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GENERAL INFORMATION & SUMMARY

Company Jackson Brothers Lease Jackson Heirs "C" Well No. 1

Location NE NW NE

Section 25 Twp. 25S Rge. 8E County Greenwood State Kansas

Name of Sand	Bartlesville
Top of Core	2450.0
Bottom of Core	2467.0
Top of Sand (According to client)	2447.0
Bottom of Sand	2461.0
Total Feet of Permeable Sand (Analyzed)	10.5
Total Feet of Floodable Sand	7.0

Distribution of Permeable Sand:

Permeability Range Millidarcys	Feet	Cum. Ft.
0 - 10	4.0	4.0
10 - 20	3.0	7.0
20 & above	3.5	10.5

Average Permeability Millidarcys	14.2
Average Percent Porosity	17.4
Average Percent Oil Saturation	18.4
Average Percent Water Saturation	60.3
Average Oil Content, Bbls./A. Ft.	254.
Total Oil Content, Bbls./Acre	2,672.
Average Percent Oil Recovery by Laboratory Flooding Tests	4.6
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	68.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	545.
Total Calculated Oil Recovery, Bbls./Acre (Primary & Secondary)	1,588.
Packer Setting, Feet	
Viscosity, Centipoises @	
A. P. I. Gravity, degrees @ 60 °F (Reported)	44.0
Elevation, Feet	

A fresh water mud was used as a circulating fluid in the coring of the sand in this well. This well was drilled in a virgin area. The core was sampled by a representative of Oilfield Research Laboratories.

FORMATION CORED

The detailed log of the formation cored is as follows:

Depth Interval, Feet	Description
2450.0 - 2460.0	Grayish light brown shaly sandstone.
2460.0 - 2461.0	Light brown slightly shaly sandstone.
2461.0 - 2467.0	Gray shale.

Coring was started at a depth of 2450.0 feet in grayish light brown shaly sandstone and completed at 2467.0 feet in gray shale. This core shows a total of 11.0 feet of sandstone. For the most part, the pay is made up of grayish light brown shaly sandstone.

PERMEABILITY

For the sake of distribution, the core was divided into two sections. The weighted average permeability of the upper and lower sections is 8.3 and 19.6 millidarcys respectively; the overall average being 14.2 (See Table III). By observing the data given on the coregraph, it is noticeable that the sand has a very irregular permeability profile. The permeability of the sand varies from 2.6 to a maximum of 39 millidarcys.

PERCENT SATURATION & OIL CONTENT

The sand in this core shows a low weighted average percent oil saturation, namely, 18.4. The weighted average percent oil satura-

tion of the upper and lower sections is 15.6 and 21.0 respectively. The weighted average percent water saturation of the upper and lower sections is 65.4 and 55.5 respectively; the overall average being 60.3 (See Table III). This gives an overall weighted average total fluid saturation of 78.7 percent. This fairly low total fluid saturation indicates some fluid was lost during coring which was probably 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 of the sand, in the core, did occur during coring as the zone (lower section) of higher permeability had the lower chloride content.

The weighted average oil content of the upper and lower sections is 201 and 303 barrels per acre foot respectively; the overall average being 254. The total oil content, as shown by this core, is 2,672 barrels per acre (See Table III).

LABORATORY FLOODING TESTS

Inasmuch as the sand in the core had a low oil saturation, one would expect very little, if any, oil to be recovered from laboratory flooding tests.

A total recovery of 545 barrels of oil per acre was obtained from 8.0 feet of sand. The weighted average percent oil saturation was reduced from 20.3 to 15.7, or represents an average recovery of

4.6 percent. The weighted average effective permeability of the samples is 0.79 millidarcys, while the average initial fluid production pressure is 25.0 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 11 samples tested, all produced water and 8 oil. This indicates that approximately 73 percent of the sand represented by these samples is floodable pay sand.

CONCLUSION

On the basis of the above data, we estimate that approximately 1,588 barrels of oil per acre can be recovered from the sand reservoir, represented by this core, by efficient primary and waterflood operations. The following data and assumptions were used in calculating the above oil recovery value:

Present formation volume factor	1.36
Irreducible water saturation, percent	39.0
Primary recovery, estimated, percent	None
Present oil saturation, percent	44.8
Average porosity, percent	18.3
Oil saturation after flooding, percent	15.7
Performance factor	0.55
Net floodable pay sand, feet	7.0

This core shows a rather shaly sand section having a low oil saturation, a high water saturation, and a fairly low permeability

and porosity. Chances are, the low oil and high water saturation are partly due to flushing of the sand in the core during the cutting of same.

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Jackson Brothers Lease Jackson Heirs "C" Well No. 1

Sample No.	Depth, Feet	Effective Porosity Percent	Percent Saturation			Oil Content Bbls. / A Ft.	Perm., Mil.	Feet of Sand		Total Oil Content	Perm. Capacity Ft. X md.
			Oil	Water	Total			Ft.	Cum. Ft.		
1	2450.5	16.0	17	58	75	211	6.5	1.0	1.0	211	6.50
2	2451.5	16.3	14	66	80	177	20.	1.0	2.0	177	20.00
3	2452.5	18.9	22	50	72	323	7.5	1.0	3.0	323	7.50
4	2453.5	14.4	9	74	83	101	4.7	1.0	4.0	101	4.70
5	2454.5	15.7	16	79	95	195	2.6	1.0	5.0	195	2.60
6	2455.5	18.2	26	55	81	367	11.	1.0	6.0	367	11.00
7	2456.4	16.1	15	78	93	187	-	0.5	6.5	93	-
P-7	2456.6	-	-	-	-	-	20.	0.5	7.0	-	10.00
8	2457.5	17.7	14	57	71	192	11.	1.0	8.0	192	11.00
9	2458.5	18.2	26	54	80	367	22.	1.0	9.0	367	22.00
10	2459.5	18.4	16	53	69	228	15.	1.0	10.0	228	15.00
11	2460.5	20.7	26	48	74	418	39.	1.0	11.0	418	39.00

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Jackson Brothers Lease Jackson Heirs "C" Well No. 1

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
2450.0 - 2455.0	5.0	8.3	41.30
2455.0 - 2461.0	5.5	19.6	108.00
2450.0 - 2461.0	10.5	14.2	149.30

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
2450.0 - 2455.0	5.0	16.3	15.6	65.4	201	1,007
2455.0 - 2461.0	5.5	18.4	21.0	55.5	303	1,665
2450.0 - 2461.0	10.5	17.4	18.4	60.3	254	2,672

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Jackson Brothers Lease Jackson Heirs "C" Well No. 1

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.
			%	Bbls./A. Ft.	%	Bbls./A. Ft.	% Oil	% Water	Bbls./A. Ft.			
1	2450.5	16.4	17	217	1	13	16	73	204	6	0.20	35
2	2451.5	17.1	16	212	0	0	16	74	212	18	0.56	30
3	2452.5	18.4	22	314	4	57	18	78	257	12	0.30	30
4	2453.5	15.1	12	141	0	0	12	84	141	16	0.40	30
5	2454.5	16.8	16	209	1	13	15	74	196	15	0.40	30
6	2455.5	19.1	26	385	12	178	14	74	207	50	1.22	20
7	2456.4	16.8	21	274	0	0	21	78	274	11	0.33	30
8	2457.5	18.4	14	200	1	14	13	82	186	46	1.10	20
9	2458.5	19.0	26	383	6	88	20	71	295	32	0.89	20
10	2459.5	18.9	16	234	2	29	14	83	205	55	1.30	20
11	2460.5	19.7	26	398	10	153	16	82	245	35	0.90	25

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.

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RESULTS OF WATER DIFFERENTIATION TESTS

TABLE VI

Company Jackson Brothers Lease Jackson Heirs "C" Well No. 1

Sample No.	Depth, Feet	Chloride Content of Brine in Sand ppm	Percent Water Saturation Connate	Drilling & Foreign	Total
1	2450.5	68,700			
2	2451.5	44,000			
3	2452.5	28,550			
4	2453.5	73,800			
5	2454.5	49,400			
6	2455.5	58,300			
7	2456.4	63,820			
8	2457.5	34,575			
9	2458.5	31,440			
10	2459.5	40,200			
11	2460.5	19,180			

Note: ppm — parts per million

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SUMMARY OF LABORATORY FLOODING TESTS

TABLE V

Company Jackson Brothers Lease Jackson Heirs "C" Well No. 1

Depth Interval, Feet	2450.0 - 2461.0
Feet of Core Analyzed	8.0
Average Percent Porosity	18.3
Average Percent Original Oil Saturation	20.3
Average Percent Oil Recovery	4.6
Average Percent Residual Oil Saturation	15.7
Average Percent Residual Water Saturation	77.1
Average Percent Total Residual Fluid Saturation	92.8
Average Original Oil Content, Bbls./A. Ft.	292.
Average Oil Recovery, Bbls./A. Ft.	68.
Average Residual Oil Content, Bbls./A. Ft.	224.
Total Original Oil Content, Bbls./Acre	2,340.
Total Oil Recovery, Bbls./Acre	545.
Total Residual Oil Content, Bbls./Acre	1,795.
Average Effective Permeability, Millidarcys	0.79
Average Initial Fluid Production Pressure, p.s.i.	25.0

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

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SUMMARY OF WATER DIFFERENTIATION TESTS

TABLE VII

Company Jackson Brothers Lease Jackson Heirs "C" Well No. 1

Depth Interval, Feet	Chloride Content of Brine in Sand, ppm	Average Percent Connate Water	Average Percent Drilling & Foreign Water
2450.0 - 2455.0	52,890		
2455.0 - 2461.0	39,201		
2450.0 - 2461.0	45,720		

Note: ppm — parts per million.