OILFIELD RESEARCH LABORATORIES
536 NORTH HIGHLAND - CHANUTE, KANSAS - PHONE HE1-2650

November 19, 1966

Jackson Brothers
514 North Main
Eureka, Kansas

Gentlemen:

Enclosed herewith is the report of the analysis of the Rotary core taken from the Crew Lease, Well No. 19, Greenwood County, Kansas, and submitted to our laboratory on November 15, 1966.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Benjamin R. Pearman

Benjamin R. Pearman

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GENERAL INFORMATION & SUMMARY

Company Jackson Bros. Lease Crew Well No. 19

Location NE NW

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

Name of Sand	Bartlesville
Top of Core	2507.0
Bottom of Core	2527.0
Top of Sand (Analyzed)	2507.0
Bottom of Sand	2515.7
Total Feet of Permeable Sand	5.7
Total Feet of Floodable Sand	1.6

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.
0 - 1	3.1	3.1
1 - 10	2.6	5.7

Average Permeability Millidarcys	2.7
Average Percent Porosity	17.1
Average Percent Oil Saturation	20.8
Average Percent Water Saturation	68.6
Average Oil Content, Bbls./A. Ft.	276.
Total Oil Content, Bbls./Acre	2,399.
Average Percent Oil Recovery by Laboratory Flooding Tests	3.9
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	57.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	91.
Total Calculated Oil Recovery, Bbls./Acre (Primary & Secondary)	650.
Packer Setting, Feet	
Viscosity, Centipoises @	
A. P. I. Gravity, degrees @ 60 °F	
Elevation, Feet	

Fresh water mud was used as the circulating fluid while taking this core. The core was sampled and the samples sealed in cans by a representative of Oilfield Research Laboratories. The well was drilled in non-virgin territory.

FORMATION CORED

The detailed log of the formation cored is as follows:

Depth Interval, Feet	Description
2507.0 - 2510.8	Light brown, slightly shaly sandstone.
2510.8 - 2511.3	Grayish light brown, shaly sandstone.
2511.3 - 2515.7	Light brown, slightly shaly sandstone.
2515.7 - 2527.0	Shale.

Coring was started at a depth of 2507.0 feet in sandstone and completed at 2527.0 feet in shale. This core shows a total of 8.7 feet of sandstone. For the most part, the pay is made up of light brown, slightly shaly sandstone.

PERMEABILITY

The weighted average permeability of the core is 2.7 millidarcys (See Table III). By observing the data given on the coregraph, it is noticeable that the sand has an irregular permeability profile. The permeability of the sand varies from impermeable to a maximum of 9.5 millidarcys.

PERCENT SATURATION & OIL CONTENT

The sand in this core shows a somewhat low weighted average percent oil saturation, namely, 20.8. The weighted average percent water saturation is 68.6 (See Table III). This gives an overall

weighted average total fluid saturation of 89.4 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 VI and VII. From the data given in these tables and on the coregraph, it is evident that very little contamination of the core occurred during coring operations with the exception of the very top of the core.

The weighted average oil content of the core is 276 barrels per acre foot. The total oil content, as shown by this core, is 2,399 barrels per acre (See Table III).

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 91 barrels of oil per acre was obtained from 1.6 feet of sand. The weighted average percent oil saturation was reduced from 21.8 to 17.9, or represents an average recovery of 3.9 percent. The weighted average effective permeability of the samples is 0.262 millidarcys, while the average initial fluid production pressure is 45.0 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 9 samples tested, 3 produced water and 2 oil. This indicates that approximately 22 percent of the sand represented by these samples is floodable pay sand. The tests also show that the sand has a somewhat low effective permeability to water.

CONCLUSION

The results of the laboratory tests indicate that efficient

primary and secondary operations in the vicinity of this well should recover approximately 650 barrels of oil per acre or an average of 251 barrels per acre foot from the 2.6 feet of floodable sand analyzed in this core. These recovery values were calculated using the following data and assumptions:

Original formation volume factor	1.23
Reservoir water saturation, percent	40.0
Average porosity, percent	18.9
Oil saturation after flooding, percent	17.9
Performance factor, percent	50.0
Net floodable pay sand, feet	2.6

This core shows a pay sand section having a good oil saturation, a moderate water saturation and a rather low effective permeability to water.

Any primary oil already recovered from the area represented by this core should be subtracted from the above calculated recovery values.

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Jackson Brothers Lease Crew Well No. 19

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	2507.1	18.9	18	65	83	264	9.5	0.6	0.6	158	5.70
2	2508.1	18.9	24	54	78	352	5.1	1.0	1.6	352	5.10
3	2509.1	17.4	25	63	88	337	0.89	1.0	2.6	337	0.89
4	2510.1	15.6	21	70	91	254	Imp.	1.2	3.8	305	0.00
5	2511.1	15.9	17	80	97	210	Imp.	0.5	4.3	105	0.00
6	2512.1	15.7	20	75	95	243	Imp.	1.3	5.6	316	0.00
7	2513.1	16.9	17	79	96	222	0.35	1.0	6.6	222	0.35
8	2514.1	18.7	17	63	80	246	2.6	1.0	7.6	246	2.60
9	2515.1	16.8	25	71	96	325	0.92	1.1	8.7	358	1.01
								Total		2,399	

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Jackson Bros. Lease Crew Well No. 19

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
2507.0 - 2515.7	5.7	2.7	15.67

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
2507.0 - 2515.7	8.7	17.1	20.8	68.6	276	2,399

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Jackson Bros. Lease Crew Well No. 19

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	2507.1	18.7	18	261	2	29	16	80	232	3	0.200	50
2	2508.1	19.1	24	355	5	74	19	80	281	12	0.300	40
3	2509.1	17.6	25	341	0	0	25	65	341	0	Imp.	-
4	2510.1	15.5	20	240	0	0	20	72	240	0	Imp.	-
5	2511.1	16.2	18	226	0	0	18	81	226	0	Imp.	-
6	2512.1	15.7	20	244	0	0	20	74	244	0	Imp.	-
7	2513.1	17.0	17	224	0	0	17	81	224	0	Imp.	-
8	2514.1	19.0	19	280	0	0	19	73	280	7	0.250	50
9	2515.1	16.8	24	312	0	0	24	73	312	0	Imp.	-

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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SUMMARY OF LABORATORY FLOODING TESTS

TABLE V

Company Jackson Bros. Lease Crew Well No. 19

Depth Interval, Feet	2507.0 - 2515.7
Feet of Core Analyzed	1.6
Average Percent Porosity	18.9
Average Percent Original Oil Saturation	21.8
Average Percent Oil Recovery	3.9
Average Percent Residual Oil Saturation	17.9
Average Percent Residual Water Saturation	80.0
Average Percent Total Residual Fluid Saturation	97.9
Average Original Oil Content, Bbls./A. Ft.	319.
Average Oil Recovery, Bbls./A. Ft.	57.
Average Residual Oil Content, Bbls./A. Ft.	262.
Total Original Oil Content, Bbls./Acre	511.
Total Oil Recovery, Bbls./Acre	91.
Total Residual Oil Content, Bbls./Acre	420.
Average Effective Permeability, Millidarcys	0.262
Average Initial Fluid Production Pressure, p.s.i.	45.0

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

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RESULTS OF WATER DIFFERENTIATION TESTS

TABLE VI

Company Jackson Bros. Lease Crew Well No. 19

Sample No.	Depth, Feet	Chloride Content of Brine in Sand ppm	Percent Water Saturation		
			Connate	Drilling & Foreign	Total
1	2507.1	12,400			
2	2508.1	117,200			
3	2509.1	111,250			
4	2510.1	99,400			
5	2511.1	98,150			
6	2512.1	111,000			
7	2513.1	103,750			
8	2514.1	101,750			
9	2515.1	82,250			

Note: ppm — parts per million

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SUMMARY OF WATER DIFFERENTIATION TESTS

TABLE VII

Company Jackson Bros. Lease Crew Well No. 19

Depth Interval, Feet	Chloride Content of Brine in Sand, ppm	Average Percent Connate Water	Average Percent Drilling & Foreign Water
2507.0 - 2515.7	97,100		

Note: ppm — parts per million.