

OILFIELD RESEARCH LABORATORIES

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

June 5, 1980

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

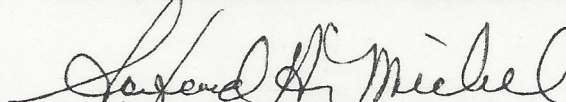
Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core taken from Well No. HCO-164, and submitted to our laboratory on April 30, 1980.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES


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-164

Location -

Section - Twp - Rge - County - State -

Elevation, Feet

Name of Sand

Top of Core 186.5

Bottom of Core 206.7

Top of Sand 186.8

Bottom of Sand 206.7

Total Feet of Permeable Sand 19.9

Total Feet of Floodable Sand 6.8

Distribution of Permeable Sand:
Permeability Range
Millidarcys

Feet

Cum. Ft.

0 - 100

6.1

6.1

100 - 150

7.4

13.5

150 - 200

4.8

18.3

200 - 300

1.6

19.9

Average Permeability Millidarcys 127.1

Average Percent Porosity 22.8

Average Percent Oil Saturation 29.1

Average Percent Water Saturation 56.8

Average Oil Content, Bbls./A. Ft. 516.

Total Oil Content, Bbls./Acre 10,268.

Average Percent Oil Recovery by Laboratory Flooding Tests 3.3

Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft. 60.

Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre 405.

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>
186.5 - 186.8	Gray sandy shale.
186.8 - 188.2	Brown sandstone.
188.2 - 205.6	Brown slightly calcareous sandstone.
205.6 - 206.7	Light brown shaly sandstone.

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 405 barrels of oil per acre was obtained from 6.8 feet of sand. The weighted average percent oil saturation was reduced from 34.0 to 30.7, or represents an average recovery of 3.3 percent. The weighted average effective permeability of the samples is 20.78 millidarcys, while the average initial fluid production pressure is 12.0 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 13 samples tested, 5 produced water and oil, and 8 samples produced water only. This indicates that approximately 38 percent of the sand represented by these samples is floodable pay sand.

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LONG 19

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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 1,650 barrels of oil per acre. This is an average recovery of 243 barrels per acre foot from 6.8 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	40.0 / 54.4 ✓
Average porosity, percent	✓ 23.2
Oil saturation after flooding, percent	✓ 30.7
Performance factor, percent, estimated	✓ 50.0
Net floodable sand, feet	6.8 / 5 ✓

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Hickory Creek Oil Company Lease - LONG 19 Well No. HCO-164

2542.9 296.2 738 1563.8

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	187.5	17.5	30	48	78	407	139.	1.4	1.4	570	194.60
2	188.5	23.5	31	56	87	565	181.	0.8	2.2	452	144.80
3	189.4	25.0	33	57	90	640	71.	1.0	3.2	640	71.00
4	190.5	22.1	39	49	88	669	56.	1.0	4.2	669	56.00
5	191.5	25.6	27	62	89	536	63.	1.0	5.2	536	63.00
6	192.3	24.6	28	61	89	534	139.	2.0	7.2	1068	278.00
8	194.5	25.0	28	58	86	543	153.	2.0	9.2	1086	306.00
10	196.6	22.8	37	57	94	655	149.	2.0	11.2	1310	298.00
12	198.3	21.7	26	58	84	438	52.	2.0	13.2	876	104.00
14	200.5	22.6	30	53	83	526	145.	2.0	15.2	1052	290.00
16	202.3	23.3	26	57	83	470	156.	2.0	17.2	940	312.00
18	204.6	23.6	26	57	83	476	253.	1.6	18.8	762	404.80
20	206.4	18.9	19	65	84	279	6.8	1.1	19.9	307	7.48

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company	Hickory Creek Oil Company	Lease	Well No.	HCO-164	
Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.		
186.8 - 206.7	19.9	127.1	2529.68		
Depth Interval, Feet	Feet of Core Analyzed	Average Percent Oil Saturation	Average Percent Water Saturation	Average Oil Content Bbl./A. Ft.	Total Oil Content Bbl./Acre
186.8 - 206.7	19.9	22.8	29.1	516	10,268

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company		Hickory Creek Oil Company				Lease		Well No.		HCO-164	
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			
1	187.5	18.0	29	405	0	0	29	67	366	13.74	10
2	188.5	23.1	32	573	2	36	30	65	271	6.50	20
3	189.4	24.9	33	637	3	58	30	60	250	30.49	10
4	190.5	22.3	39	675	6	104	33	64	327	24.98	10
5	191.5	25.5	27	534	0	0	27	69	250	17.00	10
6	192.3	24.1	29	542	0	0	29	67	286	30.00	10
8	194.5	24.9	28	541	0	0	28	62	216	25.99	10
10	196.6	22.9	37	657	4	71	33	62	305	21.32	10
12	198.3	21.5	26	434	0	0	26	70	293	9.66	15
14	200.5	23.0	30	535	2	36	28	62	234	19.00	10
16	202.3	23.6	26	476	0	0	26	64	250	23.99	10
18	204.6	23.4	26	472	0	0	26	67	253	31.00	10
20	206.4	19.2	18	268	0	0	18	78	75	1.10	20
508 2.5 = 30.8 363									254.77		

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

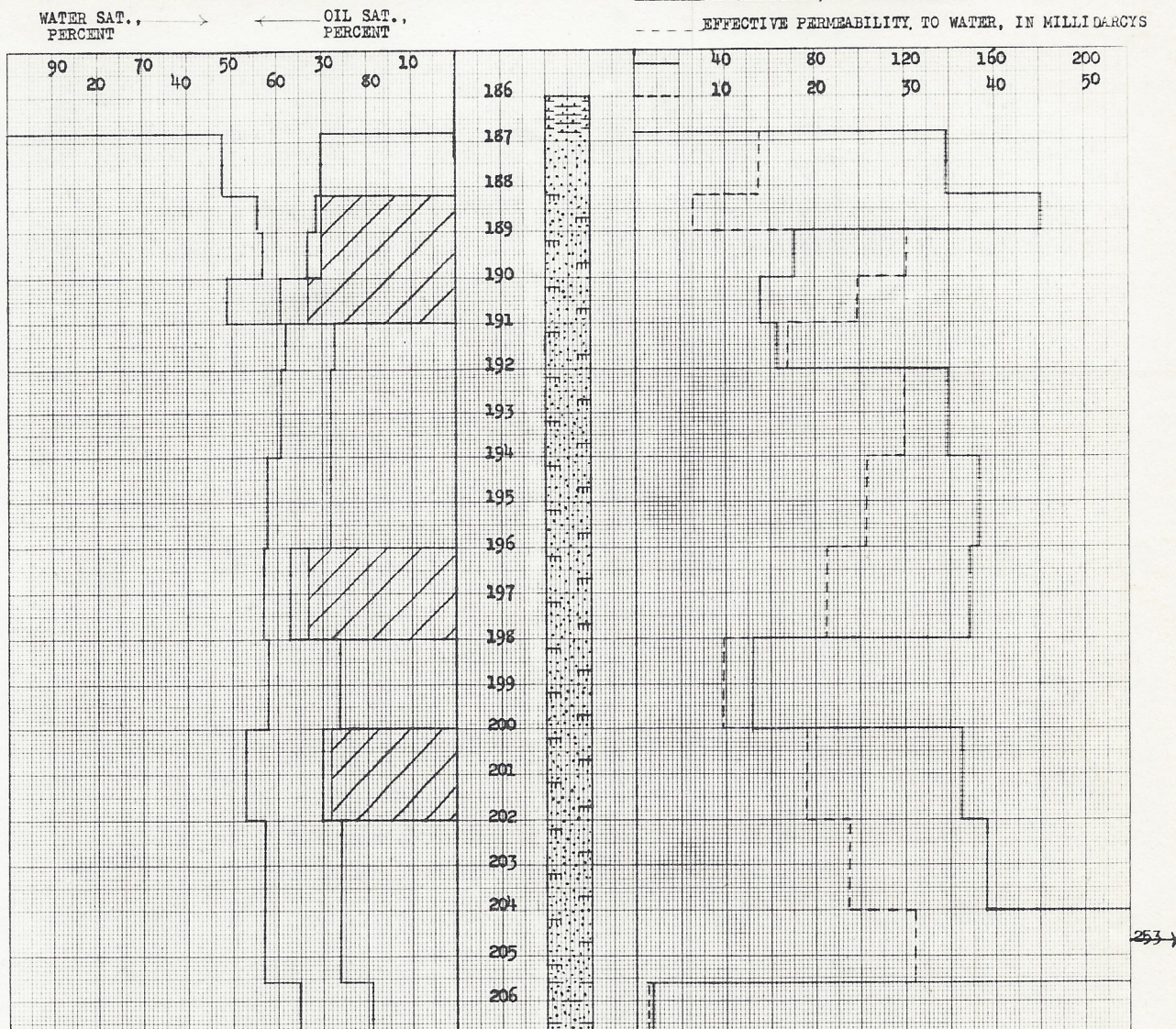
TABLE V

Company	Hickory Creek Oil Company	Lease	--	Well No.	HCO-164
Depth Interval, Feet	186.8 - 206.7				
Feet of Core Analyzed	6.8				
Average Percent Porosity	23.2				
Average Percent Original Oil Saturation	34.0				
Average Percent Oil Recovery	3.3				
Average Percent Residual Oil Saturation	30.7				
Average Percent Residual Water Saturation	62.4				
Average Percent Total Residual Fluid Saturation	93.1				
Average Original Oil Content, Bbls./A. Ft.	611.				
Average Oil Recovery, Bbls./A. Ft.	60.				
Average Residual Oil Content, Bbls./A. Ft.	551.				
Total Original Oil Content, Bbls./Acre	4,155.				
Total Oil Recovery, Bbls./Acre	405.				
Total Residual Oil Content, Bbls./Acre	3,750.				
Average Effective Permeability, Millidarcys	20.78				
Average Initial Fluid Production Pressure, p.s.i.	12.0				

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

PERMEABILITY, IN MILLIDARCYs

EFFECTIVE PERMEABILITY TO WATER, IN MILLIDARCYs



KEY:

SANDY SHALE

CALCAREOUS SANDSTONE

FLOODPOT RESIDUAL OIL SATURATION

SANDSTONE

SHALY SANDSTONE

HICKORY CREEK OIL COMPANY

LEASE

COUNTY,

WELL NO. HCC-194

DEPTH INTERVAL, FEET	FEET OF CORE ANALYZED	AVERAGE PERCENT POROSITY	AVG. OIL SATURATION PERCENT	AVG. WATER SATURATION PERCENT	AVERAGE PERMEABILITY MILLIDARCYs	CALCULATED OIL RECOVERY BBLs./ACRE
186.5 - 206.7	19.9	22.8	29.1	56.8	127.1	1650 (PRIMARY & WATERFLOODING)

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CHANUTE, KANSAS
JUNE, 1960

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