

HICKORY CREEK OIL COMPANY

CORE ANALYSIS REPORT

WELL NO. HCO-107

W. Klein 42

OILFIELD RESEARCH LABORATORIES

536 N. HIGHLAND

CHANUTE, KANSAS



OILFIELD RESEARCH LABORATORIES

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

February 15, 1980

Hickory Creek Oil Company
P.O. Box 379
Parsons, Kansas 67357

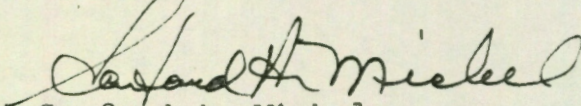
Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core taken from Well No. HCO-107, and submitted to our laboratory on January 18, 1980.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES


Sanford A. Michel

SAM/kas

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

GENERAL INFORMATION & SUMMARY

See "Calculated
Recovery" Section

-2-

The core was sampled and the samples sealed in plastic bags by a representative of the client.

FORMATION CORED

The detailed log of the formation cored is as follows:

<u>Depth Interval, Feet</u>	<u>Description</u>
179.0 - 180.5	Dark brown sandstone.
180.5 - 181.6	Brown slightly shaly sandstone.
181.6 - 182.7	Gray sandy shale.
182.7 - 184.8	Brown slightly shaly sandstone.
184.8 - 185.7	Dark brown sandstone.
185.7 - 190.8	Brown shaly sandstone.
190.8 - 192.3	Brown and gray laminated sandstone and shale.
192.3 - 192.8	Brown slightly shaly sandstone.
192.8 - 194.3	Brown and gray laminated sandstone and shale.
194.3 - 194.8	Light brown shaly sandstone.
194.8 - 195.7	Dark brown sandstone.
195.7 - 197.8	Brown and gray laminated sandstone and shale.
197.8 - 199.2	Dark brown sandstone.

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 1,095 barrels of oil per acre was obtained from 5.6 feet of sand. The weighted average percent oil saturation was reduced from 51.7 to 38.4, or represents an average recovery of 13.3 percent. The weighted average

-3-

effective permeability of the samples is 0.43 millidarcys, while the average initial fluid production pressure is 37.5 pounds per square inch (See Table V).

CALCULATED RECOVERY

It would appear from a study of the core data, that efficient primary and waterflood operations in the vicinity of this well should recover approximately 1,620 barrels of oil per acre. This is an average recovery of 290 barrels per acre foot from 5.6 feet of floodable sand analyzed in this core.

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

Original formation volume factor, estimated	✓ 1.03
Reservoir water saturation, percent, estimated	15.0 / 29.0
Average porosity, percent	18.8 / 48.6
Oil saturation after flooding, percent	38.4 / 38.0
Performance factor, percent, estimated	✓ 45.0
Net floodable sand, feet	5.6 / 4.0

Oilfield Research Laboratories

RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Hickory Creek Oil Company

Lease

- D 4 2Well No. HCO-1073387.4311.9733181.25

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	180 179.5	19.6	54	26	80	821	30.	1.0	1.0	821	30.00
2	181 180.4	16.2	52	43	95	654	22.	0.5	1.5	327	11.00
3	182 181.5	17.4	50	32	82	675	6.3	1.1	2.6	743	6.93
4	183 182.8	15.1	38	60	98	445	6.2	0.3	2.9	134	1.89
5	184 183.5	20.1	56	29	85	873	6.3	1.0	3.9	873	6.30
6	185 184.5	18.7	69	18	87	1,001	23.	0.8	4.7	801	18.40
7	186 185.5	16.8	43	38	81	560	3.1	0.9	5.6	504	2.79
8	187 186.5	16.7	49	40	89	635	4.6	1.3	6.9	826	5.98
9	188 187.6	15.7	39	52	91	475	2.3	1.0	7.9	475	2.30
10	189 188.6	16.8	42	44	86	547	1.1	1.0	8.9	547	1.10
11	190 189.6	17.0	36	50	86	475	3.1	1.0	9.9	475	3.10
12	191 190.7	16.0	40	50	90	497	3.1	0.8	10.7	398	2.48
13	192 191.7	16.6	36	56	92	464	1.0	1.5	12.2	696	1.50
14	193 192.6	15.5	15	57	72	180	6.3	0.5	12.7	90	3.15
15	194 193.6	17.4	49	42	91	661	0.55	1.5	14.2	992	0.83
16	195 194.6	19.7	54	29	83	825	4.3	0.5	14.7	413	2.15
17	196 195.6	17.1	44	36	80	584	32.	0.9	15.6	526	28.80
18	199 198.6	19.5	42	31	73	635	26.	1.4	17.0	889	36.40

Oilfield Research Laboratories

SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Hickory Creek Oil Company Lease — Well No. HCO-107

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
179.0 - 184.8	4.7	15.9	74.52
184.8 - 199.2	12.3	7.4	90.58
179.0 - 199.2	17.0	9.7	165.10

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 Bbls./Acre
179.0 - 184.8	4.7	18.4	54.8	30.7	787	3,699
184.8 - 199.2	12.3	17.1	41.6	43.7	555	6,831
179.0 - 199.2	17.0	17.5	45.3	40.1	619	10,530

Oilfield Research Laboratories

RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Hickory Creek Oil Company

Lease -

D 42

Well No. HCO-107

Sample No.	Depth, Feet	Effective Porosity Percent	Original Oil Saturation		Oil Recovery		72.2 Residual Saturation			Volume of Water Recovered cc*	2.73 Effective Permeability Millidarcys**	Initial Fluid Production Pressure Lbs./Sq./In.
			%	Bbls./A. Ft.	%	Bbls./A. Ft.	% Oil	% Water	Bbls./A. Ft.			
1	179.5	19.3	54	808	17	254	37	56	554	44	0.60	30
2	180.4	16.4	52	662	12	153	40	55	509	43	0.60	30
3	181.5	17.1	50	663	0	0	50	34	663	0	Imp.	-
4	182.8	15.3	38	451	0	0	38	60	451	0	Imp.	-
5	183.5	20.0	56	869	17	264	39	57	605	0	0.07	40
6	184.5	18.5	69	991	33	474	36	60	517	0	0.06	40
7	185.5	17.0	43	567	0	0	43	55	567	0	Imp.	-
8	186.5	16.6	49	631	0	0	49	40	631	0	Imp.	-
9	187.6	15.7	39	475	0	0	39	52	475	0	Imp.	-
10	188.6	16.7	42	544	0	0	42	44	544	0	Imp.	-
11	189.6	16.8	36	469	0	0	36	50	469	0	Imp.	-
12	190.7	16.1	40	500	0	0	40	50	500	0	Imp.	-
13	191.7	16.3	36	455	0	0	36	56	455	0	Imp.	-
14	192.6	15.6	15	182	0	0	15	57	182	0	Imp.	-
15	193.6	17.6	49	669	0	0	49	42	669	0	Imp.	-
16	194.6	19.6	54	821	0	0	54	40	821	0	Imp.	-
17	195.6	17.4	44	594	3	40	41	57	554	80	1.10	35
18	198.6	19.6	42	638	4	61	38	56	578	21	0.30	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.

11-4-50
5402

Oilfield Research Laboratories

SUMMARY OF LABORATORY FLOODING TESTS

TABLE V

Company	Hickory Creek Oil Company		Lease	-	Well No.	HCO-107
Depth Interval, Feet	179.0 - 184.8	184.8 - 199.2	179.0 - 199.2			
Feet of Core Analyzed	3.3	2.3	5.6			
Average Percent Porosity	18.9	18.7	18.8			
Average Percent Original Oil Saturation	57.9	42.8	51.7			
Average Percent Oil Recovery	20.1	3.6	13.3			
Average Percent Residual Oil Saturation	37.8	39.2	38.4			
Average Percent Residual Water Saturation	57.1	56.4	56.8			
Average Percent Total Residual Fluid Saturation	94.9	95.6	95.2			
Average Original Oil Content, Bbls./A. Ft.	849.	622.	756.			
Average Oil Recovery, Bbls./A. Ft.	295.	53.	196.			
Average Residual Oil Content, Bbls./A. Ft.	554.	569.	560.			
Total Original Oil Content, Bbls./Acre	2,801.	1,429.	4,230.			
Total Oil Recovery, Bbls./Acre	974.	121.	1,095.			
Total Residual Oil Content, Bbls./Acre	1,827.	1,308.	3,135.			
Average Effective Permeability, Millidarcys	0.31	0.61	0.43			
Average Initial Fluid Production Pressure, p.s.i.	35.0	42.5	37.5			

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