

OILFIELD RESEARCH LABORATORIES

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February 17, 1959

Graybol Oil Corporation
2200 National Bank Bldg.
Tulsa 3, Oklahoma

Gentlemen:

Enclosed herewith is the report of the analysis of the 2 11/16" Rotary core taken from the Winchell Lease, Well No. 7, Chautauqua County, Kansas, and submitted to our laboratory on February 9, 1959.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Carl L. McElrea
Carl L. McElrea

CLM:cs

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GENERAL INFORMATION & SUMMARY

Company Grayhol Oil Corporation Lease Winchell Well No. 7

Location SW $\frac{1}{4}$, NW $\frac{1}{4}$, SW $\frac{1}{4}$

Section 13 Twp. 35S Rge. 9E County Chautauqua State Kansas

Name of Sand - - - - - Wayside

Top of Core - - - - - 1525.0

Bottom of Core - - - - - 1544.0

Top of Sand - - - - - ?

Pay
Bottom of Sand - - - - - 1533.6

Total Feet of Permeable Sand - - - - - 9.5

Total Feet of Floodable Sand - - - - - 4.6

Distribution of Permeable Sand: Permeability Range Millidarcys

Feet

Cum. Ft.

0 - 1	1.0	1.0
1 - 3	2.8	3.8
3 - 6	2.1	5.9
6 - 10	2.6	8.5
10 & over	1.0	9.5

Average Permeability Millidarcys - - - - - 5.2

Average Percent Porosity - - - - - 14.6

Average Percent Oil Saturation - - - - - 26.4

Average Percent Water Saturation - - - - - 64.2

Average Oil Content, Bbls./A. Ft. - - - - - 188.

Total Oil Content, Bbls./Acre - - - - - 1,338.

Average Percent Oil Recovery by Laboratory Flooding Tests - - - - - 6.0

Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft. - - - - - 94.

Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre - - - - - 16.

Total Calculated Oil Recovery, Bbls./Acre, primary production - - - - - 780.

Packer Setting, Feet - - - - -

Viscosity, Centipoises @ - - - - -

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

Elevation, Feet - - - - -

saturation, namely, 16.4. The weighted average percent oil saturation of the upper and lower sections is 20.0 and 13.7 respectively. The weighted average percent water saturation of the upper and lower sections is 57.4 and 69.5 respectively; the overall average being 64.2 (See Table III). This gives an overall weighted average total fluid saturation of 80.6 percent. This total fluid saturation indicates some fluid was lost during coring, part of which probably was oil.

The weighted average oil content of the upper and lower sections is 252 and 141 barrels per acre foot respectively; the overall average being 188. The total oil content, as shown by this core, is 3,338 barrels per acre (See Table III).

LABORATORY FLOODING TESTS

Because of the low oil saturation, one could not expect the sand in this core to respond very satisfactorily to laboratory flooding tests. However, a total recovery of 76 barrels of oil per acre was obtained from 0.9 feet of sand, represented by 1 sample. The percent oil saturation was reduced from 22.0 to 16.0, or represents a recovery of 6.0 percent. The effective permeability of the sample is 0.694 millidarcys, while the initial fluid production pressure is 25 pounds per square inch (See Table IV).

By observing the data given in Table IV, you will note that of the 18 samples tested, 5 produced water and 1 oil. This indicates that approximately 36 percent of the sand represented by these samples will take water. The tests also show that the sand has a comparatively uniform effective permeability.

CONCLUSION

On the basis of the enclosed data, we believe that efficient hydraulic fracturing and primary production methods will recover approximately

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780 barrels of oil per acre from the area represented by this core. An efficient water-flood should recover an additional 320 barrels of oil per acre from this area, provided fracturing does not cause channeling or by-passing of the water. The following factors and assumptions were used in calculating this recovery:

Original formation volume factor	1.11
True water saturation, percent	47.0
Primary oil recovery, percent	None
Calculated present oil saturation, percent	47.8
Porosity, percent	16.0
Oil saturation at abandonment, percent	25.0
Performance factor	0.50

This core shows a rather thin section of pay sand having low oil and high water saturations. The analysis results indicate that the best pay sand extends from the top of the cored section to a depth of 1533.6 feet.

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RESULTS OF PERMEABILITY TESTS
TABLE I

Company Graybol Oil Corporation Lease Winchell Well No. 7

Sample No.	Depth Feet	Permeability Millidarcys	Feet of Core		Permeability Capacity Ft. x Md.
			Ft.	Cum. Ft.	
1	1525.3	5.3	0.6	0.6	3.18
2	1525.9	11.	0.5	1.1	5.50
3	1526.3	8.3	0.5	1.6	4.15
4	1526.9	8.0	0.6	2.2	4.80
5	1527.5	0.62	0.5	2.7	0.31
6	1527.9	Imp.	0.4	3.1	0.00
7	1528.3	Imp.	0.4	3.5	0.00
8	1528.9	2.3	0.6	4.1	1.38
9	1529.3	6.6	0.5	4.6	3.30
10	1529.9	20.	0.5	5.1	10.00
11	1530.3	4.3	0.5	5.6	2.15
12	1530.8	8.8	0.5	6.1	4.40
13	1531.3	Imp.	0.4	6.5	0.00
14	1531.9	1.9	0.6	7.1	1.14
15	1532.3	Imp.	0.5	7.6	0.00
16	1532.9	1.8	0.5	8.1	0.90
17	1533.4	3.8	0.5	8.6	1.90
18	1533.9	1.7	0.5	9.1	0.85
19	1534.3	Imp.	0.5	9.6	0.00
20	1534.9	0.63	0.5	10.1	0.31
21	1535.3	Imp.	0.5	10.6	0.00
22	1535.9	Imp.	0.5	11.1	0.00
23	1536.3	Imp.	0.5	11.6	0.00
24	1536.9	6.3	0.5	12.1	3.15
25	1537.3	Imp.	0.4	12.5	0.00
26	1538.9	Imp.	0.5	13.0	0.00
27	1539.8	Imp.	0.7	13.7	0.00
28	1540.3	Imp.	0.6	14.3	0.00
29	1540.9	Imp.	0.5	14.8	0.00
30	1541.3	2.9	0.5	15.3	1.45
31	1541.9	Imp.	0.5	15.8	0.00
32	1542.3	Imp.	0.5	16.3	0.00
33	1542.8	Fractured	0.5	16.8	-
34	1543.4	1.2	0.6	17.4	0.72
35	1543.9	Imp.	0.3	17.7	0.00

RESULTS OF SATURATION TESTS

TABLE II

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company	Craybol Oil Corporation	Lease	Winchell	Well No.	7
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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company		Graybol Oil Corporation		Lease		Winchell		Well No.		7	
Sample No.	Depth, Feet	Effective Porosity Percent	Original Oil Saturation		Oil Recovery		Residual Saturation		Volume of Water Recovered cc ^a	Effective Permeability Millidarcys ^{aa}	Initial Fluid Production Pressure Lbs./Sq./In.
			%	Bbls./A. Ft.	%	Bbls./A. Ft.	% Oil	% Water			
1	1525.1	15.4	18	215	0	0	18	70	20	0.496	35
2	1526.1	16.2	22	277	0	0	22	71	8	0.300	35
3	1527.1	15.8	18	221	0	0	18	66	0	Imp.	50+
4	1528.1	14.2	13	149	0	0	13	82	0	Imp.	50+
5	1529.1	16.7	23	298	0	0	23	68	2	0.186	50
6	1530.1	17.7	16	220	0	0	16	70	18	0.612	35
7	1531.1	18.0	22	308	6	84	16	74	25	0.694	25
8	1532.1	14.9	22	254	0	0	22	63	0	Imp.	50+
9	1533.1	14.0	15	163	0	0	15	71	0	Imp.	50+
10	1534.1	13.0	14	141	0	0	14	77	0	Imp.	50+
11	1535.1	13.5	10	105	0	0	10	77	0	Imp.	50+
12	1536.1	14.4	14	157	0	0	14	67	0	Imp.	50+
13	1537.1	13.5	12	126	0	0	12	75	0	Imp.	50+
14	1539.1	14.7	17	194	0	0	17	81	0	Imp.	50+
15	1540.1	12.3	12	114	0	0	12	86	0	Imp.	50+
16	1541.1	9.5	16	118	0	0	16	73	0	Imp.	50+
17	1542.1	12.7	11	109	0	0	11	83	0	Imp.	50+
18	1543.1	16.0	11	137	0	0	11	69	0	Imp.	50+

Notes: cc—cubic centimeter.

^a—Volume of water recovered at the time of maximum oil recovery.

^{aa}—Determined by passing water through sample which still contains residual oil.