This well was drilled in virgin territory. Fresh water mud was used as the circulating fluid during the coring of the sand.

This core was sampled and the samples were sealed in cans by a representative of Oilfield Research Laboratories.

Datum for depth given in this report was 5.0 feet above ground level.

FORMATION CORED

The detailed log of the formation cored is as follows:

Depth Interval, Feet	Description
2500.0 - 2502.8	Shale.
2502.8 - 2505.0	Brownish gray shaley sandstone.
2505.0 - 2521.0	Light brown slightly shaley sandstone.
2521.0 - 2525.0	Shale.

Coring was started at a depth of 2500.0 feet in shale and completed at 2525.0 feet in like formation. This core shows a total of 18.2 feet of sandstone. For the most part, the pay is made up of light brown slightly shaley sandstone.

PERMEABILITY

For the sake of distribution, the core was divided into three sections. The weighted average permeability of the upper, middle, and lower sections is 3.7, 38.4 and 21.0 millidarcys respectively; the overall average being 28.1 (See Table III). By observing the data given on the coregraph, it is noticeable that the sand has a rather irregular permeability profile. The permeability of the sand varies from 0.30 to a maximum of 103 millidarcys.

PERCENT SATURATION & OIL CONTENT

The sand in this core shows a low weighted average percent oil saturation, namely, 18.1. The weighted average percent oil saturation of the upper, middle and lower sections is 15.2, 20.1 and 15.9 respectively. The weighted average percent water saturation of the upper, middle and lower sections is 76.2, 62.2 and 61.3 respectively; the overall average being 63.2 (See Table III). This gives an overall weighted average total fluid saturation of 81.3 percent. This total fluid saturation indicates some fluid was lost during coring which probably was oil.

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 VI and VII. From the data given in these tables and on the coregraph, it is evident that considerable flushing did occur as the chloride content of the water in the sand was lower in the sections of the core having the higher permeability.

The weighted average oil content of the upper, middle and lower sections is 214, 332 and 251 barrels per acre foot respectively; the overall average being 289. The total oil content, as shown by this core, is 5,256 barrels per acre (See Table III).

LABORATORY FLOODING TESTS

Part of the sand in this core responded fairly well to laboratory flooding tests, as a total recovery of 1,334 barrels of oil per acre was obtained from 11.6 feet of sand. The weighted average percent oil saturation was reduced from 19.6 to 12.6, or represents an average recovery of 7.0 percent. The weighted average effective permeability of the samples is 4.86 millidarcys, while the average initial fluid

production pressure is 22.1 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 18 samples tested, 17 produced water and 12 oil. This indicates that approximately 67 percent of the sand represented by these samples is floodable pay sand. The tests also show that the sand has a wide variation in effective permeability.

CONCLUSION

From a study of the enclosed data, we believe that efficient primary production methods will recover approximately 2,600 barrels of oil per acre from the area of which this core is representative. An efficient water-flood should recover an additional 2,175 barrels of oil per acre, or an average recovery of 167 barrels of oil per acre foot from the 13.0 feet of floodable pay sand analyzed. The total oil recovery by both primary and secondary methods should be approximately 4,775 barrels of oil per acre. The following factors and assumptions were used in calculating this recovery:

Formation volume factor	1.19
True water saturation, percent	42.0
Primary oil recovery	None
Calculated present oil saturation, percent	48.7
Porosity, percent	21.0
Oil saturation at abandonment, percent	20.0
Performance factor, percent	55.0

The analysis results show 13.0 feet of floodable pay sand in the interval extending from the depth of 2505.0 to 2521.0 feet. The floodable sand has low oil and high water saturations. This is probably due to flushing of the sand with circulating fluid, and to expansion of solution gas forcing oil from the core. For the most part the floodable pay has good permeability for the depth.

Oilfield Research Laboratories

RESULTS OF PERMEABILITY TESTS

TABLE I

Company Jackson Brothers Lease Barrier Well No. 22

Sample No.	Depth Feet	Permeability Millidarcys	Feet of Core		Permeability Capacity Ft. x Md.
			Ft.	Cum. Ft.	
1	2502.9	0.30	0.3	0.3	0.09
2	2503.4	11.	0.6	0.9	6.60
3	2503.9	1.2	0.5	1.4	0.60
4	2504.4	1.6	0.5	1.9	0.80
5	2504.9	0.35	0.3	2.2	0.10
6	2505.4	7.5	0.7	2.9	5.25
7	2505.9	4.9	0.5	3.4	2.45
8	2506.4	4.6	0.5	3.9	2.30
9	2506.9	34.	0.5	4.4	17.00
10	2507.4	39.	0.5	4.9	19.50
11	2507.9	29.	0.5	5.4	14.50
12	2508.4	72.	0.5	5.9	36.00
13	2508.9	32.	0.5	6.4	16.00
14	2509.4	11.	0.5	6.9	5.50
15	2509.9	43.	0.5	7.4	21.50
16	2510.4	12.	0.5	7.9	6.00
17	2510.9	15.	0.5	8.4	7.50
18	2511.4	70.	0.5	8.9	35.00
19	2511.9	46.	0.5	9.4	23.00
20	2512.4	103.	0.5	9.9	51.50
21	2512.9	69.	0.5	10.4	34.50
22	2513.4	97.	0.5	10.9	48.50
23	2513.9	0.38	0.5	11.4	0.19
24	2514.4	56.	0.5	11.9	28.00
25	2514.9	18.	0.5	12.4	9.00
26	2515.4	8.7	0.5	12.9	4.35
27	2515.9	34.	0.5	13.4	17.00
28	2516.4	30.	0.5	13.9	15.00
29	2516.9	18.	0.5	14.4	9.00
30	2517.4	4.7	0.5	14.9	2.35
31	2517.9	24.	0.5	15.4	12.00
32	2518.4	13.	0.5	15.9	6.50
33	2518.9	19.	0.5	16.4	9.50
34	2519.4	6.9	0.5	16.9	3.45
35	2519.9	20.	0.5	17.4	10.00
36	2520.4	38.	0.8	18.2	30.40

Oilfield Research Laboratories

RESULTS OF SATURATION TESTS

TABLE II

Company Jackson Brothers Lease Barrier Well No. 22

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	2503.0	16.7	17	72	89	220	0.3	0.3	66
F-1	2503.2	22.4	12	-	-	209	0.5	0.8	104
2	2504.1	17.2	16	77	93	214	1.4	2.2	300
3	2505.1	22.1	20	62	82	343	0.6	2.8	206
4	2506.1	21.1	25	57	82	409	1.0	3.8	409
5	2507.1	21.0	19	60	79	310	1.0	4.8	310
6	2508.1	20.9	22	60	82	357	1.0	5.8	357
7	2509.1	22.0	20	64	84	341	1.0	6.8	341
8	2510.1	21.2	19	65	84	313	1.0	7.8	313
9	2511.1	22.3	18	71	89	318	1.0	8.8	318
10	2512.1	22.0	18	64	82	307	1.0	9.8	307
11	2513.1	20.2	20	64	84	314	1.0	10.8	314
12	2514.1	19.8	20	55	75	308	1.0	11.8	308
13	2515.1	21.2	15	63	78	235	1.0	12.8	235
14	2516.1	20.1	17	56	73	265	1.0	13.8	265
15	2517.1	20.0	19	60	79	295	1.0	14.8	295
16	2518.1	19.5	18	64	82	272	1.0	15.8	272
17	2519.1	21.1	16	60	76	262	1.0	16.8	262
18	2520.1	21.0	12	64	76	196	1.4	18.2	274
							Total- - - - - - -		5,256

Oilfield Research Laboratories

SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III.

Company Jackson Brothers Lease Barrier Well No. 22

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
2502.8 - 2505.0	2.2	3.7	8.19
2505.0 - 2514.6	9.6	38.4	368.59
2514.6 - 2521.0	6.4	21.0	134.15
2502.8 - 2521.0	18.2	28.1	510.93

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
2502.8 - 2505.0	2.2	18.3	15.2	76.2	214	470
2505.0 - 2514.6	9.6	21.2	20.1	62.2	332	3,183
2514.6 - 2521.0	6.4	20.5	15.9	61.3	251	1,603
2502.8 - 2521.0	18.2	20.6	18.1	63.2	289	5,256

Oilfield Research Laboratories

RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Jackson Brothers Lease Barrier Well No. 22

Sample No.	Depth, Feet	Effective Porosity Percent	Original Oil Saturation		Oil Recovery		Residual Saturation			Volume of Water Recovered cc*	Effective Permeability Millidarcys**	Initial Fluid Profuction Pressure Lbs./Sq./In.
			%	Bbls./A. Ft.	%	Bbls./A. Ft.	% Oil	% Water	Bbls./A. Ft.			
1	2503.2	22.4	12	209	0	0	12	80	209	4	0.200	50
2	2504.1	17.0	13	172	0	0	13	81	172	0	Imp.	50+
3	2505.1	21.9	20	340	10	170	10	82	170	14	0.400	40
4	2506.1	20.6	25	400	17	272	8	87	128	15	0.500	40
5	2507.1	21.4	19	315	7	116	12	83	199	119	3.34	20
6	2508.1	21.6	22	369	10	168	12	80	201	172	6.88	15
7	2509.1	21.6	20	336	5	84	15	79	252	175	5.70	15
8	2510.1	21.2	19	313	6	99	13	86	214	195	7.87	15
9	2511.1	22.8	18	318	6	106	12	79	212	205	9.50	15
10	2512.1	21.4	18	299	8	133	10	80	166	145	6.44	15
11	2513.1	20.6	20	320	4	64	16	81	256	117	2.60	15
12	2514.1	20.3	20	315	9	142	11	85	173	152	11.30	45
13	2515.1	21.0	13	212	0	0	13	77	212	5	0.198	50
14	2516.1	19.7	14	214	0	0	14	79	214	4	0.197	40
15	2517.1	19.4	16	241	0	0	16	77	241	10	0.327	30
16	2518.1	20.2	18	282	2	31	16	81	251	35	0.882	30
17	2519.1	21.4	16	266	1	17	15	83	249	43	1.18	20
18	2520.1	21.6	12	201	0	0	12	83	201	106	2.95	

Oilfield Research Laboratories

SUMMARY OF LABORATORY FLOODING TESTS

TABLE V

Company Jackson Brothers Lease Barrier Well No. 22

Depth Interval, Feet	2505.0 - 2514.6	2517.6 - 2519.6	2505.0 - 2519.6
Feet of Core Analyzed	9.6	2.0	11.6
Average Percent Porosity	21.3	20.8	21.2
Average Percent Original Oil Saturation	20.1	17.0	19.6
Average Percent Oil Recovery	8.1	1.5	7.0
Average Percent Residual Oil Saturation	12.0	15.5	12.6
Average Percent Residual Water Saturation	82.1	82.0	82.1
Average Percent Total Residual Fluid Saturation	94.1	97.5	94.7
Average Original Oil Content, Bbls./A. Ft.	332.	274.	322.
Average Oil Recovery, Bbls./A. Ft.	134.	24.	115.
Average Residual Oil Content, Bbls./A. Ft.	198.	250.	207.
Total Original Oil Content, Bbls./Acre	3,189.	548.	3,737.
Total Oil Recovery, Bbls./Acre	1,286.	48.	1,334.
Total Residual Oil Content, Bbls./Acre	1,903.	500.	2,403.
Average Effective Permeability, Millidarcys	5.65	1.03	4.86
Average Initial Fluid Production Pressure, p.s.i.	20.5	30.0	22.1

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

Oilfield Research Laboratories

RESULTS OF WATER DIFFERENTIATION TESTS

TABLE VI

Company Jackson Brothers Lease Barrier Well No. 22

Sample No.	Depth, Feet	Chloride Content of Brine in Sand ppm	Percent Water Saturation Connate	Drilling & Foreign	Total
1	2503.0	79,300			
2	2504.1	77,000			
3	2505.1	72,100			
4	2506.1	76,600			
5	2507.1	63,500			
6	2508.1	64,600			
7	2509.1	23,700			
8	2510.1	73,400			
9	2511.1	65,400			
10	2512.1	32,900			
11	2513.1	11,040			
12	2514.1	81,500			
13	2515.1	38,800			
14	2516.1	66,300			
15	2517.1	76,700			
16	2518.1	93,500			
17	2519.1	90,500			
18	2520.1	62,200			

Note: ppm — parts per million

Oilfield Research Laboratories

SUMMARY OF WATER DIFFERENTIATION TESTS

TABLE VII

Company Jackson Brothers Lease Barrier Well No. 22

Depth Interval, Feet	Chloride Content of Brine in Sand, ppm	Average Percent Connate Water	Average Percent Drilling & Foreign Water
2502.8 - 2505.0	77,990		
2505.0 - 2514.6	55,820		
2514.6 - 2521.0	70,760		
2502.8 - 2521.0	63,350		

Note: ppm — parts per million.

Oilfield Research Laboratories

GENERAL INFORMATION & SUMMARY

elevation

Company Jackson Brothers Lease Barrier Well No. 22

Location NW Corner, SE¼, NW¼

Sec. 3 Twp. 26S Rge. 8E County Greenwood State Kansas

Name of Sand	Bartlesville
Top of Core	2500.0
Bottom of Core	2525.0
Top of Pay Sand	2505.0
Bottom of Sand	2521.0
Total Feet of Permeable Sand	18.2
Total Feet of Floodable Sand	13.0

Distribution of Permeable Sand:

Permeability Range Millidarcys	Feet	Cum. Ft.
0 - 5	3.6	3.6
5 - 15	3.8	7.4
15 - 30	3.5	10.9
30 - 40	3.3	14.2
40 & above	4.0	18.2

Average Permeability Millidarcys	28.1
Average Percent Porosity	20.6
Average Percent Oil Saturation	18.1
Average Percent Water Saturation	63.2
Average Oil Content, Bbls./A. Ft.	289.
Total Oil Content, Bbls./Acre	5,256.
Average Percent Oil Recovery by Laboratory Flooding Tests	7.0
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	115.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	1,334.
Total Calculated Oil Recovery, Bbls./Acre	4,775.
Packer Setting, Feet	
Viscosity, Centipoises @	
A. P. I. Gravity, degrees @ 60 °F	
Elevation, Feet	