

1R - 177

REPORTS

DATE:

11/4/1998

R.T. HICKS CONSULTANTS, LTD.

4665 Indian School NE

Suite 106

Albuquerque, NM 87110

505.266.5004

Fax: 505.266.7738

November 4, 1998

Mr. Wayne Price
Environmental Engineer
New Mexico Oil Conservation Division
1000 West Broadway
Hobbs, NM 88240

RE: Mewbourne Oil Company, Conoco Federal #2, Section 30 T20S R39E

Dear Mr. Price:

On behalf of Mewbourne Oil Company (Mewbourne), R.T. Hicks Consultants, Ltd. (Hicks Consultants) conducted an investigation of the water quality in the McCasland water supply well adjacent to the above-mentioned plugged and abandoned oil well. This letter, which completes the work elements identified in our letter of August 17, 1998, presents the results of our investigation and our conclusions.

Data Review

Hicks Consultants conducted a literature search to obtain information on the geology and hydrogeology in southern Lea County, near Conoco Federal #2. We also obtained well logs from the office of the State Engineer for water wells within five miles of Conoco Federal #2.

The locations of Conoco Federal #2 and the adjacent McCasland water supply well are presented in Plate 1. Plates 2 and 3 show that the McCasland water supply well is near the edge of the Ogallala Formation, the principal aquifer of the area. Plate 2 also presents depth to water and total depths of nearby wells. As Plate 2 shows, wells within the area mapped as Ogallala suggest a saturated thickness of 10-100 feet. The driller's log of the McCasland water supply well

(Appendix A) identifies the base of the Ogallala at 88 feet, with a depth to water of 58 feet. The saturated thickness of the water-bearing zone at the location is therefore 30 feet.

The log for the McCasland water supply well indicates that anhydrite (CaSO_4) occupies 60% of the saturated thickness. Of nine water wells within a five-mile radius of the site, well logs show that only one other well encountered anhydrite (see Appendix A). This well is located in Section 24, T20S, R38E, approximately two miles northwest of Conoco Federal #2, and is labeled in the log as McCasland Well No. 3. The well log in Appendix A shows anhydrite occupying 30% of the saturated thickness.

We also employed water chemistry data from Nichol森 & Clebsch (1961). We looked specifically at nine oil production wells and four Ogallala water supply wells in the vicinity of Conoco Federal #2 (Table 2).

Hicks Consultants investigated the drilling and abandonment logs from Conoco Federal #2 for any indications of a potential source of impairment to the surrounding aquifer. The drilling log from December 1970 refers to the use of 200 sacks of regular 2% CaCl at a depth of 1,663 feet below grade. The log has no discussion of geology until 2,335 feet below grade, well below the depth of interest for the adjacent McCasland water supply well.

The plugging and abandonment record for Conoco Federal #2 demonstrates that this well was plugged in accordance with the requirements of the New Mexico Oil Conservation Division (NMOCD). Mark Production Company plugged and abandoned the well during the latter half of February 1974. Plugs were set at depths of 6,000 feet, 4,100 feet, 3,000 feet and 1,710 feet below grade and at the surface. There is no evidence from the abandonment record to suggest the well casing may be leaking or otherwise impairing the surrounding aquifer.

Field Investigation

On September 1, 1998, Melissa Snodgrass of Hicks Consultants examined the subject site with Mr. Jerry Elgin of Mewbourne. During the site visit, Hicks Consultants observed four water wells on the McCasland property (see Plate 4) and collected water samples from three of them.

FED #2: The water well adjacent to Conoco Federal #2, labeled Fed #2 on the chain of custody (Appendix B), is located 30 feet from the plugged and abandoned well. During our investigation, the stock tank into which the McCasland water supply well discharges exhibited a thick salt crust along the water surface and feathery yellow algae along the tank surfaces. Hicks Consultants collected a water sample from the standpipe of this windmill.

MEW #2 & MEW #3: The water well labeled MEW #2 on the chain of custody form is approximately two miles north of Conoco Federal #2 (see Plate 4). Mr. Elgin stated that this well and a third well 1.5 miles north of Conoco Federal #2 (MEW #3) are used by livestock. Our field investigation showed that stock tanks at both of these wells contained green algae, tadpoles and other aquatic species. The edges of the tanks contained only a thin layer of salt encrustation. Livestock were in the vicinity of both tanks. Because the windmill was not pumping during the site visit, Hicks Consultants collected a sample from the MEW #2 stock tank.

MEW #4: The fourth water well (labeled as MEW #4 on the chain of custody) is approximately two miles northwest of Conoco Federal #2. We believe this is the well referred to in the well logs as McCasland No. 3 (see above) — it is within a quarter mile of the location given on the well log, and no other wells are nearby. Our investigation revealed that the stock tank of this well contained some green algae; salt encrustation was considerably less than in the Fed #2 tank, though greater than in MEW #2 and MEW #3. Site evidence suggests that livestock drink from this well. Because the windmill was not pumping during the site visit, Hicks Consultants collected a water sample from the MEW #4 stock tank.

Laboratory Results

Assaigai Laboratories received all water samples on September 2, 1998. The laboratory analyzed each sample for major cations and anions, and calculated the ion balance for all three wells. The results from the analyses are summarized in Table 1.

The McCasland water supply well near Conoco Federal #2 (identified in Table 1 as Fed #2) exhibits a conductivity of 7,800 $\mu\text{mhos/cm}$, predominately calcium and chloride. The water from MEW #2 shows a conductivity of 1,160

$\mu\text{mhos/cm}$. Carbonate is the highest anion concentration at $275 \mu\text{g/l}$ and the cations calcium and sodium are each approximately $100 \mu\text{g/l}$. In MEW #4 calcium and sulfate are the dominant cations and anions, respectively. The specific conductance of MEW #4 is $3,700 \mu\text{mhos/cm}$.

Discussion

Hicks Consultants compared the water chemistry of these three wells with produced water from nine oil production wells and water from four Ogallala water supply wells in southern Lea County. The locations and ion concentrations for all these wells are displayed in Table 2. Plate 5 plots all the wells, along with the results from the 1971 sampling of Conoco #1, on a trilinear diagram.

As Plate 5 shows, all oil field produced waters plot very closely, with high levels of sodium and chloride and high total dissolved solids (TDS). The Ogallala water supply wells show larger variation, but are generally in the center of the diagram with balanced concentrations of all ions and a significantly lower TDS concentration. The March 1998 sample from the McCasland water supply well near Conoco Federal #2 plots apart from the oil field produced water and the Ogallala water supply wells due to the dominance of calcium and chloride. The September 1998 sample from this well is very similar to the March result and plots as calcium chloride water. MEW #2 plots very near the Ogallala wells, but has a slightly higher percentage of chloride. MEW #4 also plots as calcium chloride water, but with a higher percentage of sodium than the well near Conoco Federal #2.

According to *Groundwater Hydrology* (D. Todd, Wiley 1980):

Simple mixtures of two source waters can be identified; for example, an analysis of any mixture of two waters will plot on a straight line AB on the diagram, where A and B are the positions of the analyses of the two component waters.

Ogallala groundwater impaired by sodium chloride-rich produced water from a casing leak would plot between these two groupings. As Plate 5 illustrates, the McCasland water supply well does not plot on a line between the brine water and the Ogallala water.

The water from the McCasland water supply well near Conoco Federal #2 is therefore not similar to Ogallala groundwater; nor does it display characteristics we would expect of Ogallala groundwater mixed with oil field brine from a casing leak. Calcium and chloride dominate the water chemistry of this well. The TDS is also much higher than most Ogallala water wells.

Conclusions

1. The McCasland water supply well near Conoco Federal #2 draws water from the Ogallala Formation.
2. The saturated thickness of the water-bearing zone near the McCasland water supply well is less than most Ogallala supply wells.
3. Most Ogallala water supply wells draw water from thick sand and/or gravel lenses within the Formation.
4. The McCasland water supply well near Conoco Federal #2 draws water from an anhydrite (CaSO_4) unit within the lower Ogallala.
5. Anhydrite within the Ogallala indicates an evaporite sequence, such as a buried playa lake.
6. The Conoco Federal #2 oil well was properly plugged and abandoned by Mark Production Company, following applicable NMOCD rules and standard industry practice.
7. The water chemistry of the McCasland water supply well near Conoco Federal #2 is not consistent with a mixture of Ogallala groundwater and oil field produced water.
8. The plugged and abandoned Conoco Federal #2 oil well is not discharging formation brine via a casing leak.
9. Two hypotheses exist to explain why the McCasland water supply well near Conoco Federal #2 does not produce water similar to that produced by most Ogallala water supply wells:
 - Unintentional disposal of waste calcium chloride into a reserve pit, or on-site spills, could be the source of calcium chloride in groundwater. The drilling of Conoco Federal #2 employed calcium chloride, but at a depth considerably below the casing of the adjacent windmill. Invasion of drilling mud into the Ogallala and/or leaching of calcium chloride

from the grout cannot account for the calcium chloride in the McCasland water supply well near Conoco Federal #2.

- The water chemistry in the McCasland water supply well could be a natural phenomenon. The McCasland water supply well is not similar to typical Ogallala water supply wells. This well draws water from anhydrite. Wells that draw water from anhydrite will exhibit water chemistry dominated by calcium and sulfate and show a TDS concentration higher than wells producing from sand and gravel. Elevated chloride concentrations are also associated with wells that draw water from groundwater zones rich in anhydrite and other evaporite minerals.
10. If calcium chloride in the McCasland water supply well near Conoco Federal #2 is due to unintentional disposal or loss of calcium chloride from drilling operations, then the subsurface volume influenced is not large. Natural dilution will eventually restore groundwater to a quality consistent with anhydrite units.
 11. If calcium chloride in the Conoco Federal #2 windmill is a natural phenomenon, then the subsurface volume influenced is as large as the source of calcium and chloride. In this case, the subsurface extent of anhydrite may mirror the extent of calcium chloride groundwater. The zone of naturally occurring poor-quality water may be large.
 12. MEW #4 appears to demonstrate natural degradation due to increased evaporite (anhydrite) within the saturated zone.

Recommendation

We do not recommend any additional investigation or inquiry at this site. All evidence shows that Mewbourne's operations in relation to its Conoco Federal #2 well were consistent with industry practice and NMOCD rules, and the water chemistry of the adjacent McCasland water supply well is not consistent with a casing leak. The record shows no evidence of calcium chloride disposal on this lease. Evidence does show that the hydrogeology beneath the Conoco Federal #2 lease is not similar to other areas where the Ogallala produces high quality water.

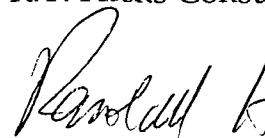
The source of calcium chloride in the McCasland water supply well is either natural evaporites or a small quantity of calcium chloride used at the well site.

The natural degradation in MEW #4 suggests the condition may be natural. If the source is natural, any further investigation should be the responsibility of the appropriate state agency, not Mewbourne. Due to the high solubility of calcium chloride, if the original source was a surface release, all of the calcium chloride is likely dissolved in groundwater. Therefore, surface remedies will not be useful in remediating the water quality. Additionally, any impairment of water quality from an on-site source is restricted to the well site and a small distance down-gradient. Natural dilution is the only logical remedial technique for such an insult. Consequently, even in the unlikely circumstance the Conoco Federal #2 well is the source, we see no benefit of further inquiry.

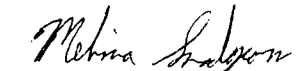
If you have any questions regarding this submission, please contact Melissa Snodgrass or me at our Albuquerque office.

Sincerely,

R.T. Hicks Consultants, L.P.


Randall T. Hicks
Principal




Melissa Snodgrass
Staff Engineer

cc: Gary Larson, Esq.
Mike Shepard, Mewbourne
Jerry Elgin, Mewbourne

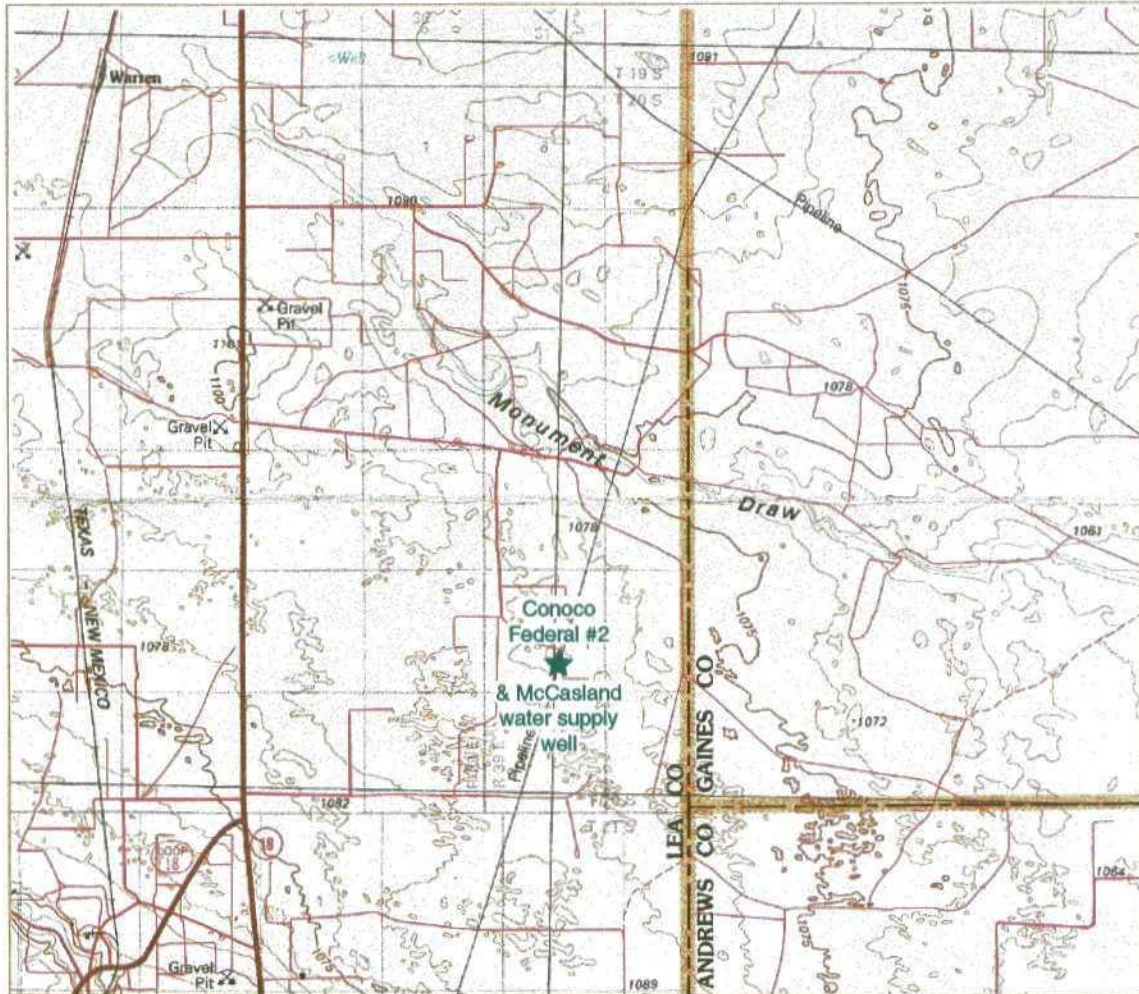
Table 1: McCasland Well Analytical Results - September 1, 1998

Lab ID	Parameter Units	Location	Ca µg/l	Fe µg/l	Mg µg/l	K µg/l	Si µg/l	Na µg/l	Zn µg/l	Cl µg/l	Fl µg/l	Nitrate µg/l	Nitrite µg/l	Ortho. P µg/l	Sulfate µg/l	Alkalinity µg/l	Conductivity µmhos/cm	Anion Sum meq/l	Cation Sum meq/l	Cat-An Balance %
Fed #2	30 ft. from C.F. #2	749	19.9	73.9	8.3	21.8	373	3.8	1930	ND	ND	1	ND	ND	112	117	7800	59.57	61	1
Mew #2	2 ml N. of C.F. #2	99.3	0.6	18.9	17	23.7	103	ND	114	0.9	0.5	0.5	ND	ND	127	275	1160	10.42	11.5	5
Mew #4	2 ml NW of C.F. #2	310	0.6	52.8	15.5	22	275	ND	453	0.6	0.5	0.5	ND	1.9	775	172	3700	32.45	32.24	0

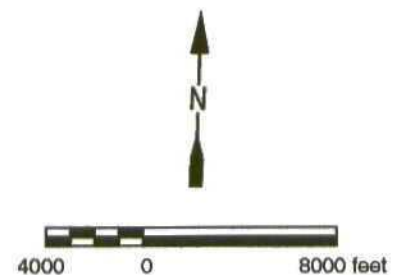
Table 2: Ion Concentrations and Percentages for Nearby Wells

Ogallala Wells*		Concentrations in equivalents per million (ppm for TDS)							Total Cations Total Anions										
Well ID	Location	Ca+2	Mg +2	Na/K +1	HCO3 -1	SO4 -2	Cl -1	TDS	Total Cations	Total Anions	Average	% Ca+2	% Mg +2	% Na/K +1	% HCO3 -1	% SO4 -2	% Cl -1		
A	19.37.4.110	3.96	3.09	5.03	1.12	0.9	383	7.05	7.05	7.05	7.05	56%	0%	44%	71%	16%	13%		
B	21.37.33.110	2.25	2.06	4.07	3.81	2.25	543	8.38	7.98	8.18	27%	25%	49%	48%	28%	24%	24%		
C	21.37.33.111	3.72	1.64	4.35	3.93	2.25	172	186	3.72	7.9	5.81	100%	0%	0%	50%	28%	22%		
D	21.37.33.233	2			4.05	2.02	1.66	445	7.99	7.73	7.86	25%	21%	54%	52%	26%	21%		
Oil Production Wells*		Concentrations in equivalents per million (ppm for TDS)							Total Cations Total Anions										
Well ID	Location	Ca+2	Mg +2	Na/K +1	HCO3 -1	SO4 -2	Cl -1	TDS	Total Cations	Total Anions	Average	% Ca+2	% Mg +2	% Na/K +1	% HCO3 -1	% SO4 -2	% Cl -1		
1	22.37/22.38	568.9	2261	1521.8	6.23	39.56	2904.6	209000	2829.9	2950.39	2890.145	20%	0%	80%	0%	1%	98%		
2	21.22.37	473.1		557.24	2	39.35	2180.1	149140	1994.9	2221.45	2108.175	24%	0%	76%	0%	2%	98%		
3	21.37	80.49	40.95	193.75	3.2	34.49	2774.7	39440	678.68	670.28	12%	6%	82%	0%	8%	92%			
4	21.37/22.38	379.98	193.75	1988.91	3.2	34.49	2774.7	147033	2562.64	2812.39	2687.515	15%	8%	78%	0%	1%	99%		
5	21.37	438.88	1600	2.39	2.39	24.36	2180.1	146900	2038.88	2206.85	2122.865	22%	0%	78%	0%	1%	99%		
6	21.38	261.47	207.8	1343.53	11.64	43.3	1748.4	93400	1812.8	1791.7	1802.25	14%	11%	74%	0%	2%	98%		
7	20.37.38	14.97	434.8	847.86	12.19	35.16	1249.9	37000	449.77	416.64	433.205	3%	0%	97%	3%	16%	81%		
8	21.37.38	168.4	2065.3	2065.3	8.13	29.19	2929.9	81208	1016.26	1297.25	1156.755	17%	0%	83%	1%	3%	96%		
9	20.38.27.28	349.3						166800	2414.6	2967.22	2690.91	14%	0%	86%	0%	1%	99%		
1971, Con. #1	20.39.30	359	330	2555	4	35	3201		3244	3240	3242	11%	10%	79%	0%	1%	99%		
Wells Sampled in this Study		Concentrations in equivalents per million (ppm for TDS)							Total Cations Total Anions										
Well ID	Date	Ca+2	Mg +2	Na/K +1	HCO3 -1	SO4 -2	Cl -1	TDS	Total Cations	Total Anions	Average	% Ca+2	% Mg +2	% Na/K +1	% HCO3 -1	% SO4 -2	% Cl -1		
Fed #2	3/31/98	34.93	7.4	12.64	2.8	2.25	49.96	4113	54.97	55.01	54.99	64%	13%	23%	5%	4%	91%		
Fed #2	9/1/98	37.38	6.08	16.43	1.17	2.33	54.44		59.89	57.94	58.915	62%	10%	27%	2%	4%	94%		
Mew #2	9/1/98	4.96	1.56	4.91	2.75	2.64	3.22		11.43	8.61	10.02	43%	14%	43%	32%	31%	37%		
Mew #4	9/1/98	15.47	4.34	12.36	1.72	16.14	12.78		32.17	30.64	31.405	48%	13%	38%	6%	53%	42%		

* Data from A. Nicholson, Jr. and A. Clebsch, Jr., Geology and Ground-water Conditions in Southern Lea County, New Mexico, USGS, 1961.



Map source: USGS Hobbs, New Mexico-Texas Quadrangle map



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Mewbourne Oil

Map Showing Five Mile Radius

Plate 1

October 12, 1998

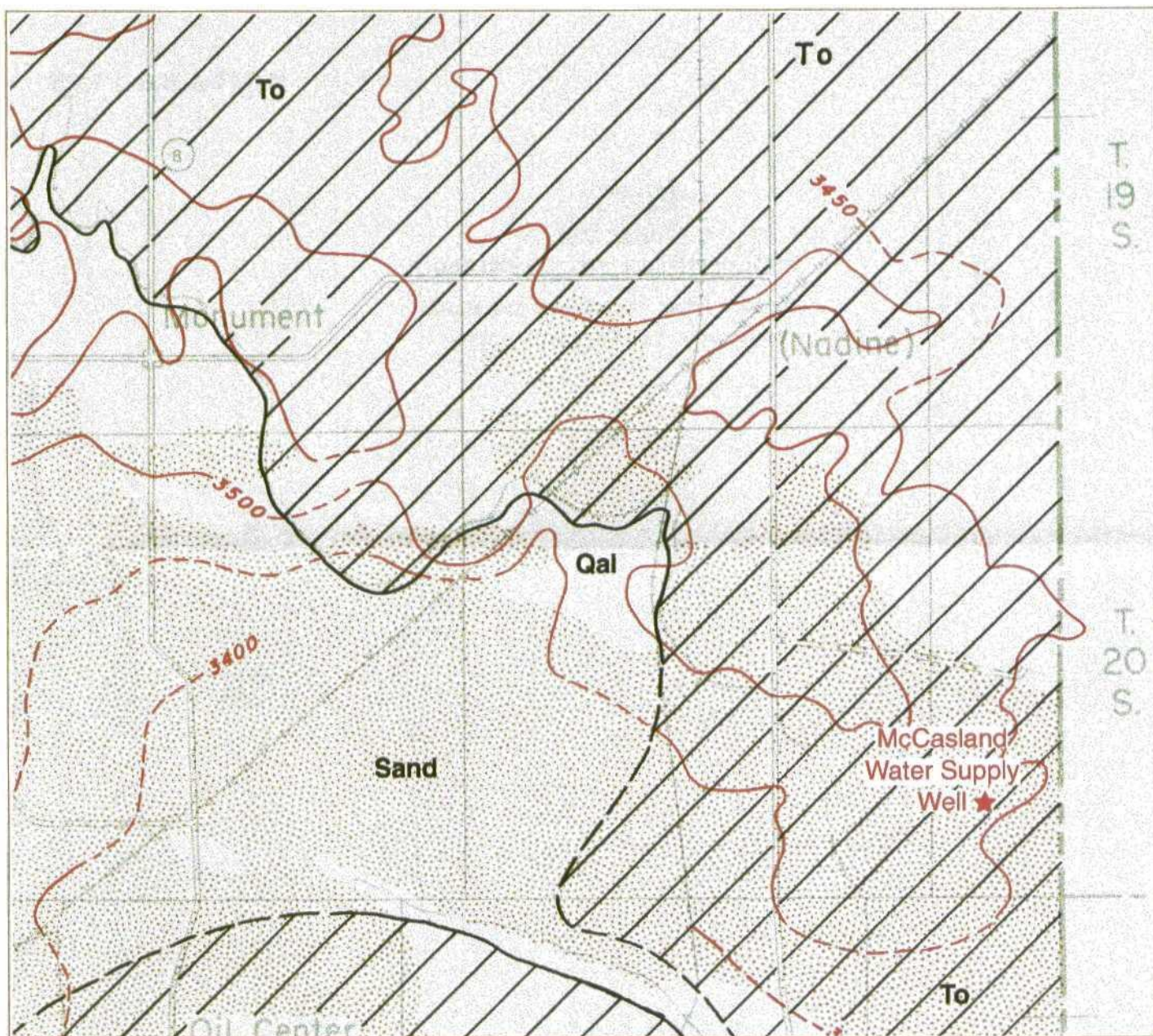


- Approximate position of boundary between Triassic rocks and saturated Tertiary and Quaternary rocks
- 3925 water-table contour in Tertiary or Quaternary rocks



1 mile 0 2 miles

October 12, 1998



Legend



Contours on the red-bed surface

Sand

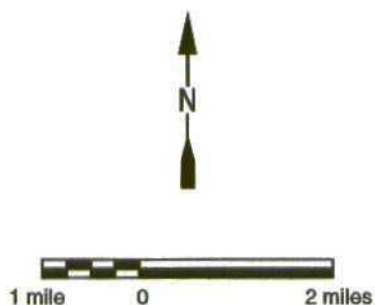
Thin cover of drift sand in most places;
locally dunes 20-40 feet high

To

Ogallala formation

Qal

Alluvium



R.T. HICKS CONSULTANTS, LTD.

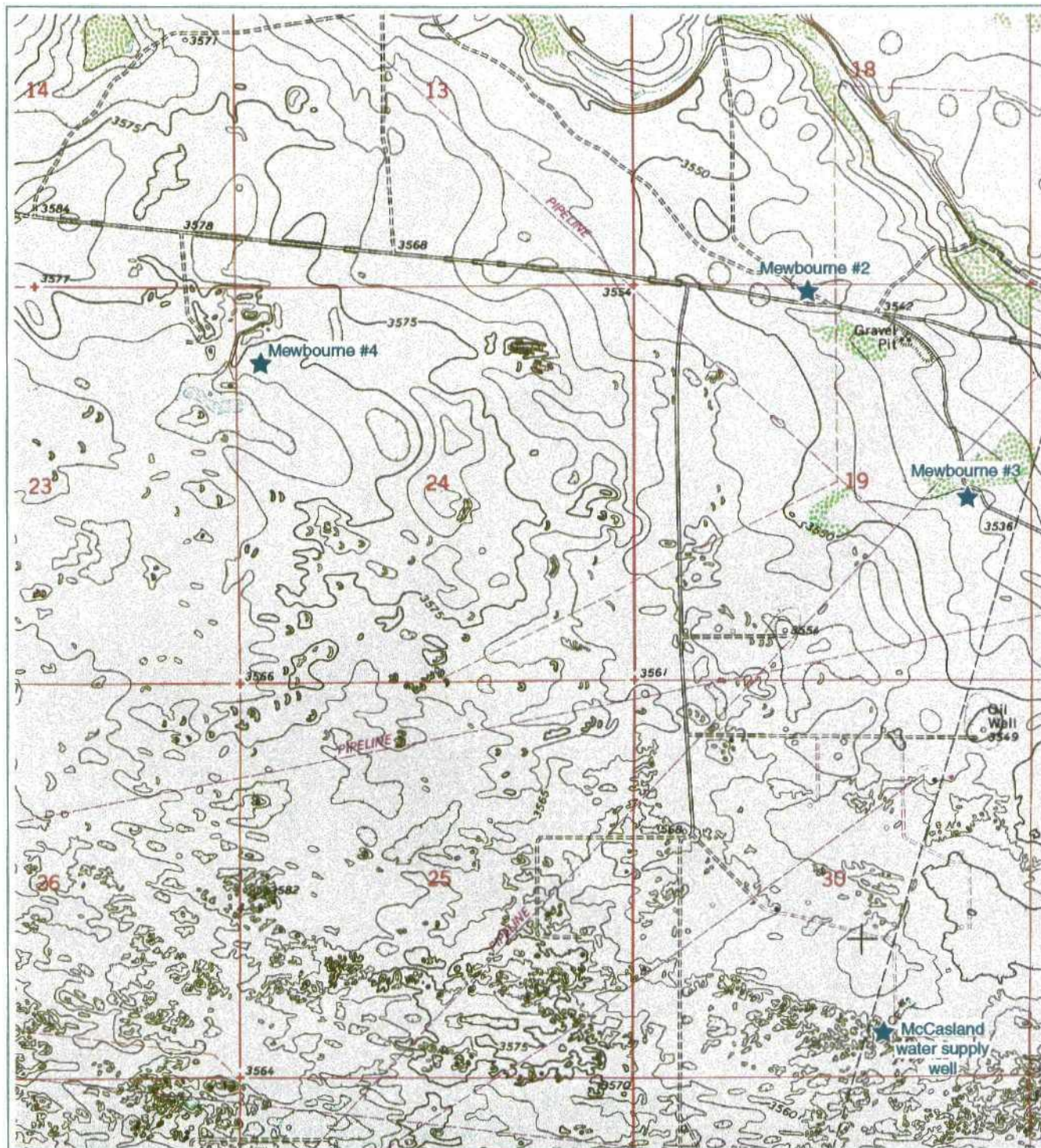
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Mewbourne Oil

Geologic Map of Southern
Lea County

Plate 3

October 12, 1998



Map source: USGS Hobbs SE, Tex.-N.Mex. 7.5 minute quadrangle map

1000 0 2000 feet



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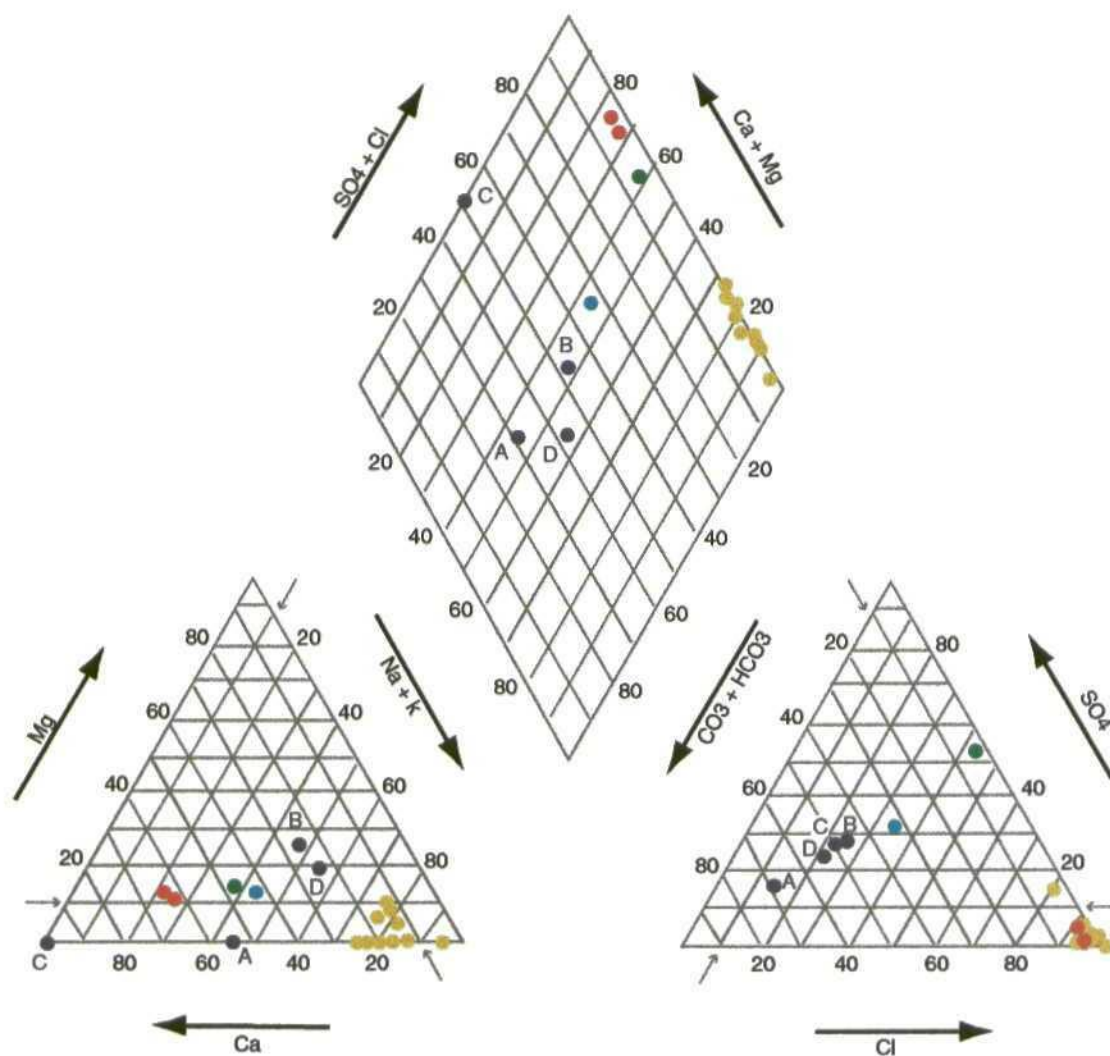
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Mewbourne Oil

Topographic Map

Plate 4

October 12, 1998



Legend

- Ogallala Well
- Mew #2
- Mew #4
- McCasland Well near Fed #2
- Oil Production Well

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Mewbourne Oil

Trilinear Diagram

Plate 5

October 12, 1998

APPENDIX A: Well Logs

TE ENGINEER OFFICE
WELL RECORD

Section 1. GENERAL INFORMATION

(A) Owner of well Dallas McCasland Owner's Well No. 2
Street or Post Office Address P.O. Box 206
City and State Eunice, NM 88231

Well was drilled under Permit No. L-10,044 and is located in the:

a. $\frac{1}{4}$ ~~NE~~ $\frac{1}{4}$ ~~EE~~ $\frac{1}{4}$ SE $\frac{1}{4}$ of Section 30 Township 20S Range 39E N.M.P.M.

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

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

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

(B) Drilling Contractor Dallas McCasland License No. WD 1196

Address P.O. Box 206, Eunice, NM 88231

Drilling Began 12-16-88 Completed 12-17-88 Type tools rotary Size of hole 7 7/8 in.

Elevation of land surface or _____ at well is _____ ft. Total depth of well 90 ft.

Completed well is ☒ shallow ☐ artesian. Depth to water upon completion of well 40 ft.

Section 2. PRINCIPAL WATER-BEARING STRATA

Depth in Feet		Thickness in Feet	Description of Water-Bearing Formation	Estimated Yield (gallons per minute)
From	To			
58	70	12	Gray sand	5

Section 3. RECORD OF CASING

[illegible]

Section 4. RECORD OF MUDDING AND CEMENTING

Depth in Feet		Hole Diameter	Sacks of Mud	Cubic Feet of Cement	Method of Placement
From	To				
					None

Section 5. PLUGGING RECORD

Plugging Contractor _____

Address _____

Plugging Method

Date Well Plugged _____

Plugging approved by: _____

State Engineer Representative

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

FOR USE OF STATE ENGINEER ONLY

Date Received **January 9, 1989**

Quad _____ FWL _____ FSL _____

File No. L-10,044 #2 Use EXP. Location No. 20.39.30.430

(THIS IS NOW STOCK WELL NO. L-10,056)

432.32

[Signature]
Driller

JAN 9 8 30 AM '89
STANLEY
ROSWELL

[illegible]

STATE ENGINEER OFFICE

WELL RECORD

Section 1. GENERAL INFORMATION

(A) Owner of well Dallas McCasland Owner's Well No. 3
 Street or Post Office Address P.O. Box 206
 City and State Eunice, NM 88231

Well was drilled under Permit No. L-10,044 and is located in the:

- a. SW 1/4 ~~XXX~~ 1/4 NW 1/4 NW 1/4 of Section 24 Township 20S Range 38E N.M.P.M.
 b. Tract No. _____ of Map No. _____ of the _____
 c. Lot No. _____ of Block No. _____ of the _____
 Subdivision, recorded in _____ County.
 d. X= _____ feet, Y= _____ feet, N.M. Coordinate System _____ Zone in
 the _____ Grant.

(B) Drilling Contractor Dallas McCasland License No. WD 1196
 Address P.O. Box 206, Eunice, NM 88231

Drilling Began 12-28-88 Completed 12-29-88 Type tools rotary Size of hole 6 1/4 in.

Elevation of land surface or _____ at well is _____ ft. Total depth of well 58 ft.

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

Section 2. PRINCIPAL WATER-BEARING STRATA

Depth in Feet		Thickness in Feet	Description of Water-Bearing Formation	Estimated Yield (gallons per minute)
From	To			
46	54	8	Gray sand	3

Section 3. RECORD OF CASING

Diameter (inches)	Pounds per foot	Threads per in.	Depth in Feet		Length (feet)	Type of Shoe	Perforations	
			Top	Bottom			From	To
4 1/2" ID	2.0	PVC			20'	none	38	56

Section 4. RECORD OF MUDDING AND CEMENTING

Depth in Feet		Hole Diameter	Sacks of Mud	Cubic Feet of Cement	Method of Placement
From	To				
					None

Section 5. PLUGGING RECORD

Plugging Contractor _____
 Address _____
 Plugging Method _____
 Date Well Plugged _____
 Plugging approved by: _____

State Engineer Representative

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

FOR USE OF STATE ENGINEER ONLY

Date Received January 9, 1989

Quad _____ FWL _____ FSL _____

File No. L-10,044 #3 Use EXP. Location No. 20.38.24.11333

(THIS IS NOW STOCK WELL NO. L-10,057)

[Signature]

This well was drilled 600' north from well #1.

SECRET

5 JAN 5 8 30 AM '88

[illegible]

WELL RECORD

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

Section 1

	716	FEL	
	1633	FNL	

(Plat of 640 acres)

(A) Owner of well ANNA L. FOSTER
 Street and Number STAR ST. A
 City HABBS State IND
 Well was drilled under Permit No. L-3519 and is located in the
E 1/2 1/4 NE 1/4 1/4 of Section 31 Twp. 19S Rge. 39E
 (B) Drilling Contractor M. L. FULFORD License No. WD124
 Street and Number 317 N. FORT ST.
 City HABBS State IND
 Drilling was commenced 3-23 1960
 Drilling was completed 3-26 1960

Elevation at top of casing in feet above sea level _____ Total depth of well 133 ft
 State whether well is shallow or artesian SHALLOW Depth to water upon completion 60

Section 2

PRINCIPAL WATER-BEARING STRATA

No.	Depth in Feet		Thickness in Feet	Description of Water-Bearing Formation
	From	To		
1	60	80	20	1st water sand
2	100	131	31	2nd water sand
3				
4				
5				

Section 3

RECORD OF CASING

Dia in.	Pounds ft.	Threads in	Depth		Feet	Type Shoe	Perforations	
			Top	Bottom			From	To
10		Welded	0	133	133	20 shoe	60	133

Section 4

RECORD OF MUDDING AND CEMENTING

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

Section 5

PLUGGING RECORD

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

Cement Plugs were placed as follows:

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

Basin Supervisor

FOR USE OF STATE ENGINEER ONLY

Date Received

APR 11 AM 9:50

File No.

L-3519

Use

JL

Location No.

19 39 31 280

22342

No.	Depth in Feet		Thickness In Feet	Color	Type of Material Encountered
	From	To			
0	8	8	8		Silt Soil
8	28	20	20		Clearer
28	53	25	25		Sandy Clay
53	60	7	7		Black Rock
60	80	20	20		1st water sand
80	95	15	15		Sandy Clay
95	100	5	5		Black Rock
100	131	31	31		2nd water
131	133	2	2		Red Rock

LS Elev 137'

Depth to K 345.6'

Elev of K 345.6'

Loc. No. 19.39.31.22342

Hydro. Survey Field Check X

SOURCE OF ALTITUDE GIVEN

X Interpolated from Topo. Sheet

Determined by Inst. Leveling

Other

STATE ENGINEER OFFICE
WELL RECORD

Revised
June 1972

Section 1. GENERAL INFORMATION

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

Street or Post Office Address E. Nadine Rd.

City and State Hobbs, New Mexico 88240

Well was drilled under Permit No. L-10,557 and is located in the :

a. _____ 1/4 _____ 1/2 N _____ 1/2 _____ 1/4 of Section 31 Township 19S
Range 39E N.M.P.M.

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

c. Lot No. _____ of block No. _____ of the _____

Subdivision, recorded in _____ County.

d. X= _____ feet, Y= _____ feet, N.M. Coordinate System _____

Zone in the _____ Grant

(B) Drilling Contractor Alan G. Fades License No. WD-1044

Address 1200 E. Bender Blvd., Hobbs, New Mexico 88240

Drilling Began 5-4-96 Completed 5-4-96 Type Tools Rotary Size of hole 7 7/8 in.

Elevation of land surface or _____ at well is _____ ft. Total depth of well 135 ft.

Completed well is ☒ shallow ☐ artesian Depth to water upon completion of well 75 ft.

Section 2. PRINCIPAL WATER-BEARING STRATA

Depth in Feet		Thickness in Feet	Description of Water-Bearing Formation	Estimated Yield (gallons per minute)
From	To			
75	135	60	Water Sand with Sandstone Stringers	35

Section 3. RECORD OF CASING

Diameter (INCHES)	Pounds per foot	Threads per in.	Depth in Feet		Length (feet)	Type of Shoe	Perforations	
			Top	Bottom			From	To
5 3/4	160psi				135		115	135

Section 4. RECORD OF MUDDING AND CEMENTING

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

Section 5. PLUGGING RECORD

Plugging Contractor _____

Address _____

Plugging Method _____

Date Well Plugged _____

Plugging approved by: _____

State Engineer Representative _____

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

Date Received 06/14/96 FOR USE OF STATE ENGINEER ONLY

Quad _____ F.W.L. _____ F.S.L. _____

File No. L-10,557 Use Domestic Location No. 19.39.31.21121

[illegible]

STATE ENGINEERING OFFICE
ROSWELL, NEW MEXICO
JUN 14 AM 10 58

Alan Eades by Andrew Root
Driller

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

STATE ENGINEER OFFICE

WELL RECORD

Section 1. GENERAL INFORMATION

(A) Owner of well _____ Owner's Well No. _____
 Street or Post Office Address _____
 City and State _____

Well was drilled under Permit No. _____ and is located in the:

- a. _____ $\frac{1}{4}$ _____ $\frac{1}{4}$ _____ $\frac{1}{4}$ of Section _____ Township _____ Range _____ N.M.P.M.
 b. Tract No. _____ of Map No. _____ of the _____
 c. Lot No. _____ of Block No. _____ of the _____
 Subdivision, recorded in _____ County.
 d. X= _____ feet, Y= _____ feet, N.M. Coordinate System _____ Zone in
 the _____ Grant.

(B) Drilling Contractor _____ License No. _____
 Address _____

Drilling Began _____ Completed _____ Type tools _____ Size of hole _____ in.

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

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

Section 2. PRINCIPAL WATER-BEARING STRATA

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

Section 3. RECORD OF CASING

Diameter (inches)	Pounds per foot	Threads per in.	Depth in Feet		Length (feet)	Type of Shoe	Perforations	
			Top	Bottom			From	To

Section 4. RECORD OF MUDDING AND CEMENTING

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

Section 5. PLUGGING RECORD

Plugging Contractor _____

Address _____

Plugging Method _____

Date Well Plugged _____

Plugging approved by: _____

State Engineer Representative

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

FOR USE OF STATE ENGINEER ONLY

Date Received Typed 1/27/78

Quad _____ FWL _____ FSL _____

File No. _____ Use 011 Location No. 21.38.8.42400

STATE ENGINEER OFFICE

WELL RECORD

Section 1. GENERAL INFORMATION

(A) Owner of well _____ Owner's Well No. _____
 Street or Post Office Address _____
 City and State _____

Well was drilled under Permit No. _____ and is located in the:

a. _____ $\frac{1}{4}$ _____ $\frac{1}{4}$ _____ $\frac{1}{4}$ of Section _____ Township _____ Range _____ N.M.P.M.

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

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

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

(B) Drilling Contractor _____ License No. _____

Address _____

Drilling Began _____ Completed _____ Type tools _____ Size of hole _____ in.

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

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

Section 2. PRINCIPAL WATER-BEARING STRATA

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

Section 3. RECORD OF CASING

Diameter (inches)	Pounds per foot	Threads per in.	Depth in Feet		Length (feet)	Type of Shoe	Perforations	
			Top	Bottom			From	To

Section 4. RECORD OF MUDDING AND CEMENTING

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

Section 5. PLUGGING RECORD

Plugging Contractor _____

Address _____

Plugging Method _____

Date Well Plugged _____

Plugging approved by: _____

State Engineer Representative

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

FOR USE OF STATE ENGINEER ONLY

Date Received Typed 1/27/78

Quad _____ FWL _____ FSL _____

File No. _____ Use 011 Location No. 21.38.8.44200

Diller

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

Section 7. REMARKS AND ADDITIONAL INFORMATION

[illegible]

סכסוכים ופיקוח

**STATE ENGINEER OFFICE
WELL RECORD**

FIELD ENGR. LOG

Section 1. GENERAL INFORMATION

(A) Owner of well Millard Deck Owner's Well No. _____
Street or Post Office Address P. O. Box 1047
City and State Eunice, New Mexico 88231

Well was drilled under Permit No. L- 7980 and is located in the:

- a. SE $\frac{1}{4}$ SW $\frac{1}{4}$ $\frac{1}{4}$ of Section 26 Township 20-S Range 38-E N.M.P.M.
b. Tract No. _____ of Map No. _____ of the _____
c. Lot No. _____ of Block No. _____ of the _____
Subdivision, recorded in Lea County.
d. X= _____ feet, Y= _____ feet, N.M. Coordinate System _____ Zone in
the _____ Grant.

(B) Drilling Contractor W. L. Van Noy License No. WD-208

Address P. O. Box 74 Oil Center, New Mexico, 88266

Drilling Began ~~JUNE~~ 6-1 Completed June 5, 1978 Drilling tools Spudder Size of hole 10 in.

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

Completed well is ☐ shallow ☐ artesian. Depth to water upon completion of well 65 ft.

Section 2. PRINCIPAL WATER-BEARING STRATA

Depth in Feet		Thickness in Feet	Description of Water-Bearing Formation	Estimated Yield (gallons per minute)
From	To			
<u>65</u>	<u>130</u>	<u>65</u>	<u>water sand.</u>	

Section 3. RECORD OF CASING

Diameter (inches)	Pounds per foot	Threads per in.	Depth in Feet		Length (feet)	Type of Shoe	Perforations	
			Top	Bottom			From	To
<u>6 5/8</u>	<u>welded</u>		<u>0</u>	<u>130</u>	<u>130</u>	<u>none</u>	<u>105</u>	<u>125</u>

Section 4. RECORD OF MUDDING AND CEMENTING

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

Section 5. PLUGGING RECORD

Plugging Contractor _____
Address _____
Plugging Method _____
Date Well Plugged _____
Plugging approved by: _____

State Engineer Representative

No.	Depth in Feet		Cubic Feet of Cement
	Top	Bottom	
<u>1</u>			
<u>2</u>			
<u>3</u>			
<u>4</u>			

FOR USE OF STATE ENGINEER ONLY

Date Received September 19, 1978

Quad _____ FWL _____ FSL _____

File No. L-7980 Use DOM. Location No. 20.38.26.34

From	To	Thickness in Feet	Color and Type of Material Encountered

[illegible]

INSTRUCTIONS: This form could be executed in triplicate, preferably typewritten, and submitted to appropriate district office of the State Engineer. All persons, except Section 5, should answer as completely and accurately as possible when well is drilled, repaired or deepened. When this form is used as a planning record, only Section 1(a) and Section 7 need be completed.

WELL RECORD

No. 2

Date of Receipt

Water Well for
Oil Well. Permit No.Name of permittee, Lowe Drilling CompanyStreet or P. O. Midland Tower Box 832, City and State Midland, Texas1. Well location and description: The shallow well is located in NW $\frac{1}{4}$, SW $\frac{1}{4}$,
(shallow or artesian)NW $\frac{1}{4}$ of Section 7, Township 20S, Range 39E; Elevation of top ofcasing above sea level, feet; diameter of hole, 7 inches; total depth, 97 feet;depth to water upon completion, 60 feet; drilling was commenced Dec. 28, 19 54,and completed Dec. 29, 19 54; name of drilling contractor O. R. MusslewhiteBox 56; Address, Hobbs, New Mexico; Driller's License No. WD 99

2. Principal Water-bearing Strata:

	Depth in Feet		Thickness	Description of Water-bearing Formation
	From	To		
No. 1	<u>60</u>	<u>95</u>	<u>35</u>	<u>Sand and sand rock, broken</u>
No. 2				
No. 3				
No. 4				
No. 5				

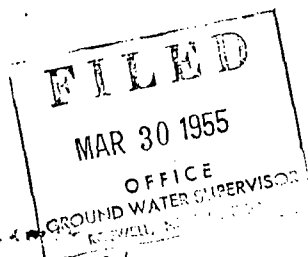
3. Casing Record:

Diameter in inches	Pounds per ft.	Threads per inch	Depth of Casing or Liner Top	Bottom	Feet of Casing	Type of Shoe	Perforation From	To
<u>7</u>	<u>24</u>	<u>8</u>	<u>0</u>	<u>97</u>	<u>97</u>	<u>None</u>	<u>67</u>	<u>97</u>

4. If above construction replaces old well to be abandoned, give location: $\frac{1}{4}$, $\frac{1}{4}$, $\frac{1}{4}$

of Section, Township, Range, name and address of plugging contractor,

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



L-2898

G.W.D.

20.397 3112

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

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

Approved: _____

D. R. Macdonald

[illegible]

STATE ENGINEER OFFICE
WELL RECORD

Section 1. GENERAL INFORMATION

(A) Owner of well _____ Owner's Well No. _____
Street or Post Office Address _____
City and State _____

Well was drilled under Permit No. _____ and is located in the:

- a. _____ $\frac{1}{4}$ _____ $\frac{1}{4}$ _____ $\frac{1}{4}$ _____ of Section _____ Township _____ Range _____ N.M.P.M.
b. Tract No. _____ of Map No. _____ of the _____
c. Lot No. _____ of Block No. _____ of the _____
Subdivision, recorded in _____ County.
d. X= _____ feet, Y= _____ feet, N.M. Coordinate System _____ Zone in
the _____ Grant.

(B) Drilling Contractor _____ License No. _____

Address _____

Drilling Began _____ Completed _____ Type tools _____ Size of hole _____ in.

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

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

Section 2. PRINCIPAL WATER-BEARING STRATA

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

Section 3. RECORD OF CASING

Diameter (inches)	Pounds per foot	Threads per in.	Depth in Feet		Length (feet)	Type of Shoe	Perforations	
			Top	Bottom			From	To

Section 4. RECORD OF MUDDING AND CEMENTING

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

Section 5. PLUGGING RECORD

Plugging Contractor _____

Address _____

Plugging Method _____

Date Well Plugged _____

Plugging approved by: _____

State Engineer Representative

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

FOR USE OF STATE ENGINEER ONLY

Date Received Typed 1/27/78

Quad _____ FWL _____ FSL _____

File No. _____ Use 011 Location No. 21.38.9 44200

990' FSL - 330' FEL

Cable 1616-4360;

Rotary 0-1616

Record of Casting: 8 5/8" 7" 4318' - 1613'

Record of Casting: 8 5/8"

Wythe #1

Owner/ Elliot Oil Co.

Location: 21.38.9.4200-34 2243

This well record is an excerpt from Oil Conservation Commission files at Hobbs, N.M.

Section 7. REMARKS AND ADDITIONAL INFORMATION

[illegible]

APPENDIX B: Chain of Custody Form



7300 JEFFERSON, N.E.
ALBUQUERQUE, NEW MEXICO 87109
(505) 345-8964

**3332 WEDGEWOOD
EL PASO, TEXAS 79925
(915) 593-6000**

Page 1 of 1

Lab job no.: _____ Date _____

Client Hicks Consulting Project Manager / Contact M. Hicks

Address 4665 Tadiosa Suburban NE Ste 106 Telephone No. 216-5504

City / State / Zip Albany NY 12210 Fax No. 516-47738

Project Name / Number	Samplers: (Signature)
3	

Contract / Purchase Order / Quote _____

IAD FRACTION NUMBER	Field Sample Number / Location	Date	Time	Sample Type	Type / Size of Container	Preservation	
						Temp.	Chemical
OFFICE USE ONLY	FeL #2	9/1/98	10:30	G	PLA 500 ml		HNO ₃
	FeL #2	9/1/98	10:30	G	PLA 500 ml		
	M _{new} #2	9/1/98	10:30	G	PLA 500 ml		HNO ₃
	M _{new} #2	9/1/98	10:30	G	PLA 500 ml		
	M _{new} #4	9/1/98	11:20	G	PLA 500 ml		HNO ₃
	M _{new} #4	9/1/98	11:20	G	PLA 500 ml		
OFFICE USE ONLY							
OFFICE USE ONLY							
OFFICE USE ONLY							
OFFICE USE ONLY							
OFFICE USE ONLY							

Relinquished by: Signature <u>[Signature]</u> Printed <u>[Name]</u> Company <u>[Company]</u> Reason _____	Received by: Signature <u>[Signature]</u> Printed <u>[Name]</u> Company <u>[Company]</u> Reason _____	Date <u>12/15/78</u> Time <u>8:00</u>	Method of Shipment: _____ Shipment No. _____ Special Instructions: _____
Comments: _____ _____ _____			

[illegible]

FIELD FILE