OILFIELD RESEARCH LABORATORIES
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January 26, 1981

Moore Oil Company
P. O. Box 6122
Leawood, Kansas 66206

Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core taken from the Wilson Lease, Well No. 101, located in Miami County, Kansas and submitted to our laboratory on December 12, 1980.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Sanford A. Michel

SAM/kas

5 c to Leawood, Kansas

Oilfield Research Laboratories

GENERAL INFORMATION & SUMMARY

Company Moore Oil Company Lease Wilson Well No. 101

Location NE¼

Section 26 Twp. 26S Rge. 21E County Miami State Kansas

Elevation, Feet - - - - - - - - - - - - - - - - -

Name of Sand	Squirrel
Top of Core	656.0
Bottom of Core	705.5
Top of Sand	656.0
Bottom of Sand (Tested)	701.8
Total Feet of Permeable Sand	36.1
Total Feet of Floodable Sand	13.2

Distribution of Permeable Sand:

Permeability Range Millidarcys	Feet	Cum. Ft.
0 - 10	6.2	6.2
10 - 20	8.9	15.1
20 - 40	1.8	16.9
40 - 60	12.9	29.8
60 - 80	1.0	30.8
80 - 100	3.1	33.9
100 & Above	2.2	36.1

Average Permeability Millidarcys	42.0
Average Percent Porosity	20.7
Average Percent Oil Saturation	51.5
Average Percent Water Saturation	40.8
Average Oil Content, Bbls./A. Ft.	829.
Total Oil Content, Bbls./Acre	29,934.
Average Percent Oil Recovery by Laboratory Flooding Tests	9.6
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	167.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	2,199.
Total Calculated Oil Recovery, Bbls./Acre	See "Calculated Recovery" Section

The core was sampled and the samples sealed in plastic bags by a representative of the client. Salt water was used as a drilling fluic The core was reported to be from a non-virgin area.

FORMATION CORED

The detailed log of the formation cored is as follows:

Depth Interval, Feet	Description
656.0 - 656.8	Brown slightly calcareous sandstone.
656.8 - 658.4	Brown and gray laminated slightly calcareous sandstone and shale.
658.4 - 660.2	Brown slightly calcareous sandstone.
660.2 - 661.1	Gray sandy shale.
661.1 - 662.2	Light brown and gray laminated sandstone and shale.
662.2 - 664.0	Gray sandy shale.
664.0 - 665.6	Light brown slightly calcareous shaly sandstone.
665.6 - 668.5	Brown slightly calcareous sandstone.
668.5 - 671.0	Hard gray limestone.
671.0 - 671.8	Brown calcareous sandstone.
671.8 - 672.7	Hard gray limestone.
672.7 - 673.4	Brown slightly calcareous sandstone.
673.4 - 674.3	Gray sandy shale.
674.3 - 677.5	Brown slightly calcareous sandstone.
677.5 - 681.5	Brown and gray conglomeratic calcareous sandstone.
681.5 - 681.9	Gray sandy shale.
681.9 - 690.4	Brown calcareous sandstone.
690.4 - 692.3	Brown calcareous shaly sandstone.
692.3 - 697.2	Brown calcareous sandstone.
697.2 - 699.8	Brown and gray laminated calcareous sandstone and shale.
699.8 - 702.8	Black carbonaceous calcareous sandstone.

702.8 - 705.5 Gray sandy shale.

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 2,199 barrels of oil per acre was obtained from 13.2 feet of sand. The weighted average percent oil saturation was reduced from 52.1 to 42.5, or represents an average recovery of 9.6 percent. The weighted average effective permeability of the samples is 1.22 millidarcys, while the average initial fluid production pressure is 36.2 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 34 samples tested, 13 produced water and oil, and 3 samples produced water only. This indicates that approximately 38 percent of the sand represented by these samples is floodable pay sand.

CALCULATED RECOVERY

It would appear from a study of the core data, that efficient primary and waterflood operations in the vicinity of this well should recover approximately 2,810 barrels of oil per acre. This is an average recovery of 213 barrels per acre foot from 13.2 feet of floodable sand analyzed in this core.

These recovery values were calculated using the following data and assumptions:

Original formation volume factor, estimated	1.04
Reservoir water saturation, percent, estimated	30.0
Average porosity, percent	22.1
Oil saturation after flooding, percent	42.5
Performance factor, percent, estimated	50.0
Net floodable sand, feet	13.2

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Moore Oil Company Lease Wilson Well No. 101

Sample No.	Depth, Feet	Effective Porosity Percent	Percent Saturation			Oil Content Bbls. / A Ft.	Perm., Mill.	Feet of Sand		Total Oil Content	Perm. Capacity Ft. X md.
			Oil	Water	Total			Ft.	Cum. Ft.		
1	656.7	19.6	49	41	90	745	14.	0.8	0.8	596	11.20
2	657.4	16.2	50	48	98	628	8.3	1.0	1.8	628	8.30
3	658.2	19.4	52	33	85	783	6.8	0.6	2.4	470	4.08
4	658.8	18.7	57	34	91	827	11.	1.0	3.4	827	11.00
5	659.8	19.6	47	46	93	715	13.	0.8	4.2	572	10.40
6	661.5	15.2	41	57	98	484	1.9	1.1	5.3	532	2.09
7	664.3	18.7	42	49	91	609	6.6	1.0	6.3	609	6.60
8	665.3	16.4	53	42	95	674	2.5	0.6	6.9	404	1.50
9	666.4	21.4	45	36	81	747	13.	1.4	8.3	1046	18.20
10	667.3	20.2	45	47	92	705	42.	1.5	9.8	1058	63.00
11	671.2	23.0	50	41	91	892	56.	0.8	10.6	714	44.80
12	673.2	22.0	43	49	92	734	49.	0.7	11.3	514	34.30
13	674.7	23.2	53	37	90	954	58.	0.7	12.0	668	40.60
14	675.3	21.9	62	36	98	1053	50.	0.7	12.7	737	35.00
15	675.8	22.2	53	38	91	913	37.	0.8	13.5	730	29.60
16	676.7	21.0	48	42	90	782	58.	1.0	14.5	782	58.00
17	677.8	22.1	48	43	91	823	79.	1.0	15.5	823	79.00
18	678.8	22.0	52	41	93	888	82.	1.0	16.5	888	82.00
19	680.5	22.7	53	36	89	933	92.	1.1	17.6	1026	101.20
20	681.3	19.7	55	43	98	841	19.	0.9	18.5	757	17.10
21	682.5	20.3	50	42	92	787	83.	1.0	19.5	787	83.00
22	683.6	23.5	55	41	96	1003	32.	1.0	20.5	1003	32.00
23	684.6	20.7	51	48	99	819	52.	1.0	21.5	819	52.00
24	685.5	21.7	48	50	98	808	47.	1.0	22.5	808	47.00
25	686.7	22.4	48	49	97	834	58.	1.5	24.0	1251	87.00
26	688.3	20.5	48	50	98	763	13.	1.5	25.5	1145	19.50
27	690.1	21.5	44	44	88	734	16.	1.5	27.0	1101	24.00
28	691.3	19.4	52	42	94	783	4.1	1.9	28.9	1488	7.79
29	693.5	22.2	53	36	89	913	43.	1.5	30.4	1370	64.50
30	695.5	16.6	53	38	91	683	56.	1.5	31.9	1025	84.00

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Moore Oil Company Lease Wilson Well No. 101

Sample No.	Depth, Feet	Effective Porosity Percent	Percent Saturation			Oil Content Bbls. / A Ft.	Perm., Mill.	Feet of Sand		Total Oil Content	Perm. Capacity Ft. X md.
			Oil	Water	Total			Ft.	Cum. Ft.		
31	696.7	22.6	61	31	92	1070	105.	1.2	33.1	1284	126.00
32	699.2	23.4	60	25	85	1089	181.	1.0	34.1	1089	181.00
33	700.5	22.3	61	23	84	1055	10.	1.0	35.1	1055	10.00
34	701.6	21.4	80	18	98	1328	41.	1.0	36.1	1328	41.00

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Moore Oil Company Lease Wilson Well No. 101

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
656.0 - 665.6	6.9	8.0	55.17
665.6 - 701.8	29.2	50.1	1461.59
656.0 - 701.8	36.1	42.0	1516.76

Depth Interval, Feet	Feet of Core Analyzed	Average Percent Porosity	Average Percent Oil Saturation	Average Percent Water Saturation	Average Oil Content Bbl./A. Ft.	Total Oil Content Bbls./Acre
656.0 - 665.6	6.9	17.8	48.4	44.7	672	4,638
665.6 - 701.8	29.2	21.3	52.2	39.8	866	25,296
656.0 - 701.8	36.1	20.7	51.5	40.8	829	29,934

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Moore Oil Company Lease Wilson Well No. 101

Sample No.	Depth, Feet	Effective Porosity Percent	Original Oil Saturation		Oil Recovery		Residual Saturation			Volume of Water Recovered cc*	Effective Permeability Millidarcys**	Initial Fluid Production Pressure Lbs./Sq./In.
			%	Bbls./A. Ft.	%	Bbls./A. Ft.	% Oil	% Water	Bbls./A. Ft.			
1	656.7	19.5	49	741	0	0	49	46	620	0	Imp.	-
2	657.4	16.7	49	635	0	0	49	49	635	0	Imp.	-
3	658.2	19.0	53	722	0	0	53	35	722	0	Imp.	-
4	658.8	19.1	56	830	0	0	56	35	830	0	Imp.	-
5	659.8	19.5	47	711	0	0	47	46	711	0	Imp.	-
6	661.5	15.4	41	490	0	0	41	57	490	0	Imp.	-
7	664.3	18.2	43	607	0	0	43	48	607	0	Imp.	-
8	665.3	16.4	53	674	0	0	53	43	674	0	Imp.	-
9	666.4	21.3	45	744	12	198	32	59	546	26	1.20	25
10	667.3	20.0	45	698	0	0	45	48	698	0	Imp.	-
11	671.2	22.9	50	888	13	231	37	53	657	7	0.56	40
12	673.2	22.1	43	737	0	0	43	50	737	0	Imp.	-
13	674.7	23.2	53	954	13	234	40	53	720	4	0.30	40
14	675.3	22.0	62	1058	20	341	42	56	717	6	0.45	45
15	675.8	22.1	53	909	8	137	45	48	772	6	0.17	45
16	676.7	21.2	48	789	5	82	43	49	707	4	0.30	50
17	677.8	21.7	49	825	0	0	49	44	825	0	Imp.	-
18	678.8	22.2	52	896	7	121	45	49	775	8	0.50	30
19	680.5	22.8	53	937	14	248	39	58	689	58	0.75	15
20	681.3	19.7	55	841	0	0	55	43	841	0	Imp.	-
21	682.5	20.3	50	787	4	63	46	52	724	16	0.64	35
22	683.6	23.4	55	998	8	145	47	50	853	8	0.50	30
23	684.6	20.2	52	815	0	0	52	47	815	0	Imp.	-
24	685.5	21.9	48	816	0	0	48	50	816	0	Imp.	-
25	686.7	22.4	48	834	0	0	48	49	834	18	0.75	30
26	688.3	20.1	49	764	0	0	49	49	764	0	Imp.	-
27	690.1	21.4	44	730	3	50	41	52	680	35	0.60	35
28	691.3	19.4	52	783	0	0	52	42	783	0	Imp.	-

Notes: cc—cubic centimeter.

*—Volume of water recovered at the time of maximum oil recovery.

**—Determined by passing water through sample which still contains residual oil.

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Moore Oil Company Lease Wilson Well No. 101

Sample No.	Depth, Feet	Effective Porosity Percent	Original Oil Saturation		Oil Recovery		Residual Saturation			Volume of Water Recovered cc*	Effective Permeability Millidarcys**	Initial Fluid Production Pressure Lbs./Sq./In.
			%	Bbls./A. Ft.	%	Bbls./A. Ft.	% Oil	% Water	Bbls./A. Ft.			
29	693.5	22.2	53	913	0	0	53	43	913	229	3.90	30
30	695.5	17.1	52	690	0	0	52	40	690	0	Imp.	-
31	696.7	22.6	61	1070	11	193	50	46	877	345	7.80	30
32	699.2	23.3	60	1085	0	0	60	38	1085	23	0.43	35
33	700.5	23.1	61	1093	13	233	48	39	860	6	0.30	50
34	701.6	21.9	79	1324	0	0	79	19	1324	0	Imp.	-

Notes: cc—cubic centimeter.

*—Volume of water recovered at the time of maximum oil recovery.

**—Determined by passing water through sample which still contains residual oil.

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SUMMARY OF LABORATORY FLOODING TESTS

TABLE V

Company Moore Oil Company Lease Wilson Well No. 101

Depth Interval, Feet	665.6 - 701.8
Feet of Core Analyzed	13.2
Average Percent Porosity	22.1
Average Percent Original Oil Saturation	52.1
Average Percent Oil Recovery	9.6
Average Percent Residual Oil Saturation	42.5
Average Percent Residual Water Saturation	51.2
Average Percent Total Residual Fluid Saturation	93.7
Average Original Oil Content, Bbls./A. Ft.	899.
Average Oil Recovery, Bbls./A. Ft.	167.
Average Residual Oil Content, Bbls./A. Ft.	732.
Total Original Oil Content, Bbls./Acre	11,862.
Total Oil Recovery, Bbls./Acre	2,199.
Total Residual Oil Content, Bbls./Acre	9,663.
Average Effective Permeability, Millidarcys	1.22
Average Initial Fluid Production Pressure, p.s.i.	36.2

NOTE: Only those samples which recovered oil were used in calculating the above averages.

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RESULTS OF WATER DIFFERENTIATION TESTS

TABLE VI

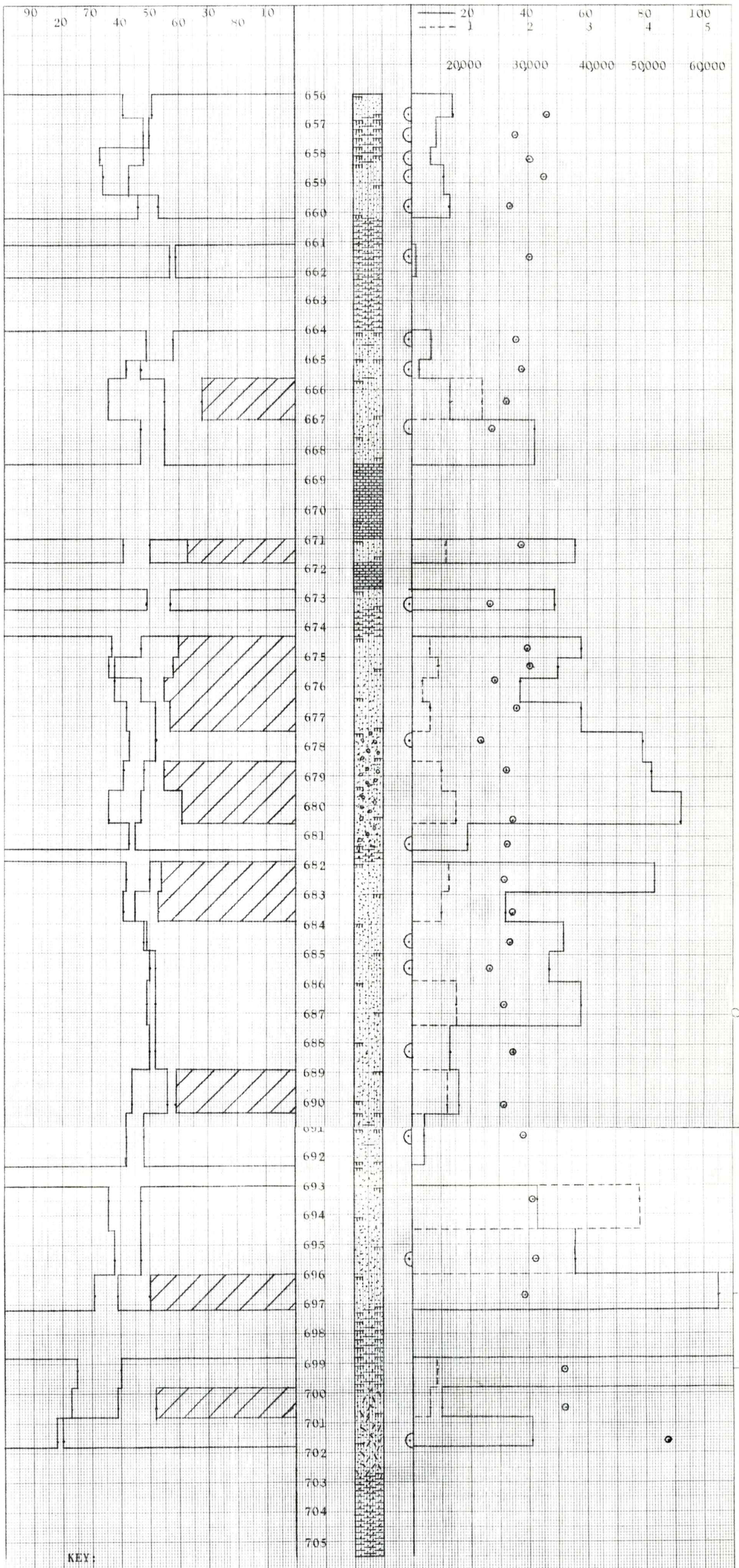
Company Moore Oil Company Lease Wilson Well No. 101

Sample No.	Depth, Feet	Chloride Content of Brine in Sand ppm	Percent Water Saturation		
			Connate	Drilling & Foreign	Total
1	656.7	33,292			
2	657.4	27,827			
3	658.2	30,183			
4	658.8	32,528			
5	659.8	26,987			
6	661.5	30,050			
7	664.3	27,974			
8	665.3	28,966			
9	666.4	26,117			
10	667.3	23,752			
11	671.2	28,668			
12	673.2	23,494			
13	674.7	29,817			
14	675.3	30,007			
15	675.8	24,018			
16	676.7	27,967			
17	677.8	21,814			
18	678.8	26,063			
19	680.5	27,120			
20	681.3	26,181			
21	682.5	25,828			
22	683.6	27,091			
23	684.6	26,834			
24	685.5	23,467			
25	686.7	25,614			
26	688.3	27,370			
27	690.1	25,691			
28	691.3	29,333			
29	693.5	30,666			
30	695.5	31,205			
31	696.7	29,458			
32	699.2	36,103			
33	700.5	36,285			
34	701.6	53,880			

Note: ppm — parts per million

WATER SAT., PERCENT → ← OIL SAT., PERCENT

PERMEABILITY, IN MILLIDARCYS
EFFECTIVE PERMEABILITY TO WATER, IN MILLIDARCYS
○ CHLORIDE CONTENT OF BRINE IN SAND, ppm



KEY:

- SANDY SHALE
- CALCAREOUS SANDSTONE
- LIMESTONE
- SHALY CALCAREOUS SANDSTONE
- LAMINATED SANDSTONE AND SHALE
- CARBONACEOUS CALCAREOUS SANDSTONE
- CONGLOMERATIC CALCAREOUS SANDSTONE
- LAMINATED CALCAREOUS SANDSTONE AND SHALE
- FLOODPOT RESIDUAL OIL SATURATION
- IMPERMEABLE TO WATER

MOORE OIL COMPANY

WILSON LEASE WELL NO. 101

MIAMI COUNTY, KANSAS

DEPTH INTERVAL, FEET	FEET OF CORE ANALYZED	AVERAGE PERCENT POROSITY	AVG. OIL SATURATION PERCENT	AVG. WATER SATURATION PERCENT	AVERAGE PERMEABILITY, MILLIDARCYS	CALCULATED OIL RECOVERY BBLS. / ACRE