OILFIELD RESEARCH LABORATORIES

- REGISTERED ENGINEERS -

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April 26, 1960

Best Scanned Copy

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

Gentlemen:

Enclosed herewith is the report of the analysis of the 3" Rotary core taken from the Pavilcek Lease, Well No. W-5, Allen County, Kansas, and submitted to our laboratory on April 21, 1960.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Carl L. McElrea

Carl L. McElrea

CLM:cs

1 c. - Schermerhorn Oil Corporation
Route #1
Earlton, Kansas

Well-4

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Oilfield Research Laboratories

GENERAL INFORMATION & SUMMARY

Company Schermerhorn Oil Corporation Lease Pavilcek Well No. W-5

Location W½, NE¼

Section 34 Twp 25S Rge 21E County Allen State Kansas

Name of Sand	Bartlesville
Top of Core	625.0
Bottom of Core	673.0
Top of Pay Sand	630.5
Bottom of Pay Sand	657.6
Total Feet of Permeable Sand	24.8
Total Feet of Good Floodable Sand	20.5

Distribution of Permeable Sand:

Permeability Range Millidarcys	Feet	Cum. Ft.
0 - 10	4.3	4.3
10 - 30	5.1	9.4
30 - 50	8.2	17.6
50 - 70	3.6	21.2
70 & above	3.6	24.8

Average Permeability Millidarcys	48.8
Average Percent Porosity	20.5
Average Percent Oil Saturation	58.5
Average Percent Water Saturation	28.7
Average Oil Content, Bbls./A. Ft.	934.
Total Oil Content, Bbls./Acre	25,141.
Average Percent Oil Recovery by Laboratory Flooding Tests	29.8
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	480.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	10,881.
Total Calculated Oil Recovery, Bbls./Acre	5,250.
Packer Setting, Feet	
Viscosity, Centipoises @	
A. P. I. Gravity, degrees @ 60 °F	
Elevation, Feet	

Fresh water was used as the circulating fluid during the coring the sand.

This core was sampled and the samples were sealed in cans by a representative of Oilfield Research Laboratories.

FORMATION CORED

The detailed log of the formation cored is as follows:

Depth Interval, Feet	Description
625.0 - 626.4	Grayish light brown sandstone.
626.4 - 627.6	Sandy shale.
627.6 - 628.2	Light brown shaley sandstone.
628.2 - 629.8	Sandy shale.
629.8 - 630.3	Light brown shaley sandstone.
630.3 - 630.5	Sandy shale.
630.5 - 631.3	Brown shaley sandstone.
631.3 - 631.5	Sandy shale.
631.5 - 634.5	Brown shaley sandstone.
634.5 - 635.0	Sandy shale.
635.0 - 636.0	Alternate layers of sandstone and shale.
636.0 - 636.9	Brown sandstone.
636.9 - 638.6	Alternate layers of sandstone and shale.
638.6 - 649.0	Dark brown sandstone.
649.0 - 649.3	Dark brown slightly carbonaceous sandstone.
649.3 - 650.0	Gray shaley sandstone.
650.0 - 654.8	Dark brown sandstone.
654.8 - 656.5	Brown laminated shaley carbonaceous sandstone.
656.5 - 660.5	Brown to dark carbonaceous laminated shaley sandstone.
660.5 - 664.5	Dark carbonaceous laminated shaley sandstone.
664.5 - 673.0	Sandy shale.

Coring was started at a depth of 625.0 feet in grayish light brn sandstone and completed at 673.0 feet in sandy shale. This core shows a total of 35.1 feet of sandstone. For the most part, the pay is made up of dark brown 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 28.0, 71.5 and 20.8 millidarcys respectively; the overall average being 48.8 (See Table III). By observing the data given on the coregraph, it is noticeable that the sand has an irregular permeability profile. The permeability of the sand varies from 1.0 to a maximum of 204 millidarcys.

PERCENT SATURATION & OIL CONTENT

The sand in this core shows a very good weighted average percent oil saturation, namely, 58.5. The weighted average percent oil saturation of the upper, middle and lower sections is 59.9, 61.1 and 53.8 respectively. The weighted average percent water saturation of the upper, middle and lower sections is 30.4, 25.2 and 33.0 respectively; the overall average being 28.7 (See Table III). This gives an overall weighted average total fluid saturation of 87.2 percent.

The weighted average oil content of the upper, middle and lower sections is 945, 1,009 and 825 barrels per acre foot respectively; the overall average being 934. The total oil content, as shown by this core, is 25,141 barrels per acre (See Table III).

LABORATORY FLOODING TESTS

The sand in this core responded very well to laboratory flooding tests, as a total recovery of 10,881 barrels of oil per acre was obtained from 22.7 feet of sand. The weighted average percent oil saturation was

reduced from 59.3 to 29.5, or represents an average recovery of 29.8 cent. The weighted average effective permeability of the samples is 3.19 millidarcys, while the average initial fluid production pressure is 14.2 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 27 samples tested, 22 produced water and 23 oil. This indicates that approximately 81 percent of the sand represented by these samples is floodable pay sand. The tests also show that the sand has a wide variation in effective permeability.

CONCLUSION

It is evident from the enclosed data that an efficient water-flood will recover approximately 5,250 barrels of oil per acre from the area of which this core is representative. This represents an average recovery of 256 barrels of oil per acre foot from the 20.5 feet of floodable pay sand analysed. The following factors and assumptions were used in calculating this recovery:

Original formation volume factor	1.06
Present formation volume factor	1.01
True water saturation, percent	28.0
Primary oil recovery, percent	8.0
Calculated present oil saturation, percent	60.6
Porosity, percent	20.6
Oil saturation at abandonment, percent	28.0
Performance factor, percent	50.0

The analysis results show 20.5 feet of good floodable pay sand in the interval extending from the depth of 630.5 to 657.6 feet. The sand in this interval has very good oil and normal water saturations and a rather wide variation in effective permeability.

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RESULTS OF PERMEABILITY TESTS

TABLE I

Company Schermerhorn Oil Corporation Lease Pavlicek Well No. W-5

Sample No.	Depth Feet	Permeability Millidarcys	Feet of Core		Permeability Capacity Ft. x Md.
			Ft.	Cum. Ft.	
1	630.6	14.	0.3	0.3	4.20
2	631.1	16.	0.5	0.8	8.00
3	631.9	21.	0.7	1.5	14.70
4	632.4	45.	0.6	2.1	27.00
5	633.1	23.	0.6	2.7	13.80
6	633.6	9.8	0.6	3.3	5.88
7	636.3	60.	0.5	3.8	30.00
8	636.8	35.	0.4	4.2	14.00
9	638.9	40.	0.6	4.8	24.00
10	639.4	72.	0.5	5.3	36.00
11	639.9	145.	0.5	5.8	72.50
12	640.4	55.	0.5	6.3	27.50
13	640.9	31.	0.5	6.8	15.50
14	641.4	44.	0.5	7.3	22.00
15	641.9	48.	0.5	7.8	24.00
16	642.4	48.	0.5	8.3	24.00
17	642.9	61.	0.5	8.8	30.50
18	643.4	53.	0.5	9.3	26.50
19	643.9	48.	0.5	9.8	24.00
20	644.4	67.	0.5	10.3	33.50
21	644.9	38.	0.5	10.8	19.00
22	645.4	42.	0.5	11.3	21.00
23	645.9	45.	0.5	11.8	22.50
24	646.4	140.	0.5	12.3	70.00
25	646.9	204.	0.5	12.8	102.00
26	647.4	149.	0.5	13.3	74.50
27	647.9	26.	0.5	13.8	13.00
28	648.4	204.	0.5	14.3	102.00
29	648.9	177.	0.3	14.6	53.10
30	649.4	Imp.	0.4	15.0	0.00
31	650.2	40.	0.4	15.4	16.00
32	650.6	74.	0.3	15.7	22.20
33	650.9	41.	0.5	16.2	20.50
34	651.4	30.	0.5	16.7	15.00
35	651.9	24.	0.5	17.2	12.00
36	652.4	27.	0.5	17.7	13.50
37	652.9	10.	0.5	18.2	5.00
38	653.4	22.	0.5	18.7	11.00
39	653.9	51.	0.5	19.2	25.50
40	654.4	65.	0.6	19.8	39.00

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RESULTS OF PERMEABILITY TESTS

TABLE I

Company Schermerhorn Oil Corporation Lease Pavilesk Well No. W-5

Sample No.	Depth Feet	Permeability Millidarcys	Feet of Core		Permeability Capacity Ft. x Md.
			Ft.	Cum. Ft.	
41	654.9	2.1	0.4	20.2	0.84
42	655.4	1.0	0.5	20.7	0.50
43	655.9	19.	0.5	21.2	9.50
44	656.4	Imp.	0.3	21.5	0.00
45	656.9	37.	0.7	22.2	25.90
46	657.4	48.	0.5	22.7	24.00
47	657.9	9.9	0.5	23.2	4.95
48	658.4	3.1	0.5	23.7	1.55
49	658.9	6.0	0.5	24.2	3.00
50	659.4	1.7	0.5	24.7	0.85
51	659.9	6.0	0.5	25.2	3.00
52	660.4	3.6	0.3	25.5	1.08
53	660.9	Imp.	0.7	26.2	0.00
54	661.4	Imp.	0.8	27.0	0.00

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RESULTS OF SATURATION TESTS

CORE NO. 2

Company Schermerhorn Oil Corporation Lease Pavilion Well No. W-5

Sat. No.	Depth Feet	Effective Porosity Percent	Percent Saturation			Oil Content Bbls./A. Ft.	Feet of Pay		Total Oil Content Bbls./Acre
			Oil	Water	Total		Ft.	Cum. Ft.	
1	630.9	20.9	62	35	97	1,007	0.8	0.8	806
2	632.1	20.4	52	32	84	824	1.2	2.0	990
3	633.3	19.6	59	31	90	897	1.3	3.3	1,166
4	636.5	20.6	70	23	93	1,119	0.9	4.2	1,008
5	639.1	22.0	68	27	95	1,161	1.0	5.2	1,161
6	640.1	21.5	58	23	81	968	1.0	6.2	968
7	641.1	19.8	60	24	84	922	1.0	7.2	922
8	642.1	20.1	57	27	84	889	1.0	8.2	889
9	643.1	22.4	62	23	85	1,078	1.0	9.2	1,078
10	644.1	20.8	59	26	85	953	1.0	10.2	953
11	645.1	21.0	66	26	92	1,076	1.0	11.2	1,076
12	646.1	19.9	63	33	96	974	1.0	12.2	974
13	647.1	22.9	64	18	82	1,136	1.0	13.2	1,136
14	648.1	20.4	54	28	82	855	1.4	14.6	1,197
15	649.1	22.1	66	11	77	1,132	0.3	14.9	340
16	650.4	21.6	64	21	85	1,072	0.7	15.6	751
17	651.1	21.1	66	26	92	1,080	0.9	16.5	972
18	652.1	22.4	57	27	84	990	1.0	17.5	990
19	653.1	18.1	52	44	96	730	1.0	18.5	730
20	654.1	21.3	51	30	81	842	1.2	19.7	1,010
20	655.1	15.5	22	45	67	264	0.8	20.5	211
22	656.1	18.2	50	37	87	706	0.9	21.4	635
23	657.1	19.9	62	33	95	957	1.1	22.5	1,053
24	658.1	21.8	56	23	79	946	1.0	23.5	946
25	659.1	19.1	51	36	87	756	1.0	24.5	756
26	660.1	18.8	58	33	91	846	0.9	25.4	762
27	661.1	20.7	69	24	93	1,106	1.5	26.9	1,659
							Total-	- - - - -	-25,14

[redacted]

Company Schermerhorn Oil Corporation Lease Pavlicek Well No. W-5

[redacted]	[redacted]	[redacted]	[redacted]
630.5 - 636.9	4.2	28.0	117.58
638.6 - 652.6	13.1	71.5	936.30
652.6 - 660.5	7.8	20.8	155.67
630.5 - 660.5	24.8	46.8	1,209.55

[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
630.5 - 636.9	4.2	20.3	59.9	30.4	945	3,972
638.6 - 652.6	13.3	21.2	61.1	25.8	1,009	13,407
652.6 - 662.0	9.4	19.5	53.8	33.0	825	7,762
630.5 - 662.0	26.9	20.5	58.5	28.7	934	25,141

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RESULTS OF LABORATORY FLOODING TESTS

TABLE [illegible]

Company Schermerhorn Oil Corporation Lease Pavlicek Well No. W-5

Sample No.	Depth, Feet	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	630.9	20.3	62	976	42	661	20	74	315	29	0.700	15
2	632.1	20.6	52	832	25	400	27	69	432	49	1.10	10
3	633.3	19.2	59	879	40	596	19	76	283	21	0.900	10
4	636.5	20.8	70	1,131	44	711	26	69	420	135	4.20	10
5	639.1	21.6	68	1,141	32	537	36	59	604	56	1.50	20
6	640.1	21.0	58	944	29	472	29	67	472	109	3.30	10
7	641.1	20.3	60	944	30	472	30	69	472	74	1.90	10
8	642.1	19.6	57	866	32	486	25	72	380	90	2.40	10
9	643.1	22.5	62	1,082	33	576	29	67	506	140	5.50	10
10	644.1	21.2	59	969	34	558	25	72	411	214	8.40	10
11	645.1	20.8	66	1,066	40	646	26	71	420	154	5.40	10
12	646.1	20.3	63	992	39	614	24	74	378	198	5.50	10
13	647.1	22.4	64	1,112	35	608	29	69	504	175	11.67	10
14	648.1	20.1	54	843	[illegible]	375	30	[illegible]	468	18	0.[illegible]	15
15	649.1	21.6	66	1,105	14	234	52	44	871	4	0.[illegible]	25
16	650.4	21.1	64	1,047	33	540	31	62	507	25	0.700	15
17	651.1	21.0	66	1,075	38	619	28	68	456	79	2.50	10
18	652.1	22.0	57	972	31	529	26	65	443	118	6.62	10
19	653.1	18.6	52	750	21	303	31	68	447	25	0.700	15
20	654.1	21.7	51	858	17	286	34	63	572	144	5.40	10
21	655.1	15.0	26	302	0	0	26	59	302	0	Imp.	50+
22	656.1	18.2	50	706	9	127	41	52	579	1	0.017	40
23	657.1	19.8	62	951	26	398	36	63	553	40	1.18	10
24	658.1	21.6	56	937	14	234	42	51	703	0	0.017	30
25	659.1	19.0	47	692	0	0	47	44	692	0	Imp.	50+
26	660.1	18.5	56	804	0	0	56	38	804	0	Imp.	50+
27	661.1	20.5	68	1,081	0	0	68	28	1,081	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 Schermerhorn Oil Corporation Lease Pavlicek Well No. W-5

Depth Interval, Feet	630.5 - 636.9	638.6 - 652.6	652.6 - 658.6	630.5 - 658.6
Feet of Core Analyzed	4.2	13.3	5.2	22.7
Average Percent Porosity	20.2	21.1	20.1	20.6
Average Percent Original Oil Saturation	59.9	61.2	54.2	59.3
Average Percent Oil Recovery	36.9	32.4	17.7	29.8
Average Percent Residual Oil Saturation	23.0	28.8	36.6	29.5
Average Percent Residual Water Saturation	72.2	67.0	59.4	66.2
Average Percent Total Residual Fluid Saturation	95.2	95.8	96.0	95.7
Average Original Oil Content, Bbls./A. Ft.	937.	1,000.	845.	954.
Average Oil Recovery, Bbls./A. Ft.	577.	328.	275.	480.
Average Residual Oil Content, Bbls./A. Ft.	360.	472.	570.	474.
Total Original Oil Content, Bbls./Acre	3,939.	13,301.	4,395.	21,635.
Total Oil Recovery, Bbls./Acre	2,423.	7,027.	1,431.	10,881.
Total Residual Oil Content, Bbls./Acre	1,516.	6,274.	2,964.	10,754.
Average Effective Permeability, Millidarcys	1.50	4.34	1.64	3.19
Average Initial Fluid Production Pressure, psi	11.3	12.5	21.0	14.2

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