

OILFIELD RESEARCH LABORATORIES

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

APR 15-037-20421

May 27, 1980

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

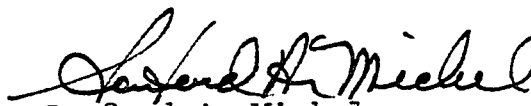
Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core taken from Well No. HCO-158, and submitted to our laboratory on April 22, 1980.

Your business is greatly appreciated.

Very truly yours,

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Sanford A. Michel

SAM/tem

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

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GENERAL INFORMATION & SUMMARY

Company Hickory Creek Oil Company Lease - Well No. HCO-158

Location -

Section - Twp - Rge - County - State -

Elevation, Feet - - - - -

Name of Sand - - - - -

Top of Core - - - - - 188.0

Bottom of Core - - - - - 204.6

Top of Sand - - - - - 188.0

Bottom of Sand - - - - - 197.2

Total Feet of Permeable Sand - - - - - 9.2

Total Feet of Floodable Sand - - - - - 7.0

Distribution of Permeable Sand:
Permeability Range
Millidarcys

Feet

Cum. Ft.

0 - 100	1.0	1.0
100 - 200	3.0	4.0
200 - 300	2.2	6.2
300 - 500	3.0	9.2

Average Permeability Millidarcys - - - - - 235.4

Average Percent Porosity - - - - - 24.8

Average Percent Oil Saturation - - - - - 35.5

Average Percent Water Saturation - - - - - 46.2

Average Oil Content, Bbls./A. Ft. - - - - - 676.

Total Oil Content, Bbls./Acre - - - - - 6,222.

Average Percent Oil Recovery by Laboratory Flooding Tests - - - - - 3.1

Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft. - - - - - 59.

Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre - - - - - 413.

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

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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>
188.0 - 197.2	Brown slightly calcareous sandstone.
197.2 - 197.7	Coal.
197.7 - 204.6	Gray sandy shale.

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 413 barrels of oil per acre was obtained from 7.0 feet of sand. The weighted average percent oil saturation was reduced from 36.8 to 33.7, or represents an average recovery of 3.1 percent. The weighted average effective permeability of the samples is 29.42 millidarcys, while the average initial fluid production pressure is 10.7 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 9 samples tested, 7 produced water and oil, and 2 samples produced water only. This indicates that approximately 78 percent of the sand represented by these samples is floodable pay sand.

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SARTIN 23

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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 2,140 barrels of oil per acre. This is an average recovery of 305 barrels per acre foot from 7.0 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	35.0 / 44.1 ✓
Average porosity, percent	✓ 24.3
Oil saturation after flooding, percent	✓ 33.7
Performance factor, percent, estimated	✓ 55.0
Net floodable sand, feet	✓ 7.0

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Hickory Creek Oil Company Lease - Well No. HCO-158

1732.5

222.5

415

2113

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	188.5	19.8	43	41	84	661	84.	1.0	1.0	661	84.00
2	189.5	22.9	38	40	78	675	130.	1.0	2.0	675	130.00
3	190.5	25.4	34	42	76	670	156.	1.0	3.0	670	156.00
4	191.5	26.1	35	44	79	709	169.	1.0	4.0	709	169.00
5	192.5	24.8	33	52	85	635	340.	1.0	5.0	635	340.00
6	193.5	24.7	39	41	80	747	405.	1.0	6.0	747	405.00
7	194.5	26.3	36	49	85	735	256.	1.0	7.0	735	256.00
8	195.5	26.1	31	55	86	628	310.	1.0	8.0	628	310.00
9	196.5	26.4	31	51	82	635	263.	1.2	9.2	762	15.60

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Hickory Creek Oil Company Lease - Well No. HCO-158

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
188.0 - 197.2	9.2	235.4	2165.60

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
188.0 - 197.2	9.2	24.8	35.5	46.2	676	6,222

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Hickory Creek Oil Company Lease - 523 Well No. HCO-158

Sample No.	Depth, Feet	Effective Porosity Percent	Original Oil Saturation		Oil Recovery		299 Residual Saturation			Volume of Water Recovered cc*	288.87 Effective Permeability Millidarcys**	Initial Fluid Production Pressure Lbs./Sq./In.
			%	Bbls./A. Ft.	%	Bbls./A. Ft.	% Oil	% Water	Bbls./A. Ft.			
1	188.5	20.0	43	667	4	62 1.0	39	58	605	219	7.96	15
2	189.5	23.1	38	681	3	54 1.0	35	59	627	326	36.74	10
3	190.5	25.5	34	673	2	40 1.0	32	61	633	247	31.86	10
4	191.5	25.8	35	701	3	60 1.0	32	61	641	342	42.36	10
5	192.5	24.9	33	637	2	39 1.0	31	57	598	160	25.50	10
6	193.5	25.0	39	756	4	78 1.0	35	57	678	177	30.00	10
7	194.5	25.9	36	723	4	80 1.0	32	62	643	197	31.49	10
8	195.5	25.8	31	620	0	0	31	63	620	310	52.98	10
9	196.5	26.2	31	630	0	0	31	66	630	180	30.00	10

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-158
Depth Interval, Feet	188.0 - 197.2				
Feet of Core Analyzed	7.0				
Average Percent Porosity	24.3				
Average Percent Original Oil Saturation	36.8				
Average Percent Oil Recovery	3.1				
Average Percent Residual Oil Saturation	33.7				
Average Percent Residual Water Saturation	59.3				
Average Percent Total Residual Fluid Saturation	93.0				
Average Original Oil Content, Bbls./A. Ft.	691.				
Average Oil Recovery, Bbls./A. Ft.	59.				
Average Residual Oil Content, Bbls./A. Ft.	632.				
Total Original Oil Content, Bbls./Acre	4,838.				
Total Oil Recovery, Bbls./Acre	413.				
Total Residual Oil Content, Bbls./Acre	4,425.				
Average Effective Permeability, Millidarcys	29.42				
Average Initial Fluid Production Pressure, p.s.i.	10.7				

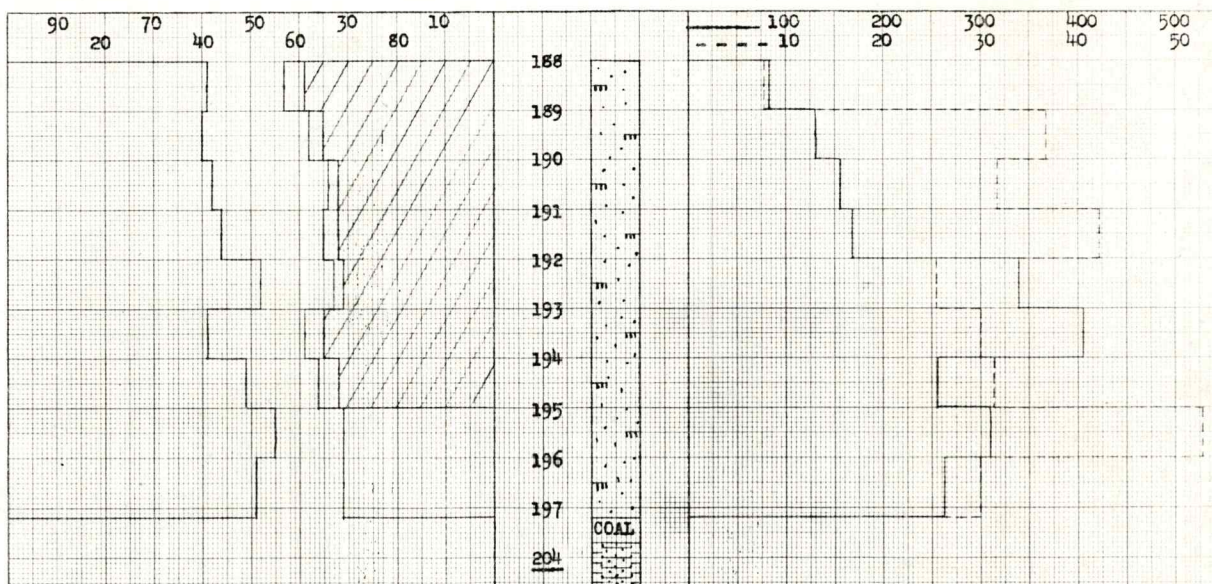
NOTE: Only those samples which recovered oil were used in calculating the above averages.

WATER SAT.,
PERCENT

OIL SAT.,
PERCENT

PERMEABILITY, IN MILLIDARCY

EFFECTIVE PERMEABILITY TO WATER, IN MILLIDARCY



KEY:



CALCAREOUS SANDSTONE



SANDY SHALE



COAL



FLOODPOT RESIDUAL OIL SATURATION

HICKORY CREEK OIL COMPANY

-- LEASE

WELL NO. HCO - 156

-- COUNTY, --

DEPTH INTERVAL, FEET	FEET OF CORE ANALYZED	AVERAGE PERCENT POROSITY	AVG. OIL SATURATION PERCENT	AVG. WATER SATURATION PERCENT	AVERAGE PERMEABILITY, MILLIDARCY	CALCULATED OIL RECOVERY BBL./ACFE
188.0 - 197.2	9.2	24.8	35.5	46.2	235.4	2,140 (PRIMARY & WATERFLOODING)

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CHANUTE, KANSAS
MAY, 1960. HR