August 22, 1950

The Ohio Oil Company
Thompson Building
Tulsa, Oklahoma

Attention: Mr. R. E. McMillen

Gentlemen:

Enclosed herewith is the report of the analysis made on the 2½" rotary core taken from the J. W. Martindell Lease, Well No. W-26, Greenwood County, Kansas, and submitted to our laboratory on August 3, 1950.

Very truly yours,

OIL FIELD RESEARCH LABORATORIES

Carl L. Pate

CLP:bb
c.c. to Mr. Fred Kluck

THE OHIO OIL COMPANY

CORE ANALYSIS REPORT

J. W. MARTINDELL LEASE WELL NO. W-26

GREENWOOD COUNTY, KANSAS

OIL FIELD RESEARCH LABORATORIES

CHANUTE, KANSAS

AUGUST 22, 1950

Oil Field Research Laboratories

GENERAL INFORMATION & SUMMARY

Company The Ohio Oil Company Lease J. W. Martindell Well No. W-26

Location

Section 31 Twp. 23 S Rge. 10 E County Greenwood State Kansas

Name of Sand	Bartlesville
Top of Core	2238.00
Bottom of Core	2332.00
Top of Sand	?
Bottom of Sand	?
Total Feet of Permeable Sand	68.78

Distribution of Permeable Sand:

Permeability Range Millidarcys	Feet	Cum. Ft.
0 - 2	12.22	12.22
2 - 4	8.71	20.93
4 - 8	8.90	29.83
8 - 12	10.75	40.58
12 - 24	11.90	52.48
24 - 48	11.75	64.23
48 & above	4.55	68.78

Average Permeability, Millidarcys	15.06
Average Percent Porosity	16.58
Average Percent Oil Saturation	25.71
Average Percent Water Saturation	57.99
Average Oil Content, Bbls./A. Ft.	330.
Total Oil Content, Bbls./Acre	23,125.
Average Percent Oil Recovery by Laboratory Flooding Tests	4.74
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	66.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	2,826.
Total Calculated Oil Recovery, Bbls./Acre	6,000.+
Casing Point, ~~Packer Setting~~, Feet	2240.0
Viscosity, Centipoises @	
A. P. I. Gravity, degrees @ 60 °F	

Note: The above average are for that part of the sand section extending from the packer setting to the bottom of the core.

Fresh water was used as a circulating fluid in the coring of the sand in this well.

FORMATION CORED

The detailed log of the formation cored is as follows:

Depth Interval, Feet	Description
2238.00 - 2238.82	Gray fine grained finely laminated micaceous shaley sandstone.
2238.82 - 2252.00	Light brown fine grained micaceous sandstone.
2252.00 - 2255.00	Loss.
2255.00 - 2257.32	Light brown fine grained micaceous sandstone.
2257.32 - 2259.00	Brownish gray fine grained micaceous sandstone.
2259.00 - 2260.00	Light brown fine grained micaceous calcareous sandstone.
2260.00 - 2274.00	Loss.
2274.00 - 2279.47	Light brown fine grained micaceous sandstone.
2279.47 - 2282.50	Light brown fine grained micaceous slightly calcareous sandstone.
2282.50 - 2286.57	Light brown fine grained micaceous sandstone.
2286.57 - 2286.90	Light brown fine grained laminated micaceous carbonaceous sandstone.
2286.90 - 2288.35	Light brown fine grained micaceous calcareous sandstone.
2288.35 - 2292.00	Light brown fine grained micaceous sandstone.
2292.00 - 2293.00	Loss.
2293.00 - 2303.60	Light brown fine grained micaceous sandstone.
2303.60 - 2303.83	Light brown fine grained laminated micaceous carbonaceous sandstone.
2303.83 - 2304.50	Light brown fine grained micaceous sandstone.
2304.50 - 2305.00	Light brown fine grained slightly laminated micaceous carbonaceous sandstone.

2305.00 - 2310.50 - Light brown fine grained micaceous sandstone.

2310.50 - 2312.00 - Loss.

2312.00 - 2312.20 - Shaley calcareous conglomerate.

2312.20 - 2314.12 - Light brown fine grained micaceous sandstone.

2314.12 - 2314.32 - Light brown fine grained slightly laminated micaceous carbonaceous sandstone.

2314.32 - 2318.00 - Light brown fine grained micaceous sandstone.

2318.00 - 2318.65 - Brown fine grained micaceous sandstone.

2318.65 - 2320.67 - Brown fine grained micaceous carbonaceous sandstone.

2320.67 - 2323.55 - Dark fine grained micaceous carbonaceous sandstone.

2323.55 - 2331.00 - Dark fine grained micaceous carbonaceous slightly calcareous sandstone.

2331.00 - 2332.00 - Loss.

Coring was started at a depth of 2238.00 feet in fine grained finely laminated micaceous shaley sandstone and completed at 2332.00 feet. The bottom foot of the core was lost. This core shows a total of 71.22 feet of sand. There was a total loss of 20.50 feet of core, which was probably sandstone. If all of the loss was sandstone, then this would give a total of 91.72 feet of sand. For the most part the pay sand is made up of fine grained micaceous sandstone. The bottom of the core, or that part of the cored section extending from 2318.65 to 2331.00 feet, is made up of fine grained micaceous carbonaceous sandstone and part of this zone is also calcareous.

PERMEABILITY

For the sake of distribution, the core was divided into three sections. The weighted average permeability of the upper, middle and lower sections are 2.03, 22.54 and 6.72 millidarcys respectively; while that of the pay sand section, or that part of the cored section extending from the casing point to the bottom of the hole, is 15.06 millidarcys

(See Table II). By observing the data given above and on the coregraph, it is noticeable that the upper and lower parts of the cored section are very tight while the middle section has a fairly irregular permeability profile.

PERCENT SATURATION & OIL CONTENT

The pay sand in this core has a low weighted average percent oil saturation, namely, 25.71. The weighted average percent oil saturation of the upper, middle and lower sections are 23.30, 23.78 and 35.04 respectively. The weighted average percent water saturation of the upper, middle and lower sections are 60.34, 59.78 and 47.87 respectively; while that of the pay sand is 57.99 (See Table IV). This gives an overall weighted average total fluid saturation of 83.70 percent. From the above data, it is noticeable that the carbonaceous sand in the lower section has a higher percent oil saturation and a lower percent water saturation.

In order to get some idea of the degree of flushing of the sand during coring, all of the saturation samples were analyzed for chloride content, which in turn were used in the determination of percent connate water. The results of these tests are given in Tables VII and VIII. From the data given in these tables and on the coregraph, it is noticeable that the middle section is badly flushed. Even part of the carbonaceous sand in the lower part of the cored section showed some flushing.

The weighted average oil content of the upper, middle and lower sections are 277, 319 and 438 barrels per acre foot respectively; while that of the pay sand is 330. The total oil content, as shown by this core, is 23,423 barrels per acre, of which 23,125 barrels are in the pay sand section (See Table IV).

LABORATORY FLOODING TESTS

Inasmuch as the core shows a low weighted average percent oil saturation, naturally, one would expect very little oil to be recovered by laboratory flooding tests. A total recovery of 2,826 barrels of oil per acre, or an average of 66 barrels per acre foot was obtained from 42.84 feet of sand. The weighted average percent oil saturation was reduced from 23.36 to 18.62, or represents an average recovery of 4.74 percent. The weighted average effective permeability of the samples is 3.64 millidarcys, while the average initial fluid production pressure is 21.0 pounds per square inch (See Table VI).

By observing the data given in Table V, you will note that of the 73 samples tested, 45 produced water and oil. The results of these tests show that most of the good pay section is floodable. The upper section produced very little oil because it was very tight. Inasmuch as the carbonaceous sand located at the bottom of the core did not take water, naturally, it is not floodable. This dark sand, however, may produce a small amount of oil by gas expansion.

CONCLUSION

From a study of the above data, we believe that an efficient water flood within the vicinity of this well will recover a minimum of 6,000 barrels of oil per acre. In calculating this recovery, an allowance was made for oil lost during coring, and it was assumed that the true water saturation of the sand is 40 percent. Assuming all of the loss, with the exception of the three feet in the tight part of the sand in the upper section and the one foot loss at the bottom of the core, to be good floodable sand containing the same volume of recoverable oil as the good floodable sand section, then an additional recovery of approximately 2,400

barrels of oil per acre can be expected.

From the results of laboratory flooding tests, it is evident that the dark carbonaceous sand located at the bottom of the cored section is not floodable, as it would not take water even at a pressure of 50 pounds per square inch which is excessive of any comparative pressures used in the field.

Oil Field Research Laboratories

RESULTS OF PERMEABILITY TESTS

TABLE I

Company The Ohio Oil Company Lease J. W. Martindell Well No. W-26

Sample No.	Depth, Feet	Permeability Millidarcys	Feet of Core		Permeability Capacity Ft. x Md.
			Ft.	Cum. Ft.	
1	2238.65	Imp.	0.32	0.32	0.00
2	2238.85	1.3	0.28	0.60	0.36
3	2239.15	4.0	0.40	1.00	1.60
4	2239.55	2.8	0.40	1.40	1.12
5	2239.95	2.1	0.30	1.70	0.63
6	2240.35	2.3	0.30	2.00	0.69
7	2240.71	3.0	0.30	2.30	0.90
8	2240.94	1.8	0.30	2.60	0.54
9	2241.32	0.96	0.30	2.90	0.29
10	2241.77	2.8	0.40	3.30	1.12
11	2242.13	1.0	0.40	3.70	0.40
12	2242.57	1.0	0.50	4.20	0.50
13	2243.00	5.7	0.40	4.60	2.28
14	2243.40	Imp.	0.35	4.95	0.00
15	2243.63	Imp.	0.37	5.32	0.00
16	2244.10	5.5	0.48	5.80	2.64
17	2244.79	1.8	0.60	6.40	1.08
18	2245.13	2.0	0.50	6.90	1.00
19	2245.75	2.2	0.50	7.40	1.10
20	2246.05	1.3	0.50	7.90	0.65
21	2246.45	1.0	0.40	8.30	0.40
22	2246.90	1.1	0.40	8.70	0.44
23	2247.35	1.2	0.40	9.10	0.48
24	2247.70	1.2	0.40	9.50	0.48
25	2248.15	0.76	0.40	9.90	0.30
26	2248.60	0.59	0.40	10.30	0.24
27	2248.97	0.47	0.40	10.70	0.19
28	2249.47	2.5	0.40	11.10	1.00
29	2249.90	0.50	0.40	11.50	0.20
30	2250.20	0.71	0.40	11.90	0.28
31	2250.60	0.57	0.40	12.30	0.23
32	2250.97	Imp.	0.40	12.70	0.00
33	2251.37	0.97	0.30	13.00	0.29
34	2251.75	0.40	0.30	13.30	0.12
35	2251.95	3.1	0.20	13.50	0.62
36	2255.05	2.6	0.30	13.80	0.78

Oil Field Research Laboratories

RESULTS OF PERMEABILITY TESTS

TABLE I

Company The Ohio Oil Company Lease J. W. Martindell Well No. W-26

Sample No.	Depth, Feet	Permeability Millidarcys	Feet of Core		Permeability Capacity Ft. x Md.
			Ft.	Cum. Ft.	
37	2255.47	3.4	0.30	14.10	1.02
38	2255.85	3.2	0.30	14.40	0.96
39	2256.15	1.8	0.30	14.70	0.54
40	2256.55	2.0	0.50	15.20	1.00
41	2256.82	1.6	0.62	15.82	0.99
42	2257.38	Imp.	0.38	16.20	0.00
43	2257.83	0.49	0.60	16.80	0.29
44	2258.44	0.64	0.70	17.50	0.45
45	2259.05	1.2	0.50	18.00	0.60
46	2259.60	10.	0.50	18.50	5.00
47	2274.08	10.	0.30	18.80	3.00
48	2274.35	8.7	0.30	19.10	2.61
49	2274.75	4.9	0.40	19.50	1.96
50	2275.12	4.9	0.50	20.00	2.45
51	2275.70	16.	0.50	20.50	8.00
52	2276.25	17.	0.40	20.90	6.80
53	2276.75	6.9	0.40	21.30	2.76
54	2277.13	3.1	0.40	21.70	1.24
55	2277.59	12.	0.45	22.15	5.40
56	2277.95	4.8	0.45	22.60	2.16
57	2278.43	8.2	0.45	23.05	3.69
58	2278.83	9.9	0.45	23.50	4.46
59	2279.15	4.4	0.45	23.95	1.98
60	2279.66	39.	0.45	24.40	17.55
61	2280.09	23.	0.40	24.80	9.20
62	2280.38	7.1	0.40	25.20	2.84
63	2280.75	39.	0.40	25.60	15.60
64	2281.22	56.	0.40	26.00	22.40
65	2281.65	56.	0.35	26.35	19.60
66	2282.10	43.	0.35	26.70	15.05
67	2282.40	58.	0.30	27.00	17.40
68	2282.92	1.1	0.50	27.50	0.55
69	2283.13	4.2	0.45	27.95	1.89
70	2283.52	9.9	0.45	28.40	4.46
71	2284.00	49.	0.40	28.80	1.96
72	2284.35	41.	0.40	29.20	16.40

Oil Field Research Laboratories

RESULTS OF PERMEABILITY TESTS

TABLE I

Company The Ohio Oil Company Lease J. W. Martindell Well No. W-26

Sample No.	Depth, Feet	Permeability Millidarcys	Feet of Core		Permeability Capacity Ft. x Md.
			Ft.	Cum. Ft.	
73	2284.75	19.	0.30	29.50	5.70
74	2285.06	15.	0.30	29.80	4.50
75	2285.41	15.	0.30	30.10	4.50
76	2285.85	25.	0.45	30.55	11.25
77	2286.35	26.	0.50	31.05	13.00
78	2286.78	Imp.	0.35	31.40	0.00
79	2287.17	Imp.	0.45	31.85	0.00
80	2287.55	3.6	0.35	32.20	1.26
81	2287.85	1.8	0.30	32.50	0.54
82	2288.25	0.47	0.35	32.85	0.16
83	2288.69	38.	0.45	33.30	17.10
84	2289.29	6.5	0.50	33.80	3.25
85	2289.65	16.	0.45	34.25	7.20
86	2290.03	13.	0.45	34.70	5.85
87	2290.40	9.3	0.45	35.15	4.19
88	2290.85	67.	0.45	35.60	30.15
89	2291.31	43.	0.45	36.05	19.35
90	2291.65	20.	0.45	36.50	9.00
91	2293.15	20.	0.45	36.95	9.00
92	2293.59	16.	0.45	37.40	7.20
93	2294.00	11.	0.40	37.80	4.40
94	2294.42	9.2	0.40	38.20	3.68
95	2294.82	21.	0.40	38.60	8.40
96	2295.15	14.	0.35	38.95	4.90
97	2295.50	43.	0.35	39.30	15.05
98	2295.94	11.	0.35	39.65	3.85
99	2296.22	35.	0.35	40.00	12.25
100	2296.55	18.	0.35	40.35	6.30
101	2296.95	9.0	0.35	40.70	3.15
102	2297.35	15.	0.35	41.05	5.25
103	2297.73	19.	0.35	41.40	6.65
104	2298.13	31.	0.40	41.80	12.40
105	2298.55	18.	0.45	42.25	8.10
106	2299.20	39.	0.50	42.75	19.50
107	2299.37	79.	0.40	43.15	31.60
108	2299.85	41.	0.35	43.50	14.35

Oil Field Research Laboratories

RESULTS OF PERMEABILITY TESTS

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Sample No.	Depth, Feet	Permeability Millidarcys	Feet of Core		Permeability Capacity Ft. x Md.
			Ft.	Cum. Ft.	
109	2300.09	30.	0.40	43.90	12.00
110	2300.45	44.	0.40	44.30	17.60
111	2300.96	48.	0.40	44.70	19.20
112	2301.31	12.	0.40	45.10	4.80
113	2301.68	12.	0.40	45.50	4.80
114	2302.35	16.	0.50	46.00	8.00
115	2302.88	27.	0.50	46.50	13.50
116	2303.25	28.	0.60	47.10	16.80
117	2303.64	1.6	0.23	47.33	0.37
118	2303.90	1.9	0.27	47.60	0.51
119	2304.18	12.	0.40	48.00	4.80
120	2304.56	0.87	0.25	48.25	0.22
121	2304.82	3.4	0.25	48.50	0.85
122	2305.15	52.	0.40	48.90	20.80
123	2305.55	13.	0.40	49.30	5.20
124	2305.95	1.7	0.40	49.70	0.68
125	2306.31	30.	0.40	50.10	12.00
126	2306.65	41.	0.40	50.50	16.40
127	2307.14	48.	0.40	50.90	19.20
128	2307.48	55.	0.35	51.25	19.25
129	2307.92	38.	0.35	51.60	13.30
130	2308.15	35.	0.30	51.90	10.50
131	2308.45	40.	0.40	52.30	16.00
132	2308.86	34.	0.40	52.70	13.60
133	2309.35	36.	0.40	53.10	14.40
134	2309.75	10.	0.45	53.55	4.50
135	2310.15	14.	0.45	54.00	6.30
136	2312.28	5.0	0.30	54.30	1.50
137	2312.54	13.	0.30	54.60	3.90
138	2312.95	8.8	0.30	54.90	2.64
139	2313.21	7.6	0.30	55.20	2.28
140	2313.61	15.	0.35	55.55	5.25
141	2314.07	3.0	0.35	55.90	1.05
142	2314.35	3.3	0.38	56.28	1.25
143	2314.75	30.	0.35	56.63	10.50
144	2315.22	65.	0.35	56.98	22.75

Oil Field Research Laboratories

RESULTS OF PERMEABILITY TESTS

TABLE I

Company The Ohio Oil Company Lease J. W. Martindell Well No. W-26

Sample No.	Depth, Feet	Permeability Millidarcys	Feet of Core		Permeability Capacity Ft. x Md.
			Ft.	Cum. Ft.	
145	2315.50	47.	0.35	57.33	16.45
146	2315.86	59.	0.35	57.68	20.65
147	2316.30	28.	0.40	58.08	11.20
148	2316.71	18.	0.40	58.48	7.20
149	2317.01	26.	0.40	58.88	10.40
150	2317.40	20.	0.40	59.28	8.00
151	2317.80	24.	0.30	59.58	7.20
152	2318.30	19.	0.35	59.93	6.65
153	2318.58	11.7	0.30	60.23	3.51
154	2318.95	8.8	0.45	60.68	3.96
155	2319.40	13.4	0.40	61.08	5.36
156	2319.82	8.6	0.40	61.48	3.44
157	2320.22	9.0	0.40	61.88	3.60
158	2320.62	7.0	0.37	62.25	2.59
159	2321.05	3.8	0.43	62.68	1.63
160	2321.35	3.9	0.40	63.08	1.56
161	2321.70	4.5	0.40	63.48	1.80
162	2322.05	3.9	0.50	63.98	1.95
163	2322.50	3.4	0.40	64.38	1.36
164	2322.87	2.9	0.35	64.73	1.02
165	2323.20	2.6	0.40	65.13	1.04
166	2323.65	4.0	0.35	65.48	1.40
167	2324.09	9.6	0.35	65.83	3.36
168	2324.43	8.8	0.35	66.18	3.08
169	2324.72	6.1	0.35	66.53	2.14
170	2325.15	8.6	0.40	66.93	3.44
171	2325.69	9.1	0.45	67.38	4.10
172	2326.08	9.0	0.40	67.78	3.60
173	2326.35	8.3	0.40	68.18	3.32
174	2326.64	9.2	0.40	68.58	3.68
175	2327.07	10.8	0.40	68.98	4.32
176	2327.48	9.5	0.40	69.38	3.80
177	2327.83	4.3	0.30	69.68	1.29
178	2328.15	2.8	0.30	69.98	0.84
179	2328.45	4.0	0.30	70.28	1.20
180	2328.84	4.8	0.40	70.68	1.92
181	2329.35	4.5	0.45	71.13	2.02
182	2329.75	4.7	0.45	71.58	2.12
183	2330.20	9.8	0.50	72.08	4.90
184	2330.72	6.4	0.50	72.58	3.20

Oil Field Research Laboratories

SUMMARY OF PERMEABILITY TESTS

TABLE II

Company The Ohio Oil Co. Lease J.W. Martindell Well No. W-26

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity, Ft. x Md.
2238.82 - 2260.00	16.68	2.03	33.80
2274.00 - 2318.65	40.93	22.54	922.40
2318.65 - 2331.00	12.35	6.72	83.04
2240.00 - 2331.00	68.78	15.06	1,035.95

Oil Field Research Laboratories

RESULTS OF SATURATION TESTS

TABLE III

Company The Ohio Oil Co. Lease J.W. Martindell Well No. W-26

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.	Cum. Ft.	
1	2239.32	16.4	20.2	49.4	69.6	257	1.08	1.08	278
2	2240.45	15.9	16.4	66.6	83.0	202	1.00	2.08	202
3	2241.05	15.4	18.2	61.8	80.0	218	1.00	3.08	218
4	2242.32	15.3	19.7	55.8	75.5	234	1.00	4.08	234
5	2243.15	15.5	23.2	65.0	88.2	279	1.00	5.08	279
6	2244.45	15.8	24.3	63.3	87.6	298	1.05	6.13	313
7	2245.45	14.3	25.6	68.9	94.5	284	1.05	7.18	298
8	2246.61	15.8	24.1	61.2	85.3	296	1.00	8.18	296
9	2247.06	15.8	23.9	50.0	73.9	293	1.00	9.18	293
10	2248.72	16.0	24.3	54.8	79.1	301	1.00	10.18	301
11	2249.62	17.5	28.5	50.6	79.1	387	1.00	11.18	387
12	2250.32	14.3	28.7	63.3	92.0	318	1.00	12.18	318
13	2251.51	13.8	23.5	65.4	88.9	252	1.00	13.18	252
14	2255.22	17.0	22.8	62.7	85.5	300	0.80	13.98	240
15	2256.32	15.8	32.0	53.3	85.3	392	0.80	14.78	314
16	2257.05	15.2	23.9	57.4	81.3	282	0.72	15.50	203
17	2258.05	14.5	13.7	69.5	83.2	154	1.68	17.18	258
18	2259.82	12.7	34.9	59.3	94.2	344	1.00	18.18	344
19	2274.51	18.7	19.4	57.1	76.5	281	1.10	19.28	309

Oil Field Research Laboratories

RESULTS OF SATURATION TESTS

TABLE III

Company The Ohio Oil Co. Lease J.W. Martindell Well No. W-26

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.	Cum. Ft.	
20	2275.41	19.0	23.9	53.9	77.8	352	1.10	20.38	388
21	2276.41	19.8	23.8	48.7	72.5	365	1.00	21.38	365
22	2277.25	15.7	23.8	60.5	84.3	290	1.10	22.48	319
23	2278.57	16.3	26.0	70.2	96.2	351	1.17	23.65	410
24	2279.82	17.0	22.7	57.6	80.3	300	0.93	24.58	279
25	2280.50	15.3	23.5	72.5	96.0	280	0.90	25.48	252
26	2281.41	16.2	26.6	50.9	77.5	334	1.20	26.68	400
27	2282.55	16.8	23.0	61.0	84.0	300	0.70	27.38	210
28	2283.25	16.1	22.0	61.0	83.0	276	0.80	28.18	220
29	2284.51	17.9	23.8	53.6	77.4	330	1.00	29.18	330
30	2285.57	18.1	27.4	49.1	76.5	386	0.90	30.08	348
31	2286.05	16.7	24.6	66.5	91.1	318	0.67	30.75	213
32	2286.96	14.7	22.3	69.7	92.0	254	0.70	31.45	178
33	2288.02	13.3	23.6	58.8	82.4	243	0.75	32.20	182
34	2289.42	18.1	28.2	45.0	73.2	396	1.35	33.55	535
35	2290.52	16.3	25.4	56.7	82.1	321	1.10	34.65	353
36	2291.81	17.7	26.8	51.4	73.2	368	1.20	35.85	441
37	2293.31	17.0	22.3	65.5	87.8	294	1.00	36.85	294
38	2294.56	15.0	21.5	67.0	88.5	250	1.00	37.85	250

Oil Field Research Laboratories

RESULTS OF SATURATION TESTS

TABLE III

Company The Ohio Oil Co. Lease J.W. Martindell Well No. W-26

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.	Cum. Ft.	
39	2295.61	16.1	24.4	62.8	87.2	305	1.00	38.85	305
40	2296.72	16.1	25.1	64.3	89.4	314	1.00	39.85	314
41	2297.85	17.5	22.0	68.5	90.5	299	1.00	40.85	299
42	2298.82	17.8	25.1	66.5	91.6	347	1.00	41.85	347
43	2299.52	17.0	26.8	70.6	97.4	354	1.00	42.85	354
44	2300.72	21.3	25.6	71.4	97.0	422	1.00	43.85	422
45	2301.82	17.5	22.4	53.8	76.2	304	1.00	44.85	304
46	2302.05	18.5	25.1	49.3	74.4	360	1.00	45.85	360
47	2303.35	18.8	24.1	59.6	83.7	352	0.60	46.45	212
48	2304.32	16.7	23.2	63.5	86.7	300	0.67	47.12	201
49	2305.32	17.5	23.0	61.7	84.7	312	1.00	48.12	312
50	2306.82	19.5	19.0	54.9	73.9	287	1.00	49.12	287
51	2307.61	18.7	19.4	53.0	72.4	282	1.00	50.12	282
52	2308.62	18.0	18.6	63.0	81.6	260	1.00	51.12	260
53	2309.52	17.1	22.8	54.3	77.1	302	0.80	51.92	242
54	2310.32	17.6	17.3	58.8	76.1	236	0.70	52.62	165
55	2312.71	15.4	18.2	63.8	82.0	218	1.00	53.62	218
56	2313.81	16.9	25.6	71.8	97.4	336	0.92	54.54	309
57	2314.51	16.2	26.7	66.2	92.9	335	0.98	55.52	328

Oil Field Research Laboratories

RESULTS OF SATURATION TESTS

TABLE III

Company The Ohio Oil Co. Lease J.W. Martindell Well No. W-26

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.	Cum. Ft.	
58	2315.61	19.5	26.8	45.0	71.8	411	1.00	56.52	411
59	2316.45	16.2	26.4	63.0	89.4	332	1.10	57.62	365
60	2317.52	17.4	24.6	62.7	87.3	332	1.25	58.87	415
61	2318.71	17.0	31.0	58.1	89.1	409	1.05	59.92	430
62	2319.96	16.4	33.3	47.2	80.5	424	0.97	60.89	411
63	2320.81	15.7	33.0	47.3	80.3	402	0.73	61.62	294
64	2321.45	16.1	31.2	43.2	74.4	390	1.00	62.62	390
65	2322.62	16.4	32.9	42.7	75.6	418	1.15	63.77	480
66	2323.81	15.9	32.4	62.6	95.0	400	0.95	64.72	380
67	2324.86	15.5	30.6	56.8	87.4	368	1.00	65.72	368
68	2325.81	17.7	33.4	39.0	72.4	459	0.90	66.62	413
69	2326.81	14.9	37.5	59.4	96.9	434	1.00	67.62	434
70	2327.61	14.3	40.9	55.0	95.9	454	0.90	68.52	408
71	2328.55	16.9	40.7	35.6	76.3	534	0.90	69.42	480
72	2329.86	16.8	39.7	35.0	74.7	517	1.00	70.42	517
73	2330.41	15.8	41.0	37.8	78.8	502	0.80	71.22	402
							Total	- - - - -	23,423

Oil Field Research Laboratories

SUMMARY OF SATURATION TESTS

TABLE IV

Company The Ohio Oil Co. Lease J.W. Martindell Well No. W-26

Depth Interval, Feet	Feet of Core Analyzed	Average Percent Porosity	Average Percent Oil Saturation	Average Percent Water Saturation	Average Oil Content Bbls./A. Ft.	Total Oil Content Bbls./Acre
2238.82-2260.00	18.18	15.34	23.30	60.34	277	5,028
2274.00-2318.65	40.69	17.27	23.78	59.78	319	12,988
2318.65-2331.00	12.35	16.14	35.04	47.87	438	5,407
2240.00-2331.00	70.04	16.58	25.71	57.99	330	23,125

Company The Ohio Oil Co.

Sample No.	Depth, Feet	Effective Porosity Percent	Original Oil Saturation		Oil Recovery	
			Percent	Bbls./A. Ft.	Percent	Bb
1	2239.42	16.8	17.6	230	1.5	
2	2240.58	17.5	15.2	206	0.0	
3	2241.16	16.6	17.7	228	1.2	
4	2242.43	16.4	17.5	223	1.4	
5	2243.28	15.8	22.6	277	0.0	
6	2244.58	16.7	20.0	260	0.0	
7	2245.58	15.0	25.9	302	0.0	
8	2246.73	15.3	25.0	297	0.0	
9	2247.16	15.5	25.0	301	0.0	
10	2248.83	14.9	24.1	279	0.0	
11	2249.73	17.1	28.3	375	1.5	
12	2250.44	15.9	27.6	340	0.0	
13	2251.63	14.0	20.3	220	0.0	
14	2255.32	17.0	25.1	331	4.3	
15	2256.42	16.4	31.2	397	11.7	
16	2257.18	14.9	25.5	295	0.0	
17	2258.18	14.8	13.9	160	0.0	
18	2259.93	11.1	33.1	285	0.0	
19	2274.63	18.1	20.2	284	4.1	
20	2275.53	19.7	21.9	335	6.1	
21	2276.53	16.8	23.2	302	0.0	
22	2277.38	16.9	21.9	287	3.6	
23	2278.69	18.0	24.1	336	6.9	
24	2279.93	15.4	24.8	296	1.5	
25	2280.63	15.5	22.8	274	4.5	
26	2281.54	18.7	25.3	365	7.1	
27	2282.68	17.3	24.5	329	2.7	
28	2283.38	16.1	22.3	278	3.7	
29	2284.63	18.2	22.5	318	6.7	
30	2285.68	17.4	28.5	386	5.9	
31	2286.19	18.7	24.3	353	5.3	
32	2287.07	14.2	22.9	252	0.0	
33	2288.13	14.0	23.0	250	0.0	
34	2289.54	18.0	26.7	373	6.9	
35	2290.64	17.8	23.1	319	6.7	
36	2291.94	16.4	26.8	341	7.7	

Research Laboratories

ABORATORY FLOODING TESTS

TABLE V

Lease J.W. Martindell Well No. W-26

ls./A. Ft.	Residual Saturation			Volume of Water Recovered cc*	Effective Permeability, Millidarcys **	Initial Fluid Production Pressure Lbs./Sq. In.
	% Oil	% Water	Bbls./A. Ft.			
20	16.1	80.6	210	37	0.741	30
0	15.2	68.8	206	0	Imp.	50+
15	16.5	85.1	213	14	0.292	30
18	16.1	78.8	205	3	0.0658	40
0	22.6	56.2	277	0	Imp.	50+
0	20.0	70.9	260	0	Imp.	50+
0	25.9	67.3	302	0	Imp.	50+
0	25.0	66.2	297	0	Imp.	50+
0	25.0	67.5	301	0	Imp.	50+
0	24.1	70.7	279	0	Imp.	50+
126	18.8	73.2	249	2	0.0933	30
0	27.6	65.8	340	0	Imp.	50+
0	20.3	71.7	220	0	Imp.	50+
57	20.8	78.0	274	6	0.206	40
149	19.5	71.5	248	0	0.033	30
0	25.5	68.4	295	0	Imp.	50+
0	13.9	83.1	160	0	Imp.	50+
0	33.1	60.7	285	0	Imp.	50+
58	16.1	69.6	226	123.5	4.08	25
93	15.8	69.2	242	103	5.03	15
0	23.2	73.4	302	16	0.230	25
47	18.3	75.7	240	47.5	1.53	25
96	17.2	80.4	240	68.5	1.11	15
18	23.3	70.0	278	20.5	0.590	30
54	18.3	75.7	220	15	0.270	30
101	18.2	78.2	264	187.5	12.50	5
36	21.8	73.7	292	85	2.85	20
46	18.6	74.5	232	61	1.81	25
95	15.8	77.3	223	130	5.23	20
80	22.6	73.0	306	60	2.27	25
77	19.0	77.0	276	127.5	4.75	20
0	22.9	68.3	252	0	Imp.	50+
0	23.0	70.0	250	0	Imp.	50+
96	19.8	76.4	277	146.5	5.00	20
93	16.4	76.7	226	159.5	6.27	15
98	19.1	77.8	243	104	3.20	15

Oil

RESULTS

Company The Ohio Oil Co.

Sample No.	Depth, Feet	Effective Porosity Percent	Original Oil Saturation		Oil Rec
			Percent	Bbls./A. Ft.	Percent
37	2293.43	17.4	22.8	308	4.3
38	2294.68	15.9	20.9	258	3.3
39	2295.75	18.3	24.5	348	7.4
40	2296.83	17.4	24.0	324	4.8
41	2297.97	17.7	22.7	311	4.9
42	2298.93	19.7	23.7	363	6.0
43	2299.64	19.4	25.8	388	10.5
44	2300.82	21.6	25.7	430	9.7
45	2301.95	19.2	22.5	335	3.8
46	2302.18	17.3	23.3	313	5.5
47	2303.48	16.1	25.8	322	1.0
48	2304.45	17.1	21.6	287	2.4
49	2305.45	17.7	23.8	327	4.0
50	2306.95	18.6	19.7	284	3.0
51	2307.75	17.9	20.0	278	4.8
52	2308.75	18.9	20.0	293	5.1
53	2309.65	17.0	22.5	297	3.3
54	2310.43	17.0	17.7	233	2.3
55	2312.85	15.5	18.4	221	1.0
56	2313.93	16.8	23.4	305	1.2
57	2314.64	18.4	25.4	362	2.0
58	2315.73	18.7	27.1	394	1.7
59	2316.58	17.1	23.0	305	1.1
60	2317.63	17.4	23.4	316	3.2
61	2318.84	16.7	31.6	409	0.0
62	2320.07	16.2	31.2	392	0.0
63	2320.93	15.3	32.6	387	0.0
64	2321.59	15.1	29.6	347	0.0
65	2322.74	14.9	34.0	394	0.0
66	2323.94	16.5	32.0	410	0.0
67	2324.97	16.4	31.8	405	0.0
68	2325.93	16.0	33.2	412	0.0
69	2326.93	15.7	38.1	464	0.0
70	2327.75	14.4	39.6	442	0.0

Field Research Laboratories

OF LABORATORY FLOODING TESTS

TABLE V

J.W. Martindell Lease W-26 Well No.

very	Residual Saturation			Volume of Water Recovered cc*	Effective Permeability, Millidarcys **	Initial Fluid Production Pressure Lbs./Sq. In.
Bbls./A. Ft.	% Oil	% Water	Bbls./A. Ft.			
58	18.5	82.4	250	97.5	3.61	15
41	17.6	76.7	217	83	2.40	20
105	17.1	77.7	243	137.5	4.97	20
65	19.2	73.4	259	54.5	1.59	15
67	17.8	79.2	244	102	9.65	15
92	17.7	76.0	271	185	6.88	15
158	15.3	83.0	230	217.5	11.35	10
162	16.0	80.9	268	62	10.40	10
57	18.7	66.2	278	63	2.61	25
74	17.8	80.5	239	58	2.29	25
12	24.8	67.0	310	30.5	0.892	25
32	19.2	79.6	255	34.5	1.06	25
55	19.8	69.9	272	78.5	2.90	20
43	16.7	75.9	241	135	6.43	15
67	15.2	79.2	211	135	5.27	15
75	14.9	84.4	218	140.5	5.95	15
44	19.2	76.0	253	34.5	0.982	20
30	15.4	79.2	203	22	0.595	25
12	17.4	77.3	209	39.5	1.98	20
16	22.2	75.2	289	48	1.34	20
29	23.4	76.3	333	11	0.305	30
25	25.4	67.0	369	98	7.93	15
15	21.9	72.8	290	98.5	3.15	15
45	20.2	74.8	273	36	1.22	20
0	31.6	61.6	409	0	Imp.	50+
0	31.2	60.4	392	0	Imp.	50+
0	32.6	52.4	387	0	Imp.	50+
0	29.6	51.2	347	0	Imp.	50+
0	34.0	44.0	394	0	Imp.	50+
0	32.0	67.3	410	0	Imp.	50+
0	31.8	66.5	405	0	Imp.	50+
0	33.2	55.5	412	0	Imp.	50+
0	38.1	51.0	464	0	Imp.	50+
0	39.6	52.4	442	0	Imp.	50+

Oil Fiel

RESULTS OF

Company The Ohio Oil Co.

Sample No.	Depth, Feet	Effective Porosity Percent	Original Oil Saturation		Oil Recovery	
			Percent	Bbls./A. Ft.	Percent	B
71	2328.68	15.9	40.4	499	0.0	
72	2329.98	16.3	40.5	512	0.0	
73	2330.54	15.7	40.2	[illegible]	0.0	

Notes: cc - cubic centimeter
*Volume of water recovered at the time of maximum
**Determined by passing water through sample which

LABORATORY FLOODING TESTS

TABLE V

Lease J.W. Martindell Well No. W-26

bls./A. Ft.	Residual Saturation % Oil	% Water	Bbls./A. Ft.	Volume of Water Recovered cc*	Effective Permeability, Millidarcys **	Initial Fluid Production Pressure Lbs./Sq. In.
0	40.4	43.7	499	0	Imp.	50+
0	40.5	53.3	512	0	Imp.	50+
0	40.2	45.2	490	0	Imp.	50+

oil recovery.
still contains residual oil.

Oil Field Research Laboratories

SUMMARY OF LABORATORY FLOODING TESTS

TABLE VI

Company The Ohio Oil Co. Lease J.W. Martindell Well No. W-26

Depth, Interval, Feet	2238.82-2256.60	2274.00-2318.65	2240.00-2318.65
Feet of Core Analyzed	5.68	38.24	42.84
Average Percent Porosity	16.73	17.74	17.63
Average Percent Original Oil Saturation	22.45	23.33	23.36
Average Percent Oil Recovery	4.67	4.66	4.74
Average Percent Residual Oil Saturation	17.78	18.67	18.62
Average Percent Residual Water Saturation	78.12	75.86	76.04
Average Percent Total Residual Fluid Saturation	95.90	94.53	94.66
Average Original Oil Content, Bbls./A. Ft.	292.	321.	320.
Average Oil Recovery, Bbls./A. Ft.	61.	65.	66.
Average Residual Oil Content, Bbls./A. Ft.	231.	256.	254.
Total Original Oil Content, Bbls./Acre	1,656.	12,300.	13,708.
Total Oil Recovery, Bbls./Acre	346.	2,502.	2,826.
Total Residual Oil Content, Bbls./Acre	1,310.	9,798.	10,882.
Average Effective Permeability, Millidarcys	0.254	4.06	3.64
Average Initial Fluid Production Pressure, p.s.i.	33.3	19.4	21.0

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

Oil Field Research Laboratories

RESULTS OF WATER DIFFERENTATION TESTS

TABLE VII

Company The Ohio Oil Company Lease J.W. Martindell Well No. W-26

Sample No.	Depth, Feet	Chloride Content of Brine in Sand ppm	Percent Water Saturation		
			Connate	Drilling & Foreign	Total
1	2239.32	31,400	24.6	24.8	49.4
2	2240.45	44,200	46.8	19.8	66.6
3	2241.05	63,400	61.8	0.0	61.8
4	2242.32	52,200	46.3	9.5	55.8
5	2243.15	60,400	62.4	2.6	65.0
6	2244.45	62,700	63.1	0.2	63.3
7	2245.45	52,500	57.5	11.4	68.9
8	2246.61	55,400	53.9	7.3	61.2
9	2247.06	55,600	44.2	5.8	50.0
10	2248.72	55,200	48.1	6.7	54.8
11	2249.62	55,800	44.9	5.7	50.6
12	2250.32	58,100	58.5	4.8	63.3
13	2251.51	63,600	65.4	0.0	65.4
14	2255.22	55,100	54.9	7.8	62.7
15	2256.32	54,100	45.8	7.5	53.3
16	2257.05	56,300	51.3	6.1	57.4
17	2258.05	54,300	60.0	9.5	69.5
18	2259.82	26,400	24.9	34.4	59.3
19	2274.51	5,800	5.3	51.8	57.1
20	2275.41	4,100	3.5	50.4	53.9
21	2276.41	4,790	3.7	45.0	48.7
22	2277.25	11,600	11.2	49.3	60.5
23	2278.57	28,700	32.0	38.2	70.2
24	2279.82	5,620	5.2	52.4	57.6
25	2280.50	3,620	4.2	68.3	72.5
26	2281.41	4,810	3.9	47.0	50.9
27	2282.55	19,460	18.9	42.1	61.0
28	2283.25	37,200	36.1	24.9	61.0
29	2284.51	2,980	2.5	51.1	53.6
30	2285.57	4,370	3.9	45.2	49.1
31	2286.05	3,880	4.1	62.4	66.5
32	2286.96	53,900	59.7	10.0	69.7
33	2288.02	61,400	57.5	1.3	58.8
34	2289.42	7,740	5.5	39.5	45.0
35	2290.52	12,900	11.6	45.1	56.7
36	2291.81	14,600	11.9	39.5	51.4
37	2293.31	2,610	2.7	62.8	65.5
38	2294.56	31,500	33.6	33.4	67.0
39	2295.61	11,800	11.8	51.0	62.8
40	2296.72	18,800	19.2	45.1	64.3

Oil Field Research Laboratories

RESULTS OF WATER DIFFERENTATION TESTS

TABLE VII

Company The Ohio Oil Company Lease J. W. Martindell Well No. W-26

Sample No.	Depth, Feet	Chloride Content of Brine in Sand ppm	Percent Water Saturation		
			Connate	Drilling & Foreign	Total
41	2297.85	3,820	4.2	64.3	68.5
42	2298.82	3,410	3.8	65.7	69.5
43	2299.52	2,840	3.2	67.4	70.6
44	2300.72	3,030	3.4	68.0	71.4
45	2301.82	3,810	3.3	50.5	53.8
46	2302.05	3,100	2.4	46.9	49.3
47	2303.35	10,400	9.9	49.7	59.6
48	2304.32	50,600	51.1	12.4	63.5
49	2305.32	18,200	17.9	43.8	61.7
50	2306.82	3,590	3.1	51.8	54.9
51	2307.61	3,900	3.3	49.7	53.0
52	2308.62	2,070	2.1	60.9	63.0
53	2309.52	6,200	5.4	48.9	54.3
54	2310.32	4,550	4.3	54.5	58.8
55	2312.71	33,600	34.1	29.7	63.8
56	2313.81	27,100	31.0	40.8	71.8
57	2314.51	46,100	48.5	17.7	66.2
58	2315.61	9,420	6.7	38.3	45.0
59	2316.45	59,500	59.6	3.4	63.0
60	2317.52	52,700	52.5	10.2	62.7
61	2318.71	63,800	58.1	0.0	58.1
62	2319.96	57,500	43.1	4.1	47.2
63	2320.81	47,700	35.8	11.5	47.3
64	2321.45	46,900	32.2	11.0	43.2
65	2322.62	44,300	30.1	12.6	42.7
66	2323.81	24,000	23.9	38.7	62.6
67	2324.86	30,400	27.4	29.4	56.8
68	2325.81	37,500	23.2	15.8	39.0
69	2326.81	28,500	26.9	32.5	59.4
70	2327.61	71,800	55.0	0.0	55.0
71	2328.55	61,000	34.5	1.1	35.6
72	2329.86	64,700	35.0	0.0	35.0
73	2330.41	58,600	35.2	2.6	37.8

Note: ppm - parts per million

Oil Field Research Laboratories

SUMMARY OF WATER DIFFERENTATION TESTS

TABLE VIII

Company The Ohio Oil Company Lease J. W. Martindell Well No. W-26

Depth Interval, Feet	Chloride Content of Brine in Sand, ppm	Average Percent Connate Water	Average Percent Drilling & Foreign Water
2238.82 - 2260.00	53,042	51.09	10.39
2274.00 - 2318.65	16,235	16.12	43.76
2318.65 - 2331.00	48,753	35.41	16.24
2240.00 - 2331.00	31,249	28.43	31.85

Note: ppm - parts per million