

OILFIELD RESEARCH LABORATORIES

- REGISTERED ENGINEERS -

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June 20, 1962

Jackson Brothers
514 North Main
Eureka, Kansas

Gentlemen:

Enclosed herewith is the report of the analysis of the Rotary core taken from the Dusenberry Lease, Well No. 2, Greenwood County, Kansas, and submitted to our laboratory on June 16, 1962.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES


Fred O. Stenger

FOS:rf

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GENERAL INFORMATION & SUMMARY

Company Jackson Bros. Lease Dusenberry We'll No. 2

Location NW Corner

Section 18 Twp. 24S Rge. 10E County Greenwood State Kansas

Name of Sand	Bartlesville
Top of Core	2259.0
Bottom of Core	2271.0
Top of/Sand ^{Good}	2262.5
Bottom of/Sand ^{Good}	2268.0
Total Feet of Permeable Sand	6.5
Total Feet of Floodable Sand	4.5

Distribution of Permeable Sand:
Permeability Range
Millidarcys

Feet

Cum. Ft.

0 - 3
3 & above

3.0
3.5

3.0
6.5

Average Permeability Millidarcys	3.06
Average Percent Porosity	12.8
Average Percent Oil Saturation	27.0
Average Percent Water Saturation	48.5
Average Oil Content, Bbls./A. Ft.	281.
Total Oil Content, Bbls./Acre	2,751.
Average Percent Oil Recovery by Laboratory Flooding Tests	5.9
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	65.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	291.
Total Calculated Oil Recovery, Bbls./Acre	580.
Packer Setting, Feet	
Viscosity, Centipoises @	
A. P. I. Gravity, degrees @ 60 °F	
Elevation, Feet	

Fresh water mud was used as the circulating fluid in the coring of the sand in this well. This core was sampled and the samples sealed in cans by Oilfield Research Laboratories.

FORMATION CORED

The detailed log of the formation cored is as follows:

<u>Depth Interval, Feet</u>	<u>Description</u>
2259.0 - 2260.3	- Gray sandy shale.
2260.3 - 2261.5	- Gray laminated sandstone and shale.
2261.5 - 2266.5	- Brown calcareous sandstone.
2266.5 - 2268.0	- Brown sandstone.
2268.0 - 2268.8	- Brown laminated shaly sandstone.
2268.8 - 2271.0	- Shale.

Coring was started at a depth of 2259.0 feet in gray sandy shale and completed at 2271.0 feet in shale. This core shows a total of 7.3 feet of sandstone. For the most part, the pay is made up of brown sandstone, much of which is calcareous.

PERMEABILITY

For the sake of distribution, the core was divided into two sections. The weighted average permeability of the upper and lower sections is 1.55 and 5.32 millidarcys respectively; the overall average being 3.06 (See Table III). By observing the data given on the coregraph, it is noticeable that the sand has a somewhat irregular permeability profile. The permeability of the sand varies from impermeable to a maximum of 4.6 millidarcys.

PERCENT SATURATION & OIL CONTENT

The sand in this core shows a low weighted average percent oil saturation, namely, 27.0. The weighted average percent oil saturation of the upper and lower sections is 23.2 and 31.9 respectively. The weighted

average percent water saturation of the upper and lower sections is 53.8 and 41.4 respectively; the overall average being 48.5 (See Table III). This gives an overall weighted average total fluid saturation of 75.5 percent. This low total fluid saturation indicates considerable fluid was lost during coring which probably was oil.

The weighted average oil content of the upper and lower sections is 220 and 358 barrels per acre foot respectively; the overall average being 281. The total oil content, as shown by this core, is 2,751 barrels per acre (See Table III).

LABORATORY FLOODING TESTS

The sand in this core responded rather poorly to laboratory flooding tests, as a total recovery of 291 barrels of oil per acre was obtained from 4.5 feet of sand. The weighted average percent oil saturation was reduced from 32.9 to 27.0, or represents an average recovery of 5.9 percent. The weighted average effective permeability of the samples is 0.200 millidarcys, while the average initial fluid production pressure is 52.2 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 9 samples tested, 4 produced water and 4 oil. This indicates that approximately 44 percent of the sand represented by these samples is floodable pay sand. The tests also show that the sand has a rather low effective permeability to water and thus it is believed would not take water too readily.

CONCLUSION

On the basis of the above laboratory tests and assuming an efficiently operated water-flood and that a sufficient amount of water can be injected into the sand, it is believed that a well in this vicinity should recover approximately 580 barrels of oil per acre or an average of 129 barrels per acre foot from the 4.5 feet of floodable sand analyzed.

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In calculating this oil recovery value, the following facts and assumptions were used:

Original formation volume factor	1.18
Present formation volume factor	1.05
Reservoir water saturation, percent	37.0
Primary recovery, estimated, percent	7.0
Present oil saturation, percent	49.2
Average porosity, percent	14.3
Oil saturation after flooding, percent	27.0
Performance factor, percent	55.0
Net floodable pay sand, feet	4.5

This core shows a very thin section of clean sand, most of the pay being calcareous, a somewhat low oil saturation and low permeability, both to air and to water.

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Jackson Bros. Lease Dusenberry Well No. 2

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	2260.1	6.7	15	67	82	72	Imp.	1.3	1.3	93	0.00
2	2261.1	12.4	10	64	74	96	Imp.	1.2	2.5	115	0.00
3	2262.1	14.0	33	41	74	359	2.2	1.0	3.5	359	2.20
4	2263.1	13.2	29	44	73	297	2.0	1.0	4.5	297	2.00
5	2264.1	11.4	34	47	86	345	0.45	1.0	5.5	345	0.45
6	2265.1	12.8	38	47	85	378	4.6	1.0	6.5	378	4.60
7	2266.1	16.8	27	37	64	352	4.6	1.0	7.5	352	4.60
8	2267.1	14.2	36	40	76	397	4.0	1.5	9.0	596	6.00
9	2268.1	15.1	23	43	66	270	Imp.	0.8	9.8	216	0.00
Total										2,751	

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Jackson Bros. Lease Dusenberry Well No. 2

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.	Depth Interval, Feet	Feet of Core Analyzed	Average Porosity	Average Percent Oil Saturation	Average Percent Water Saturation	Average Oil Content Bbl./A. Ft.	Total Oil Content Bbl./Acre
2261.5 - 2264.5	3.0	1.55	4.65	2259.0 - 2264.5	5.5	11.3	23.2	53.8	220	1,209
2264.5 - 2268.0	3.5	5.32	15.20	2264.5 - 2268.8	4.3	14.6	31.9	41.4	358	1,542
2261.5 - 2268.0	6.5	3.06	19.85	2259.0 - 2268.8	9.8	12.8	27.0	48.5	281	2,751

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RESULTS OF LABORATORY FLOoding TESTS

TABLE IV

Company Jackson Bros. Lease Dusenberry Well No. 2

Sample No.	Depth, Feet	Effective Porosity Percent	Original Oil Saturation		Oil Recovery		Residual Saturation			Volume of Water Recovered cc ^a	Effective Permeability MILLIDarcys ^b	Initial Fluid Production Pressure Lbs./Sq./In.
			%	Bbls./A. Ft.	%	Bbls./A. Ft.	% Oil	% Water	Bbls./A. Ft.			
1	2260.1	6.8	15	79	0	0	15	67	79	0	Imp.	60+
2	2261.1	12.3	10	95	0	0	10	64	95	0	Imp.	60+
3	2262.1	14.0	33	359	0	0	33	41	359	0	Imp.	60+
4	2263.1	13.3	29	297	1	10	28	61	287	3	0.250	60
5	2264.1	11.4	34	345	0	0	34	47	345	0	Imp.	60+
6	2265.1	12.7	38	374	6	59	32	66	315	11	0.300	50
7	2266.1	16.7	27	350	3	39	24	60	311	6	0.200	50
8	2267.1	14.3	26	400	11	122	25	62	278	3	0.100	50
9	2268.1	15.1	23	270	0	0	23	43	270	0	Imp.	60+

Notes: cc—cubic centimeter.

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

^b—Determined by passing water through sample which still contains residual oil.

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SUMMARY OF LABORATORY FLOORING TESTS

TABLE V

Company Jackson Bros. Lease Dusenberry Well No. 2

Depth Interval, Feet	2262.5 - 2268.0
Feet of Core Analyzed	4.5
Average Percent Porosity	14.3
Average Percent Original Oil Saturation	32.9
Average Percent Oil Recovery	5.9
Average Percent Residual Oil Saturation	27.0
Average Percent Residual Water Saturation	62.2
Average Percent Total Residual Fluid Saturation	89.2
Average Original Oil Content, Bbls./A. Ft.	361.
Average Oil Recovery, Bbls./A. Ft.	65.
Average Residual Oil Content, Bbls./A. Ft.	296.
Total Original Oil Content, Bbls./Acre	1,621.
Total Oil Recovery, Bbls./Acre	291.
Total Residual Oil Content, Bbls./Acre	1,330.
Average Effective Permeability, Millidarcys	0.200
Average Initial Fluid Production Pressure, p.s.i.	52.2

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