● CORE ANALYSIS ● WATER REPRESSURING ENGINEERING ● WATER ANALYSIS ● FLOODING WATER TREATMENT ● SURVEYING

OILFIELD RESEARCH LABORATORIES

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December 6, 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 Eklund Lease, Well No. D-30, Wilson County, Kansas, and submitted to our laboratory on November 29, 1962.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Benjamin R. Pearman

Benjamin R. Pearman

BRP:rf

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Oilfield Research Laboratories

GENERAL INFORMATION & SUMMARY

Company Schermerhorn Oil Corp. Lease Eklund Well No. D-30

Location 990' South of North line and 1815' East of West line

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

Name of Sand	Bartlesville
Top of Core	970.0
Bottom of Core	990.0
Top of Sand	974.0
Bottom of Sand (Analyzed)	985.6
Total Feet of Permeable Sand (Analyzed)	11.6
Total Feet of Floodable Sand	6.0

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.
0 - 10	4.0	4.0
30 - 40	1.0	5.0
100 - 200	1.6	6.6
200 - 400	5.0	11.6

Average Permeability Millidarcys	153.0
Average Percent Porosity	20.2
Average Percent Oil Saturation	54.5
Average Percent Water Saturation	28.4
Average Oil Content, Bbls./A. Ft.	855.
Total Oil Content, Bbls./Acre	9,934.
Average Percent Oil Recovery by Laboratory Flooding Tests	5.6
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	89.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	533.
Total Calculated Oil Recovery, Bbls./Acre	1,240.
Packer Setting, Feet	
Viscosity, Centipoises @	
A. P. I. Gravity, degrees @ 60 °F	
Elevation, Feet	

This core was taken using fresh water mud as the circulating fluid. A representative of Oilfield Research Laboratories sampled the core and sealed the samples in cans. This core was taken from a semi-virgin area.

FORMATION CORED

The detailed log of the formation cored is as follows:

Depth Interval, Feet	Description
970.0 - 974.0	Sandy shale.
974.0 - 980.0	Dark brown, slightly shaly sandstone.
980.0 - 988.0	Dark carbonaceous, shaly sandstone.
988.0 - 990.0	Shale.

Coring was started at a depth of 970.0 feet in sandy shale and completed at 990.0 feet in shale. This core shows a total of 14.0 feet of sandstone. For the most part, the pay is made up of dark brown, slightly shaly sandstone.

PERMEABILITY

For the sake of distribution, the core was divided into two sections. The weighted average permeability of the upper and lower sections is 271.1 and 26.7 millidarcys respectively; the overall average being 153.0 (See Table III). By observing the data given on the coregraph, it is noticeable that the pay sand has a rather uniform permeability profile. The permeability of the sand varies from 0.21 to a maximum of 343. millidarcys.

PERCENT SATURATION & OIL CONTENT

The pay sand in this core shows a good weighted average percent oil saturation, namely, 45.9. The weighted average percent oil saturation of the upper and lower sections is 45.9 and 63.6 respectively. The weighted average percent water saturation of the upper and lower sections

is 34.2 and 22.2 respectively; while that of the pay sand is 34.2, the overall average being 28.4 (See Table III). This gives an overall weighted average total fluid saturation in the pay sand of 80.1 percent.

The weighted average oil content of the upper and lower sections is 710 and 1,012 barrels per acre foot respectively; the overall average being 855. The total oil content, as shown by this core, is 9,934 barrels per acre of which 4,260 barrels are in the pay sand section (See Table III).

LABORATORY FLOODING TESTS

The upper portion of the sand in this core responded to laboratory flooding tests, as a total recovery of 533 barrels of oil per acre was obtained from 6.0 feet of sand. The weighted average percent oil saturation was reduced from 45.7 to 40.1, or represents an average recovery of 5.6 percent. The weighted average effective permeability of the samples is 2.63 millidarcys, while the average initial fluid production pressure is 28.4 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 12 samples tested, 6 produced water and oil. This indicates that approximately 50 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 to water.

CONCLUSION

The laboratory data indicates that an efficient water-flood in the vicinity of this well should recover approximately 1,240 barrels of oil per acre or an average of 206 barrels per acre foot from the 6.0 feet of floodable pay sand analyzed in this core. These recovery values were calculated using the following data and assumptions:

Original formation volume factor	1.07
Present formation volume factor	1.03
Reservoir water saturation, percent	30.0
Primary recovery, estimated, percent	0.0
Present oil saturation, percent	67.4
Average porosity, percent	20.1
Oil saturation after flooding, percent	40.1
Performance factor, percent	50.0
Net floodable pay sand, feet	6.0

This core shows a pay sand section having a good oil saturation, a moderate water saturation and a wide variation in effective permeability to water.

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Schermerhorn Oil Corp. **Lease** Eklund **Well No.** D-30

Sample No.	Depth, Feet	Effective Porosity Percent	Percent Saturation			Oil Content Bbls. / A Ft.	Perm., Mill.	Feet of Sand		Total Oil Content	Perm. Capacity Ft. X md.
			Oil	Water	Total			Ft.	Cum. Ft.		
1	974.1	19.4	45	37	82	676	221.	0.6	0.6	406	132.60
2	975.1	18.6	41	35	76	591	334.	1.0	1.6	591	334.00
3	976.1	20.5	38	36	74	604	190.	1.0	2.6	604	190.00
4	977.1	21.5	43	40	83	716	276.	1.0	3.6	716	276.00
5	978.1	19.4	48	30	78	721	214.	1.0	4.6	721	214.00
6	979.1	20.1	56	30	86	872	343.	1.4	6.0	1,222	480.20
7	980.1	23.6	62	24	86	1,134	163.	0.6	6.6	681	97.80
8	981.1	20.3	68	24	92	1,070	5.5	1.0	7.6	1,070	5.50
9	982.1	16.9	61	29	90	799	0.21	1.0	8.6	799	0.21
10	983.1	17.1	62	31	93	821	1.3	1.0	9.6	821	1.30
11	984.1	23.1	61	12	73	1,092	34.	1.0	10.6	1,092	34.00
12	985.1	23.3	67	14	81	1,211	9.6	1.0	11.6	1,211	9.60
								Total	-------	9,934	

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Schermerhorn Oil Corp. Lease Eklund Well No. D-30

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
974.0 - 980.0	6.0	271.1	1,626.80
980.0 - 985.6	5.6	26.7	148.41
974.0 - 985.6	11.6	153.0	1,775.21

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
974.0 - 980.0	6.0	20.0	45.9	34.2	710	4,260
980.0 - 985.6	5.6	20.5	63.6	22.2	1,012	5,674
974.0 - 985.6	11.6	20.2	54.5	28.4	855	9,934

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Schermerhorn Oil Corp. Lease Eklund Well No. D-30

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	974.1	19.6	45	684	2	30	43	53	654	38	0.666	30
2	975.1	18.9	41	600	3	44	38	59	556	263	4.84	20
3	976.1	20.0	38	589	2	31	36	53	558	14	0.340	30
4	977.1	21.2	43	706	6	99	37	49	607	27	0.510	30
5	978.1	19.8	48	737	12	184	36	55	553	260	9.14	20
6	979.1	20.6	56	895	7	112	49	45	783	13	0.378	40
7	980.1	23.2	60	1080	0	0	60	27	1,080	0	Imp.	-
8	981.1	20.3	64	1009	0	0	64	27	1,009	0	Imp.	-
9	982.1	17.3	64	858	0	0	64	28	858	0	Imp.	-
10	983.1	16.8	60	781	0	0	60	32	781	0	Imp.	-
11	984.1	23.0	63	1124	0	0	63	14	1,124	0	Imp.	-
12	985.1	23.3	64	1158	0	0	64	15	1,158	0	Imp.	-

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 Corp. Lease Eklund Well No. D-30

Depth Interval, Feet	974.0 - 980.0
Feet of Core Analyzed	6.0
Average Percent Porosity	20.1
Average Percent Original Oil Saturation	45.7
Average Percent Oil Recovery	5.6
Average Percent Residual Oil Saturation	40.1
Average Percent Residual Water Saturation	51.9
Average Percent Total Residual Fluid Saturation	92.0
Average Original Oil Content, Bbls./A. Ft.	716.
Average Oil Recovery, Bbls./A. Ft.	89.
Average Residual Oil Content, Bbls./A. Ft.	627.
Total Original Oil Content, Bbls./Acre	4,296.
Total Oil Recovery, Bbls./Acre	533.
Total Residual Oil Content, Bbls./Acre	3,763.
Average Effective Permeability, Millidarcys	2.63
Average Initial Fluid Production Pressure, p.s.i.	28.4

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