● CORE ANALYSIS ● WATER REPRESSURING ENGINEERING ● WATER ANALYSIS ● FLOODING WATER TREATMENT ● SURVEYING

OILFIELD RESEARCH LABORATORIES

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June 18, 1962

Langdon & Finch
309 East 5th
Ottawa, Kansas

Gentlemen:

Enclosed herewith is the report of the analysis of the Cable Tool core taken from the Kretsinger Lease, Well No. 1, Douglas County, Kansas, and submitted to our laboratory on June 13, 1962.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Carl L. Pate

Carl L. Pate

CLP:rf

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GENERAL INFORMATION & SUMMARY

Company Langdon & Finch Lease Kretsinger Well No. 1

Location W½ NE¼

Section 25 Twp. 14S Rge. 20E County Douglas State Kansas

Name of Sand	Squirrel
Top of Core	810.7
Bottom of Core	830.5
Top of Oil Sand	811.7
Bottom of Sand	824.0
Total Feet of Permeable Sand	6.5
Total Feet of Floodable Sand	2.2

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.
0 - 1	2.8	2.8
1 - 20	1.7	4.5
20 & above	2.0	6.5

Average Permeability Millidarcys	24.6
Average Percent Porosity	20.0
Average Percent Oil Saturation	24.6
Average Percent Water Saturation	60.6
Average Oil Content, Bbls./A. Ft.	405.
Total Oil Content, Bbls./Acre	5,589.
Average Percent Oil Recovery by Laboratory Flooding Tests	9.0
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	171.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	239.
Total Calculated Oil Recovery, Bbls./Acre (Primary & Secondary)	825.
Packer Setting, Feet	
Viscosity, Centipoises @	
A. P. I. Gravity, degrees @ 60 °F	
Elevation, Feet	

Water was used as a circulating fluid in the coring of the sand in this well. This well was drilled in a virgin area. The core was sampled by a representative of Oilfield Research Laboratories.

FORMATION CORED

The detailed log of the formation cored is as follows:

Depth Interval, Feet	Description
810.7 - 811.7	Gray and light brown shaly sandstone.
811.7 - 815.0	Brown and gray shaly sandstone.
815.0 - 816.4	Brown, fine grained sandstone.
816.4 - 824.0	Gray and brown shaly sandstone.
824.0 - 830.5	Shale.

Coring was started at a depth of 810.7 feet in gray and light brown shaly sandstone and completed at 830.5 feet in shale. This core shows a total of 14.0 feet of sandstone. For the most part, the pay is made up of brown fine grained 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 29.0 and 0.89 millidarcys respectively; the overall average being 24.6 (See Table III). By observing the data given on the coregraph, it is noticeable that the sand has a wide variation in permeability. The permeability of the sand varies from impermeable to a maximum of 95. millidarcys.

PERCENT SATURATION & OIL CONTENT

The sand in this core shows a fairly low weighted average percent oil saturation, namely, 24.6. The weighted average percent oil saturation of the upper and lower sections is 24.5 and 24.8 respectively. The weighted average percent water saturation of the upper and lower sections

is 59.0 and 62.6 respectively; the overall average being 60.6 (See Table III). This gives an overall weighted average total fluid saturation of 85.2 percent.

The weighted average oil content of the upper and lower sections is 396 and 416 barrels per acre foot respectively; the overall average being 405. The total oil content, as shown by this core, is 5,589 barrels per acre (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 239 barrels of oil per acre was obtained from 1.4 feet of sand. The weighted average percent oil saturation was reduced from 34.0 to 25.0, or represents an average recovery of 9.0 percent. The weighted average effective permeability of the sample is 12.50 millidarcys, while the average initial fluid production pressure is 20.0 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 10 samples tested, 3 produced water and 1 oil. This indicates that approximately 30 percent of the sand represented by these samples will take water.

CONCLUSION

On the basis of the above data, it is evident that approximately 240 barrels of oil per acre can be recovered from the area, represented by this core, by efficient primary production methods. An additional recovery of approximately 585 barrels of oil per acre can be expected by efficient water-flooding. In calculating the above oil recovery values, the following data and assumptions were employed:

Original formation volume factor	1.06
Present formation volume factor	1.06
Irreducible water saturation, percent	34.0

Primary recovery, estimated, percent	None.
Present oil saturation, percent	63.5
Average porosity, percent	23.7
Oil saturation after flooding, percent	28.0
Performance factor, percent	0.50
Net floodable pay sand, feet	2.2

This core shows a shaly sand section having a fairly low oil saturation, a high water saturation and a wide variation in permeability. Apparently, this well was drilled near the edge of the trend.

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Langdon & Finch **Lease** Dretsinger **Well No.** 1

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.		
P-1	810.8						Imp.	0.2	0.2		0.00
1	811.0	19.0	30	36	66	442	-	0.8	1.0	354	-
2	811.8	22.3	24	55	79	415	24.	0.6	1.6	249	14.40
3	812.8	22.7	22	63	85	387	18.	1.2	2.8	464	21.60
4	814.3	15.6	11	77	88	133	-	1.5	4.3	199	-
5	815.4	24.3	34	40	74	642	95.	1.4	5.7	899	123.50
6	816.5	18.6	34	53	87	491	1.3	0.5	6.2	245	0.06
7	817.3	20.8	40	54	94	646	0.20	0.8	7.0	517	0.16
8	818.2	16.3	13	82	95	164	0.31	1.0	8.0	164	0.31
9	819.2	22.4	34	50	84	591	Imp.	1.0	9.0	591	0.00
10	820.2	22.4	32	51	83	556	Imp.	1.0	10.0	556	0.00
11	821.1	16.8	7	83	90	91	0.89	1.0	11.0	91	0.89
12	822.1	16.8	14	79	93	182	Imp.	1.0	12.0	182	0.00
13	823.1	20.8	28	62	90	452	-	1.3	13.3	452	-
14	829.9	22.4	36	45	81	626	Imp.	0.7	14.0	626	0.00

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Langdon & Finch Lease Kretsinger Well No. 1

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
811.7 - 818.7	5.5	29.0	160.03
820.7 - 821.7	1.0	0.89	0.89
811.7 - 821.7	6.5	24.6	160.92

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
810.9 - 818.7	7.8	19.9	24.5	59.0	396	3,091
818.7 - 830.5	6.0	20.2	24.8	62.6	416	2,498
810.9 - 830.5	13.8	20.0	24.6	60.6	405	5,589

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Langdon & Finch Lease Kretsinger Well No. 1

Sample No.	Depth, Feet	Effective Porosity Percent	Original Oil Saturation		Oil Recovery		Residual Saturation			Volume of Water Recovered cc*	Effective Permeability Millidarcys**	Initial Field Production Pressure Lbs./Sq./In.
			%	Bbls./A. Ft.	%	Bbls./A. Ft.	% Oil	% Water	Bbls./A. Ft.			
1	811.0	19.4	27	406	0	0	27	60	406	36	0.653	30
2	811.8	21.8	26	440	0	0	26	66	440	12	0.276	30
3	812.8	22.1	20	343	0	0	20	67	343	0	Imp.	-
4	814.3	15.9	9	111	0	0	9	81	111	0	Imp.	-
5	815.4	24.5	34	646	9	171	25	70	475	324	12.50	20
8	818.2	16.0	11	137	0	0	11	86	137	0	Imp.	-
9	819.2	22.0	31	530	0	0	31	58	530	0	Imp.	-
11	821.1	17.0	5	66	0	0	5	87	66	0	Imp.	-
12	822.1	16.4	12	153	0	0	12	84	153	0	Imp.	-
14	829.9	22.0	33	564	0	0	33	52	564	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.