

# OILFIELD RESEARCH LABORATORIES

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

15-037-20466

February 27, 1980

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

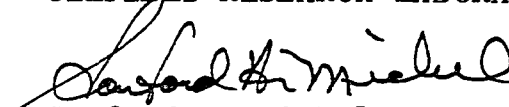
Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core taken from Well No. HCO-120, and submitted to our laboratory on February 7, 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-120

Location -

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

Elevation, Feet - - - - -

Name of Sand - - - - -

Top of Core - - - - - 183.0

Bottom of Core - - - - - 205.0

Top of Sand - - - - - 183.9

Bottom of Sand - - - - - 205.0

Total Feet of Permeable Sand - - - - - 17.5

Total Feet of Floodable Sand - - - - - 5.9

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.
0 - 5	3.0	3.0
10 - 20	2.9	5.9
20 - 40	4.1	10.0
40 - 60	7.5	17.5

Average Permeability Millidarcys - - - - - 31.4

Average Percent Porosity - - - - - 19.8

Average Percent Oil Saturation - - - - - 39.2

Average Percent Water Saturation - - - - - 40.2

Average Oil Content, Bbls./A. Ft. - - - - - 605.

Total Oil Content, Bbls./Acre - - - - - 10,581.

Average Percent Oil Recovery by Laboratory Flooding Tests - - - - - 4.3

Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft. - - - - - 73.

Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre - - - - - 432.

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

See "Calculated  
Recovery" Section

## OILFIELD RESEARCH LABORATORIES

-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>
183.0 - 183.9	Gray sandy shale.
183.9 - 184.8	Brown shaly sandstone.
184.8 - 186.0	Hard gray calcareous sandstone.
186.0 - 187.5	Brown and gray laminated sandstone and shale.
187.5 - 189.3	Brown sandstone.
189.3 - 190.0	Brown and gray laminated sandstone and shale.
190.0 - 190.3	Brown sandstone.
190.3 - 194.1	Brown and gray laminated sandstone and shale.
194.1 - 195.1	Brown sandstone.
195.1 - 198.0	Brown and gray laminated sandstone and shale.
198.0 - 203.3	Brown sandstone.
203.3 - 205.0	Dark brown carbonaceous sandstone.

### LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 432 barrels of oil per acre was obtained from 5.9 feet of sand. The weighted average percent oil saturation was reduced from 43.4 to 39.1, or represents an average recovery of 4.3 percent. The weighted average effective permeability of the samples is 5.49 millidarcys, while the average initial fluid production pressure is 23.8 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 11 samples tested, 4 produced water and oil, and 4 samples produced water only. This indicates that approximately 36 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 1,690 barrels of oil per acre. This is an average recovery of 287 barrels per acre foot from 5.9 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	✓ 21.3
Oil saturation after flooding, percent	39.1 / 40.0
Performance factor, percent, estimated	✓ 45.0
Net floodable sand, feet	5.9 / 6.0

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## RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Hickory Creek Oil Company Lease - 5-12 Well No. HCO-120

2139.1

217.2

435

323.66

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	184.4	18.6	49	26	77	707	2.9	0.9	0.9	636	2.61
3	186.5	22.5	53	25	78	925	54.	1.5	2.4	1388	81.00
5	188.5	21.7	43	34	77	724	39.	1.8	4.2	1303	70.20
7	190.2	20.5	39	38	77	620	23.	0.3	4.5	186	6.90
9	192.5	15.6	42	53	95	508	0.76	2.1	6.6	1067	1.60
11	194.5	15.5	25	55	80	301	18.	1.0	7.6	301	18.00
12	196.5	21.1	30	41	71	491	14.	1.9	9.5	933	26.60
14	198.5	18.0	39	42	81	545	27.	2.0	11.5	1090	54.00
16	200.5	21.2	37	39	76	609	42.	2.0	13.5	1218	84.00
18	202.5	20.2	38	40	78	596	49.	2.3	15.8	1371	112.70
20	204.5	22.3	37	42	79	640	54.	1.7	17.5	1088	91.80

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## SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Hickory Creek Oil Company Lease — Well No. HCO-120

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
183.9 - 194.1	6.6	24.6	162.31
194.1 - 205.0	10.9	35.5	387.10
183.9 - 205.0	17.5	31.4	549.41

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
183.9 - 194.1	6.6	19.5	45.6	37.1	694	4,580
194.1 - 205.0	10.9	20.0	35.3	42.1	551	6,001
183.9 - 205.0	17.5	19.8	39.2	40.2	605	10,581

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## RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Hickory Creek Oil Company Lease - 5-22 Well No. HCO-120

Sample No.	Depth, Feet	Effective Porosity Percent	Original Oil Saturation		Oil Recovery		413 Residual Saturation			Volume of Water Recovered cc*	32.62 Effective Permeability Millidarcys**	Initial Fluid Production Pressure Lbs./Sq./In.
			%	Bbls./A. Ft.	%	Bbls./A. Ft.	% Oil	% Water	Bbls./A. Ft.			
1	184.4	19.0	48	708	0	0	48	50	708	0	Imp.	-
3	186.5	22.3	53	917	10	173	(43)	55	744	80	1.65	30
5	188.5	21.7	43	724	3	51	(40)	57	673	270	6.45	20
7	190.2	20.8	39	629	2	32	(37)	60	597	174	3.45	25
9	192.5	16.0	41	509	0	0	41	55	509	0	Imp.	-
11	194.5	15.8	25	306	0	0	25	72	306	118.	1.35	25
12	196.5	21.0	30	489	0	0	30	63	489	0	Imp.	-
14	198.5	18.1	39	548	0	0	39	56	548	66	1.20	40
16	200.5	21.2	37	609	0	0	37	60	609	236	3.90	20
18	202.5	20.3	38	598	2	31	36	61	567	376	7.50	20
20	204.5	22.6	37	649	0	0	37	61	649	390	7.12	15

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-120
Depth Interval, Feet	183.9 - 194.1	194.1 - 205.0	183.9 - 205.0			
Feet of Core Analyzed	3.6	2.3	5.9			
Average Percent Porosity	21.9	20.3	21.3			
Average Percent Original Oil Saturation	46.8	38.0	43.4			
Average Percent Oil Recovery	5.8	2.0	4.3			
Average Percent Residual Oil Saturation	41.0	36.0	39.1			
Average Percent Residual Water Saturation	56.4	61.0	58.2			
Average Percent Total Residual Fluid Saturation	97.4	97.0	97.3			
Average Original Oil Content, Bbls./A. Ft.	771.	598.	704.			
Average Oil Recovery, Bbls./A. Ft.	100.	31.	73.			
Average Residual Oil Content, Bbls./A. Ft.	671.	567.	631.			
Total Original Oil Content, Bbls./Acre	2,777.	1,380.	4,157.			
Total Oil Recovery, Bbls./Acre	361.	71.	432.			
Total Residual Oil Content, Bbls./Acre	2,416.	1,309.	3,725.			
Average Effective Permeability, Millidarcys	4.20	7.50	5.49			
Average Initial Fluid Production Pressure, p.s.i.	25.0	20.0	23.8			

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

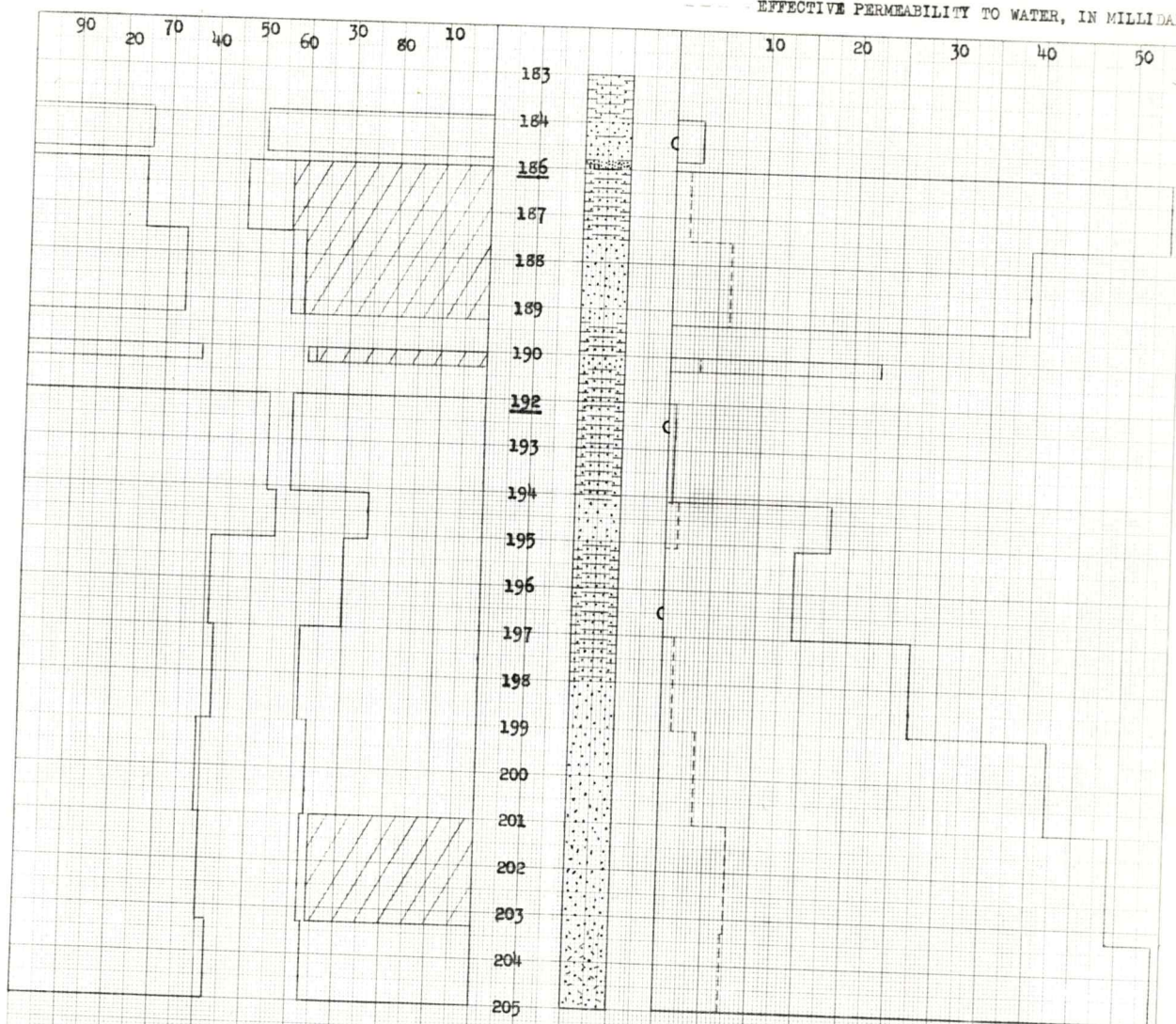


WATER SAT.,  
PERCENT

OIL SAT.,  
PERCENT

47 1512  
PERMEABILITY, IN MILLIDARCS

EFFECTIVE PERMEABILITY TO WATER, IN MILLIDARCS



KEY:

	SANDSTONE		SHALY SANDSTONE
	CALCAREOUS SANDSTONE		CARBONACEOUS SANDSTONE
	SANDY SHALE		LAMINATED SANDSTONE AND SHALE
	FLOODPOT RESIDUAL OIL SATURATION		IMPERMEABLE TO WATER

## HICKORY CREEK OIL COMPANY

— LEASE

— COUNTY, —

WELL NO. HCO - 120

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
183.9 - 194.1	6.6	19.5	45.6	37.1	24.6	
194.1 - 205.0	10.9	26.0	35.3	42.1	35.5	
183.9 - 205.0	17.5	19.8	39.2	40.2	31.4	1,690 (PRIMARY AND WATERFLOODING)

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CHANUTE, KANSAS  
FEBRUARY, 1980. HR