



OILFIELD RESEARCH LABORATORIES

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Chanute, Kansas

July 21, 1965

John A. Walters
Box 849
Manhattan, Kansas

Dear Sir:

Enclosed herewith is the report of the analysis of the Rotary core taken from the Hobson (Holman Block), Well No. 17, Crawford County, Kansas, and submitted to our laboratory on July 13, 1965.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Benjamin R. Pearman
Benjamin R. Pearman

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Oilfield Research Laboratories

GENERAL INFORMATION & SUMMARY

Company John A. Walters Lease Hobson (Holman Block) Well No. 17

Location NW

Section 32 Twp. 30S Rge. 22E County Crawford State Kansas

Name of Sand	Bartlesville
Top of Core	218.0
Bottom of Core	255.0
Top of Sand (Analyzed)	218.0
Bottom of Sand (Analyzed)	252.6
Total Feet of Permeable Sand	28.4
Total Feet of Floodable Sand	14.6

Distribution of Permeable Sand:
Permeability Range
Millidarcys

	Feet	Cum. Ft.
0 - 10	18.4	18.4
10 - 50	7.0	25.4
50 - 96	3.0	28.4

Average Permeability Millidarcys	17.8
Average Percent Porosity	17.6
Average Percent Oil Saturation	40.1
Average Percent Water Saturation	38.6
Average Oil Content, Bbls./A. Ft.	551.
Total Oil Content, Bbls./Acre	15,675.
Average Percent Oil Recovery by Laboratory Flooding Tests	7.8
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	109.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	1,597.
Total Calculated Oil Recovery, Bbls./Acre (Primary & Secondary)	3,500.
Packer Setting, Feet	
Viscosity, Centipoises @	
A. P. I. Gravity, degrees @ 60 °F	
Elevation, Feet	

Water 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 non-virgin territory.

FORMATION CORED

The detailed log of the formation cored is as follows:

Depth Interval, Description
Feet

218.0 - 219.0 - Brown, laminated, shaly sandstone.
219.0 - 219.4 - Shale.
219.4 - 227.6 - Brown, laminated, shaly sandstone.
227.6 - 229.0 - Sandy shale.
229.0 - 232.0 - Brown, laminated, shaly sandstone.
232.0 - 232.4 - Shale.
232.4 - 234.6 - Brown, slightly calcareous sandstone.
234.6 - 235.6 - Gray, laminated, shaly sandstone.
235.6 - 236.6 - Brown, laminated, shaly sandstone.
236.6 - 238.8 - Gray, laminated, shaly sandstone.
238.8 - 239.8 - Brown, laminated, shaly sandstone.
239.8 - 240.6 - Laminated sandstone and shale.
240.6 - 251.6 - Dark brown, slightly calcareous sandstone.
251.6 - 254.0 - Grayish brown, calcareous sandstone.
254.0 - 255.0 - Shale.

Coring was started at a depth of 218.0 feet in shaly sandstone and completed at 255.0 feet in shale. This core shows a total of 28.4 feet of sandstone. For the most part, the pay is made up of brown to dark

brown, slightly calcareous 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 5.2 and 37.6 millidarcys respectively; the overall average being 17.8 (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 0.69 to a maximum of 96. millidarcys.

PERCENT SATURATION & OIL CONTENT

The sand in this core shows a good weighted average percent oil saturation, namely, 40.1. The weighted average percent oil saturation of the upper and lower sections is 35.8 and 46.9 respectively. The weighted average percent water saturation of the upper and lower sections is 42.5 and 32.6 respectively; the overall average being 38.6 (See Table III). This gives an overall weighted average total fluid saturation of 78.7 percent. This low total fluid saturation indicates some fluid was lost during coring most of which was probably oil.

The weighted average oil content of the upper and lower sections is 481 and 665 barrels per acre foot respectively; the overall average being 551. The total oil content, as shown by this core, is 15,675 barrels per acre of which 8,083 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 1,597 barrels of oil per acre was obtained from 14.6

feet of sand. The weighted average percent oil saturation was reduced from 40.2 to 32.4, or represents an average recovery of 7.8 percent. The weighted average effective permeability of the samples is 0.664 millidarcys, while the average initial fluid production pressure is 41.9 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 28 samples tested, 19 produced water and 14 oil. This indicates that approximately 50 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 3,500 barrels of oil per acre or an average of 240 barrels per acre foot from the 14.6 feet of floodable pay sand analyzed in this core. Any primary oil that has already been recovered from the vicinity of this well should be subtracted from the foregoing recovery values. These values were calculated using the following data and assumptions:

Original formation volume factor	1.05
Present formation volume factor	1.02
Reservoir water saturation, percent	30.0
Average porosity, percent	17.8
Oil saturation after flooding, percent	32.4
Performance factor, percent	50.0
Net floodable pay sand, feet	14.6

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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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company John A. Walters Lease Hobson (Holman Block) Well No. 17

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	218.1	16.7	39	52	91	504	2.5	1.0	1.0	504	2.50
2	220.1	18.6	39	33	72	562	6.3	1.2	2.2	675	7.56
3	221.1	18.8	35	39	74	510	4.5	1.0	3.2	510	4.50
4	222.1	17.9	43	32	75	596	3.9	1.0	4.2	596	3.90
5	223.1	17.0	38	47	85	501	6.1	1.0	5.2	501	6.10
6	224.1	17.1	34	47	81	451	3.4	1.0	6.2	451	3.40
7	225.1	18.4	41	38	79	584	1.7	1.0	7.2	584	1.70
8	226.1	16.7	47	41	88	609	1.8	1.0	8.2	609	1.80
9	227.1	15.0	23	61	84	268	1.8	1.0	9.2	268	1.80
10	229.1	15.9	33	60	93	407	1.1	0.6	9.8	244	6.60
11	230.1	15.4	25	59	84	299	0.69	1.0	10.8	299	0.69
12	231.1	16.8	30	46	76	390	2.8	1.4	12.2	546	3.92
13	233.1	17.1	42	23	65	556	9.0	1.2	13.4	666	10.80
14	234.1	17.6	43	31	74	586	8.1	1.0	14.4	586	8.10
15	236.1	18.3	42	37	79	595	9.7	1.0	15.4	595	9.70
16	239.1	17.8	29	42	71	400	11.	1.0	16.4	400	11.00
17	241.1	16.4	26	46	72	331	6.2	1.0	17.4	331	6.20
18	242.1	19.4	48	31	79	721	96.	1.0	18.4	721	96.00
19	243.1	18.5	41	31	72	589	88.	1.0	19.4	589	88.00
20	244.1	19.9	36	37	73	555	70.	1.0	20.4	555	70.00
21	245.1	17.9	47	39	86	652	34.	1.0	21.4	652	34.00
22	246.1	19.0	49	29	78	721	34.	1.0	22.4	721	34.00
23	247.1	19.1	61	28	89	903	26.	1.0	23.4	903	26.00
24	248.1	19.0	54	27	81	794	17.	1.0	24.4	794	17.00

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company John A. Walters Lease Hobson (Holman Block) Well No. 17

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.		
25	249.1	19.7	59	28	87	901	13.	1.0	25.4	901	13.00
26	250.1	16.3	38	39	77	480	27.	1.0	26.4	480	27.00
27	251.1	15.6	51	31	82	616	8.2	1.0	27.4	616	8.20
28	252.1	15.7	31	39	70	378	1.3	1.0	28.4	378	1.30
Total								-----		15,675	

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company		John A. Walters	Lease	Hobson (Holman Block)	Well No.	17
Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.			
218.0 - 241.6	17.4	5.2	90.27			
241.6 - 252.6	11.0	37.6	414.50			
218.0 - 252.6	28.4	17.8	504.77			
Depth Interval, Feet	Feet of Core Analyzed	Average Percent Porosity	Average Percent Oil Saturation	Average Water Saturation	Average Oil Content Bbl./A. Ft.	Total Oil Content Bbls./Acre
218.0 - 241.6	17.4	17.2	35.8	42.5	481	8,365
241.6 - 252.6	11.0	18.2	46.9	32.6	665	7,310
218.0 - 252.6	28.4	17.6	40.1	38.6	551	15,675

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company			John A. Walters			Lease			Hobson(Holman Block)			Well No. 17		
Sample No.	Depth, Feet	Effective Porosity Percent	Original Oil Saturation		Oil Recovery		Residual Saturation		Volume of Water Recovered cc ^a	Effective Permeability Millidarcys ^{cc}	Initial Fluid Production Pressure Lbs./Sq./In.			
			%	Bbls./A. Ft.	%	Bbls./A. Ft.	% Oil	% Water				Bbls./A. Ft.		
1	218.1	16.8	39	508	6	78	33	59	2	0.058	50			
2	220.1	18.3	39	554	11	156	28	61	4	0.135	50			
3	221.1	18.3	35	496	8	114	27	69	2	0.131	50			
4	222.1	17.5	43	583	16	217	27	68	2	0.121	50			
5	223.1	17.2	39	520	0	0	39	48	0	Imp.	-			
6	224.1	17.2	33	440	0	0	33	50	0	Imp.	-			
7	225.1	18.6	41	591	0	0	41	38	0	Imp.	-			
8	226.1	16.4	48	611	0	0	48	42	0	Imp.	-			
9	227.1	15.2	25	294	0	0	25	60	0	Imp.	-			
10	229.1	16.2	33	414	0	0	33	62	0	Imp.	-			
11	230.1	15.4	25	299	0	0	25	60	0	Imp.	-			
12	231.1	17.3	30	402	3	40	27	69	8	0.202	50			
13	233.1	17.0	42	554	0	0	42	25	0	Imp.	-			
14	234.1	17.4	43	580	4	54	39	57	1	0.070	50			
15	236.1	18.0	45	628	0	0	45	39	0	Imp.	-			
16	239.1	17.5	29	393	2	27	27	67	12	0.212	40			
17	241.1	16.8	27	352	0	0	27	61	4	0.070	50			
18	242.1	19.2	48	714	13	194	35	61	75	1.43	20			
19	243.1	18.1	41	574	5	70	36	61	287	5.55	20			
20	244.1	19.6	36	547	2	30	34	60	6	0.205	50			
21	245.1	17.8	47	649	13	179	34	58	30	0.659	25			
22	246.1	19.4	49	738	15	226	34	52	28	0.513	30			
23	247.1	18.7	62	898	0	0	62	29	2	0.073	50			

Notes: cc—cubic centimeter.

a.—Volume of water recovered at the time of maximum oil recovery.

cc.—Determined by passing water through sample which still contains residual oil.

Company John A. Walters

Lease

Hobson (Holman Block)

Well No. 17

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company		John A. Walters		Lease		Hobson(Holman Block)		Well No.		17	
Sample No.	Depth, Feet	Effective Porosity Percent	Original Oil Saturation		Oil Recovery		Residual Saturation		Volume of Water Recovered cc ^a	Effective Permeability Millidarcys ^{aa}	Initial Fluid Production Pressure Lbs./Sq./In.
			%	Bbbl./A. Ft.	%	Bbbl./A. Ft.	% Oil	% Water			
24	248.1	18.7	54	782	0	0	54	38	5	0.220	50
25	249.1	19.4	58	872	0	0	58	39	7	0.220	50
26	250.1	16.2	38	478	2	25	36	62	5	0.146	50
27	251.1	15.1	51	596	12	140	39	58	8	0.146	50
28	252.1	16.1	33	412	0	0	33	65	30	0.585	30

Notes: cc—cubic centimeter.

^a—Volume of water recovered at the time of maximum oil recovery.

^{aa}—Determined by passing water through sample which still contains residual oil.

Oilfield Research Laboratories

SUMMARY OF LABORATORY FLOODING TESTS

TABLE V

Company	John A. Walters	Lease	Hobson (Holman Block)	Well No.	17
Depth Interval, Feet	218.0 - 241.6	241.6 - 252.6	218.0 - 252.6		
Feet of Core Analyzed	7.6	7.0	14.6		
Average Percent Porosity	17.6	17.9	17.8		
Average Percent Original Oil Saturation	36.5	44.3	40.2		
Average Percent Oil Recovery	6.9	8.9	7.8		
Average Percent Residual Oil Saturation	29.6	35.4	32.4		
Average Percent Residual Water Saturation	64.4	59.0	61.8		
Average Percent Total Residual Fluid Saturation	94.0	94.4	94.2		
Average Original Oil Content, Bbls./A. Ft.	498.	613.	553.		
Average Oil Recovery, Bbls./A. Ft.	97.	123.	109.		
Average Residual Oil Content, Bbls./A. Ft.	401.	490.	444.		
Total Original Oil Content, Bbls./Acre	3,787.	4,296.	8,083.		
Total Oil Recovery, Bbls./Acre	733.	864.	1,597.		
Total Residual Oil Content, Bbls./Acre	3,054.	3,432.	6,486.		
Average Effective Permeability, Millidarcys	0.136	1.24	0.664		
Average Initial Fluid Production Pressure, p.s.i.	48.6	35.0	41.9		

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