



6-24-24E

OILFIELD RESEARCH LABORATORIES

536 NORTH HIGHLAND - CHANUTE, KANSAS - PHONE HE1-2650

May 17, 1966

Cherokee Oil Company
Union National Building
Wichita, Kansas

Gentlemen:

Enclosed herewith is the report of the analysis of the Rotary core taken from the Feagins Lease, Well No. 1, Bourbon County, Kansas, and submitted to our laboratory on May 10, 1966.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Benjamin R. Pearman
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BRP:rf

5 c. - Robert Freeman

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GENERAL INFORMATION & SUMMARY

Company	Cherokee Oil Company		Lease	Feagins		Well No.	1
Location	Center SW NE						
Section	6	Twp.	24S	Rge.	24E	County	Bourbon
						State	Kansas
Name of Sand							Squirrel
Top of Core							153.0
Bottom of Core							170.0
Top of Sand	(Analyzed)						153.0
Bottom of Sand							166.5
Total Feet of Permeable Sand							13.5
Total Feet of Floodable Sand							12.4
Distribution of Permeable Sand:							
Permeability Range			Feet			Cum. Ft.	
Millidarcys							
10 - 100			9.1			9.1	
100 - 119			4.4			13.5	
Average Permeability Millidarcys							55.9
Average Percent Porosity							20.6
Average Percent Oil Saturation							50.6
Average Percent Water Saturation							30.6
Average Oil Content, Bbls./A. Ft.							810.
Total Oil Content, Bbls./Acre							10,920.
Average Percent Oil Recovery by Laboratory Flooding Tests							24.4
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.							390.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre							4,842.
Total Calculated Oil Recovery, Bbls./Acre	(Primary & Secondary)						4,640.
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 plastic bags by a representative of Oilfield Research Laboratories. The well was drilled in virgin territory.

FORMATION CORED

The detailed log of the formation cored is as follows:

Depth Interval, Feet	Description
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153.0 - 166.0	- Brown, slightly shaly sandstone.
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166.0 - 166.5	- Dark carbonaceous sandstone.
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166.5 - 170.0	- Shale.
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Coring was started at a depth of 153.0 feet in sandstone and completed at 170.0 feet in shale. This core shows a total of 13.5 feet of sandstone. For the most part, the pay is made up of brown, slightly 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 26.8 and 85.4 millidarcys respectively; the overall average being 55.9 (See Table III). By observing the data given on the coregraph, it is noticeable that the sand has an irregular permeability profile. The permeability of the sand varies from 10. to a maximum of 119. millidarcys.

PERCENT SATURATION & OIL CONTENT

The sand in this core shows a good weighted average percent oil saturation, namely, 50.6. The weighted average percent oil saturation

of the upper and lower sections is 49.9 and 51.4 respectively. The weighted average percent water saturation of the upper and lower sections is 31.8 and 29.0 respectively; the overall average being 30.6 (See Table III). This gives an overall weighted average total fluid saturation of 81.2 percent.

The weighted average oil content of the upper and lower sections is 764 and 866 barrels per acre foot respectively; the overall average being 810. The total oil content, as shown by this core, is 10,920 barrels per acre of which 10,290 barrels are in the pay sand section (See Table III).

LABORATORY FLOODING TESTS

The sand in this core responded very well to laboratory flooding tests, as a total recovery of 4,842 barrels of oil per acre was obtained from 12.4 feet of sand. The weighted average percent oil saturation was reduced from 51.8 to 27.4, or represents an average recovery of 24.4 percent. The weighted average effective permeability of the samples is 5.66 millidarcys, while the average initial fluid production pressure is 16.7 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 14 samples tested, all produced water and 12 oil. This indicates that approximately 86 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 4,640 barrels of oil per acre or an average of 374 barrels per acre foot from the 12.4 feet of floodable pay sand analyzed in this core. These recovery values were calculated using the following data and assumptions:

Original formation volume factor	1.02
Reservoir water saturation, percent	25.0
Average porosity, percent	20.7
Oil saturation after flooding, percent	27.4
Performance factor, percent	50.0
Net floodable pay sand, feet	12.4

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.

The data indicates that to recover the above reserves it will be necessary to institute some form of secondary recovery.

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

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.		
1	153.1	20.1	28	48	76	436	19.	0.6	0.6	262	11.40
2	154.1	19.9	35	39	74	540	44.	1.0	1.6	540	44.00
3	155.1	20.5	55	27	82	875	15.	1.0	2.6	875	15.00
4	156.1	19.3	42	33	75	629	31.	1.0	3.6	629	31.00
5	157.1	21.1	57	25	82	932	17.	1.0	4.6	932	17.00
6	158.1	18.6	70	28	98	1,008	10.	1.0	5.6	1,008	10.00
7	159.1	20.6	57	28	85	910	33.	1.0	6.6	910	33.00
8	160.1	18.2	46	33	79	649	42.	1.0	7.6	649	42.00
9	161.1	22.8	58	25	83	1,028	119.	1.0	8.6	1,028	119.00
10	162.1	22.6	54	26	80	945	104.	1.0	9.6	945	104.00
11	163.1	20.4	55	30	85	877	55.	1.0	10.6	877	55.00
12	164.1	21.2	47	29	76	772	119.	1.0	11.6	772	119.00
13	165.1	22.2	47	33	80	809	101.	1.4	13.0	1,132	141.40
14	166.1	19.4	48	30	78	721	24.	0.5	13.5	361	12.00
Total								Total		10,920	

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company	Cherokee Petroleum Company			Lease	Feagins		Well No.	1
	Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.				
	153.0 - 160.6	7.6	26.8	203.40				
	160.6 - 166.5	5.9	85.4	550.40				
	153.0 - 166.5	13.5	55.9	753.80				
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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

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			
1	153.1	19.7	28	428	0	0	28	71	24	0.700	35
2	154.1	20.0	35	541	5	77	30	63	40	1.00	30
3	155.1	20.0	55	851	31	479	24	72	37	1.00	20
4	156.1	18.8	42	611	20	291	22	74	37	0.900	10
5	157.1	20.8	57	919	31	500	26	73	35	1.00	10
6	158.1	19.0	70	1,032	41	604	29	72	21	0.600	20
7	159.1	20.8	57	919	31	500	26	72	421	11.00	10
8	160.1	18.7	46	666	20	290	26	61	88	3.70	20
9	161.1	22.6	58	1,018	30	526	28	69	306	10.00	10
10	162.1	22.9	54	958	23	409	31	67	410	15.20	10
11	163.1	20.8	55	887	25	403	30	68	155	4.70	20
12	164.1	20.8	47	757	16	258	31	58	232	9.60	20
13	165.1	22.2	47	809	21	361	26	62	254	8.10	20
14	166.1	18.9	50	733	0	0	50	46	15	0.300	35

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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SUMMARY OF LABORATORY FLOODING TESTS

TABLE V

Company	Cherokee Petroleum Company	Lease	Feagins	Well No.
Depth Interval, Feet		153.0 - 166.5		1
Feet of Core Analyzed		12.4		
Average Percent Porosity		20.7		
Average Percent Original Oil Saturation		51.8		
Average Percent Oil Recovery		24.4		
Average Percent Residual Oil Saturation		27.4		
Average Percent Residual Water Saturation		67.4		
Average Percent Total Residual Fluid Saturation		94.8		
Average Original Oil Content, Bbls./A. Ft.		829.		
Average Oil Recovery, Bbls./A. Ft.		390.		
Average Residual Oil Content, Bbls./A. Ft.		439.		
Total Original Oil Content, Bbls./Acre		10,290.		
Total Oil Recovery, Bbls./Acre		4,842.		
Total Residual Oil Content, Bbls./Acre		5,448.		
Average Effective Permeability, Millidarcys		5.66		
Average Initial Fluid Production Pressure, p.s.i.		16.7		

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