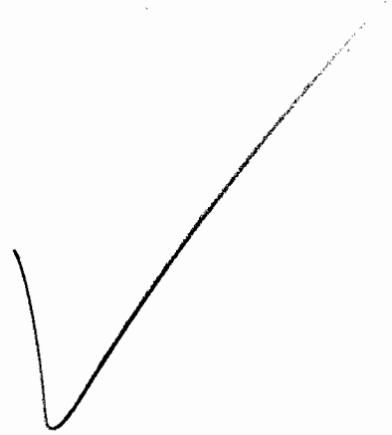


OIL FIELD RESEARCH LABORATORIES
CHANUTE, KANSAS

October 11, 1951



Franco Central Oil Company
512 Fourth National Bank Building
Wichita, Kansas

Gentlemen:

Enclosed herewith is the report of the analysis of the 2 $\frac{1}{2}$ " Rotary core taken from the Hughes Lease, Well No. W-6, Butler County, Kansas, and submitted to our laboratory on September 29, 1951.

Very truly yours,

OIL FIELD RESEARCH LABORATORIES

A handwritten signature in cursive script, reading "Carl L. Pate", is written over the typed name.

Carl L. Pate

CLP:mm
C.C.

FRANCO CENTRAL OIL COMPANY

CORE ANALYSIS REPORT

HUGHES LEASE

WELL NO. W-6

BUTLER COUNTY, KANSAS

OIL FIELD RESEARCH LABORATORIES

CHANUTE, KANSAS

OCTOBER 10, 1951

Oil Field Research Laboratories

GENERAL INFORMATION & SUMMARY

Company Franco Central Oil Company Lease Hughes Well No. W-6

Location On East Line, 928' North of South Line, E $\frac{1}{2}$, SE $\frac{1}{4}$

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

Name of Sand Bartlesville

Top of Core 2420.00

Bottom of Core 2495.00

Pay
Top of Sand 2425.15

Bottom of Sand 2490.90

Total Feet of Permeable Sand (Analyzed) 54.80

Total Feet of Floodable Sand (Analyzed) 50.05

Distribution of Permeable Sand:
Permeability Range
Millidarcys

Feet

Cum. Ft.

0 - 10	2.30	2.30
10 - 30	2.40	4.70
30 - 60	7.90	12.60
60 - 120	22.55	35.15
120 - 180	16.65	51.80
180 - 240	2.05	53.85
240 & above	0.95	54.80
Average Permeability Millidarcys		99.64

Average Percent Porosity 20.09

Average Percent Oil Saturation 21.34

Average Percent Water Saturation 69.37

Average Oil Content, Bbls./A. Ft. 333.

Total Oil Content, Bbls./Acre 17,432.

Average Percent Oil Recovery by Laboratory Flooding Tests 2.41

Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft. 38.

Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre 1,717.

Total Calculated Oil Recovery, Bbls./Acre 11,750.

Casing point

~~Packer-Setting-Feet~~

2430.0

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 - 2423.15	- Gray sandy shale.
2423.15 - 2425.15	- Grayish light brown fine grained micaceous slightly shaley sandstone.
2425.15 - 2425.45	- Grayish light brown fine grained micaceous sandstone.
2425.45 - 2425.60	- Grayish light brown fine grained slightly shaley sandstone.
2425.60 - 2426.55	- Grayish light brown fine grained micaceous sandstone.
2426.55 - 2427.90	- Gray shale.
2427.90 - 2433.65	- Light brown fine grained micaceous sandstone.
2433.65 - 2436.60	- Sandy limestone.
2436.60 - 2436.75	- Brown fine grained micaceous sandstone.
2436.75 - 2436.90	- Sandy limestone.
2436.90 - 2437.50	- Brown fine-grained micaceous sandstone.
2437.50 - 2437.65	- Light brown fine grained micaceous sandstone.
2437.65 - 2437.80	- Brown fine grained micaceous sandstone.
2437.80 - 2439.00	- Loss.
2439.00 - 2442.00	- Brown fine grained micaceous sandstone.
2442.00 - 2443.15	- Brown fine grained micaceous conglomeratic sandstone.
2443.15 - 2443.85	- Gray sandy shale.
2443.85 - 2452.70	- Brown fine grained micaceous sandstone.
2452.70 - 2458.00	- Loss.
2458.00 - 2487.80	- Brown fine grained micaceous sandstone.
2487.80 - 2488.30	- Brown fine grained laminated micaceous carbonaceous sandstone.

-3-

- 2488.30 - 2489.00 - Brown fine grained micaceous sandstone.
2489.00 - 2489.60 - Brown fine grained micaceous slightly carbonaceous sandstone.
2489.60 - 2490.90 - Brown fine grained micaceous sandstone.
2490.90 - 2491.20 - Brown fine grained laminated micaceous carbonaceous sandstone.
2491.20 - 2493.60 - Gray shale.
2493.60 - 2495.00 - Loss.

Coring was started at a depth of 2420.00 feet in gray sandy shale and completed at 2495.00 feet probably in shale. There was a loss extending from 2493.60 to 2495.00 feet. This core shows a total of 56.55 feet of sandstone. There was a loss extending from 2437.80 to 2439.00 feet which was probably sandstone. If so, this would give a total of 57.75 feet of sandstone. For the most part, the pay 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 38.89, 120.38, 74.48 and 131.13 millidarcys respectively; the overall average being 99.64 (See Table II). By observing the data given on the coregraph, it is noticeable that the sand section has a fairly uniform permeability profile.

PERCENT SATURATION & OIL CONTENT

The sand in this core shows a low overall weighted average percent oil saturation, namely, 21.34. The weighted average percent oil saturation of the four sections with respect to increasing depth is 18.56, 21.46, 21.76 and 23.29 respectively. The weighted average percent water saturation of the corresponding sections is 72.77, 71.62, 66.35 and 61.11

respectively; the overall average being 69.37 (See Table IV). This gives an overall weighted average total fluid saturation of 90.71 percent.

In order to determine the degree of flushing of the sand 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 considerable flushing of the sand did occur during coring, as most of the sand has a comparatively low chloride content.

The weighted average oil content of the four sections with respect to increasing depth is 280, 342, 327 and 363 barrels per acre foot respectively; the overall average being 333. The total oil content, as shown by this core, is 17,432 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, naturally, one would expect very little oil to be recovered by laboratory flooding tests. A total recovery of 1,717 barrels of oil per acre was obtained from 45.10 feet of sand. The weighted average percent oil saturation was reduced from 21.00 to 18.59 or represents an average recovery of 2.41 percent. The weighted average effective permeability of the samples is 10.29 millidarcys, while the average initial fluid production pressure is 5.4 pounds per square inch (See Table VI).

By observing the data given in Table V, you will note that of the 56 samples tested, all produced water and 48 oil. This indicates that all 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 11,750 barrels of oil per acre, or an average of 247 barrels per acre foot from the 47.65 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 primary production and the true water saturation of the sand are 20 and 38 percent respectively. This core shows a good clean sand section, having a fairly uniform permeability.

Oil Field Research Laboratories
RESULTS OF PERMEABILITY TESTS
TABLE I

Company Franco Central Oil Company Lease Hughes Well No. W-6

Sample No.	Depth, Feet	Permeability Millidarcys	Feet of Core		Permeability Capacity Ft. x Md.
			Ft.	Cum. Ft.	
1	2424.50	5.2	0.80	0.80	4.16
2	2425.10	7.4	0.35	1.15	2.59
3	2425.57	6.0	0.15	1.30	0.90
4	2426.05	71.	0.65	1.95	46.15
5	2426.45	110.	0.30	2.25	33.00
6	2428.35	59.	0.70	2.95	41.30
7	2428.95	53.	0.60	3.55	31.80
8	2429.35	57.	0.40	3.95	22.80
9	2429.80	57.	0.60	4.55	34.20
10	2430.55	41.	0.50	5.05	20.50
11	2430.85	44.	0.35	5.40	15.40
12	2431.25	45.	0.55	5.95	24.75
13	2431.90	32.	0.55	6.50	17.60
14	2432.35	14.	0.35	6.85	4.90
15	2432.65	7.4	0.30	7.15	2.22
16	2432.95	12.	0.45	7.60	5.40
17	2433.55	8.7	0.40	8.00	3.48
18	2434.45	Imp.	1.00	9.00	0.00
19	2435.45	Imp.	1.00	10.00	0.00
20	2436.50	Imp.	0.60	10.60	0.00
21	2436.95	4.7	0.30	10.90	1.41
22	2437.45	15.	0.30	11.20	4.50
23	2439.10	16.	0.30	11.50	4.80
24	2439.55	46.	0.50	12.00	23.00
25	2440.03	35.	0.50	12.50	17.50
26	2440.56	18.	0.50	13.00	9.00
27	2441.08	68.	0.50	13.50	34.00
28	2441.55	75.	0.70	14.20	52.50
29	2442.12	161.	0.40	14.60	64.40
30	2442.70	174.	0.50	15.10	87.00
31	2443.10	155.	0.25	15.35	38.75
32	2444.20	132.	0.65	16.00	85.80
33	2444.70	75.	0.50	16.50	37.50
34	2445.27	71.	0.50	17.00	35.50
35	2445.70	61.	0.50	17.50	30.50
36	2446.25	51.	0.50	18.00	25.50
37	2446.70	54.	0.50	18.50	27.00
38	2447.25	64.	0.50	19.00	32.00
39	2447.78	65.	0.50	19.50	32.50
40	2448.26	70.	0.55	20.05	38.50

Oil Field Research Laboratories
RESULTS OF PERMEABILITY TESTS
TABLE I

Company Franco Central Oil Company Lease Hughes Well No. W-6

Sample No.	Depth, Feet	Permeability Millidarcys	Feet of Core		Permeability Capacity Ft. x Md.
			Ft.	Cum. Ft.	
41	2448.80	149.	0.45	20.50	67.05
42	2449.25	187.	0.50	21.00	93.50
43	2449.78	76.	0.50	21.50	38.00
44	2450.30	140.	0.45	21.95	63.00
45	2450.60	144.	0.30	22.25	43.20
46	2450.88	134.	0.35	22.60	46.90
47	2451.28	144.	0.35	22.95	50.40
48	2451.65	149.	0.45	23.40	67.05
49	2452.28	165.	0.55	23.95	90.75
50	2452.67	146.	0.25	24.20	36.50
51	2458.05	156.	0.30	24.50	46.80
52	2458.45	131.	0.40	24.90	52.40
53	2458.95	179.	0.50	25.40	89.50
54	2459.45	155.	0.50	25.90	77.50
55	2459.85	168.	0.40	26.30	67.20
56	2460.33	155.	0.50	26.80	77.50
57	2460.95	188.	0.60	27.40	112.80
58	2461.35	174.	0.55	27.95	95.70
59	2462.15	163.	0.50	28.45	81.50
60	2462.37	148.	0.35	28.80	51.80
61	2462.87	174.	0.50	29.30	87.00
62	2463.25	162.	0.45	29.75	72.90
63	2463.82	132.	0.55	30.30	72.60
64	2464.35	164.	0.50	30.80	82.00
65	2464.87	76.	0.55	31.35	41.80
66	2465.33	127.	0.45	31.80	57.15
67	2465.86	142.	0.40	32.20	56.80
68	2466.10	138.	0.25	32.45	34.50
69	2466.35	145.	0.40	32.85	58.00
70	2466.91	145.	0.50	33.35	72.50
71	2467.30	132.	0.45	33.80	59.40
72	2467.85	97.	0.55	34.35	53.35
73	2468.40	101.	0.55	34.90	55.55
74	2468.90	132.	0.45	35.35	59.40
75	2469.30	122.	0.45	35.80	54.90
76	2469.85	159.	0.50	36.30	79.50
77	2470.30	200.	0.50	36.80	100.00
78	2470.82	188.	0.45	37.25	84.60
79	2471.28	93.	0.45	37.70	41.85
80	2471.70	136.	0.50	38.20	68.00

Oil Field Research Laboratories

RESULTS OF PERMEABILITY TESTS

TABLE I

Company Franco Central Oil Company Lease Hughes Well No. W-6

Sample No.	Depth, Feet	Permeability Millidarcys	Feet of Core		Permeability Capacity Ft. x Md.
			Ft.	Cum. Ft.	
81	2472.29	105.	0.50	38.70	52.50
82	2472.80	88.	0.50	39.20	44.00
83	2473.15	91.	0.50	39.70	45.50
84	2473.85	76.	0.50	40.20	38.00
85	2474.20	74.	0.45	40.65	33.30
86	2474.65	55.	0.40	41.05	22.00
87	2475.05	67.	0.55	41.60	36.85
88	2475.65	56.	0.45	42.05	25.20
89	2476.10	75.	0.65	42.70	48.75
90	2476.88	91.	0.60	43.30	54.60
91	2477.30	74.	0.45	43.75	33.30
92	2477.80	70.	0.45	44.20	31.50
93	2478.20	59.	0.50	44.70	29.50
94	2478.75	63.	0.40	45.10	25.20
95	2479.05	57.	0.30	45.40	17.10
96	2479.32	66.	0.40	45.80	26.40
97	2479.80	80.	0.50	46.30	40.00
98	2480.30	76.	0.50	46.80	38.00
99	2480.85	76.	0.50	47.30	38.00
100	2481.38	79.	0.50	47.80	39.50
101	2481.90	87.	0.60	48.40	52.20
102	2482.35	96.	0.50	48.90	48.00
103	2482.90	78.	0.40	49.30	31.20
104	2483.30	69.	0.50	49.80	34.50
105	2483.91	16.	0.50	50.30	8.00
106	2484.38	156.	0.70	51.00	109.20
107	2485.12	110.	0.50	51.50	55.00
108	2485.45	64.	0.45	51.95	28.80
109	2486.00	86.	0.45	52.40	38.70
110	2486.45	69.	0.55	52.95	37.95
111	2487.05	112.	0.50	53.45	56.00
112	2487.45	65.	0.55	54.00	35.75
113	2487.94	65.	0.50	54.50	32.50
114	2488.34	63.	0.30	54.80	18.90
115	2488.85	118.	0.40	55.20	47.20
116	2489.15	112.	0.30	55.50	33.60
117	2489.50	119.	0.30	55.80	35.70
118	2490.00	310.	0.65	56.45	201.50
119	2490.50	178.	0.65	57.10	115.70
120	2491.00	290.	0.30	57.40	87.00

Oil Field Research Laboratories

SUMMARY OF PERMEABILITY TESTS

TABLE II

Company Franco Central Oil Company Lease Hughes Well No. W-6

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity, Ft. x Md.
2424.00 - 2433.65	8.00	38.89	311.15
2434.00 - 2472.00	27.60	120.38	3,322.51
2472.00 - 2484.20	12.20	74.48	908.70
2484.20 - 2491.20	7.00	131.13	917.90
2424.00 - 2491.20	54.80	99.64	5,460.26

Oil Field Research Laboratories
RESULTS OF SATURATION TESTS

TABLE III

Company Franco Central Oil Company Lease Hughes Well No. W-6

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	2425.30	19.5	17.7	70.0	87.7	268	0.30	0.30	80
2	2426.25	21.9	19.4	73.1	92.5	330	0.95	1.25	314
3	2428.05	20.5	17.4	75.0	92.4	277	0.70	1.95	194
4	2429.15	20.3	16.9	76.7	93.6	264	1.05	3.00	277
5	2430.15	19.9	17.7	75.5	93.2	271	0.95	3.95	257
6	2431.05	19.6	17.7	71.8	89.5	269	1.00	4.95	269
7	2432.15	17.1	20.6	68.0	88.6	274	1.10	6.05	301
8	2433.20	18.2	20.1	68.7	88.8	284	0.95	7.00	270
F-9	2436.70	16.8	22.5	-	-	293	0.15	7.15	44
9	2436.82	10.2	12.6	85.7	98.3	100	0.15	7.30	15
F-10	2437.60	17.4	16.8	-	-	227	0.15	7.45	34
10	2437.72	17.3	24.5	69.0	93.5	329	0.15	7.60	49
11	2439.80	18.8	23.2	70.8	94.0	338	1.30	8.90	439
12	2440.85	19.0	23.3	68.9	92.2	344	1.05	9.95	361
13	2441.85	19.7	22.1	70.6	92.7	338	0.65	10.60	220
14	2442.90	19.1	20.3	68.4	88.7	301	1.15	11.75	346
15	2444.00	19.6	25.2	60.9	86.1	384	0.65	12.40	250
16	2445.05	19.5	24.7	67.4	92.1	374	1.05	13.45	393
17	2446.05	20.2	17.4	69.0	86.4	273	1.00	14.45	273

Oil Field Research Laboratories
RESULTS OF SATURATION TESTS

TABLE III

Company Franco Central Oil Company Lease Hughes Well No. W-6

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.	
18	2447.05	19.1	20.2	78.5	300	1.00	15.45	300
19	2448.05	20.4	20.8	72.5	329	1.00	16.45	329
20	2449.05	20.6	19.7	73.0	315	1.05	17.50	331
21	2450.10	20.7	19.2	76.7	308	1.00	18.50	308
22	2451.05	21.6	24.8	73.3	416	0.95	19.45	395
23	2452.05	22.2	20.4	74.4	352	1.15	20.60	405
24	2458.65	22.5	22.0	72.8	384	1.10	21.70	422
25	2459.65	21.5	24.2	71.8	404	1.00	22.70	404
26	2460.60	21.8	21.0	72.4	355	1.00	23.70	355
27	2461.60	22.6	23.7	71.8	415	1.00	24.70	415
28	2462.60	22.0	23.3	70.3	398	1.00	25.70	398
29	2463.60	22.0	22.1	75.0	377	1.00	26.70	377
30	2464.65	20.8	19.8	73.4	320	1.05	27.75	336
31	2465.65	21.4	19.5	71.5	324	1.00	28.75	324
32	2466.65	21.0	20.0	69.0	326	1.00	29.75	326
33	2467.65	20.2	23.2	72.5	364	1.00	30.75	364
34	2468.65	20.2	20.3	74.0	318	1.00	31.75	318
35	2469.60	20.2	21.3	68.0	334	0.95	32.70	316
36	2470.60	20.3	20.1	70.1	317	0.95	33.65	301

Oil Field Research Laboratories
RESULTS OF SATURATION TESTS

TABLE III

Company Franco Central Oil Company Lease Hughes Well No. W-6

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.	
37	2471.50	20.5	20.0	71.6	91.6	318	0.95	34.60	302
38	2472.50	20.1	19.5	70.4	89.9	304	1.00	35.60	304
39	2473.45	19.9	21.9	70.3	92.2	338	0.95	36.55	321
40	2474.45	19.7	21.6	69.2	90.8	330	1.00	37.55	330
41	2475.45	20.0	19.1	75.8	94.9	297	1.00	38.55	297
42	2476.45	20.4	23.4	73.9	97.3	371	1.05	39.60	390
43	2477.56	20.1	20.9	53.5	74.4	336	1.00	40.60	336
44	2478.50	18.9	20.6	61.2	81.8	302	1.00	41.60	302
45	2479.55	18.5	19.2	65.4	84.6	276	1.10	42.70	304
46	2480.65	19.6	21.9	69.3	91.2	333	1.10	43.80	366
47	2481.70	18.8	23.4	61.4	84.8	342	1.00	44.80	342
48	2482.70	19.1	21.7	61.2	82.9	322	1.00	45.80	322
49	2483.70	17.0	28.1	69.5	97.6	371	1.00	46.80	371
50	2484.75	19.9	24.7	55.7	80.4	382	1.05	47.85	401
51	2485.75	19.9	26.8	59.7	86.5	414	1.05	48.90	435
52	2486.80	19.9	24.0	62.7	86.7	371	0.90	49.80	334
53	2487.65	19.8	25.5	60.9	86.4	392	0.60	50.40	235
54	2488.65	20.5	19.8	63.3	83.1	315	0.70	51.10	221
55	2489.75	20.6	21.4	60.0	81.4	342	0.65	51.75	222
56	2490.75	20.8	17.8	68.7	86.5	288	0.65	52.40	187
							Total	- - -	17,432

Oil Field Research Laboratories

SUMMARY OF SATURATION TESTS

TABLE IV

Company	Franco Central Oil Company			Lease	Hughes	Well No.	W-6
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	
2425.15 - 2433.65	7.00	19.57	18.56	72.37	280	1,962	
2436.60 - 2472.00	27.60	20.54	21.46	71.62	342	9,450	
2472.00 - 2484.20	12.20	19.34	21.76	66.35	327	3,985	
2484.20 - 2490.90	5.60	20.14	23.29	61.11	363	2,035	
2425.15 - 2490.90	52.40	20.09	21.34	69.37	333	17,432	

Oil Field Research Laboratories

RESULTS OF LABORATORY FLOODING TESTS

TABLE V

Company Franco Central Oil Company

Lease Hughes

Well No. W-6

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.			
1	2425.30	19.5	18.2	276	1.3	20	16.9	76.1	256	291	5.96	5
2	2426.25	21.9	18.6	316	0.7	12	17.9	74.0	304	188	16.84	5
3	2428.05	20.3	18.0	384	1.4	22	16.6	74.7	262	197	22.55	5
4	2429.15	20.1	16.5	258	0.0	0	16.5	77.2	258	148	14.20	5
5	2430.15	19.7	17.1	261	0.6	9	16.5	76.0	252	213	6.02	5
6	2431.05	19.8	17.2	264	0.0	0	17.2	77.2	264	165	12.95	5
7	2432.15	17.1	19.6	261	1.4	19	18.2	74.3	242	95	2.23	5
8	2433.20	18.4	19.6	280	2.6	37	17.0	77.5	243	159	3.12	5
9	2436.70	16.8	22.5	293	2.3	30	20.2	73.0	263	18	0.54	25
10	2437.60	17.4	16.8	227	0.0	0	16.8	81.4	227	54	1.26	10
11	2439.80	18.8	22.1	323	2.6	38	19.5	75.8	285	253	4.96	5
12	2440.85	19.1	22.4	332	4.9	73	17.5	76.3	259	199	4.50	5
13	2441.85	19.4	21.9	330	4.1	62	17.8	73.9	268	216	10.32	5
14	2442.90	19.4	18.6	280	0.0	0	18.6	72.9	280	122	13.53	5
15	2444.00	20.0	24.3	377	6.0	93	18.3	71.6	284	154	12.50	5
16	2445.05	19.9	22.6	349	3.0	46	19.6	73.0	303	132	13.50	5
17	2446.05	19.9	18.1	278	0.6	8	17.5	76.4	270	149	9.62	5
18	2447.05	18.6	20.7	298	2.6	37	18.1	81.6	261	221	8.19	5
19	2448.05	20.2	21.4	335	2.5	39	18.9	76.0	296	152	9.13	5
20	2449.05	20.2	19.5	306	1.5	24	18.0	76.2	282	112	11.48	5
21	2450.10	21.1	20.4	334	2.8	46	17.6	78.6	288	159	19.83	5
22	2451.05	21.8	22.4	379	3.2	54	19.2	76.1	325	202	23.50	5
23	2452.05	22.2	21.7	373	3.8	65	17.9	75.5	308	132	23.80	5
24	2458.65	22.4	20.7	360	3.1	54	17.6	76.1	306	118	19.42	5
25	2459.65	21.8	23.0	389	4.1	69	18.9	75.5	320	116	14.91	5
26	2460.60	21.9	20.3	345	2.3	39	18.0	77.2	306	96	15.90	5
27	2461.60	22.5	22.5	393	5.0	87	17.5	74.8	306	210	16.80	5
28	2462.60	22.0	22.9	391	4.3	73	18.6	73.9	318	198	18.20	5
29	2463.60	21.8	23.2	392	6.4	108	16.8	79.3	284	580	5.75	5
30	2464.65	20.4	18.6	295	2.2	35	16.4	78.0	260	148	6.86	5
31	2465.65	21.2	20.3	334	2.7	44	17.6	76.8	290	140	8.20	5
32	2466.65	20.7	19.7	317	1.9	31	17.8	77.2	286	179	11.58	5

Oil Field Research Laboratories

RESULTS OF LABORATORY FLOODING TESTS

TABLE V

Company Franco Central Oil Company Lease Hughes Well No. W-6

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.			
33	2467.65	19.8	22.5	346	1.2	18	21.3	75.0	328	207	8.57	5
34	2468.65	20.1	19.3	301	2.3	36	17.0	75.2	265	242	9.38	5
35	2469.60	20.2	20.2	317	1.7	27	18.5	75.5	290	151	8.74	5
36	2470.60	20.5	20.9	332	2.1	33	18.8	72.8	299	96	1.89	5
37	2471.50	20.4	20.3	338	2.0	32	19.3	71.7	306	173	11.55	5
38	2472.50	20.2	18.7	294	0.8	13	17.9	78.0	281	171	11.02	5
39	2473.45	19.8	20.3	312	0.4	6	19.9	78.2	306	179	7.62	5
40	2474.45	19.4	19.8	298	0.4	6	19.4	76.0	292	197	9.30	5
41	2475.20	19.9	20.3	314	0.0	0	20.3	73.7	314	115	7.11	10
42	2476.45	20.2	22.8	357	1.2	19	21.6	74.8	338	227	8.54	5
43	2477.58	20.0	21.6	335	1.1	17	20.5	72.3	318	203	8.07	5
44	2478.50	18.8	19.6	286	0.0	0	19.6	74.5	286	175	7.16	5
45	2479.55	18.3	19.2	273	1.6	23	17.6	75.5	250	226	6.97	5
46	2480.65	19.9	20.0	310	0.9	15	19.1	75.6	295	178	6.46	5
47	2481.70	18.4	21.9	313	1.3	19	20.6	72.5	294	173	6.99	5
48	2482.70	19.2	20.7	309	1.8	27	18.9	71.3	282	205	6.14	5
49	2483.70	16.8	27.3	356	0.0	0	27.3	74.2	356	14	0.173	20
50	2484.75	20.1	23.7	370	4.5	70	19.2	75.1	300	177	6.46	5
51	2485.75	17.9	25.6	356	2.8	39	22.8	75.0	317	195	5.69	5
52	2486.80	19.9	22.2	344	2.3	36	19.9	72.7	308	205	9.16	5
53	2487.65	19.5	25.6	387	2.4	36	23.2	73.4	351	208	3.69	5
54	2488.65	20.7	19.0	305	2.0	32	17.0	76.3	273	113	12.60	5
55	2489.75	20.4	20.6	325	3.0	47	17.6	74.2	278	197	10.74	5
56	2490.75	20.8	16.6	268	0.0	0	16.6	78.2	268	184	9.58	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	Franco Central Oil Company	Lease	Hughes	Well No.
				W-6
Depth Interval, Feet	2425.15 - 2433.65	2436.60 - 2472.00		
Feet of Core Analyzed	4.95	26.00		
Average Percent Porosity	19.37	20.64		
Average Percent Original Oil Saturation	18.62	21.23		
Average Percent Oil Recovery	1.35	2.98		
Average Percent Residual Oil Saturation	17.27	18.25		
Average Percent Residual Water Saturation	75.29	78.83		
Average Percent Total Residual Fluid Saturation	92.56	94.08		
Average Original Oil Content, Bbls./A. Ft.	279.	340.		
Average Oil Recovery, Bbls./A. Ft.	20.	48.		
Average Residual Oil Content, Bbls./A. Ft.	259.	292.		
Total Original Oil Content, Bbls./Acre	1,377.	8,842.		
Total Oil Recovery, Bbls./Acre	97.	1,248.		
Total Residual Oil Content, Bbls./Acre	1,280.	7,594.		
Average Effective Permeability, Millidarcys	9.03	11.84		
Average Initial Fluid Production Pressure, p.s.i.	5.0	5.7		

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	Hughes	Well No.
					W-6
Depth Interval, Feet	2472.00 - 2483.20	2484.20 - 2490.25	2425.15-2490.25		
Feet of Core Analyzed	9.20	4.95	45.10		
Average Percent Porosity	19.48	19.66	20.15		
Average Percent Original Oil Saturation	20.56	22.97	21.00		
Average Percent Oil Recovery	1.08	2.93	2.41		
Average Percent Residual Oil Saturation	19.48	20.04	18.59		
Average Percent Residual Water Saturation	74.89	74.47	75.43		
Average Percent Total Residual Fluid Saturation	94.37	94.51	94.02		
Average Original Oil Content, Bbls./A. Ft.	311.	349.	328.		
Average Oil Recovery, Bbls./A. Ft.	16.	45.	38.		
Average Residual Oil Content, Bbls./A. Ft.	295.	304.	290.		
Total Original Oil Content, Bbls./Acre	2,860.	1,729.	14,808.		
Total Oil Recovery, Bbls./Acre	150.	222.	1,717.		
Total Residual Oil Content, Bbls./Acre	2,710.	1,507.	13,091.		
Average Effective Permeability, Millidarcys	7.88	7.89	10.29		
Average Initial Fluid Production Pressure, p.s.i.	5.0	5.0	5.4		

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 Franco Central Oil Company Lease Hughes Well No. W-6

Sample No.	Depth, Feet	Chloride Content of Brine in Sand ppm	Connate	Percent Water Saturation Drilling & Foreign	Total
1	2425.30	11,300			
2	2426.25	6,900			
3	2428.05	5,000			
4	2429.15	8,800			
5	2430.15	8,100			
6	2431.05	8,100			
7	2432.15	14,300			
8	2433.20	24,200			
9	2436.82	64,500			
10	2437.72	46,900			
11	2439.80	16,800			
12	2440.85	30,100			
13	2441.85	12,700			
14	2442.90	23,000			
15	2444.00	15,700			
16	2445.05	6,400			
17	2446.05	5,900			
18	2447.05	8,700			
19	2448.05	5,900			
20	2449.05	4,500			
21	2450.10	6,200			
22	2451.05	7,000			
23	2452.05	4,900			
24	2458.65	5,000			
25	2459.65	7,300			
26	2460.60	5,200			
27	2461.60	5,900			
28	2462.60	5,300			
29	2463.60	4,900			
30	2464.65	5,400			
31	2465.65	5,400			
32	2466.65	6,800			
33	2467.65	6,800			
34	2468.65	4,600			
35	2469.60	8,200			
36	2470.60	6,500			
37	2471.50	4,600			
38	2472.50	7,000			
39	2473.45	4,900			
40	2474.45	7,300			
41	2475.45	5,500			
42	2476.45	5,600			

Oil Field Research Laboratories
RESULTS OF WATER DIFFERENTIATION TESTS
TABLE VII

Company Franco Central Oil Company Lease Hughes Well No. W-6

Sample No.	Depth, Feet	Chloride Content of Brine in Sand ppm	Connate	Percent Water Saturation Drilling & Foreign	Total
43	2477.56	7,800			
44	2478.50	7,800			
45	2479.55	5,800			
46	2480.65	6,100			
47	2481.70	11,400			
48	2482.70	8,600			
49	2483.70	25,600			
50	2484.75	4,800			
51	2485.75	10,900			
52	2486.80	7,800			
53	2487.65	16,700			
54	2488.65	8,700			
55	2489.75	11,100			
56	2490.75	8,900			
Note: ppm - parts per million.					

Oil Field Research Laboratories
SUMMARY OF WATER DIFFERENTIATION TESTS
TABLE VIII

Company Franco Central Oil Company Lease Hughes Well No. W-6

Depth Interval, Feet	Chloride Content of Brine in Sand, ppm	Average Percent Connate Water	Average Percent Drilling & Foreign Water
2425.15 - 2433.65	11,029		
2436.75 - 2472.00	9,051		
2472.00 - 2484.20	8,575		
2484.20 - 2490.90	9,384		
2425.15 - 2490.90	9,241		

Note: ppm - parts per million.