Look up ✓ (13)

elevation

Oilfield Research Laboratories

GENERAL INFORMATION & SUMMARY

Company Jackson Bros. Lease Hawthorne Well No. 10

Location NE SE SE (SENESE)

Section 27 Twp. 25S Rge. 8E County Greenwood State Kansas

27-25-8E

Name of Formation	Kansas City
Top of Core	1906.0
Bottom of Core	1914.0
Top of Limestone (Tested)	1906.0
Bottom of Limestone (Tested)	1911.6
Total Feet of Permeable Limestone	0.6
Total Feet of Floodable Sand	

Distribution of Permeable Limestone

Permeability Range Millidarcys	Feet	Cum. Ft.
0 - 1	0.6	0.6

Average Permeability Millidarcys	0.54
Average Percent Porosity	10.4
Average Percent Oil Saturation	16.6
Average Percent Water Saturation	69.0
Average Oil Content, Bbls./A. Ft.	209.
Total Oil Content, Bbls./Acre	2,616.
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	

Hawthorne 10

Oilfield Research Laboratories

GENERAL INFORMATION & SUMMARY

Company Jackson Bros. Lease Hawthorne Well No. 10

Location NE SE SE

Section 27 Twp. 25S Rge. 8E County Greenwood State Kansas

Name of Sand	Prue
Top of Core	2340.0
Bottom of Core	2349.0
Top of Sand (Analyzed)	2340.0
Bottom of Sand (Analyzed)	2347.6
Total Feet of Permeable Sand	6.6
Total Feet of Floodable Sand	1.6

Distribution of Permeable Sand:

Permeability Range Millidarcys	Feet	Cum. Ft.
2 - 20	3.0	3.0
20 - 50	3.6	6.6

Average Permeability Millidarcys	22.0
Average Percent Porosity	14.1
Average Percent Oil Saturation	16.0
Average Percent Water Saturation	48.0
Average Oil Content, Bbls./A. Ft.	165.
Total Oil Content, Bbls./Acre	1,256.
Average Percent Oil Recovery by Laboratory Flooding Tests	4.5
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	62.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	100.
Total Calculated Oil Recovery, Bbls./Acre (Primary & Secondary)	1,100.
Packer Setting, Feet	
Viscosity, Centipoises @	
A. P. I. Gravity, degrees @ 60 °F	
Elevation, Feet	

Oilfield Research Laboratories

GENERAL INFORMATION & SUMMARY

Company Jackson Bros. Lease Hawthorne Well No. 10

Location NE SE SE

Section 27 Twp. 25S Rge. 8E County Greenwood State Kansas

Name of Sand	Bartlesville
Top of Core	2485.0
Bottom of Core	2509.0
Top of Sand (Analyzed)	2492.0
Bottom of Sand	2504.5
Total Feet of Permeable Sand	9.9
Total Feet of Floodable Sand	3.0

Distribution of Permeable Sand:

Permeability Range Millidarcys	Feet	Cum. Ft.
0 - 1	1.0	1.0
1 - 5	6.0	7.0
5 - 10	1.9	8.9
10 & above	1.0	9.9

Average Permeability Millidarcys	4.6
Average Percent Porosity	16.3
Average Percent Oil Saturation	16.6
Average Percent Water Saturation	69.0
Average Oil Content, Bbls./A. Ft.	209.
Total Oil Content, Bbls./Acre	2,616.
Average Percent Oil Recovery by Laboratory Flooding Tests	2.3
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	32.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	97.
Total Calculated Oil Recovery, Bbls./Acre - (Primary & Secondary)	1,670.
Packer Setting, Feet	
Viscosity, Centipoises @	
A. P. I. Gravity, degrees @ 60 °F	
Elevation, Feet	

Fresh water mud was used as the circulating fluid while taking these cores. The cores were sampled by a representative of Oilfield Research Laboratories. The Kansas City and Prue cores were out over 24 hours before they were sampled; while the Bartlesville core was sample immediately. Only the Prue and Bartlesville cores will be discussed below.

FORMATION CORED

The detailed log of the formation cored is as follows:

Depth Interval, Feet	Descritpion
KANSAS CITY LIMESTONE	
1906.0 - 1906.6	Brownish gray, slightly sandy limestone.
1906.6 - 1914.0	Brownish gray, crystalline limestone.
1914.0 - 2340.0	Drilled.
PRUE SANDSTONE	
2340.0 - 2344.6	Grayish light brown, laminated, shaly sandstone.
2344.6 - 2345.6	Grayish light brown, calcareous, shaly sandstone.
2345.6 - 2349.0	Grayish light brown, shaly sandstone.
2349.0 - 2485.0	Drilled.
BARTLESVILLE SANDSTONE	
2485.0 - 2492.0	Sandy shale.
2492.0 - 2493.0	Gray shaly sandstone.
2493.0 - 2494.6	Light brown, laminated, shaly sandstone.
2494.6 - 2504.5	Light brown, laminated, slightly shaly sandstone.
2504.5 - 2508.5	Shale.
2508.5 - 2509.0	Loss.

PERMEABILITY

The weighted average permeability of the Pure and Bartlesville cores is 22.0 and 4.6 millidarcys respectively (See Table III). By observing the data given on the coregraph, it is noticeable that the sands in these cores have rather irregular permeability profiles.

PERCENT SATURATION & OIL CONTENT

The sand in these cores show fairly low weighted average percent oil saturations. The weighted average percent oil saturation of the Prue and Bartlesville sections is 16.0 and 16.6 respectively. The weighted average percent water saturation is 48.0 and 69.0 respectively (See Table III). This gives overall weighted average total fluid saturations of 64.0 and 85.6 percent.

The low total saturation in the Prue core is due to laying out before sampling.

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 the Bartlesville sand is not as badly flushed as some of the previous cores have been. The chloride content in the Prue sand is probably too high. Chlorides are calcaulted on the basis of the amount of water present in the core and since the Prue core was somewhat dried out the chloride readings will be high.

The weighted average oil content of the Prue and Bartlesville sections is 165 and 209 barrels per acre foot respectively. The total oil contents, as shown by these cores, are 1,256 and 2,616 barrels per

acre (See Table III).

LABORATORY FLOODING TESTS

The sand in these cores responded rather poorly to laboratory flooding tests, as a total recovery of 100 and 97 barrels of oil per acre was obtained from 1.6 and 3.0 feet of sand respectively. The weighted average effective permeability of the samples is 0.824 and 0.566 millidarcys, while the average initial fluid production pressure is 25.0 and 40.0 pounds per square inch respectively (See Table V).

The tests also show that the sands have wide variations in effective permeability to water.

CONCLUSION

The results of the laboratory tests indicate that efficient primary and secondary operations in the vicinity of this well should recover approximately 1,100 and 1,670 barrels of oil per acre from the Prue and Bartlesville sections respectively. These recovery values were calculated using the following data and assumptions:

	Prue	Bartlesville
Original formation volume factor	1.21	1.23
Present formation volume factor	1.11	1.13
Reservoir water saturation, percent	35.0	50.0
Average porosity, percent	17.7	18.2
Oil saturation after flooding, percent	20.8	16.0
Performance factor, percent	50.0	50.0
Net floodable pay sand, feet	4.6	8.9

The chloride tests indicate that the Bartlesville section is not badly flushed and based on the high water saturations, it is like that this zone will produce water.

Any primary oil already recovered from the vicinity of this well should be subtracted from the above calculated recoveries.

Oilfield Research Laboratories

RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Jackson Bros. Lease Hawthorne Well No. 10

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.		
						KANSAS CITY LIME					
1	1906.1	15.2	4	15	19	47	0.54	0.6	0.6	28	0.32
2	1907.1	4.9	36	53	89	137	Imp.	1.0	1.6	137	0.00
3	1908.1	11.0	30	33	63	256	Imp.	1.0	2.6	256	0.00
4	1909.1	14.3	4	43	47	44	Imp.	1.0	3.6	44	0.00
5	1910.1	7.1	19	35	54	105	Imp.	1.0	4.6	105	0.00
6	1911.1	11.9	5	28	33	46	Imp.	1.0	5.6	46	0.00
						PRUE SANDSTONE					
1	2340.1	17.6	29	16	45	396	48.	0.6	0.6	238	28.80
2	2341.1	18.1	23	39	62	323	12.	1.0	1.6	323	12.00
3	2342.1	15.5	5	52	57	60	7.5	1.0	2.6	60	7.50
4	2343.1	15.8	17	37	54	208	21.	1.0	3.6	208	21.00
5	2344.1	14.4	5	47	52	56	49.	1.0	4.6	56	49.00
6	2345.1	5.9	34	63	97	156	Imp.	1.0	5.6	156	0.00
7	2346.1	12.5	6	54	60	58	2.7	1.0	6.6	58	2.70
8	2347.1	14.5	14	63	77	157	24.	1.0	7.6	157	24.00

Oilfield Research Laboratories

RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Jackson Bros. Lease Hawthorne Well No. 10

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.		
						BARTLESVILLE SAND					
1	2492.1	16.0	6	91	97	74	Imp.	1.0	1.0	74	0.00
2	2493.1	14.1	14	82	96	153	Imp.	0.6	1.6	92	0.00
3	2494.1	13.4	17	80	97	177	Imp.	1.0	2.6	177	0.00
4	2495.1	17.7	16	63	79	220	2.3	1.0	3.6	220	2.30
5	2496.1	15.5	16	68	84	193	1.3	1.0	4.6	193	1.30
6	2497.1	13.1	21	75	96	214	3.9	1.0	5.6	214	3.90
7	2498.1	16.2	20	66	86	254	4.5	1.0	6.6	254	4.50
8	2499.1	17.0	18	66	84	238	2.2	1.0	7.6	238	2.20
9	2500.1	15.3	19	64	83	226	0.99	1.0	8.6	226	0.99
10	2501.1	18.2	18	62	80	255	9.3	1.0	9.6	255	9.30
11	2502.1	20.0	17	55	72	264	11.	1.0	10.6	264	11.00
12	2503.1	16.1	14	69	83	175	1.5	1.0	11.6	175	1.50
13	2504.1	18.6	18	61	79	260	9.4	0.9	12.5	234	8.46

Oilfield Research Laboratories

RESULTS OF LABORATORY FLOODING TESTS

TABLE [illegible]

Company Jackson Bros. Lease Hawthorne Well No. 10

Sample No.	Depth, Feet	Effective Porosity Percent	Original Oil Saturation %	Original Oil Saturation Bbls/A.Ft.	Oil Recovery %	Oil Recovery Bbls/A.Ft.	Residual Saturation % Oil	Residual Saturation % Water	Residual Saturation Bbls/A.Ft.	Volume of Water Recovered cc*	Effective Permeability Millidarcys**	Initial Fluid Production Pressure Lbs/Sq.In.
						PRUE						
1	2340.1	17.4	29	392	2	27	27	71	365	34	0.700	30
2	2341.1	18.0	23	321	6	84	17	79	237	47	0.900	20
3	2342.1	16.0	9	112	0	0	9	79	112	69	1.40	20
4	2343.1	15.5	17	204	0	0	17	77	204	4	0.400	50
5	2344.1	14.8	6	69	0	0	6	92	69	58	1.10	20
6	2345.1	6.0	33	154	0	0	33	61	154	0	Imp.	-
7	2346.1	12.1	8	75	0	0	8	88	75	36	1.16	30
8	2347.1	15.0	14	163	0	0	14	84	163	147	2.80	20
						BARTLESVILLE						
1	2492.1	16.1	7	87	0	0	7	90	87	0	Imp.	-
2	2493.1	14.4	14	156	0	0	14	83	156	0	Imp.	-
3	2494.1	13.3	17	175	0	0	17	82	175	0	Imp.	-
4	2495.1	17.2	18	240	0	0	18	65	240	0	Imp.	-
5	2496.1	15.4	15	179	0	0	15	67	179	0	Imp.	-
6	2497.1	13.0	21	212	0	0	21	76	212	0	Imp.	-
7	2498.1	16.5	20	256	3	38	17	78	218	9	0.400	50
8	2499.1	16.8	18	234	0	0	18	68	234	0	Imp.	-
9	2500.1	15.5	21	252	0	0	21	65	252	0	Imp.	-
10	2501.1	18.2	18	254	2	28	16	79	226	38	0.800	30
11	2502.1	19.8	17	261	2	31	15	84	230	18	0.500	40
12	2503.1	16.0	15	186	0	0	15	71	186	0	Imp.	-
13	2504.1	18.8	20	292	0	0	20	62	292	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 PERMEABILITY & SATURATION TESTS

TABLE II

Company Jackson Bros. Lease Hawthorne Well No. 10

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
	KANSAS CITY		
1906.0 - 1911.6	0.6	0.54	0.32
	PRUE		
2340.0 - 2347.6	6.6	22.0	145.00
	BARTLESVILLE		
2492.0 - 2504.5	9.9	4.6	45.45

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
			KANSAS CITY			
1906.0 - 1911.6	5.6	10.4	17.2	35.9	110	616
			PRUE			
2340.0 - 2347.6	7.6	14.1	16.0	48.0	165	1,256
			BARTLESVILLE			
2492.0 - 2504.5	12.5	16.3	16.6	69.0	209	2,616

Oilfield Research Laboratories

RESULTS OF WATER DIFFERENTIATION TESTS

TABLE VI

Company Jackson Bros. Lease Hawthorne Well No. 10

Sample No.	Depth, Feet	Chloride Content of Brine in Sand ppm	Percent Water Saturation Connate	Drilling & Foreign	Total
		PRUE SAND			
1	2340.1	56,750			
2	2341.1	136,300			
3	2342.1	134,250			
4	2343.1	164,500			
5	2344.1	114,300			
6	2345.1	185,000			
7	2346.1	155,000			
8	2347.1	41,850			
		BARTLESVILLE SAND			
1	2492.1	104,300			
2	2493.1	96,900			
3	2494.1	101,700			
4	2495.1	94,500			
5	2496.1	91,100			
6	2497.1	102,300			
7	2498.1	89,300			
8	2499.1	91,000			
9	2500.1	86,300			
10	2501.1	105,700			
11	2502.1	110,600			
12	2503.1	90,800			
13	2504.1	95,900			

Note: ppm — parts per million

Oilfield Research Laboratories

ACID SOLUBILITY TESTS

TABLE VIII

Company Jackson Bros. Lease Hawthorne Well No. 10

Sample No.	Depth Interval, Feet	Percent Solubility
1	1906.1	85
2	1907.1	90
3	1908.1	87
4	1909.1	49
5	1910.1	90
6	1911.1	86

Oilfield Research Laboratories

SUMMARY OF WATER DIFFERENTIATION TESTS

TABLE VII

Company Jackson Bros. Lease Hawthorne Well No. 10

Depth Interval, Feet	Chloride Content of Brine in Sand, ppm	Average Percent Connate Water	Average Percent Drilling & Foreign Water
		PRUE SANDSTONE	
2340.0 - 2347.6	127,000		
		BARTLESVILLE SANDSTONE	
2492.0 - 2504.5	97,000		

Note: ppm — parts per million.

CITIES Research Laboratories

SUMMARY OF LABORATORY RECORDING TESTS

SHEET 7

Company Jackson Bros. Lease Hawthorne Well No. 10

	PRUE	BARTLESVILLE
Depth Interval, Feet	2340.0 - 2347.6	2492.0 - 2504.5
Feet of Core Analyzed	1.6	3.0
Average Percent Porosity	17.7	18.2
Average Percent Original Oil Saturation	25.3	18.3
Average Percent Oil Recovery	4.5	2.3
Average Percent Residual Oil Saturation	20.8	16.0
Average Percent Residual Water Saturation	75.9	80.4
Average Percent Total Residual Fluid Saturation	96.7	96.4
Average Original Oil Content, Bbls./A. Ft.	345.	256.
Average Oil Recovery, Bbls./A. Ft.	62.	32.
Average Residual Oil Content, Bbls./A. Ft.	284.	224.
Total Original Oil Content, Bbls./Acre	556.	771.
Total Oil Recovery, Bbls./Acre	100.	97.
Total Residual Oil Content, Bbls./Acre	456.	674.
Average Effective Permeability, Millidarcys	0.824	0.566
Average Initial Fluid Production Pressure, p.s.i.	25.0	40.0

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