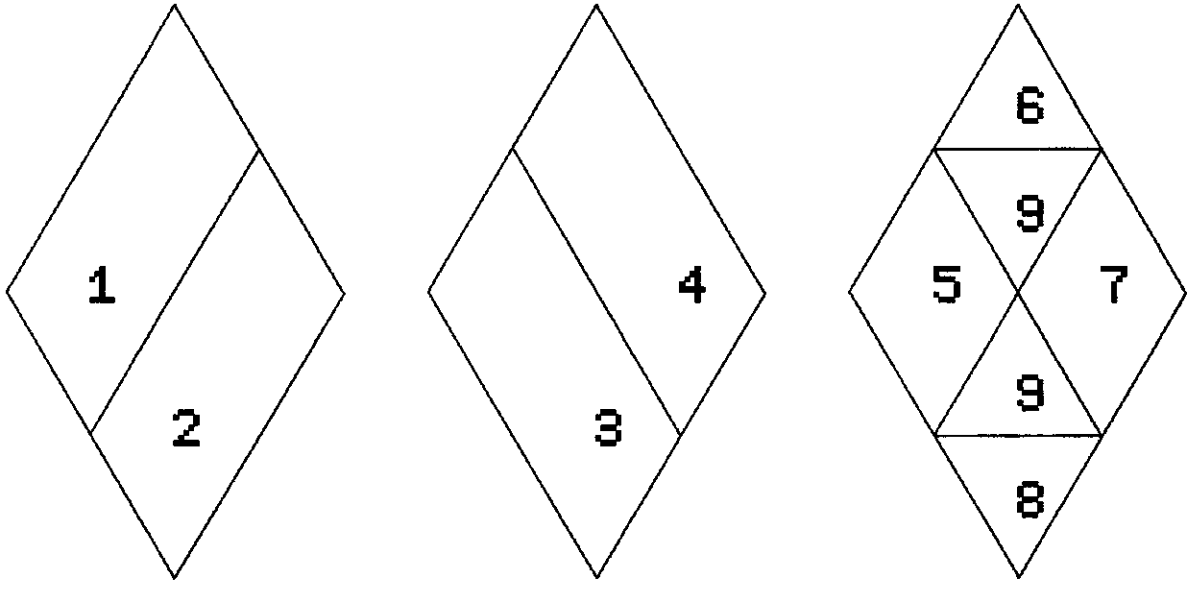


WELL ID : CAUDILL RANCH - WATER WELLS AND OIL PRODUCTION WASTE WATER	DATE: NOVEMBER 1990; FEBRUARY 1991

NEW MEXICO OIL CONSERVATION DIVISION

Figure : 4

Subdivisions of the Piper Diagram diamond shaped field



ZONE	GROUNDWATER CHARACTERISTICS
1	Alkaline earths > Alkalies
2	Alkalies > Alkaline earths
3	Weak acids > Strong acids
4	Strong acids > Weak acids
5	Carbonate hardness (secondary alkalinity) > 50 %
6	Noncarbonate hardness (secondary salinity) > 50 %
7	Noncarbonate alkali (primary salinity) > 50 %
8	Carbonate alkali (primary alkalinity) > 50 %
9	No cation-anion pair exceeds 50 %

STATE OF NEW MEXI[CO]
ENERGY AND MINERALS DE[PART]MENT
OIL CONSERVATION DIV[ISI]ON

EDDIE W. SEAY
FIELD REPRESENTATIVE
SUPERVISOR

HOME PHONE:
(505) 392-2236
OFFICE PHONE:
(505) 393-6161

P.O. BOX 1980
HOBBS, NM 88241-1980

Memo

From
EDDIE W. SEAY
Field Representative
Supervisor

To Dave Boyer

Lower corral well - 4276.9

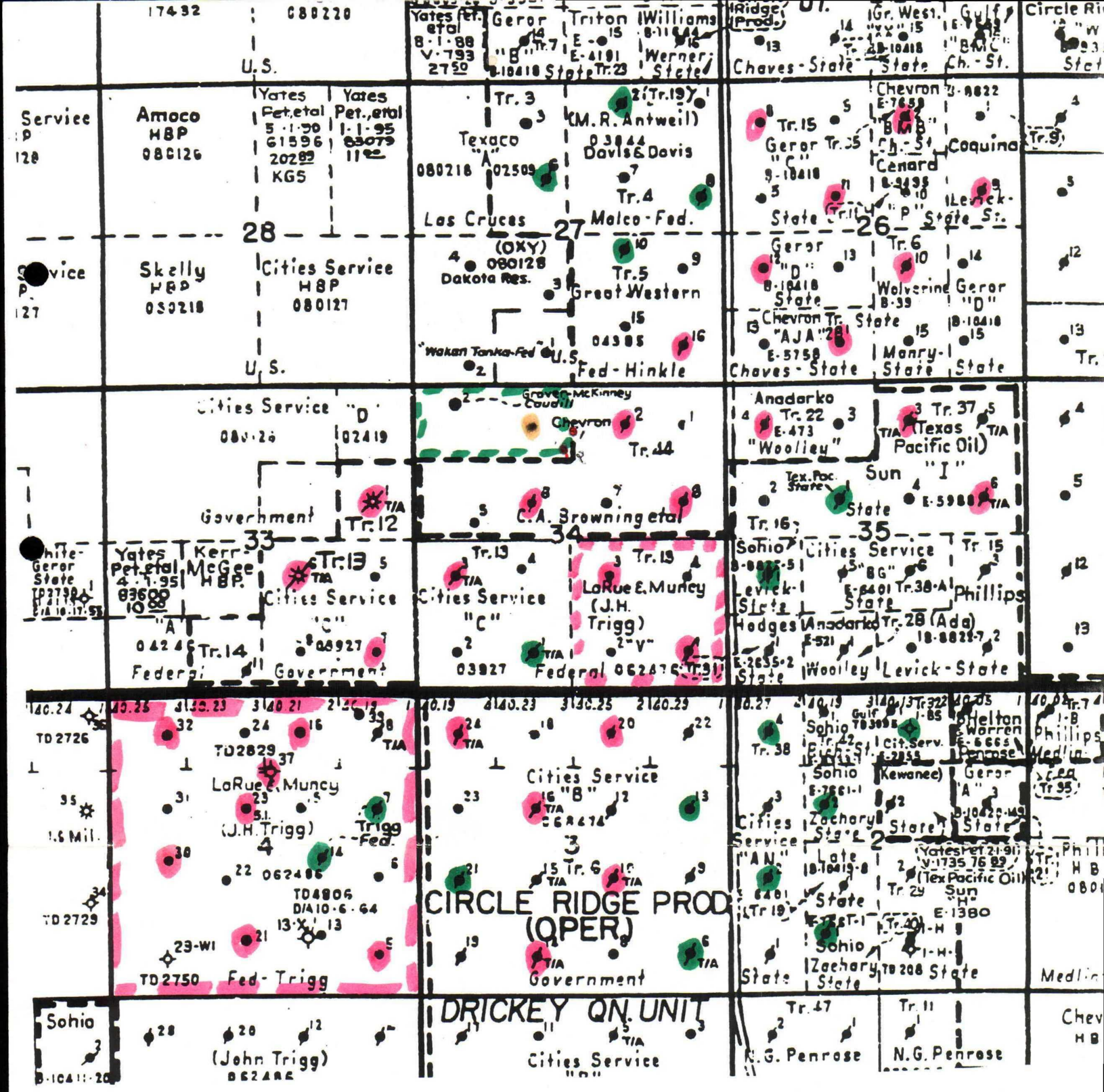
Bad corral well - 4273.2

Cattle Guard well - 4280.2

Abandon House well - 4286.1

House well - 4289.1

Elevations from Caudill water study


U.S.
Yates Pet. etal 8-1-88 V-793 2750
Geror "B" 8-10418 State
Triton E-4191
Williams
Werner State
Ridge Prod.
Chaves-State
Gr. West "XX" 8-10418 State
Gulf "B" Ch.-St.
Circle Ridge
Service HBP 128
Amoco HBP 080126
Yates Pet. etal 5-1-90 61596 20289 KGS
Yates Pet., etal 1-1-95 63079 11
Tr. 3
Texaco "A" 080218 02509
(M. R. Antweil) 03844 Davis & Davis
Tr. 4 Malco-Fed.
Las Cruces (OXY) 080128 Dakota Res.
Tr. 5 Great Western 04385
Waken Tanka-Fed
Fed-Hinkle
Chevron E-7659
Tr. 15
Geror Tr. 25 "C" 8-10418 State
Cenard 8-9435 State
Coquina
Tr. 6
Geror "D" 8-10418 State
Chevron "AJA" 281 E-5758 Chaves-State
Wolverine 8-39 State
Manry-State
Service HBP 127
Skelly HBP 080218
Cities Service HBP 080127
Cities Service "D" 080126 02419
Government Tr. 12
Anadarko Tr. 22 E-473 "Woolley"
Texas Pacific Oil) Sun "I" E-5988
Tex. Pac. State
Tr. 16
Kerr-McGee HBP
Yates Pet. etal 4-1-95 83600 10
"A" 04246 Tr. 14 Federal
Tr. 13 Cities Service "C" 08927 Government
Cities Service "C"
LaRue & Muncy (J.H. Trigg) "V" 03927 Federal
Sohio
Cities Service "BG" E-6401 Tr. 38-A State
Phillips
Hodges Anadarko E-521 Tr. 28 (Ada) Wooley
Levick-State
TD 2726
TD 2829
LaRue & Muncy (J.H. Trigg) 4
Trigg Fed.
062486
TD 4806 D/A 10-6-64
TD 2729
TD 2750 Fed-Trigg
Cities Service "B" 068674
3
CIRCLE RIDGE PROD (OPER)
Government
Sohio
Tr. 38
Sohio (Kewanee) E-7661-1
Cit. Serv. E-2855
Shelton & Warren E-6665 Penrose
Geror "A" 8-10420-149 State
Cities Service "AN" E-6401 (Tr 19)
Zachary State
Late 18-10419-8 State
Yates Pet. 2-1-91 V-1735 7689 (Tex Pacific Oil)
Tr. 29 Sun "H" E-1380
Tr. 40
Sohio Zachary State
TD 208 State
DRICKEY QN. UNIT
Sohio
(John Trigg) 062486
Cities Service "D"
Tr. 47
Tr. 11
S. G. Penrose
N. G. Penrose
Chev
HB
1 Caudill House well
2 Caudill Livestock well - bad well
SWD
WIW
WIW T/A
WIW P&A
GROVER - MCKINNEY
LARUE & MUNCY

COUNTY	FORMATION	BASIN NAME	LOCATION	OWNER	ALTITUDE	DEPTH
CHAVES	OGLL	TATUM-LOV.-HOBBS	13 S 31 E35.143412	TX. PACIFIC COAL & OIL	4412.70	198.

UNIQUE NUMBER IS 05G000010501:ABD. OWD WELL. DIAM 5 IN. FILE# L-2849.

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
MAR. 21 1961	173.63	JAN. 17 1965	173.50	SEP. 15 1965	176.58A	FEB. 08 196c	173.54	JAN. 04 1967	173.55
JAN. 04 1968	173.42	JAN. 14 1969	173.24	JAN. 06 1970	174.37	JAN. 15 1971	173.58	JAN. 13 1972	174.35
APR. 15 1976	174.20	FEB. 06 1981	172.02	APR. 15 1986	171.63				

COUNTY	FORMATION	BASIN NAME	LOCATION	OWNER	ALTITUDE	DEPTH
CHAVES	SALM	ROSWELL ARTESIAN	14 S 17 E26.334244	~~JIM VANDEWART~~ Forrest Henderson	5691.60	72.0

UNIQUE NUMBER IS 05G000006316:UNUSED WELL WITH 7" CASING.

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
JUL. 11 1961	68.39	AUG. 15 1988	54.83✓						

COUNTY	FORMATION	BASIN NAME	LOCATION	OWNER	ALTITUDE	DEPTH
CHAVES	YESO	ROSWELL ARTESIAN	14 S 17 E28.24114	JIM VANDEWART	5775.40	-

UNIQUE NUMBER IS 05G000006317:STOCK WELL WITH 6" CASING. "McCARTY WELL"

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
JUL. 14 1961	133.44								

COUNTY	FORMATION	BASIN NAME	LOCATION	OWNER	ALTITUDE	DEPTH
CHAVES	SALM	ROSWELL ARTESIAN	14 S 17 E35.24133	JIM VANDEWART	5641.20	84.0

UNIQUE NUMBER IS 05G000006318:UNUSED WELL WITH 6" CASING.

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
JUL. 12 1961	44.13								

COUNTY	FORMATION	BASIN NAME	LOCATION	OWNER	ALTITUDE	DEPTH
CHAVES	OGLL	TATUM-LOV.-HOBBS	13 S 31 E13.12122	STATE OF NEW MEX.	4404.00	-

UNIQUE NUMBER IS 05GO00012615:UNCASED SHOT HOLE PLUGGED IN 1966.

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
APR. 03 1961	116.38								

COUNTY	FORMATION	BASIN NAME	LOCATION	OWNER	ALTITUDE	DEPTH
CHAVES	OGLL	TATUM-LOV.-HOBBS	13 S 31 E25.22222	J.W. TULK	4380.00	-

UNIQUE NUMBER IS 05GO00012616:STOCK WELL WITH PISTON PUMP.

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
MAR. 21 1961	120.85A	FEB. 15 1966	100.23	MAR. 16 1971	99.75	APR. 15 1976	98.03	FEB. 06 1981	97.62

COUNTY	FORMATION	BASIN NAME	LOCATION	OWNER	ALTITUDE	DEPTH
CHAVES	OGLL	TATUM-LOV.-HOBBS	13 S 31 E34.124224	CAUDILL RANCH	4296.40	-

UNIQUE NUMBER IS 05GO00012617:STOCK WELL DIAM. 6 IN.

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
APR. 21 1961	74.74	FEB. 18 1966	72.73	MAR. 16 1971	73.50C	APR. 27 1976	74.29D	FEB. 06 1981	72.58C
APR. 15 1986	73.34	Sept 13, 1990	71.25						

COUNTY	FORMATION	BASIN NAME	LOCATION	OWNER	ALTITUDE	DEPTH
CHAVES	OGLL	TATUM-LOV.-HOBBS	13 S 31 E34.124231	CAUDILL RANCH	4281.40	080.

UNIQUE NUMBER IS 05GO00012618:STOCK WELL WITH PISTON PUMP.

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
MAR. 28 1961	63.35	FEB. 15 1966	62.51	APR. 27 1976	67.39B				

WATER QUALITY IN SOUTHEASTERN NEW MEXICO
LISTED BY LOCATION

Location	DPN	WBF	Use	Date Cltd	Pt. of Cltn.	Cltr.	Chlorides mg/liter	Conduct. K x 10e6	Temp. deg. F	File No.	Ref. No.	Addl. Data	Card Date	Source
** 13S.26E.34.433143														
13S.26E.34.433143		QAL	IRR	74/ 5/00	DP	ONR	2160	8854	0	RA 03355			0683	
13S.26E.34.433143		QAL	IRR	78/ 7/21	DP	SEO	1700	0	0	RA 03355			0196	
13S.26E.34.433143		QAL	IRR	85/ 8/01	DP	SEO	2450	9608	66	RA 03355			1185	
** 13S.26E.34.433314														
13S.26E.34.433314		QAL	IRR	70/ 9/22	DP	USG	1610	8000	65	RA 03355			0285	
** 13S.27E.30.41221														
13S.27E.30.41221		PAT	STK	57/ 5/02	DP	USG	120	3180	0	RA		X	0685	U
** 13S.30E.20.243224														
13S.30E.20.243224		PAT	OIL	74/ 8/15	BLR507	ONR	300	0	0	03			0683	
13S.30E.20.243224		PAT	OIL	74/ 8/15	BLR290	ONR	150	0	0	03			0683	
** 13S.31E.01.33444														
13S.31E.01.33444		TOG	STK	79/10/25	DP	SEO	100	891	65	L				
13S.31E.01.33444		TOG	STK	84/11/28	DP	SEO	145	771	62	L			1284	
** 13S.31E.34.124242														
13S.31E.34.124242		TOG	DOM	85/ 4/09	DP	SEO	50	641	64	L			0485	
** 13S.31E.34.2100														
13S.31E.34.2100		TOG	DOM	61/05/02	DP	SEO	110	850	0			*		
** 13S.32E.02.343344														
13S.32E.02.343344		TOG	STK	79/11/14	DP	SEO	76	932	64	L				
13S.32E.02.343344		TOG	STK	84/11/28	DP	SEO	79	941	64	L			1284	
** 13S.32E.08.31113														
13S.32E.08.31113		TOG	STK	79/11/14	DP	SEO	52	684	64	L 03836 X2	L 03836			
13S.32E.08.31113		TOG	STK	84/11/28	DP	SEO	64	696	62	L 03836 X2			1284	
** 13S.32E.20.411213														
13S.32E.20.411213		TOG	STK	79/11/14	DP	SEO	12	470	62	L 03836 X3	L 03836			
13S.32E.20.411213		TOG	STK	84/11/28	DP	SEO	35	562	64	L 03836 X3			1284	
** 13S.32E.35.14113														
13S.32E.35.14113		TOG	STK	79/11/14	DP	SEO	56	639	64	L				
13S.32E.35.14113		TOG	STK	84/11/27	DP	SEO	61	652	64	L			1284	
** 13S.33E.02.33343														
13S.33E.02.33343		TOG	STK	79/11/09	DP	SEO	66	891	63	L 07377				
13S.33E.02.33343		TOG	STK	84/11/29	DP	SEO	67	900	64	L 07377			1284	
** 13S.33E.04.113113														
13S.33E.04.113113		TOG	DOM	79/11/09	YT	SEO	138	1495	0	L				
13S.33E.04.113113		TOG	DOM	85/ 2/18	DP	SEO	269	1600	0	L			0385	

OIL CONSERVATION DIVISION

RECEIVED

'90 NOV 26 AM 10 53

NOTIFICATION OF FIRE, BREAKS, SPILLS, LEAKS, AND BLOWOUTS

NAME OF OPERATOR Circle Ridge Production, Inc.					ADDRESS P. O. Box 755, Hobbs, NM 88241		
REPORT OF	FIRE	BREAK	SPILL	LEAK X	BLOWOUT	OTHER*	
TYPE OF FACILITY	DRLG WELL	PROD WELL X	TANK BTTY	PIPE LINE	GASO PLNT	OIL RFY	OTHER*
NAME OF FACILITY Rock Queen Unit Tract 30 #5							
LOCATION OF FACILITY (QUARTER/QUARTER SECTION OR FOOTAGE DESCRIPTION) SW/4 NW/4					SEC. 30	TWP. 13S	RGE. 32	COUNTY Lea
DISTANCE AND DIRECTION FROM NEAREST TOWN OR PROMINENT LANDMARK 27 miles north of Maljamar							
DATE AND HOUR OF OCCURENCE Night of 10/14/90					DATE AND HOUR OF DISCOVERY 10:30 A.M. of 10/15/90		
WAS IMMEDIATE NOTICE GIVEN?	YES X	NO	NOT REQUIRED		IF YES, TO WHOM Donna Pitzer		
BY WHOM James Davis					DATE AND HOUR 11:10 A.M. of 10/15/90		
TYPE OF FLUID LOST oil & water					QUANTITY OF LOSS 285 bbls fluid	VOLUME RECOVERED See below	
DID ANY FLUIDS REACH A WATERCOURSE?	YES X	NO	QUANTITY 280 bbls water, 5 bbls oil				

IF YES, DESCRIBE FULLY**

Ran into a lake bed, no other outlet to water course.
Site inspection made by Eddie Seay with OCD at 1:30 P.M.

DESCRIBE CAUSE OF PROBLEM AND REMEDIAL ACTION TAKEN**

Hunter ran over flowline. Repaired flowline. Pumped water from lake bed, covered other areas. Placed fence around lake bed.

DESCRIBE AREA AFFECTED AND CLEANUP ACTION TAKEN**

Lake bed contained some fresh water from rain. Picked up 5 bbls fluid immediately. Placed barrier across East end of lake bed to contain contamination; pumped 200 bbls fluid from lake bed.

DESCRIPTION OF AREA	FARMING	GRAZING X	URBAN	OTHER*			
SURFACE CONDITIONS	SANDY	SANDY LOAM	CLAY	ROCKY X	WET	DRY	SNOW

DESCRIBE GENERAL CONDITIONS PREVAILING (TEMPERATURE, PRECIPITATION, ETC.)**

Dry & warm

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

Above information based on data furnished by Eddie Seay & James Davis.

SIGNED Donna Pitzer TITLE Agent DATE 11/20/90

*SPECIFY **ATTACH ADDITIONAL SHEETS IF NECESSARY

OIL CONSERVATION DIVISION

'91 MAR 2? AM 9 17

NOTIFICATION OF FIRE, BREAKS, SPILLS, LEAKS, AND BLOWOUTS

NAME OF OPERATOR Circle Ridge Production, Inc.					ADDRESS P. O. Box 755, Hobbs, NM 88241		
REPORT OF	FIRE	BREAK	SPILL	LEAK XXX	BLOWOUT	OTHER*	
TYPE OF FACILITY	DRLG WELL	PROD WELL	TANK BTTY xx	PIPE LINE	GASO PLNT	OIL RFY	OTHER*
NAME OF FACILITY Rock Queen Unit							
LOCATION OF FACILITY (QUARTER/QUARTER SECTION OR FOOTAGE DESCRIPTION) SW/4 NE/4					SEC. 26	TWP. 13S	RGE. 31E	COUNTY Chaves
DISTANCE AND DIRECTION FROM NEAREST TOWN OR PROMINENT LANDMARK 16 miles South Caprock							
DATE AND HOUR OF OCCURENCE Nite of 3/11/91					DATE AND HOUR OF DISCOVERY 7am 3/12/91		
WAS IMMEDIATE NOTICE GIVEN?	YES X	NO	NOT REQUIRED		IF YES, TO WHOM Eddie Seay		
BY WHOM James Davis					DATE AND HOUR 8 am 3/12/91		
TYPE OF FLUID LOST 200 BO, 200 BW					QUANTITY OF LOSS 400bbls		VOLUME RECOVERED 250 bbls
DID ANY FLUIDS REACH A WATERCOURSE?	YES	NO X	QUANTITY				

IF YES, DESCRIBE FULLY**

DESCRIBE CAUSE OF PROBLEM AND REMEDIAL ACTION TAKEN**

High wind blow water leg off separator; replaced same.

DESCRIBE AREA AFFECTED AND CLEANUP ACTION TAKEN**

Area was bare ground from prior years salt water leaks.
Covered same with durt.

DESCRIPTION OF AREA	FARMING	GRAZING X	URBAN	OTHER*			
SURFACE CONDITIONS	SANDY	SANDY LOAM	CLAY	ROCKY X	WET	DRY	SNOW

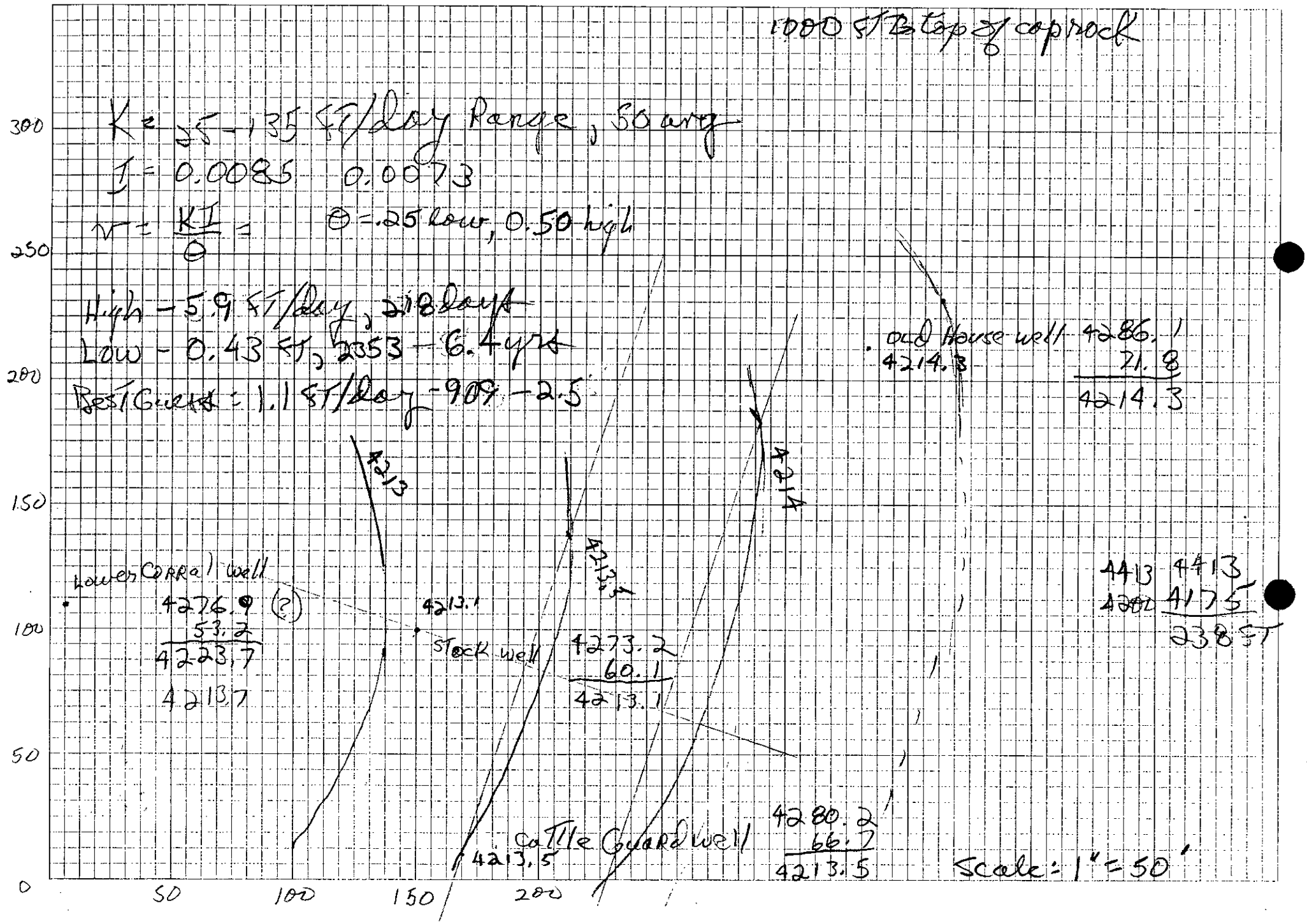
DESCRIBE GENERAL CONDITIONS PREVAILING (TEMPERATURE, PRECIPITATION, ETC.)**

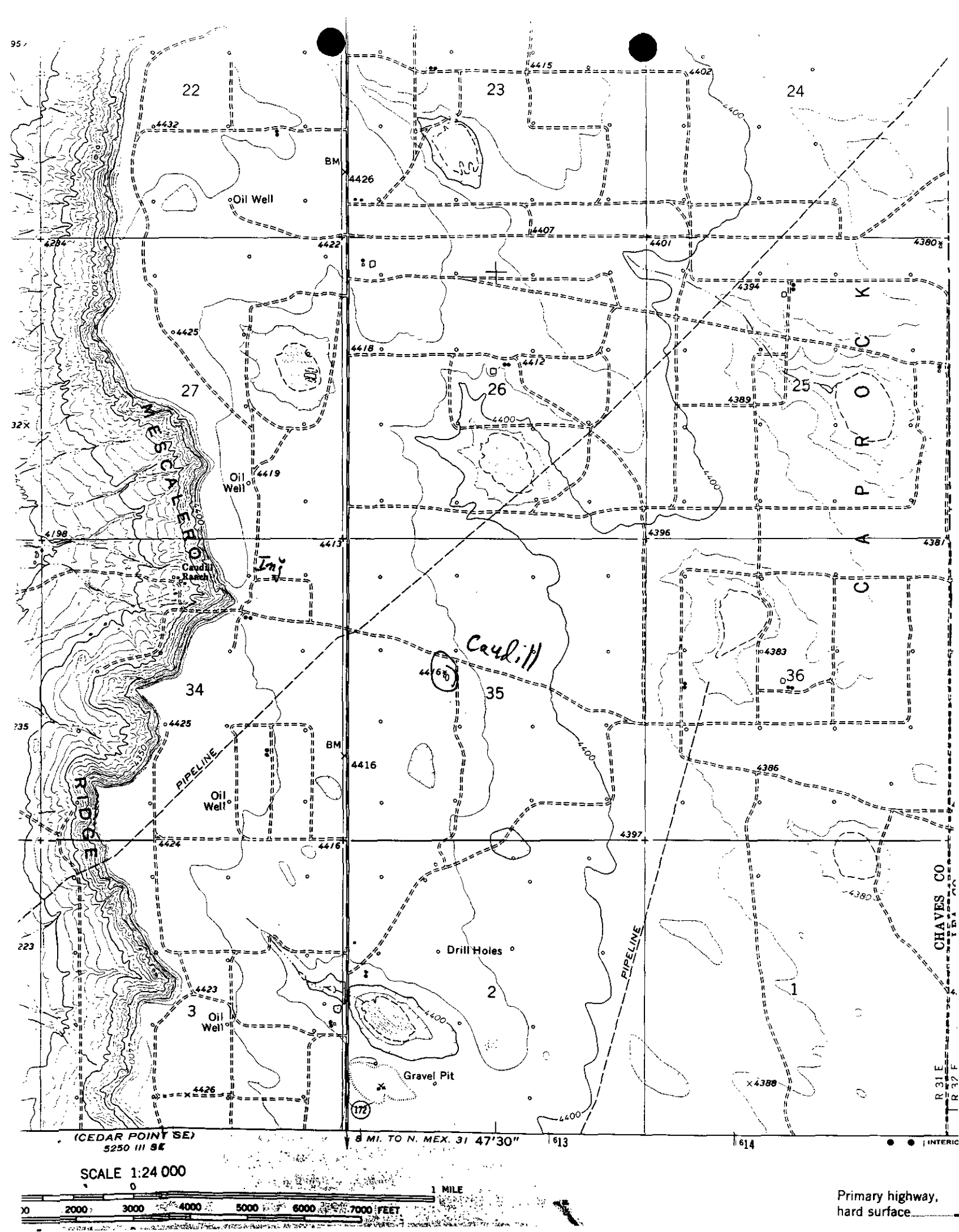
Windy, warm

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

SIGNED Norma Valles TITLE Agent DATE 3/18/91

*SPECIFY **ATTACH ADDITIONAL SHEETS IF NECESSARY

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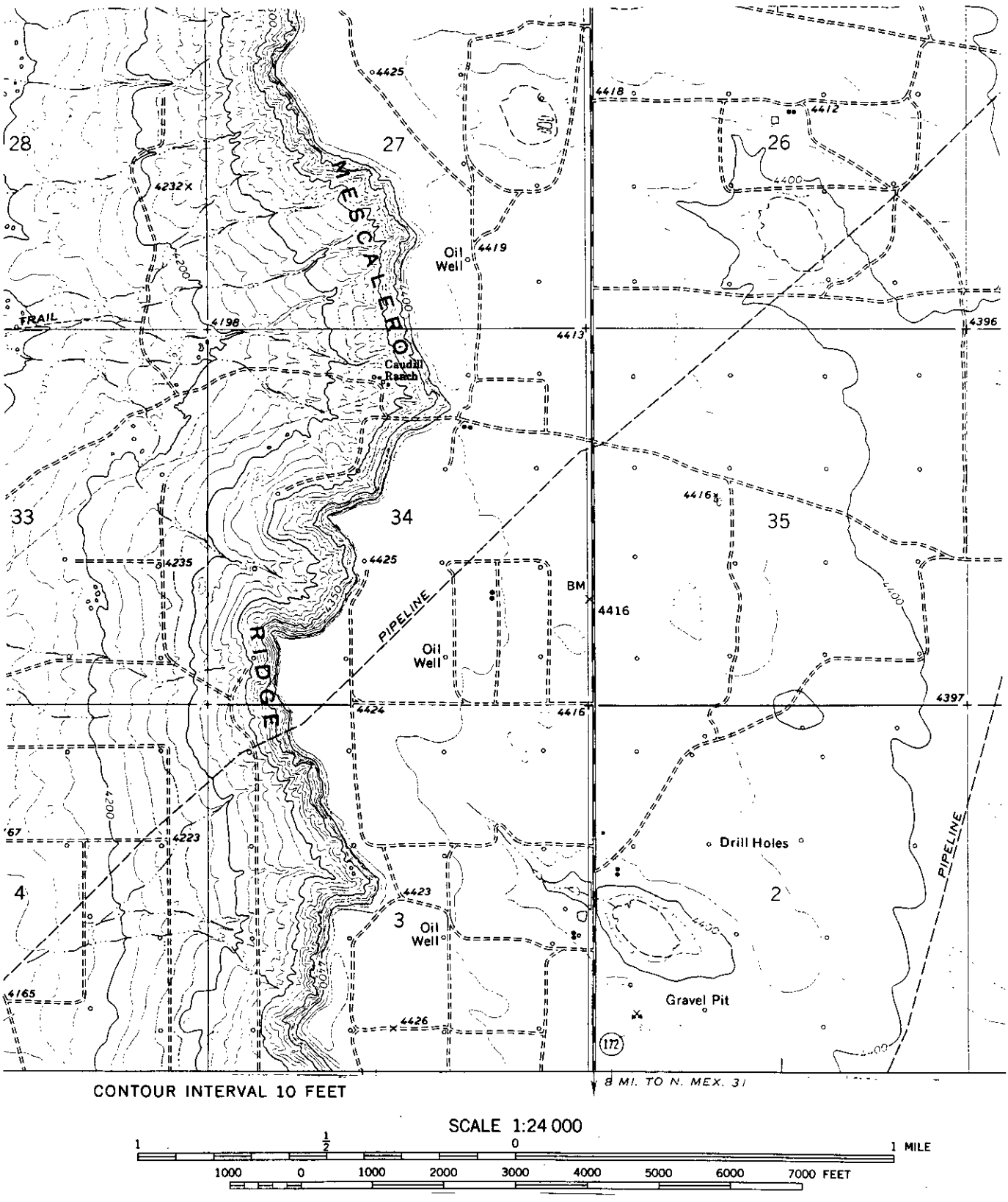
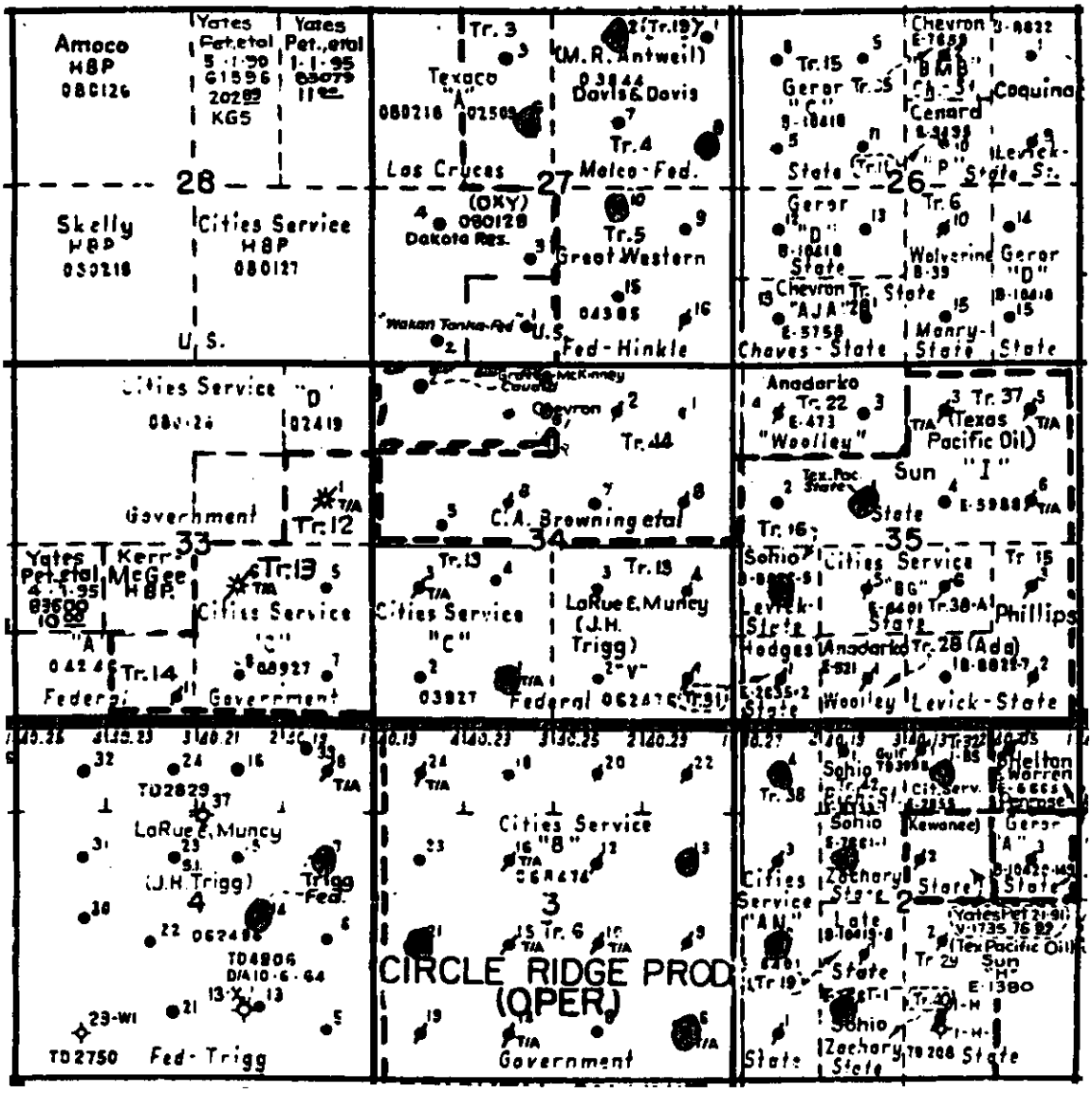
Caudill Ranch
Inj
Caudill
PIPELINE
PIPELINE
MESCALERO RIDGE
APACHE
CHAVES CO
Drill Holes
Gravel Pit
172
(CEDAR POINT SE)
5250 III SE
8 MI. TO N. MEX. 31 47'30"
613
614
R 31 E
SCALE 1:24 000
0
1 MILE
2000
3000
4000
5000
6000
7000 FEET
Primary highway, hard surface



Map 1. Location of Caudill Ranch Study Area

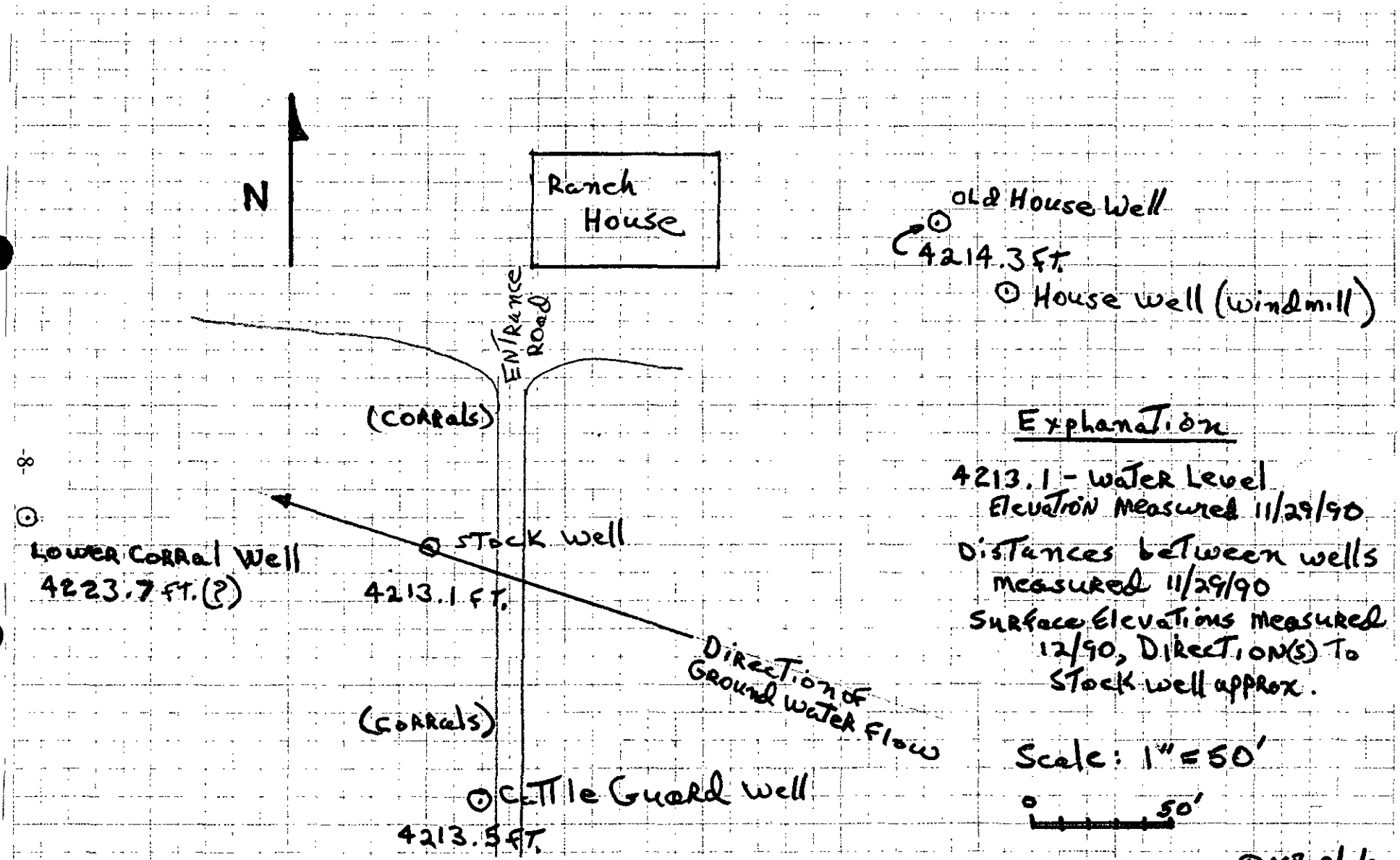


- 1 - Caudill House Well
  2 - Caudill Stock Well
- Salt Water Disposal Well
- Water Injection Well (secondary recovery)
- Wells Temporarily Abandoned, or Plugged and Abandoned

40-ACRE TRACTS WITHIN A SQUARE-MILE SECTION

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

Map 2. Location of Oil and Gas Wells



Map 3. Location of Caudill Ranch Water Wells

```
 Records    Organize    Go To    Exit
OPERATOR     CIRCLE RIDGE
FACILITY
TYPE         FL
CAUSE        LK
UNIT_LTR     A
SEC          34
TWP          13S
RGE          31E
COUNTY       CHAVES
DATE         01/06/90
OVS             25
OVR              5
OVL             20
WVS
WVR
WVL
MVS
MVR
MVL
CLEANUP      N

Edit     ¤C:\dbase\roger\SPILL90  ¤Rec 12/80        ¤File ¤         ¤       Caps
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STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

BRUCE KING
GOVERNOR

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87504
(505) 827-5800

August 7, 1991

Mr. Robert Love, Attorney
P. O. Box 1099
Hobbs, New Mexico 88240

RE: CAUDILL RANCH GROUND WATER INVESTIGATION

Dear Mr. Love:

Enclosed for your use is the final report on our Caudill Ranch Ground Water Investigation. I appreciate your patience during the past several weeks while I was completing the report.

As I previously told you by phone, the water quality results show calcium chloride versus sodium chloride contamination. The former is not associated with oil well salt water production or disposal activities, but may be due to improper handling or disposal of common oil field chemicals by a service company. The specific circumstances relating to spill location, date, and responsible party remain unknown, but I believe the discharge occurred in the drainageway adjacent to the ranch road between the cattleguard and the top of the caprock.

If you have any questions on the report, or if you need further information, please contact me at 827-5812.

Sincerely,

David G. Boyer, Hydrogeologist
Environmental Bureau Chief

DGB/sl

Attachment

cc: E. P Caudill (w/report)
Ken Fresquez, State Engineer Office Roswell (w/report)
Sandra Porenta, BLM - Roswell (w/report)