



OILFIELD RESEARCH LABORATORIES

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

May 20, 1966

Mr. Warren Blufston
3045 S. Harvard
Room 212
Tulsa, Oklahoma

Dear Mr. Blufston:

Enclosed herewith is the report of the analysis of the Rotary core taken from the Testerman Lease, Well No. 7, Labette County, Kansas, and submitted to our laboratory on May 17, 1966.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Benjamin R. Pearman
Benjamin R. Pearman

BRP:cm

Oilfield Research Laboratories

GENERAL INFORMATION & SUMMARY

Company	Warren Blufston		Lease	Testerman		Well No.	7
Location	SW						
Section	14	Twp.	33S	Rge.	18E 17?	County	Labette
						State	Kansas
Name of Sand							Bartlesville
Top of Core							673.0
Bottom of Core							719.0
Top of Sand	(Analyzed)						673.0
Bottom of Sand							690.1
Total Feet of Permeable Sand							16.3
Total Feet of Floodable Sand							14.7
Distribution of Permeable Sand:							
Permeability Range Millidarcys			Feet			Cum. Ft.	
0 - 5			3.4			3.4	
5 - 10			3.4			6.8	
10 - 20			3.4			10.2	
20 - 50			5.3			15.5	
50 & above			0.8			16.3	
Average Permeability Millidarcys							19.8
Average Percent Porosity							17.8
Average Percent Oil Saturation							30.0
Average Percent Water Saturation							52.5
Average Oil Content, Bbls./A. Ft.							419.
Total Oil Content, Bbls./Acre							6,846.
Average Percent Oil Recovery by Laboratory Flooding Tests							5.1
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.							73.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre							1,065.
Total Calculated Oil Recovery, Bbls./Acre	(Primary & Secondary)						3,300
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.

FORMATION CORED

The detailed log of the formation cored is as follows:

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

673.0 - 673.8	- Brown slightly shaly sandstone.
673.8 - 676.2	- Grayish light brown laminated shaly sandstone.
676.2 - 679.6	- Brown slightly laminated slightly shaly sandstone.
679.6 - 680.2	- Grayish light brown shaly sandstone.
680.2 - 684.3	- Brown slightly laminated slightly shaly sandstone.
684.3 - 685.3	- Grayish light brown laminated shaly sandstone.
685.3 - 689.3	- Brown slightly laminated slightly shaly sandstone.
689.3 - 690.1	- Brown sandstone containing coal laminations.
690.1 - 714.0	- Shale.
714.0 - 719.0	- Gray sandstone.

Coring was started at a depth of 673.0 feet in sandstone and completed at 719.0 feet in gray sandstone. This core shows a total of 16.3 feet of sandstone. For the most part, the pay is made up of brown, slightly laminated, 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 25.1 and 15.8 millidarcys respectively; the overall average being 19.8 (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

0.37 to a maximum of 52 millidarcys.

PERCENT SATURATION & OIL CONTENT

The sand in this core shows a good weighted average percent oil saturation, namely, 30.0. The weighted average percent oil saturation of the upper and lower sections is 28.0 and 31.8 respectively. The weighted average percent water saturation of the upper and lower sections is 53.2 and 52.1 respectively; the overall average being 52.5 (See Table III). This gives an overall weighted average total fluid saturation of 82.5 percent.

The weighted average oil content of the upper and lower sections is 382 and 451 barrels per acre foot respectively; the overall average being 419. The total oil content, as shown by this core, is 6846 barrels per acre of which 6494 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 1065 barrels of oil per acre was obtained from 14.7 feet of sand. The weighted average percent oil saturation was reduced from 31.3 to 26.2, or represents an average recovery of 5.1 percent. The weighted average effective permeability of the samples is 1.20 millidarcys, while the average initial fluid production pressure is 26.0 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 17 samples tested, 16 produced water and 15 oil. This indicates that approximately 88 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 3300 barrels of oil per acre or an average of 225 barrels per acre foot from the 14.7 feet of floodable pay sand analyzed in this core. These recovery values were calculated using the following data and assumptions:

Original formation volume factor	1.06
Reservoir water saturation, percent	40.0
Average porosity, percent	18.2
Oil saturation after flooding, percent	26.2
Performance factor, percent	50.0
Net floodable pay sand, feet	14.7

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.

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

Oilfield Research Laboratories

RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Warren Blufston Lease Testerman Well No. 7

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	673.1	17.2	29	54	83	386	52.	0.8	0.8	309	41.60
2	674.1	16.5	28	65	93	358	1.2	0.8	1.6	286	0.96
3	675.1	18.4	30	51	81	428	2.4	1.0	2.6	428	2.40
4	676.1	15.6	15	72	87	181	4.6	0.6	3.2	109	2.76
5	677.1	19.5	28	46	74	424	46.	1.4	4.6	594	64.40
6	678.1	18.0	35	48	83	489	17.	1.0	5.6	489	17.00
7	679.1	16.3	26	52	78	328	25.	1.0	6.6	328	25.00
8	680.1	16.2	27	48	75	339	44.	0.6	7.2	203	26.40
9	681.1	18.8	39	46	85	568	9.3	1.4	8.6	794	13.02
10	682.1	18.1	31	51	82	435	5.7	1.0	9.6	435	5.70
11	683.1	17.7	35	54	89	480	20.	1.0	10.6	480	20.00
12	684.1	18.1	47	50	97	660	12.	0.7	11.3	462	8.40
13	685.1	13.6	14	78	92	148	0.37	1.0	12.3	148	0.37
14	686.1	19.2	26	47	73	388	35.	1.3	13.6	504	45.50
15	687.1	19.2	31	43	74	462	36.	1.0	14.6	462	36.00
16	688.1	17.7	29	54	83	398	5.8	1.0	15.6	398	5.80
17	689.1	19.7	39	49	88	596	12.	0.7	16.3	417	8.40

Oilfield Research Laboratories

SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company	Warren Blufston	Lease	Testerman	Well No.	7		
	Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.			
	673.0 - 680.2	7.2	25.1	180.52			
	680.2 - 689.3	9.1	15.8	143.19			
	673.0 - 689.3	16.3	19.8	323.71			
	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 Bbbl./Acre
	673.0 - 680.2	7.2	17.5	28.0	53.2	382	2746
	680.2 - 689.3	9.1	18.1	31.8	52.1	451	4100
	673.0 - 689.3	16.3	17.8	30.0	52.5	419	6846

Oilfield Research Laboratories

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	Bbls./A. Ft.			
1	673.1	17.4	29	391	5	67	24	54	324	80	1.70	20
2	674.1	16.1	28	349	2	25	26	70	324	9	0.333	40
3	675.1	18.4	30	428	3	43	27	58	385	25	0.600	30
4	676.1	15.1	17	199	0	0	17	79	199	2	0.200	50
5	677.1	20.0	28	434	4	62	24	63	372	74	1.60	20
6	678.1	17.7	35	480	6	82	29	59	398	20	0.445	30
7	679.1	16.7	26	336	2	26	24	56	310	61	1.40	20
8	680.1	15.9	27	333	3	37	24	68	296	13	0.556	40
9	681.1	18.5	39	560	10	144	29	56	416	53	1.20	20
10	682.1	17.7	31	426	4	55	27	64	371	13	0.556	30
11	683.1	18.1	35	491	7	98	28	66	393	31	0.890	30
12	684.1	17.2	38	506	10	133	28	70	373	40	0.900	20
13	685.1	13.3	15	155	0	0	15	78	155	0	Imp.	-
14	686.1	19.3	26	389	2	30	24	62	359	88	1.90	20
15	687.1	19.0	31	456	7	103	24	62	353	123	2.60	20
16	688.1	18.0	29	404	3	42	26	57	362	32	0.800	30
17	689.1	20.2	39	610	9	141	30	63	469	80	1.90	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.

Oilfield Research Laboratories

SUMMARY OF LABORATORY FLOODING TESTS

TABLE V

Company	Lease	Testerman	Well No.
Warren Blufston			7
Depth Interval, Feet	673.0 - 680.2	680.2 - 689.3	673.0 - 689.3
Feet of Core Analyzed	6.6	8.1	14.7
Average Percent Porosity	17.8	18.5	18.2
Average Percent Original Oil Saturation	29.0	33.1	31.3
Average Percent Oil Recovery	3.6	6.3	5.1
Average Percent Residual Oil Saturation	25.4	26.8	26.2
Average Percent Residual Water Saturation	60.8	62.0	61.4
Average Percent Total Residual Fluid Saturation	86.2	88.8	87.6
Average Original Oil Content, Bbls./A. Ft.	401.	474.	442.
Average Oil Recovery, Bbls./A. Ft.	51.	90.	73.
Average Residual Oil Content, Bbls./A. Ft.	350.	384.	369.
Total Original Oil Content, Bbls./Acre	2644.	3850.	6494.
Total Oil Recovery, Bbls./Acre	334.	731.	1065.
Total Residual Oil Content, Bbls./Acre	2310.	3119.	5429.
Average Effective Permeability, Millidarcys	1.01	1.35	1.20
Average Initial Fluid Production Pressure, p.s.i.	28.6	23.8	26.0

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