L. F. KEPLEY

CORE ANALYSIS REPORT

KEPLEY LEASE WELL NO. 3

NEOSHO COUNTY, KANSAS

OILFIELD RESEARCH LABORATORIES
336 N. HIGHLAND CHANUTE, KANSAS

OILFIELD RESEARCH LABORATORIES
536 NORTH HIGHLAND - CHANUTE, KANSAS 66720 - PHONE (316) 431-2650

January 23, 1975

L. F. Kepley
4226 Gold
Wichita, Kansas 67217

Dear Sir:

Enclosed herewith is the report of the analysis of the Rotary cores taken from the Kepley Lease, Well No. 3, Neosho County, Kansas, and submitted to our laboratory on January 16, 1975.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Carl L. Pate

CLP:bl
4 c to Wichita, Kansas
1 c to Osage Drilling
Chanute, Kansas

Oilfield Research Laboratories

GENERAL INFORMATION & SUMMARY

Company L. F. Kepley Lease Kepley Well No. 3

Location 750' EWL & 800' NSL, SE¼

Section 2 Twp. 28S Rge. 17E County Neosho State Kansas

Name of Sand	Squirrel
Top of Core	686.0
Bottom of Core	711.0
Top of Oil Sand	695.2
Bottom of Sand (Cored)	711.0
Total Feet of Permeable Sand (Analyzed)	14.4
Total Feet of Floodable Sand	6.7

Distribution of Permeable Sand:

Permeability Range Millidarcys	Feet	Cum. Ft.
0 - 5	5.0	5.0
5 - 10	4.1	9.1
10 - 40	3.6	12.7
40 & above	1.7	14.4

Average Permeability Millidarcys	15.9
Average Percent Porosity	15.8
Average Percent Oil Saturation	51.4
Average Percent Water Saturation	27.4
Average Oil Content, Bbls./A. Ft.	631.
Total Oil Content, Bbls./Acre	9,466.
Average Percent Oil Recovery by Laboratory Flooding Tests	8.4
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	119.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	680.
Total Calculated Oil Recovery, Bbls./Acre (Primary & Secondary)	1,962
Packer Setting, Feet	
Viscosity, Centipoises @	
A. P. I. Gravity, degrees @ 60 °F	
Elevation, Feet	

Oilfield Research Laboratories

GENERAL INFORMATION & SUMMARY

Company L. F. Kepley Lease Kepley Well No. 3

Location 750' EWL & 800' NSL, SE¼

Section 2 Twp. 28S Rge. 17E County Neosho State Kansas

Name of Sand	Tucker(?)
Top of Core	925.0
Bottom of Core	950.2
Top of Sand (Cored)	929.0
Bottom of Sand (Cored)	950.2
Total Feet of Permeable Sand (Analyzed)	5.4
Total Feet of Floodable Sand	

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.
0 - 1	3.0	3.0
1 & above	2.4	5.4

Average Permeability Millidarcys	4.3
Average Percent Porosity	14.8
Average Percent Oil Saturation	26.8
Average Percent Water Saturation	59.2
Average Oil Content, Bbls./A. Ft.	311.
Total Oil Content, Bbls./Acre	3,298.
Average Percent Oil Recovery by Laboratory Flooding Tests	
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	
Total Calculated Oil Recovery, Bbls./Acre	
Packer Setting, Feet	
Viscosity, Centipoises @	
A. P. I. Gravity, degrees @ 60 °F	
Elevation, Feet	

A fresh water mud was used as a circulating fluid in the coring of the sands in this well. This well was drilled in a virgin area. The cores were sampled by a representative of the client.

FORMATION CORED

The detailed log of the formation cored is as follows:

Depth Interval, Feet	Description
	Squirrel Sand
686.0 - 694.2	Gray shale.
694.2 - 695.2	Hard gray calcareous sandstone.
695.2 - 700.2	Dark brown slightly shaly sandstone.
700.2 - 702.8	Dark brown slightly carbonaceous sandstone.
702.8 - 703.6	Grayish brown shaly sandstone.
703.6 - 705.7	Dark brown carbonaceous sandstone.
705.7 - 711.0	Dark carbonaceous very shaly sandstone.
	Tucker Sand
925.0 - 925.3	Brown sandstone.
925.3 - 925.7	Gray sandy shale.
925.7 - 926.0	Brown sandstone.
926.0 - 929.0	Gray sandy shale.
929.0 - 941.2	Grayish light brown finely laminted very shaly sandstone.
941.2 - 950.2	Grayish brown laminated very shaly sandstone.

Squirrel Sand

Coring was started at a depth of 686.0 feet in gray shale and completed at 711.0 feet in dark carbonaceous very shaly sandstone. This core shows a total of 16.8 feet of sandstone. For the most part, the pay is made up of dark brown slightly shaly to carbonaceous 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 22.0 and 1.6 millidarcys respectively; the overall average being 15.9 (See Table III). By observing the data given on the core-graph, it is noticeable that the sand has a very irregular permeability profile. The permeability of the sand varies from impermeable to a maximum of 53 millidarcys.

PERCENT SATURATION & OIL CONTENT

The sand in this core shows a good weighted average percent oil saturation, namely, 51.4. The weighted average percent oil saturation of the upper and lower sections is 51.0 and 52.2 respectively. The weighted average percent water saturation of the upper and lower sections is 26.8 and 28.5 respectively; the overall average being 27.4 (See Table III). This gives an overall weighted average total fluid saturation of 78.8 percent. This fairly low total fluid saturation indicates some fluid was lost during coring which was probably oil.

The weighted average oil content of the upper and lower sections is 666 and 567 barrels per acre foot respectively; the overall average being 631. The total oil content, as shown by this core, is 9,466 barrels per acre (See Table III).

LABORATORY FLOODING TESTS

Part of the sand in this core responded fairly well to laboratory flooding tests, as a total recovery of 680 barrels of oil per acre was obtained from 5.7 feet of sand. The weighted average percent oil satura-

tion was reduced from 54.4 to 46.0, or represents an average recovery of 8.4 percent. The weighted average effective permeability of the samples is 2.86 millidarcys, while the average initial fluid production pressure is 22.4 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 16 samples tested, 10 produced water and 7 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 high residual oil saturation. This indicates that the reservoir oil may have a rather high viscosity.

CONCLUSION

On the basis of the above data we estimate that approximately 1,962 barrels of oil per acre can be recovered from the sand reservoir, represented by this core, by efficient primary and waterflood operations. The following data and assumptions were used in calculating the above oil recovery value:

Present formation volume factor	1.03
Irreducible water saturation, percent	16.0
Primary recovery	None
Present oil saturation, percent	81.6
Average porosity, percent	18.0
Oil saturation after flooding, percent	46.0
Performance factor	0.50
Net floodable pay sand, feet	6.7

The core shows a somewhat shaly and carbonaceous sand section

having a good oil saturation, a low water saturation and a fair permeability and porosity. The tests show that the better sand extends from a depth of 697.2 to 705.7 feet.

It is very doubtful whether ir would be profitable to complete this well in the lower sand.

RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company L. F. Kepley Lease Kepley Well No. 3

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.		
						Squirrel Sand					
1	695.7	13.5	46	38	84	482	2.4	1.0	1.0	482	2.40
2	696.7	13.8	54	37	91	578	7.5	1.0	2.0	578	7.50
3	697.7	16.4	45	35	80	573	12.	1.0	3.0	573	12.00
4	698.7	17.3	47	29	76	631	7.3	1.0	4.0	631	7.30
5	699.6	16.7	40	29	69	519	4.6	1.0	5.0	519	4.60
6	700.6	19.0	56	26	82	826	38.	0.9	5.9	743	34.20
7	701.6	17.7	47	24	71	646	39.	1.0	6.9	646	39.00
8	702.5	17.5	65	20	85	883	33.	0.7	7.6	618	23.10
P-9	703.5	-	-	-	-	-	6.4	0.8	8.4	-	5.12
9	703.7	18.6	49	17	66	708	-	0.4	8.8	287	-
10	704.4	18.1	61	14	75	858	53.	1.0	9.8	858	53.00
11	705.5	17.2	56	14	70	748	48.	0.7	10.5	524	33.60
12	706.5	13.8	52	30	82	557	5.0	1.3	11.8	724	6.50
13	707.5	15.3	47	33	80	558	0.23	1.0	12.8	558	0.23
14	708.5	13.6	58	25	83	612	0.16	1.0	13.8	612	0.16
15	709.5	13.3	48	28	76	496	0.18	1.0	14.8	496	0.18
16	710.5	14.2	56	26	82	617	Imp.	1.0	15.8	617	0.00

RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company L. F. Kepley Lease Kepley Well No. 3

Sample No.	Depth, Feet	Effective Porosity Percent	Percent Saturation			Oil Content Bbls. / A Ft.	Perm., Mil.	Feet of Sand		Total Oil Content	Perm. Capacity Ft. X md.
			Oil	Water	Total			Ft.	Cum. Ft.		
						Tucker Sand(?)					
17	925.1	19.8	14	57	71	215	27.	0.3	0.3	64	8.10
18	925.9	16.5	16	64	80	205	16.	0.3	0.6	62	4.80
19	929.6	14.9	29	65	94	335	0.26	1.0	1.6	335	0.26
20	930.3	13.7	16.	78	94	170	Imp.	1.0	2.6	170	0.00
21	941.8	16.6	29	50	79	374	7.3	0.8	3.4	299	5.84
22	942.5	16.1	30	65	95	375	Imp.	1.0	4.4	375	0.00
23	943.5	14.6	37	58	95	419	0.87	1.0	5.4	419	0.87
24	944.3	16.8	39	38	77	509	2.9	1.0	6.4	509	2.90
25	946.5	13.3	20	50	70	207	Imp.	1.0	7.4	207	0.00
26	947.5	13.7	19	70	89	202	Imp.	1.0	8.4	202	0.00
27	948.5	14.6	24	54	78	272	0.62	1.0	9.4	272	0.62
28	949.5	12.9	32	61	93	320	Imp.	1.2	10.6	384	0.00

Oilfield Research Laboratories

SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company L. F. Kepley Lease Kepley Well No. 3

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
	Squirrel Sand		
695.2 - 705.7	10.1	22.0	221.82
705.7 - 711.0	4.3	1.6	7.07
695.2 - 711.0	14.4	15.9	228.89

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
695.2 - 705.7	9.7	16.7	51.0	26.8	666	6,459
705.7 - 711.0	5.3	14.0	52.2	28.5	567	3,007
695.2 - 711.0	15.0	15.8	51.4	27.4	631	9,466

Oilfield Research Laboratories

RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company L. F. Kepley Lease Kepley Well No. 3

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.
			%	Bbls./A. Ft.	%	Bbls./A. Ft.	% Oil	% Water	Bbls./A. Ft.			
						Squirrel Sand						
1	695.7	13.1	42	427	0	0	42	46	427	3	0.10	40
2	696.7	14.7	49	560	0	0	49	47	560	12	0.33	30
3	697.7	17.3	43	578	0	0	43	56	578	22	0.60	25
4	698.7	17.5	47	638	2	27	45	54	611	17	0.40	30
5	699.6	16.0	43	534	0	0	43	30	534	0	Imp.	-
6	700.6	18.4	56	800	14	200	42	56	600	204	6.50	15
7	701.6	17.0	47	620	1	13	46	51	607	17	0.40	30
8	702.5	18.7	65	943	16	232	49	50	711	160	5.00	15
9	703.7	19.3	49	734	5	75	44	52	659	235	8.40	15
10	704.4	18.8	61	890	14	204	47	50	686	78	2.40	20
11	705.5	17.0	56	738	7	92	49	43	646	20	0.60	25
12	706.5	14.2	48	529	0	0	48	36	529	0	Imp.	-
13	707.5	14.5	50	563	0	0	50	34	563	0	Imp.	-
14	708.5	14.1	53	580	0	0	53	35	580	0	Imp.	-
15	709.5	13.8	45	482	0	0	45	35	482	0	Imp.	-
16	710.5	13.6	52	549	0	0	52	33	549	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.

Oilfield Research Laboratories

SUMMARY OF LABORATORY FLOODING TESTS

TABLE V

Company L. F. Kepley Lease Kepley Well No. 3

Depth Interval, Feet	698.2 - 705.7
Feet of Core Analyzed	5.7
Average Percent Porosity	18.0
Average Percent Original Oil Saturation	54.4
Average Percent Oil Recovery	8.4
Average Percent Residual Oil Saturation	46.0
Average Percent Residual Water Saturation	51.1
Average Percent Total Residual Fluid Saturation	97.1
Average Original Oil Content, Bbls./A. Ft.	761.
Average Oil Recovery, Bbls./A. Ft.	119.
Average Residual Oil Content, Bbls./A. Ft.	642.
Total Original Oil Content, Bbls./Acre	4,338.
Total Oil Recovery, Bbls./Acre	680.
Total Residual Oil Content, Bbls./Acre	3,658.
Average Effective Permeability, Millidarcys	2.86
Average Initial Fluid Production Pressure, p.s.i.	22.4

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