



OILFIELD RESEARCH LABORATORIES

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August 16, 1979

C-K Oil Company
c/o Mr. Glenn Caldwell
P. O. Box 42
Garnett, Kansas 66032

Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core taken from the Kirk Lease, Well No. 23, Anderson County, Kansas, and submitted to our laboratory on August 13, 1979.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Benjamin R. Pearman
Benjamin R. Pearman

BRP:dlb

5 c to Garnett, Kansas

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GENERAL INFORMATION & SUMMARY

Company C-K Oil Company Lease Kirk Well No. 23

Location SW SE

Section 8 Twp. 21S Rge. 20E County Anderson State Kansas

Name of Sand	- - - - -	Squirrel
Top of Core	- - - - -	777.0
Bottom of Core	- - - - -	795.0
Top of Sand	- - - - -	777.0
Bottom of Sand	- - - - -	795.0
Total Feet of Permeable Sand	- - - - -	16.0
Total Feet of Floodable Sand	- - - - -	12.0

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.
0 - 1	5.0	5.0
1 - 10	4.1	9.1
10 - 31	5.5	14.6
31 & Above	1.4	16.0

Average Permeability Millidarcys	- - - - -	25.8
Average Percent Porosity	- - - - -	16.3
Average Percent Oil Saturation	- - - - -	35.2
Average Percent Water Saturation	- - - - -	54.0
Average Oil Content, Bbls./A. Ft.	- - - - -	460.
Total Oil Content, Bbls./Acre	- - - - -	8,269.
Average Percent Oil Recovery by Laboratory Flooding Tests	- - - - -	10.5
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	- - - - -	163.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	- - - - -	1,956.
Total Calculated Oil Recovery, Bbls./Acre	(Primary & Waterflooding)	2,180.
Packer Setting, Feet	- - - - -	
Viscosity, Centipoises @	- - - - -	
A. P. I. Gravity, degrees @ 60 °F	- - - - -	
Elevation, Feet	- - - - -	

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This core was sampled by a representative of Oilfield Research Laboratories. The well was drilled in non-virgin territory. Fresh water mud was used as the circulating fluid while taking this core.

FORMATION CORED

The detailed log of the formation cored is as follows:

<u>Depth Interval, Feet</u>	<u>Description</u>
777.0 - 781.0	Brown and gray laminated sandstone and shale 30% sandstone.
781.0 - 786.8	Brown shaly sandstone.
786.8 - 789.4	Brown sandstone.
789.4 - 791.2	Brown slightly shaly sandstone.
791.2 - 793.0	Brown shaly sandstone.
793.0 - 794.2	Light brown very shaly sandstone.
794.2 - 795.0	Brown slightly shaly sandstone.

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 1,956 barrels of oil per acre was obtained from 12.0 feet of sand. The weighted average percent oil saturation was reduced from 40.9 to 30.4, or represents an average recovery of 10.5 percent. The weighted average effective permeability of the samples is 1.44 millidarcys, while the average initial fluid production pressure is 32.0 pounds per square inch (See Table V).

CALCULATED RECOVERY

The results of the laboratory testing indicates that efficient primary and waterflooding operations in the vicinity of this well should recover approximately 2,180 barrels of oil per acre. This is an average recovery of 181 barrels per acre foot from the 12.0

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feet of floodable sand analyzed in this core.

These recovery values were calculated using the following data and assumptions:

Original formation volume factor	1.08
Reservoir water saturation, percent	35.0
Average porosity, percent	17.5
Oil saturation after flooding, percent	30.4
Performance factor, percent	45.0
Net floodable pay sand, feet	12.0

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company C-K Oil Company Lease Kirk Well No. 23

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			Ft.	Cum. Ft.		
1	777.5	17.2	49	32	654	0.56	1.0	1.0	654	0.56
2	778.7	14.6	28	65	317	Imp.	1.0	2.0	317	0.00
3	779.5	20.4	36	49	570	1.1	1.0	3.0	570	1.10
4	780.5	14.6	28	59	317	11.	1.0	4.0	317	11.00
5	781.4	20.6	38	43	607	31.	1.0	5.0	607	31.00
6	782.4	17.0	34	55	448	22.	1.0	6.0	448	22.00
7	783.4	13.6	15	76	158	0.26	1.0	7.0	158	0.26
8	784.4	12.4	21	75	202	Imp.	1.0	8.0	202	0.00
9	785.4	13.6	29	67	306	0.33	1.0	9.0	306	0.33
10	786.4	13.9	34	62	367	0.63	0.8	9.8	294	0.50
11	787.4	19.2	46	40	685	19.	1.2	11.0	822	22.80
12	788.6	19.5	46	43	696	203.	1.4	12.4	975	284.20
13	789.5	18.4	43	42	614	5.5	0.5	12.9	307	2.75
14	790.4	17.6	41	46	560	12.	1.3	14.2	728	15.60
15	791.3	15.5	38	54	456	8.9	0.8	15.0	365	7.12
16	792.4	14.2	39	48	429	6.6	1.0	16.0	429	6.60
17	793.3	13.5	18	75	189	0.24	1.2	17.2	227	0.29
18	794.3	16.2	54	39	679	8.4	0.8	18.0	543	6.72

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company		Lease		Well No.			
C-K Oil Company		Kirk		23			
Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.	Average Percent Oil Saturation	Average Percent Water Saturation	Average Oil Content Bbl./A. Ft.	Total Oil Content Bbls./Acre
777.0 - 781.0	3.0	4.2	12.66	35.3	51.4	465	1,858
781.0 - 795.0	13.0	30.8	400.17	35.2	54.9	459	6,411
777.0 - 795.0	16.0	25.8	412.83	35.2	54.0	460	8,269

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

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.
			%	Bbbls./A. Ft.	%	Bbbls./A. Ft.	% Oil	% Water			
1	777.5	17.6	49	669	17	232	32	59	7	0.20	45
2	778.7	15.0	27	314	0	0	27	68	0	Imp.	-
3	779.5	20.1	36	561	3	47	33	66	42	0.90	30
4	780.5	14.9	28	324	2	23	26	73	48	1.10	30
5	781.4	20.1	38	593	7	109	31	68	107	2.20	30
6	782.4	17.5	34	462	3	41	31	66	109	2.20	30
7	783.4	13.8	18	193	0	0	18	78	0	Imp.	-
8	784.4	12.4	21	202	0	0	21	77	0	Imp.	-
9	785.4	14.0	27	293	0	0	27	70	0	Imp.	-
10	786.4	14.0	34	369	0	0	34	65	0	Imp.	-
11	787.4	19.6	46	699	17	258	29	70	110	2.30	30
12	788.6	19.5	46	696	19	408	27	73	145	3.00	30
13	789.5	18.8	43	627	13	190	30	68	48	1.10	30
14	790.4	18.0	41	573	11	154	30	69	53	1.10	30
15	791.3	15.6	38	460	6	73	32	66	36	0.80	30
16	792.4	14.7	39	445	6	68	33	65	35	0.80	35
17	793.3	13.5	19	199	0	0	19	75	0	Imp.	-
18	794.3	16.3	54	683	20	253	34	63	8	0.30	35

Company C-K Oil Company Lease Kirk Well No. 23

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.

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SUMMARY OF LABORATORY FLOODING TESTS

TABLE V

Company	Lease	Kirk	Well No.
C-K Oil Company			23
Depth Interval, Feet	777.0 - 781.0	781.0 - 795.0	777.0 - 795.0
Feet of Core Analyzed	3.0	9.0	12.0
Average Percent Porosity	17.5	17.5	17.5
Average Percent Original Oil Saturation	37.6	42.2	40.9
Average Percent Oil Recovery	7.3	11.6	10.5
Average Percent Residual Oil Saturation	30.3	30.6	30.4
Average Percent Residual Water Saturation	66.0	68.0	67.5
Average Percent Total Residual Fluid Saturation	96.3	98.6	97.9
Average Original Oil Content, Bbls./A. Ft.	519.	588.	569.
Average Oil Recovery, Bbls./A. Ft.	101.	184.	163.
Average Residual Oil Content, Bbls./A. Ft.	418.	404.	406.
Total Original Oil Content, Bbls./Acre	1,554.	5,288.	6,842.
Total Oil Recovery, Bbls./Acre	302.	1,654.	1,956.
Total Residual Oil Content, Bbls./Acre	1,252.	3,634.	4,886.
Average Effective Permeability, Millidarcys	0.73	1.67	1.44
Average Initial Fluid Production Pressure, p.s.i.	35.0	31.1	32.0

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