

HICKORY CREEK OIL COMPANY

CORE ANALYSIS REPORT

WELL NO. HCO-105

*W. Berlin 35*



# OILFIELD RESEARCH LABORATORIES

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

February 13, 1980

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

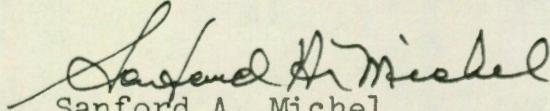
Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core taken from Well No. HCO-105, and submitted to our laboratory on January 15, 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

# Oilfield Research Laboratories

## GENERAL INFORMATION & SUMMARY

Company Hickory Creek Oil Company Lease - Well No. HCO-105

Location -

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

Elevation, Feet - - - - -

Name of Sand - - - - -

Top of Core - - - - - 174.0

Bottom of Core - - - - - 212.8

Top of Sand - - - - - 174.0

Bottom of Sand - - - - - 212.8

Total Feet of Permeable Sand - - - - - (Tested) 37.2

Total Feet of Floodable Sand - - - - - (Tested) 16.2

Distribution of Permeable Sand:  
Permeability Range  
Millidarcys

Feet

Cum. Ft.

0 - 5	13.2	13.2
5 - 10	4.6	17.8
10 - 50	5.6	23.4
50 - 100	6.0	29.4
100 - 200	7.8	37.2

Average Permeability Millidarcys - - - - - 44.3

Average Percent Porosity - - - - - 19.9

Average Percent Oil Saturation - - - - - 39.8

Average Percent Water Saturation - - - - - 38.4

Average Oil Content, Bbls./A. Ft. - - - - - 623.

Total Oil Content, Bbls./Acre - - - - - 23,169.

Average Percent Oil Recovery by Laboratory Flooding Tests - - - - - 2.9

Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft. - - - - - 49.

Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre - - - - - 799.

Total Calculated Oil Recovery, Bbls./Acre - - - - -

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>
174.0 - 175.2	Brown sandstone.
175.2 - 188.2	Brown shaly sandstone.
188.2 - 188.8	Brown sandstone.
188.8 - 189.0	Gray sandy shale.
189.0 - 193.6	Brown shaly sandstone.
193.6 - 194.0	Gray sandy shale.
194.0 - 195.2	Dark brown shaly sandstone.
195.2 - 204.8	Brown sandstone.
204.8 - 207.0	Dark brown slightly carbonaceous sandstone.
207.0 - 212.8	Brown sandstone.

LABORATORY FLOODING TESTS

The lower portion of the sand in this core responded well, relative to the upper portion of the sand to laboratory flooding tests, as total overall recovery of 799 barrels of oil per acre was obtained from 16.2 feet of sand. The weighted average percent oil saturation was reduced from 42.8 to 39.9, or represents an average recovery of 2.9 percent. The weighted average effective permeability of the samples is 5.66 millidarcys, while the average initial fluid production pressure is 28.3 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 20 samples tested, 9 produced water and oil, and 4 samples produced water only. This indicates that approximately 45 percent of the sand represented by these samples is floodable pay sand. The tests also show that the sand has an erratic permeability profile.

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 4,680 barrels of oil per acre. This is an average recovery of 289 barrels per acre foot from 16.2 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	20.0 / ✓ 26.8
Average porosity, percent	21.9 / ✓ 21.8
Oil saturation after flooding, percent	39.9 / ✓ 40.5
Performance factor, percent, estimated	✓ 45.0
Net floodable sand, feet	16.2 / ✓ 2.0

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Hickory Creek Oil Company Lease - D 35 Well No. HCO-105

3870.0    399.1                      759                      875.16

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.		
		X					X				
1	174.5	20.1	45	26	71	702	43.	21.2	1.2	842	51.60
3	176.5	14.9	23	62	85	266	2.6	1.8	3.0	479	4.68
5	178.5	15.2	33	56	89	389	0.73	2.0	5.0	778	1.46
7	180.5	15.4	37	51	88	442	2.3	2.0	7.0	884	4.60
9	182.5	19.1	38	32	70	563	8.2	2.0	9.0	1126	16.40
11	184.5	16.8	19	52	71	248	0.68	2.0	11.0	496	1.36
13	186.5	17.1	48	37	85	637	0.45	2.0	13.0	1274	0.90
15	188.5	18.3	41	32	73	582	18.	0.6	13.6	349	10.80
17	190.5	18.3	51	34	85	724	1.1	2.2	15.8	1593	2.42
19	192.5	20.2	<del>47</del>	25	72	737	9.6	<del>2.6</del>	18.4	1916	24.96
21	194.5	23.8	50	24	74	923	2.5	1.2	19.6	1108	3.00
23	196.5	24.3	45	24	69	848	68.	1.8	21.4	1526	122.40
25	198.5	24.2	43	27	70	807	108.	2.0	23.4	1614	216.00
27	200.5	23.0	39	36	75	696	113.	2.0	25.4	1392	226.00
29	202.5	21.1	39	40	79	636	68.	2.0	27.4	1272	136.00
31	204.5	23.1	37	32	69	663	199.	1.8	29.2	1193	358.20
33	206.5	23.2	45	30	72	810	56.	2.2	31.4	1782	123.20
35	208.5	19.7	41	42	83	627	14.	2.0	33.4	1254	28.00
37	210.5	23.1	32	55	87	574	145.	2.0	35.4	1148	290.00
39	212.5	18.2	45	42	87	635	15.	1.8	37.2	1143	27.00

875.16

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### SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Hickory Creek Oil Company Lease — Well No. HCO-105

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
174.0 - 193.6	18.4	6.5	119.18
194.0 - 212.8	18.8	81.4	1529.80
174.0 - 212.8	37.2	44.3	1648.98

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
174.0 - 193.6	18.4	17.5	38.3	41.2	529	9,737
194.0 - 212.8	18.8	22.3	41.3	35.7	714	13,432
174.0 - 212.8	37.2	19.9	39.8	38.4	623	23,169

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Hickory Creek Oil Company

Lease

- D 35

Well No. HCO-105

Sample No.	Depth, Feet	Effective Porosity Percent	Original Oil Saturation		Oil Recovery		770 Residual Saturation			Volume of Water Recovered cc*	90.13 Effective Permeability Millidarcys**	Initial Fluid Production Pressure Lbs./Sq./In.
			%	Bbls./A. Ft.	%	Bbls./A. Ft.	% Oil	% Water	Bbls./A. Ft.			
1	174.5	19.9	45	695	7	108	38	54	587	76	1.60	30
3	176.5	14.9	23	266	0	0	23	62	266	0	Imp.	-
5	178.5	15.1	33	387	0	0	33	56	387	0	Imp.	-
7	180.5	15.6	37	448	0	0	37	52	448	0	Imp.	-
9	182.5	19.0	38	560	2	29	36	56	531	5	0.20	45
11	184.5	17.0	19	250	0	0	19	54	250	6	0.20	45
13	186.5	16.8	48	626	0	0	48	50	626	0	Imp.	-
15	188.5	18.3	41	582	0	0	41	57	582	0	Imp.	-
17	190.5	18.5	51	732	0	0	51	56	732	0	Imp.	-
19	192.5	20.1	47	733	0	0	47	50	733	0	Imp.	-
21	194.5	23.7	50	919	3	55	47	49	864	171	4.80	30
23	196.5	24.4	45	852	4	76	41	54	776	264	12.40	20
25	198.5	24.0	43	801	2	37	41	57	764	209	11.44	20
27	200.5	22.9	39	693	2	36	37	60	657	321	14.40	20
29	202.5	21.0	39	635	2	33	32	59	602	146	2.90	30
31	204.5	22.9	37	657	0	0	37	60	657	271	22.85	15
33	206.5	23.1	45	806	3	54	42	51	752	72	1.40	25
35	208.5	20.0	41	636	0	0	41	46	636	25	0.40	25
37	210.5	23.0	32	571	0	0	32	53	571	356	17.14	10
39	212.5	18.5	45	646	3	43	42	52	603	36	0.40	35

SOR  
= 4  
= 40.5

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 V

Company	Lease			Well No.
Hickory Creek Oil Company				HCO-105
Depth Interval, Feet	174.0 - 193.6	194.0 - 212.8	174.0 - 212.8	
Feet of Core Analyzed	3.2	13.0	16.2	
Average Percent Porosity	19.3	22.5	21.9	
Average Percent Original Oil Saturation	40.7	43.3	42.8	
Average Percent Oil Recovery	3.9	2.7	2.9	
Average Percent Residual Oil Saturation	36.8	40.6	39.9	
Average Percent Residual Water Saturation	55.3	54.9	55.0	
Average Percent Total Residual Fluid Saturation	92.1	95.5	94.9	
Average Original Oil Content, Bbls./A. Ft.	611.	756.	727.	
Average Oil Recovery, Bbls./A. Ft.	59.	47.	49.	
Average Residual Oil Content, Bbls./A. Ft.	552.	709.	678.	
Total Original Oil Content, Bbls./Acre	1,954.	9,830.	11,784.	
Total Oil Recovery, Bbls./Acre	188.	611.	799.	
Total Residual Oil Content, Bbls./Acre	1,766.	9,219.	10,985.	
Average Effective Permeability, Millidarcys	0.73	6.87	5.66	
Average Initial Fluid Production Pressure, p.s.i.	37.5	25.7	28.3	

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