

OILFIELD RESEARCH LABORATORIES

813 EAST SIXTH
OKMULGEE, OKLAHOMA
PHONE: 1488

- REGISTERED ENGINEERS -

Chanute, Kansas

536 N. HIGHLAND
CHANUTE, KANSAS
PHONE: 728

November 3, 1958

Best Scanned Copy

Schermerhorn Oil Corporation
P. O. Box 287
Tulsa, Oklahoma

Gentlemen:

Enclosed herewith is the report of the analysis of the 2 11/16" Rotary core taken from the Wiggans Lease, Well No. 19-I, Wilson County, Kansas, and submitted to our laboratory on October 27, 1958.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Carl L. McElrea
Carl L. McElrea

CLM:jh

1 c. to Mr. Roy Williams

Well # 2

Lease # 1

Field # 1

Oilfield Research Laboratories

GENERAL INFORMATION & SUMMARY

Company Schermerhorn Oil Corp. Lease Wiggins Well No. 19-I
 Location 660 North of South Line on North and South Center Line
 Section 17 Twp. 28S Rgn. 17E County Wilson State Kansas

Name of Sand **Bartlesville**
 Top of Core 936.0
 Bottom of Core 985.5
 Pay
 Top of Sand 944.7
 Pay
 Bottom of Sand 965.5
 Total Feet of Permeable Sand 20.2
 Good
 Total Feet of Payable Sand 6.0

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	% of Total
0 - 2	5.6	27.7
2 - 4	2.8	13.9
4 - 10	5.0	24.8
10 - 20	2.3	11.4
20 - 40	3.1	15.3
40 & above	1.4	6.9
Average Permeability Millidarcys		12.1

Average Percent Porosity 17.7
 Average Percent Oil Saturation 33.5
 Average Percent Water Saturation 44.0
 Average Oil Content, Bbls./A. Ft. 477.
 Total Oil Content, Bbls./Acre 15,178.
 Average Percent Oil Recovery by Laboratory Flooding Tests 7.1
 Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft. 105.
 Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre 838.
 Total Calculated Oil Recovery, Bbls./Acre 1,000.
 Fracture Setting, Feet
 Viscosity, Centipoises @
 A. P. I. Gravity, Degrees @ 60 F
 Elevation, Feet (Assumed Datum) 919.5

A fresh water base mud was used as the circulating fluid during the coring of the sand.

This core was sampled and the samples were sealed in cans by a representative of our laboratory.

FORMATION CORED

The detailed log of the formation cored is as follows:

<u>Depth Interval,</u> <u>Feet</u>	<u>Description</u>
---------------------------------------	--------------------

936.0 - 944.7	Laminated sandstone and shale.
944.7 - 946.3	Brown fine grained micaceous shaley sandstone.
946.3 - 950.0	Laminated sandstone and shale.
950.0 - 951.0	Brown fine grained micaceous sandstone.
951.0 - 953.7	Brown fine grained laminated micaceous shaley sandstone.
953.7 - 953.9	Brown fine grained micaceous shaley sandstone.
953.9 - 954.1	Laminated sandstone and shale.
954.1 - 954.5	Brown fine grained micaceous shaley sandstone.
954.5 - 965.5	Brown fine grained laminated micaceous shaley sandstone.
965.5 - 982.0	Dark fine grained micaceous carbonaceous sandstone.
982.0 - 985.5	Dark shale.

Coring was started at a depth of 936.0 feet in laminated sandstone and shale and completed at 985.5 feet in dark shale. This core shows a total of 33.4 feet of sandstone. For the most part, the pay is made up of brown fine grained laminated micaceous shaley sandstone.

PERMEABILITY

For the sake of distribution, the core was divided into three sections. The weighted average permeability of the upper, middle

and lower sections is 4.4, 16.8 and 2.2 millidarcys respectively; the overall average being 12.1 (See Table III). By observing the data given on the coregraph, it is noticeable that the sand has a very irregular permeability profile. The permeability of the sand varies from 0.55 to a maximum of 75 millidarcys.

PERCENT SATURATION & OIL CONTENT

The sand in this core shows a fairly good weighted average percent oil saturation, namely, 33.5. The weighted average percent oil saturation of the upper, middle and lower sections is 23.9, 33.6 and 45.9 respectively. The weighted average percent water saturation of the upper, middle and lower sections is 56.8, 44.3 and 28.9 respectively; the overall average being 44.0 (See Table III). This gives an overall weighted average total fluid saturation of 77.5 percent. This total fluid saturation indicates some fluid was lost during coring which was probably oil.

In an effort to determine whether or not any flushing of the sand occurred during coring all of the coregraph samples were analyzed for chloride content. The results of these tests are given in Tables VI and VII. From the data given in these tables and on the coregraph, it is evident that the chloride content of the water in the sand was comparatively uniform.

The weighted average oil content of the upper, middle and lower section is 284, 467 and 744 barrels per acre foot respectively; the overall average being 477. The total oil content, as shown by this core, is 15,178 barrels per acre (See Table III).

LABORATORY FLOODING TESTS

Part of the sand in this core responded fairly well to laboratory

Flooding tests, as a total recovery of 838 barrels of oil per acre was obtained from 8.0 feet of sand. The weighted average percent oil saturation was reduced from 36.1 to 29.0, or represents an average recovery of 7.1 percent. The weighted average effective permeability of the samples is 1.82 millidarcys, while the average initial fluid production pressure is 30.0 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 31 samples tested, 7 produced water and 9 oil. This indicates that approximately 29 percent of the sand represented by these samples is floodable pay sand. The tests also show that the sand has a rather wide variation in effective permeability.

CONCLUSION

On the basis of the enclosed data, it is evident that an efficient water-flood within the vicinity of this well will recover approximately 1,000 barrels of oil per acre, or an average of 167 barrels of oil per acre foot from the 6.0 feet of good floodable pay sand analyzed. The following factors and assumptions were employed in calculating this recovery:

Original formation volume factor	1.06
Present formation volume factor	1.03
True water saturation, percent	38.0
Primary oil recovery, percent	4.0
Calculated present oil saturation, percent	54.6
Porosity, percent	18.8
Oil saturation at abandonment, percent	30.0
Performance factor	0.50

The analysis results show 6.0 feet of good floodable pay sand in the interval extending from a depth of 944.7 to 965.5 feet.

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RESULTS OF PERMEABILITY TESTS
TABLE I

Company Schermerhorn Oil Corp. Lease Wiggins Well No. 19-I

Sample No.	Depth Feet	Permeability Millidarcy	Feet of Core		Permeability Capacity Ft. x Md.
			Ft.	Cum. Ft.	
1	940.8	Fractured	0.5	0.5	-
2	941.3	3.1	0.5	1.0	1.55
3	941.8	2.1	0.7	1.7	1.47
4	944.8	12.	0.3	2.0	3.60
5	945.3	25.	0.5	2.5	12.50
6	945.8	5.7	0.8	3.3	4.56
7	946.8	0.55	1.0	4.3	0.55
8	947.8	0.74	1.0	5.3	0.74
9	948.8	0.77	1.0	6.3	0.77
10	950.3	21.	0.5	6.8	10.50
11	950.8	96.	0.5	7.3	18.00
12	951.3	2.5	0.6	7.9	1.50
13	951.8	1.1	0.5	8.4	0.55
14	952.3	12.	0.5	8.9	6.00
15	952.8	Imp.	0.5	9.4	0.00
16	953.3	6.2	0.6	10.0	3.72
17	953.8	31.	0.2	10.2	6.20
18	954.3	37.	0.4	10.6	14.80
19	954.8	7.8	0.6	11.2	4.68
20	955.8	29.	0.5	11.7	14.50
21	956.3	30.	0.5	12.2	15.00
22	956.8	9.0	0.5	12.7	4.50
23	957.3	7.7	0.5	13.2	3.85
24	957.8	11.	0.5	13.7	5.50
25	958.3	2.4	0.5	14.2	1.20
26	958.8	3.0	0.5	14.7	1.50
27	959.3	0.96	0.5	15.2	0.48
28	959.8	1.2	0.5	15.7	0.60
29	960.3	9.5	0.5	16.2	4.75
30	960.8	6.2	0.5	16.7	3.10
31	961.3	43.	0.5	17.2	21.50
32	961.8	15.	0.5	17.7	7.50
33	962.3	17.	0.5	18.2	8.50
34	962.8	Imp.	0.5	18.7	0.00
35	963.3	3.0	0.5	19.2	2.50
36	964.8	75.	0.5	19.7	37.50
37	965.3	41.	0.4	20.1	16.40
38	965.8	2.2	0.5	20.6	2.60
39	966.3	0.57	0.6	21.2	0.34
40	966.8	1.2	0.5	21.7	0.60

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RESULTS OF SATURATION TESTS

TABLE II

Company Schermerhorn Oil Corp. Lease Wiggins Well No. 19-1

Sat. No.	Depth, Feet	Effective Porosity Percent	Percent Saturation			Oil Content Bbls./A. Ft.	Feet of Core		Total Oil Content Bbls./Acre
			Oil	Water	Total		Ft.	Cum. Ft.	
1	941.1	15.8	26	41	67	319	1.0	1.0	319
2	942.1	14.9	17	55	72	197	1.0	2.0	197
3	943.1	12.1	18	70	88	169	1.0	3.0	169
4	944.1	10.6	18	76	94	148	1.1	4.1	163
5	945.1	17.6	33	41	74	451	0.9	5.0	406
6	946.1	19.1	25	38	63	370	0.7	5.7	259
7	947.1	15.4	20	56	76	239	1.3	7.0	311
8	948.1	14.1	20	61	81	219	1.0	8.0	219
9	949.1	16.1	36	49	85	450	1.4	9.4	630
10	950.1	17.1	47	38	85	625	1.0	10.4	625
11	951.1	14.2	30	47	77	330	0.6	11.0	198
12	952.1	15.2	22	55	77	260	1.0	12.0	260
13	953.1	16.7	31	41	72	402	1.1	13.1	442
14	954.0	13.4	25	59	84	260	0.2	13.3	52
F-14	954.2	19.8	40	-	-	615	0.4	13.7	246
15	955.1	14.4	22	56	78	246	1.1	14.8	271
16	956.1	20.3	37	33	70	582	1.0	15.8	582
17	957.1	19.2	39	45	84	581	1.0	16.8	581
18	958.1	17.7	37	44	81	508	1.0	17.8	508
19	959.1	19.4	31	42	73	467	1.0	18.8	467
20	960.1	20.3	36	35	71	567	1.0	19.8	567
21	961.1	20.3	39	33	72	614	1.0	20.8	614
22	962.1	16.0	31	49	80	385	1.0	21.8	385
23	963.1	17.6	31	44	75	423	1.0	22.8	423
24	964.1	13.4	29	62	91	302	1.0	23.8	302
25	965.1	21.4	42	37	79	698	0.9	24.7	628

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RESULTS OF SATURATION TESTS

TABLE II

Company Schermerhorn Oil Corp. Lease Wiggins Well No. 19-I

Sat. No.	Depth, Feet	Effective Porosity Percent	Percent Saturation			Oil Content Bbls./A. Ft.	Feet of Core		Total Oil Content Bbls./Acre
			Oil	Water	Total		Ft.	Cum. Ft.	
26	966.1	19.6	66	29	95	1,004	1.1	25.8	1,104
27	967.1	20.1	48	34	82	748	1.0	26.8	748
28	968.1	23.8	36	26	62	665	1.0	27.8	665
29	969.1	19.9	46	32	78	710	1.0	28.8	710
30	970.1	22.6	41	26	67	719	1.0	29.8	719
31	971.1	21.6	42	29	71	704	1.0	30.8	704
32	972.1	22.7	40	26	66	704	1.0	31.8	704
							Total	- - - -	15,178

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Schermerhorn Oil Corp. Lease Wiggans Well No. 19-I

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
941.1 - 949.3	5.8	4.4	25.74
950.0 - 965.5	12.8	16.8	214.83
965.5 - 967.1	1.6	2.2	3.54
941.1 - 967.1	20.2	12.1	244.11

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
940.6 - 950.0	9.4	14.9	23.9	54.8	284	2,673
950.0 - 965.5	15.3	17.6	33.6	44.3	467	7,151
965.5 - 972.6	7.1	21.5	45.9	28.9	754	5,354
940.6 - 972.6	31.8	17.7	33.5	44.0	477	15,178

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Schermerhorn Oil Corp.Lease WigginsWell No. 19-I

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	941.1	15.6	24	290	0	0	24	55	290	0	Imp.	50+
3	943.1	12.0	20	186	0	0	20	74	186	0	Imp.	50+
4	944.1	10.9	20	169	0	0	20	62	169	0	Imp.	50+
5	945.1	17.7	33	453	7	96	26	63	357	32	1.39	30
6	946.1	18.9	25	367	1	15	24	63	352	109	6.88	25
7	947.1	15.2	23	271	0	0	23	67	271	0	Imp.	50+
8	948.1	14.1	19	208	0	0	19	74	208	0	Imp.	50+
9	949.1	15.8	34	417	0	0	34	60	417	0	Imp.	50+
10	950.1	17.4	47	635	17	230	30	61	405	166	5.21	25
11	951.1	14.5	32	360	0	0	32	55	360	0	Imp.	50+
12	952.1	15.1	24	282	0	0	24	62	282	0	Imp.	50+
13	953.1	16.7	31	402	2	26	29	58	376	21	0.600	25
14	954.2	19.8	40	615	16	246	24	66	369	19	0.555	25
15	955.1	14.4	24	268	0	0	24	52	268	0	Imp.	50+
16	956.1	20.6	37	592	10	160	27	62	432	24	0.672	25
17	957.1	19.2	39	581	9	134	30	62	447	0	0.010	50
18	958.1	17.6	35	478	0	0	35	59	478	0	Imp.	50+
19	959.1	19.4	28	421	0	0	28	59	421	0	Imp.	50+
20	960.1	20.1	34	530	0	0	34	60	530	0	Imp.	50+
21	961.1	20.4	37	585	0	0	37	59	585	0	Imp.	50+
22	962.1	16.0	28	347	0	0	28	58	347	0	Imp.	50+
23	963.1	18.0	31	433	1	14	30	64	419	0	0.008	35
24	964.1	13.6	30	317	0	0	30	51	317	0	Imp.	50+
25	965.1	21.6	42	704	5	84	37	63	620	47	1.90	30

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 Schermerhorn Oil Corp. Lease Wiggans Well No. 19-I

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.			
26	966.1	19.7	65	964	0	0	65	28	964	0	Imp.	50+
27	967.1	19.8	46	707	0	0	46	41	707	0	Imp.	50+
28	968.1									0	Imp.	50+
29	969.1									0	Imp.	50+
30	970.1									0	Imp.	50+
31	971.1									0	Imp.	50+
32	972.1									0	Imp.	50+

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	Lease	Well No.
Schermerhorn Oil Corp.	Wiggins	19-I
Depth Interval, Feet	944.7 - 946.3	950.0 - 965.5
Feet of Core Analyzed	1.6	6.4
Average Percent Porosity	18.2	18.9
Average Percent Original Oil Saturation	29.5	37.8
Average Percent Oil Recovery	4.4	7.8
Average Percent Residual Oil Saturation	25.1	30.0
Average Percent Residual Water Saturation	63.0	61.8
Average Percent Total Residual Fluid Saturation	88.1	91.8
Average Original Oil Content, Bbls./A. Ft.	415.	557.
Average Oil Recovery, Bbls./A. Ft.	61.	116.
Average Residual Oil Content, Bbls./A. Ft.	354.	441.
Total Original Oil Content, Bbls./Acro	664.	3,564.
Total Oil Recovery, Bbls./Acro	97.	741.
Total Residual Oil Content, Bbls./Acro	567.	2,823.
Average Effective Permeability, Millidarcys	3.79	1.33
Average Initial Fluid Production Pressure, p.s.i.	27.5	30.8

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

Oilfield Research Laboratories
RESULTS OF WATER DIFFERENTIATION TESTS

TABLE VI

Company Schermerhorn Oil Corp. Lease Wiggans Well No. 19-1

Sample No.	Depth, Feet	Chloride Content of Brine in Sand ppm	Percent Water Saturation	
			Connate	Drilling & Foreign
1	941.1	41,650		
2	942.1	33,900		
3	943.1	37,000		
4	944.1	35,000		
5	945.1	34,550		
6	946.1	30,600		
7	947.1	38,800		
8	948.1	36,500		
9	949.1	36,250		
10	950.1	42,700		
11	951.1	31,600		
12	952.1	38,650		
13	953.1	34,800		
14	954.0	36,125		
15	955.1	42,300		
16	956.1	39,100		
17	957.1	35,175		
18	958.1	40,200		
19	959.1	36,700		
20	960.1	37,950		
21	961.1	34,100		
22	962.1	36,000		
23	963.1	38,650		
24	964.1	35,500		
25	965.1	43,850		
26	966.1	44,100		
27	967.1	39,750		
28	968.1	40,150		
29	969.1	36,500		
30	970.1	36,650		
31	971.1	40,550		
32	972.1	40,250		

Notes: ppm -- parts per million

Oilfield Research Laboratories

SUMMARY OF WATER DIFFERENTIATION TESTS

TABLE VII

Company Schermerhorn Oil Corp. Lease Wiggans Well No. 19-1

<u>Depth Interval, Feet</u>	<u>Chloride Content of Brine in Sand, ppm</u>	<u>Average Percent Connate Water</u>	<u>Average Percent Drilling & Foreign Water</u>
940.6 - 950.0	36,300		
950.0 - 965.5	37,900		
965.5 - 972.6	39,800		
940.6 - 972.6	37,900		

Note: ppm — parts per million.