

# OILFIELD RESEARCH LABORATORIES

- REGISTERED ENGINEERS -

700 NORTH MISSION  
OKMULGEE, OKLAHOMA  
PHONE: 4444

Chanute, Kansas

536 N. HIGHLAND  
CHANUTE, KANSAS  
PHONE: HE 1-2650

May 8, 1962

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 Wiggans Lease, Well No. J-20, Wilson County, Kansas, and submitted to our laboratory on May 1, 1961.

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

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES



Carl L. Pate

CLP:rf

1 c. - Earlton, Kansas

# Oilfield Research Laboratories

## GENERAL INFORMATION & SUMMARY

Company Schermerhorn Oil Corp. Lease Wiggans Well No. J-20  
 Location 165' East of West line & 330' South of North line S $\frac{1}{2}$  SE $\frac{1}{4}$   
 Section 17 Twp. 28S Rge. 17E County Wilson State Kansas

Name of Sand	Bartlesville
Top of Core	951.0
Bottom of Core	971.0
Top of Sand	950.0
(According to field log).	
Bottom of Sand	954.0
Total Feet of Permeable Sand	9.2
Total Feet of Floodable Sand	3.0

**Distribution of Permeable Sand:**  
 Permeability Range  
 Millidarcys

	Feet	Cum. Ft.
0 - 1	2.0	2.0
1 - 5	3.2	5.2
5 - 10	1.0	6.2
10 - 40	1.4	7.6
40 & above	1.6	9.2

Average Permeability Millidarcys	18.0
Average Percent Porosity	16.9
Average Percent Oil Saturation	31.4
Average Percent Water Saturation	48.3
Average Oil Content, Bbls./A. Ft.	425.
Total Oil Content, Bbls./Acre	4,885.
Average Percent Oil Recovery by Laboratory Flooding Tests	6.7
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	113.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	360.
Total Calculated Oil Recovery, Bbls./Acre	681.
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. This well was drilled in a semi-virgin area.

#### FORMATION CORED

The detailed log of the formation cored is as follows:

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

951.0 - 954.0	Brown, fine grained sandstone.
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954.0 - 954.5	Dark carbonaceous sandstone.
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954.5 - 958.8	Brown, laminated, shaly sandstone.
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958.8 - 961.8	Laminated, sandy shale.
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961.8 - 971.0	Laminated sandstone and shale.
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Coring was started at a depth of 951.0 feet in brown, fine grained sandstone and completed at 971.0 feet in laminated sandstone and shale. This core shows a total of 7.8 feet of sandstone. The pay is made up of brown, fine grained sandstone. According to the field log, one foot of sand was drilled before coring was started.

#### PERMEABILITY

For the sake of distribution, the core was divided into two sections. The weighted average permeability of the upper and lower sections is 49.4 and 2.8 millidarcys respectively; the overall average being 18.0 (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 impermeable to a maximum of 71. millidarcys.

#### PERCENT SATURATION & OIL CONTENT

The sand in this core shows a fair weighted average percent oil saturation, namely, 31.4. The weighted average percent oil saturation of the upper and lower sections is 35.3 and 29.7 respectively. The weighted average percent water saturation of the upper and lower sections

is 48.3 and 48.4 respectively; the overall average being 48.3 (See Table III). This gives an overall weighted average total fluid saturation of 79.7 percent. This fairly low total fluid saturation indicates some fluid was lost during coring which probably was oil.

The weighted average oil content of the upper and lower sections is 556 and 367 barrels per acre foot respectively; the overall average being 425. The total oil content, as shown by this core, is 4,885 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 360 barrels of oil per acre was obtained from 3.5 feet of sand. The weighted average percent oil saturation was reduced from 35.0 to 28.3, or represents an average recovery of 6.7 percent. The weighted average effective permeability of the samples is 2.47 millidarcys, while the average initial fluid production pressure is 22.4 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 12 samples tested, 4 produced water and oil. This indicates that approximately 33 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

From a study of the above data, it is evident that an efficient water-flood, within the vicinity of this well, will recover approximately 681 barrels of oil per acre or an average of 227 barrels per acre foot from the 3 feet of floodable pay sand analyzed. In calculating this oil recovery value, the following data and assumptions were employed:

Original formation volume factor	1.06
Present formation volume factor	1.03
Irreducible water saturation, percent	40.0

Primary recovery, estimated, percent	2.0
Present oil saturation, percent	56.3
Average porosity, percent	19.6
Oil saturation after flooding, percent	28.3
Performance factor, percent	0.55
Net floodable pay sand, feet	3.0

This core shows a thin pay sand section having a fair oil saturation, a rather high water saturation and a good permeability. The pay sand section extends from a depth of 951.0 to 954.0 feet. Of course, the foot of sand that was drilled may have been pay sand.

RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Schermerhorn Oil Corp. Lease Wiggins Well No. J-20

Sample No.	Depth, Feet	Effective Porosity Percent	Percent Saturation			Oil Content Bbbs. / A Ft.	Perm., Mill.	Feet of Sand		Total Oil Content	Perm. Capacity Ft. X md.
			Oil	Water	Total			Ft.	Cum. Ft.		
1	951.1	18.9	32	48	80	469	71.	0.6	0.6	381	42.60
2	952.1	19.4	33	51	84	497	58.	1.0	1.6	497	58.00
3	953.1	19.6	35	49	84	532	34.	1.4	3.0	744	47.60
4	954.1	19.5	43	41	84	650	Imp.	0.5	3.5	325	0.00
5	956.1	18.0	33	38	71	461	0.71	1.0	4.5	461	0.71
6	957.1	14.0	39	52	91	424	2.3	1.0	5.5	424	2.30
7	958.1	16.8	34	44	78	443	4.6	1.2	6.7	532	5.52
8	962.1	15.2	27	49	76	318	Imp.	0.8	7.5	254	0.00
9	963.1	17.4	28	45	73	378	2.8	1.0	8.5	378	2.80
10	964.1	17.2	31	36	67	414	5.7	1.0	9.5	414	5.70
11	966.1	14.4	22	65	87	246	Imp.	1.0	10.5	246	0.00
12	968.1	13.4	22	59	81	229	0.37	1.0	11.5	229	0.37
								Total		4,885	

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## SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Schermerhorn Oil Corp. Lease Wiggans Well No. J-20

Depth Interval, Feet	Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.	Average Percent Porosity	Average Percent Oil Saturation	Average Percent Water Saturation	Average Oil Content Bbl./A. Ft.	Total Oil Content Bbls./Acre
951.0 - 954.5	951.0 - 954.0	3.5	49.4	148.20	19.4	35.3	48.3	556	1,947
955.6 - 968.6	955.6 - 968.6	8.0	2.8	17.40	15.9	29.7	48.4	367	2,938
951.0 - 968.6	951.0 - 968.6	11.5	18.0	165.60	16.9	31.4	48.3	425	4,885

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Schermerhorn Oil Corp. Loss Wiggins Well No. J-20

Sample No.	Depth, Feet	Effective Porosity Percent		Original Oil Saturation		Oil Recovery		Residual Saturation		Volume of Water Recovered cc <sup>a</sup>	Effective Permeability mD/darcy <sup>b</sup>	Initial Fluid Production Pressure Lbs./Sq./In.
		%	Ehls./A. Ft.	%	Ehls./A. Ft.	%	Ehls./A. Ft.	%	Water			
1	951.1	18.5	459	4	57	28	67	402	29	0.780	30	
2	952.1	19.9	509	7	108	26	68	401	272	5.87	10	
3	953.1	20.0	543	8	124	27	68	419	100	1.58	20	
4	954.1	19.0	633	6	88	37	51	545	9	0.180	45	
5	956.1	17.6	409	0	0	30	41	409	0	Imp.	-	
6	957.1	14.3	399	0	0	36	57	399	0	Imp.	-	
7	958.1	16.3	404	0	0	32	53	404	0	Imp.	-	
8	962.1	15.6	291	0	0	24	62	291	0	Imp.	-	
9	963.1	16.9	367	0	0	28	63	367	0	Imp.	-	
10	964.1	16.6	386	0	0	30	45	386	0	Imp.	-	
11	966.1	14.0	217	0	0	20	70	217	0	Imp.	-	
12	968.1	13.8	214	0	0	20	63	214	0	Imp.	-	

Notes: cc—cubic centimeter.

<sup>a</sup>—Volume of water recovered at the time of maximum oil recovery.

<sup>b</sup> Determined by passing water through sample which still contains residual oil.

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## SUMMARY OF LABORATORY FLOODING TESTS

TABLE V

Well No. J-20

Lease Wiggans

Company Schermerhorn Oil Corp.

951.0 - 954.5

Depth Interval, Feet

3.5

Feet of Core Analyzed

19.6

Average Percent Porosity

35.0

Average Percent Original Oil Saturation

6.7

Average Percent Oil Recovery

28.3

Average Percent Residual Oil Saturation

63.7

Average Percent Residual Water Saturation

92.0

Average Percent Total Residual Fluid Saturation

542.

Average Original Oil Content, Bbls./A. Ft.

113.

Average Oil Recovery, Bbls./A. Ft.

429.

Average Residual Oil Content, Bbls./A. Ft.

1,861.

Total Original Oil Content, Bbls./Acre

360.

Total Oil Recovery, Bbls./Acre

1,501.

Total Residual Oil Content, Bbls./Acre

2.47

Average Effective Permeability, Millidarcys

22.4

Average Initial Fluid Production Pressure, p.s.i.

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