

HICKORY CREEK OIL COMPANY

CORE ANALYSIS REPORT

WELL NO. HCO-13

Mc Gown 8

OILFIELD RESEARCH LABORATORIES

536 N. HIGHLAND

CHANUTE, KANSAS



OILFIELD RESEARCH LABORATORIES

536 NORTH HIGHLAND - CHANUTE, KANSAS 66720 - PHONE (316) 431-2650

July 9, 1979

Hickory Creek Oil Company
1128 Main
Parsons, Kansas 67357

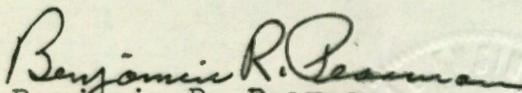
Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core taken from Well No. HCO-13, and submitted to our laboratory on June 29, 1979.

Your business is greatly appreciated.

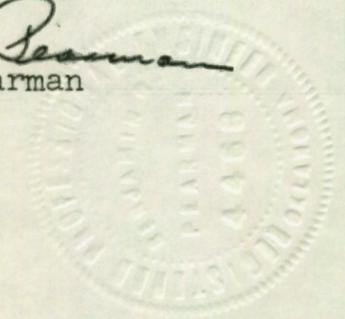
Very truly yours,

OILFIELD RESEARCH LABORATORIES


Benjamin R. Pearman

SAM:km

4 c to Parsons, Kansas
1 c to Chanute, Kansas



Oilfield Research Laboratories

GENERAL INFORMATION & SUMMARY

Company Hickory Creek Oil Company Lease - Well No. HCO-13

Location -

Section - Twp. - Rge. - County - State -

Name of Sand	-
Top of Core	166.0
Bottom of Core	184.7
Top of Sand	166.0
Bottom of Sand	184.7
Total Feet of Permeable Sand	16.1
Total Feet of Floodable Sand	1.2

Distribution of Permeable Sand:
Permeability Range
Millidarcys

Permeability Range Millidarcys	Feet	Cum. Ft.
0 - 5	11.2	11.2
5 - 10	3.9	15.1
10 - 15	1.0	16.1

Average Permeability Millidarcys	3.4
Average Percent Porosity	15.2
Average Percent Oil Saturation	31.2
Average Percent Water Saturation	56.3
Average Oil Content, Bbls./A. Ft.	371.
Total Oil Content, Bbls./Acre	6,939.
Average Percent Oil Recovery by Laboratory Flooding Tests	5.0
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	74.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	89.
Total Calculated Oil Recovery, Bbls./Acre (Primary & Waterflooding)	294.
Packer Setting, Feet	
Viscosity, Centipoises @	
A. P. I. Gravity, degrees @ 60 °F	
Elevation, Feet	

The core was sampled and the samples sealed in plastic bags by an agent of the client. The drilling fluid consisted of fresh water mud.

FORMATION CORED

The detailed log of the formation cored is as follows:

<u>Depth Interval, Feet</u>	<u>Description</u>
166.0 - 167.7	Brown and gray laminated sandstone and shale.
167.7 - 175.9	Light brown and gray laminated sandstone and shale.
175.9 - 180.2	Brown and gray laminated sandstone and shale.
180.2 - 181.9	Gray and light brown laminated shale and sandstone.
181.9 - 184.7	Gray and brown laminated sandstone and shale.

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 89 barrels of oil per acre was obtained from 1.2 feet of sand. The weighted average percent oil saturation was reduced from 36.0 to 31.0, or represents an average recovery of 5.0 percent. The weighted average effective permeability of the samples is 0.15 millidarcys, while the average initial fluid production pressure is 30.0 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 19 samples tested, 2 produced water and 1 oil. This indicates that approximately 5 percent of the sand represented by these samples is floodable pay sand.

McGOWN⁻³⁻ # 8CALCULATED RECOVERY

It would appear from a study of the data, that efficient primary and waterflood operations in the vicinity of this well should recover approximately 294 barrels of oil per acre. This is an average recovery of 245 barrels per acre foot from 1.2 feet of floodable sand analyzed in this core.

These recovery values were calculated using the following data and assumptions:

Original formation volume factor	1.03	
Reservoir water saturation, percent	30.0	43.0
Average porosity, percent	19.0	
Oil saturation after flooding, percent	31.0	32.0
Performance factor, percent	45.0	
Net floodable pay sand, feet	1.2	0.0

RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Hickory Creek Oil Company

Lease - M-8

Well No. HCO-13

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	162-166.5	16.4	34	51	85	433	13.	1.0	1.0	433	13.00
2	163-167.5	18.3	33	41	74	469	10.	0.7	1.7	328	7.00
3	164-168.5	14.3	25	70	95	277	0.30	1.3	3.0	360	0.39
4	165-169.5	12.8	47	48	95	467	0.33	1.0	4.0	467	0.33
5	166-170.5	15.2	26	57	83	307	0.63	1.0	5.0	307	0.63
6	167-171.5	13.9	29	67	96	313	0.16	1.0	6.0	313	0.16
7	168-172.5	11.5	25	66	91	223	Imp.	1.0	7.0	223	0.00
8	169-173.5	15.7	54	37	91	658	0.64	1.0	8.0	658	0.64
9	170-174.5	14.1	20	68	88	219	0.33	1.0	9.0	219	0.33
10	171-175.5	12.4	24	70	94	231	0.16	0.9	9.9	208	0.14
11	172-176.5	18.0	26	54	80	363	2.4	1.1	11.0	399	2.64
12	173-177.5	17.0	45	34	79	594	5.3	1.0	12.0	594	5.30
13	174-178.5	17.4	40	41	81	540	7.0	1.0	13.0	540	7.00
14	175-179.5	18.8	36	43	79	525	10.	1.2	14.2	630	12.00
15	176-180.5	14.2	13	78	91	143	0.90	0.8	15.0	114	0.72
16	177-181.5	12.8	42	49	91	417	Imp.	0.9	15.9	375	0.00
17	178-182.5	14.0	23	72	95	250	0.34	1.1	17.0	275	0.37
18	179-183.5	15.5	22	65	87	265	3.6	1.0	18.0	265	3.60
19	180-184.5	15.2	28	57	85	330	Imp.	0.7	18.7	231	0.00
		3334.5	287.5	1068			55.09				
				1.0-43							
				= .57							
				AVERAGE							
				S _{wo} =							
				48.5%							
				(.57 + .43)							
				= .2							

RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Hickory Creek Oil Company Lease M 8 Well No. HCO-13

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	166.5/62.5	16.8	34	443	0	0	34	59	443	0	Imp.	-
2	167.5/63.5	18.1	31	435	0	0	31	60	435	0	Imp.	-
3	168.5/64.5	14.5	24	270	0	0	24	71	270	0	Imp.	-
4	169.5/65.5	13.0	45	454	0	0	45	50	454	0	Imp.	-
5	170.5/66.5	15.1	27	317	0	0	27	56	317	0	Imp.	-
6	171.5/67.5	14.0	30	326	0	0	30	66	326	0	Imp.	-
7	172.5/68.5	11.7	25	227	0	0	25	66	227	0	Imp.	-
8	173.5/69.5	15.5	51	614	0	0	51	40	614	0	Imp.	-
9	174.5/70.5	14.1	21	230	0	0	21	67	230	0	Imp.	-
10	175.5/71.5	12.7	22	216	0	0	22	73	216	0	Imp.	-
11	176.5/72.5	17.8	28	386	0	0	28	62	386	3	0.15	30
12	177.5/73.5	17.1	43	570	0	0	43	47	570	0	Imp.	-
13	178.5/74.5	17.4	38	513	0	0	38	56	513	0	Imp.	-
14	179.5/75.5	19.0	36	531	5	74	31*	67	457	6	0.15	30
15	180.5/76.5	14.2	14	154	0	0	14	78	154	0	Imp.	-
16	181.5/77.5	13.0	40	403	0	0	40	52	403	0	Imp.	-
17	182.5/78.5	14.2	23	254	0	0	23	72	254	0	Imp.	-
18	183.5/79.5	15.4	24	287	0	0	24	66	287	0	Imp.	-
19	184.5/80.5	15.3	27	320	0	0	27	65	320	0	Imp.	-

578
578
578

.30

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.

67 68 69 70 72 74 76 78
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Oilfield Research Laboratories

SUMMARY OF LABORATORY FLOODING TESTS

TABLE V

Company <u>Hickory Creek Oil Company</u>	Lease <u>-</u>	Well No. <u>HCO-13</u>
Depth Interval, Feet	175.9 - 184.7	
Feet of Core Analyzed	1.2	
Average Percent Porosity	19.0	
Average Percent Original Oil Saturation	36.0	
Average Percent Oil Recovery	5.0	
Average Percent Residual Oil Saturation	31.0	
Average Percent Residual Water Saturation	67.0	
Average Percent Total Residual Fluid Saturation	98.0	
Average Original Oil Content, Bbls./A. Ft.	531.	
Average Oil Recovery, Bbls./A. Ft.	74.	
Average Residual Oil Content, Bbls./A. Ft.	457.	
Total Original Oil Content, Bbls./Acre	637.	
Total Oil Recovery, Bbls./Acre	89.	
Total Residual Oil Content, Bbls./Acre	548.	
Average Effective Permeability, Millidarcys	0.15	
Average Initial Fluid Production Pressure, p.s.i.	30.0	

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