## 1R - 177

# REPORTS





#### R.T. HICKS CONSULTANTS, LTD.

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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<sub>4</sub>) 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 Nicholsen & 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  $\mu$ mhos/cm, predominately calcium and chloride. The water from MEW #2 shows a conductivity of 1,160

 $\mu$ mhos/cm. Carbonate is the highest anion concentration at 275  $\mu$ g/l and the cations calcium and sodium are each approximately 100  $\mu$ g/l. In MEW #4 calcium and sulfate are the dominant cations and anions, respectively. The specific conductance of MEW #4 is 3,700  $\mu$ 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<sub>4</sub>) 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.
- 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, Randall T. Hicks Principal

Melissa Snodgrass Staff Engineer

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

Ortho. P Sulfate Alkalinity Conductivity Anion Sum Cation Sum Cat-An Balance µg/n µg/l µmhos/cm meq/l meq/l % Nitrite µg/l Table 1: McCasland Well Analytical Results - September 1, 1998 Nitrate µg/I Hg/ N Nort иZ л ы Na/I/дч is il х р рви М Fe µg/I hg/i Parameter Units

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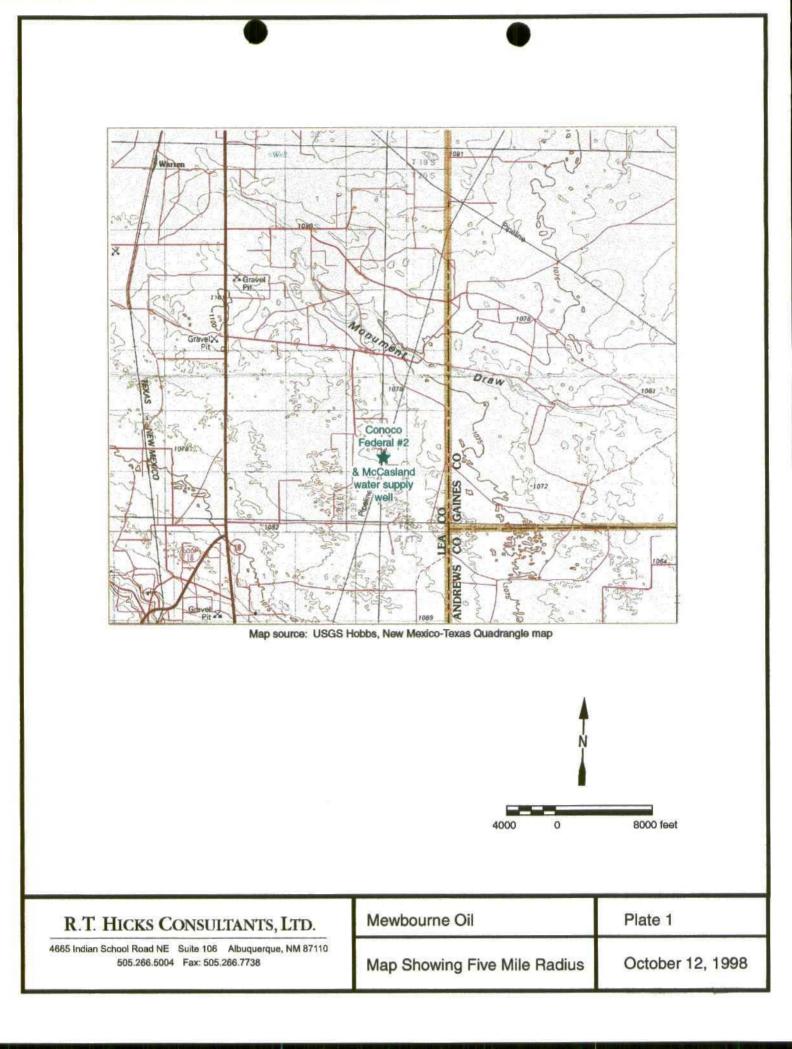
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Location	30 ft. from C.F. #2		Mew #4 2 mi NW of C.F. #2
Lab ID	Fed #2	Mew #2	Mew #4

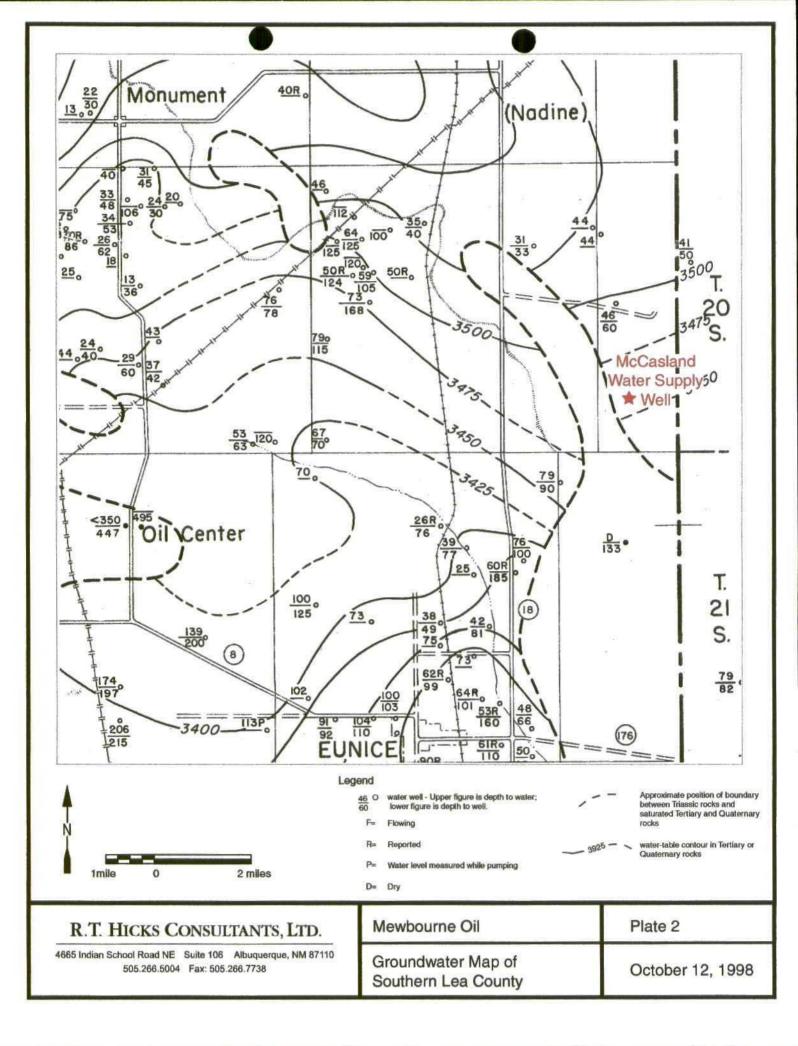
# Table 2: Ion Concentrations and Percentages for Nearby Wells

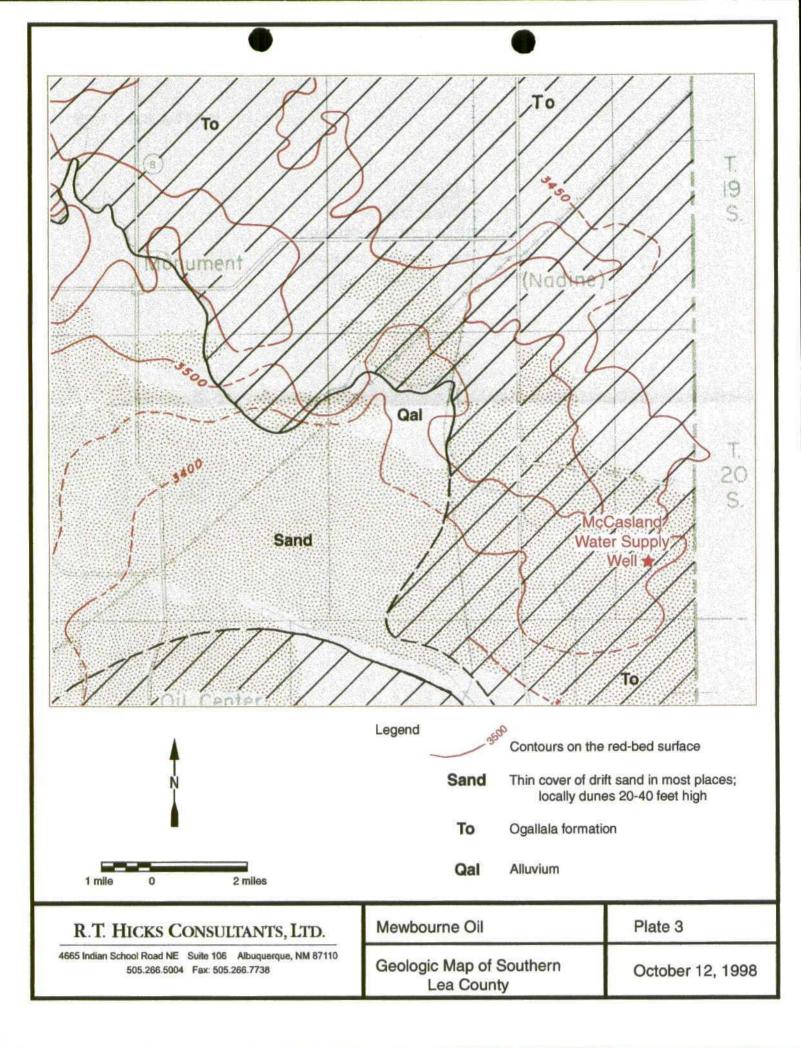
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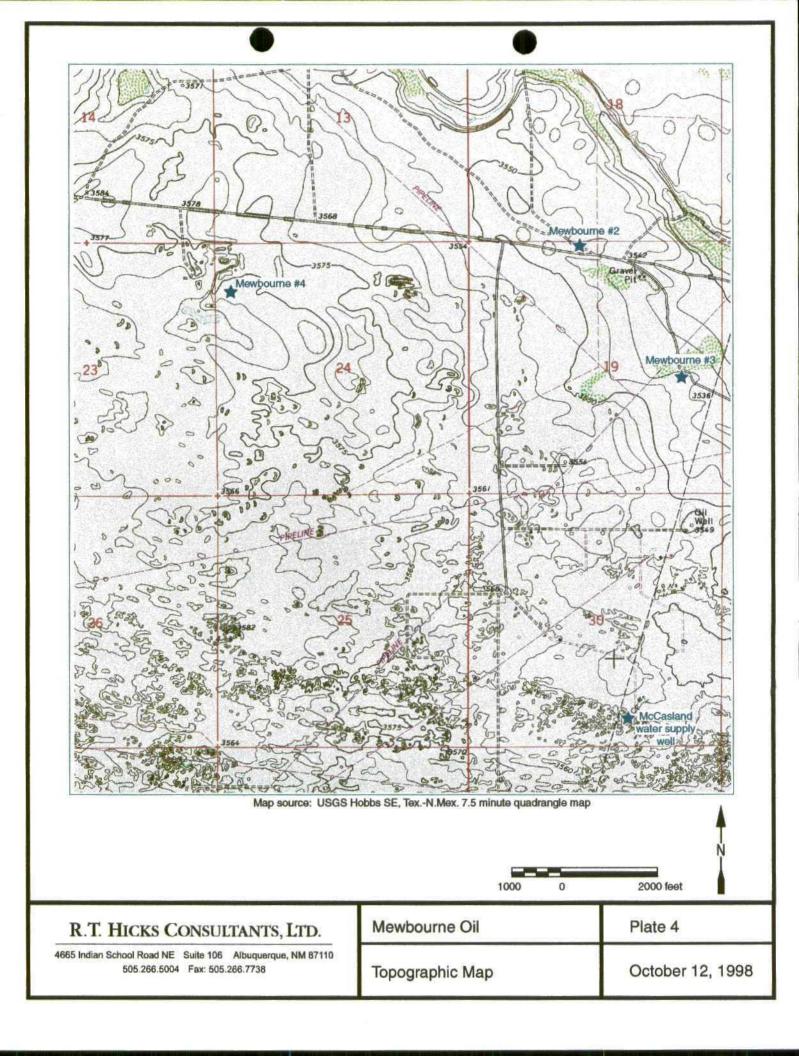
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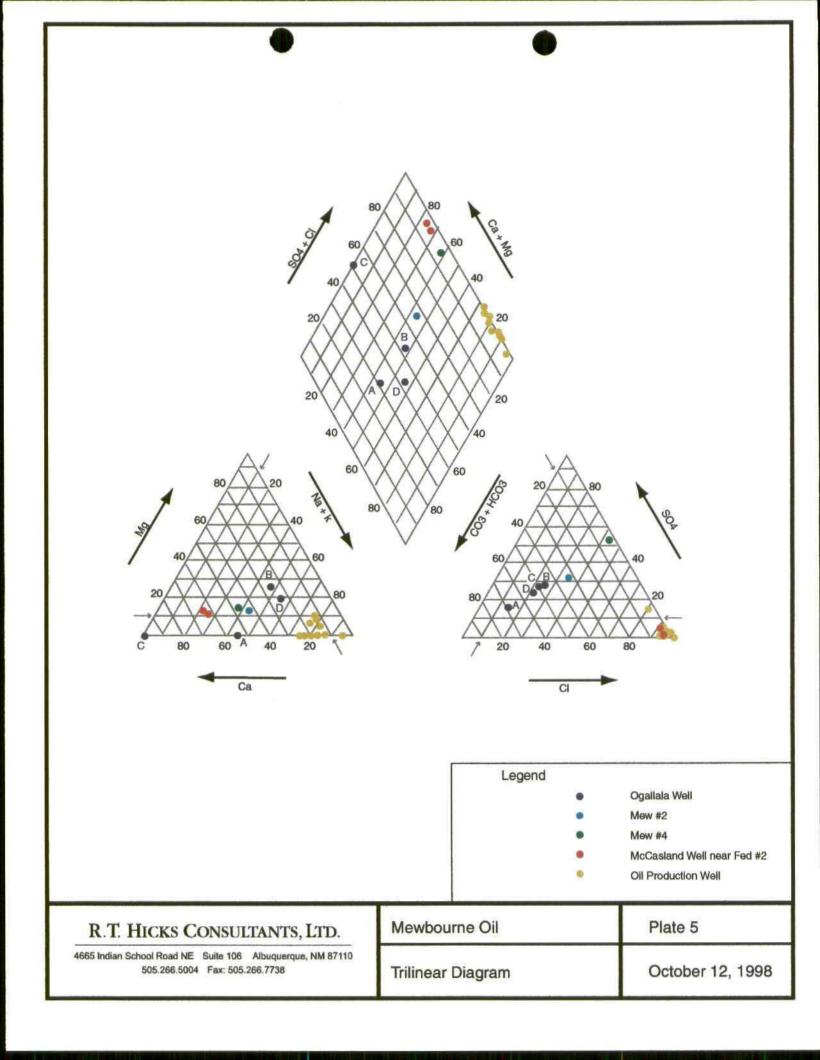
• Data from A. Nicholson, Jr. and A. Clebsch, Jr., Geology and Ground-water Conditions in Southern Lea County, New Mexico, USGS, 1961.











## **APPENDIX A: Well Logs**

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Section 7. REMARKS AND ADDITIONAL INFORMATION



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



INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the appropriate district office of the State Engineer. All t s, except Section 5, shall be answered as completely and accurate' ossible when dilled, repaired or deepened to this form is used as a place is a place is a split of the State Engineer. All t is form is used as a place is a place is the State is and Section 1(a) and Section 1(a) and Section 2, be completed at the State Engineer.

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(B)	Drilling (	Contractor	<u> </u>	Dal	las McCasland		_ License No	WD 1196	
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					None					
					1					

#### Section 5. PLUGGING RECORD

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Plugging appro-	ved by:				2			
	_ <u></u>	····			3			
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Color and Type of Material Encountered	Thickness		

Section 7. REMARKS AND ADDITIONAL INFORMATION



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

THE UM

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the appropriate district office of the State Engineer. All the State Engineer. All the state of decepended or dec

Form WR-23

FIELD ENGR. LUG





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

Section	1			(A) Owner of well ANNA L. Foster
		ł		Street and Number <u>STAR</u> <u>RF</u> <u>H</u> City <u>ABBS</u> State <u>State</u>
	716	FEL		Well was drilled under Permit No. $h^{-35/9}$ and is located in the $E_{34}^{-4}$ $N = \frac{19}{4}$ of Section $3/$ Twp. $195$ Rge. $39F$
	1633	FNL		(B) Drilling Contractor Dick Fulling / Micense No. 100124 Street and Number <u>3/9</u> ) Four etc. City <u>Hebb5</u> State <u>17</u> 27
				CityState $777$ Drilling was commenced $3 - 2.5$ $19.60$ Drilling was completed $3 - 2.6$ $19.60$

(Plat of 640 acres)

Total depth of well 1334 Elevation at top of casing in feet above sea level..... State whether well is shallow or artesian 5 / ALLOW Depth to water upon completion 60

Section	n 2		PRINCIPAL	WATER-BEARING STRATA
No. Depth in F		in Feet	Thickness in Feet	Description of Water-Bearing Formation
1	60	80	JZ ()	1 st water Sand
2	100	131	31	2nd Wille Sand
3				
4				
5				·

Section 3	3			RECOR	D OF CAS	ING		
Dia	Pounds	Threads	D	epth	Feet	Type Shoe	Perfo	rations
in.	ft.	in	Top	Bottom	reet	Type Bloe	From	То
16		Wilded	C	133	133	No Stare	60	133
			·					

Section 4	

RECORD OF MUDDING AND CEMENTING

Depth	in Feet	Diameter Hole in in.	Tons Clay	No. Sacks of Cement	Methods Used
	 1				

Section 5

#### PLUGGING RECORD

Name of Plugging Contractor	License No,
Street and Number	City State
Tons of Clay used	sedType of roughage
Plugging method used	Date Plugged19
Plugging approved by:	Cement Plugs were placed as follows:
Basin Supervisor	No. Depth of Plug From To No. of Sacks Used
FOR USE OF STATE ENGINEER ONLY JULIE Date Received SUB HU II USE File No. 2-35/9 Use. 2	1 Location No. /9, 3.9. 3/. 200
	22342

MERI	40	901
1 13/91	30	501

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			}	}
				1
				1
Interpolated from Topo. Sheet				
SOURCE OF ALTITUDE GIVEN			·	
				<b> </b>
Hydro Survey Field Check				ļ
			L	
THECT '18 '68 '61 '00 '001				
				1
254601 30 NOI3				
/ CET X of Ulday				+
. 1858	<u> </u>		5	<u> </u>
			·	<u> </u>
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min fre		2	251	12
and with		18	1 &1	P G
Y style for all		Ş	201	2
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125 with Sind		OC	08	00
Hard and		4	09	E.
- Swith Chry		58	55	82
Cleartic		108	8€	8
Sut Suil		8	5	0
	·····		oT	mora
Type of Material Encountered	Color	Thickness in Feet		i hidəci *

 $\left| {{l_{\rm F}}} \right|$ 

Mr Julier

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									Revised
			ទ	TATE ENGIN WELL RE	ieer offici Cord	=			Junø 1972
			Section 1.	GENERA	L INFORMA	NON		1	
(A) Owner	of well	layson U	ssery	<u></u>		•	o	wner's W	/ell No.
Street o	or Post O	ffice Add	ress <u>E.N</u>	adina Rd.					· · ·
City and	State _	lobbsNe	w Mexico	88240			· · · ·		
Well was drill	•					and is	located in t	he:	
						-	<u>31</u> Tov		95
		ł			•••••				
b. Tract	No		of Map No	·		of the _			<u> </u>
c. Lot N	o	(	of block No.	. <u></u>		of the			
				-					
d. X=			.feet,Y≖ _		feet,N	.M. Cod	ordinate Sys	stem	<u></u>
Zone	inthe								Grant
(B) Drilling (	Contractor	r <u>Alan G</u>	Eades				_License N	No. WD	-1044
Address_120	0 E. Bend	der Blvd.	Hobbs, Ne	w Mexico	88240				·
Drilling Begar	n <u>5-4-96</u>	Cor	npleted 5	4-96	Туре То	als <u>Ro</u>	otary	Size of	hole <u>7_7/8_</u> in.
Elevation of I	and surfa	ace or	6	nt well is _		ft. T	otal depth	of well <u>1</u>	<u>35 </u> ft.
Completed w	ell is 区	shallo	w 🛄 ar	tesian i	Depth to wa	ater upo	n completic	on of wel	1 <u>75</u> ft.
		Sectio	n 2. PRI		WATER-BE	ARING	STRATA		
Depth in I		Thickne	1 134	escription	of Water-B	aarina f	ormation		mated Yield
From 75	<u>To</u> 135	<u>in Fee</u> 60	L	•	h Sandstor				ns oer minute) 35
					<u></u>				
l			Section	n 3. REC	ORD OF C	ASING			
Diameter F	ounds	Threads	Depth	in Feet	Length	Τ	( 0)	Per	forations
(INCHES)		oer in.	Too	Bottom	(feet)		be of Shoe	From	To
5 3/4	160psi				135			115	135
Ł_	<b>I</b>	Section	4. RECO	RD OF N		AND CI	EMENTING	<u>.                                    </u>	
Depth in Fe		Hole	Sacks		c Feet		Method of	Placeme	ent
From	To Di	ameter	of Mud		ament			_	
							<u>-</u>		
	A				GGING RI	CORD			
Plugging Con			·····			- No.	Depth in		Cubic Feet
Address						-	Too	Bottom	of Cement
Plugging Meth			_		v	- 2			<u> </u>
Date Well Plug			· · _/			- 3	[		
Plugging appr	oved by:					_ 4	·	{	
			Engineer				· · · · · · · · · · · · · · · · · · ·		
Date Received	06/1	L4/96 I	OR USE		ENGINEE		-		CI
	L-10,55				mestic		M		

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i.

		S	ection 6. LOG OF HOLE
Depth	in Feet	Thickness in Feet	Color and Type of Material Encountered
_ <b>∌</b> rom 0	1	1	Top Soil
1	32	31	Caliche
32	34	2	Sandstone
34	73	39	Sand & Sandstone Stringers
73	75	2	Sandstone
75	135	60	Water Sand with Sandstone Stringers
	·		
	·		
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			·
	<u> </u>		
			Jayson Ussery

Section 7. REMARKS AND ADDITIONAL INFORMATION

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

Driller

EN NEXICO

AM 10 58

#### **INSTRUCTIONS:**

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

Section 1. GENERAL INFORMATION   (A) Owner of well	
Street or Post Office Address	
•	
a ¼ ¼ ¼ of Section Township Range No 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 the	
(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   Description of Water-Bearing Formation   Estimated Yiel (gallons per minit)	

.

То

#### Section 3. RECORD OF CASING Diameter (inches) Pounds per foot Threads per in. Length (feet) Depth in Feet Perforations Type of Shoe From Тор Bottom

Depth in Feet		Hole	Sacks	Cubic Feet	Method of Placement
rom	То	Diameter	of Mud	of Cement	method of Placement
			······································		
					•

#### Section 5. PLUGGING RECORD

				—   <sub>No.</sub>  -	Depth	in Feet	Cubic Feet
				NO	Тор	Bottom	of Cement
oate Well Plugge	:d						
lugging approve	ed by:			2			
		State En	gineer Representative	4			
Date Received	Typed	1/27/78	FOR USE OF STATE EN	GINEER ONLY			-
-		•	Quad _		FW	L	. FSL
File No			01 Use	1	Ocation No.2	1.38.8.424	00

#### Section 6, LUG UF HOLE

REMARKS AND ADDITIONAL INFORMATION		T	· ·
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			0191
silana bed bear		0191	1255
ked bed		1552	75
and and the state of the state		·	+
pues		75	0
Color and Type of Material Encountered	in Feet	οT	From
	Thickness	n Feet	Depth i

This well record is an excerpt from 041 Conservation Commission files at Hobbs, N.M.

Elevation: 3576' DF of

Косастоп: 21.38.8.42400 Оwner: Elliott 011 Co. Parcell #3 Record of Casing: 8 5/8" - 1621' - 1612' - 1612'

1020, EST - 330, EET

/

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

Driller

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INSTRUCTIONS: This form "hould be executed in triplicate, preferably typewritten, and submitted to "he appropriate district office of the State Engineer. All one, except Section 5, shall be executed as completely and accurat possible when drilled, repaired or deepenee. Then this form is used as a pitting record, only Section 1(a) and Section need be complete advilled, repaired or deepenee.

•	i series		WELL F	ECORD	فميزريعه	Revised June 1972
			Section 1. GENER	L INFORMATION		
Street or Post (	Office Address	;				
Well was drilled unde	r Permit No			and is located in t	he:	
a ¼	¼	¼	¼ of Section	Township	Range	N.M.P.M.
b. Tract No	of	Map No	0	i the		- <u>,,</u>
c. Lot No Subdivision,	of Bl recorded in _	ock No	o	f the County.		
		•		· · · · · · · · · · · · · · · · · · ·		Zone in Grant.
(B) Drilling Contra	ctor				icense No	
Address	······			· · · · · · · · · · · · · · · · · · ·		
Drilling Began		Comple	ted	Type tools		. Size of hole in.
Elevation of land surf	ace or		al	well is ft	. Total depth of	wellft.
Completed well is	🖾 shallov	v 🗆 arte	esian.	Depth to water upo	n completion of	well ft.
		Sectio	n 2. PRINCIPAL WA	TER-BEARING STRA	ГА	
Depth in Fee	-	hickness in Feet	Description	of Water-Bearing Form	ation	Estimated Yield (gallons per minute)
				<u> </u>		

Diameter	Pounds	Threads	· · · · · · · · · · · · · · · · · · ·	in 3. RECORD	OF CASING Length		Perfor	rations
(inches)	per foot	per in.	Тор	Bottom	(feet)	Type of Shoe	From	To
							1	
							+	
					Ì		}	
l						· ·	L	

		Section	4. RECORD OF M	UDDING AND C	EMENTING
Depth	in Feet	Hole	Sacks	Cubic Feet	Method of Placement
From	То	Diameter	of Mud	of Cement	Method of Placement
	·				
					······································
				1	
				1	

#### Section 5. PLUGGING RECORD

Address				- No	Depth	in Feet	Cubic Feet
Plugging Method _					Тор	Bottom	of Cement
Date Well Plugged.							
Plugging approved	by:			2			
		State Eng	incer Representative	$-\frac{3}{4}$			
Date Received	Typed	1/27/78	FOR USE OF STATE ENG	INEER ONLY			<u>, and and a second s</u>
		•	Quad		FWI	·	FSL
File No			011	L	ocation No	21.38.8.44	200

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		· · _ · · _ · · · · · · · · · · · · · ·	Р. н. ———————————————————————————————————
Red bed, anhydrite		66ST	297T
Red bed and shells		7462	557
ked beg	<del> </del>	EET	25
pues		22	0
	in Feet	T	From
Section 6, LUG, OF HULE: Color and Type of Material Encountered	Thickness	in Feet	Depth

This well record is an excerpt from 011 Conservation Commission files at Nobbs, N.M. Location: 21.38.8.44200 Elevation: 3577' DF  $o_{\mathcal{K}}$  Towner: Elliot 011 Co. Parcell #2

,9TE7 -

,709T -

Record of Casing: 8 5/8" 5 1/2" Sotary

'n,

060, EST - 330, EEF

1

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

Driller

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INSTRUCTIONS: This form "hould be executed in triplicate, preferably typewritten, and submitted to "he appropriate district office of the State Engineer. All one, except Section 5, shall be answered as completely and accurat possible whe drilled, repaired or deepeneu: "then this form is used as a provide the section 1(a) and Section need be complete area of the state transfer or deepeneu: "then this form is used as a provide the section 1(a) and Section 1(a) and Section area of the section 1(b) and Section area of the section 1(a) area of the section 1(a) and Section area of the section 1(a) area of the section 1(a)

· •			STA	TE ENGI	INEEI	R OFFICE		14. J.	Vi	sed June 1972
				WELL	REC	ORD	:		FIELD E	NGR. 1.OU
			Section 1	. GENER		NFORMATIC	ол			•
(A) Owner o	f wellMi	llard De	eck				;	Owner's We	ell No	. · · · ·
Street or	Post Office Ac State	idress <u>P.</u> Eunice.	<u>O. Box</u> New Me	<u>1047</u> xico						
-				-						
	d under Permit									
a. <u>5</u> E	_ ¼ <u>SW</u> ½	· ¼	¼ of Se	ction	26	Township	<u>20-S</u> _	Range	<u>_38-E</u>	N.M.P.M.
b. Tract	No	of Map No			of the		<u> </u>		<u></u>	<u>_</u>
c. Lot N	o vision, recorde	of Block No.			of the					
	- <u></u>									
(B) Drilling (	Contractor	<u>W. L. Va</u>	n Noy				License	NoWI	-208	·····,
Address	P,	O. Box	74 (	Dil Co	ente	er, New	Mexico,	-88266		<u> </u>
Drilling Began	INNEL	6-1_ Com	pleted <u>J</u> 1	ine 5	, 19	78pe tools	Spu	dder	Size of hole_	<u></u>
Elevation of la	nd surface or _				at wel	1 is	ft. Tota	l depth of w	ell130	) ft,
```		hallow 🗆 i				Depth to wat				
Completed wel	i 15 🖵 S	i لے nanow	artesian.			Depth to wat	ter upon com	pletion of w	en	It.
Depth	in Feet	Sec	tion 2. PRIN	CIPAL W	ATEF	R-BEARING	STRATA		Estimated	Vield
From	То	in Feet	' <u> </u>	Descriptio	on of V	Water-Bearing	g Formation		(gallons per	
65	130	65		water		nd.				
				-Wab91						
	<u>}</u>	<u>}</u>					· · · · · · · · · · · · · · · · · · ·			
									······································	
l		<u> </u>				·····				I
·		······	Section	n 3. REC	ORD	OF CASING			· ,	
Diameter (inches)	Pounds per foot	Threads per in.	Depth Top	in Feet Botto		Length (feet)	Type	of Shoe	Perfo From	rations To
		<u> </u>								
6 5/8	weld	ied	0	130		130	non	e	105	125
		┨─────┤.				<b>├</b> ───				
L						l		<del></del>	<u> </u>	
		Secti	ion 4. RECOR	RD OF M	UDDI	ING AND CE	MENTING			
Depth From	in Feet To	Hole Diameter	Sack of Mu			bic Feet Cement		Method of	Placement	
	<u>_</u>									
		<u>}</u>			<u> </u>					
										ŀ

#### Section 5. PLUGGING RECORD

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Plugging Method					Cubic Feet
		No	Тор	Bottom	of Cement
Date Well Plugged		1			
Plugging approved by:	•	2		1	
		3			
	State Engineer Representative	4			

Use.

DOM.

File No	L-7980

Quad \_\_\_ \_ FWL \_

\_\_\_\_ FSL

\_\_ Location No. 20.38.26.34

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	59	067	59
ματά τοςκ	5	59	09
sand rock	06	09	30
caliche	52	٥٤	Ş
Lios got	Ş	5	0
Color and Type of Material Encountered	in Feet	oT	From
Section 6. LOG OF HOLE	Thickness	n Feet	i AtgaO

Section 7. REMARKS AND ADDITIONAL INFORMATION



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

12 Alton Par

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of the State Engineer. Al. of the State Engineer. Al. of the State Engineer. Al. ons, except Section 5, show answered as completely and accurate. defined, repaired or deepeneu. When this form is used as a plue grecord, only Section 1(a) and Section : need be completed.

					RECORD	•	
2	Date of R	eceipt				Permit No.	Water Wel 011 Well.
		-	• ]	owe Drilling	Company		1.1
•	- 1			. •	, City and State		1
		*			I is located in		4 ' IA
	19/19/2 19/0	STREET, STREET		1996 gale 1996 Sec.	أبال المترج والمحاجب والرائية		1 1
	1 · · · ·	1.1.1			205, Range		
					r of hole,		
			· .		ame of drilling contra		-
					w Mexico ; Dr	1	
	<del>.</del> .	2 25	1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -	<b>88,</b>	n north dot chara	iller's License No	MP
		Depth	earing Strata:	Thickness	Description	of Water-bearing Formatio	
	No. 1	From	To				
	No. 2	<u>60</u>	95	35	Sand and sai	nd rock, borken	l
	No. 3	<u> </u>	· · · · · · · · · · · · · · · · · · ·			· · · · · · · · · · · · · · · · · · ·	
	No. 4						· · · · ·
	No. 5		<u>                                      </u>		· · · · · · · · · · · · · · · · · · ·	······································	
	3. Casing	Record:					
	3. Casing		Threads Det	th of Casing or Liner	Feet of	Per	foration
	3. Casing Diameter in inches	Pounds per fi.	per inch	th of Casing or Liner Top Bottom	Feet of Casing Type o	f Shoe From	To
	Dismeter	Pounds	Threads Dep per inch	th of Casing or Liner Top Bottom 0.97	Casing Type o		To
	Dismeter	Pounds per fi.	per inch	Top Bottom	Casing Type o	f Shoe From	To
	Dismeter	Pounds per fi.	per inch	Top Bottom	Casing Type o	f Shoe From	To
	Dismeter	Pounds per fi.	per inch	Top Bottom	Casing Type o	f Shoe From	To
	Dismeter	Pounds per fi.	per inch	Top Bottom	Cading Type o	f Shoe From	т. 9.7
	Diameter in taches 	Pounds per ft. 214	per inch 	Top Bottom	Cading Type o	4 Shoe Prom 1018 67	то 97
	Diameter     1     7	Pounds per ft. 214	per inch     8	Top Bottom 0 97	Cading Type o	1 Shoe From Ione 67	To 97 4,
	Diameter     1     7	Pounds per ft. 214	per inch     8	Top Bottom 0 97	Casing Type o 97	1 Shoe From Ione 67	To 
	Diameter in inches 7 4. If above of Section	Pounds per ft. 214  e construction	per inch     8	Top Bottom 0.97	Casing Type o 97	Ione 67	To 
	Diameter   n inches   7   4. If above of Section	Pounds per ft. 24 	per inch   8	Top Bottom 0 97	Cadag Type o 	I Shoe From Ione 67 	To
	Diameter   n inches   7   4. If above of Section	Pounds per ft. 24 e construction lon	per inch   8	Top Bottom 0 97 well to be abandon , Range , 19	Cading Type of 97	if Shee   From     Ione   67	To
	Diameter   n inches   7   4. If above of Section	Pounds per ft. 24 e construction lon	per inch   8	Top Bottom 0 97 well to be abandon , Range , 19	Cadag Type o 	if Shee   From     Ione   67	To
	Diameter   n inches   7   4. If above of Section	Pounds per ft. 24 e construction lon	per inch   8	Top Bottom 0 97 well to be abandon , Range , 19	Cadag Type o 	if Shee   From     Ione   67	To
	Diameter   n inches   7   4. If above of Section	Pounds per ft. 24 e construction lon	per inch   8	Top Bottom 0 97 well to be abandon , Range , 19	Cadag Type o 97. N ed, give location: ; name au ; describe how well	A Shoe From 1000 From 67	To
	Diameter   n inches   7   4. If above of Section	Pounds per ft. 24 e construction lon	per inch   8	Top Bottom 0 97 well to be abandon , Range , 19	Cadag Type o 97. A ed, give location: ; name al ; describe how well	if Shee From Ione 67 	To
	Diameter   n inches   7   4. If above of Section	Pounds per ft. 24 e construction lon	per inch   8	Top Bottom 0 97 well to be abandon , Range , 19	Cadag Type o 97. A ed, give location: ; name al ; describe how well	if Shee From Ione 67 	To
	Diameter   n inches   7   4. If above of Section	Pounds per ft. 24 e construction lon	per inch   8	Top Bottom 0 97 well to be abandon , Range , 19	Cadag Type o 97. N ed, give location: ; name au ; describe how well	if Shee From Ione 67 	To
	A. If above of Section	Pounds per ft. 24 e construction lon	per inch 	Top Bottom 0 97 well to be abandon , Range , 19	Cadag Type o 97. A ed, give location: ; name al ; describe how well	if Shee From Ione 67 	To

	TIOS	Calliche & Rock	Sandy Shale	(uartette	Sand rock, hard	Sand & sand rock, broken	bed bea		E25E			 Hydro 201.49 7 311/3	 SOURCE OF ALTITUDE GIVEN	Defermined by Inst. Leveling	 Jot Tow 21 por 7417 71161320				en en la superior de la constance de la constan La constance de la constance de	the best of his knowledge and bellef, the foregoing is a true and	The second second	And The Level and the second	Instructions
teet mi	5	97									·	 	 		1 + 51	ALL PA	0			ertifies that, to t	described well.		٠,
٥T	S	50	07	57	09	\$6	26	·	  .	<u> </u>		 · · · ·	 		There	11 fou		i	in some .	Brred hereby c			والأراجي والمراجع
From	0	8 5,0	81	07	57	09	56		b	<u> </u>		 	 	<u> </u>	 , stow					The underst			. is e

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tormations encountered should be as complete and accurate as possible.

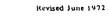
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STATE ENGINEER OFFICE
WELL DC0000



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#### WELL RECORD

		~	Section	1. GENERAL I	NFORMATION	1		
Street of						Owner's	Well No	·····
Well was drille	d under Permi	t No			_ and is located	1 in the:		
a	¼	¼ ¼	¼ of Se	ection	Township	Range	<u>.                                    </u>	N.M.P.M
b. Tract	No	of Map No		of th	e			- <u></u>
		of Block No ed in						
		feet, Y=				System		
(B) Drilling (	Contractor			•		License No.	;	<u>.                                    </u>
Address		·	·					
Drilling Began		Com	pleted		_ Type tools _		Size of hole	in.
Elevation of la	nd surface or .			at we	U is	ft. Total depth of	í well	ft.
Completed we	ilis 🗋 s	shallow 🗔 a			-	upon completion o	f well	ft.
Depth	in Feet	Sec Thickness			R-BEARING ST		Estimated	Yield
From	То	in Feet		Description of	Water-Bearing F	ormation	(gallons per r	ninute)
<u>.</u>		<u> </u>					<u> </u>	
					<u> </u>	· · · ·	<u></u>	
			Sectio	n 3. RECORD	OF CASING			
Diameter (inches)	Pounds per foot	Threads per in.		in Fect	Length (feet)	Type of Shoe		ations
(110103)	perioot	per ui.	Тор	Bottom			From	<u> </u>
		+		<u> </u>		<u> </u>		
		1			1	1		1

Depth i	n Feet	Hole	Sacks	MUDDING AND CEMER	·····
From	То	Diameter	of Mud	of Cement	Method of Placement
		+			

#### Section 5. PLUGGING RECORD

Plugging Contra	ctor						
Address				- [ i	Depth i	n Feet	Cubic Feet
Plugging Metho	d			No.  -	Top	Bottom	of Cement
Date Well Plugg	ed						
Plugging approv	ed by:			2			
		State Er	igincer Representative	$-\frac{3}{4}$			
Date Received	Typed	1/27/78	FOR USE OF STATE ENG	INEER ONLY			
		•	Quad		FWL		FSL
File No		<u>.</u>	Use011	L	ocation No.	21.38.9.4	4200

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<b>ΚΕΜΑ</b> RKS AND ADDITIONAL INFORMATION	.7 noitos2		
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Elev of Kروح <i>2205</i>			
1 2 Elev 22 25			
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϶϶;ϫϷλϥͷϡ		SOLT	609T
pues		609T	0251
pues		ΟΖΕΤ	07TT
Red bed		0711	098
pues		098	028
			· ·
ked bed	ļ	028	02
bras braH		02	07
puzs		07	0
Color and Type of Material Encountered	1997 ni	oT	From
Section 6, LOG OF HOLE	Thickness	in Feet	Depth

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

Location: 21.38.9.44200 54 2243 Owner/ Elliot Oll Co. Wylie #1 Record of Casing: 8 5/8" - 1613' 7" 4318' Cable 1616'-4360'

191 .0EE - 191 .066

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

Drillet

Elevation: 3565' of

\_\_\_\_

INSTRUCTIONS: This form chould be executed in triplicate, preferably typewritted and submitted for the state Engineer of the state enswered as content in the state of the state enswered as content in the state enswered as a plugging record, only Section 1(a) and Section and the completed.

## **APPENDIX B: Chain of Custody Form**

	ASSAIGAI	Chain of Custody Record		7300 JEFFERSON, N.E. ALBUQUERQUE, NEW MEXICO 87109 (505) 345-8964
	ANALYTICAL LABORATORIES, INC.	Lab job no:: Date Date	(332 EL PAS	3332 WEDGEWOOD EL PASO, TEXAS 79925 (915) 593-6000
Client Hicks	Consultants	Project Manager / Contact		
Address 4665	5 Tadion Schul NE	<u> Ae Kili</u> Telephone No. <u>206 – Sprit U</u>	Analysis Required	tired
City / State / Zip	Allog Non Source	10 Fax No. 211, - 3773X		
Project Name / Number	Number Dembourne	Samplers: (Signature)		A Remarks
Contract / Purch	Contract / Purchase Order / Quote		28 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	
AAL FRACTION NUMBER	Field Sample Number/Location	tio Time Sample Crype/Stas of Container Preservation	/] 4 ///////	
	ত	1.19× 10:30 G PLA, court 11NO.		
-	7	10130 C PI 1.		
	42	ON0		
)	Ū <i>R</i>	with G Pl. 1.		
warning	) # ( <del>]</del>	11-27- 11-27-		
S	# U	9/1/9× 11.72 G 24.44 30 ml		
0				
)				
Relinquished by:	Date		Date Received by:	d by:
Signature	far datas		Printed Printed	
Company 1		Company AVL Company Company Basson	Company	ny
Heason			After analysis, samples are to be:	to be:
Method of Shipment:		Comments:		Disposed of (additional fee)
Shipment No.			Stored (30 days max)	ys max)
Special Instructions:				Stored over 30 days (additional fee)
			Returned to customer	ustomer