



OILFIELD RESEARCH LABORATORIES

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15-133-21354

January 29, 1980

Hickory Creek Oil Company
1128 Main Street
Parsons, Kansas 67357

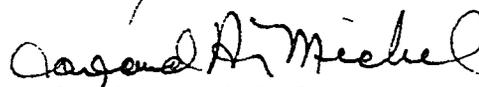
Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core taken from Well No. HCO-97, and submitted to our laboratory on January 3, 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-97

Location -

Section - Twp - Rge - County - State -

Elevation, Feet - - - - -

Name of Sand - - - - -

Top of Core - - - - - 175.0

Bottom of Core - - - - - 195.2

Top of Sand - - - - - (Tested) 175.2

Bottom of Sand - - - - - 195.2

Total Feet of Permeable Sand - - - - - 19.0

Total Feet of Floodable Sand - - - - - 12.3

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.
0 - 10	6.7	6.7
10 - 100	4.7	11.4
100 - 300	5.3	16.7
600 - 700	2.3	19.0

Average Permeability Millidarcys - - - - - 162.3

Average Percent Porosity - - - - - 21.5

Average Percent Oil Saturation - - - - - 48.0

Average Percent Water Saturation - - - - - 28.5

Average Oil Content, Bbls./A. Ft. - - - - - 784.

Total Oil Content, Bbls./Acre - - - - - 14,894.

Average Percent Oil Recovery by Laboratory Flooding Tests - - - - - 11.3

Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft. - - - - - 217.

Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre - - - - - 2,668.

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

See "Calculated Recovery" Section.

-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>
175.0 - 175.2	Light brown laminated shaly sandstone.
175.2 - 179.3	Brown sandstone.
179.3 - 180.0	Brown laminated carbonaceous sandstone.
180.0 - 182.0	Brown slightly laminated carbonaceous sandstone.
182.0 - 185.6	Brown sandstone.
185.6 - 186.4	Light brown shaly sandstone.
186.4 - 188.3	Brown sandstone.
188.3 - 188.5	Gray sandy shale.
188.5 - 195.2	Light brown shaly sandstone.

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests as a total recovery of 2,668 barrels of oil per acre was obtained from 12.3 feet of sand. The weighted average percent oil saturation was reduced from 46.3 to 35.0, or represents an average recovery of 11.3 percent. The weighted average effective permeability of the samples is 14.81 millidarcys, while the average initial fluid production pressure is 17.1 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 10 samples tested, 7 produced water and oil. This indicates that approximately 70 percent of the sand represented by these samples is floodable pay sand.

Please note that the coregraph presents residual oil saturation instead of recovery, as in the past.

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 6,050 barrels of oil per acre. This is an average recovery of 492 barrels per acre foot from 12.3 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	10.0 / 18.8
Average porosity, percent	24.2 / 24.3
Oil saturation after flooding, percent	35.0 / 35.2
Performance factor, percent, estimated	50.0
Net floodable sand, feet	12.3 / 17.0

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Hickory Creek Oil Company Lease - H30 Well No. HCO-97

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	175.5	24.0	47	17	64	875	288.	1.8	1.8	1575	518.40
3	177.5	25.8	58	11	69	1161	664.	2.3	4.1	2670	1527.20
5	179.5	22.0	44	24	68	751	24.	0.7	4.8	526	16.80
7	181.5	26.7	50	23	73	1036	89.	2.0	6.8	2072	178.00
9	183.5	23.3	38	26	64	687	53.	2.0	8.8	1374	106.00
11	185.5	24.1	38	34	72	711	153.	1.6	10.4	1138	244.80
13	187.5	23.4	44	39	83	799	247.	1.9	12.3	1518	469.30
15	189.5	11.8	67	31	98	613	2.7	2.5	14.8	1533	6.75
17	191.5	16.0	41	49	90	509	0.22	2.0	16.8	1018	0.44
19	193.5	20.5	42	30	72	668	7.5	2.2	19.0	1470	16.50
	<u>1845.</u>	<u>217.6</u>		<u>284</u>			<u>1528.42</u>				

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Hickory Creek Oil Company Lease - Well No. HCO-97

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
175.2 - 180.0	4.8	429.6	2,062.0
180.0 - 195.2	14.2	72.0	1,021.79
175.2 - 195.2	19.0	162.3	3,083.79

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
175.2 - 180.0	4.8	24.6	51.8	15.2	994	4,771
180.0 - 195.2	14.2	20.4	46.6	33.0	713	10,123
175.2 - 195.2	19.0	21.5	48.0	28.5	784	14,894

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Hickory Creek Oil Company Lease - H30 Well No. HCO-97

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	175.5	23.6	47	861	6	110	41	50	751	226	11.11	20	
3	177.5	25.3	58	1138	18	353	40	56	785	333	43.98	10	
5	179.5	21.8	44	744	3	51	41	40	693	26	0.30	10	
7	181.5	26.5	50	1028	19	391	31	64	637	181	4.00	30	
9	183.5	23.1	38	681	5	90	33	57	591	84	0.90	30	
11	185.5	23.8	38	702	6	111	32	64	591	357	14.99	10	
13	187.5	23.4	44	799	14	254	30	60	545	254	14.24	10	
15	189.5	12.0	67	624	0	0	67	30	624	0	Imp.	-	
17	191.5	16.0	41	509	0	0	41	52	509	0	Imp.	-	
19	193.5	20.4	42	665	0	0	42	40	665	0	Imp.	-	
							378			89.52			
							50 or 51						
							= 37.2						

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-97		
Depth Interval, Feet	175.2 - 180.0	180.0 - 195.2	175.2 - 195.2
Feet of Core Analyzed	4.8	7.5	12.3
Average Percent Porosity	24.2	24.2	24.2
Average Percent Original Oil Saturation	51.8	42.7	46.3
Average Percent Oil Recovery	11.3	11.2	11.3
Average Percent Residual Oil Saturation	40.5	31.5	35.0
Average Percent Residual Water Saturation	51.4	61.1	57.3
Average Percent Total Residual Fluid Saturation	91.9	92.6	92.3
Average Original Oil Content, Bbls./A. Ft.	977.	808.	874.
Average Oil Recovery, Bbls./A. Ft.	218.	216.	217.
Average Residual Oil Content, Bbls./A. Ft.	759.	592.	657.
Total Original Oil Content, Bbls./Acre	4,688.	6,059.	10,747.
Total Oil Recovery, Bbls./Acre	1,046.	1,622.	2,668.
Total Residual Oil Content, Bbls./Acre	3,642.	4,437.	8,079.
Average Effective Permeability, Millidarcys	25.28	8.11	14.81
Average Initial Fluid Production Pressure, p.s.i.	13.3	20.0	17.1

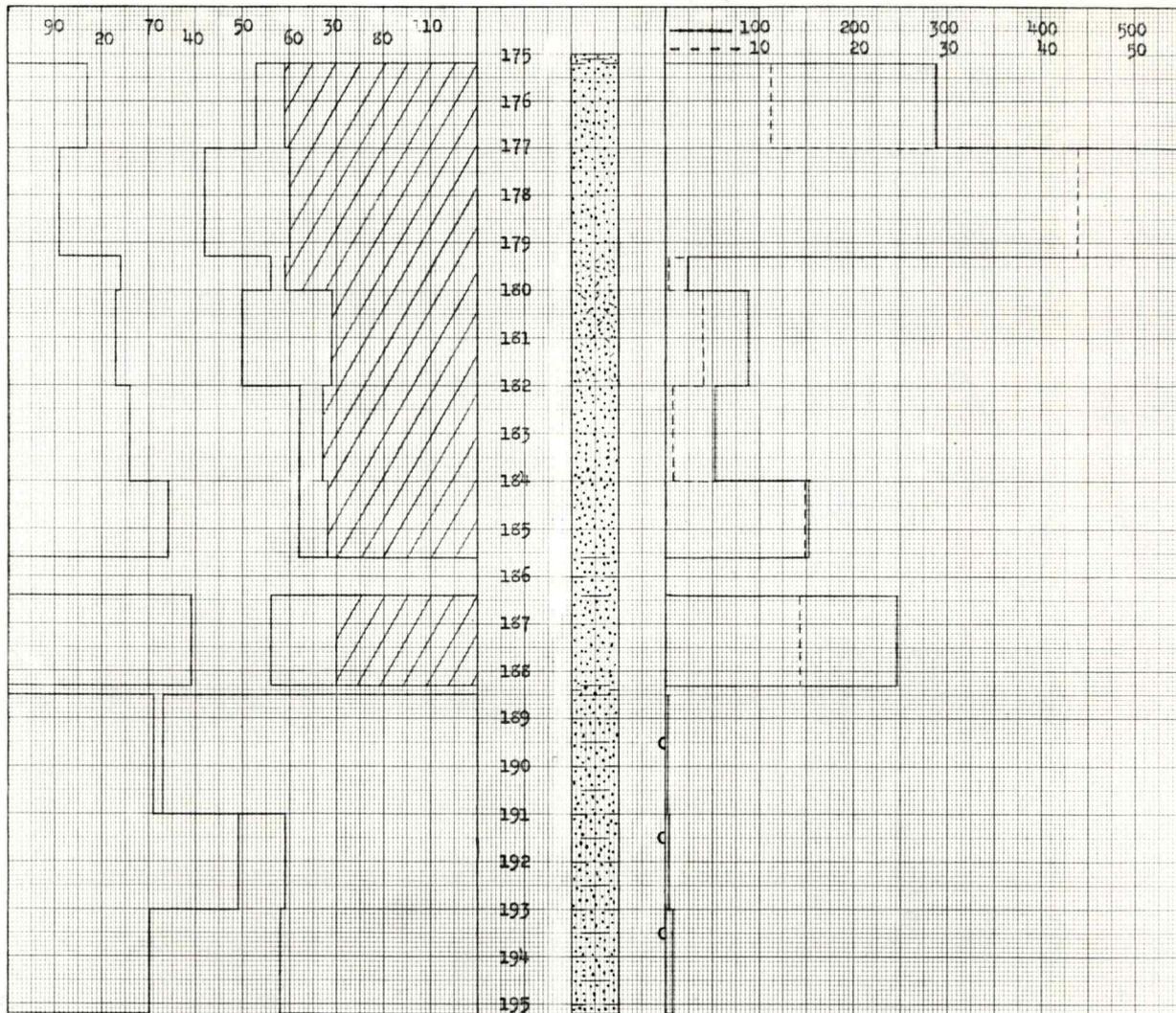
NOTE: Only those samples which recovered oil were used in calculating the above averages.

WATER SAT.,
PERCENT

OIL SAT.,
PERCENT

PERMEABILITY, IN MILLIDARCY

----- EFFECTIVE PERMEABILITY TO WATER, IN MILLIDARCY



KEY:

- SANDSTONE
- SHALY SANDSTONE
- CARBONACEOUS SANDSTONE
- SANDY SHALE
- FLOODPOT RESIDUAL OIL SATURATION
- IMPERMEABLE TO WATER

HICKORY CREEK OIL COMPANY

--- LEASE ---

--- COUNTY, ---

WELL NO. HCO - 97

DEPTH INTERVAL, FEET	FEET OF CORE ANALYZED	AVERAGE PERCENT POROSITY	AVG. OIL SATURATION PERCENT	AVG. WATER SATURATION PERCENT	AVERAGE PERMEABILITY, MILLIDARCY	CALCULATED OIL RECOVERY BBLG./ACRE
175.2 - 180.0	4.8	24.6	51.8	15.2	429.6	
180.0 - 195.2	14.2	20.4	46.6	33.0	72.0	
175.2 - 195.2	19.0	21.5	48.0	28.5	162.3	6,050 (PRIMARY AND WATERFLOODING)

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 CHANUTE, KANSAS
 JANUARY, 1980 ER