

Oilfield Research Laboratories

GENERAL INFORMATION & SUMMARY

Company Jackson Bros. Lease G.K. Jackson Heirs Well No. 8

Location _____

Section 23 Twp. 25S Rge. 8E County Greenwood State Kansas

Name of Sand - - - - - Squirrel Cattleman

Top of Core - - - - - 2061.0 2300.0

Bottom of Core - - - - - 2066.0 2305.0

Top of Sand - - - - - (Cored) 2061.0 2300.0

Bottom of Sand - - - - - (Cored) 2066.0 2305.0

Total Feet of Permeable Sand - - - - - 5.0 2.1

Total Feet of Floodable Sand - - - - - - -

Distribution of Permeable Sand:

Permeability Range
Millidarcys

Feet

Cum. Ft.

Squirrel Sand

0 - 100
100 & above

3.5
1.5

3.5
5.0

Average Permeability Millidarcys - - - - - 75.9 44.6

Average Percent Porosity - - - - - 18.6 13.4

Average Percent Oil Saturation - - - - - 11.0 26.6

Average Percent Water Saturation - - - - - 14.5 39.6

Average Oil Content, Bbls./A. Ft. - - - - - 159. 277.

Total Oil Content, Bbls./Acre - - - - - 797. 971.

Average Percent Oil Recovery by Laboratory Flooding Tests - - - - - None

Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft. - - - - - None

Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre - - - - - None

Total Calculated Oil Recovery, Bbls./Acre - - - - -

Packer Setting, Feet - - - - -

Viscosity, Centipoises @ - - - - -

A. P. I. Gravity, degrees @ 60 °F - - - - -

Elevation, Feet - - - - -

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GENERAL INFORMATION & SUMMARY

Company Jackson Bros. Lease G.K. Jackson Heirs Well No. 8

Location _____

Section 23 Twp. 25S Rge. 9E County Greenwood State Kansas

Name of Sand - - - - - Bartlesville

Top of Core - - - - - 2335.0

Bottom of Core - - - - - 2364.0

Top of Sand - - - - - (Cored) - - - - - 2335.0

Bottom of ^{Permeable} Sand - - - - - 2361.6

Total Feet of Permeable Sand - (Analyzed) - - - - - 15.6

Total Feet of Floodable Sand - - - - - -

Distribution of Permeable Sand:
Permeability Range
Millidarcys

Feet

Cum. Ft.

0 - 0.5	3.0	3.0
0.5 - 1.0	3.6	6.6
1.0 - 2.0	6.0	12.6
2.0 & above	3.0	15.6

Average Permeability Millidarcys - - - - - 1.5

Average Percent Porosity - - - - - 13.2

Average Percent Oil Saturation - - - - - 26.1

Average Percent Water Saturation - - - - - 57.3

Average Oil Content, Bbls./A. Ft. - - - - - 267.

Total Oil Content, Bbls./Acre - - - - - 6,416.

Average Percent Oil Recovery by Laboratory Flooding Tests - - - - - None

Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft. - - - - - None

Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre - - - - - None

Total Calculated Oil Recovery, Bbls./Acre - (Primary) - - - - - 662.

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 sand in this well. This well was drilled in a virgin area. The cores were sampled and sealed in tin cans by a representative of Oilfield Research Laboratories.

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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SQUIRREL

2061.0 - 2062.7 - Light brown, shaly sandstone.

2062.7 - 2066.0 - Gray shaly sandstone.

2066.0 - 2300.0 - Core not received.

CATTLEMAN

2300.0 - 2302.0 - Light brown, laminated, shaly sandstone.

2302.0 - 2302.5 - Shale.

2302.5 - 2303.0 - Light brown, shaly sandstone.

2303.0 - 2303.5 - Shale.

2303.5 - 2305.0 - Light brown, shaly sandstone.

2305.0 - 2335.0 - Core not received.

BARTLESVILLE

2335.0 - 2343.5 - Gray and light brown, laminated, shaly sandstone.

2343.5 - 2344.5 - Sandy shale.

2344.5 - 2349.6 - Gray and light brown, laminated, shaly sandstone.

2349.6 - 2351.6 - Sandy shale.

2351.6 - 2363.0 - Gray and light brown, laminated, shaly sandstone.

2363.0 - 2364.0 - Black shale.

BARTLESVILLE SAND

Coring was started at a depth of 2335.0 feet in gray and light brown, laminated, shaly sandstone and completed at 2364.0 feet in black shale. This core shows a total of 25.0 feet of sandstone. For the most

part, the sand section is made up of gray and light brown, laminated, 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 0.9 and 2.1 millidarcys respectively; the overall average being 1.5 (See Table III). By observing the data given on the coregraph, it is noticeable that the sand is very tight. The permeability of the sand varies from impermeable to a maximum of 4.9 millidarcys.

PERCENT SATURATION & OIL CONTENT

The sand in this core shows a fairly low weighted average percent oil saturation, namely, 26.1. The weighted average percent oil saturation of the upper and lower sections is 22.9 and 28.6 respectively. The weighted average percent water saturation of the upper and lower sections is 60.1 and 53.7 respectively; the overall average being 57.3 (See Table III). This gives an overall weighted average total fluid saturation of 82.9 percent.

In an effort to determine whether or not any flushing of the sand occurred during coring, all of the saturation samples were analyzed for chloride content. The results of these tests are given in Tables VI and VII. From the data given in these tables and on the coregraph, it is evident that very little flushing of the sand occurred during the cutting of the core.

The weighted average oil content of the upper and lower sections is 237 and 307 barrels per acre foot respectively; the overall average being 267. The total oil content, as shown by this core, is 6,416 barrels per acre (See Table III)

LABORATORY FLOODING TESTS

By observing the data given in Table IV, you will note that of the 24 samples tested, none produced water or oil. This indicates that none of the sand represented by these samples is floodable pay sand.

CONCLUSION

From a study of the above data, it is estimated that approximately 662 barrels of oil per acre can be recovered from the area, represented by this core, by efficient primary production methods. Inasmuch as none of the samples were permeable to water, no calculated water-flood recovery is given.

The above tests indicate that there is not sufficient recoverable oil in the Cattleman and Squirrel sands to justify completion in these zones.

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Jackson Bros. Lease G.K. Jackson Heirs Well No. 8

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	2061.1	19.8	7	12	19	107	141.	0.6	0.6	64	84.60
2	2062.1	18.6	15	11	26	216	71.	1.1	1.7	238	78.10
3	2063.1	16.5	4	21	25	51	112.	0.9	2.6	46	100.80
4	2064.1	19.5	4	9	13	60	67.	1.0	3.6	60	67.00
5	2065.1	18.9	19	18	37	278	35.	1.4	5.0	389	49.00
CATTLEMAN SAND											
1	2300.1	12.7	17	51	68	167	1.0	0.6	5.6	100	0.60
2	2301.1	13.2	25	48	73	256	Imp.	1.4	7.0	358	0.00
3	2304.1	13.8	32	27	59	342	62.	1.5	8.5	513	93.00
BARTLESVILLE SAND											
4	2335.1	11.9	22	61	83	203	0.82	0.6	9.1	122	0.49
5	2336.1	9.9	33	65	98	253	0.40	1.0	10.1	253	0.40
6	2337.1	10.4	23	73	96	186	Imp.	1.0	11.1	186	0.00
7	2338.1	15.5	28	37	65	336	1.1	1.0	12.1	336	1.10
8	2339.1	8.4	23	74	97	150	1.0	1.0	13.1	150	1.00
9	2340.1	15.8	36	46	82	441	0.96	1.0	14.1	441	0.96
10	2341.1	10.7	29	62	91	241	0.33	1.0	15.1	241	0.33
11	2342.1	12.2	22	66	88	208	0.37	1.0	16.1	208	0.37
12	2343.1	15.2	32	46	78	377	1.2	0.9	17.0	339	1.08
13	2345.1	11.2	11	75	86	96	1.8	1.1	18.1	106	1.98
14	2346.1	15.2	12	54	66	141	Imp.	1.0	19.1	141	0.00
15	2347.1	13.5	28	54	82	293	Imp.	1.0	20.1	293	0.00
16	2348.1	14.0	26	50	76	282	Imp.	1.0	21.1	282	0.00

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Jackson Bros. Lease G.K. Jackson Heirs Well No. 8

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.		
17	2349.1	14.1	11	76	87	120	Imp.	1.0	22.1	120	0.00
18	2352.1	14.8	33	48	81	379	3.9	1.0	23.1	379	3.90
19	2353.1	13.9	30	50	80	323	4.9	1.0	24.1	323	4.90
20	2354.1	15.5	33	45	78	397	2.5	1.0	25.1	397	2.50
21	2355.1	16.0	25	46	71	298	Imp.	1.0	26.1	298	0.00
22	2356.1	14.4	31	53	84	346	1.3	1.0	27.1	346	1.30
23	2358.1	17.7	17	39	56	234	0.81	1.0	28.1	234	0.81
24	2359.1	14.7	26	50	76	297	0.74	1.0	29.1	297	0.74
25	2360.1	12.6	38	60	98	371	Imp.	1.0	30.1	371	0.00
26	2361.1	10.3	24	72	96	192	1.2	1.0	31.1	192	1.20
27	2362.1	11.5	29	68	97	258	Imp.	1.4	32.5	361	0.00

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Jackson Bros. Lease G.K. Jackson Heirs Well No. 8

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
<u>SQUIRREL SAND</u>			
2061.0 - 2066.0	5.0	75.9	379.50
<u>CATTLEMAN SAND</u>			
2300.0 - 2305.0	2.1	44.6	93.60
<u>BARTLESVILLE SAND</u>			
2335.0 - 2345.6	8.6	0.9	7.71
2351.6 - 2361.6	7.0	2.1	15.35
2335.0 - 2361.6	15.6	1.5	23.06

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
<u>SQUIRREL SAND</u>						
2061.0 - 2066.0	5.0	18.6	11.0	14.5	159	797
<u>CATTLEMAN SAND</u>						
2300.0 - 2305.0	3.5	13.4	26.6	39.6	277	971
<u>BARTLESVILLE SAND</u>						
2335.0 - 2349.6	13.6	12.7	22.9	60.1	237	3,218
2351.6 - 2363.0	10.4	14.0	28.6	53.7	307	3,198
2335.0 - 2363.0	24.0	13.2	26.1	57.3	267	6,416

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Jackson Bros. Lease G.K. Jackson Heirs Well No. 8

Sample No.	Depth, Feet	Effective Porosity Percent	Original Oil Saturation		Oil Recovery		Residual Saturation			Volume of Water Recovered cc ³	Effective Permeability mDarcy ¹⁰⁰	Initial Fluid Production Pressure Lbs./Sq./In.
			%	Ebbl./A. Ft.	%	Ebbl./A. Ft.	% Oil	% Water	Ebbl./A. Ft.			
CATTLEMAN SAND												
1	2300.1	14.3	15	143	0	0	15	56	143	None	Imp.	
2	2301.1	12.9	22	220	0	0	22	54	220	"	"	
3	2304.1	13.3	29	299	0	0	29	34	299	"	"	
BARTLESVILLE SAND												
4	2335.1	12.3	19	181	0	0	19	67	181	"	"	
5	2336.1	9.5	31	228	0	0	31	70	228	"	"	
6	2337.1	10.8	20	168	0	0	20	77	168	"	"	
7	2338.1	15.2	24	283	0	0	24	42	283	"	"	
8	2339.1	8.9	20	138	0	0	20	78	138	"	"	
9	2340.1	15.4	33	394	0	0	33	52	394	"	"	
10	2341.1	11.1	26	224	0	0	26	66	224	"	"	
11	2342.1	12.0	20	186	0	0	20	72	186	"	"	
12	2343.1	14.9	29	335	0	0	29	51	335	"	"	
13	2345.1	11.0	13	111	0	0	13	75	111	"	"	
14	2346.1	14.8	10	115	0	0	10	60	115	"	"	
15	2347.1	13.2	27	277	0	0	27	60	277	"	"	
16	2348.1	13.5	24	251	0	0	24	55	251	"	"	
17	2349.1	13.6	14	148	0	0	14	77	148	"	"	
18	2352.1	14.4	30	335	0	0	30	54	335	"	"	
19	2353.1	13.6	28	296	0	0	28	55	296	"	"	
20	2354.1	15.1	30	356	0	0	30	50	356	"	"	
21	2355.1	15.5	27	325	0	0	27	49	325	"	"	
22	2356.1	14.8	28	322	0	0	28	58	322	"	"	
23	2358.1	17.2	19	254	0	0	19	45	254	"	"	
24	2359.1	15.0	23	268	0	0	23	57	268	"	"	

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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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Jackson Bros. Lease G.K. Jackson Heirs Well No. 8

Sample No.	Depth, Feet	Effective Porosity Percent	Original Oil Saturation		Oil Recovery		Residual Saturation			Volume of Water Recovered cc ^a	Effective Permeability Millidarcys ^{cc}	Initial Fluid Production Pressure Lbs./Sq./In.
			%	Bbls./A. Ft.	%	Bbls./A. Ft.	% Oil	% Water	Bbls./A. Ft.			
25	2360.1	12.3	34	325	0	0	34	66	325	None	Imp.	
26	2361.1	10.8	22	184	0	0	22	76	184	"	"	
27	2362.1	11.1	27	232	0	0	27	72	232	"	"	

Notes: cc—cubic centimeter.

^a—Volume of water recovered at the time of maximum oil recovery.

^{cc}—Determined by passing water through sample which still contains residual oil.

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RESULTS OF WATER DIFFERENTIATION TESTS
TABLE VI

Company Jackson Bros. Lease G.K. Jackson Heirs Well No. 8

Sample No.	Depth, Feet	Chloride Content of Brine in Sand ppm	Percent Connate Water Saturation Drilling & Foreign	Total
<u>SQUIRREL SAND</u>				
1	2061.1	242,200		
2	2062.1	238,750		
3	2063.1	240,000		
4	2064.1	412,000		
5	2065.1	266,000		
<u>CATTLEMAN SAND</u>				
1	2300.1	148,750		
2	2301.1	138,400		
3	2304.1	155,450		
<u>BARTLESVILLE SAND</u>				
4	2335.1	111,000		
5	2336.1	106,700		
6	2337.1	124,450		
7	2338.1	113,400		
8	2339.1	116,000		
9	2340.1	98,200		
10	2341.1	104,000		
11	2342.1	79,700		
12	2343.1	115,800		
13	2345.1	101,800		
14	2346.1	103,900		
15	2347.1	107,000		
16	2348.1	117,550		
17	2349.1	96,750		
18	2352.1	114,800		
19	2353.1	112,300		
20	2354.1	103,100		
21	2355.1	103,900		
22	2356.1	130,900		
23	2358.1	118,250		
24	2359.1	110,150		
25	2360.1	117,700		
26	2361.1	116,500		
27	2362.1	109,400		

Note: ppm — parts per million

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SUMMARY OF WATER DIFFERENTIATION TESTS

TABLE VII

Company Jackson Bros. Lease G.K. Jackson Heirs Well No. 8

Depth Interval, Feet	Chloride Content of Brine in Sand, ppm	Average Percent Connate Water	Average Percent Drilling & Foreign Water
<u>SQUIRREL SAND</u>			
2061.0 - 2066.0	281,640		
<u>CATTLEMAN SAND</u>			
2300.0 - 2305.0	171,567		
<u>BARTLESVILLE SAND</u>			
2335.0 - 2363.0	109,617		

Note: ppm — parts per million.