(10)

Oilfield Research Laboratories

GENERAL INFORMATION & SUMMARY

Company Jackson Bros. Lease G.K. Jackson Heirs Well No. 5

Location SW SE NW

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

	Lansing	B'ville.
Name of Sand		
Top of Core	1483.0	2369.0
Bottom of Core	1489.0	2400.0
Top of Sand	1483.0	2369.0
Bottom of Sand	1489.0	2382.0
Total Feet of Permeable Sand	4.0	13.0
Total Feet of Floodable Sand		7.4

Distribution of Permeable Sand:

	Permeability Range Millidarcys	Feet	Cum. Ft.
Lansing	0.4 - 1.0	2.0	2.0
	2.0 - 3.5	2.0	4.0
B'ville	0 - 5	6.6	6.6
	5 - 10	4.4	11.0
	10 - 12	2.0	13.0

Average Permeability Millidarcys	1.6	5.8
Average Percent Porosity	12.7	17.3
Average Percent Oil Saturation		26.0
Average Percent Water Saturation		58.0
Average Oil Content, Bbls./A. Ft.		351.
Total Oil Content, Bbls./Acre		4,560.
Average Percent Oil Recovery by Laboratory Flooding Tests		4.0
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.		54.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre		401.
Total Calculated Oil Recovery, Bbls./Acre (Primary & Secondary)		3,150.
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 virgin territory. Only the Bartlesville section will be considered in the following discussion. The Lansing data is presented on Table 1-B.

FORMATION CORED

The detailed log of the formation cored is as follows:

Depth Interval, Feet	Description

LANSING

1483.0 - 1489.0 - Brownish gray, slightly sandy limestone.

1489.0 - 2369.0 - Drilled.

BARTLESVILLE

2369.0 - 2382.0 - Light brown, slightly shaly sandstone.

2382.0 - 2400.0 - Shale.

Coring was started in the Bartlesville section at a depth of 2369.0 feet in sandstone and completed at 2400.0 feet in shale. This core shows a total of 13.0 feet of sandstone. For the most part, the pay is made up of light brown, slightly shaly sandstone.

PERMEABILITY

The weighted average permeability is 5.8 millidarcys (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 0.66 to a maximum of 12. millidarcys.

PERCENT SATURATION & OIL CONTENT

The sand in this core shows a good weighted average percent oil saturation, namely, 26.0. The weighted average percent water saturation of the core is 58.0 (See Table III). This gives an overall weighted average

total fluid saturation of 84.0 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 some flushing did occur since the zones of higher permeability exhibit a lower chloride content.

The weighted average oil content is 351 barrels per acre foot. The total oil content, as shown by this core, is 4,560 barrels per acre of which 2,818 barrels are in the pay sand section (See Table III).

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 401 barrels of oil per acre was obtained from 7.4 feet of sand. The weighted average percent oil saturation was reduced from 28.0 to 24.0, or represents an average recovery of 4.0 percent. The weighted average effective permeability of the samples is 0.403 millidarcys, while the average initial fluid production pressure is 47.1 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 13 samples tested, 7 produced water and oil. This indicates that approximately 54 percent of the sand represented by these samples is floodable pay sand. The tests also show that the sand has a fairly uniform 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 1,960 and 1,190 barrels of oil per acre respectively. These are average recoveries of 169 and 161 barrels per acre foot respectively. These recovery values were calculated using the following data

and assumptions:

Original formation volume factor	1.21
Reservoir water saturation, percent	45.0
Expected primary recovery, estimated, percent	15.0
Average porosity, percent	17.6
Oil saturation after flooding, percent	24.0
Performance factor, percent	50.0
Net floodable pay sand, feet	7.4

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

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Jackson Bros. Lease G.W. Jackson Heirs Well No. 5

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.		
						LANSING					
1	1483.5	11.2					Imp.	1.0	1.0		0.00
2	1484.5	11.6					0.40	1.0	2.0		0.40
3	1485.5	11.3					0.81	1.0	3.0		0.81
4	1486.5	11.8					Imp.	1.0	4.0		0.00
5	1487.5	14.7					3.3	1.0	5.0		3.30
6	1488.5	15.8					2.0	1.0	6.0		2.00
						BARTLESVILLE					
1	2369.1	14.3	12	77	89	133	0.28	0.6	0.6	80	0.17
2	2370.1	17.8	31	52	83	428	1.8	1.0	1.6	428	1.80
3	2371.1	18.6	24	56	80	346	3.3	1.0	2.6	346	3.30
4	2372.1	16.2	25	58	83	314	0.66	1.0	3.6	314	0.66
5	2373.1	17.8	32	54	86	442	3.9	1.0	4.6	442	3.90
6	2374.1	16.0	30	62	92	372	4.5	1.0	5.6	372	4.50
7	2375.1	16.6	30	53	83	386	8.9	1.0	6.6	386	8.90
8	2376.1	19.0	25	56	81	368	6.1	1.0	7.6	368	6.10
9	2377.1	18.1	22	71	93	319	1.6	1.0	8.6	319	1.60
10	2378.1	17.1	23	60	83	305	11.	1.0	9.6	305	11.00
11	2379.1	15.4	21	65	86	251	12.	1.0	10.6	251	12.00
12	2380.1	17.2	22	61	83	293	7.5	1.0	11.6	293	7.50
13	2381.1	18.9	32	43	75	469	5.1	1.4	13.0	656	7.14

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SUMMARY OF PERMEABILITY & SATURATION DATA

Company Jackson Bros. Lease G.W. Jackson Heirs Well No. 5

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
		LANSING	
1483.0 - 1489.0	6.0	1.6	6.51
		BARTLESVILLE	
2369.0 - 2382.0	13.0	5.8	68.57

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
			LANSING			
1483.0 - 1489.0	6.0	12.7				
			BARTLESVILLE			
2369.0 - 2382.0	13.0	17.3	26.0	58.0	351	4,560

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RESULTS OF LABORATORY FLOODING TESTS

CORE NO. 27

Company Jackson Bros. Lease G.K. Jackson Heirs Well No. 5

Sample No.	Depth, Feet	Effective Porosity Percent	Original Oil Saturation		Oil Recovery		Residual Saturation			Volume of Water Recovered cc³	Effective Permeability Millidarcys**	Initial Fluid Production Pressure Lbs./Sq./In.
			%	Bbls/A.Ft.	%	Bbls/A.Ft.	% Oil	% Water	Bbls/A.Ft.			
1	2369.1	14.0	13	141	0	0	13	78	141	0	Imp.	-
2	2370.1	17.7	31	425	0	0	31	54	425	0	Imp.	-
3	2371.1	18.6	25	361	0	0	25	55	361	0	Imp.	-
4	2372.1	16.0	25	310	0	0	25	59	310	0	Imp.	-
5	2373.1	17.6	32	436	4	55	28	70	381	5	0.200	50
6	2374.1	16.5	30	384	6	77	24	73	307	18	0.600	50
7	2375.1	16.4	30	381	5	64	25	73	317	6	0.200	50
8	2376.1	18.7	25	362	3	43	22	76	319	4	0.300	50
9	2377.1	17.6	22	300	2	27	20	76	273	1	0.100	50
10	2378.1	17.4	23	310	4	54	19	80	256	27	0.600	40
11	2379.1	15.1	22	258	0	0	22	66	258	0	Imp.	-
12	2380.1	17.0	22	290	0	0	22	64	290	0	Imp.	-
13	2381.1	18.6	32	461	4	58	28	61	403	35	0.700	40

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 7

Company Jackson Bros. Lease S.E. Jackson Heirs Well No. 5

Depth Interval, Feet	2369.0 - 2382.0
Feet of Core Analyzed	7.4
Average Percent Porosity	17.6
Average Percent Original Oil Saturation	28.0
Average Percent Oil Recovery	4.0
Average Percent Residual Oil Saturation	24.0
Average Percent Residual Water Saturation	72.0
Average Percent Total Residual Fluid Saturation	96.0
Average Original Oil Content, Bbls./A. Ft.	380.
Average Oil Recovery, Bbls./A. Ft.	54.
Average Residual Oil Content, Bbls./A. Ft.	326.
Total Original Oil Content, Bbls./Acre	2,818.
Total Oil Recovery, Bbls./Acre	401.
Total Residual Oil Content, Bbls./Acre	2,417.
Average Effective Permeability, Millidarcys	0.403
Average Initial Fluid Production Pressure, p.s.i.	47.1

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 G.K. Jackson Heirs Well No. 5

Sample No.	Depth, Feet	Chloride Content of Brine in Sand ppm	Percent Water Saturation Connate	Drilling & Foreign	Total
1	2369.1	101,250			
2	2370.1	105,100			
3	2371.1	86,900			
4	2372.1	100,800			
5	2373.1	95,900			
6	2374.1	97,550			
7	2375.1	95,500			
8	2376.1	86,200			
9	2377.1	60,300			
10	2378.1	88,400			
11	2379.1	92,800			
12	2380.1	97,000			
13	2381.1	103,800			

Note: ppm — parts per million

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SUMMARY OF WATER DIFFERENTIATION TESTS

TABLE VII

Company Jackson Bros. Lease G.K. Jackson Heirs Well No. 5

Depth Interval, Feet	Chloride Content of Brine in Sand, ppm	Average Percent Connate Water	Average Percent Drilling & Foreign Water
2369.0 - 2382.0	92,500		

Note: ppm — parts per million.