

OILFIELD RESEARCH LABORATORIES

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September 25, 1962

Fabco Oil Company
701 North State
Iola, Kansas

Gentlemen:

Enclosed herewith is the report of the analysis of the Cable Tool core taken from the Wood Lease, Well No. 2, Allen County, Kansas, and submitted to our laboratory on September 17, 1962.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES


Benjamin R. Pearman

BRP:rf

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Oilfield Research Laboratories

GENERAL INFORMATION & SUMMARY

Company Fabco Oil Co. Lease Wood Well No. 2

Location SW SE

Section 17 Twp. 24S Rge. 19E County Allen State Kansas

Name of Sand	Bartlesville
Top of Core	918.0
Bottom of Core	934.8
Top of Sand	918.0
Bottom of Sand	934.8
Total Feet of Permeable Sand	(Analyzed) 7.3
Total Feet of Floodable Sand	(Analyzed) 2.2

Distribution of Permeable Sand:
Permeability Range
Millidarcys

	Feet	Cum. Ft.
0 - 100	0.8	0.8
100 - 500	4.8	5.6
500 - 1000	0.7	6.3
1000 & above	1.0	7.3

Average Permeability Millidarcys	372.2
Average Percent Porosity	21.4
Average Percent Oil Saturation	31.0
Average Percent Water Saturation	57.5
Average Oil Content, Bbls./A. Ft.	501.
Total Oil Content, Bbls./Acre	5,560.
Average Percent Oil Recovery by Laboratory Flooding Tests	3.9
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	79.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	174.
Total Calculated Oil Recovery, Bbls./Acre	(Primary & Secondary) 1,750.
Packer Setting, Feet	
Viscosity, Centipoises @	
A. P. I. Gravity, degrees @ 60 °F	
Elevation, Feet	

Fresh water was used as the coring fluid. The core was sampled and the samples sealed in cans by a representative of Oilfield Research Laboratories. The well was drilled in virgin territory.

FORMATION CORED

The detailed log of the formation cored is as follows:

<u>Depth Interval,</u> <u>Feet</u>	<u>Description</u>
918.0 - 918.3	Dark brown sandstone.
918.3 - 919.2	Laminated sandy shale.
919.2 - 919.5	Brown sandstone.
919.5 - 920.3	Laminated sandy shale.
920.3 - 923.5	Brown and dark brown, slightly shaly sandstone.
923.5 - 924.5	Loss.
924.5 - 926.7	Brown, slightly shaly sandstone.
926.7 - 928.7	Loss.
928.7 - 930.0	Grayish brown, slightly shaly sandstone.
930.0 - 931.0	Laminated sandstone and shale.
931.0 - 933.0	Dark brown sandstone.
933.0 - 934.8	Dark carbonaceous sandstone.

Coring was started at a depth of 918.0 feet in sandstone and completed at 934.8 feet in carbonaceous sandstone. This core shows a total of 11.1 feet of sandstone. For the most part, the pay is made up of brown, slightly shaly 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 461.0 and 228.5 millidarcys respectively; the overall average being 372.2 (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 15. to a maximum of 1006. millidarcys. Because of the soft nature of the sand, it was not possible to obtain permeability samples for the entire core.

PERCENT SATURATION & OIL CONTENT

The sand in this core shows a fairly good weighted average percent oil saturation, namely, 31.0. The weighted average percent oil saturation of the upper and lower sections is 28.8 and 33.6 respectively. The weighted average percent water saturation of the upper and lower sections is 58.7 and 56.0 respectively; the overall average being 57.5 (See Table III). This gives an overall weighted average total fluid saturation of 88.5 percent. This somewhat high total fluid saturation would tend to indicate that some contamination of the core occurred during coring operations. Also, the high permeability found in this core would allow for more than normal flushing to occur.

The weighted average oil content of the upper and lower sections is 449 and 564 barrels per acre foot respectively; the overall average being 501. The total oil content, as shown by this core, is 5,560 barrels per acre (See Table III).

LABORATORY FLOODING TESTS

Because of the soft nature of the sand, it was not possible to obtain sufficient flood-pot samples for the entire core. Some portions of the sand in this core responded to laboratory flooding tests, as a total recovery of 174 barrels of oil per acre was obtained from 2.2 feet of sand. The weighted average percent oil saturation was reduced from 29.5 to 25.6, or represents an average recovery of 3.9 percent. The weighted average effective permeability of the samples is 29.23 millidarcys, while the average initial fluid production pressure is 16.7 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 8 samples tested, 7 produced water and 3 oil. This indicates that approximately 38 percent of the sand represented by these samples is floodable pay sand. The tests also show that the sand has a wide variation in effective permeability to water, at least for the samples tested.

CONCLUSION

Based on the results of the laboratory tests, it appears that efficient primary and secondary operations in the vicinity of this well should recover approximately 1,110 and 640 barrels of oil per acre respectively. These represent average recoveries of 100 barrels per acre foot primary and 291 barrels per acre foot secondary.

It is felt that flushing of the core resulted in the reduction of the oil saturation, in some zones, to water-flood residuals.

The above recovery values were calculated using the following data and assumptions:

Original formation volume factor	1.05
Estimated reservoir water saturation, percent	38.0
Expected primary recovery, estimated, percent	6.0
Average porosity, percent	26.8
Oil saturation after flooding, percent	25.6
Performance factor, percent	50.0
Net floodable pay sand analyzed, feet	2.2

This core shows a sand section having a good oil saturation, a moderately high water saturation and good permeability.

It is felt that a rotary core taken in this area would allow for a more complete analysis.

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Fabco Oil Co.

Lease Wood

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	918.1	22.1	41	38	79	703	151.	0.3	0.3	211	45.30
2	919.3	19.3	30	44	74	449	-	0.3	0.6	135	-
3	920.5	22.2	27	49	76	464	795.	0.7	1.3	324	556.50
4	921.5	27.2	29	52	81	611	1006.	1.0	2.3	611	1006.00
5	922.5	17.9	24	65	89	333	182.	1.0	3.3	333	182.00
6	923.4	27.9	34	56	90	735	-	0.5	3.8	263	-
7	925.5	14.1	32	63	95	349	192.	1.5	5.3	524	288.00
8	926.5	25.2	21	77	98	410	-	0.7	6.0	287	-
9	929.5	24.3	20	72	92	376	-	1.3	7.3	492	-
10	931.5	21.5	45	45	90	749	377.	1.0	8.3	749	377.00
11	932.5	22.2	45	40	85	774	253.	1.0	9.3	774	253.00
12	933.5	19.5	25	73	98	378	-	1.0	10.3	378	-
13	934.5	20.3	38	42	80	598	15.	0.8	11.1	479	12.00
Total										5,560	

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Well No. 2

Lease Wood

Company Fabco Oil Co.

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 Water Saturation	Average Oil Content Bbl./A. Ft.	Total Oil Content Bbls./Acre
918.0 - 926.7	4.5	461.0	2077.80	918.0 - 926.7	6.0	21.0	28.8	58.7	449	2,688
928.7 - 934.8	2.8	228.5	642.00	928.7 - 934.8	5.1	21.8	33.6	56.0	564	2,872
918.0 - 934.8	7.3	372.2	2719.80	918.0 - 934.8	11.1	21.4	31.0	57.5	501	5,560

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Fabco Oil Co.

Lease Wood

Well No. 2

Sample No.	Depth, Feet	Effective Porosity Percent	Original Oil Saturation		Oil Recovery		Residual Saturation		Volume of Water Recovered cu'	Effective Permeability MILLIDarcys ¹	Initial Fluid Production Pressure Lbs./Sq./In.
			%	Bbls./A. Ft.	%	Bbls./A. Ft.	% Oil	% Water			
1	918.1	22.0	42	716	0	0	42	56	164	23.30	10
2	919.3	19.5	30	454	0	0	30	66	240	14.11	30
3	920.5	22.4	27	469	3	52	24	73	213	12.21	10
4	921.5	27.5	29	618	4	85	25	70	564	55.75	10
5	922.5	17.6	22	300	0	0	22	73	50	0.956	20
6	923.4	27.4	34	722	5	106	29	69	13	0.354	30
9	929.5	24.7	22	421	0	0	22	76	115	3.08	20
10	931.5	21.4	43	714	0	0	43	46	0	Imp.	-

Notes: cu—cubic centimeter.

¹—Volume of water recovered at the time of maximum oil recovery.

²—Determined by passing water through sample which still contains residual oil.

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SUMMARY OF LABORATORY FLOODING TESTS

TABLE V

Well No. 2

Lease Wood

Company Fabco Oil Co.

918.1 - 934.8

Depth Interval, Feet	2.2
Feet of Core Analyzed	26.8
Average Percent Porosity	29.5
Average Percent Original Oil Saturation	3.9
Average Percent Oil Recovery	25.6
Average Percent Residual Oil Saturation	70.6
Average Percent Residual Water Saturation	96.2
Average Percent Total Residual Fluid Saturation	594.
Average Original Oil Content, Bbls./A. Ft.	79.
Average Oil Recovery, Bbls./A. Ft.	515.
Average Residual Oil Content, Bbls./A. Ft.	1,307.
Total Original Oil Content, Bbls./Acre	174.
Total Oil Recovery, Bbls./Acre	1,133.
Total Residual Oil Content, Bbls./Acre	29.23
Average Effective Permeability, Millidarcys	16.7
Average Initial Fluid Production Pressure, p.s.i.	

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