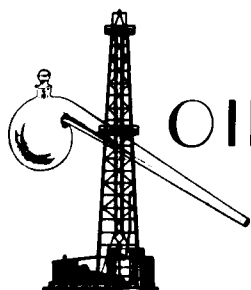


9-19-24E



OILFIELD RESEARCH LABORATORIES

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

June 2, 1966

Robert A. Mason
100 Park Avenue Building
Room 505
Oklahoma City, Oklahoma

Dear Sir:

Enclosed herewith is the report of the analysis of the Rotary core taken from the Crume Lease, Well No. PF-4, Miami County, Kansas, and submitted to our laboratory on May 27, 1966.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Benjamin R. Pearman
Benjamin R. Pearman

BRP:rf

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Oilfield Research Laboratories

GENERAL INFORMATION & SUMMARY

Company Robert A. Mason Lease Crume Well No. PF-4

Location 220' North & 220' West, SE Corner, NE SE

Section 9 Twp. 19S Rge. 24E County Miami State Kansas

Name of Sand	- - - - -	Peru
Top of Core	- - - - -	217.0
Bottom of Core	- - - - -	232.0
Top of Sand	- - - (Analyzed) - - - - -	217.0
Bottom of Sand	- - - (Analyzed) - - - - -	232.0
Total Feet of Permeable Sand	- - - - -	14.0
Total Feet of Floodable Sand	- - - - -	9.6

Distribution of Permeable Sand:

Permeability Range Millidarcys	Feet	Cum. Ft.
7 - 20	9.4	9.4
20 - 100	3.6	13.0
100 & above	1.0	14.0

Average Permeability Millidarcys	- - - - -	33.8
Average Percent Porosity	- - - - -	19.2
Average Percent Oil Saturation	- - - - -	45.5
Average Percent Water Saturation	- - - - -	40.0
Average Oil Content, Bbls./A. Ft.	- - - - -	685.
Total Oil Content, Bbls./Acre	- - - - -	10,281.
Average Percent Oil Recovery by Laboratory Flooding Tests	- - - - -	21.2
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	- - - - -	326.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	- - - - -	3,133.
Total Calculated Oil Recovery, Bbls./Acre	- (Primary & Secondary) -	3,290.
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 the client. The well was drilled in non-virgin territory.

FORMATION CORED

The detailed log of the formation cored is as follows:

<u>Depth Interval,</u>	<u>Description</u>
<u>Feet</u>	

217.0 - 232.0	- Brown and gray, laminated, calcareous, shaly sandstone.
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Coring was started at a depth of 217.0 feet in laminated, calcareous sandstone and completed at 232.0 feet also in calcareous sandstone. This core shows a total of 15.0 feet of sandstone. For the most part, the pay is made up of brown and gray, laminated, calcareous, 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 44.3 and 17.0 millidarcys respectively; the overall average being 33.8 (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 impermeable to a maximum of 161. millidarcys.

PERCENT SATURATION & OIL CONTENT

The sand in this core shows a good weighted average percent oil saturation, namely, 45.5. The weighted average percent oil satura-

tion of the upper and lower sections is 47.9 and 42.4 respectively. The weighted average percent water saturation of the upper and lower sections is 36.2 and 45.2 respectively; the overall average being 40.0 (See Table III). This gives an overall weighted average total fluid saturation of 85.5 percent.

The weighted average oil content of the upper and lower sections is 761 and 583 barrels per acre foot respectively; the overall average being 685. The total oil content, as shown by this core, is 10,281 barrels per acre of which 7,181 barrels are in the pay sand section (See Table III).

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 3,133 barrels of oil per acre was obtained from 9.6 feet of sand. The weighted average percent oil saturation was reduced from 49.4 to 28.2, or represents an average recovery of 21.2 percent. The weighted average effective permeability of the samples is 1.56 millidarcys, while the average initial fluid production pressure is 28.0 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 15 samples tested, 10 produced water and oil. This indicates that approximately 67 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 3,290 barrels of oil per acre or an average of 343 barrels per acre foot from the 9.6 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	19.3
Oil saturation after flooding, percent	28.2
Performance factor, percent	50.0
Net floodable pay sand, feet	9.6

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

Any oil already recovered from the area represented by this core should be subtracted from the above recovery values.

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RESULTS OF SATURATION & PERMEABILITY TESTS

Company			Robert A. Mason			Lease			Crume			Well No.			PF--4		
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	217.1	11.6	39	10	49	351	39.	0.6	0.6	211	23.40						
2	218.1	17.1	40	46	86	531	8.8	1.0	1.6	531	8.80						
3	219.1	18.0	57	39	96	795	20.	1.0	2.6	795	20.00						
4	220.1	19.1	53	44	97	786	15.	1.0	3.6	786	15.00						
5	221.1	21.8	42	34	76	710	8.7	1.0	4.6	710	8.70						
6	222.1	18.5	32	53	85	459	9.6	1.0	5.6	459	9.60						
7	223.1	25.8	52	27	79	1,042	161.	1.0	6.6	1,042	161.00						
8	224.1	22.8	57	33	90	1,008	49.	1.0	7.6	1,008	49.00						
9	225.1	23.2	56	29	85	1,008	86.	1.0	8.6	1,008	86.00						
10	226.1	18.9	32	46	78	469	36.	1.0	9.6	469	36.00						
11	227.1	17.3	32	51	83	429	13.	1.0	10.6	429	13.00						
12	228.1	17.1	39	48	87	517	15.	1.0	11.6	517	15.00						
13	229.1	17.6	51	38	89	696	Imp.	1.0	12.6	696	0.00						
14	230.1	16.3	64	32	96	809	17.	1.0	13.6	809	17.00						
15	231.1	19.7	38	53	91	580	7.7	1.4	15.0	811	10.78						
Total-----										10,281							

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company	Robert A. Mason	Lease	Crume	Well No.	PF-4

Oilfield Research Laboratories

RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company			Robert A. Mason			Lease			Crume			Well No.			PF-4		
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.					
			%	Bbbls./A. Ft.	%	Bbbls./A. Ft.	% Oil	% Water	Bbbls./A. Ft.								
1	217.1	12.1	39	366	15	141	24	62	225	16	0.280	20					
2	218.1	16.9	40	524	13	170	27	63	354	2	0.070	50					
3	219.1	18.5	57	817	24	344	33	64	473	11	0.280	40					
4	220.1	19.4	53	796	27	406	26	68	390	20	0.420	30					
5	221.1	21.4	43	714	0	0	43	36	714	0	Imp.	-					
6	222.1	18.8	31	452	0	0	31	56	452	0	Imp.	-					
7	223.1	25.3	52	1020	28	549	24	70	471	310	6.20	10					
8	224.1	22.4	57	989	25	434	32	61	555	41	0.840	10					
9	225.1	23.0	56	999	27	481	29	67	518	280	5.89	10					
10	226.1	18.7	32	464	8	116	24	68	348	10	0.280	40					
11	227.1	17.5	33	448	0	0	33	64	448	0	Imp.	-					
12	228.1	17.3	39	523	9	121	30	65	402	12	0.280	40					
13	229.1	17.2	52	692	0	0	52	39	692	0	Imp.	-					
14	230.1	16.7	64	829	33	427	31	67	402	25	0.560	30					
15	231.1	19.8	40	614	0	0	40	54	614	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.

Company Robert A. Mason

Lease Crume

Well No. PF-4

Oilfield Research Laboratories

SUMMARY OF LABORATORY FLOODING TESTS

TABLE V

Company	Robert A. Mason	Lease	Crume	Well No.	PF-4
Depth Interval, Feet	217.0 - 232.0				
Feet of Core Analyzed	9.6				
Average Percent Porosity	19.3				
Average Percent Original Oil Saturation	49.4				
Average Percent Oil Recovery	21.2				
Average Percent Residual Oil Saturation	28.2				
Average Percent Residual Water Saturation	65.8				
Average Percent Total Residual Fluid Saturation	94.0				
Average Original Oil Content, Bbls./A. Ft.	747.				
Average Oil Recovery, Bbls./A. Ft.	326.				
Average Residual Oil Content, Bbls./A. Ft.	421.				
Total Original Oil Content, Bbls./Acre	7,181.				
Total Oil Recovery, Bbls./Acre	3,133.				
Total Residual Oil Content, Bbls./Acre	4,048.				
Average Effective Permeability, Millidarcys	1.56				
Average Initial Fluid Production Pressure, p.s.i.	28.0				

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