

OILFIELD RESEARCH LABORATORIES

- REGISTERED ENGINEERS -

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June 9, 1962

Langdon & Finch
309 East 5th
Ottawa, Kansas

Gentlemen:

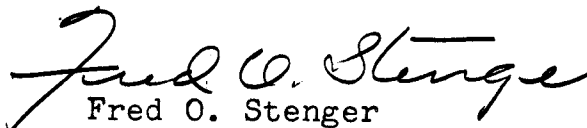
Enclosed herewith is the report of the analysis of the Cable Tool core taken from the Glen Kalb Lease, Well No. 2, Douglas County, Kansas, and submitted to our laboratory on June 4, 1962.

This core was sampled and the samples sealed in cans by a representative of Oilfield Research Laboratories.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES


Fred O. Stenger

FOS:rf

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GENERAL INFORMATION & SUMMARY

Company Langdon & Finch Lease Glen Kalb Well No. 2

Location NW N $\frac{1}{2}$ NE $\frac{1}{4}$

Section 12 Twp. 15S Rge. 21E County Douglas State Kansas

Name of Sand	- - - - -	Squirrel
Top of Core	- - - - -	831.8
Bottom of Core	- - - - -	851.4
Top of Sand	- - - - -	?
Good Bottom of Sand	- - - - -	845.2
Total Feet of Permeable Sand	- - - - -	15.7
Total Feet of Floodable Sand	- - - - -	11.4

Distribution of Permeable Sand:
Permeability Range
Millidarcys

Feet

Cum. Ft.

0 - 10	6.3	6.3
10 - 100	5.7	12.0
100 & above	3.7	15.7

Average Permeability Millidarcys	- - - - -	58.4
Average Percent Porosity	- - - - -	20.6
Average Percent Oil Saturation	- - - - -	32.6
Average Percent Water Saturation	- - - - -	49.9
Average Oil Content, Bbls./A. Ft.	- - - - -	516.
Total Oil Content, Bbls./Acre	- - - - -	9,394.
Average Percent Oil Recovery by Laboratory Flooding Tests	- - - - -	9.0
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	- - - - -	153.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	- - - - -	1,742.
Total Calculated Oil Recovery, Bbls./Acre	- - - - -	3,380.
Packer Setting, Feet	- - - - -	
Viscosity, Centipoises @	- - - - -	
A. P. I. Gravity, degrees @ 60 °F	- - - - -	
Elevation, Feet	- - - - -	1082.2

Primary = 1,254
W.F. = 2,126
Total = 3,380

Fresh water was used in the coring of the sand in this well. This core was taken from a virgin formation.

FORMATION CORED

The detailed log of the formation cored is as follows:

<u>Depth Interval,</u> <u>Feet</u>	<u>Description</u>
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831.8 - 845.2	- Brown, laminated, slightly shaly sandstone.
845.2 - 847.3	- Dark carbonaceous, laminated, shaly sandstone.
847.3 - 850.0	- Laminated sandstone and shale.
850.0 - 851.4	- Sandy shale.

Coring was started at a depth of 831.8 feet in brown, laminated, slightly shaly sandstone and completed at 851.4 feet in sandy shale. This core shows a total of 15.5 feet of sandstone. For the most part, the pay is made up of brown, laminated, 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 29.2 and 86.6 millidarcys respectively; the overall average being 58.4 (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 0.25 to a maximum of 252. millidarcys. It should be noted that there are no air perms for samples No. 9 and 18. This is because the samples were broken so small that plugs could not be obtained from them.

PERCENT SATURATION & OIL CONTENT

The sand in this core shows a good weighted average percent oil saturation, namely, 32.6. The weighted average percent oil saturation of the upper and lower sections is 32.0 and 33.1 respectively. The weighted average percent water saturation of the upper and lower sections

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is 45.0 and 53.4 respectively; the overall average being 49.9 (See Table III). This gives an overall weighted average total fluid saturation of 82.5 percent. This somewhat low total fluid saturation indicates some fluid was lost during coring which probably was oil.

The weighted average oil content of the upper and lower sections is 512 and 518 barrels per acre foot respectively; the overall average being 516. The total oil content, as shown by this core, is 9,394 barrels per acre of which 5,449 barrels are in the lower sand section (See Table III).

LABORATORY FLOODING TESTS

The sand in this core responded fairly well to laboratory flooding tests, as a total recovery of 1,742 barrels of oil per acre was obtained from 11.4 feet of sand. The weighted average percent oil saturation was reduced from 34.5 to 25.5, or represents an average recovery of 9.0 percent. The weighted average effective permeability of the samples is 8.25 millidarcys, while the average initial fluid production pressure is 28.2 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 15 samples tested, 12 produced water and 12 oil. This indicates that approximately 80 percent of the sand represented by these samples is floodable pay sand. The tests also show that the sand has a good effective permeability and, for the most part, should take water quite readily.

CONCLUSION

Based on the results of the above laboratory tests and assuming an efficient water-flood operation, within the vicinity of this well, it is believed that this well should recover approximately 3,380 barrels of oil per acre or an average of 296 barrels per acre foot from the 11.4 feet of floodable sand analyzed. In calculating this oil recovery value

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the following facts and assumptions were used:

Original formation volume factor	1.08
Present formation volume factor	1.02
Reservoir water saturation, percent	38.
Primary recovery, estimated, percent	None.
Present oil saturation, percent	58.5
Average porosity, percent	21.5
Oil saturation after flooding, percent	25.5
Performance factor, percent	55.
Net floodable pay sand, feet	11.4

This core shows a pay section which is laminated and slightly shaly with a good oil saturation and a good effective permeability to water.

RESULTS OF SATURATION & PERMEABILITY TESTS

**Langdon & Finch
Company**

Lease
Glen Kalb

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	832.0	19.4	35	45	80	527	22.	0.7	0.7	369	15.40
2	833.1	19.8	28	47	75	430	29.	1.0	1.7	430	29.00
3	834.1	19.8	36	43	79	554	7.4	1.0	2.7	554	7.40
4	835.1	19.4	32	44	76	482	1.7	1.0	3.7	482	1.70
5	836.1	18.7	29	50	79	421	5.1	1.0	4.7	421	5.10
6	837.1	22.6	33	41	74	580	13.	1.0	5.7	580	13.00
7	838.1	25.6	35	39	74	695	32.	1.0	6.7	695	32.00
8	839.1	18.4	29	51	80	414	121.	1.0	7.7	414	121.00
9	840.1	18.5	32	55	87	460	r	1.0	8.7	460	-
10	841.1	24.0	34	37	71	635	66.	1.0	9.7	635	66.00
11	842.1	22.4	36	42	78	627	252.	1.0	10.7	627	252.00
12	843.1	22.6	37	41	78	650	206.	1.0	11.7	650	206.00
13	844.1	22.4	42	40	82	731	85.	1.0	12.7	731	85.00
14	845.1	21.0	36	45	81	587	110.	0.7	13.4	410	77.00
15	846.1	21.2	29	53	82	477	0.25	1.3	14.7	620	0.33
16	847.1	20.0	54	38	92	840	7.6	0.8	15.5	672	6.08
17	848.1	17.9	25	70	95	347	0.57	1.2	16.7	416	0.68
18	849.5	15.1	13	83	96	152	-	1.5	18.2	228	-
								Total	-----	9,394	

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SUMMARY OF PERMEABILITY & SATURATION TESTS
TABLE III

Company		Lease		Well No.	
Langdon & Finch		Glen Kalb		2	
Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, mDarcy	Permeability Capacity Fr. $\pm$ Md.		
831.8 - 839.5	7.7	29.2	224.60		
840.5 - 848.5	8.0	86.6	693.09		
831.8 - 848.5	15.7	58.4	917.69		

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
831.8 - 839.5	7.7	20.5	32.0	45.0	512	3,945
839.5 - 850.0	10.5	20.6	33.1	53.4	518	5,449
831.8 - 850.0	18.2	20.6	32.6	49.9	516	9,394

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company		Langdon & Finch		Lease		Glen Kalb		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 mDarcy ^{**}	Initial Field Production Pressure Lbs./Sq./In.
			%	Ebbs./A. Ft.	%	Ebbs./A. Ft.	% Oil	% Water			
1	832.0	19.3	35	524	10	150	25	68	8	0.340	40
2	833.1	19.7	28	428	0	0	28	60	0	Imp.	50+
3	834.1	19.9	36	556	11	170	25	65	96	4.65	30
4	835.1	19.5	32	484	3	45	29	64	194	8.51	30
5	836.1	18.6	29	418	3	43	26	65	2	0.299	50
6	837.1	22.7	33	581	12	211	21	64	34	0.900	30
7	838.1	25.5	35	692	10	198	25	65	280	24.00	20
8	839.1	18.5	29	416	7	100	22	75	105	7.09	20
10	841.1	23.9	34	630	7	130	27	66	334	24.80	20
11	842.1	22.5	36	629	15	262	21	71	124	5.69	30
12	843.1	22.6	37	650	9	158	28	69	190	8.97	20
13	844.1	22.5	42	734	15	263	27	62	108	5.75	30
14	845.1	21.1	36	590	5	82	31	64	126	4.44	20
15	846.1	21.2	29	477	0	0	29	53	0	Imp.	50+
16	847.1	20.0	54	840	0	0	54	38	0	Imp.	50+

Notes: cc—cubic centimeter.

^a—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 V

Company	Langdon & Finch	Lease	Glen Kalb	Well No.	2
Depth Interval, Feet	831.8 - 839.5	840.5 - 845.2	831.8 - 845.2		
Feet of Core Analyzed	6.7	4.7	11.4		
Average Percent Porosity	20.7	22.6	21.5		
Average Percent Original Oil Saturation	32.6	37.0	34.5		
Average Percent Oil Recovery	7.9	10.5	9.0		
Average Percent Residual Oil Saturation	24.7	26.5	25.5		
Average Percent Residual Water Saturation	66.5	66.6	66.6		
Average Percent Total Residual Fluid Saturation	91.2	93.1	92.1		
Average Original Oil Content, Bbls./A. Ft.	524.	671.	577.		
Average Oil Recovery, Bbls./A. Ft.	130.	185.	153.		
Average Residual Oil Content, Bbls./A. Ft.	394.	486.	424.		
Total Original Oil Content, Bbls./Acre	3,514.	3,056.	6,570.		
Total Oil Recovery, Bbls./Acre	872.	870.	1,742.		
Total Residual Oil Content, Bbls./Acre	2,642.	2,186.	4,828.		
Average Effective Permeability, Millidarcys	6.82	10.27	8.25		
Average Initial Fluid Production Pressure, p.s.i.	31.1	24.3	28.2		

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