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Oilfield Research Laboratories

GENERAL INFORMATION & SUMMARY

Company Jackson Bros. Lease Crew Well No. 14

Location SW NW SE

Section 34 Twp. 25S Rge. 8E County Greenwood State Kansas

Name of Sand	Bartlesville
Top of Core	2518.0
Bottom of Core	2537.0
Top of Sand	2518.0
Bottom of Sand	2533.0
Total Feet of Permeable Sand	14.4
Total Feet of Floodable Sand	11.0

Distribution of Permeable Sand:

Permeability Range Millidarcys	Feet	Cum. Ft.
0 - 1	3.0	3.0
1 - 10	3.0	6.0
10 - 20	5.4	11.4
20 - 35	3.0	14.4

Average Permeability Millidarcys	12.3
Average Percent Porosity	18.2
Average Percent Oil Saturation	19.4
Average Percent Water Saturation	65.1
Average Oil Content, Bbls./A. Ft.	270.
Total Oil Content, Bbls./Acre	4,055.
Average Percent Oil Recovery by Laboratory Flooding Tests	3.3
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	47.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	512.
Total Calculated Oil Recovery, Bbls./Acre - (Primary & Secondary)	3,510.
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 this core. The core was sampled and the samples sealed in cans by a representative of Oilfield Research Laboratories. The well was drilled in virgin territory. Two Kansas City Lime samples were tested for permeability and acid solubility. The following discussion will be concerned only with the Bartlesville zone.

FORMATION CORED

The detailed log of the formation cored is as follows:

Depth Interval, Feet	Description
KANSAS CITY LIME	
2017.0 - 2019.0	Limestone
BARTLESVILLE SAND	
2518.0 - 2526.6	Light brown, slightly shaly sandstone.
2526.6 - 2533.0	Grayish light brown sandstone.
2533.0 - 2537.0	Shale.

Coring was started at a depth of 2518.0 feet in slightly shaly sandstone and completed at 2537.0 feet in shale. This core shows a total of 15.0 feet of sandstone. For the most part, the pay is made up of light brown to grayish light brown 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 5.6 and 20.7 millidarcys respectively; the overall average being 12.3 (See Table III). By observing the data given on the coregraph, it is noticeable that the sand has a rather irregular permeability profile. The permeability of the sand varies from impermeable to a maximum of 32. millidarcys.

PERCENT SATURATION & OIL CONTENT

The sand in this core shows a fairly good weighted average percent oil saturation, namely, 19.4. The weighted average percent oil saturation of the upper and lower sections is 20.8 and 17.5 respectively. The weighted average percent water saturation of the upper and lower sections is 64.0 and 66.8 respectively; the overall average being 65.1 (See Table III). This gives an overall weighted average total fluid saturation of 84.5 percent.

The weighted average oil content of the upper and lower sections is 290 and 244 barrels per acre foot respectively; the overall average being 270. The total oil content, as shown by this core, is 4,055 barrels per acre of which 3,222 barrels are in the pay sand section (See Table III).

LABORATORY FLOODING TESTS

During the flood-pot tests there was no evidence that fresh water was causing the shale in the sand to swell.

The sand in this core responded to laboratory flooding tests, as a total recovery of 512 barrels of oil per acre was obtained from 11.0 feet of sand. The weighted average percent oil saturation was reduced from 20.7 to 17.4, or represents an average recovery of 3.3 percent. The weighted average effective permeability of the samples is 1.08 millidarcys, while the average initial fluid production pressure is 33.6 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 15 samples tested, 12 produced water and 11 oil. This indicates that approximately 73 percent of the sand represented by these samples is floodable pay sand. The tests also show that the sand has a wide variation 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 2,020 and 1,490 barrels of oil per acre respectively. These recovery values were calculated using the following data and assumptions:

Original formation volume factor	1.23
Reservoir water saturation, percent	44.0
Expected primary recovery, estimated, percent	12.0
Average porosity, percent	18.5
Oil saturation after flooding, percent	17.4
Performance factor, percent	50.0
Net floodable pay sand, feet	11.0

This core shows a pay sand section having a good oil saturation, a moderate water saturation and a wide variation in effective permeability to water.

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Jackson Bros. Lease Crew Well No. 14

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
2518.0 - 2526.6	8.0	5.6	44.56
2526.6 - 2533.0	6.4	20.7	132.20
2518.0 - 2533.0	14.4	12.3	176.76

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
2518.0 - 2526.6	8.6	18.0	20.8	64.0	290	2,494
2526.6 - 2533.0	6.4	18.7	17.5	66.8	244	1,561
2518.0 - 2533.0	15.0	18.2	19.4	65.1	270	4,055

OILFIELD RESEARCH LABORATORIES

ACID SOLUBILITY TESTS

TABLE II

Company Jackson Bros. Lease Crew Well No. 14

Sample No.	Depth, Feet	Percent Solubility
1	2017.5	73
2	2018.5	86

Oilfield Research Laboratories

SUMMARY OF LABORATORY FLOODING TESTS

TABLE V

Company Jackson Bros. Lease Crew Well No. 14

Depth Interval, Feet	2518.0 - 2526.6	2526.6 - 2533.0	2518.0 - 2533.0
Feet of Core Analyzed	6.0	5.0	11.0
Average Percent Porosity	18.7	18.2	18.5
Average Percent Original Oil Saturation	21.5	19.6	20.7
Average Percent Oil Recovery	3.5	3.0	3.3
Average Percent Residual Oil Saturation	18.0	16.6	17.4
Average Percent Residual Water Saturation	72.5	76.8	74.4
Average Percent Total Residual Fluid Saturation	90.5	93.4	91.8
Average Original Oil Content, Dbls./A. Ft.	311.	271.	293.
Average Oil Recovery, Dbls./A. Ft.	51.	41.	47.
Average Residual Oil Content, Dbls./A. Ft.	260.	230.	246.
Total Original Oil Content, Dbls./Acre	1,866.	1,356.	3,222.
Total Oil Recovery, Dbls./Acre	307.	205.	512.
Total Residual Oil Content, Dbls./Acre	1,559.	1,151.	2,710.
Average Effective Permeability, Millidarcys	0.750	1.48	1.08
Average Initial Fluid Production Pressure, p.s.i.	40.0	26.0	33.6

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

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Jackson Bros. Lease Crew Well No. 14

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.			
1	2518.1	15.0	15	174	0	0	15	77	174	0	Imp.	-
2	2519.1	16.8	17	222	0	0	17	66	222	0	Imp.	-
3	2520.1	20.9	23	372	5	81	18	73	291	27	0.800	30
4	2521.1	21.9	19	322	3	51	16	71	271	66	2.00	20
5	2522.1	17.6	23	314	0	0	23	60	314	0	Imp.	-
6	2523.1	17.7	21	288	3	41	18	71	247	2	0.200	50
7	2524.1	16.0	20	248	3	37	17	73	211	6	0.400	50
8	2525.1	17.9	20	278	3	42	17	75	236	10	0.600	50
9	2526.1	17.8	26	358	4	55	22	72	303	10	0.500	40
10	2527.1	16.4	18	229	2	25	16	80	204	33	0.900	30
11	2528.1	20.6	16	256	2	32	14	77	224	96	2.80	20
12	2529.1	17.4	19	256	2	27	17	74	229	11	0.400	30
13	2530.1	15.7	28	341	6	73	22	76	268	16	0.500	30
14	2531.1	20.8	17	274	3	48	14	77	226	74	2.80	20
15	2532.1	21.2	12	197	0	0	12	83	197	53	1.80	20

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 SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Jackson Bros. Lease Crew Well No. 14

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	2017.5						Imp.				
2	2018.5						Imp.				
						BARTLESVILLE SAND					
1	2518.1	15.3	14	79	93	166	Imp.	0.6	0.6	100	0.00
2	2519.1	17.0	19	63	82	250	0.73	1.0	1.6	250	0.73
3	2520.1	20.6	23	57	80	367	12.	1.0	2.6	367	12.00
4	2521.1	21.6	19	61	80	318	16.	1.0	3.6	318	16.00
5	2522.1	17.8	22	60	82	304	2.3	1.0	4.6	304	2.30
6	2523.1	17.1	21	66	87	278	1.0	1.0	5.6	278	1.00
7	2524.1	15.6	20	70	90	242	3.4	1.0	6.6	242	3.40
8	2525.1	17.4	20	65	85	270	0.73	1.0	7.6	270	0.73
9	2526.1	18.1	26	61	87	365	8.4	1.0	8.6	365	8.40
10	2527.1	15.9	18	71	89	222	11.	1.0	9.6	222	11.00
11	2528.1	20.3	16	64	80	252	16.	1.0	10.6	252	16.00
12	2529.1	17.0	19	65	84	250	25.	1.0	11.6	250	25.00
13	2530.1	15.1	28	70	98	328	32.	1.0	12.6	328	32.00
14	2531.1	20.8	17	62	79	274	30.	1.0	13.6	274	30.00
15	2532.1	21.6	10	68	78	168	13.	1.4	15.0	235	18.20
								Total		4,055	

WELEX

INDUCTION—ELECTRIC LOG

COMPANY JACKSON BROS.
WELL CREW # 14
FIELD SALLYARDS
County GREENWOOD State KANS.

COMPANY JACKSON BROTHERS

WELL CREW # 14

FIELD SALLYARDS

COUNTY GREENWOOD STATE KANSAS

Location SW-NW-SE

Sec. 34 Twp 25S Rge 8E

Other Services:
ACOUSTIC

Permanent Datum KELLY BUSHING Elev. 1485'
Log Measured From KELLY BUSHING Ft. Above Perm. Datum
Drilling Measured From KELLY BUSHING

Elev.: K.B. 1485'
D.F.
G.L. 1481'

Date	7-12-63			1488*
Run No.	ONE			
Depth—Driller	2580'			
Depth—Welex	2572'			
Btm. Log Inter.	2567'			
Top Log Inter.	100'			
Casing—Driller	7" @ 80'	@	@	@
Casing—Welex				
Bit Size	10-3/4" 0-80', 6-1/4" 80'-2580'			
Type Fluid in Hole	DRLG. MUD CHEMICAL			
Dens. | Visc.	10.2 | 40	|	|	|
pH | Fluid Loss	| 13 ml	| ml	| ml	| ml
Source of Sample	CIRC.			
R_m @ Meas. Temp.	1.5 @ 84 °F	@ °F	@ °F	@ °F
R_{mf} @ Meas. Temp.	1.1 @ 77 °F	@ °F	@ °F	@ °F
R_{mc} @ Meas. Temp.	1.9 @ 80 °F	@ °F	@ °F	@ °F
Source R_{mf} R_{mc}	MEAS. |	|	|	|
R_m @ BHT	1.3 @ 96 °F	@ °F	@ °F	@ °F
Time Since Circ.	NONE			
Max. Rec. Temp.	96 °F @ 2550'	°F @	°F @	°F @
Equip. | Location	4970 EL DORADO |	|	|	|
Recorded By	H. STEITZ			
Witnessed By	MR. JACKSON			

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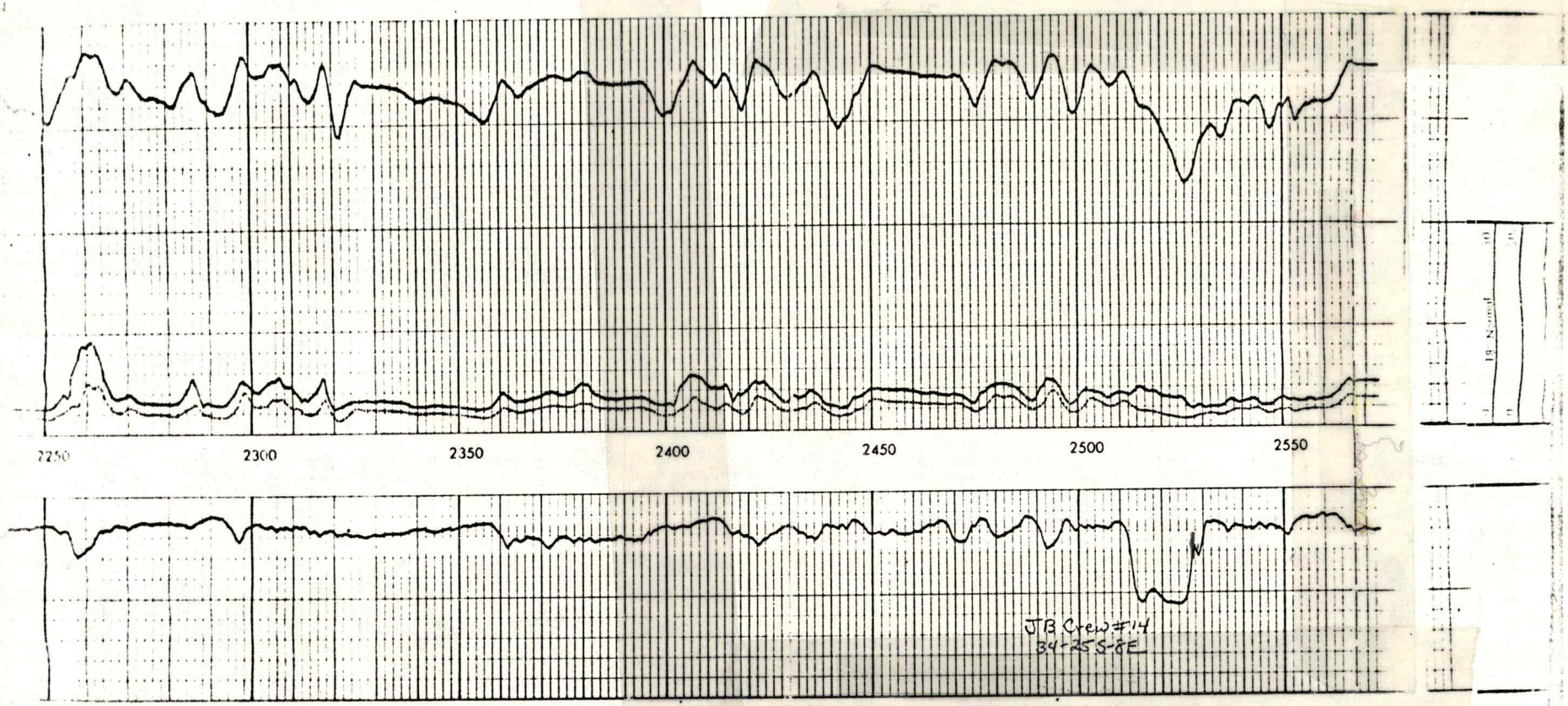
2250
2300
2350
2400
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2500
2550
JTB Crew #14
34-25S-8E