

Oilfield Research Laboratories

GENERAL INFORMATION & SUMMARY

Company Jackson Brothers Lease Crew Well No. 12

Location _____

Section 3 Twp. 25S Rge. 8E County Greenwood State Kansas

Name of Sand - - - - - Bartlesville

Top of Core - - - - - 2490.0

Bottom of Core - - - - - 2521.0

Top of ^{Pay} Sand - - - - - 2506.0

Bottom of Sand - - - - - 2513.0

Total Feet of Permeable Sand - - - - - 6.2

Total Feet of Floodable Sand - - - - - 1.6

Distribution of Permeable Sand:
Permeability Range
Millidarcys

Feet

Cum. Ft.

0 - 1	2.3	2.3
1 - 4	2.2	4.5
4 & above	1.7	6.2

Average Permeability Millidarcys - - - - - 2.7

Average Percent Porosity - - - - - 16.7

Average Percent Oil Saturation - - - - - 16.7

Average Percent Water Saturation - - - - - 66.9

Average Oil Content, Bbls./A. Ft. - - - - - 222.

Total Oil Content, Bbls./Acre - - - - - 2,798.

Average Percent Oil Recovery by Laboratory Flooding Tests - - - - - 2.6

Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft. - - - - - 37.

Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre - - - - - 59.

Total Calculated Oil Recovery, Bbls./Acre (Primary) - - - - - 887.

Packer Setting, Feet - - - - -

Viscosity, Centipoises @ - - - - -

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

Elevation, Feet - - - - -

Rotary mud was used as a circulating fluid in the coring of the sand in this well. This well was drilled in a virgin area.

FORMATION CORED

The detailed log of the formation cored is as follows:

<u>Depth Interval, Feet</u>	<u>Description</u>
2490.0 - 2506.0	- Shale.
2506.0 - 2509.0	- Grayish light brown sandstone.
2509.0 - 2513.0	- Grayish light brown shaley sandstone.
2513.0 - 2517.0	- Gray shaley sandstone.
2517.0 - 2520.0	- Gray and light brown shaley sandstone.
2520.0 - 2521.0	- Shale.

Coring was started at a depth of 2490.0 feet in shale and completed at 2521.0 feet in same type of material. This core shows a total of 14.0 feet of sandstone. The pay is made up of grayish light brown shaley 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 2.7 and zero millidarcys respectively (See Table III). By observing the data given on the coregraph, it is noticeable that all of the pay sand is comparatively tight. The permeability of the sand varies from impermeable to a maximum of 5.4 millidarcys.

PERCENT SATURATION & OIL CONTENT

The sand in this core shows a low weighted average percent oil saturation, namely, 16.7. The weighted average percent oil saturation of the upper and lower sections is 20.4 and 13.1 respectively. The weighted average percent water saturation of the upper and lower sections is 62.9 and 70.8 respectively; the overall average being 66.9 (See Table III).

This gives an overall weighted average total fluid saturation of 80.0 percent.

The above tests indicate that the pay sand extends from a depth of 2506.0 to 2512.2 feet (upper section).

The weighted average oil content of the upper and lower sections is 281 and 165 barrels per acre foot respectively; the overall average being 222. The total oil content, as shown by this core, is 2,798 barrels per acre of which 1,740 barrels are in the pay sand section (See Table III).

LABORATORY FLOODING TESTS

The sand in this core did not respond very well to laboratory flooding tests, as a total recovery of only 59 barrels of oil per acre was obtained from 1.6 feet of sand. The weighted average percent oil saturation was reduced from 18.7 to 16.1, or represents an average recovery of 2.6 percent. The weighted average effective permeability of the samples is 0.14 millidarcys, while the average initial fluid production pressure is 50.0 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 12 samples tested, 2 produced water and oil. This indicates that approximately 17 percent of the sand represented by these samples is floodable pay sand.

CONCLUSION

From a study of the above data, we estimate that approximately 887 barrels of oil per acre can be recovered from the area represented by this core, by efficient primary production methods. This is equivalent to an average of 143 barrels per acre foot. Chances are, an additional recovery of 246 barrels per acre can be recovered from 1.6 feet of the sand by efficient water-flooding. In calculating the above oil recovery values, the following data and assumptions were employed:

Formation volume factor

1.24

Primary oil recovery	None
Irreducible water saturation, percent	43.0
Present oil saturation, percent	48.3
Oil saturation after flooding, percent	16.0
Percent porosity	18.1
Performance factor	0.55
Reported A.P.I. gravity of oil, degrees	40.0

This core shows a shaley sand section having a low oil saturation, a high water saturation and a low permeability. Chances are, the high water saturation is partly due to the shaley condition of the sand section.

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Jackson Brothers Lease Crew Well No. 12

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	2506.8	18.3	11	73	84	156	3.7	1.3	1.3	203	4.81
2	2507.8	20.6	15	66	81	240	5.4	1.0	2.3	240	5.40
3	2508.8	18.4	17	68	85	242	4.9	0.7	3.0	169	3.43
4	2509.8	16.6	35	43	78	451	0.71	1.3	4.3	586	0.92
5	2510.8	16.3	22	65	87	278	0.57	1.0	5.3	278	0.57
6	2511.8	18.9	20	56	76	294	1.7	0.9	6.2	264	1.53
7	2512.6	18.5	17	59	76	244	Imp.	0.8	7.0	195	0.00
8	2514.9	16.1	19	70	89	237	Imp.	1.0	8.0	237	0.00
9	2515.9	12.2	3	79	82	28	Imp.	1.6	9.6	45	0.00
10	2517.1	15.9	22	68	90	272	Imp.	0.8	10.4	218	0.00
11	2518.5	16.5	15	65	80	192	Imp.	1.4	11.8	269	0.00
12	2519.9	15.1	10	80	90	117	Imp.	0.8	12.6	94	0.00
								Total	-----	2,798	

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Jackson Brothers Lease Crew Well No. 12

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
2506.0 - 2512.2	6.2	2.7	16.66
2512.2 - 2520.0	-	0.0	0.00

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
2506.0 - 2512.2	6.2	18.1	20.4	62.9	281	1,740
2512.2 - 2520.0	6.4	15.4	13.1	70.8	165	1,058
2506.0 - 2520.0	12.6	16.7	16.7	66.9	222	2,798

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Jackson Brothers Lease Crew Well No. 12

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	2506.8	18.6	9	130	0	0	9	81	130	0	Imp.	-
2	2507.8	20.1	12	187	0	0	12	78	187	0	Imp.	-
3	2508.8	18.8	17	248	2	29	15	81	219	7	0.200	50
4	2509.8	16.4	31	395	0	0	31	53	395	0	Imp.	-
5	2510.8	15.8	20	245	0	0	20	70	245	0	Imp.	-
6	2511.8	18.5	20	287	3	43	17	71	244	2	0.100	50
7	2512.6	18.8	16	233	0	0	16	71	233	0	Imp.	-
8	2514.9	16.0	15	186	0	0	15	75	186	0	Imp.	-
9	2515.9	12.0	5	37	0	0	5	82	37	0	Imp.	-
10	2517.1	15.4	19	227	0	0	19	73	227	0	Imp.	-
11	2518.5	16.3	17	215	0	0	17	75	215	0	Imp.	-
12	2519.9	15.5	8	96	0	0	8	83	96	0	Imp.	-

Notes: cc—cubic centimeter.

*—Volume of water recovered at the time of maximum oil recovery.

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SUMMARY OF LABORATORY FLOODING TESTS

TABLE V

Company	Jackson Brothers	Lease	Crew	Well No.	12
Depth Interval, Feet	2508.3 - 2512.2				
Feet of Core Analyzed	1.6				
Average Percent Porosity	18.7				
Average Percent Original Oil Saturation	18.7				
Average Percent Oil Recovery	2.6				
Average Percent Residual Oil Saturation	16.1				
Average Percent Residual Water Saturation	75.4				
Average Percent Total Residual Fluid Saturation	91.5				
Average Original Oil Content, Bbls./A. Ft.	270.				
Average Oil Recovery, Bbls./A. Ft.	37.				
Average Residual Oil Content, Bbls./A. Ft.	233.				
Total Original Oil Content, Bbls./Acre	432.				
Total Oil Recovery, Bbls./Acre	59.				
Total Residual Oil Content, Bbls./Acre	373.				
Average Effective Permeability, Millidarcys	0.14				
Average Initial Fluid Production Pressure, p.s.i.	50.0				

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