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

OILFIELD RESEARCH LABORATORIES

- REGISTERED ENGINEERS -

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December 24, 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 Freidline "B" Lease, Well No. P-32, Wilson County, Kansas, and submitted to our laboratory on December 20, 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 Freidline "B" Well No. P-32

Location 1155' East of West line & 330' South of North line, NE

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

Name of Sand	Bartlesville
Top of Core	962.0
Bottom of Core	982.0
Top of Sand (Analyzed)	962.6
Bottom of Sand	980.5
Total Feet of Permeable Sand	17.9
Total Feet of Floodable Sand	12.9

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.
10 - 50	5.7	5.7
50 - 100	3.0	8.7
100 - 200	7.3	16.0
200 - 300	0.9	16.9
300 & above	1.0	17.9

Average Permeability Millidarcys	119.1
Average Percent Porosity	20.5
Average Percent Oil Saturation	34.0
Average Percent Water Saturation	39.2
Average Oil Content, Bbls./A. Ft.	544.
Total Oil Content, Bbls./Acre	9,729.
Average Percent Oil Recovery by Laboratory Flooding Tests	11.8
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	192.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	2,479.
Total Calculated Oil Recovery, Bbls./Acre	4,880.
Packer Setting, Feet	
Viscosity, Centipoises @	
A. P. I. Gravity, degrees @ 60 °F	
Elevation, Feet	

Water was used as the circulating fluid while taking this core. The core was sampled and the samples sealed in cans by a representative of Oilfield Research Laboratories. The well was drilled in semi-virgin territory.

FORMATION CORED

The detailed log of the formation cored is as follows:

Depth Interval, Feet	Description
962.0 - 968.3	Light brown, slightly shaly sandstone.
968.3 - 980.5	Brown, slightly shaly sandstone.
980.5 - 982.0	Shale.

Coring was started at a depth of 962.0 feet in slightly shaly sandstone and completed at 982.0 feet in shale. This core shows a total of 18.5 feet of sandstone. For the most part, the pay is made up of 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 65.0 and 140.0 millidarcys respectively; the overall average being 119.1 (See Table III). By observing the data given on the coregraph, it is noticeable that the sand has a rather irregular permeability profile. The permeability of the sand varies from 13. to a maximum of 342. millidarcys.

PERCENT SATURATION & OIL CONTENT

The sand in this core shows a good weighted average percent oil saturation, namely, 34.0. The weighted average percent oil saturation of the upper and lower sections is 20.6 and 39.2 respectively. The weighted average percent water saturation of the upper and lower sections is 53.0 and 33.8 respectively; the overall average being 39.2 (See Table III). This gives an overall weighted average total fluid saturation

of 73.2 percent. This low total fluid saturation indicates considerable fluid was lost during coring most of which probably was oil.

The weighted average oil content of the upper and lower sections is 306 and 635 barrels per acre foot respectively; the overall average being 544. The total oil content, as shown by this core, is 9,729 barrels per acre of which 8,264 barrels are in the pay sand section (See Table III).

LABORATORY FLOODING TESTS

The sand in this core responded well to laboratory flooding tests, as a total recovery of 2,479 barrels of oil per acre was obtained from 12.9 feet of sand. The weighted average percent oil saturation was reduced from 39.2 to 27.4, or represents an average recovery of 11.8 percent. The weighted average effective permeability of the samples is 7.94 millidarcys, while the average initial fluid production pressure is 23.8 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 18 samples tested, 17 produced water and 13 oil. This indicates that approximately 72 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 to water.

CONCLUSION

The results of the laboratory tests indicate that an efficient water-flood in the vicinity of this well should recover approximately 4,880 barrels of oil per acre or an average of 378 barrels per acre foot from the 12.9 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	1.02
Reservoir water saturation, percent	26.0
Primary recovery, estimated, percent	0.0

Present oil saturation, percent	70.5
Average porosity, percent	21.0
Oil saturation after flooding, percent	27.4
Performance factor, percent	55.0
Net floodable pay sand, feet	12.9

This core shows a pay sand section having a good oil saturation, a moderate water saturation and good effective permeability to water. It appears that the sand above 967.6 feet may be gas sand.

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Schermerhorn Oil Corp. Lease Freidline "B" Well No. P-32

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	963.1	19.8	14	51	65	215	27.	1.0	1.0	215	27.00
2	964.1	20.8	19	50	69	307	49.	1.0	2.0	307	49.00
3	965.1	21.1	16	68	84	262	173.	1.0	3.0	262	173.00
4	966.1	20.6	24	50	74	384	57.	1.0	4.0	384	57.00
5	967.1	15.5	30	46	76	360	19.	1.0	5.0	360	19.00
6	968.1	19.0	37	38	75	545	13.	0.7	5.7	382	9.10
7	969.1	20.3	36	37	73	567	188.	1.3	7.0	737	244.40
8	970.1	21.3	32	38	70	528	145.	1.0	8.0	528	145.00
9	971.1	19.2	41	36	77	611	145.	1.0	9.0	611	145.00
10	972.1	18.8	40	30	70	584	38.	1.0	10.0	584	38.00
11	973.1	23.4	39	35	74	708	183.	1.0	11.0	708	183.00
12	974.1	23.1	38	31	69	681	342.	1.0	12.0	681	342.00
13	975.1	18.6	43	28	71	620	54.	1.0	13.0	620	54.00
14	976.1	16.7	38	40	78	492	69.	1.0	14.0	492	69.00
15	977.1	21.9	48	26	74	815	44.	1.0	15.0	815	44.00
16	978.1	23.2	36	36	72	648	166.	1.0	16.0	648	166.00
17	979.1	22.3	42	35	77	727	168.	1.0	17.0	727	168.00
18	980.1	23.9	40	29	69	742	221.	0.9	17.9	668	198.90
								Total	------	9,729	

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Schermerhorn Oil Corp. Lease Fredkline "B" Well No. P-32

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
962.6 - 967.6	5.0	65.0	325.00
967.6 - 980.5	12.9	140.0	1,806.40
962.6 - 980.5	17.9	119.1	2,131.40

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
962.6 - 967.6	5.0	19.6	20.6	53.0	306	1,528
967.6 - 980.5	12.9	20.9	39.2	33.8	635	8,201
962.6 - 980.5	17.9	20.5	34.0	39.2	544	9,729

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Schermerhorn Oil Corp. Lease Freidline "B" Well No. P-32

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	963.1	20.0	14	210	0	0	14	81	210	72	2.52	30
2	964.1	20.8	18	290	0	0	18	80	290	283	10.15	20
3	965.1	20.7	17	273	0	0	17	81	273	233	11.20	20
4	966.1	20.7	21	337	0	0	21	75	337	150	16.55	20
5	967.1	15.8	28	343	0	0	28	49	343	0	Imp.	-
6	968.1	18.8	37	539	10	146	27	71	393	50	1.73	30
7	969.1	20.8	36	581	7	113	29	69	468	265	10.40	20
8	970.1	21.0	32	521	5	81	27	70	440	220	6.38	20
9	971.1	18.7	41	594	12	174	29	67	420	133	4.16	30
10	972.1	19.3	40	599	14	210	26	68	389	186	6.12	20
11	973.1	23.1	39	698	10	179	29	69	519	300	15.40	20
12	974.1	23.5	38	692	12	218	26	64	474	212	11.95	20
13	975.1	19.2	43	640	15	224	28	67	416	37	1.06	30
14	976.1	17.0	38	501	12	158	26	63	343	11	0.360	40
15	977.1	22.4	48	834	23	400	25	69	434	335	9.54	20
16	978.1	23.1	36	644	7	125	29	68	519	301	11.15	20
17	979.1	22.6	42	736	15	263	27	69	473	315	9.35	20
18	980.1	23.7	40	735	12	220	28	64	515	163	13.25	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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SUMMARY OF LABORATORY FLOODING TESTS

TABLE V

Company Schermerhorn Oil Corp. Lease Freidline "B" Well No. P-32

Depth Interval, Feet	967.6 - 980.5
Feet of Core Analyzed	12.9
Average Percent Porosity	21.0
Average Percent Original Oil Saturation	39.2
Average Percent Oil Recovery	11.8
Average Percent Residual Oil Saturation	27.4
Average Percent Residual Water Saturation	67.5
Average Percent Total Residual Fluid Saturation	94.9
Average Original Oil Content, Bbls./A. Ft.	640.
Average Oil Recovery, Bbls./A. Ft.	192.
Average Residual Oil Content, Bbls./A. Ft.	448.
Total Original Oil Content, Bbls./Acre	8,264.
Total Oil Recovery, Bbls./Acre	2,479.
Total Residual Oil Content, Bbls./Acre	5,785.
Average Effective Permeability, Millidarcys	7.94
Average Initial Fluid Production Pressure, p.s.i.	23.8

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