

OILFIELD RESEARCH LABORATORIES

813 EAST 58TH
OKMULGEE, OKLAHOMA
PHONE 1498

• REGISTERED ENGINEERS •

Chanute, Kansas

505 N. HIGHLAND
CHANUTE, KANSAS
PHONE 728

August 9, 1960

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

Gentlemen:

Enclosed herewith is the report of the analysis of the 2 $\frac{1}{2}$ " Rotary core taken from the Pavilcek Lease, Well No. W-11, Allen County, Kansas, and submitted to our laboratory on August 2, 1960.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Carl L. McElrea
Carl L. McElrea

CLM:cw

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

Well 6 ✓

L - 1

F - 2

Oilfield Research Laboratories

GENERAL INFORMATION & SUMMARY

Company Schermerhorn Oil Corporation Lease Pavilcek Well No. W-11

Location NE $\frac{1}{4}$

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

Name of Sand - - - - - Bartlesville

Top of Core - - - - - 642.0

Bottom of Core - - - - - 682.0

Pay
Top of Sand - - - - - 650.2

Pay
Bottom of Sand - - - - - 673.5

Total Feet of Permeable Sand - - - - - 34.5

Total Feet of Floodable Sand - - - - - 18.4

Distribution of Permeable Sand:
Permeability Range
Millidarcys

Feet

Cum. Ft.

0 - 5	10.2	10.2
5 - 15	4.0	14.2
15 - 30	6.1	20.3
30 - 60	9.0	29.3
60 - 90	2.0	31.3
90 & above	3.2	34.5

Average Permeability Millidarcys - - - - - 31.0

Average Percent Porosity - - - - - 18.7

Average Percent Oil Saturation - - - - - 45.4

Average Percent Water Saturation - - - - - 45.5

Average Oil Content, Bbls./A. Ft. - - - - - 672.

Total Oil Content, Bbls./Acre - - - - - 24,508.

Average Percent Oil Recovery by Laboratory Flooding Tests - - - - - 27.2

Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft. - - - - - 417.

Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre - - - - - 8,922.

Total Calculated Oil Recovery, Bbls./Acre - - - - - 3,800.

Packer Setting, Feet - - - - -

Viscosity, Centipoises @ - - - - -

A. P. I. Gravity, degrees @ 60 °F - - - - -

Elevation, Feet - - - - -

A fresh water 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 Oilfield Research Laboratories.

Datum for depths given in this report is 2.5 feet above ground level.

FORMATION CORED

The detailed log of the formation cored is as follows:

Depth Interval, Feet.	Description
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642.0 - 650.2	- Light brown laminated shaley sandstone.
650.2 - 659.7	- Brown slightly laminated slightly shaley sandstone.
659.7 - 660.1	- Light brown laminated shaley sandstone.
660.1 - 665.5	- Brown slightly laminated slightly shaley sandstone.
665.5 - 673.5	- Dark brown laminated shaley sandstone.
673.5 - 678.0	- Brown to dark carbonaceous shaley sandstone.
678.0 - 682.0	- Dark carbonaceous shaley sandstone.

Coring was started at a depth of 642.0 feet in light brown laminated shaley sandstone and completed at 682.0 feet in dark carbonaceous shaley sandstone. This core shows a total of 40.0 feet of sandstone. For the most part, the pay is made up of brown slightly laminated slightly 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 43.3, 35.2 and 7.3 millidarcys respectively; the overall average being 31.0 (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 0.29 to a maximum of 143 millidarcys.

PERCENT SATURATION & OIL CONTENT

The sand in this core shows a good weighted average percent oil saturation, namely, 45.4. The weighted average percent oil saturation of the upper, middle and lower sections is 20.4, 51.7 and 48.2 respectively. The weighted average percent water saturation of the upper, middle and lower sections is 72.3, 39.2 and 40.2 respectively; the overall average being 45.5 (See Table III). This gives an overall weighted average total fluid saturation of 90.9 percent.

The weighted average oil content of the upper, middle and lower sections is 258, 784 and 696 barrels per acre foot respectively; the overall average being 672. The total oil content, as shown by this core; is 24,508 barrels per acre of which 18,253 barrels are in the middle section (See Table III).

LABORATORY FLOODING TESTS

The sand in this core responded very well to laboratory flooding tests, as a total recovery of 8,922 barrels of oil per acre was obtained from 21.4 feet of sand. The weighted average percent oil saturation was reduced from 52.9 to 25.7, or represents an average recovery of 27.2 percent. The weighted average effective permeability of the samples is 3.28 millidarcys, while the average initial fluid production pressure is 11.4 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 36 samples tested, 24 produced water and 21 oil. This indicates that approximately 58 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 3,800 barrels of oil per acre from the area of which this core is representative. This represents an average recovery of 206 barrels of oil per acre foot from the 18.4 feet of good floodable pay sand analyzed. The following factors were used in calculating this recovery:

Original formation volume factor	1.06
Present formation volume factor	1.01
True water saturation, percent	36.0
Primary oil recovery, percent	8.0
Calculated present oil saturation, percent	53.0
Porosity, percent	20.0
Oil saturation at abandonment, percent	26.0
Performance factor, percent	50.0

The analysis results show 18.4 feet of good floodable pay sand in the interval extending from the depth of 650.2 to 673.5 feet. The pay sand has very good oil saturation and good effective permeability.

Oilfield Research Laboratories
RESULTS OF PERMEABILITY TESTS
TABLE I

Company Schermerhorn Oil Corporation Lease Pavilcek. Well No. W-11

Sample No.	Depth Feet	Permeability MMDarcy	Feet of Core		Permeability Capacity Ft. x Md.
			Ft.	Cum. Ft.	
1	643.9	143.	0.7	0.7	100.10
2	644.4	108.	0.5	1.2	54.00
3	644.9	78.	0.5	1.7	39.00
4	645.4	6.5	0.5	2.2	3.25
5	645.9	6.2	0.5	2.7	3.10
6	646.4	4.5	0.5	3.2	2.25
7	646.9	1.9	0.5	3.7	0.95
8	647.4	Imp.	0.5	4.2	0.00
9	647.9	0.80	0.5	4.7	0.40
10	648.4	Imp.	0.5	5.2	0.00
11	648.9	Imp.	0.5	5.7	0.00
12	649.4	Imp.	0.5	6.2	0.00
13	649.9	1.0	0.5	6.7	0.50
14	650.4	23.	0.5	7.2	11.50
15	650.9	51.	0.5	7.7	25.50
16	651.4	52.	0.5	8.2	26.00
17	651.9	134.	0.5	8.7	67.00
18	652.4	90.	0.5	9.2	45.00
19	652.9	116.	0.5	9.7	58.00
20	653.4	19.	0.5	10.2	9.50
21	653.9	9.9	0.5	10.7	4.95
22	654.4	1.2	0.5	11.2	0.60
23	654.9	16.	0.5	11.7	8.00
24	655.4	5.8	0.5	12.2	2.90
25	655.9	52.	0.5	12.7	26.00
26	656.4	41.	0.5	13.2	20.50
27	656.9	60.	0.5	13.7	30.00
28	657.4	116.	0.5	14.2	58.00
29	657.9	68.	0.5	14.7	34.00
30	658.4	50.	0.5	15.2	25.00
31	658.9	21.	0.5	15.7	10.50
32	659.4	33.	0.5	16.2	16.50
33	659.8	0.74	0.4	16.6	0.30
34	660.4	21.	0.6	17.2	12.60
35	660.9	41.	0.5	17.7	20.50
36	661.4	1.6	0.5	18.2	0.80
37	661.9	50.	0.5	18.7	25.00
38	662.4	20.	0.5	19.2	10.00
39	662.9	7.1	0.5	19.7	3.55
40	663.4	44.	0.5	20.2	22.00

Offield Research Laboratories
RESULTS OF PERMEABILITY TESTS
TABLE I

Company Schermerhorn Oil Corporation Lease Pavilcek Well No. W-11

Sample No.	Depth Feet	Permeability Millidarcys	Feet of Core		Permeability Capacity Ft. x Md.
			Ft.	Core Ft.	
41	663.9	3.2	0.5	20.7	1.60
42	664.4	36.	0.5	21.2	18.00
43	664.9	44.	0.5	21.7	22.00
44	665.4	21.	0.3	22.0	6.30
45	665.9	18.	0.7	22.7	12.60
46	666.4	24.	0.5	23.2	12.00
47	666.9	1.2	0.5	23.7	0.60
48	667.4	12.	0.5	24.2	6.00
49	667.9	60.	0.5	24.7	30.00
50	668.4	4.4	0.5	25.2	2.20
51	668.9	3.9	0.5	25.7	1.95
52	669.4	0.29	0.5	26.2	0.14
53	669.9	31.	0.5	26.7	15.50
54	670.4	15.	0.5	27.2	7.50
55	670.9	41.	0.5	27.7	20.50
56	671.4	37.	0.5	28.2	18.50
57	671.9	32.	0.5	28.7	16.00
58	672.4	29.	0.5	29.2	14.50
59	672.9	52.	0.5	29.7	26.00
60	673.4	45.	0.3	30.0	13.50
61	673.9	33.	0.7	30.7	23.10
62	674.4	17.	0.5	31.2	8.50
63	674.9	6.7	0.5	31.7	3.35
64	675.4	2.6	0.5	32.2	1.30
65	675.9	2.3	0.5	32.7	1.15
66	676.4	12.	0.5	33.2	6.00
67	676.9	2.2	0.5	33.7	1.10
68	677.4	0.97	0.5	34.2	0.48
69	677.9	1.8	0.3	34.5	0.54
70	678.4	0.43	0.7	35.2	0.30
71	678.9	0.68	0.5	35.7	0.34
72	679.4	1.8	0.8	36.5	1.44

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RESULTS OF SATURATION TESTS

TABLE B

Company Schermerhorn Oil Corporation Lease Pavilcek Well No. W-11

Sat. No.	Depth, Feet	Effective Porosity Percent	Percent Saturation			Oil Content Hds./A. Ft.	Feet of Core		Total Oil Content Hds./Acres
			Oil	Water	Total		Ft.	Core Ft.	
1	644.1	22.0	12	76	88	205	1.1	1.1	226
2	645.1	19.8	16	78	94	246	1.0	2.1	246
3	646.1	18.0	22	65	87	307	1.0	3.1	307
4	647.1	16.8	28	67	95	365	1.0	4.1	365
5	648.1	8.1	12	84	96	76	1.0	5.1	76
6	649.1	9.1	16	80	96	113	1.0	6.1	113
7	650.1	17.3	49	45	94	658	0.6	6.7	395
8	651.1	18.4	46	37	83	656	1.4	8.1	920
9	652.1	20.8	50	38	88	807	1.0	9.1	807
10	653.1	20.2	48	39	87	752	1.0	10.1	752
11	654.1	17.5	52	40	92	706	1.0	11.1	706
12	655.1	22.4	61	29	90	1,060	1.0	12.1	1,060
13	656.1	20.9	60	31	91	973	1.0	13.1	973
14	657.1	20.9	51	39	90	826	1.0	14.1	826
15	658.1	21.8	48	43	91	812	1.0	15.1	812
16	659.1	20.1	62	36	98	966	1.1	16.2	1,063
F-17	660.0	20.5	22	-	-	350	0.4	16.6	140
17	660.2	18.0	57	38	95	796	0.5	17.1	398
18	661.1	14.8	35	56	91	402	1.0	18.1	402
19	662.1	20.2	39	57	96	612	1.0	19.1	612
20	663.1	17.9	54	35	89	750	1.0	20.1	750
21	664.1	18.3	48	50	98	681	1.0	21.1	681
22	665.1	19.6	63	35	98	960	0.9	22.0	864
23	666.1	20.7	62	35	97	956	1.1	23.1	1,052
24	667.1	17.2	56	40	96	748	1.0	24.1	748
25	668.1	20.5	55	34	89	875	1.0	25.1	875

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RESULTS OF SATURATION TESTS

TABLE II

Company Schermerhorn Oil Corporation Lease Pavilcek Well No. W-11

Set. 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	669.1	18.0	49	41	90	685	1.0	26.1	685
27	670.1	20.2	49	40	89	768	1.0	27.1	768
28	671.1	19.6	46	36	82	700	1.0	28.1	700
29	672.1	18.7	58	39	97	842	1.0	29.1	842
30	673.1	20.9	56	33	89	908	0.9	30.0	817
31	674.1	20.1	47	31	78	732	1.1	31.1	805
32	675.1	17.4	45	41	86	607	1.0	32.1	607
33	676.1	18.8	46	37	83	671	1.0	33.1	671
34	677.1	16.9	42	51	93	550	1.4	34.5	770
35	678.1	19.9	53	33	86	818	0.6	35.1	492
36	679.1	19.1	57	41	98	845	1.4	36.5	1,182
							Total	- - - -	24,508

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Schermerhorn Oil Corporation Lease Pavilcek Well No. W-11

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Fl. x Md.
643.5 - 650.2	4.7	43.3	203.55
650.2 - 673.5	23.3	35.2	819.59
673.5 - 680.0	6.5	7.3	47.60
643.5 - 680.0	34.5	31.0	1,070.74

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
643.5 - 650.2	6.7	15.9	20.4	72.3	258	1,728
650.2 - 673.5	23.3	19.5	51.7	39.2	784	18,253
673.5 - 680.0	6.5	18.5	48.2	40.2	696	4,527
643.5 - 680.0	36.5	18.7	45.4	45.5	672	24,508

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company			Schermmerhorn Oil Corporation				Lease		Pavilcek		Well No.		W-11	
Sample No.	Depth, Feet	Effective Porosity Percent	Original Oil Saturation		Oil Recovery		Residual Saturation			Volume of Water Recovered cc ^o	Effective Permeability mDarcy ^{oo}	Initial Fluid Production Pressure Lbs./Sq./In.		
			%	Bbls./A. Ft.	%	Bbls./A. Ft.	% Oil	% Water	Bbls./A. Ft.					
1	644.1	21.4	9	150	0	0	9	75	150	158	7.68	5		
2	645.1	20.2	18	282	0	0	18	76	282	255	5.75	5		
3	646.1	18.6	26	375	0	0	26	71	375	48	0.808	15		
4	647.1	16.5	26	333	0	0	26	71	333	0	Imp.	50+		
5	648.1	7.6	14	83	0	0	14	82	83	0	Imp.	50+		
6	649.1	8.5	13	86	0	0	13	78	86	.0	Imp.	50+		
7	650.1	17.0	46	607	0	0	46	49	607	0	Imp.	50+		
8	651.1	18.3	46	652	23	326	23	70	326	55	1.03	10		
9	652.1	21.0	50	814	28	456	22	66	358	83	8.70	10		
10	653.1	19.7	48	734	24	367	24	73	367	139	7.88	5		
11	654.1	17.2	52	694	28	374	24	74	320	12	0.346	10		
12	655.1	22.7	61	1,072	31	545	30	67	527	186	13.14	10		
13	656.1	20.4	60	950	37	586	23	75	364	47	0.910	5		
14	657.1	21.2	51	839	29	477	22	76	362	168	9.04	5		
15	658.1	21.4	48	796	26	431	22	75	365	172	4.24	5		
16	659.1	20.4	62	982	41	650	21	70	332	200	7.75	5		
17	660.0	20.5	22	350	0	0	22	75	350	0	Imp.	50+		
18	661.1	14.5	32	360	0	0	32	58	360	0	Imp.	50+		
19	662.1	19.7	39	595	19	290	20	75	305	85	1.50	15		
20	663.1	17.4	54	729	28	378	26	70	351	12	0.313	15		
21	664.1	18.7	48	697	17	247	31	67	450	34	0.975	10		
22	665.1	19.7	63	963	34	520	29	67	443	60	1.39	10		
23	666.1	20.9	62	1,004	31	502	31	64	502	89	2.34	10		
24	667.1	16.7	56	726	34	441	22	74	285	2	0.081	15		
25	668.1	20.1	55	857	16	249	39	54	608	9	0.243	20		

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 <u>Schermerhorn Oil Corporation</u> Lease <u>Pavilcek</u> Well No. <u>W-11</u>												
Sample No.	Depth, Feet	Effective Porosity Percent	Original Oil Saturation		Oil Recovery		Residual Saturation			Volume of Water Recovered cc*	Effective Permeability Millidarcys**	Initial Field Production Pressure Lbs./Sq./In.
			%	Bbls./A. Ft.	%	Bbls./A. Ft.	% Oil	% Water	Bbls./A. Ft.			
26	669.1	18.5	49	703	20	287	29	63	416	9	0.212	15
27	670.1	20.8	49	790	18	290	31	65	500	67	1.68	15
28	671.1	20.2	46	720	23	360	23	70	360	131	3.87	15
29	672.1	18.7	58	842	35	508	23	69	334	28	0.683	20
30	673.1	20.5	56	892	31	494	25	70	398	103	2.82	15
31	674.1	19.7	50	765	0	0	50	43	765	0	Imp.	50+
32	675.1	18.0	48	670	0	0	48	47	670	0	Imp.	50+
33	676.1	18.5	46	660	0	0	46	50	660	0	Imp.	50+
34	677.1	16.7	43	557	0	0	43	53	557	0	Imp.	50+
35	678.1	19.4	50	753	0	0	50	43	753	0	Imp.	50+
36	679.1	18.8	53	772	0	0	53	43	772	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.

Oilfield Research Laboratories

SUMMARY OF LABORATORY FLOODING TESTS

TABLE V

Company	Schermerhorn Oil Corporation	Lease	Pavilcek	Well No.	W-11
Depth Interval, Feet	650.2 - 673.5				
Feet of Core Analyzed	21.4				
Average Percent Porosity	19.7				
Average Percent Original Oil Saturation	52.9				
Average Percent Oil Recovery	27.2				
Average Percent Residual Oil Saturation	25.7				
Average Percent Residual Water Saturation	69.2				
Average Percent Total Residual Fluid Saturation	94.9				
Average Original Oil Content, Bbls./A. Ft.	811.				
Average Oil Recovery, Bbls./A. Ft.	417.				
Average Residual Oil Content, Bbls./A. Ft.	394.				
Total Original Oil Content, Bbls./Acre	17,324.				
Total Oil Recovery, Bbls./Acre	8,922.				
Total Residual Oil Content, Bbls./Acre	8,402.				
Average Effective Permeability, Millidarcys	3.28				
Average Initial Fluid Production Pressure, p.s.i.	11.4				

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