



OILFIELD RESEARCH LABORATORIES

536 NORTH HIGHLAND - CHANUTE, KANSAS - PHONE HE1-2650

January 3, 1968

Jackson Brothers
514 North Main
Eureka, Kansas 67045

Gentlemen:

Enclosed herewith is the report of the analysis of the Rotary core taken from the Jackson Heirs Lease, Well No. 21, Greenwood County, Kansas, and submitted to our laboratory on December 27, 1967.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Carl L. Pate

CLP:bjo

6 c. - Eureka, Kansas

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GENERAL INFORMATION & SUMMARY

Company Jackson Brothers Lease Jackson Heirs Well No. 21

Location SW, SW, SW,

Section 23 Twp. 25S Rge. 8E County Greenwood State Kansas

Name of Sand - - - - - Bartlesville

Top of Core - - - - - 2547.0

Bottom of Core - - - - - 2560.0

Top of ^{Oil}/_{Sand} - - - - - 2547.6

Bottom of Sand - - - - - 2556.8

Total Feet of Permeable Sand - - - - - 8.8

Total Feet of Floodable Sand - - - - - 1.2

Distribution of Permeable Sand:
Permeability Range
Millidarcys

Feet

Cum. Ft.

0 - 1
1 & above

4.0
4.8

4.0
8.8

Average Permeability Millidarcys - - - - - 1.7

Average Percent Porosity - - - - - 16.1

Average Percent Oil Saturation - - - - - 22.7

Average Percent Water Saturation - - - - - 59.2

Average Oil Content, Bbls./A. Ft. - - - - - 276.

Total Oil Content, Bbls./Acre - - - - - 2,703.

Average Percent Oil Recovery by Laboratory Flooding Tests - - - - - 1.0

Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft. - - - - - 13.

Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre - - - - - 16.

Total Calculated Oil Recovery, Bbls./Acre - (Primary) - - - - - 861.

Packer Setting, Feet - - - - -

Viscosity, Centipoises @ - - - - -

A. P. I. Gravity, degrees @ 60 °F - - - - -

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 and sealed in tin cans by an employee of Oilfield Research Laboratories.

FORMATION CORED

The detailed log of the formation cored is as follows:

<u>Depth Interval,</u> <u>Feet</u>	<u>Description</u>
2547.0 - 2551.0	Light brown slightly shaly sandstone.
2551.0 - 2552.0	Gray shaly sandstone.
2552.0 - 2556.8	Light brown slightly shaly sandstone.
2556.8 - 2560.0	Dark shale.

Coring was started at a depth of 2547.0 feet in light brown slightly shaly sandstone and completed at 2560.0 feet in dark shale. This core shows a total of 9.8 feet of sandstone. The pay is made up of light brown slightly shaly sandstone.

PERMEABILITY

The weighted average permeability of the cored section is 1.7 millidarcys (See Table III). By observing the data given on the coregraph, it is noticeable that the sand has a comparatively uniform permeability profile. The permeability of the sand varies from Imp. to a maximum of 4.1 millidarcys.

PERCENT SATURATION & OIL CONTENT

The sand in this core shows a low weighted average percent oil saturation, namely, 22.7. The weighted average percent water saturation of the cored section is 59.2 (See Table III).

This gives an overall weighted average total fluid saturation of 81.9 percent. This low total fluid saturation indicates considerable 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 very little flushing of the sand occurred during the coring operation as the zones of higher permeability do not have the lower chloride content.

The weighted average oil content of the cored section is 276 barrels per acre foot while the total oil content, as shown by this core, is 2,703 barrels per acre (See Table III).

LABORATORY FLOODING TESTS

The sand in this core responded poorly to laboratory flooding tests, as a total recovery of only 16 barrels of oil per acre was obtained from 1.2 feet of sand. The average percent oil saturation was reduced from 21.0 to 20.0, or represents an average recovery of 1.0 percent. The average effective permeability of the sample is 0.20 millidarcys, while the initial fluid production pressure is 50 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 10 samples tested, 1 produced water and oil. This indicates that approximately 10 percent of the sand represented by these samples is floodable pay sand.

CONCLUSION

On the basis of the above data, we estimate that approximately 861 barrels of oil per acre or an average of 105 barrels a foot can be recovered from the area, represented by this core, by efficient primary production methods. The tests indicate that it would not be profitable to waterflood the area of which this core is representative.

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

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Jackson Brothers Lease Jackson Heirs Well No. 21

Sample No.	Depth, Feet	Effective Porosity Percent	Percent Saturation			Oil Content Bbls. / A Ft.	Perm., Mill.	Feet of Sand		Total Oil Content	Perm. Capacity Ft. X md.
			Oil	Water	Total			Ft.	Cum. Ft.		
1	2547.1	15.4	11	66	77	131	0.67	0.6	0.6	79	0.40
2	2548.1	15.6	19	60	79	230	1.4	1.0	1.6	230	1.40
3	2549.1	16.6	29	68	97	373	0.69	1.0	2.6	373	0.69
4	2550.1	17.9	21	62	83	292	0.79	1.4	4.0	409	1.11
5	2551.1	8.5	34	61	95	224	Imp.	1.0	5.0	224	0.00
6	2552.1	16.5	31	62	93	397	1.4	0.6	5.6	238	0.84
7	2553.1	16.0	19	66	85	236	0.83	1.0	6.6	236	0.83
8	2554.1	16.7	23	62	85	298	4.1	1.0	7.6	298	4.10
9	2555.1	19.9	19	50	69	293	3.3	1.0	8.6	293	3.30
10	2556.1	16.5	21	58	79	269	3.5	1.2	9.8	323	4.20

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company			Jackson Brothers			Lease		Jackson Heirs			Well No.		21	
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	2547.1	15.1	12	141	0	0	12	68	141	None	Imp.	-		
2	2548.1	15.2	17	200	0	0	17	68	200	None	Imp.	-		
3	2549.1	16.2	26	327	0	0	26	72	327	None	Imp.	-		
4	2550.1	17.4	23	311	0	0	23	66	311	None	Imp.	-		
5	2551.1	9.0	31	216	0	0	31	66	216	None	Imp.	-		
6	2552.1	16.3	28	354	0	0	28	69	354	None	Imp.	-		
7	2553.1	15.6	21	254	0	0	21	69	254	None	Imp.	-		
8	2554.1	16.4	21	267	0	0	21	70	267	None	Imp.	-		
9	2555.1	19.4	20	301	0	0	20	57	301	None	Imp.	-		
10	2556.1	16.8	21	274	1	13	20	71	261	3	0.20	50		

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 Well No. 21

Sample No.	Depth, Feet	Chloride Content of Brine in Sand ppm	Percent Water Saturation Connate Drilling & Foreign	Total
1	2547.1	99,700		
2	2548.1	124,300		
3	2548.1	95,700		
4	2550.1	102,700		
5	2551.1	99,450		
6	2552.1	112,600		
7	2553.1	117,300		
8	2554.1	118,100		
9	2555.1	121,200		
10	2556.1	129,100		

Note: ppm — parts per million

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SUMMARY OF WATER DIFFERENTIATION TESTS

TABLE VII

Company Jackson Brothers Lease Jackson Heirs Well No. 21

Depth Interval, Feet	Chloride Content of Brine in Sand, ppm	Average Percent Connate Water	Average Percent Drilling & Foreign Water
2547.0 - 2556.8	112,439.		

Note: ppm — parts per million.