

# OILFIELD RESEARCH LABORATORIES

- REGISTERED ENGINEERS -

813 EAST SIXTH  
OKMULGEE, OKLAHOMA  
PHONE: 4444

Chanute, Kansas

536 N. HIGHLAND  
CHANUTE, KANSAS  
PHONE: 728

March 9, 1961

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

Gentlemen:

Enclosed herewith is the report of the analysis of the Rotary core taken from the Freidline-Wiggans Lease, Well No. I-27, Wilson County, Kansas, and submitted to our laboratory on March 3, 1961.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES



Carl L. Pate

CLP:db

1 c. - Earlton, Kansas

# Oilfield Research Laboratories

## GENERAL INFORMATION & SUMMARY

Company Schermerhorn Oil Corp. Lease Freidline-Wiggans Well No. I-27

Location 660' North of the Center of

Section 17 Twp. 28S Rge. 17E County Wilson State Kansas

Name of Sand - - - - - Bartlesville

Top of Core - - - - - 975.0

Bottom of Core - - - - - 1009.0

Top of Sand - - (Received) - - - - - 975.0

Pay  
Bottom of Sand - - - - - 997.6

Total Feet of Permeable Sand - (Analyzed) - - - - - 20.3

Total Feet of Floodable Sand - (Analyzed) - - - - - 11.3

**Distribution of Permeable Sand:**

Permeability Range Millidarcys	Feet	Cum. Ft.	
0 - 5	7.0	7.0	
5 - 10	1.9	8.9	
10 - 50	4.6	13.5	
50 - 100	1.4	14.9	
100 - 200	3.4	18.3	
200 & above	2.0	20.3	
Average Permeability Millidarcys - - - - -			58.9
Average Percent Porosity - - - - -			19.5
Average Percent Oil Saturation - - - - -			49.6
Average Percent Water Saturation - - - - -			33.9
Average Oil Content, Bbls./A. Ft. - - - - -			755.
Total Oil Content, Bbls./Acre - - - - -			15,628.
Average Percent Oil Recovery by Laboratory Flooding Tests - - - - -			22.8
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft. - - - - -			359.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre - - - - -			4,411.
Total Calculated Oil Recovery, Bbls./Acre - - - - -			3,320.
Packer Setting, Feet - - - - -			
Viscosity, Centipoises @ - - - - -			
A. P. I. Gravity, degrees @ 60 °F - - - - -			
Elevation, Feet - - - - -			

A fresh water mud was used as a circulating fluid in the coring of the sand in this well. The depth measurements were corrected to ground level. This core was sampled and the samples sealed in cans by a representative of Oilfield Research Laboratories.

#### FORMATION CORED

The detailed log of the formation cored is as follows:

<u>Depth Interval,</u> <u>Feet</u>	<u>Description</u>
975.0 - 978.2	- Brown slightly laminated shaley sandstone.
978.2 - 978.5	- Laminated sandstone and shale.
978.5 - 985.8	- Brown slightly laminated shaley sandstone.
985.8 - 986.8	- Laminated sandstone and shale.
986.8 - 992.0	- Brown laminated slightly shaley sandstone.
992.0 - 997.0	- Loss.
997.0 - 998.8	- Dark brown conglomeratic sandstone.
998.8 - 1001.0	- Dark carbonaceous shaley sandstone.
1001.0 - 1007.0	- Shale.
1007.0 - 1009.0	- Loss.

Coring was started at a depth of 975.0 feet in brown slightly laminated shaley sandstone and completed at 1009.0 feet probably in shale. This core shows a total of 19.7 feet of sandstone. For the most part, the pay is made up of brown slightly laminated shaley sandstone. There were 2 core losses; one extending from a depth of 992.0 to 997.0 feet and the other from 1007.0 to 1009.0 feet. The first loss was probably sand.

#### 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 105.1, 8.1 and 2.5 millidarcys respectively; the overall average being 58.9 (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 0.32 to a maximum of 377 millidarcys.

#### PERCENT SATURATION & OIL CONTENT

The sand in this core shows a good weighted average percent oil saturation, namely, 49.6. The weighted average percent oil saturation of the upper, middle and lower sections is 54.0, 41.6 and 51.8 respectively. The weighted average percent water saturation of the upper, middle and lower sections is 30.6, 39.6 and 31.5 respectively; the overall average being 33.9 (See Table III). This gives an overall weighted average total fluid saturation of 83.5 percent. The good floodable sand is included in the upper section.

The weighted average oil content of the upper, middle and lower sections is 852, 616 and 734 barrels per acre foot respectively; the overall average being 755. The total oil content, as shown by this core, is 15,628 barrels per acre of which 8,944 barrels are in the better pay sand section (See Table III).

#### LABORATORY FLOODING TESTS

The pay sand in this core responded very well to laboratory flooding tests, as a total recovery of 4,411 barrels of oil per acre was obtained from 12.3 feet of sand. The weighted average percent oil saturation was reduced from 53.3 to 30.5, or represents an average recovery of 22.8 percent. The weighted average effective permeability of the samples is 3.41 millidarcys, while the average initial fluid production pressure is 19.7 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 21 samples tested, 14 produced water and 15 oil. This indicates that approximately 71 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

From a study of the above data, it is evident that an efficient water-flood, within the vicinity of this well, will recover approximately 3,320 barrels of oil per acre or an average of 294 barrels per acre foot from the 11.3 feet of floodable pay sand analyzed. The following factors and assumptions were used in calculating the above oil recovery value:

Original formation volume factor	1.07
Present formation volume factor	1.02
Irreducible water saturation, percent	26.0
Primary oil recovery, percent	7.0
Present oil saturation, percent	63.5
Oil saturation after flooding, percent	30.0
Percent porosity	21.0
Performance factor	0.55

This core shows a fairly clean sand section having a good oil saturation, a rather low water saturation and a wide variation in permeability. The analysis show that the better pay sand section extends from a depth of 975.0 to 985.8 feet. Part of the core loss, extending from a depth of 992.0 to 997.0 feet may have been pay sand.

**Oilfield Research Laboratories**  
**RESULTS OF PERMEABILITY TESTS**  
**TABLE I**

Company Schermerhorn Oil Corp. Lease Freidline-Wiggans Well No. I-27

Sample No.	Depth Feet	Permeability Millidarcys	Feet of Core		Permeability Capacity Ft. x Md.
			Ft.	Cum. Ft.	
1	975.4	149.	0.7	0.7	104.30
2	975.9	297.	0.5	1.2	148.50
3	976.4	42.	0.5	1.7	21.00
4	976.9	25.	0.5	2.2	12.50
5	977.4	202.	0.4	2.6	80.80
6	977.8	100.	0.6	3.2	60.00
7	978.4	0.23	0.3	3.5	0.07
8	978.9	46.	0.7	4.2	32.20
9	979.4	60.	0.5	4.7	30.00
10	979.9	27.	0.5	5.2	13.50
11	980.4	57.	0.4	5.6	22.80
12	980.8	115.	0.6	6.2	69.00
13	981.4	18.	0.5	6.7	9.00
14	981.9	19.	0.5	7.2	9.50
15	982.4	72.	0.5	7.7	36.00
16	982.9	1.7	0.5	8.2	0.85
17	983.4	2.9	0.5	8.7	1.45
18	983.9	227.	0.5	9.2	113.50
19	984.4	162.	0.5	9.7	81.00
20	984.9	126.	0.5	10.2	63.00
21	985.4	377.	0.6	10.8	226.20
22	985.9	Imp.	0.4	11.2	0.00
23	986.4	0.23	0.6	11.8	0.14
24	986.9	20.	0.4	12.2	8.00
25	987.4	19.	0.5	12.7	9.50
26	987.9	9.5	0.5	13.2	4.25
27	988.4	10.	0.5	13.7	5.00
28	988.9	2.9	0.5	14.2	1.45
29	989.4	1.3	0.5	14.7	0.65
30	989.9	7.8	0.5	15.2	3.90
31	990.4	0.47	0.5	15.7	0.23
32	990.9	16.	0.5	16.2	8.00
33	991.4	13.	0.5	16.7	6.50
34	991.9	6.9	0.3	17.0	2.07
35	997.4	4.0	0.7	17.7	2.80
36	997.9	4.0	0.5	18.2	2.00
37	998.4	5.5	0.6	18.8	3.30
38	998.9	0.32	0.4	19.2	0.13
39	999.4	1.3	0.5	19.7	0.65
40	999.9	1.3	0.5	20.2	0.65
41	1000.4	1.8	0.5	20.7	0.90

# Oilfield Research Laboratories

## RESULTS OF SATURATION TESTS

TABLE II

Company Schermerhorn Oil Corp. Lease Freidline-Wiggans Well No. I-27

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.	
1	975.1	21.4	49	42	91	0.6	0.6	488
2	976.1	21.0	56	26	82	1.0	1.6	912
3	977.1	18.6	52	34	86	1.0	2.6	750
4	977.9	21.1	54	24	78	0.4	3.0	354
F-4	978.1	16.4	46	-	76	0.2	3.2	117
5	979.1	20.8	52	24	77	1.1	4.3	924
6	980.1	20.5	52	25	77	1.0	5.3	827
F-7	980.9	22.7	62	-	84	0.4	5.7	436
7	981.1	20.0	58	26	84	0.6	6.3	540
8	982.1	20.0	61	30	91	1.0	7.3	946
9	983.1	18.0	62	31	93	1.0	8.3	866
10	984.1	21.7	51	38	89	1.0	9.3	858
11	985.1	19.2	51	39	90	0.6	9.9	456
F-11	985.3	24.6	41	-	89	0.6	10.5	470
12	986.1	12.2	24	65	89	1.0	11.5	227
13	987.1	19.7	47	33	80	0.8	12.3	574
14	988.1	19.2	42	31	73	1.0	13.3	626
15	989.1	20.3	45	37	82	1.0	14.3	709
16	990.1	18.7	49	38	87	1.0	15.3	711
17	991.1	20.4	40	35	75	1.4	16.7	886
18	997.1	19.9	49	38	87	0.6	17.3	454
19	998.1	20.7	45	35	80	1.2	18.5	867
20	999.1	14.0	44	43	87	0.8	19.3	383
21	1000.1	18.5	62	22	84	1.4	20.7	1,247

# Oilfield Research Laboratories

## SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company	Lease	Well No.
Schermerhorn Oil Corp.	Freidline-Wiggans	I-27

  

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
975.0 - 985.8	10.8	105.1	1,135.17
986.2 - 997.6	6.5	8.1	52.49
997.6 - 1000.7	3.0	2.5	7.63
975.0 - 1000.7	20.3	58.9	1,195.29

  

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
975.0 - 985.8	10.5	20.4	54.0	30.6	852	8,944
985.8 - 997.6	6.8	18.6	41.6	39.6	616	4,187
997.6 - 1001.0	3.4	18.2	51.8	31.5	734	2,497
975.0 - 1001.0	20.7	19.5	49.6	33.9	755	15,628

# Offfield Research Laboratories

## RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

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.
			%	Ebbs./A. Ft.	%	Ebbs./A. Ft.	% Oil	% Water			
1	975.1	21.7	49	825	21	354	28	64	302	6.77	10
2	976.1	21.4	56	913	23	382	32	60	197	8.60	10
3	977.1	18.1	52	730	22	309	30	63	22	0.441	10
4	978.1	16.4	46	586	12	153	34	59	1	0.088	25
5	979.1	20.9	52	843	30	486	22	68	109	2.25	10
6	980.1	20.0	52	807	28	435	24	62	48	0.962	10
7	980.9	22.7	62	1,091	32	563	30	63	128	6.93	10
8	982.1	19.6	61	928	27	411	34	59	4	0.176	25
9	983.1	18.5	62	890	31	445	31	62	21	0.441	15
10	984.1	21.4	51	846	29	481	22	68	308	8.38	10
11	985.3	24.6	41	783	17	325	24	67	288	17.30	10
12	986.1	11.8	21	192	0	0	21	69	0	Imp.	40
13	987.1	19.1	47	696	9	133	38	56	0	0.008	40
14	988.1	19.7	42	646	10	154	32	63	1	0.086	40
15	989.1	19.7	42	645	0	0	42	37	0	Imp.	30
16	990.1	19.1	49	726	21	311	28	68	7	0.173	40
17	991.1	19.9	36	556	0	0	36	56	0	Imp.	40
18	997.1	19.7	43	753	4	61	45	47	23	0.383	40
19	998.1	20.2	43	674	0	0	43	41	0	Imp.	-
20	999.1	14.4	40	447	0	0	40	51	0	Imp.	-
21	1000.1	18.0	56	782	0	0	56	33	0	Imp.	-

Company Schermerhorn Oil Corp. Lease Freidline-Wiggans Well No. I-27

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	Lease	Friedline-Wiggans	Well No.
Schermerhorn Oil Corp.	975.0 - 985.8	986.8 - 997.6	975.0 - 997.6
	8.9	3.4	12.3
Depth Interval, Feet			
	21.4	19.4	20.9
Average Percent Porosity			
	55.9	46.4	53.3
Average Percent Original Oil Saturation			
	26.9	11.9	22.8
Average Percent Oil Recovery			
	29.0	34.5	30.5
Average Percent Residual Oil Saturation			
	66.3	60.0	64.6
Average Percent Residual Water Saturation			
	95.3	94.5	95.1
Average Percent Total Residual Fluid Saturation			
	884.	700.	834.
Average Original Oil Content, Bbls./A. Ft.			
	427.	179.	359.
Average Oil Recovery, Bbls./A. Ft.			
	457.	521.	475.
Average Residual Oil Content, Bbls./A. Ft.			
	7,871.	2,380.	10,251.
Total Original Oil Content, Bbls./Acre			
	3,803.	608.	4,411.
Total Oil Recovery, Bbls./Acre			
	4,068.	1,772.	5,840.
Total Residual Oil Content, Bbls./Acre			
	4.66	0.15	3.41
Average Effective Permeability, Millidarcys			
	13.0	37.1	19.7
Average Initial Fluid Production Pressure, p.s.i.			

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