

October 5, 1951

France Central Oil Company
301 Fourth National Bank Building
Wichita 2, Kansas

Gentlemen:

Enclosed herewith is the report of the analysis of the 2½" Rotary core taken from the Hughes Lease, Well No. W-5, Butler County, Kansas, and submitted to our laboratory on September 22, 1951.

Very truly yours,

OIL FIELD RESEARCH LABORATORIES

Carl L. Pate

GLP:eda
C.C.

FRANCO CENTRAL OIL COMPANY

CORE ANALYSIS REPORT

HUGHES LEASE WELL NO. W - 1

BUTLER COUNTY, KANSAS

OIL FIELD RESEARCH LABORATORIES

CHANUTE, KANSAS

OCTOBER 5, 1951

Oil Field Research Laboratories

GENERAL INFORMATION & SUMMARY

Company **Franco Central Oil Company** Lease **Hughes** Well No. **W-5**

Location **655' East of West Line and 928' North of South Line, E¹ of the**

Section **9** Twp. **26S** Rge. **8E** County **Butler** State **Kansas**

Name of Sand **Bartlesville**

Top of Core **2420.00**

Bottom of Core **2519.00**

Top of Sand **2443.40**

Bottom of Sand **2515.15**

Total Feet of Permeable Sand **(Analyzed) 60.76**

Total Feet of Floodable Sand **(Analyzed) 58.16**

Distribution of Permeable Sand:

Permeability Range Millidarcys	Feet	Cum. Ft.
0 - 25	8.50	8.50
25 - 35	4.18	12.68
35 - 45	5.28	17.96
45 - 75	17.35	35.31
75 - 100	10.87	46.18
100 & above	14.58	60.76

Average Permeability Millidarcys **73.02**

Average Percent Porosity **19.07**

Average Percent Oil Saturation **24.83**

Average Percent Water Saturation **64.88**

Average Oil Content, Bbls./A. Ft. **369.**

Total Oil Content, Bbls./Acre **23,037.**

Average Percent Oil Recovery by Laboratory Flooding Tests **3.72**

Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft. **56.**

Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre **3,346.**

Total Calculated Oil Recovery, Bbls./Acre **11,050.**

~~Casing Point.~~ **2446.0**

Packer Setting, Feet

Viscosity, Centipoises @

A. P. I. Gravity, degrees @ 60 °F

Elevation, Feet

Fresh water was used in making up the circulating fluid used in the coring of the sand in this well.

FORMATION CORED

The detailed log of the formation cored is as follows:

<u>Depth Interval, Feet</u>	<u>Description</u>
2420.00 - 2439.00	- Gray shale (Discarded at well).
2439.00 - 2443.40	- Gray sandy shale.
2443.40 - 2444.30	- Brown fine grained micaceous sandstone.
2444.30 - 2444.45	- Brown fine grained micaceous slightly shaley sandstone.
2444.45 - 2444.65	- Brown fine grained micaceous sandstone.
2444.65 - 2445.43	- Brown fine grained micaceous slightly shaley sandstone.
2445.43 - 2455.55	- Brown fine grained micaceous sandstone.
2455.55 - 2458.12	- Sandy limestone.
2458.12 - 2460.95	- Brown fine grained micaceous sandstone.
2460.95 - 2463.37	- Slightly shaley sandy limestone.
2463.37 - 2470.50	- Brown fine grained micaceous sandstone.
2470.50 - 2471.00	- Brown fine grained micaceous slightly carbonaceous sandstone.
2471.00 - 2475.70	- Brown fine grained micaceous sandstone.
2475.70 - 2475.85	- Brown fine grained laminated shaley sandstone.
2475.85 - 2476.00	- Brown fine grained micaceous sandstone.
2476.00 - 2477.00	- Loss.
2477.00 - 2496.00	- Brown fine grained micaceous sandstone.
2496.00 - 2500.00	- Drilled sand.
2500.00 - 2501.40	- Brown fine grained micaceous sandstone.
2501.40 - 2501.82	- Brown fine grained laminated micaceous carbonaceous sandstone.

2501.82 - 2515.15 - Brown fine grained micaceous sandstone.

2515.15 - 2517.20 - Gray shale.

2517.20 - 2519.00 - Loss.

Coring was started at a depth of 2420.00 feet in gray shale and completed at 2519.00 feet probably in gray shale. There was a loss extending from 2517.20 to 2519.00 feet. This core shows a total of 61.81 feet of sandstone. There were two core losses, one extending from 2476.00 to 2477.00 feet and the other one from 2496.00 to 2500.00 feet which was probably sandstone. If so, this would give a total of 56.81 feet of sandstone. For the most part, the pay sand is made up of fine grained micaceous sandstone.

PERMEABILITY

For the sake of distribution, the core was divided into four sections. The weighted average permeability of the four sections with respect to increasing depth is 29.32, 41.01, 81.86 and 159.26 millidarcys respectively; the overall average being 73.02 (See Table II). By observing the data given on the coregraph, it is noticeable that the sand has a fairly uniform permeability profile.

PERCENT SATURATION & OIL CONTENT

The sand in this core shows a low weighted average percent oil saturation, namely, 24.83. The weighted average percent oil saturation of the four sections with respect to increasing depth is 30.86, 26.29, 22.17 and 21.97 respectively. The weighted average percent water saturation of the corresponding sections is 63.12, 63.71, 67.35 and 60.26 respectively; the overall average being 64.88 (See Table IV). This gives an overall weighted average total fluid saturation of 89.71 percent.

In an effort to determine whether or not any flushing of the sand

occurred during coring, all of the saturation samples were analyzed for chloride content. 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, with the exception of part of the upper section, most of the sand is badly flushed as for the most part the water in the core has a low chloride content.

The weighted average oil content of the four sections with respect to increasing depth is 467, 337, 337 and 348 barrels per acre foot respectively; the overall average being 363. The total oil content, as shown by this core, is 23,037 barrels per acre (See Table IV).

LABORATORY FLOODING TESTS

When taking into consideration the fact that the sand in the core has a low percent oil saturation, the sand responded very well to laboratory flooding tests, as a total recovery of 3,346 barrels of oil per acre was obtained from 59.24 feet of sand. The weighted average percent oil saturation was reduced from 24.43 to 20.71, or represents an average recovery of 3.72 percent. The weighted average effective permeability of the samples is 6.92 millidarcys, while the average initial fluid production pressure is 8.0 pounds per square inch (See Table VI).

By observing the data given in Table V, you will note that of the 64 samples tested, 61 produced water and 58 oil. This indicates that most of the sand represented by these samples is floodable. The tests also show that the sand has a fairly uniform 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 11,050

barrels of oil per acre, or an average of 190 barrels per acre foot from the 58.16 feet of good floodable sand analyzed. In calculating this recovery, an allowance was made for oil lost during coring, and it was assumed that the average primary production and the true water saturation of the sand are 20 and 38 percent respectively. The amount of recoverable oil in place, in the area represented by this core, could be affected somewhat by salt water that has been injected into the disposal well. Just how much is impossible to determine from the core analysis. The pay zone represented by this core shows a good clean sand section and should respond very satisfactorily to water repressuring.

Oil Field Research Laboratories
RESULTS OF PERMEABILITY TESTS
TABLE I

Company France Central Oil Company Lease Hughes Well No. W-5

Sample No.	Depth, Feet	Permeability Millidarcys	Feet of Core		Permeability Capacity Ft. x Md.
			Ft.	Cum. Ft.	
1	2443.70	16.	0.45	0.45	7.20
2	2444.00	40.	0.45	0.90	18.00
3	2444.70	0.39	0.20	1.10	0.08
4	2445.00	2.8	0.58	1.68	1.62
5	2445.47	5.2	0.22	1.90	1.14
6	2445.85	15.	0.35	2.25	5.25
7	2446.10	14.	0.40	2.65	5.60
8	2446.66	171.	0.45	3.10	76.95
9	2447.05	142.	0.45	3.55	69.90
10	2447.55	69.	0.40	3.95	25.20
11	2447.90	66.	0.55	4.50	36.30
12	2448.60	6.0	0.50	5.00	3.00
13	2448.92	7.2	0.45	5.45	3.24
14	2449.50	16.	0.60	6.05	9.60
15	2450.04	11.	0.50	6.55	5.50
16	2450.50	16.	0.45	7.00	7.20
17	2450.95	11.	0.35	7.35	3.85
18	2451.25	11.	0.40	7.75	4.40
19	2451.74	13.	0.55	8.30	7.15
20	2452.36	8.5	0.50	8.80	4.25
21	2452.73	100.	0.35	9.15	35.00
22	2453.05	48.	0.60	9.75	28.80
23	2453.90	31.	0.50	10.25	15.50
24	2454.10	51.	0.65	10.90	33.15
25	2455.20	69.	0.90	11.80	62.10
26	2455.75	Imp.	0.45	12.25	0.00
27	2456.25	Imp.	0.55	12.80	0.00
28	2456.85	Imp.	0.60	13.40	0.00
29	2457.46	Imp.	0.60	14.00	0.00
30	2458.08	Imp.	0.37	14.37	0.00
31	2458.55	27.	0.75	15.10	19.71
32	2459.10	9.6	0.45	15.55	4.32
33	2459.50	40.	0.55	16.10	22.00
34	2460.20	38.	0.55	16.65	20.90
35	2460.60	8.1	0.55	17.20	4.46
36	2461.20	Imp.	0.45	17.65	0.00
37	2461.60	Imp.	0.45	18.10	0.00
38	2462.15	Imp.	0.50	18.60	0.00
39	2462.60	Imp.	0.55	19.15	0.00
40	2463.20	Imp.	0.47	19.62	0.00

Oil Field Research Laboratories
RESULTS OF PERMEABILITY TESTS
TABLE I

Company Franco Central Oil Company Lease Hughes Well No. 4-5

Sample No.	Depth, Feet	Permeability Millidarcys	Feet of Core		Permeability Capacity Ft. x Md.
			Ft.	Cum. Ft.	
41	2463.65	43.	0.58	20.20	24.94
42	2464.20	42.	0.45	20.65	18.90
43	2464.62	38.	0.50	21.15	19.00
44	2465.16	60.	0.50	21.65	30.00
45	2465.65	28.	0.55	22.20	15.40
46	2466.25	48.	0.55	22.75	26.40
47	2466.70	40.	0.40	23.15	16.00
48	2467.15	52.	0.45	23.60	23.40
49	2467.60	30.	0.55	24.15	16.50
50	2468.20	35.	0.50	24.65	17.50
51	2468.60	48.	0.50	25.15	24.00
52	2469.15	41.	0.50	25.65	20.50
53	2469.65	48.	0.50	26.15	24.00
54	2470.15	49.	0.60	26.75	29.40
55	2470.65	34.	0.50	27.25	17.00
56	2471.22	28.	0.40	27.65	11.20
57	2471.55	32.	0.45	28.10	14.40
58	2472.15	53.	0.55	28.65	29.15
59	2472.63	47.	0.50	29.15	23.50
60	2473.15	59.	0.50	29.65	29.50
61	2473.65	45.	0.50	30.15	22.50
62	2474.15	58.	0.50	30.65	29.00
63	2474.65	86.	0.55	31.20	47.30
64	2475.25	85.	0.45	31.65	38.25
65	2475.60	124.	0.30	31.95	37.80
66	2477.11	51.	0.35	32.30	17.85
67	2477.60	93.	0.50	32.80	46.50
68	2478.10	80.	0.45	33.25	36.00
69	2478.44	101.	0.45	33.70	45.45
70	2479.05	56.	0.50	34.20	28.00
71	2479.55	111.	0.50	34.70	55.50
72	2480.10	93.	0.55	35.25	51.15
73	2480.55	53.	0.60	35.85	31.80
74	2481.20	51.	0.50	36.35	25.50
75	2481.65	50.	0.50	36.85	25.00
77	2482.60	65.	0.65	37.50	42.25
78	2483.15	84.	0.55	38.05	46.20
79	2483.70	75.	0.55	38.60	41.25
80	2484.25	92.	0.45	39.05	41.40

Oil Field Research Laboratories
RESULTS OF PERMEABILITY TESTS
TABLE I

Company **Pranco Central Oil Company** Lease **Hughes** Well No. **W-5**

Sample No.	Depth, Feet	Permeability Millidarcys	Feet of Core		Permeability Capacity Ft. x Md.
			Ft.	Cum. Ft.	
81	2484.60	82.	0.45	39.50	36.90
82	2485.20	90.	0.55	40.05	49.50
83	2485.65	125.	0.50	40.55	62.50
84	2486.20	101.	0.45	41.00	45.45
85	2486.55	140.	0.40	41.40	56.00
86	2487.08	105.	0.50	41.90	52.50
87	2487.55	101.	0.55	42.45	55.55
88	2488.16	61.	0.50	42.95	30.50
89	2488.55	84.	0.50	43.45	42.00
90	2489.10	88.	0.45	43.90	39.60
91	2489.50	111.	0.55	44.45	61.05
92	2490.20	80.	0.55	45.00	44.00
93	2490.57	68.	0.45	45.45	30.60
94	2491.10	70.	0.50	45.95	35.00
95	2491.55	82.	0.50	46.45	41.00
96	2492.11	63.	0.50	46.95	31.50
97	2492.60	82.	0.50	47.45	41.00
98	2493.11	61.	0.50	47.95	30.50
99	2493.60	60.	0.50	48.45	34.50
100	2494.11	54.	0.55	49.00	29.70
101	2494.65	50.	0.50	49.50	25.00
102	2495.10	55.	0.45	49.95	24.75
103	2495.60	53.	0.65	50.60	34.45
104	2500.15	122.	0.45	51.05	54.90
105	2500.75	115.	0.55	51.60	63.25
106	2501.22	136.	0.40	52.00	56.40
107	2501.80	79.	0.42	52.42	33.18
108	2502.16	102.	0.63	53.05	64.26
109	2502.70	91.	0.40	53.45	36.40
110	2503.00	102.	0.30	53.75	30.60
111	2503.30	88.	0.40	54.15	35.20
112	2503.80	39.	0.45	54.60	17.55
113	2504.15	64.	0.50	55.10	32.00
114	2504.85	108.	0.50	55.60	54.00
115	2505.15	80.	0.30	55.90	24.00
116	2505.45	44.	0.35	56.25	15.40
117	2505.85	50.	0.40	56.65	20.00
118	2506.26	11.	0.50	57.15	5.50
119	2506.85	14.	0.50	57.65	7.00
120	2507.25	136.	0.50	58.15	68.00

Oil Field Research Laboratories
RESULTS OF PERMEABILITY TESTS
TABLE I

Company **Franco Central Oil Company** Lease **Hughes** Well No. **W-5**

Sample No.	Depth, Feet	Permeability Millidarcys	Feet of Core		Permeability Capacity Ft. x Md.
			Ft.	Cum. Ft.	
121	2507.85	164.	0.55	58.70	90.20
122	2508.35	84.	0.45	59.15	38.70
123	2508.80	136.	0.40	59.55	54.40
124	2509.12	136.	0.30	59.85	40.80
125	2509.40	139.	0.40	60.25	55.60
126	2509.90	130.	0.50	60.75	65.00
127	2510.40	89.	0.50	61.25	44.50
128	2510.95	96.	0.50	61.75	48.00
129	2511.30	156.	0.45	62.20	70.20
130	2511.90	217.	0.50	62.70	108.50
131	2512.25	212.	0.30	63.00	67.60
132	2512.52	188.	0.35	63.35	65.80
133	2513.00	155.	0.45	63.80	69.75
134	2513.38	173.	0.40	64.20	69.20
135	2513.90	254.	0.55	64.75	139.70
136	2514.35	213.	0.50	65.25	106.50
137	2514.95	165.	0.50	65.75	82.50

Oil Field Research Laboratories

SUMMARY OF PERMEABILITY TESTS

TABLE II

Company France Central Oil Company Lease Hughes Well No. 3-5

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity, Ft. x Md.
2443.40-2455.55	11.80	39.32	465.98
2455.55-2474.45	13.91	41.01	557.88
2474.45-2508.10	28.00	81.84	2,293.29
2508.10-2515.15	7.05	159.26	1,123.73
2443.40-2515.15	60.76	75.02	4,436.90

Oil Field Research Laboratories

RESULTS OF SATURATION TESTS

TABLE III

Company Fransco Central Oil Company Lease Hurthen Well No. W-5

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.	
P-1A	2443.45	18.9	42.0	-	616	0.90	0.90	535
P-1	2444.40	17.3	26.9	-	361	0.15	1.05	54
1	2444.52	18.3	31.4	66.7	446	0.20	1.25	89
2	2445.20	14.3	25.2	74.0	280	0.78	2.03	218
3	2446.25	21.6	30.2	66.0	306	1.32	3.35	668
4	2447.30	21.9	27.7	68.9	471	1.05	4.40	495
5	2448.30	20.6	36.8	52.3	508	0.95	5.35	558
6	2449.25	19.1	34.2	56.7	307	1.05	6.40	573
7	2450.35	19.2	29.1	60.9	474	1.15	7.55	699
8	2451.50	17.4	29.0	61.9	392	1.05	8.60	611
9	2452.45	18.8	30.9	62.7	452	1.00	9.60	652
10	2453.50	20.8	29.7	65.5	479	1.00	10.60	679
11	2454.50	19.9	26.9	64.7	416	0.95	11.55	795
12	2455.60	19.9	29.0	61.3	448	0.60	12.15	269
13	2456.50	5.1	39.7	28.0	156	1.65	13.80	257
15	2458.80	16.7	27.5	60.9	356	1.23	15.03	638
16	2459.90	19.6	26.9	67.0	409	1.05	16.08	429
17	2460.90	15.7	28.6	68.9	348	0.55	16.63	191
20	2463.90	19.3	24.6	61.8	368	1.03	17.66	779

Oil Field Research Laboratories

RESULTS OF SATURATION TESTS

TABLE III

Company Franco Central Oil Company Lease Hughes Well No. W-5

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.	
21	2464.85	18.0	26.5	65.0	370	1.00	18.66	370
22	2465.95	18.6	22.3	71.8	322	1.05	19.71	338
23	2466.90	19.2	25.0	72.4	373	0.90	20.61	336
24	2467.85	18.7	24.1	75.4	350	1.00	21.61	350
25	2468.80	18.8	26.7	71.8	390	1.00	22.61	390
26	2469.90	20.1	24.4	67.3	381	1.15	23.76	438
27	2470.85	19.0	25.0	68.3	368	0.50	24.26	184
28	2471.85	18.8	20.8	68.2	304	1.35	25.61	410
29	2472.85	19.4	23.6	71.2	356	1.05	26.66	374
30	2473.90	19.1	23.4	72.6	347	1.05	27.71	364
31	2475.00	18.7	25.4	68.9	369	1.25	28.96	461
F-32	2475.80	13.1	17.0	-	173	0.15	29.11	26
32	2475.91	18.4	26.6	69.4	380	0.15	29.26	57
33	2477.80	19.5	22.5	61.2	341	1.30	30.56	443
34	2478.80	19.4	23.9	62.5	360	1.05	31.61	378
35	2479.85	19.3	24.2	68.5	362	0.95	32.56	344
36	2480.80	20.1	18.1	77.3	282	1.05	33.61	296
37	2481.85	19.6	20.2	75.8	307	0.90	34.51	276
38	2482.80	19.9	24.6	68.2	380	1.10	35.61	418
39	2483.90	20.3	25.8	70.8	406	1.00	36.61	406

Oil Field Research Laboratories

RESULTS OF SATURATION TESTS

TABLE III

Company Pranco Central Oil Company Lease Hughes Well No. W-3

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.	
40	2484.85	20.7	21.9	68.0	89.9	346	1.00	37.61	346
41	2485.85	20.1	25.2	69.8	95.0	393	1.00	38.61	393
42	2486.80	20.6	22.8	70.2	93.0	364	1.00	39.61	364
43	2487.85	20.0	20.4	71.8	92.2	316	1.00	40.61	316
44	2488.85	20.4	20.1	57.1	87.2	319	0.95	41.56	303
45	2489.80	20.4	23.1	66.7	89.8	367	1.00	42.56	367
46	2490.85	19.7	20.6	70.2	90.8	308	1.00	43.56	308
47	2491.80	18.7	22.2	70.8	93.0	322	1.00	44.56	322
48	2492.85	19.3	23.1	67.2	90.3	346	1.05	45.61	363
49	2493.85	19.4	20.7	68.7	89.0	306	1.00	46.61	306
50	2494.85	19.5	20.8	68.2	89.0	315	1.00	47.61	315
51	2495.85	19.0	19.3	64.4	83.7	284	0.65	48.26	185
52	2500.45	20.0	20.6	54.5	75.1	320	1.40	49.66	448
53	2501.55	15.7	22.5	69.5	92.0	267	0.42	50.08	112
54	2502.45	20.8	23.9	64.3	88.2	386	1.23	51.31	475
55	2503.65	19.6	21.8	68.0	89.8	332	1.10	52.41	365
56	2504.60	19.7	25.9	55.8	81.7	409	0.95	53.36	388
57	2505.65	19.4	18.7	69.3	88.0	282	1.05	54.41	296
58	2506.65	17.2	20.5	75.2	95.7	274	1.00	55.41	274

Oil Field Research Laboratories

RESULTS OF SATURATION TESTS

TABLE III

Company Francis Central Oil Company Lease Hughes Well No. 1-5

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.	
59	2507.65	20.1	21.1	60.0	81.1	329	0.95	56.76	312
60	2508.60	20.5	20.4	60.1	80.5	325	1.00	57.76	325
61	2509.65	21.3	21.0	62.7	83.7	347	1.05	58.81	364
62	2510.65	19.6	22.1	67.2	90.3	352	1.00	59.81	352
63	2511.65	20.3	24.1	59.2	83.3	380	1.05	60.86	399
64	2512.75	20.1	24.6	58.3	82.9	384	1.00	61.86	384
65	2513.65	20.7	21.3	57.2	78.5	342	0.95	62.81	325
66	2514.65	20.2	19.3	56.8	76.1	302	1.00	63.81	302
Total							Total		23,837

Oil Field Research Laboratories

SUMMARY OF SATURATION TESTS

TABLE IV

Company	Franeo Central Oil Company	Lease	Hughes	Well No.	W-5	
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
2443.40-2455.55	12.15	19.46	30.86	63.12	467	5,675
2455.55-2474.45	15.56	17.26	26.29	63.71	337	5,248
2474.45-2508.10	28.65	19.55	22.17	67.35	337	9,663
2508.10-2515.15	7.05	20.40	21.97	60.26	348	2,451
2443.40-2515.15	63.41	19.07	24.83	64.88	363	23,037

Oil Field Research Laboratories

RESULTS OF LABORATORY FLOODING TESTS

TABLE V

Company Franco Central Oil Company Lease Hughes Well No. 2-3

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.			
1A	2443.45	18.9	43.0	616	24.4	358	17.6	77.4	259	166	2.64	15
1	2444.38	17.5	26.9	351	2.4	32	24.5	69.0	329	6	0.113	30
2	2445.20	14.5	26.1	378	0.0	0	26.1	73.4	378	0	Imp.	50+
3	2446.25	21.2	31.3	515	8.8	145	22.5	69.2	370	121	11.40	5
4	2447.30	21.9	27.1	460	9.2	136	17.9	76.4	304	214	4.68	10
5	2448.30	20.5	35.6	566	13.1	208	22.5	71.4	358	112	2.64	10
6	2449.25	19.5	34.2	517	9.8	148	24.4	63.7	369	48	0.775	15
7	2450.35	19.4	29.4	442	4.0	60	25.4	66.3	385	62	1.05	10
8	2451.50	17.8	28.4	392	3.2	44	25.2	72.4	348	18	0.276	15
9	2452.45	18.8	30.2	441	11.4	167	18.6	79.2	274	45	1.62	20
10	2453.50	20.5	29.8	470	10.9	172	18.9	71.1	298	154	6.46	10
11	2454.50	19.4	25.3	381	4.5	69	20.7	71.9	312	161	3.20	10
12	2455.40	19.9	23.3	458	6.7	104	21.6	71.7	334	199	3.01	5
13	2456.50	5.4	40.0	168	0.0	0	40.0	43.3	168	0	Imp.	50+
14	2458.50	17.0	27.6	367	2.2	39	25.6	65.7	338	52	0.479	15
15	2459.90	19.9	26.6	410	5.5	84	21.1	68.3	326	153	12.23	5
17	2460.90	16.1	27.5	343	1.4	17	23.1	64.4	326	18	0.247	15
20	2463.90	19.0	26.1	363	6.7	99	19.4	72.0	266	209	5.22	5
21	2464.85	18.3	25.7	365	2.9	41	22.8	74.7	324	229	3.45	10
22	2465.95	18.7	21.9	318	3.1	45	18.6	76.8	273	174	5.37	5
23	2466.90	19.1	25.2	374	4.6	68	20.6	74.0	306	200	6.55	10
24	2467.85	18.9	24.0	352	3.9	57	20.1	74.5	295	219	5.27	5
25	2468.80	19.0	27.5	405	6.0	74	22.3	74.1	329	198	4.37	10
26	2469.90	20.2	25.0	361	1.9	30	21.1	76.8	351	239	5.68	5
27	2470.85	19.7	26.7	387	3.4	49	23.3	71.6	358	124	2.71	10
28	2471.55	18.6	19.9	291	2.3	34	17.6	62.0	257	265	5.08	5
29	2472.85	19.5	22.2	332	2.4	36	19.8	73.3	296	218	9.72	5
30	2473.90	19.0	22.5	352	3.4	50	19.1	79.0	252	150	6.74	5

Oil Field Research Laboratories

RESULTS OF LABORATORY FLOODING TESTS

TABLE V

Company Franco Central Oil Company

Lease Hughes

Well No. W-5

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.			
31	2475.00	19.1	24.3	360	1.7	25	22.6	70.0	335	169	9.74	5
32	2475.80	13.1	17.0	173	0.0	0	17.0	82.3	173	0	Imp.	50
33	2477.80	19.2	23.2	346	3.6	54	19.6	75.0	292	140	8.04	5
34	2478.80	19.5	23.3	352	2.4	36	20.9	77.8	316	152	7.72	5
35	2479.85	19.4	24.4	366	2.2	33	22.2	72.0	333	214	15.67	5
36	2480.80	19.9	19.0	293	1.7	26	17.3	65.0	267	235	5.85	5
37	2481.85	19.3	21.3	319	0.2	3	21.1	75.8	316	155	9.25	5
38	2482.80	20.0	23.9	370	2.6	40	21.3	69.5	330	220	8.31	5
39	2483.90	20.1	24.9	388	2.3	36	22.6	71.6	352	168	9.30	5
40	2484.85	20.3	22.6	356	2.4	38	20.2	74.5	318	150	8.63	5
41	2485.85	19.7	24.3	372	2.1	32	22.2	71.2	340	194	9.60	5
42	2486.80	20.4	22.4	355	2.1	33	20.3	74.6	322	206	11.95	5
43	2487.85	19.6	21.2	322	2.2	33	19.0	69.3	289	109	1.47	5
44	2488.85	20.1	21.7	339	2.6	41	19.1	77.2	298	169	11.37	5
45	2489.80	20.1	22.4	349	1.5	23	20.9	71.6	326	232	18.84	5
46	2490.85	19.3	19.8	296	4.5	67	15.3	79.6	229	263	7.97	5
47	2491.80	18.6	22.1	319	1.9	27	20.2	72.4	292	172	6.07	5
48	2492.85	18.8	22.7	331	1.6	23	21.1	72.2	308	178	6.77	5
49	2493.85	19.2	21.6	322	1.8	27	19.8	73.7	295	231	8.77	5
50	2494.85	19.5	19.4	294	2.1	32	17.3	75.5	262	167	6.19	5
51	2495.85	19.2	20.0	298	1.3	19	18.7	78.9	279	234	6.15	5
52	2500.45	19.5	22.5	341	2.3	35	20.2	71.8	306	172	7.07	10
53	2501.55	15.5	21.2	255	0.0	0	21.2	69.3	255	5	0.100	25
54	2502.45	20.5	25.0	398	2.3	37	22.7	70.2	361	204	7.14	5
55	2503.65	19.7	22.3	341	1.2	18	21.1	74.6	323	223	5.99	5
56	2504.60	19.4	26.8	404	0.8	12	26.0	69.0	392	217	5.66	5
57	2505.65	19.7	19.7	301	0.8	12	18.9	76.3	289	186	4.86	10
58	2506.65	17.0	19.0	251	0.0	0	19.0	80.0	251	39	0.706	15
59	2507.65	20.3	20.3	320	3.1	49	17.2	70.0	271	184	6.71	5
60	2508.60	20.2	20.2	317	0.2	3	20.0	73.5	314	141	3.53	10

RESULTS OF LABORATORY FLOODING TESTS

Company France Central Oil Company Lease Thru Gas Well No. W-3

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.			
61	2509.65	21.2	22.0	362	1.2	20	20.6	73.8	342	172	6.18	10
62	2510.55	19.6	22.3	343	1.5	23	20.8	72.3	320	93	2.02	10
63	2511.65	20.4	23.2	367	1.9	30	21.3	71.0	337	113	2.39	10
64	2512.75	20.4	23.6	374	1.0	16	22.6	70.3	358	171	6.14	10
65	2513.65	20.6	20.9	354	1.9	30	19.0	74.5	304	136	6.09	5
66	2514.65	20.3	19.4	309	1.5	26	17.9	71.3	285	143	6.03	10
Notes: cc = cubic centimeters * = Volume of water recovered at the time of maximum oil recovery. ** = Determined by passing water through sample which still contains residual oil. "A" = Sample was taken from core after it was received in the laboratory.												

Oil Field Research Laboratories

SUMMARY OF LABORATORY FLOODING TESTS

TABLE VI

Company	Frano Central Oil Company	Lease	Hughes	Well No.
				V-5
Depth Interval, Feet	2443.40 - 2455.55	2450.12 - 2474.45		2474.45 - 2508.10
Feet of Core Analyzed	11.35	13.91		26.93
Average Percent Porosity	19.74	16.79		19.63
Average Percent Original Oil Saturation	30.76	24.67		22.42
Average Percent Oil Recovery	9.36	3.49		2.08
Average Percent Residual Oil Saturation	21.40	20.98		20.34
Average Percent Residual Water Saturation	72.70	73.93		72.90
Average Percent Total Residual Fluid Saturation	94.10	94.91		93.24
Average Original Oil Content, Bbls./A. Ft.	471.	356.		342.
Average Oil Recovery, Bbls./A. Ft.	144.	51.		32.
Average Residual Oil Content, Bbls./A. Ft.	327.	305.		310.
Total Original Oil Content, Bbls./Acre	5,346.	4,954.		9,202.
Total Oil Recovery, Bbls./Acre	1,634.	712.		853.
Total Residual Oil Content, Bbls./Acre	3,712.	4,242.		8,349.
Average Effective Permeability, Millidarcys	3.23	5.42		8.24
Average Initial Fluid Production Pressure, p.s.i.	12.9	7.9		5.4

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

Oil Field Research Laboratories

SUMMARY OF LABORATORY FLOODING TESTS

TABLE VI

Company	Franco Central Oil Company	Lease	Hatchers	Well No.	M-5
Depth Interval, Feet					
Feet of Core Analyzed	2508.10 - 2515.15			2443.40 - 2515.15	
Average Percent Porosity	7.05			59.24	
Average Percent Original Oil Saturation	20.44			19.55	
Average Percent Oil Recovery	21.69			24.63	
Average Percent Residual Oil Saturation	1.32			9.72	
Average Percent Residual Water Saturation	20.37			20.71	
Average Percent Total Residual Fluid Saturation	72.63			73.06	
Average Original Oil Content, Bbls./A. Ft.	92.80			93.75	
Average Oil Recovery, Bbls./A. Ft.	344.			370.	
Average Residual Oil Content, Bbls./A. Ft.	21.			54.	
Total Original Oil Content, Bbls./Acre	323.			314.	
Total Oil Recovery, Bbls./Acre	2,626.			21,928.	
Total Residual Oil Content, Bbls./Acre	147.			3,346.	
Average Effective Permeability, Millidarcys	2,279.			18,582.	
Average Initial Fluid Production Pressure, p.s.i.	5.45			6.29	
	9.3			8.0	

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 France Central Oil Company Lease Hughes Well No. 7-6

Sample No.	Depth, Feet	Chloride Content of Brine in Sand ppm	Connate	Percent Water Saturation Drilling & Foreign	Total
1	2444.52	55,200			
2	2445.20	68,500			
3	2446.25	17,100			
4	2447.30	20,500			
5	2448.30	76,100			
6	2449.25	53,400			
7	2450.35	22,700			
8	2451.50	61,300			
9	2452.45	48,000			
10	2453.50	53,400			
11	2454.50	47,000			
12	2455.40	44,500			
13	2456.50	21,100			
14	2458.50	68,200			
15	2459.90	35,200			
16	2460.90	54,500			
17	2462.90	7,100			
18	2464.85	9,400			
19	2465.95	8,300			
20	2466.90	4,900			
21	2467.85	32,100			
22	2468.80	27,900			
23	2469.90	10,100			
24	2470.85	27,900			
25	2471.85	12,700			
26	2472.85	4,900			
27	2473.90	7,200			
28	2475.00	8,400			
29	2475.91	12,800			
30	2477.80	7,000			
31	2478.80	8,200			
32	2479.85	7,600			
33	2480.80	7,900			
34	2481.85	7,700			
35	2482.80	7,500			
36	2483.90	8,200			
37	2484.85	8,000			
38	2485.85	9,200			
39	2486.80	4,700			
40	2487.85	9,000			
41	2488.85	6,000			
42	2489.80	5,000			

Oil Field Research Laboratories
RESULTS OF WATER DIFFERENTIATION TESTS
TABLE VII

Company Franno Central Oil Company Lease Hughes Well No. W-5

Sample No.	Depth, Feet	Chloride Content of Brine in Sand ppm	Connate	Percent Water Saturation Drilling & Foreign	Total
46	2490.85	6,200			
47	2491.80	5,300			
48	2492.85	8,900			
49	2493.85	6,000			
50	2494.85	5,200			
51	2495.85	8,200			
52	2500.45	4,800			
53	2501.55	7,400			
54	2502.45	6,200			
55	2503.65	9,700			
56	2504.60	22,000			
57	2505.65	30,000			
58	2506.65	42,600			
59	2507.65	6,700			
60	2508.60	5,500			
61	2509.65	6,100			
62	2510.65	47,200			
63	2511.65	5,300			
64	2512.75	6,700			
65	2513.65	7,000			
66	2514.65	9,900			
Note: ppm - parts per million.					

Oil Field Research Laboratories

SUMMARY OF WATER DIFFERENTIATION TESTS

TABLE VIII

Company France Central Oil Company Lease Hughes Well No. 7-5

Depth Interval, Feet	Chloride Content of Brine in Sand, ppm	Average Percent Connate Water	Average Percent Drilling & Foreign Water
2444.45 - 2455.55	51,000		
2455.55 - 2474.45	51,000		
2474.45 - 2508.10	9,400		
2508.10 - 2515.15	11,900		
2444.45 - 2515.15	20,000		

Note: ppm - parts per million.