

30-25s-9E

THE OHIO OIL COMPANY

CORE ANALYSIS REPORT

H. HOFFMAN LEASE INLET WELL NO. 2

GREENWOOD COUNTY, KANSAS

OIL FIELD RESEARCH LABORATORIES

CHANUTE, KANSAS

OCTOBER 16, 1950

October 16, 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 2 $\frac{1}{2}$ " rotary core taken from the H. Hoffman Lease, Inlet Well No. 2, Greenwood County, Kansas, and submitted to our laboratory on September 26, 1950.

Very truly yours,

OIL FIELD RESEARCH LABORATORIES

Carl L. Pate

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

Oil Field Research Laboratories

GENERAL INFORMATION & SUMMARY

Company The Ohio Oil Company Lease H. Hoffman Well No. I-2

Location SW¹₄

Section 30 Twp. 25S Rge. 9E County Greenwood State Kansas

Name of Sand	Bartlesville
Top of Core	2434.00
Bottom of Core	2534.00
Top of ^{Pay} Sand	2455.10
Bottom of Sand	2530.00
Total Feet of Permeable Sand	69.82

Distribution of Permeable Sand:

Permeability Range Millidarcys	Feet	Cum. Ft.
0 - 5	5.71	5.71
5 - 10	7.22	12.93
10 - 25	18.96	31.89
25 - 50	17.89	49.78
50 - 100	12.11	61.89
100 - 200	6.28	68.17
200 & above	1.65	69.82

Average Permeability, Millidarcys	42.91
Average Percent Porosity	17.67
Average Percent Oil Saturation	18.02
Average Percent Water Saturation	59.92
Average Oil Content, Bbls./A. Ft.	246.
Total Oil Content, Bbls./Acre	17,349.
Average Percent Oil Recovery by Laboratory Flooding Tests	1.57
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	23.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	880.
Total Calculated Oil Recovery, Bbls./Acre	6,700.

Casing Point 2452.00
~~Proker Setting, Feet~~ The above averages are for that part of
the sand section extending from the casing
Viscosity, Centipoises @ point to the bottom of the sand.

A. P. I. Gravity, degrees @ 60 °F

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:

<u>Depth Interval,</u> <u>Feet</u>	<u>Description</u>
2434.00 - 2435.00	- Brownish-gray fine grained micaceous shaley sandstone.
2435.00 - 2436.00	- Gray shale.
2436.00 - 2436.35	- Brownish-gray fine grained micaceous shaley sandstone.
2436.35 - 2436.70	- Gray sandy shale.
2436.70 - 2437.62	- Brownish-gray fine grained micaceous shaley sandstone.
2437.62 - 2440.50	- Laminated sandy shale.
2440.50 - 2440.75	- Gray fine grained micaceous shaley sandstone.
2440.75 - 2441.40	- Gray shale.
2441.40 - 2443.00	- Light brown fine grained micaceous slightly shaley sandstone.
2443.00 - 2443.50	- Brownish-gray fine grained micaceous shaley sandstone.
2443.50 - 2443.65	- Laminated sandy shale.
2443.65 - 2445.05	- Gray shale.
2445.05 - 2446.20	- Gray sandy shale.
2446.20 - 2446.50	- Gray fine grained micaceous shaley sandstone.
2446.50 - 2447.40	- Gray sandy shale.
2447.40 - 2448.40	- Loss.
2448.40 - 2449.65	- Gray sandy shale.
2449.65 - 2449.90	- Laminated shale and sandstone.
2449.90 - 2450.05	- Gray shale.
2450.05 - 2450.60	- Laminated shaley sandstone.
2450.60 - 2451.70	- Light brown fine grained micaceous sandstone.
2451.70 - 2452.00	- Laminated shaley sandstone.

- 2452.00 - 2452.22 - Brownish-gray fine grained micaceous shaley sandstone.
- 2452.22 - 2452.40 - Laminated shaley sandstone.
- 2452.40 - 2454.25 - Brownish-gray fine grained micaceous slightly shaley sandstone.
- 2454.25 - 2454.50 - Laminated sandy shale.
- 2454.50 - 2456.25 - Light brown fine grained micaceous slightly shaley sandstone.
- 2456.25 - 2459.00 - Light brown fine grained micaceous sandstone.
- 2459.00 - 2460.45 - Gray fine grained micaceous sandstone.
- 2460.45 - 2469.35 - Light brown fine grained micaceous sandstone.
- 2469.35 - 2469.60 - Light brown fine grained micaceous slightly shaley slightly laminated micaceous carbonaceous sandstone.
- 2469.60 - 2470.00 - Light brown fine grained micaceous slightly shaley sandstone.
- 2470.00 - 2470.40 - Light brown fine grained micaceous sandstone.
- 2470.40 - 2470.83 - Light brown fine grained micaceous shaley sandstone.
- 2470.83 - 2473.00 - Light brown fine grained micaceous sandstone.
- 2473.00 - 2474.00 - Loss.
- 2474.00 - 2476.09 - Light brown fine grained micaceous sandstone.
- 2476.09 - 2477.69 - Grayish-brown finely laminated micaceous carbonaceous shaley sandstone.
- 2477.69 - 2479.24 - Grayish-brown slightly laminated micaceous carbonaceous shaley sandstone.
- 2479.24 - 2491.18 - Light brown fine to medium grained micaceous slightly carbonaceous sandstone.
- 2491.18 - 2492.90 - Grayish-brown fine grained micaceous carbonaceous shaley sandstone.
- 2492.90 - 2493.90 - Loss.
- 2493.90 - 2495.64 - Grayish-brown fine grained micaceous carbonaceous shaley sandstone.
- 2495.64 - 2496.30 - Gray finely laminated micaceous carbonaceous shaley sandstone.

- 2496.30 - 2498.45 - Grayish-brown fine grained micaceous slightly carbonaceous shaley sandstone.
- 2498.45 - 2499.25 - Gray finely laminated micaceous carbonaceous shaley sandstone.
- 2499.25 - 2500.50 - Light brown fine grained micaceous shaley sandstone.
- 2500.50 - 2506.80 - Grayish-brown fine grained micaceous slightly carbonaceous shaley sandstone.
- 2506.80 - 2507.50 - Light brown fine grained micaceous sandstone.
- 2507.50 - 2508.04 - Light brown finely laminated micaceous carbonaceous sandstone.
- 2508.04 - 2512.00 - Light brown fine grained micaceous sandstone.
- 2512.00 - 2515.00 - Loss.
- 2515.00 - 2515.47 - Light brown finely laminated micaceous carbonaceous sandstone.
- 2515.47 - 2516.50 - Light brown fine grained micaceous sandstone.
- 2516.50 - 2517.20 - Grayish-brown laminated micaceous carbonaceous sandstone.
- 2517.20 - 2519.05 - Light brown fine grained micaceous sandstone.
- 2519.05 - 2530.00 - Brownish-gray fine grained micaceous slightly carbonaceous sandstone.
- 2530.00 - 2534.00 - Dark shale (discarded at well).

Coring was started at a depth of 2434.00 feet in fine grained micaceous shaley sandstone and completed at 2534.00 feet in dark shale. This core shows a total of 78.60 feet of sandstone. There was a total core loss of 6 feet of which 5 feet was probably sandstone.

PERMEABILITY

For the sake of distribution, the core was divided into four sections. The weighted average permeability of the various sections with respect to increasing depth are 3.26, 20.16, 62.78 and 87.00 millidarcys respectively while that of the pay sand, or that part of the cored section extending from the casing point to the bottom of sand, is 42.91 millidarcys (See

Table II). From the data given above and on the coregraph, it is noticeable that the sand has a fairly irregular permeability profile and that the sand in the lower half of the cored section has a much higher permeability.

PERCENT SATURATION & OIL CONTENT

The pay sand in this core has a low weighted average percent oil saturation, namely, 18.02. The weighted average percent oil saturation of the four sections with respect to increasing depth are 13.65, 20.08, 16.93 and 9.69 respectively. The weighted average percent water saturation of the four sections with respect to increasing depth are 64.36, 54.96, 61.47 and 79.48 respectively, while that of the pay sand section is 59.92 (See Table IV). This gives an overall weighted average total fluid saturation (for the pay sand) of 77.92 percent. This comparatively low total fluid saturation indicates that an appreciable amount of fluid was lost during coring which was probably oil. From the above data and that given on the coregraph, it is evident that part of the sand section extending from 2523.90 feet to the bottom of sand is watered out.

In an effort 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 was used in the determination of percent connate water. The results of these tests are given in Tables VII and VIII. By observing the data given in these tables and on the coregraph, it is evident that considerable flushing of the sand did occur during coring as the percentage of connate water in the sand decreases with increasing depth or is indirectly proportional to the permeability of the sand.

The weighted average oil content of the various sections with respect to increasing depth are 169, 271, 237 and 135 barrels per acre foot

respectively, while that of the pay sand is 246. The total oil content, as shown by this core, is 18,254 barrels per acre of which 17,349 barrels are in the pay sand section (See Table IV).

LABORATORY FLOODING TESTS

Inasmuch as the sand in this core has a low percent oil saturation, naturally, one would expect very little oil to be recovered by laboratory flooding tests. A total recovery of 880 barrels of oil per acre was obtained from 39.01 feet of sand (pay sand section). The weighted average percent oil saturation was reduced from 18.98 to 17.41, or represents an average recovery of 1.57 percent. The weighted average effective permeability of the samples is 3.49 millidarcys while the average initial fluid production pressure is 16.4 pounds per square inch (See Table VI).

By observing the data given in Table V, you will note that of the 82 samples tested, 71 took water and 42 produced oil. This indicates that most of the sand represented by these samples is floodable. From the above data, it is noticeable that most of the sand in the upper part of the cored section is comparatively tight or has a low effective permeability.

CONCLUSION

From a study of the above data, we believe that an efficient water flood within the vicinity of this well will recover approximately 6,700 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. The reason why the calculated recovery is rather low in relationship to the thick sand section is the fact that the upper part of the cored section is comparatively tight and that most of the water injected will enter the lower half of the cored section.

Apparently, the water that this hole made during the cleaning out of same was coming from the bottom of the sand section or that part of the cored section extending from 2523.90 feet to the bottom of sand. If you have not already done so, we recommend that the hole be plugged back to a depth of 2522.00 feet. Chances are if this zone was left open, it would have a tendency to take more than its share of the water and thereby increase the water-oil ratio of the fluid produced from the surrounding producing wells.

Oil Field Research Laboratories
RESULTS OF PERMEABILITY TESTS

TABLE I

Company The Ohio Oil Company Lease H. Hoffman Inlet Well No. 2

Sample No.	Depth, Feet	Permeability Millidarcys	Feet of Core		Permeability Capacity Ft. x Md.
			Ft.	Cum. Ft.	
1	2434.38	0.74	0.50	0.50	0.37
2	2434.68	0.24	0.50	1.00	12.00
3	2436.15	Imp.	0.35	1.35	0.00
4	2437.55	0.24	0.92	2.27	0.22
5	2441.74	0.62	0.50	2.77	0.31
6	2442.08	0.91	0.35	3.12	0.32
7	2442.35	1.6	0.35	3.47	0.56
8	2442.82	1.0	0.50	3.97	0.50
9	2443.45	0.61	0.40	4.37	0.24
10	2450.10	2.0	0.25	4.62	0.50
11	2450.53	Imp.	0.30	4.92	0.00
12	2450.93	2.1	0.50	5.42	1.05
13	2451.25	2.6	0.60	6.02	1.56
14	2451.80	Imp.	0.30	6.32	0.00
15	2452.10	2.8	0.22	6.54	0.62
16	2452.92	1.9	0.65	7.19	1.24
17	2453.23	2.9	0.30	7.49	0.87
18	2453.50	3.4	0.50	7.99	1.70
19	2454.13	4.2	0.40	8.39	1.68
20	2454.92	6.1	0.60	8.99	3.66
21	2455.25	2.2	0.40	9.39	0.88
22	2455.75	4.8	0.40	9.79	1.92
23	2456.05	4.2	0.35	10.14	1.47
24	2456.40	5.3	0.35	10.49	1.86
25	2456.80	14.	0.35	10.84	4.90
26	2457.14	15.	0.35	11.19	5.25
27	2457.50	16.	0.50	11.69	8.00
28	2458.12	21.	0.45	12.14	9.45
29	2458.33	15.	0.35	12.49	5.25
30	2458.80	19.	0.60	13.09	11.40
31	2459.55	Imp.	0.70	13.79	0.00
32	2460.35	Imp.	0.55	14.34	0.00
33	2460.57	5.9	0.55	14.89	3.25
34	2461.40	9.8	0.50	15.39	4.90
35	2461.67	11.	0.30	15.69	3.30
36	2461.95	13.	0.40	16.09	5.20
37	2462.42	8.3	0.50	16.59	4.15
38	2462.90	9.1	0.40	16.99	3.64
39	2463.22	9.5	0.40	17.39	3.80
40	2463.80	15.	0.60	17.99	9.00

Oil Field Research Laboratories
RESULTS OF PERMEABILITY TESTS

TABLE I

Company The Ohio Oil Company Lease H. Hoffman Inlet Well No. 2

Sample No.	Depth, Feet	Permeability Millidarcys	Feet of Core		Permeability Capacity Ft. x Md.
			Ft.	Cum. Ft.	
41	2464.35	13.	0.50	18.49	6.50
42	2464.84	21.	0.40	18.89	8.40
43	2465.10	28.	0.25	19.14	7.00
44	2465.38	29.	0.35	19.49	10.15
45	2465.82	46.	0.40	19.89	18.40
46	2466.15	45.	0.30	20.19	13.50
47	2466.50	19.	0.40	20.59	7.60
48	2466.92	20.	0.50	21.09	10.00
49	2467.40	26.	0.40	21.49	10.40
50	2467.80	18.	0.40	21.89	7.20
51	2468.20	20.	0.40	22.29	8.00
52	2468.62	16.	0.50	22.79	8.00
53	2469.10	28.	0.45	23.24	12.60
54	2469.55	2.9	0.25	23.49	0.73
55	2470.08	11.	0.20	23.69	2.20
56	2470.33	32.	0.20	23.89	6.40
57	2470.75	2.6	0.43	24.32	1.12
58	2471.12	11.	0.47	24.79	5.17
59	2471.52	14.	0.50	25.29	7.00
60	2472.10	29.	0.40	25.69	11.60
61	2472.28	38.	0.40	26.09	15.20
62	2472.85	42.	0.40	26.49	16.80
63	2474.41	62.	0.50	26.99	31.00
64	2474.68	40.	0.30	27.29	12.00
65	2474.93	14.	0.40	27.69	5.60
66	2475.33	11.	0.30	27.99	3.30
67	2475.72	36.	0.40	28.39	14.40
68	2476.05	Broken	0.19	28.58	-
69	2476.60	Broken	0.66	29.24	-
70	2476.90	4.3	0.35	29.59	1.51
71	2477.33	6.7	0.59	30.18	3.95
72	2477.72	3.9	0.16	30.34	0.62
73	2478.03	6.9	0.35	30.69	2.42
74	2478.38	4.8	0.40	31.09	1.92
75	2478.80	18.	0.40	31.49	7.20
76	2479.18	12.	0.24	31.73	2.88
77	2479.51	33.	0.56	32.29	18.48
78	2480.08	13.	0.50	32.79	6.50
79	2480.53	13.	0.45	33.24	5.85
80	2480.95	9.4	0.35	33.59	3.29

Oil Field Research Laboratories
RESULTS OF PERMEABILITY TESTS

TABLE I

Company The Ohio Oil Company Lease H. Hoffman Inlet Well No. 2

Sample No.	Depth, Feet	Permeability Millidarcys	Feet of Core		Permeability Capacity Ft. x Md.
			Ft.	Cum. Ft.	
81	2481.25	13.	0.30	33.89	3.90
82	2481.55	13.	0.40	34.29	5.20
83	2482.00	9.5	0.30	34.59	2.85
84	2482.18	Cracked	0.25	34.84	-
85	2482.45	22.	0.45	35.29	9.90
86	2483.10	21.	0.40	35.69	8.40
87	2483.32	58.	0.40	36.09	23.20
88	2483.75	47.	0.40	36.49	18.80
89	2484.13	17.	0.40	36.89	6.80
90	2484.58	16.	0.30	37.19	4.80
91	2484.90	48.	0.30	37.49	14.40
92	2485.20	27.	0.40	37.89	10.80
93	2485.65	71.	0.50	38.39	35.50
94	2486.30	6.1	0.60	38.99	3.66
95	2486.70	46.	0.30	39.29	13.80
96	2486.98	39.	0.40	39.69	15.60
97	2487.33	34.	0.30	39.99	10.20
98	2487.71	34.	0.40	40.39	13.60
99	2488.15	39.	0.45	40.84	17.55
100	2488.60	12.	0.45	41.29	5.40
101	2489.07	36.	0.45	41.74	16.20
102	2489.43	23.	0.45	42.19	10.35
103	2489.92	15.	0.40	42.59	6.00
104	2490.32	29.	0.40	42.99	11.60
105	2490.75	19.	0.40	43.39	7.60
106	2491.08	26.	0.28	43.67	7.28
107	2491.45	9.4	0.52	44.19	4.89
108	2491.90	49.	0.40	44.59	19.60
109	2492.28	71.	0.80	45.39	56.80
110	2494.10	37.	0.30	45.69	11.10
111	2494.40	37.	0.55	46.24	20.35
112	2495.13	18.	0.55	46.79	9.90
113	2495.60	52.	0.34	47.13	17.68
114	2495.95	6.1	0.41	47.54	2.50
115	2496.17	46.	0.25	47.79	11.50
116	2496.66	11.	0.55	48.34	6.05
117	2497.10	32.	0.45	48.79	14.40
118	2497.62	38.	0.50	49.29	19.00
119	2498.05	104.	0.65	49.94	67.60
120	2498.52	109.	0.25	50.19	27.25

Oil Field Research Laboratories
RESULTS OF PERMEABILITY TESTS

TABLE I

Company The Ohio Oil Company Lease H. Hoffman Inlet Well No2

Sample No.	Depth, Feet	Permeability Millidarcys	Feet of Core		Permeability Capacity Ft. x Md.
			Ft.	Cum. Ft.	
121	2498.88	24.	0.55	50.74	13.20
122	2499.30	62.	0.25	50.99	15.50
123	2499.76	59.	0.55	51.54	32.45
124	2500.25	94.	0.45	51.99	42.30
125	2500.75	64.	0.40	52.39	25.60
126	2501.10	150.	0.45	52.84	67.50
127	2501.60	216.	0.45	53.29	97.20
128	2501.90	222.	0.40	53.69	88.80
129	2502.35	225.	0.40	54.09	90.00
130	2502.75	247.	0.40	54.49	98.80
131	2503.22	76.	0.50	54.99	38.00
132	2503.72	166.	0.30	55.29	49.80
133	2503.92	109.	0.40	55.69	43.60
134	2504.40	60.	0.30	55.99	18.00
135	2504.66	120.	0.30	56.29	36.00
136	2505.00	113.	0.40	56.69	45.20
137	2505.40	42.	0.40	57.09	16.80
138	2505.75	69.	0.40	57.49	27.60
139	2506.30	66.	0.50	57.99	33.00
140	2506.70	93.	0.30	58.29	27.90
141	2507.12	49.	0.70	58.99	34.30
142	2507.60	31.	0.30	59.29	9.30
143	2507.95	47.	0.24	59.53	11.28
144	2508.32	44.	0.46	59.99	20.24
145	2508.80	36.	0.50	60.49	18.00
146	2509.25	60.	0.50	60.99	30.00
147	2509.74	79.	0.50	61.49	39.50
148	2510.25	2.3	0.40	61.89	0.92
149	2510.68	0.92	0.50	62.39	0.46
150	2511.12	40.	0.45	62.84	18.00
151	2511.60	15.	0.65	63.49	9.75
152	2515.10	8.1	0.25	63.74	2.03
153	2515.40	61.	0.22	63.96	13.42
154	2515.82	131.	0.63	64.59	82.53
155	2516.38	50.	0.40	64.99	20.00
156	2416.85	52.	0.70	65.69	36.40
157	2517.30	18.	0.20	65.89	3.60
158	2517.60	49.	0.40	66.29	19.60
159	2517.95	26.	0.40	66.69	10.40
160	2518.35	11.	0.30	66.99	3.30

Oil Field Research Laboratories

RESULTS OF PERMEABILITY TESTS

TABLE I

Company The Ohio Oil Company Lease H. Hoffman Inlet Well No. 2

Sample No.	Depth, Feet	Permeability Millidarcys	Feet of Core		Permeability Capacity Ft. x Md.
			Ft.	Cum. Ft.	
161	2518.75	8.9	0.55	67.54	4.90
162	2519.10	12.	0.20	67.74	2.40
163	2519.40	12.	0.35	68.09	4.20
164	2519.85	30.	0.40	68.49	12.00
165	2520.20	24.	0.30	68.79	7.20
166	2520.50	29.	0.40	69.19	11.60
167	2520.90	29.	0.55	69.74	15.95
168	2521.48	37.	0.45	70.19	16.65
169	2521.90	62.	0.40	70.59	24.80
170	2522.30	23.	0.50	71.09	11.50
171	2522.80	25.	0.50	71.59	12.50
172	2523.30	113.	0.40	71.99	45.20
173	2523.72	55.	0.40	72.39	22.00
174	2524.10	86.	0.40	72.79	34.40
175	2524.58	133.	0.40	73.19	53.20
176	2524.88	37.	0.40	73.59	14.80
177	2525.30	61.	0.50	74.09	30.50
178	2525.82	94.	0.60	74.69	56.40
179	2526.45	66.	0.50	75.19	33.00
180	2526.90	108.	0.40	75.59	43.20
181	2527.22	62.	0.40	75.99	24.80
182	2527.72	134.	0.40	76.39	53.60
183	2528.10	58.	0.40	76.79	23.20
184	2528.45	10.	0.40	77.19	4.00
185	2528.90	126.	0.40	77.59	50.40
186	2529.32	113.	0.40	77.99	45.20
187	2529.65	128.	0.50	78.49	64.00

Oil Field Research Laboratories

SUMMARY OF PERMEABILITY TESTS

TABLE II

Company The Ohio Oil Company Lease H. Hoffman Inlet Well No. 2

<u>Depth Interval Feet</u>	<u>Feet of Core Analyzed</u>	<u>Average Permeability, Millidarcys</u>	<u>Permeability Capacity, Ft. x Md.</u>
2434.00 - 2452.22	5.59	3.26	18.25
2452.40 - 2492.10	35.70	20.16	719.54
2492.10 - 2523.90	27.80	62.78	1,745.31
2523.90 - 2530.00	6.10	87.00	530.70
2452.00 - 2530.00	69.82	42.91	2,996.17

Oil Field Research Laboratories
RESULTS OF SATURATION TESTS

TABLE III

Company The Ohio Oil Company Lease H. Hoffman Inlet Well No. 2

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	2434.85	16.2	11.3	64.8	76.1	142	1.00	1.00	142
3	2436.80	15.7	10.8	66.7	77.5	131	0.40	1.40	52
4	2437.25	15.9	15.0	58.1	73.1	185	0.52	1.92	96
7	2440.60	11.6	12.0	81.5	93.5	108	0.25	2.17	27
8	2441.47	15.3	13.9	68.5	82.4	168	0.60	2.77	101
9	2442.55	16.0	15.0	62.5	77.5	186	1.00	3.77	186
10	2443.05	15.4	13.8	64.2	78.0	165	0.50	4.27	83
16	2450.65	16.8	16.7	62.8	79.5	218	0.50	4.77	109
17	2451.53	16.8	14.0	60.9	74.9	182	0.60	5.37	109
18	2452.55	17.7	22.6	56.4	79.0	311	0.80	6.17	248
19	2453.65	16.0	24.6	59.0	83.6	305	1.05	7.22	320
20	2454.55	17.9	16.9	53.2	70.1	235	0.60	7.82	141
21	2455.45	17.1	19.9	58.1	78.0	264	1.15	8.97	304
22	2456.55	18.0	21.2	50.7	71.9	296	0.85	9.82	252
23	2457.70	18.8	17.4	63.9	81.3	254	1.00	10.82	254
24	2458.40	19.1	19.6	52.8	72.4	290	1.10	11.92	319
25	2459.86	13.1	7.1	79.4	86.5	72	1.25	13.17	90
26	2460.70	18.8	22.7	50.0	72.7	331	0.55	13.72	182

Oil Field Research Laboratories

RESULTS OF SATURATION TESTS

TABLE III

Company The Ohio Oil Company Lease H. Hoffman Inlet Well No. 2

Sat. No.	Depth, Feet	Effective Porosity Percent	Percent Saturation		Oil Content Bbls./A. Ft.	Feet of Core		Total Oil Content Bbls./Acre
			Oil	Water		Ft.	Cum. Ft.	
27	2461.10	18.7	14.7	53.5	68.2	0.80	14.52	170
28	2462.63	16.8	15.1	50.3	65.4	1.30	15.82	256
29	2463.47	17.8	19.3	48.6	67.9	0.90	16.72	240
30	2464.60	17.5	16.5	48.6	65.1	1.10	17.82	258
31	2465.56	18.0	24.1	50.0	74.1	1.00	18.82	337
32	2466.65	18.2	21.9	56.1	78.0	1.00	19.82	310
33	2467.55	18.3	20.7	46.7	67.4	1.10	20.92	324
34	2468.82	15.2	24.6	55.0	79.6	1.15	22.07	334
35	2469.70	16.0	24.2	55.2	79.4	0.40	22.47	120
36	2470.48	18.1	16.8	47.5	64.3	0.83	23.30	196
37	2471.72	19.3	22.0	53.5	75.5	1.37	24.67	452
38	2472.52	17.0	18.4	53.2	71.6	0.80	25.47	195
39	2474.07	16.1	31.1	49.2	80.3	0.60	26.07	233
40	2475.07	17.4	30.7	46.8	77.5	1.49	27.56	618
41	2476.28	17.0	15.1	56.4	71.5	0.66	28.22	126
42	2477.20	17.0	15.0	83.8	98.8	0.95	29.17	188
43	2478.50	16.2	17.0	59.5	76.5	1.54	30.71	330
44	2479.75	19.1	19.9	48.0	67.9	0.96	31.67	283
45	2480.70	17.5	19.1	55.5	74.6	1.00	32.67	260

Oil Field Research Laboratories

RESULTS OF SATURATION TESTS

TABLE III

Company The Ohio Oil Company Lease H. Hoffman Inlet Well No. 2

Sat. No.	Depth, Feet	Effective Porosity Percent	Percent Saturation		Oil Content Bbls./A. Ft.	Feet of Core		Total Oil Content Bbls./Acre
			Oil	Water		Ft.	Cum. Ft.	
46	2481.70	15.3	21.9	51.7	260	1.10	33.77	286
47	2482.80	18.2	20.9	66.4	296	0.90	34.67	266
48	2483.50	18.0	15.9	57.0	222	0.70	35.37	155
49	2484.30	15.5	16.5	54.6	199	0.90	36.27	179
50	2485.40	18.6	18.6	49.2	268	1.20	37.47	322
51	2486.45	19.4	22.4	54.6	337	1.20	38.67	405
52	2487.90	18.4	22.2	48.5	317	1.15	39.82	365
53	2488.80	15.9	24.7	50.8	305	0.85	40.67	260
54	2489.60	15.4	19.1	63.4	228	0.90	41.57	205
55	2490.50	17.4	21.8	52.8	294	1.08	42.65	318
56	2491.60	16.2	20.5	47.7	258	0.92	43.57	238
57	2492.70	18.9	23.6	43.2	346	0.80	44.37	276
58	2494.60	18.2	15.7	72.1	222	1.10	45.47	244
59	2495.35	18.8	18.4	55.5	268	0.64	46.11	171
60	2496.40	17.1	19.9	56.8	264	0.90	47.01	238
61	2497.80	19.8	17.1	59.4	263	0.90	47.91	236
62	2498.25	17.6	19.9	58.0	272	0.35	48.26	95
63	2499.05	13.5	13.6	68.0	142	0.80	49.06	114
64	2500.45	14.4	16.9	77.3	189	1.25	50.31	236

Oil Field Research Laboratories

RESULTS OF SATURATION TESTS

TABLE III

Company The Ohio Oil Company Lease H. Hoffman Inlet Well No. 2

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.	
F-64	2500.55	17.0	16.1	-	-	213	0.50	50.81	107
65	2501.30	18.4	15.5	66.7	82.2	222	0.70	51.51	155
66	2502.10	17.2	17.2	64.1	81.3	230	1.10	52.61	253
67	2503.40	17.6	13.1	61.5	74.6	179	1.00	53.61	179
68	2504.10	15.1	16.0	67.8	83.8	158	0.90	54.51	142
69	2505.20	17.2	19.6	54.8	74.4	262	1.20	55.71	314
70	2506.50	17.6	14.7	62.6	77.3	201	0.90	56.61	181
71	2507.30	19.8	16.1	60.5	76.6	248	0.70	57.31	174
72	2508.50	18.5	18.5	58.4	76.9	266	0.91	58.22	242
73	2509.40	18.8	18.1	55.0	75.1	264	0.95	59.17	250
74	2510.40	18.6	19.9	52.4	72.3	288	1.20	60.37	346
75	2511.80	16.2	15.6	68.0	83.6	196	0.90	61.27	177
76	2515.54	20.5	17.3	57.0	69.3	275	1.03	62.30	283
77	2516.70	18.9	15.3	75.0	90.3	224	0.70	63.00	157
78	2517.75	19.0	17.2	62.0	79.2	254	0.90	63.90	228
79	2518.50	19.3	16.0	63.8	79.8	240	0.95	64.85	228
80	2519.55	18.6	15.5	66.3	81.8	224	1.05	65.90	235
81	2520.60	19.5	16.1	61.0	77.1	244	0.80	66.70	195
82	2521.20	18.9	15.5	64.5	80.0	227	0.80	67.50	182

Oil Field Research Laboratories

RESULTS OF SATURATION TESTS

TABLE III

Company The Ohio Oil Company Lease H. Hoffman Inlet Well No. 2

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.	
83	2522.10	18.8	17.1	63.7	80.8	1.10	68.60	275
84	2523.44	20.0	16.0	62.8	78.8	1.10	69.70	272
85	2524.30	17.2	17.5	78.3	95.8	1.00	70.80	234
86	2525.50	17.8	13.8	79.9	93.7	1.10	71.80	210
87	2526.60	17.8	7.6	84.5	92.1	1.10	72.90	116
88	2527.45	18.5	7.4	78.4	85.8	0.90	73.80	95
89	2528.65	18.5	5.5	73.3	78.8	1.30	75.10	103
90	2529.85	21.2	5.8	85.5	91.3	0.70	75.80	67
						Total	--	18,254

Oil Field Research Laboratories

SUMMARY OF SATURATION TESTS

TABLE IV

Company	The Ohio Oil Company	Lease	H. Hoffman	Inlet	Well No.	
					2	
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
2434.00-2451.70	5.37	15.85	13.65	64.36	169	905
2452.40-2492.10	38.20	17.31	20.08	54.96	271	10,339
2492.10-2523.90	26.13	18.04	16.93	61.47	237	6,185
2523.90-2530.00	6.10	18.34	9.69	79.48	135	825
2452.00-2530.00	70.43	17.67	18.02	59.92	246	17,349

Oil Field Research Laboratories

RESULTS OF LABORATORY FLOODING TESTS

TABLE V

Company The Ohio Oil Company

Lease H. Hoffmen

Well No. I-2

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.
			Percent	Bbls./A. Ft.	Percent	Bbls./A. Ft.	% Oil	% Water	Bbls./A. Ft.			
43	2478.60	16.9	15.9	209	0.0	0	15.9	79.0	209	28	0.520	20
44	2479.90	18.0	21.2	296	0.0	0	21.2	70.9	296	29	0.805	25
45	2480.80	17.5	17.2	234	0.0	0	17.2	75.5	234	14.5	0.341	30
46	2481.80	16.7	18.7	246	0.2	3	18.7	72.3	243	22	0.560	25
47	2482.90	17.9	22.2	309	2.5	35	19.7	74.6	274	105	2.70	15
48	2483.60	18.7	16.8	244	1.8	26	15.0	80.5	218	126.5	3.99	15
49	2484.40	15.5	17.5	211	0.0	0	17.5	69.6	211	7	0.200	35
50	2485.50	17.8	17.1	237	2.0	28	15.1	79.5	209	99	3.97	15
51	2486.55	19.3	19.1	286	2.2	35	16.9	79.2	253	130.5	4.45	15
52	2488.00	18.1	19.3	271	1.3	18	18.0	71.4	253	79	2.74	20
53	2488.90	15.6	22.9	277	0.0	0	22.9	74.2	277	25	0.589	25
54	2489.70	15.1	20.6	242	0.0	0	20.6	78.7	242	14	0.513	25
55	2490.60	18.3	20.2	287	1.0	14	19.2	76.5	273	85	2.99	15
56	2491.70	16.8	19.3	252	0.0	0	19.3	73.0	252	21	0.420	20
57	2492.80	19.9	20.7	320	0.7	11	20.0	70.9	309	58	3.86	15
58	2494.75	18.0	18.0	252	0.2	3	17.8	78.0	249	47	2.53	15
59	2495.44	19.0	19.5	288	2.0	30	17.5	74.6	258	143	3.28	10
60	2496.50	17.7	17.3	238	0.0	0	17.3	72.7	238	86	2.33	15
61	2497.90	19.7	16.9	258	1.6	24	15.3	83.7	234	153	3.81	10
62	2498.35	18.4	19.8	283	0.8	11	19.0	75.5	272	80	1.70	15
63	2499.15	13.1	15.2	154	0.0	0	15.2	75.0	154	0	Imp.	50+
64	2500.55	17.0	16.1	213	0.2	3	15.9	79.8	210	119	3.23	15
65	2501.40	18.7	15.0	218	0.4	6	14.6	80.3	212	171	5.83	15
66	2502.20	17.5	15.0	204	0.0	0	15.0	80.0	204	64	1.57	10
67	2503.50	17.4	14.8	200	0.0	0	14.8	80.8	200	134.5	3.09	15
68	2504.20	16.2	14.2	179	0.0	0	14.2	81.9	179	30.5	0.588	20
69	2505.30	17.5	19.1	260	1.6	22	17.5	77.5	238	194	4.44	10
70	2506.60	17.1	15.9	212	1.4	19	14.5	85.0	193	148	3.83	10
71	2507.40	19.0	17.9	264	2.2	32	15.7	72.7	232	126	7.32	5
72	2508.60	17.3	19.6	263	0.7	9	18.9	77.7	254	55	1.57	15
73	2509.55	18.8	16.7	243	2.7	39	14.0	82.0	204	156	3.44	10
74	2510.50	18.2	21.0	297	2.1	30	18.9	76.8	267	120	2.48	15
75	2511.90	16.9	14.8	194	0.3	4	14.5	78.2	190	30	2.10	15

Oil Field Research Laboratories

RESULTS OF LABORATORY FLOODING TESTS

TABLE V

Company The Ohio Oil Company Lease H. Hoffman Inlet Well No. 2

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.
			Percent	Bbls./A. Ft.	Percent	Bbls./A. Ft.	% Oil	% Water	Bbls./A. Ft.			
76	2515.65	19.2	17.6	262	2.4	36	15.2	79.4	226	163.5	4.20	5
77	2516.70	18.7	16.1	234	0.4	6	15.7	70.4	228	108	3.87	10
78	2517.85	17.7	19.5	268	4.5	62	15.0	82.5	206	180	12.95	10
79	2518.60	19.5	17.8	269	0.8	12	17.0	80.2	257	96	8.46	5
80	2519.65	18.5	13.5	195	0.0	0	13.5	79.0	195	119	6.79	5
81	2520.70	19.4	18.8	285	0.0	15	17.8	75.6	268	167	7.57	5
82	2521.30	18.8	18.7	273	3.4	50	15.3	80.5	223	166	6.68	10
83	2522.20	18.8	19.0	277	1.8	26	17.2	73.0	251	182.5	8.22	10
84	2523.54	19.7	15.8	242	2.1	32	13.7	78.5	210	173.5	6.00	10
85	2524.40	17.4	17.2	233	0.2	3	17.0	79.5	230	159	6.56	10
86	2525.60	17.5	12.3	167	0.0	0	12.3	84.2	167	161	15.75	5
87	2526.70	17.9	6.9	96	0.0	0	6.9	90.1	96	211.5	4.98	5
88	2527.55	19.5	6.5	98	0.0	0	6.5	91.2	98	118	12.12	5
89	2528.74	18.7	4.9	71	0.0	0	4.9	93.3	71	174.5	7.42	5
90	2529.95	22.0	5.1	87	0.0	0	5.1	92.2	87	126	15.25	5

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.

Oil Field Research Laboratories

SUMMARY OF LABORATORY FLOODING TESTS

TABLE VI

Company	Lease		H. Hoffman	Inlet	Well No.
The Ohio Oil Company					2
Depth, Interval, Feet	2455.10-2491.18	2492.10-2524.90	2452.00-2524.90		
Feet of Core Analyzed	18.88	20.13	39.01		
Average Percent Porosity	18.19	18.46	18.33		
Average Percent Original Oil Saturation	20.14	17.94	18.98		
Average Percent Oil Recovery	1.63	1.52	1.57		
Average Percent Residual Oil Saturation	18.51	16.42	17.41		
Average Percent Residual Water Saturation	72.88	78.13	75.33		
Average Percent Total Residual Fluid Saturation	91.39	94.55	92.74		
Average Original Oil Content, Bbls./A. Ft.	283.	258.	270.		
Average Oil Recovery, Bbls./A. Ft.	23.	22.	23.		
Average Residual Oil Content, Bbls./A. Ft.	260.	236.	247.		
Total Original Oil Content, Bbls./Acre	5,351.	5,172.	10,523.		
Total Oil Recovery, Bbls./Acre	440.	440.	880.		
Total Residual Oil Content, Bbls./Acre	4,911.	4,732.	9,643.		
Average Effective Permeability, Millidarcys	1.84	5.04	3.49		
Average Initial Fluid Production Pressure, p.s.i.	23.2	10.7	16.4		

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

Oil Field Research Laboratories
RESULTS OF WATER DIFFERENTIATION TESTS
TABLE VII

Company The Ohio Oil Company Lease H. Hoffman Inlet Well No. I-2

Sample No.	Depth, Feet	Chloride Content of Brine in Sand ppm	Percent Water Saturation		
			Connate	Drilling & Foreign	Total
1	2434.85	58,900	56.2	8.6	64.8
3	2436.80	55,600	54.6	12.1	66.7
4	2437.25	54,600	46.7	11.4	58.1
7	2440.60	49,000	58.7	22.8	81.5
8	2441.47	56,600	57.0	11.5	68.5
9	2442.55	56,400	51.8	10.7	62.5
10	2443.05	57,100	54.0	10.2	64.2
16	2450.65	59,400	54.9	7.9	62.8
17	2451.53	59,800	53.6	7.3	60.9
18	2452.55	58,500	48.5	7.9	56.4
19	2453.65	70,300	59.0	0.0	59.0
20	2454.55	58,600	45.8	7.4	53.2
21	2455.45	54,300	46.4	11.7	58.1
22	2456.55	49,300	36.8	13.9	50.7
23	2457.70	62,800	50.0	4.9	63.9
24	2458.40	38,600	30.0	22.8	52.8
25	2459.86	53,300	62.2	17.2	79.4
26	2460.70	62,900	46.2	3.8	50.0
27	2461.10	58,000	45.6	7.9	53.5
28	2462.63	66,500	49.2	1.1	50.3
29	2463.47	27,900	20.0	28.6	48.6
30	2464.60	20,200	14.4	34.2	48.6
31	2465.56	5,200	3.8	46.2	50.0
32	2466.65	7,400	6.1	50.0	56.1
33	2467.55	49,900	34.3	12.4	46.7
34	2468.82	61,800	50.0	5.0	55.0
35	2469.70	57,400	46.6	8.6	55.2
36	2470.48	59,000	41.2	6.3	47.5
37	2471.72	50,500	39.7	13.8	53.5
38	2472.52	58,800	46.0	7.2	53.2
39	2474.07	5,100	3.7	45.5	49.2
40	2475.07	58,600	40.4	6.4	46.8
41	2476.28	56,900	47.2	9.2	56.4
42	2477.20	54,100	66.7	17.1	83.8
43	2478.50	49,900	36.6	22.9	59.5
44	2479.75	54,300	38.3	9.7	48.0
45	2480.70	51,000	41.6	13.9	55.5
46	2481.70	57,300	43.6	8.1	51.7
47	2482.80	51,900	50.7	15.7	66.4
48	2483.50	37,100	31.1	25.9	57.0
49	2484.30	56,000	45.0	9.6	54.6

Oil Field Research Laboratories
RESULTS OF WATER DIFFERENTIATION TESTS

TABLE VII

Company The Ohio Oil Company Lease H. Hoffman Inlet Well No. 2

Sample No.	Depth, Feet	Chloride Content of Brine in Sand ppm	Percent Water Saturation		
			Connate	Drilling & Foreign	Total
50	2485.40	28,600	20.7	28.5	49.2
51	2486.45	16,500	13.3	41.3	54.6
52	2487.90	56,300	40.2	8.3	48.5
53	2488.80	71,600	50.8	0.0	50.8
54	2489.60	63,000	58.7	4.7	63.4
55	2490.50	68,300	52.8	0.0	52.8
56	2491.60	67,100	47.1	0.6	47.7
57	2492.70	67,100	42.0	1.2	43.2
58	2494.60	29,900	31.7	40.4	72.1
59	2495.35	47,600	38.8	16.7	55.5
60	2496.40	14,200	11.9	44.9	56.8
61	2497.80	5,140	4.5	54.9	59.4
62	2498.25	56,100	47.9	10.1	58.0
63	2499.05	61,800	42.0	26.0	68.0
64	2500.45	47,000	53.4	23.9	77.3
65	2501.30	4,940	4.9	61.8	66.7
66	2502.10	34,200	32.2	31.9	64.1
67	2503.40	50,100	45.3	16.2	61.5
68	2504.10	55,600	55.5	12.3	67.8
69	2505.20	44,700	36.0	18.8	54.8
70	2506.50	31,900	29.4	33.2	62.6
71	2507.30	10,850	9.6	50.9	60.5
72	2508.50	42,900	36.8	21.6	58.4
73	2509.40	9,600	7.8	47.2	55.0
74	2510.40	41,400	31.9	20.5	52.4
75	2511.80	44,800	44.8	23.2	68.0
76	2515.54	7,730	6.5	50.5	57.0
77	2516.70	40,000	44.1	30.9	75.0
78	2517.75	6,600	6.0	56.0	62.0
79	2518.50	3,480	3.3	60.5	63.8
80	2519.55	37,200	36.3	30.0	66.3
81	2520.60	7,160	6.4	54.6	61.0
82	2521.20	5,660	5.7	58.8	64.5
83	2522.10	3,590	3.4	60.3	63.7
84	2523.44	3,910	3.6	59.2	62.8
85	2524.30	25,500	20.0	58.3	78.3
86	2525.50	6,830	8.0	71.9	79.9
87	2526.60	21,000	26.1	58.4	84.5
88	2527.45	10,300	11.9	66.5	78.4
89	2528.65	14,300	15.4	57.9	73.3
90	2529.85	4,090	5.2	80.3	85.5

Note: ppm - parts per million

Oil Field Research Laboratories

SUMMARY OF WATER DIFFERENTIATION TESTS

TABLE VIII

Company <u>The Ohio Oil Company</u>		Lease <u>H. Hoffman</u>		Inlet Well No. <u>2</u>	
Depth Interval, Feet	Chloride Content of Brine in Sand, ppm	Average Percent Connate Water	Average Percent Drilling & Foreign Water		
2434.00 - 2451.70	57,030	53.93	10.45		
2452.40 - 2492.10	49,504	39.86	16.33		
2492.10 - 2523.90	28,655	25.60	36.65		
2523.90 - 2530.00	14,236	15.07	64.44		
2452.00 - 2530.00	38,789	32.47	28.49		

Note: ppm - parts per million