

July 24, 1952

Barnett Oil Company
417 First National
Wichita, Kansas

Gentlemen:

Enclosed herewith is the report of the analysis of the 2 3/4" Rotary core samples taken from the Hostetter Lease, Well No. H-2, Franklin County, Kansas, and submitted to our laboratory on July 14, 1952.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Carl L. Pate

CLP:er
c.c.

BARNETT OIL COMPANY

CORE ANALYSIS REPORT

HIGHTOWER LEASE WELL NO. W-2

FRANKLIN COUNTY, KANSAS

OILFIELD STRONG LABORATORIES

GRAND, MISS G.

JULY 23, 1952

Oilfield Research Laboratories

GENERAL INFORMATION & SUMMARY

Company Barnett Oil Company Lease Hostetter Well No. W-2

Location 100' N. of S. line & 675' W. of E. line SE $\frac{1}{4}$

Section 3 Twp. 17S Rge. 21E County Franklin State Kansas

Name of Sand	Squirrel
Top of Core	575.50
Bottom of Core	610.00
Top of Sand (according to log)	575.50
Bottom of ^{Pay} Sand	607.30
Total Feet of Permeable Sand (Analyzed)	11.00
Total Feet of Floodable Sand (Analyzed)	8.00

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.
0 - 13	4.00	4.00
13 - 26	5.00	9.00
26 & above	2.00	11.00

Average Permeability Millidarcys	17.63
Average Percent Porosity	19.84
Average Percent Oil Saturation	42.01
Average Percent Water Saturation	30.69
Average Oil Content, Bbls./A. Ft.	649.
Total Oil Content, Bbls./Acre	7,136.
Average Percent Oil Recovery by Laboratory Flooding Tests	18.16
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	283.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	2,261.
Total Calculated Oil Recovery, Bbls./Acre	2,500.
Packer Setting, Feet	
Viscosity, Centipoises @	
A. P. I. Gravity, degrees @ 60 °F	
Elevation, Feet	

Fresh water was used as the circulating fluid in the coring of the sand in this well.

The following log of the formation cored was submitted to our laboratory along with the core samples.

FORMATION CORED

The detailed log of the formation cored is as follows:

<u>Depth Interval,</u> <u>Feet</u>	<u>Description</u>
575.50 - 578.40	- Brown fine grained micaceous sandstone.
578.40 - 578.70	- Laminated sandy shale.
578.70 - 583.00	- Brown fine grained micaceous sandstone.
583.00 - 584.10	- Brown fine grained laminated micaceous shaley sandstone.
584.10 - 586.80	- Brown fine grained micaceous sandstone.
586.80 - 588.00	- Brown fine grained laminated micaceous shaley sandstone.
588.00 - 588.80	- Limestone.
588.80 - 591.00	- Brown fine grained micaceous sandstone.
591.00 - 591.20	- Brown fine grained laminated micaceous shaley sandstone.
591.20 - 595.20	- Brown fine grained micaceous sandstone.
595.20 - 595.30	- Laminated sandy shale.
595.30 - 607.30	- Brown fine grained micaceous sandstone.
607.30 - 608.10	- Dark fine grained micaceous carbonaceous shaley sandstone.
608.10 - 610.00	- Dark fine grained micaceous carbonaceous sandstone.

Coring was started at a depth of 575.50 feet in fine grained micaceous sandstone and completed at 610.00 feet in fine grained micaceous carbonaceous sandstone. This core shows a total of 35.45

feet of sandstone. For the most part, the pay is made up of fine grained micaceous 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 2.95 and 20.89 millidarcys respectively; the overall average being 17.63 (See Table II). By observing the data given on the coregraph, it is noticeable that the sand has a fairly uniform permeability.

PERCENT SATURATION & OIL CONTENT

The sand in this core shows a good weighted average percent oil saturation, namely, 42.01. The weighted average percent oil saturation of the upper and lower sections is 34.20 and 45.97 respectively. The weighted average percent water saturation of the upper and lower sections is 44.20 and 27.69 respectively; the overall average being 30.69 (See Table IV). This gives an overall weighted average total fluid saturation of 72.70 percent. This comparatively low total fluid saturation indicates that an appreciable amount of fluid was lost during coring, which was probably oil.

In an effort to determine the degree of flushing of the sand during coring, all of the saturation samples were analyzed for chloride content. The results of these tests are given in Tables VII and VIII. From the data given in these tables and on the coregraph, it is evident that the sand was not flushed to any appreciable degree as for the most part, the sand has a fairly uniform chloride content.

The weighted average oil content of the upper and lower sections is 360 and 713 barrels per acre foot respectively; the overall average being 649. The total oil content, as shown by this core, is 7,136 barrels per acre (See Table IV).

LABORATORY FLOODING TESTS

The sand in this core responded very well to laboratory flooding tests, as a total recovery of 2,261 barrels of oil per acre was obtained from 8.00 feet of sand. The weighted average percent oil saturation was reduced from 43.77 to 25.61, or represents an average recovery of 18.16 percent. The weighted average effective permeability of the samples is 0.433 millidarcys, while the average initial fluid production pressure is 18.8 pounds per square inch (See Table VI).

By observing the data given in Table V, you will note that of the 11 samples tested, 10 produced water and 8 oil. This indicates that approximately 73 percent of the sand represented by these samples is floodable. The tests also show that the sand is comparatively tight.

CONCLUSION

From a study of the above data, we believe that an efficient water flood within the vicinity of this well will recover approximately 2,500 barrels of oil per acre, or an average of 312 barrels per acre foot from the 8.00 feet of floodable sand analyzed provided the sand will take water satisfactorily. In calculating this recovery, an allowance was made for oil lost during coring, and it was assumed that the primary oil production is 10 percent. Of

course, if all the sand was analyzed, the recovery value would be considerable higher than that mentioned above.

This core shows a good sand section, however, the sand is comparatively tight for its depth.

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RESULTS OF PERMEABILITY TESTS
TABLE I

Company Hess Oil Company Lease Hostetter Well No. 4-2

Sample No.	Depth, Feet	Permeability Millidarcys	Feet of Core		Permeability Capacity Ft. x Md.
			Ft.	Cum. Ft.	
1	577.0	1.1	1.00	1.00	1.10
2	582.0	4.8	1.00	2.00	4.80
3	585.0	35.	1.00	3.00	35.00
4	590.0	27.	1.00	4.00	27.00
5	592.0	16.	1.00	5.00	16.00
6	594.0	12.	1.00	6.00	12.00
7	597.0	11.	1.00	7.00	11.00
8	600.0	25.	1.00	8.00	25.00
9	603.0	25.	1.00	9.00	25.00
10	606.0	23.	1.00	10.00	23.00
11	606.0	14.	1.00	11.00	14.00

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SUMMARY OF PERMEABILITY TESTS

TABLE II

Company	Lease	Well No.	
Barnett Oil Company	Hostetter	W-2	
Depth Interval Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity, Ft. x Md.
576.50 - 582.00	2.00	2.95	5.90
584.50 - 609.50	9.00	20.89	188.00
576.50 - 609.50	11.00	17.63	193.90

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RESULTS OF SATURATION TESTS

TABLE III

Company Barnett Oil Company Lease Koetter Well No. 4-2

Sat. No.	Depth, Feet	Effective Porosity Percent	Percent Saturation			Oil Content Bbls./A. Ft.	Feet of Core		Total Oil Content Bbls./Acre
			Oil	Water	Total		Ft.	Cum. Ft.	
1	577.0	18.0	22.0	48.6	70.6	308	1.00	1.00	308
2	582.0	20.1	26.4	39.8	66.2	412	1.00	2.00	412
3	585.0	20.7	33.3	35.3	68.6	536	1.00	3.00	536
4	590.0	20.9	40.2	39.0	79.2	552	1.00	4.00	552
5	592.0	18.6	49.2	36.4	25.6	710	1.00	5.00	710
6	599.0	19.9	45.3	28.7	73.0	713	1.00	6.00	713
7	597.0	20.8	49.0	23.9	72.9	791	1.00	7.00	791
8	600.0	19.0	41.8	35.6	77.4	617	1.00	8.00	617
9	603.0	20.9	47.7	22.7	20.4	773	1.00	9.00	773
10	606.0	19.9	52.2	24.2	76.4	806	1.00	10.00	806
11	608.0	19.5	54.0	22.4	76.4	818	1.00	11.00	818
							Total		7,136

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SUMMARY OF SATURATION TESTS

TABLE IV

Company	Lease	Hostetter	Well No.			
	Barnett Oil Company	Hostetter	8-2			
Depth Interval, Feet	Feet of Core Analyzed	Average Percent Porosity	Average Percent Oil Saturation	Average Percent Water Saturation	Average Oil Content Bbls./A. Ft.	Total Oil Content Bbls./Acre
576.50 - 582.50	2.00	19.35	24.20	40.23	360	720
584.50 - 609.50	2.00	20.00	45.97	27.69	713	6,416
576.50 - 609.50	11.00	19.64	42.01	37.69	649	7,136

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RESULTS OF LABORATORY FLOODING TESTS

TABLE V

Company Barnett Oil Company

Lease Hostetter

Well No. W-2

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.
			Percent	Bbls./A. Ft.	Percent	Bbls./A. Ft.	% Oil	% Water	Bbls./A. Ft.			
1	577.00	17.9	21.5	299	0.0	0	21.5	75.0	299	7	0.460	45
2	582.00	20.1	26.9	420	0.0	0	26.9	68.2	420	9	0.458	45
3	585.00	20.4	32.3	511	8.5	134	23.8	71.5	377	121	3.80	20
4	590.00	20.6	41.2	659	17.2	275	24.0	70.4	384	26	0.772	20
5	592.00	18.7	47.2	686	17.7	257	29.5	65.4	429	4	0.175	20
6	594.00	19.9	44.5	687	20.0	309	24.5	69.7	378	15	0.337	15
7	597.00	20.9	47.2	766	23.5	382	23.7	72.2	384	13	0.400	20
8	600.00	19.5	40.5	613	13.3	201	27.2	70.0	412	18	0.465	20
9	603.00	20.6	46.7	747	21.5	344	25.2	72.0	403	16	0.360	15
10	606.00	19.6	50.6	770	23.6	359	27.0	66.4	411	21	0.575	20
11	609.00	19.4	52.5	791	0.0	0	52.5	35.3	791	0	Imp.	50*

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 VI

Company	Murdell Oil Company	Lease	Hostetter	Well No.	W-2
Depth Interval, Feet			184.50 - 616.50		
Feet of Core Analyzed			3.00		
Average Percent Porosity			20.00		
Average Percent Original Oil Saturation			43.77		
Average Percent Oil Recovery			18.16		
Average Percent Residual Oil Saturation			25.61		
Average Percent Residual Water Saturation			69.70		
Average Percent Total Residual Fluid Saturation			95.31		
Average Original Oil Content, Bbls./A. Ft.			680.		
Average Oil Recovery, Bbls./A. Ft.			283.		
Average Residual Oil Content, Bbls./A. Ft.			397.		
Total Original Oil Content, Bbls./Acre			5,439.		
Total Oil Recovery, Bbls./Acre			2,261.		
Total Residual Oil Content, Bbls./Acre			3,178.		
Average Effective Permeability, Millidarcys			0.400		
Average Initial Fluid Production Pressure, p.s.i.			18.0		

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

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RESULTS OF WATER DIFFERENTIATION TESTS
TABLE VII

Company Barnett Oil Company Lease Hostetter Well No. W-2

Sample No.	Depth, Feet	Chloride Content of Brine in Sand ppm	Percent Water Saturation		
			Connate	Drilling & Foreign	Total
1	577.0	16,100			
2	582.0	18,300			
3	585.0	12,400			
4	590.0	24,000			
5	592.0	23,600			
6	594.0	21,500			
7	597.0	19,500			
8	600.0	20,000			
9	603.0	22,000			
10	606.0	25,400			
11	609.0	26,200			

Note: ppm - parts per million.

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SUMMARY OF WATER DIFFERENTIATION TESTS

TABLE VIII

Company ~~Barnett Oil Company~~ Lease ~~Hostetter~~ Well No. ~~W-2~~

Depth Interval, Feet	Chloride Content of Brine in Sand, ppm	Average Percent Connate Water	Average Percent Drilling & Foreign Water
576.50 - 582.50	14,700		
584.50 - 609.50	21,622		
576.50 - 609.50	20,364		

Note: ppm - parts per million.