

OILFIELD RESEARCH LABORATORIES

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AP5: 15-099-21192

May 15, 1980

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

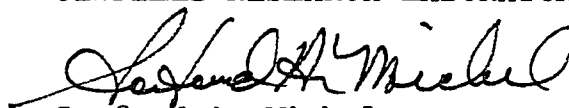
Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core taken from Well No. HCO-150, and submitted to our laboratory on April 10, 1980.

Your business is greatly appreciated.

Very truly yours, .

OILFIELD RESEARCH LABORATORIES


Sanford A. Michel

SAM/kas
1 c to Chanute, Kansas
4 c to Parsons, Kansas

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GENERAL INFORMATION & SUMMARY

Company Hickory Creek Oil Company Lease - Well No. HCO-150

Location -

Section - Twp - Rge - County - State -

Elevation, Feet - - - - -

Name of Sand - - - - -

Top of Core - - - - - 197.0

Bottom of Core - - - - - 217.0

Top of Sand - - - - - 197.0

Bottom of Sand - - - - - 215.7

Total Feet of Permeable Sand - - - - - 17.0

Total Feet of Floodable Sand - - - - - 13.5

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.
0 - 10	3.5	3.5
80 - 90	2.0	5.5
100 - 150	9.5	15.0
150 - 200	2.0	17.0

Average Permeability Millidarcys - - - - - 101.5

Average Percent Porosity - - - - - 22.0

Average Percent Oil Saturation - - - - - 43.8

Average Percent Water Saturation - - - - - 39.3

Average Oil Content, Bbls./A. Ft. - - - - - 753.

Total Oil Content, Bbls./Acre - - - - - 14,083.

Average Percent Oil Recovery by Laboratory Flooding Tests - - - - - 4.7

Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft. - - - - - 85.

Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre - - - - - 1,141.

Total Calculated Oil Recovery, Bbls./Acre - - - - - See "Calculated Recovery" Section

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-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>
197.0 - 210.5	Dark brown slightly calcareous slightly carbonaceous sandstone.
210.5 - 212.4	Brown slightly shaly sandstone.
212.4 - 215.7	Brown shaly sandstone.
215.7 - 216.0	Coal.
216.0 - 217.0	Brown shaly sandstone.

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 1,141 barrels of oil per acre was obtained from 13.5 feet of sand. The weighted average percent oil saturation was reduced from 45.7 to 41.0, or represents an average recovery of 4.7 percent. The weighted average effective permeability of the samples is 8.52 millidarcys, while the average initial fluid production pressure is 17.9 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 10 samples tested, 7 produced water and oil, and 1 sample produced water only. This indicates that approximately 70 percent of the sand represented by these samples is floodable pay sand.

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 4,460 barrels of oil per acre. This is an average recovery of 330 barrels per acre foot from 13.5 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 / 32.3
Average porosity, percent	23.2 / 23.4
Oil saturation after flooding, percent	41.0 / 42.5
Performance factor, percent (estimated)	✓ 50.0
Net floodable sand, feet	13.5 / 3.0

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Hickory Creek Oil Company

Lease

- D56Well No. HCO-1502065.0218.3297894.13

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	197.5	22.1	59	23	82	1012	103.	2.0	2.0	2026	206.00
3	199.5	23.3	44	34	78	795	191.	2.0	4.0	1590	382.00
5	201.5	25.5	44	(42)	86	870	118.	2.0	6.0	1740	236.00
7	203.5	23.3	47	30	77	850	84.	2.0	8.0	1700	168.00
9	205.5	24.5	40	39	79	760	121.	2.0	10.0	1520	242.00
11	207.5	23.5	42	46	88	766	145.	2.0	12.0	1532	290.00
13	209.5	23.1	33	45	78	591	123.	1.5	13.5	887	184.50
15	211.5	19.9	43	39	82	664	8.5	1.9	15.4	1262	16.15
17	213.5	18.7	59	39	98	856	0.63	1.6	17.0	1370	1.01
19	215.5	14.4	24	60	84	268	Imp.	1.7	18.7	456	0.00

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Hickory Creek Oil Company Lease — Well No. HCO-150

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
197.0 - 215.7	17.0	101.5	1725.66

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
197.0 - 215.7	18.7	22.0	43.8	39.3	753	14,083

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Hickory Creek Oil Company

Lease

- D56

Well No. HCO-150

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	197.5	22.0	59	1007	9	154	(50)	46	853	201	74.64 5.50	25
3	199.5	23.1	44	789	3	54	(41)	57	735	302	21.71	10
5	201.5	25.5	44	870	7	138	(37)	59	732	200	5.40	15
7	203.5	23.0	47	839	5	89	(42)	51	750	73	1.30	30
9	205.5	24.5	40	760	4	76	36	62	684	598	8.40	15
11	207.5	23.4	42	762	2	36	40	55	726	231	14.28	10
13	209.5	23.3	33	597	0	0	33	49	597	250	16.85	10
15	211.5	19.9	43	664	2	31	41	56	633	83	1.20	20
17	213.5	19.1	58	859	0	0	58	40	859	0	Imp.	-
19	215.5	14.6	24	272	0	0	24	62	272	0	Imp.	-

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	Hickory Creek Oil Company	Lease	—	Well No.	HCO-150
Depth Interval, Feet	197.0 - 215.7				
Feet of Core Analyzed	13.5				
Average Percent Porosity	23.2				
Average Percent Original Oil Saturation	45.7				
Average Percent Oil Recovery	4.7				
Average Percent Residual Oil Saturation	41.0				
Average Percent Residual Water Saturation	55.1				
Average Percent Total Residual Fluid Saturation	96.1				
Average Original Oil Content, Bbls./A. Ft.	819.				
Average Oil Recovery, Bbls./A. Ft.	85.				
Average Residual Oil Content, Bbls./A. Ft.	734.				
Total Original Oil Content, Bbls./Acre	11,047.				
Total Oil Recovery, Bbls./Acre	1,141.				
Total Residual Oil Content, Bbls./Acre	9,906.				
Average Effective Permeability, Millidarcys	8.52				
Average Initial Fluid Production Pressure, p.s.i.	17.9				

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

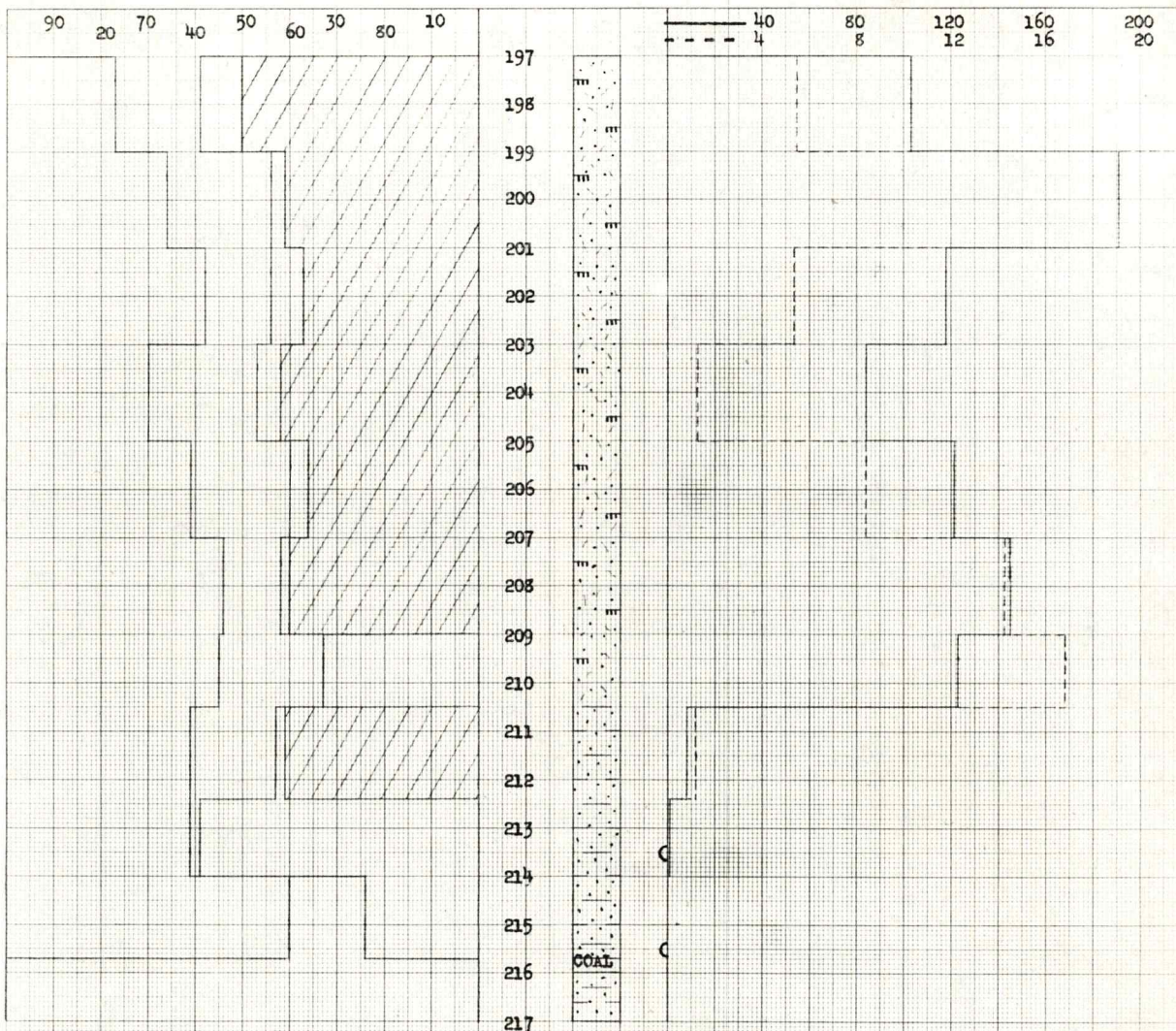
WATER SAT.,
PERCENT

OIL SAT.,
PERCENT

47 1512

PERMEABILITY, IN MILLIDARCS

EFFECTIVE PERMEABILITY TO WATER, IN MILLIDARCS



KEY:



SHALY SANDSTONE



COAL



IMPERMEABLE TO WATER



CALCAREOUS CARBONACEOUS SANDSTONE



FLOODPOT RESIDUAL OIL SATURATION

HICKORY CREEK OIL COMPANY

-- LEASE

WELL NO. HCO - 150

-- COUNTY, --

DEPTH INTERVAL, FEET	FEET OF CORE ANALYZED	AVERAGE PERCENT POROSITY	AVG. OIL SATURATION PERCENT	AVG. WATER SATURATION PERCENT	AVERAGE PERMEABILITY, MILLIDARCS	CALCULATED OIL RECOVERY BBLs./ACRE
197.0 - 215.7	18.7	22.0	43.8	39.3	101.5	4,460 (PRIMARY & WATERFLOODING)

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CHANUTE, KANSAS
MAY, 1980. HR