HICKORY CREEK OIL COMPANY

CORE ANALYSIS REPORT

WELL NO. HCO-56

W. Derein 13

OILFIELD RESEARCH LABORATORIES

536 N. HIGHLAND CHANUTE, KANSAS

OILFIELD RESEARCH LABORATORIES

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

November 14, 1979

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-56, and submitted to our laboratory on October 27, 1979.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Benjamin R. Pearman

Benjamin R. Pearman

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-56

Location –

Section – Twp – Rge – County – State –

Name of Sand	–
Top of Core	190.0
Bottom of Core	209.4
Top of Sand	190.0
Bottom of Sand (Tested)	209.1
Total Feet of Permeable Sand	8.6
Total Feet of Floodable Sand	6.4

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.
0 – 50	1.3	1.3
50 – 100	1.0	2.3
100 – 150	6.3	8.6

Average Permeability Millidarcys	108.4
Average Percent Porosity	21.3
Average Percent Oil Saturation	44.8
Average Percent Water Saturation	38.0
Average Oil Content, Bbls./A. Ft.	738.
Total Oil Content, Bbls./Acre	6,351.
Average Percent Oil Recovery by Laboratory Flooding Tests	8.0
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	131.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	837.
Total Calculated Oil Recovery, Bbls./Acre	See "Calculated Recovery" Section.
Packer Setting, Feet	
Viscosity, Centipoises @	
A. P. I. Gravity, degrees @ 60 °F	
Elevation, Feet	

The core was sampled and the samples sealed in plastic bags by a representative of the client.

FORMATION CORED

Depth Interval, Feet	Description
190.0 - 192.7	Brown sandstone.
192.7 - 202.0	Gray sandy shale.
202.0 - 203.2	Gray and light brown laminated shale and sandstone, 10% sandstone.
203.2 - 203.8	Brown shaly sandstone.
203.8 - 209.1	Brown sandstone.
209.1 - 209.4	Light brown shaly sandstone.

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 837 barrels of oil per acre was obtained from 6.4 feet of sand. The weighted average percent oil saturation was reduced from 46.7 to 38.7, or represents an average recovery of 8.0 percent. The weighted average effective permeability of the samples is 4.39 millidarcys, while the average initial fluid production pressure is 20.7 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 9 samples tested, 7 produced water and oil and 2 samples produced water only. This indicates that approximately 78 percent of the sand represented by these samples is floodable pay sand.

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CALCULATED RECOVERY

It would appear from a study of the data, that efficient primary and waterflood operations in the vicinity of this well should recover approximately 2,300 barrels of oil per acre. This is an average recovery of 360 barrels per acre foot from 6.4 feet of floodable sand analyzed in this core.

These recovery values were calculated using the following data and assumptions:

Original formation volume factor	1.03	
Reservoir water saturation, percent	15.0	22.3
Average porosity, percent	21.2	20.9
Oil saturation after flooding, percent	38.7	41.3
Performance factor, percent	50.0	
Net floodable pay sand, feet	6.4	8.0

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Hickory Creek Oil Company Lease - DEVLIN 13 Well No. HCO-56

1810.4 188.5 343 900.8

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.		
1 183	190.5	20.5	55	19	74	875	131.	1.0	1.0	875	131.00
2 189	191.5	20.6	53	25	78	847	68.	1.0	2.0	847	68.00
3 185	192.3	20.5	57	23	80	907	21.	0.7	2.7	635	14.70
4 196.	203.3	14.4	39	56	95	436	3.8	0.6	3.3	262	2.28
5 197	204.5	22.5	41	38	79	716	127.	1.2	4.5	859	152.40
6 198	205.5	22.7	45	40	85	793	141.	1.0	5.5	793	141.00
7 199	206.7	22.5	44	38	82	768	135.	1.0	6.5	768	135.00
8 200	207.6	22.4	37	49	86	643	133.	1.0	7.5	643	133.00
9 201	208.5	22.4	35	55	90	608	141.	1.1	8.6	669	155.10

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Hickory Creek Oil Company Lease - Well No. HCO-56

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
190.0 - 192.7	2.7	79.2	213.70
203.2 - 209.1	5.9	121.8	718.78
190.0 - 209.1	8.6	108.4	932.48

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
190.0 - 192.7	2.7	20.6	54.8	22.3	873	2,357.
203.2 - 209.1	5.9	21.7	40.2	45.2	677	3,994.
190.0 - 209.1	8.6	21.3	44.8	38.0	738	6,351.

RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Hickory Creek Oil Company Lease D-13 Well No. HCO-56

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	190.5	20.8	55	888	20	323	35	63	565	235	4.42	15
2	191.5	21.0	53	863	11	179	42	54	684	143	3.37	25
3	192.5	21.0	57	929	10	163	47	50	766	33	0.75	30
4	203.3	14.9	39	451	3	35	36	57	416	20	0.45	30
5	204.5	22.6	41	719	0	0	41	57	719	331	7.50	20
6	205.5	23.0	45	803	6	107	39	58	696	339	6.00	15
7	206.7	22.9	44	782	2	36	42	56	746	395	6.15	15
8	207.6	22.8	37	654	0	0	37	59	654	443	6.22	15
9	208.5	22.2	35	603	3	52	32	56	551	538	6.67	15

351 41.53

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-56

Depth Interval, Feet	190.0 - 192.7	203.2 - 209.1	190.0 - 209.1
Feet of Core Analyzed	2.7	3.7	6.4
Average Percent Porosity	20.9	21.4	21.2
Average Percent Original Oil Saturation	54.8	40.7	46.7
Average Percent Oil Recovery	14.1	3.5	8.0
Average Percent Residual Oil Saturation	40.7	37.2	38.7
Average Percent Residual Water Saturation	56.3	56.7	56.5
Average Percent Total Residual Fluid Saturation	97.0	93.9	95.2
Average Original Oil Content, Bbls./A. Ft.	889.	681.	769.
Average Oil Recovery, Bbls./A. Ft.	228.	60.	131.
Average Residual Oil Content, Bbls./A. Ft.	661.	621.	638.
Total Original Oil Content, Bbls./Acre	2,401.	2,519.	4,920.
Total Oil Recovery, Bbls./Acre	616.	221.	837.
Total Residual Oil Content, Bbls./Acre	1,785.	2,298.	4,083.
Average Effective Permeability, Millidarcys	3.08	5.34	4.39
Average Initial Fluid Production Pressure, p.s.i.	23.3	18.8	20.7

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