September 12, 1950

Layton Oil Company
P. O. Box 263
Independence, Kansas

Gentlemen:

Enclosed herewith is the report of the analysis made on the No. 6 Baker barrel core taken from the Saxon Lease, Well No. 1, Montgomery County, Kansas, and submitted to our laboratory on September 4, 1950.

Very truly yours,

OIL FIELD RESEARCH LABORATORIES

Carl L. Pate

CLP:bb
c.c.

I-32-15E

Saxon 1

LAYTON OIL COMPANY

CORE ANALYSIS REPORT

BAXON LEASE WELL NO. 1

MONTGOMERY COUNTY, KANSAS

OIL FIELD RESEARCH LABORATORIES

CHANUTE, KANSAS

SEPTEMBER 12, 1950

Oil Field Research Laboratories

GENERAL INFORMATION & SUMMARY

Company Layton Oil Company Lease Saxon Well No. 1

Location 165' North of South Line & 1485' East of West Line, NE¼,

Section 12 Twp. 32 Rge. 15 County Montgomery State Kansas

Peru Formation

Name of Sand	Peru
Top of Core	563.00
Bottom of Core	566.00
Top of Sand	?
Bottom of Sand	566.00
Total Feet of Permeable Sand	-

Distribution of Permeable Sand:

Permeability Range Millidarcys	Feet	Cum. Ft.

Average Permeability, Millidarcys	-
Average Percent Porosity	15.52
Average Percent Oil Saturation	23.79
Average Percent Water Saturation	55.86
Average Oil Content, Bbls./A. Ft.	286.
Total Oil Content, Bbls./Acre	83.
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	

Oil Field Research Laboratories

GENERAL INFORMATION & SUMMARY

Company Layton Oil Company Lease Sozan Well No. 1

Location 165' North of South Line & 1485' East of West Line, NE¼,

Section 12 Twp. 32 Rge. 15 County Montgomery State Kansas

Bartlesville Sand

Name of Sand	Bartlesville
Top of Core	834.00
Bottom of Core	882.00
Top of Sand	836.15
Bottom of Sand	866.80
Total Feet of Permeable Sand	14.15

Distribution of Permeable Sand:

Permeability Range Millidarcys	Feet	Cum. Ft.
0 - 2	5.45	5.45
2 - 4	5.45	10.90
4 - 8	1.65	12.55
8 - 12	1.30	13.85
12 & above	0.30	14.15

Average Permeability, Millidarcys	3.35
Average Percent Porosity	13.23
Average Percent Oil Saturation	15.63
Average Percent Water Saturation	64.63
Average Oil Content, Bbls./A. Ft.	175.
Total Oil Content, Bbls./Acre	2,345.
Average Percent Oil Recovery by Laboratory Flooding Tests	4.40
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	52.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	47.
Total Calculated Oil Recovery, Bbls./Acre	1,250.
Packer Setting, Feet	-
Viscosity, Centipoises @	
A. P. I. Gravity, degrees @ 60 °F	

Fresh water was used as a circulating fluid in the coring of the sand in this well.

FORMATION CORED

The detailed log of the formation cored is as follows:

Depth Interval, Feet	Description

Peru Formation

563.00 - 563.15 - Brown fine grained micaceous slightly calcareous sandstone.

563.15 - 565.63 - Discarded at well.

565.63 - 565.77 - Brown fine grained micaceous sandstone.

565.77 - 565.88 - Discarded at well.

565.88 - 566.00 - Gray sandy shale.

Bartlesville Formation

834.00 - 834.30 - Sandy limestone.

834.30 - 834.75 - Gray sandy micaceous shale.

834.75 - 835.00 - Soft gray shale.

835.00 - 835.25 - Gray sandy micaceous shale.

835.25 - 835.55 - Light brown fine grained micaceous shaley sandstone.

835.55 - 835.85 - Gray sandy micaceous shale.

835.85 - 836.15 - Light brown fine grained micaceous shaley sandstone.

836.15 - 838.10 - Brown fine grained micaceous sandstone.

838.10 - 838.40 - Gray sandy micaceous shale.

838.40 - 842.25 - Lost.

842.25 - 844.60 - Gray sandy micaceous shale.

844.60 - 849.40 - Brownish gray fine grained micaceous shaley sandstone.

849.40 - 850.30 - Gray sandy micaceous shale.

850.30 - 853.65 - Light brown fine grained micaceous shaley sandstone.

853.65 - 853.95 - Light brown fine grained micaceous sandstone.

853.95 - 855.83 - Brownish gray fine grained micaceous calcareous sandstone.

855.83 - 855.97 - Light brown fine grained micaceous sandstone.

855.97 - 856.30 - Brownish gray fine grained micaceous calcareous sandstone.

856.30 - 858.30 - Light brown fine grained micaceous sandstone.

858.30 - 858.60 - Laminated micaceous shaley sandstone.

858.60 - 860.30 - Light brown fine grained micaceous sandstone.

860.30 - 860.90 - Laminated micaceous shaley sandstone.

860.90 - 861.60 - Brown fine grained micaceous sandstone.

861.60 - 862.60 - Loss.

862.60 - 864.25 - Light brown fine grained micaceous sandstone.

864.25 - 865.10 - Dark fine grained micaceous carbonaceous sandstone.

865.10 - 866.45 - Light brown fine grained micaceous sandstone.

866.45 - 866.80 - Dark fine grained micaceous carbonaceous sandstone.

866.80 - 868.50 - Gray shale.

868.50 - 869.10 - Gray sandy shale.

869.10 - 872.20 - Gray shale.

872.20 - 882.00 - Discarded at well.

Coring of the Peru sand was started at a depth of 563.00 feet in fine grained micaceous slightly calcareous sandstone and completed at 566.00 feet in sandy shale; while the coring of the Bartlesville sand was started at a depth of 834.00 feet in sandy limestone and completed at 882.00 feet, probably in shale. That part of the cored section extending from 872.20 to 882.00 feet was discarded at the well. All of the Peru formation, with the exception of the sealed samples, was dis-

carded at the well and, as a result, we do not know how much sand this formation actually contains. The Bartlesville cored section shows a total of 19.35 feet of sandstone. There was a loss extending from 861.60 to 862.60 feet, which is probably sandstone. For the most part, the Bartlesville sand section is made up of fine grained micaceous to shaley sandstone.

PERMEABILITY

For the sake of distribution, the Bartlesville sand was divided into two sections. The weighted average permeability of the upper and lower sections are 3.90 and 2.89 millidarcys respectively; the overall average being 3.35 (See Table II). By observing the data given above and on the coregraph, it is noticeable that the sand is very tight, however, it does have a fairly uniform permeability profile.

PERCENT SATURATION & OIL CONTENT

The Bartlesville sand in this core has a low weighted average percent oil saturation, namely, 15.63, while that for the 0.29 feet of Peru sand analyzed is 23.79. The weighted average percent oil saturation of the upper and lower sections of the Bartlesville sand are 7.62 and 24.99 respectively. The weighted average percent water saturation of the upper and lower sections of the Bartlesville sand are 78.70 and 48.19 respectively; the overall average being 64.63.(See Table IV). The total fluid saturation of the pay sand, or that part of the cored section extending from 855.83 to 866.80 feet, is 73.18 percent. This indicates that an appreciable amount of fluid was lost during coring which was probably oil. From the above data, it is evident that the upper section is gas sand.

In order to get some idea of the degree of flushing of the sand during coring, all of the saturation samples were analyzed for chloride content. The results of these tests are given in Tables VII and VIII. Inasmuch as the chloride content of the sand section is fairly uniform, it is evident that most of the oil lost during coring was not due to flushing, but to the expansion of gas carried in solution by the oil.

The weighted average oil content of the Peru sand is 286 barrels per acre foot, while that of the upper and lower sections of the Bartlesville sand is 62 and 306 barrels respectively; the overall average being 175 barrels per acre foot. The total oil content (for the Bartlesville Sand), as shown by this core, is 2,345 barrels per acre.

LABORATORY FLOODING TESTS

The sand in this core did not respond any appreciable extent to laboratory flooding tests, as a total recovery of only 47 barrels of oil per acre was obtain 'rom 0,90 feet of sand. By observing the data given in Table V, you will note that of the 9 samples tested, 4 produced water and only 1 oil. Furthermore, high pressures were required to force the sand to take water. Due to the fact that a poor core recovery was obtained and that the biscuits were very small, we were unable to get good samples.

CONCLUSION

From a study of the above data, we believe that an efficient water flood within the vicinity of this well will recover approximately 1,250 barrels of oil per acre from the Bartlesville sand section providing the sand will take water satisfactorily. In calculating this recovery, an allowance was made for oil lost during coring, and it was assumed that

the true water saturation of the sand is 37 percent.

The principle drawback of this core is the fact that the sand is very tight and that it contains only approximately 5.00 feet of good floodable sand. As far as the Peru sand is concerned, it does not contain sufficient recoverable oil to justify flooding.

Oil Field Research Laboratories

RESULTS OF PERMEABILITY TESTS

TABLE I

Company Layton Oil Company Lease Saxon Well No. 1

Sample No.	Depth, Feet	Permeability Millidarcys	Feet of Core		Permeability Capacity Ft. x Md.
			Ft.	Cum. Ft.	
	Bartlesville Formation				
1	836.25	5.0	0.35	0.35	1.75
2	836.80	10.	0.50	0.85	5.00
3	837.15	13.	0.30	1.15	3.90
4	837.50	9.1	0.40	1.55	3.64
5	837.85	9.6	0.40	1.95	3.84
6	847.15	1.8	0.50	2.45	0.90
7	847.50	1.2	0.50	2.95	0.60
8	848.05	1.1	0.50	3.45	0.55
9	848.55	Imp.	0.50	3.95	0.00
10	849.05	2.2	0.60	4.55	1.32
11	849.50	Imp.	0.35	4.90	0.00
12	850.00	Imp.	0.55	5.45	0.00
13	850.50	Imp.	0.50	5.95	0.00
14	851.20	Imp.	0.70	6.65	0.00
15	851.75	0.90	0.50	7.15	0.45
16	852.20	1.2	0.50	7.65	0.60
17	852.80	1.5	0.50	8.15	0.75
18	853.25	2.4	0.65	8.80	1.56
19	853.70	1.6	0.30	9.10	0.48
20	854.15	Imp.	0.35	9.45	0.00
21	854.42	Imp.	0.45	9.90	0.00
22	855.00	Imp.	0.45	10.35	0.00
23	855.35	Imp.	0.40	10.75	0.00
24	855.81	Imp.	0.23	10.98	0.00
25	856.32	2.1	0.20	11.18	0.42
26	856.70	2.9	0.50	11.68	1.45
27	857.20	0.90	0.50	12.18	0.45
28	857.95	4.1	0.60	12.78	2.46
29	858.25	1.3	0.20	12.98	0.26
30	858.70	2.8	0.30	13.28	0.84
31	859.15	3.4	0.50	13.78	1.70
32	859.73	3.1	0.60	14.38	1.86
33	860.25	2.4	0.30	14.68	0.72
34	860.60	1.2	0.60	15.28	0.72
35	861.15	7.5	0.40	15.68	3.00
36	861.55	6.7	0.30	15.98	2.01
37	862.85	3.3	0.50	16.48	1.65
38	863.30	3.3	0.35	16.83	1.16
39	863.60	Imp.	0.35	17.18	0.00
40	864.05	2.8	0.45	17.63	1.26

Oil Field Research Laboratories

RESULTS OF PERMEABILITY TESTS

TABLE I

Company Layton Oil Company Lease Saxon Well No. 1

Sample No.	Depth, Feet	Permeability Millidarcys	Feet of Core		Permeability Capacity Ft. x Md.
			Ft.	Cum. Ft.	
41	864.55	Imp.	0.85	18.48	0.00
42	865.40	1.2	0.50	18.98	0.60
43	865.90	2.2	0.50	19.48	1.10
44	866.25	1.2	0.20	19.68	0.24
45	866.43	1.2	0.15	19.83	0.18

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SUMMARY OF PERMEABILITY TESTS

TABLE II

Company Layton Oil Company Lease Saxon Well No. 1

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity, Ft. x Md.
	Bartlesville Formation		
836.15 - 855.83	6.50	3.90	25.34
855.83 - 866.80	7.65	2.89	22.08
836.15 - 866.80	14.15	3.35	47.42

Oil Field Research Laboratories

RESULTS OF SATURATION TESTS

TABLE III

Company Layton Oil Company Lease Saxon Well No. 1

Sat. No.	Depth, Feet	Effective Porosity Percent	Percent Saturation			Oil Content Bbls./A. Ft.	Feet of Core		Total Oil Content Bbls./Acre
			Oil	Water	Total		Ft.	Cum. Ft.	
				Peru Formation					
1	563.10	14.1	15.0	61.1	76.1	164	0.15	0.15	25
3	565.70	17.4	30.7	50.0	80.7	415	0.14	0.29	58
				Bartlesville Formation					
5	847.85	16.1	7.3	68.2	75.5	91	2.00	2.29	182
7	851.53	12.6	5.2	75.9	81.1	51	1.70	3.99	87
8	853.40	8.1	8.5	88.4	96.9	53	1.65	5.64	87
9	854.60	6.7	9.4	84.4	93.8	49	1.88	7.52	92
10	855.90	14.9	32.1	44.8	76.9	371	0.14	7.66	52
11	856.75	14.6	20.0	44.8	64.8	227	0.95	8.61	216
12	857.75	15.4	21.7	52.2	73.9	259	1.05	9.66	272
13	861.20	16.1	31.9	45.3	77.2	398	0.40	10.06	159
14	861.60	15.5	22.8	55.3	78.1	274	0.30	10.36	82
15	862.95	16.7	36.0	45.7	81.7	467	0.90	11.26	420
16	864.10	17.2	20.3	55.7	76.0	271	0.75	12.01	203
17	865.25	16.5	22.1	48.5	70.6	283	1.35	13.36	382
18	866.50	12.5	32.6	33.9	66.5	316	0.35	13.71	111
							Total	- - - -	2,428

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SUMMARY OF SATURATION TESTS

TABLE IV

Company Layton Oil Company Lease Saxon Well No. 1

Depth Interval, Feet	Feet of Core Analyzed	Average Percent Porosity	Average Percent Oil Saturation	Average Percent Water Saturation	Average Oil Content Bbls./A. Ft.	Total Oil Content Bbls./Acre
			Peru Formation			
563.00-565.77	0.29	15.52	23.79	55.86	286	83
			Bartlesville Formation			
846.80-855.83	7.23	11.00	7.62	78.70	62	448
855.83-866.80	6.19	15.82	24.99	48.19	306	1,897
846.80-866.80	13.42	13.23	15.63	64.63	175	2,345

Oil Field Research Laboratories

RESULTS OF LABORATORY FLOODING TESTS

TABLE V

Company Layton Oil Company Lease Saxon 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 Fluid Production Pressure Lbs./Sq. In.
			Percent	Bbls./A. Ft.	Percent	Bbls./A. Ft.	% Oil	% Water	Bbls./A. Ft.			
1	863.10	13.0	14.1	142	0.0	0	14.1	73.2	142	4	0.139	40
5	847.85	16.1	8.9	111	0.0	0	8.9	77.6	111	0	Imp.	50+
8	853.40	9.6	8.2	61	0.0	0	8.2	78.2	61	0	Imp.	50+
11	856.75	15.9	20.6	264	0.0	0	20.6	66.1	264	2	0.066	40
12	857.75	16.2	20.4	256	0.0	0	20.4	68.5	256	0	Imp.	50+
15	862.95	16.1	38.9	457	4.4	52	34.5	65.5	405	4	0.179	35
16	864.10	16.0	22.1	274	0.0	0	22.1	72.6	274	9	0.116	30
17	865.25	16.1	22.9	286	0.0	0	22.9	66.2	286	0	Imp.	50+
18	866.50	12.8	33.9	337	0.0	0	33.9	41.3	337	0	Imp.	50+

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.

Oil Field Research Laboratories

RESULTS OF WATER DIFFERENTATION TESTS

TABLE VII

Company Layton Oil Company Lease Saxon Well No. 1

Sample No.	Depth, Feet	Chloride Content of Brine in Sand ppm	Percent Water Saturation Connate	Drilling & Foreign	Total
		Peru Formation			
1	563.10	21,300			
3	565.70	35,300			
		Bartlesville Formation			
5	847.85	24,900			
7	851.53	26,600			
8	853.40	31,900			
9	854.60	33,100			
10	855.90	37,200			
11	856.75	36,400			
12	857.75	29,100			
13	861.20	25,100			
14	861.60	23,400			
15	862.95	25,000			
16	864.10	19,400			
17	865.25	28,500			
18	866.50	28,600			

Note: ppm - parts per million.

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SUMMARY OF WATER DIFFERENTATION TESTS

TABLE VIII

Company Layton Oil Company Lease Saxon Well No 1

Depth Interval, Feet	Chloride Content of Brine in Sand, ppm	Average Percent Connate Water	Average Percent Drilling & Foreign Water
	Peru Formation		
563.00 - 565.77	25,645		
	Bartlesville Formation		
846.80 - 855.83	29,031		
855.83 - 866.80	27,937		
846.80 - 866.80	28,527		

Note: ppm - parts per million.