

OILFIELD RESEARCH LABORATORIES

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15-037-20472

March 19, 1980

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

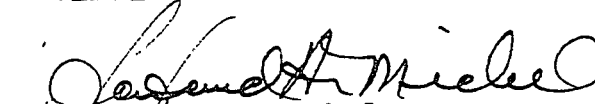
Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core taken from Well No. HCO-129, and submitted to our laboratory on February 26, 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

- REGISTERED ENGINEERS -

CORE ANALYSIS - WATER ANALYSIS - REPRESSURING ENGINEERING - SURVEYING & MAPPING - PROPERTY EVALUATION & OPERATION

SARTIN #20

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GENERAL INFORMATION & SUMMARY

Company Hickory Creek Oil Company Lease - Well No. HCO-129Location -Section - Twp. - Rge. - County - State -

Elevation, Feet - - - - -

Name of Sand - - - - -

Top of Core - - - - - 190.0

Bottom of Core - - - - - 209.4

Top of Sand - - - - - 190.0

Bottom of Sand - - - - - (Tested) - - 198.0

Total Feet of Permeable Sand - - - - - (Tested) - - 8.0

Total Feet of Floodable Sand - - - - - (Tested) - - 6.0

Distribution of Permeable Sand:
Permeability Range
Millidarcys

Feet

Cum. Ft.

0 - 100	1.0	1.0
100 - 200	2.0	3.0
200 - 300	3.0	6.0
300 - 400	1.0	7.0
400 - 500	1.0	8.0

Average Permeability Millidarcys - - - - - 228.6

Average Percent Porosity - - - - - 24.6

Average Percent Oil Saturation - - - - - 35.8

Average Percent Water Saturation - - - - - 48.6

Average Oil Content, Bbls./A. Ft. - - - - - 680.

Total Oil Content, Bbls./Acre - - - - - 5,439.

Average Percent Oil Recovery by Laboratory Flooding Tests - - - - - 2.3

Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft. - - - - - 45.

Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre - - - - - 271.

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>
190.0 - 198.8	Brown sandstone.
198.8 - 199.2	Coal.
199.2 - 205.8	Gray shale.
205.8 - 206.5	Hard gray fossiliferous calcareous shale.
206.5 - 209.4	Gray shale.

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 271 barrels of oil per acre was obtained from 6.0 feet of sand. The weighted average percent oil saturation was reduced from 35.1 to 32.8, or represents an average recovery of 2.3 percent. The weighted average effective permeability of the samples is 30.98 millidarcys, while the average initial fluid production pressure is 12.5 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 8 samples tested, 6 produced water and oil, and 2 samples produced water only. This indicates that approximately 75 percent of the sand represented by these samples is floodable pay sand. The tests also show that the sand has a relatively high and uniform permeability profile.

SAR 20

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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 1,640 barrels of oil per acre. This is an average recovery of 273 barrels per acre foot from 6.0 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	40.0 / 49.5 ✓
Average porosity, percent	25.1 / 25.7 ✓
Oil saturation after flooding, percent	✓ 32.8
Performance factor, percent, estimated	✓ 55.0
Net floodable sand, feet	✓ 6.0

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Hickory Creek Oil Company Lease SARTIN 20 Well No. HCO-129

1552		196.6		399		1829							
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.				
189'													189'
6 SHOTS	1	190.5	26.3	34	46	80	694	340.	1.0	1.0	694	340.00	6 SHOTS
	2	191.5	26.4	36	55	91	737	407.	1.0	2.0	737	407.00	
192.5'	3	192.5	26.0	34	46	80	686	113.	1.0	3.0	686	113.00	192.5'
	4	193.5	24.6	37	51	88	706	263.	1.0	4.0	706	263.00	
	5	194.5	21.5	42	46	88	701	212.	1.0	5.0	701	212.00	
	6	195.5	24.1	33	55	88	617	259.	1.0	6.0	617	259.00	
	7	196.5	25.6	36	46	82	715	79.	1.0	7.0	715	79.00	
	8	197.5	22.1	34	44	78	583	156.	1.0	8.0	583	156.00	
			49.5										

1-49.5
= 50.5

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Hickory Creek Oil Company Lease - Well No. HCO-129

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
190.0 - 198.0	8.0	228.6	1,829.00

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
190.0 - 198.0	8.0	24.6	35.8	48.6	680	5,439

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Hickory Creek Oil Company Lease -SARTIN 20 Well No. HCO-129

	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.				
189'														189'
6 SHOTS	1	190.5	26.0	34	686	2	40	32	50	646	120	44.98	10	6 SHOTS
	2	191.5	26.0	36	726	2	40	34	60	686	151	56.23	10	
191.5'	3	192.5	25.9	34	683	2	40	32	63	643	474	23.73	10	191.5'
	4	193.5	24.8	37	712	3	57	34	55	655	184	26.00	10	
	5	194.5	21.4	42	697	0	0	42	53	697	337	35.61	10	
	6	195.5	24.4	33	625	0	0	33	60	625	330	33.74	10	
	7	196.5	25.4	36	709	3	59	33	60	650	471	9.45	10	
	8	197.5	22.5	34	593	2	35	32	65	558	434	25.48	25	

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-129
Depth Interval, Feet	190.0 - 198.0				
Feet of Core Analyzed	6.0				
Average Percent Porosity	25.1				
Average Percent Original Oil Saturation	35.1				
Average Percent Oil Recovery	2.3				
Average Percent Residual Oil Saturation	32.8				
Average Percent Residual Water Saturation	58.8				
Average Percent Total Residual Fluid Saturation	91.6				
Average Original Oil Content, Bbls./A. Ft.	685.				
Average Oil Recovery, Bbls./A. Ft.	45.				
Average Residual Oil Content, Bbls./A. Ft.	640.				
Total Original Oil Content, Bbls./Acre	4,109.				
Total Oil Recovery, Bbls./Acre	271.				
Total Residual Oil Content, Bbls./Acre	3,838.				
Average Effective Permeability, Millidarcys	30.98				
Average Initial Fluid Production Pressure, p.s.i.	12.5				

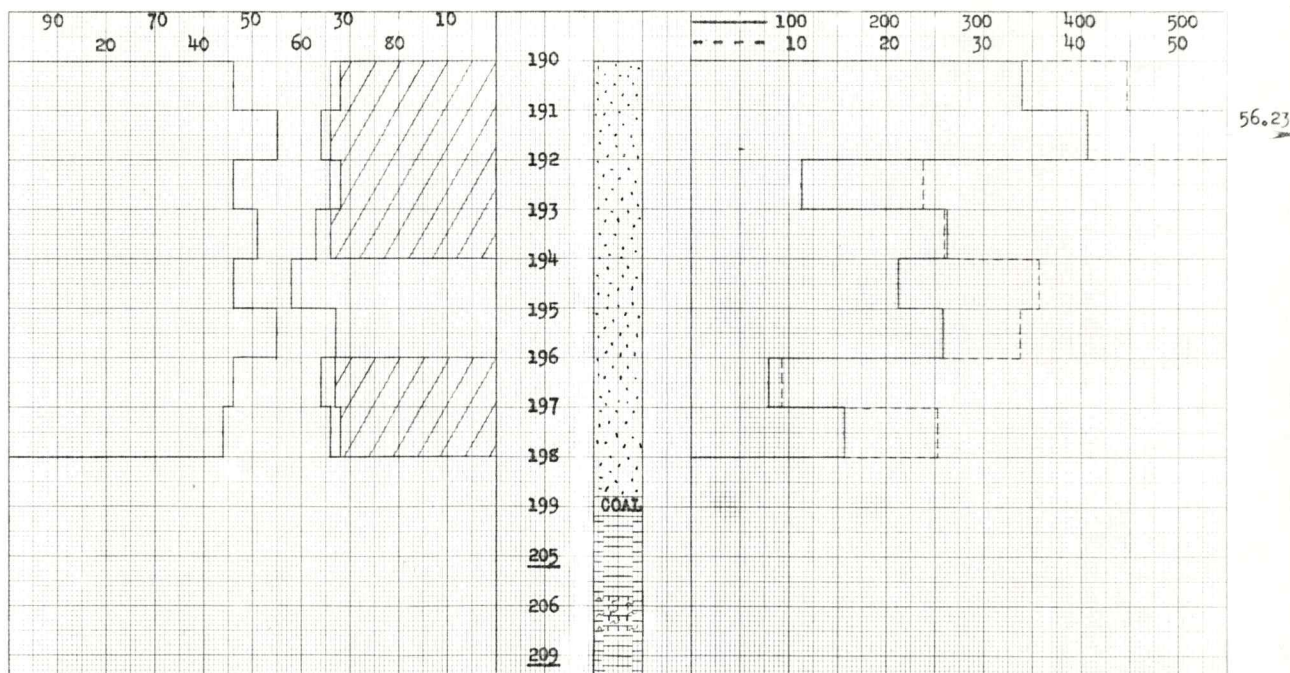
NOTE: Only those samples which recovered oil were used in calculating the above averages.

WATER SAT.,
PERCENT

OIL SAT.,
PERCENT

PERMEABILITY, IN MILLIDARCS

EFFECTIVE PERMEABILITY TO WATER, IN MILLIDARCS



KEY:

SANDSTONE

FOSSILIFEROUS CALCAREOUS SHALE

SHALE

COAL

HICKORY CREEK OIL COMPANY

-- LEASE

WELL NO. HCO - 129

-- 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 BBL./ACRE
190.0 - 198.0	8.0	24.6	35.8	48.6	228.6	1,640 (PRIMARY AND WATERFLOODING)

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CHANUTE, KANSAS
MARCH, 1980. HR