

# OILFIELD RESEARCH LABORATORIES

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

July 14, 1980

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

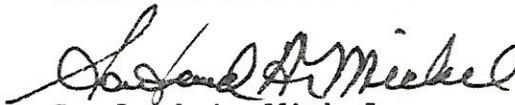
Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core taken from Well No. HCO-174, and submitted to our laboratory on May 22, 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

# Oilfield Research Laboratories

## GENERAL INFORMATION & SUMMARY

Company Hickory Creek Oil Company Lease --- Well No. HCO-174

Location ---

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

Elevation, Feet . . . . .

Name of Sand . . . . .

Top of Core . . . . . 219.0

Bottom of Core . . . . . 238.7

Top of Sand . . . . . 219.0

Bottom of Sand . . . . . (tested) . . . . . 238.0

Total Feet of Permeable Sand . . . . . (tested) . . . . . 18.1

Total Feet of Floodable Sand . . . . . (tested) . . . . . 3.5

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.
0 - 50	2.7	2.7
50 - 100	9.5	12.2
100 - 300	3.5	15.7
300 - 500	2.4	18.1

Average Permeability Millidarcys . . . . . 143.0

Average Percent Porosity . . . . . 22.7

Average Percent Oil Saturation . . . . . 39.2

Average Percent Water Saturation . . . . . 34.9

Average Oil Content, Bbls./A. Ft. . . . . 673.

Total Oil Content, Bbls./Acre . . . . . 12,176.

Average Percent Oil Recovery by Laboratory Flooding Tests . . . . . 18.1

Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft. . . . . 289.

Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre . . . . . 1,012.

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>
219.0 - 220.7	Brown micaceous sandstone.
220.7 - 222.1	Brown slightly calcareous sandstone.
223.0 - 226.5	Brown slightly calcareous sandstone.
226.5 - 238.7	Black carbonaceous slightly calcareous sandstone.

#### LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 1,012 barrels of oil per acre was obtained from 3.5 feet of sand. The weighted average percent oil saturation was reduced from 55.5 to 37.4, or represents an average recovery of 18.1 percent. The weighted average effective permeability of the samples is 0.69 millidarcys, while the average initial fluid production pressure is 40.0 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 12 samples tested, 2 produced water and oil, and 8 samples produced water only. This indicates that approximately 17 percent of the sand represented by these samples is floodable pay sand.

LONG 26

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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 1,140 barrels of oil per acre. This is an average recovery of 326 barrels per acre foot from 3.5 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 / 23.5
Average porosity, percent	20.8
Oil saturation after flooding, percent	37.4
Performance factor, percent, estimated	50.0
Net floodable sand, feet	3.5 / 2.0

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Hickory Creek Oil Company Lease LONG - 26 Well No. HCO-174

2750. 276.7 43d 19/4

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	219.5	17.0	46	33	607	169.	1.0	1.0	607	169.00
2	220.5	25.9	33	23	663	42.	0.7	1.7	464	29.40
3	221.5	28.5	30	49	663	493.	1.4	3.1	928	690.20
4	223.5	25.6	22	56	437	387.	1.0	4.1	437	387.00
5	224.5	26.6	27	50	557	247.	1.0	5.1	557	247.00
6	225.5	25.1	31	51	604	241.	1.5	6.6	906	361.50
8	227.5	22.3	51	24	882	52.	1.5	8.1	1323	78.00
10	229.5	19.8	59	23	906	13.	2.0	10.1	1812	26.00
12	231.5	21.8	33	31	558	82.	2.0	12.1	1116	164.00
14	233.5	19.3	35	28	524	51.	2.0	14.1	1048	102.00
16	235.5	21.5	47	27	784	83.	2.0	16.1	1568	166.00
18	237.5	23.3	39	39	705	84.	2.0	18.1	1410	168.00

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## SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company	Lease	Well No.		HCO-174	
Hickory Creek Oil Company					
	Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.	
	219.0 - 226.5	6.6	285.5	1884.10	
	226.5 - 238.0	11.5	61.2	704.00	
	219.0 - 238.0	18.1	143.	2588.10	
	Depth Interval, Feet	Feet of Core Analyzed	Average Percent Oil Saturation	Average Oil Content Bbl./A. Ft.	Total Oil Content Bbls./Acre
	219.0 - 226.5	6.6	31.3	45.5	3,899
	226.5 - 238.0	11.5	43.7	28.9	8,277
	219.0 - 238.0	18.1	39.2	34.9	12,176

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## RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Hickory Creek Oil Company

Lease 426

Well No. HCO-174

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.			
1	219.5	17.0	46	607	0	0	46	40	607	0	Imp.	-
2	220.5	25.7	33	658	0	0	33	60	658	372	26.09	10
3	221.5	28.4	30	661	0	0	30	54	661	159	59.23	10
4	223.5	25.9	22	442	0	0	22	63	442	126	47.22	10
5	224.5	26.6	27	557	0	0	27	62	557	205	38.48	10
6	225.5	25.0	31	601	0	0	31	62	601	360	20.24	10
8	227.5	22.2	51	878	13	224	38	43	654	21	0.22	40
10	229.5	19.8	59	906	22	338	37	50	568	43	1.05	40
12	231.5	21.7	33	556	0	0	33	36	556	0	Imp.	-
14	233.5	19.6	35	532	0	0	35	53	532	121	1.87	25
16	235.5	21.7	47	791	0	0	47	47	791	442	7.80	15
18	237.5	23.4	39	708	0	0	39	53	708	221	9.37	15

Sor = 37.5

Por = 22.0

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.

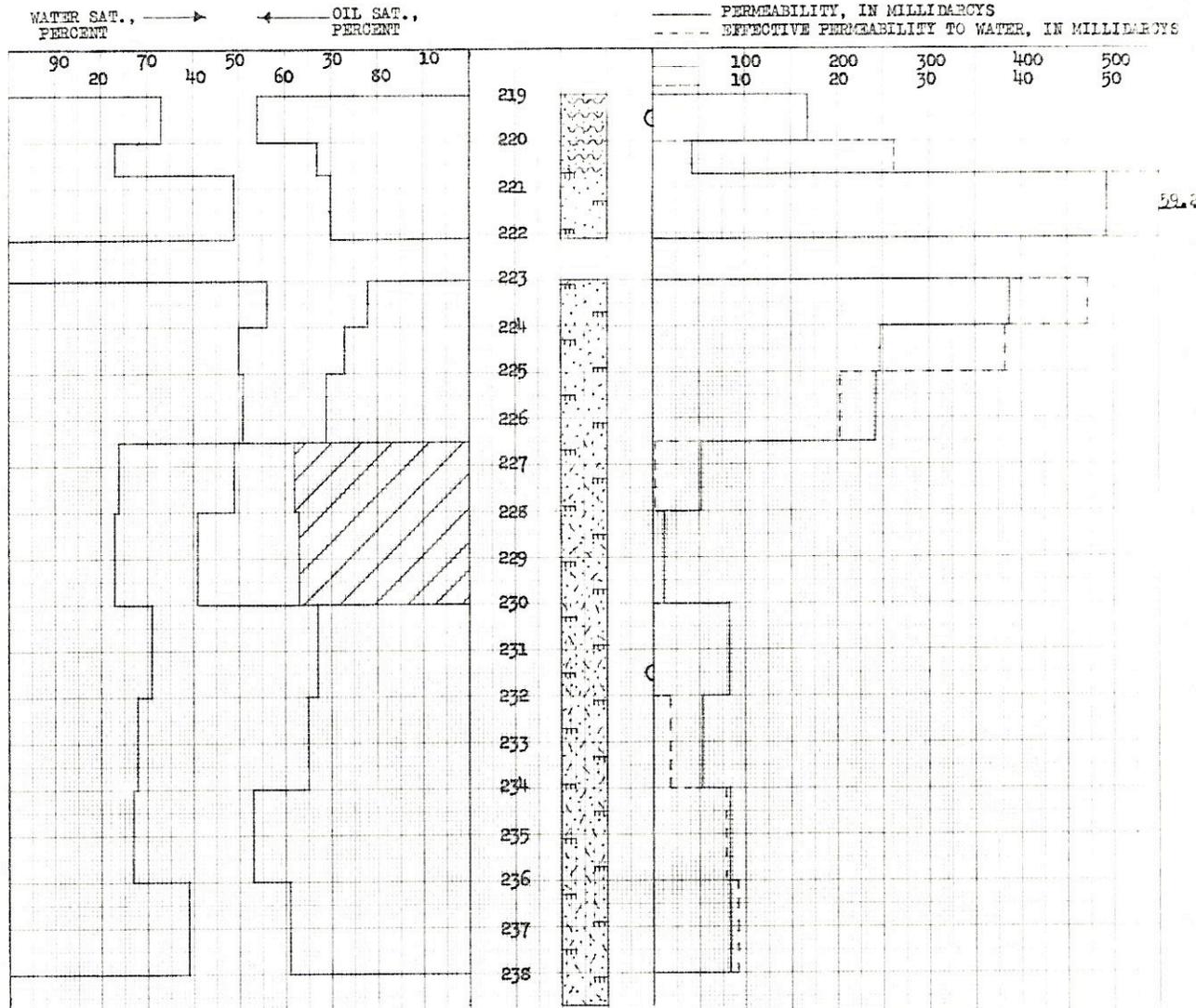
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## SUMMARY OF LABORATORY FLOODING TESTS

TABLE V

Company	Hickory Creek Oil Company	Lease	226.5 - 238.0	Well No.	HCO-174
Depth Interval, Feet			3.5		
Feet of Core Analyzed			20.8		
Average Percent Porosity			55.5		
Average Percent Original Oil Saturation			18.1		
Average Percent Oil Recovery			37.4		
Average Percent Residual Oil Saturation			47.0		
Average Percent Residual Water Saturation			84.4		
Average Percent Total Residual Fluid Saturation			89.4		
Average Original Oil Content, Bbls./A. Ft.			289.		
Average Oil Recovery, Bbls./A. Ft.			605.		
Average Residual Oil Content, Bbls./A. Ft.			3,129.		
Total Original Oil Content, Bbls./Acre			1,012.		
Total Oil Recovery, Bbls./Acre			2,117.		
Total Residual Oil Content, Bbls./Acre			0.69		
Average Effective Permeability, Millidarcys			40.0		
Average Initial Fluid Production Pressure, p.s.i.					

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



KEY:

- MICACEOUS SANDSTONE
- CALCAREOUS SANDSTONE
- CARBONACEOUS CALCAREOUS SANDSTONE
- FLOODPOT RESIDUAL OIL SATURATION
- IMPERMEABLE TO WATER

# HICKORY CREEK OIL COMPANY

LEASE COUNTY, WELL NO. HCC-174

DEPTH INTERVAL, FEET	FEET OF CORE ANALYZED	AVERAGE PERCENT POROSITY	AVG. OIL SATURATION PERCENT	AVG. WATER SATURATION PERCENT	AVERAGE PERMEABILITY MILLIDARCY	CALCULATED OIL RECOVERY BELS./ACRE
219.0 - 226.5	6.6	25.0	31.3	45.5	285.5	
226.5 - 238.0	11.5	21.3	43.7	28.9	61.2	
219.0 - 238.0	18.1	22.7	39.2	34.9	143.0	1,140 (PRIMARY & WATERFLOODING)

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 CHEANUTE, KANSAS  
 JULY, 1960