OILFIELD RESEARCH LABORATORIES

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API: 15-133-21343

February 13, 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-106, and submitted to our laboratory on January 16, 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-106

Location –

Section – Twp – Rge – County – State –

Elevation, Feet - - - - - - - - - - - - - - - - -

Name of Sand	–
Top of Core	173.0
Bottom of Core	193.2
Top of Sand	173.0
Bottom of Sand	193.2
Total Feet of Permeable Sand	17.7
Total Feet of Floodable Sand	16.2

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.
0 - 50	4.0	4.0
50 - 100	2.0	6.0
100 - 150	8.2	14.2
150 - 200	3.5	17.7

Average Permeability Millidarcys	105.6
Average Percent Porosity	23.0
Average Percent Oil Saturation	39.4
Average Percent Water Saturation	26.7
Average Oil Content, Bbls./A. Ft.	798.
Total Oil Content, Bbls./Acre	14,118.
Average Percent Oil Recovery by Laboratory Flooding Tests	4.0
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	72.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	1,170.
Total Calculated Oil Recovery, Bbls./Acre	See "Calculated Recovery" Section.

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:

Depth Interval, Feet	Description
173.0 - 180.0	Dark brown sandstone containing thin widely scattered carbonaceous partings.
180.0 - 185.1	Brown sandstone containing several widely scattered streaks of shale.
185.1 - 186.5	Gray shale.
186.5 - 193.2	Brown sandstone.

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 1,170 barrels of oil per acre was obtained from 16.2 feet of sand. The weighted average percent oil saturation was reduced from 44.0 to 40.0, or represents an average recovery of 4.0 percent. The weighted average effective permeability of the samples is 12.55 millidarcys, while the average initial fluid production pressure is 22.2 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 10 samples tested, 9 produced water and oil, and 1 sample produced water only. This indicates that approximately 90 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.

HILLER 16

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 6,060 barrels of oil per acre. This is an average recovery of 374 barrels per acre foot from 16.2 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	15.0 / 25.0
Average porosity, percent	22.7
Oil saturation after flooding, percent	40.0
Performance factor, percent, estimated	50.0
Net floodable sand, feet	16.2 / 10.0

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Hickory Creek Oil Company Lease - H-16 Well No. HCO-106

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	173.5	23.4	49	19	68	890	175.-	2.0	2.0	1780	350.00
3	175.5	23.8	40	18	58	739	128.-	2.0	4.0	1478	256.00
5	177.5	25.7	47	21	68	937	137.-	1.5	5.5	1406	205.50
7	179.5	25.6	50	20	70	993	109.-	1.5	7.0	1490	163.50
9	181.5	18.2	39	33	72	551	31.-	2.0	9.0	1102	62.00
~~11~~	~~183.5~~	22.7	37	(34)	71	652	50.	2.0	11.0	1304	100.00
13	186.8	23.7	53	28	81	975	161.	1.5	12.5	1463	241.50
~~15~~	~~188.5~~	23.2	45	(30)	75	810	108.	2.0	14.5	1620	216.00
17	190.5	21.7	47	(30)	77	791	67.	2.0	16.5	1582	134.00
19	192.5	23.4	41	(34)	75	744	118.	1.2	17.7	893	141.60
	1829.3	231.4		267			1084				

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Hickory Creek Oil Company Lease - Well No. HCO-106

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
173.0 - 180.0	7.0	139.2	974.50
180.0 - 193.2	10.7	83.7	895.10
173.0 - 193.2	17.7	105.6	1869.60

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
173.0 - 180.0	7.0	24.5	46.2	19.4	879	6,154
180.0 - 193.2	10.7	22.0	43.4	31.5	744	7,964
173.0 - 193.2	17.7	23.0	39.4	26.7	798	14,118

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Hickory Creek Oil Company Lease H 16 Well No. HCO-106

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	173.5	23.4	49	890	6	109	43	41	781	284	16.92	15
3	175.5	24.1	40	746	2	37	38	50	711	251	14.99	10
5	177.5	25.7	47	937	5	100	42	48	837	432	23.56	10
7	179.5	~~25.8~~	50	1001	0	0	50	28	1001	173	~~21.37~~	10
9	181.5	18.3	39	554	2	28	37	61	526	18	0.22	45
11	183.5	22.4	37	643	2	35	35	61	606	337	11.40	20
13	186.8	23.8	53	979	9	166	44	52	813	510	18.00	20
~~15~~	~~188.5~~	23.0	45	803	4	71	41	57	732	277	11.70	35
17	190.5	21.7	47	791	5	84	42	56	707	324	5.77	25
19	192.5	23.2	41	738	2	36	39	59	702	433	15.75	20
							411				139.68	
							5 or 6					
							11 - 39.8					

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-106

Depth Interval, Feet	173.0 - 180.0	180.0 - 193.2	173.0 - 193.2
Feet of Core Analyzed	5.5	10.7	16.2
Average Percent Porosity	24.3	21.9	22.7
Average Percent Original Oil Saturation	45.2	43.4	44.0
Average Percent Oil Recovery	4.3	3.9	4.0
Average Percent Residual Oil Saturation	40.9	39.5	40.0
Average Percent Residual Water Saturation	46.2	57.8	53.9
Average Percent Total Residual Fluid Saturation	87.1	97.3	93.9
Average Original Oil Content, Bbls./A. Ft.	851.	749.	777.
Average Oil Recovery, Bbls./A. Ft.	80.	68.	72.
Average Residual Oil Content, Bbls./A. Ft.	771.	681.	705.
Total Original Oil Content, Bbls./Acre	4,681.	7,914.	12,595.
Total Oil Recovery, Bbls./Acre	442.	728.	1,170.
Total Residual Oil Content, Bbls./Acre	4,239.	7,186.	11,425.
Average Effective Permeability, Millidarcys	18.03	9.73	12.55
Average Initial Fluid Production Pressure, p.s.i.	11.7	27.5	22.2

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

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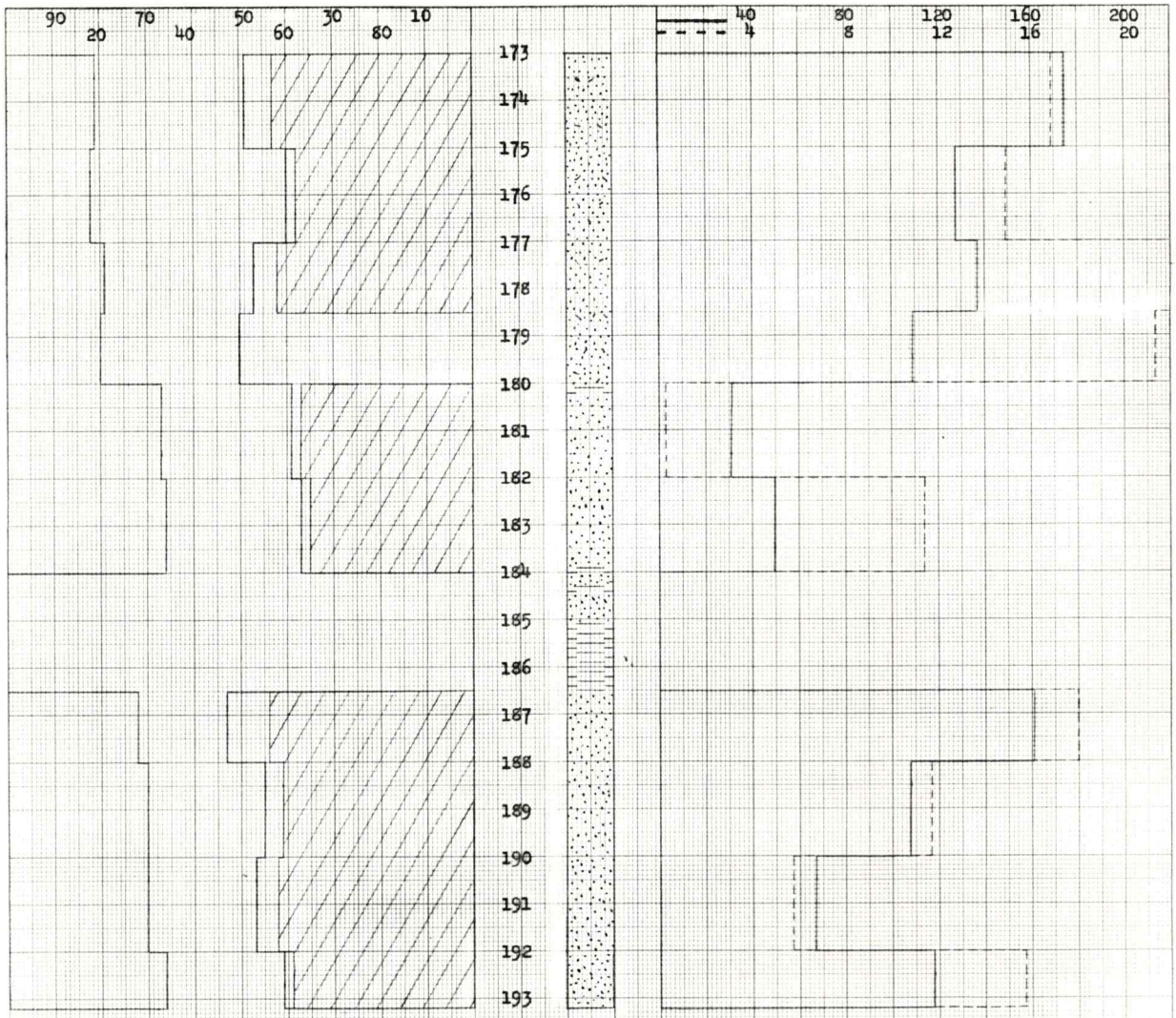
WATER SAT., PERCENT → ← OIL SAT., PERCENT

——— PERMEABILITY, IN MILLIDARCYS

- - - - EFFECTIVE PERMEABILITY TO WATER, IN MILLIDARCYS



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KEY:

SANDSTONE CONTAINING CARBONACEOUS PARTINGS

SANDSTONE

FLOODPOT RESIDUAL OIL SATURATION

SANDSTONE CONATINING STREAKS OF SHALE

SHALE

HICKORY CREEK OIL COMPANY

-- LEASE WELL NO. HCO - 106

-- COUNTY, --

DEPTH INTERVAL, FEET	FEET OF CORE ANALYZED	AVERAGE PERCENT POROSITY	AVG. OIL SATURATION PERCENT	AVG. WATER SATURATION PERCENT	AVERAGE PERMEABILITY, MILLIDARCYS	CALCULATED OIL RECOVERY BBLS./ACRE
173.0 - 180.0	7.0	24.5	46.2	19.4	139.2	
180.0 - 193.2	10.7	22.0	43.4	31.5	83.2	
173.0 - 193.2	17.7	23.0	39.4	26.7	105.6	6,060 (PRIMARY AND WATERFLOODING)

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CHANUTE, KANSAS
FEBRUARY, 1960. HR