

# OILFIELD RESEARCH LABORATORIES

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

July 21, 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-175, and submitted to our laboratory on May 27, 1980.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

A handwritten signature in cursive script that reads "Sanford A. Michel".

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-175

Location -

Section - Twp - Rge - County - State -

Elevation, Feet . . . . .

Name of Sand . . . . .

Top of Core . . . . . 179.0

Bottom of Core . . . . . 199.5

Top of Sand . . . . . 180.4

Bottom of Sand . . . . . 199.5

Total Feet of Permeable Sand . . . . . 14.6

Total Feet of Floodable Sand . . . . . 10.0

**Distribution of Permeable Sand:**  
Permeability Range  
Millidarcys

Permeability Range Millidarcys	Feet	Cum. Ft.
0 - 100	4.1	4.1
100 - 150	5.5	9.6
150 - 200	5.0	14.6

Average Permeability Millidarcys . . . . . 133.6

Average Percent Porosity . . . . . 23.4

Average Percent Oil Saturation . . . . . 34.5

Average Percent Water Saturation . . . . . 43.8

Average Oil Content, Bbls./A. Ft. . . . . 626.

Total Oil Content, Bbls./Acre . . . . . 9,140.

Average Percent Oil Recovery by Laboratory Flooding Tests . . . . . 4.5

Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft. . . . . 83.

Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre . . . . . 829.

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>
179.0 - 180.4	Gray sandy shale.
180.4 - 181.0	Brown shaly sandstone.
181.0 - 185.5	Gray sandy shale.
185.5 - 199.5	Brown slightly calcareous sandstone.

#### LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 829 barrels of oil per acre was obtained from 10.0 feet of sand. The weighted average percent oil saturation was reduced from 36.9 to 32.4, or represents an average recovery of 4.5 percent. The weighted average effective permeability of the samples is 20.05 millidarcys, while the average initial fluid production pressure is 11.1 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 15 samples tested, 9 produced water and oil, and 5 samples produced water only. This indicates that approximately 60 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 3,750 barrels of oil per acre. This is an average recovery of 375 barrels per acre foot from 10.0 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	25.0 / 32.6
Average porosity, percent	✓ 23.9
Oil saturation after flooding, percent	✓ 32.4
Performance factor, percent, estimated	✓ 50.0
Net floodable sand, feet	✓ 10.0

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Hickory Creek Oil Company Lesse - LONG 25 Well No. HCO-175

2292.5 273.5 490 1542.4

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			Ft.	Cum. Ft.		
1	180.7	15.0	34	46	396	1.4	0.6	0.6	238	0.84
2	185.8	19.1	37	32	548	107.	0.5	1.1	274	53.50
3	186.5	23.9	38	29	705	195.	1.0	2.1	705	195.00
4	187.5	24.2	37	28	695	172.	1.0	3.1	695	172.00
5	188.5	21.8	43	32	727	79.	1.0	4.1	727	79.00
6	189.5	24.2	33	38	620	108.	1.0	5.1	620	108.00
7	190.5	23.5	40	31	729	137.	1.0	6.1	729	137.00
8	191.5	24.6	32	50	611	184.	1.0	7.1	611	184.00
9	192.5	25.6	34	48	675	149.	1.5	8.6	1013	223.50
11	194.5	23.7	31	49	570	128.	1.5	10.1	855	192.00
13	196.5	24.9	38	49	734	199.	2.0	12.1	1468	398.00
15	198.5	23.0	27	58	482	83.	2.5	14.6	1205	207.50

0.6'  
18 FT  
7005.5'  
=22 FT

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## SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Hickory Creek Oil Company Lease - Well No. HCO-175

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
180.4 - 199.5	14.6	133.6	1950.34

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
180.4 - 199.5	14.6	23.4	34.5	43.8	626	9,140

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Hickory Creek Oil Company Lease LONG 25 Well No. HCO-175

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	180.7	15.0	34	396	0	0	34	50	0	Imp.	-
2	185.8 <sup>82.8</sup>	19.2	37	551	6	89.5	31	55	398	17.61	10
3	186.5 <sup>82.5</sup>	24.1	38	710	7	131.0	31	55	231	14.24	10
4	187.5 <sup>88.5</sup>	23.9	37	686	4	74.0	33	57	255	10.49	15
5	188.5 <sup>83.5</sup>	21.8	43	727	5	85.0	38	57	226	8.50	15
6	189.5 <sup>90.5</sup>	24.0	33	614	2	37.0	31	59	300	14.24	10
7	190.5 <sup>91.5</sup>	23.4	40	726	6	109.0	34	57	361	10.50	10
8	191.5 <sup>90.5</sup>	24.8	32	616	2	38.0	30	58	262	15.99	10
9	192.5 <sup>92.5</sup>	25.6	34	675	4	79.5	30	61	440	29.98	10
11	194.5 <sup>92.5</sup>	23.5	31	565	0	0	31	64	212	16.50	10
13	196.5 <sup>92.5</sup>	24.7	38	728	5	96.0	33	58	311	36.36	10
15	198.5 <sup>92.5</sup>	23.3	27	488	0	0	27	65	282	25.80	10

508  
1.9  
= 32.3

200.21

✓ 96 Skts 1/20 SAND  
Oct. 6, 1980

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.

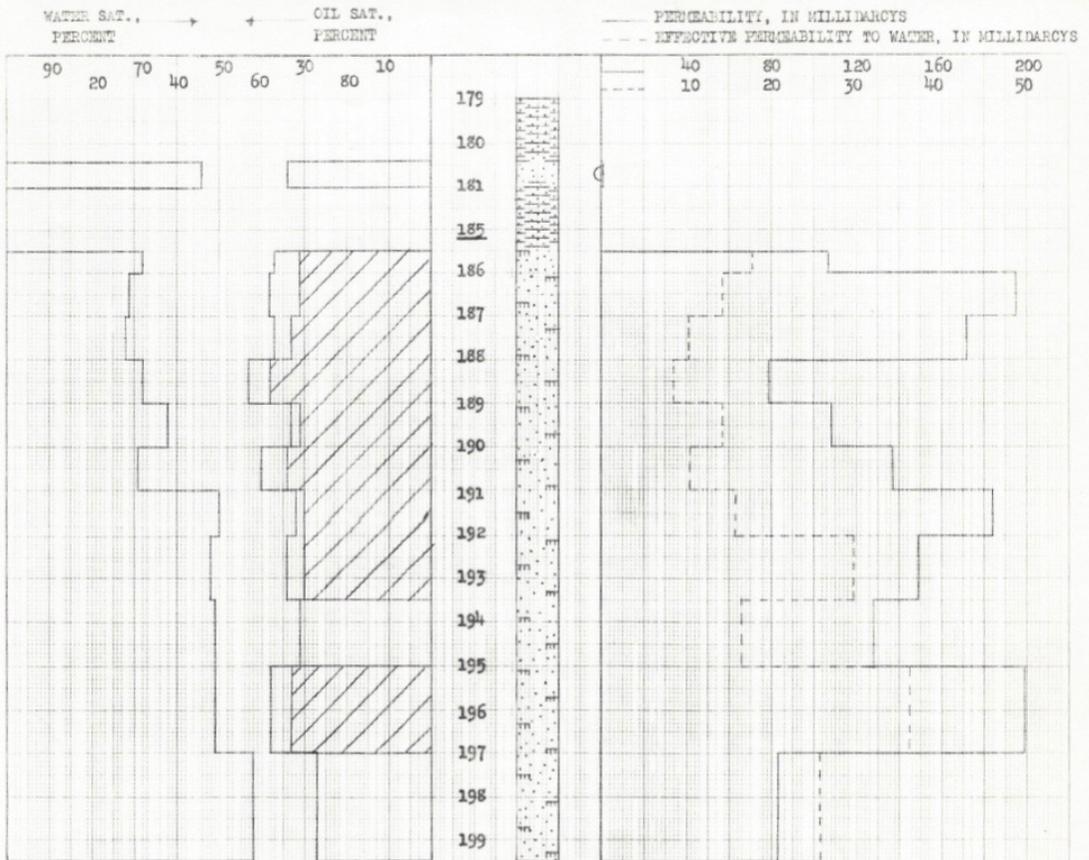
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## SUMMARY OF LABORATORY FLOODING TESTS

TABLE V

Company	Hickory Creek Oil Company	Lease	-	Well No.	HCO-175
Depth Interval, Feet	180.4 - 199.5				
Feet of Core Analyzed	10.0				
Average Percent Porosity	23.9				
Average Percent Original Oil Saturation	36.9				
Average Percent Oil Recovery	4.5				
Average Percent Residual Oil Saturation	32.4				
Average Percent Residual Water Saturation	57.8				
Average Percent Total Residual Fluid Saturation	90.2				
Average Original Oil Content, Bbls./A. Ft.	683.				
Average Oil Recovery, Bbls./A. Ft.	83.				
Average Residual Oil Content, Bbls./A. Ft.	600.				
Total Original Oil Content, Bbls./Acre	6,825.				
Total Oil Recovery, Bbls./Acre	829.				
Total Residual Oil Content, Bbls./Acre	5,996.				
Average Effective Permeability, Millidarcys	20.05				
Average Initial Fluid Production Pressure, p.s.i.	11.1				

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



- KEY:
- SANDY SHALE
  - CALCAREOUS SANDSTONE
  - SHALY SANDSTONE
  - FLOODPOT RESIDUAL OIL SATURATION
  - IMPERMEABLE TO WATER

**HICKORY CREEK OIL COMPANY**  
 LEASE \_\_\_\_\_ COUNTY, \_\_\_\_\_ WELL NO. H00-175

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./ACRE
180.4 - 199.5	14.6	23.4	34.5	43.8	133.6	3,750 (PRIMARY & WATERFLOODING)

OILFIELD RESEARCH LABORATORIES  
 CHANUTE, KANSAS  
 JULY, 1980

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