HICKORY CREEK OIL COMPANY

CORE ANALYSIS REPORT

WELL NO. HCO-111

W. Dexlin 39

OILFIELD RESEARCH LABORATORIES
536 N. HIGHLAND CHANUTE, KANSAS

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February 19, 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-111 and submitted to our laboratory on January 23, 1980.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Sanford A. Michel

SAM/kas
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-111

Location –

Section – Twp. – Rge. – County – State –

Elevation, Feet	–
Name of Sand	–
Top of Core	173.0
Bottom of Core	210.1
Top of Sand	173.0
Bottom of Sand	210.1
Total Feet of Permeable Sand	30.1
Total Feet of Floodable Sand	9.7

Distribution of Permeable Sand:

Permeability Range Millidarcys	Feet	Cum. Ft.
0 – 10	9.6	9.6
10 – 50	10.5	20.1
50 – 100	8.0	28.1
100 – 150	2.0	30.1

Average Permeability Millidarcys	35.4
Average Percent Porosity	19.4
Average Percent Oil Saturation	38.5
Average Percent Water Saturation	41.8
Average Oil Content, Bbls./A. Ft.	586.
Total Oil Content, Bbls./Acre	18,467.
Average Percent Oil Recovery by Laboratory Flooding Tests	5.1
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	78.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	756.
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 - 174.0	Light brown very shaly sandstone.
174.0 - 174.8	Gray laminated shale.
174.8 - 175.8	Brown and gray laminated sandstone and shale.
175.8 - 176.3	Gray sandy shale.
176.3 - 178.3	Brown shaly sandstone.
178.3 - 180.6	Brown very shaly sandstone.
180.6 - 181.4	Gray laminated shale.
181.4 - 181.8	Brown and gray laminated sandstone and shale.
181.8 - 183.4	Gray sandy shale.
183.4 - 185.0	Brown sandstone.
185.0 - 185.7	Brown shaly sandstone.
185.7 - 186.4	Gray sandy shale.
186.4 - 186.9	Brown sandstone.
186.9 - 188.8	Brown shaly sandstone.
188.8 - 191.0	Brown sandstone.
191.0 - 191.4	Gray sandy shale.
191.4 - 197.5	Brown sandstone.
197.5 - 197.8	Gray sandy shale.
197.8 - 199.5	Brown shaly sandstone.
199.5 - 210.1	Brown sandstone.

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LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 756 barrels ofoil per acre was obtained from 9.7 feet of sand. The weighted average percent oil saturation was reduced from 43.6 to 38.5, or represents an average recovery of 5.1 percent. The weighted average effective permeability of the samples is 3.02 millidarcys, while the average initial fluid production pressure is 39.2 pounds per square inch (See Table V).

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 2,640 barrels of oil per acre. This is an average recovery of 272 barrels per acre foot from 9.7 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 / 36.8
Average porosity, percent	19.9 / 18.7
Oil saturation after flooding, percent	38.5 / 38.2
Performance factor, percent, estimated	45.0
Net floodable sand, feet	9.7 / 6.0

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Hickory Creek Oil Company Lease - D39 Well No. HCO-111

3628.5 362.3 813 554.7

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	14.0	10	73	83	109	Imp.	1.0	1.0	109	0.00
2	175.5	16.4	45	43	88	573	1.0	1.0	2.0	573	1.00
4	177.5	19.1	45	33	78	667	7.8	2.0	4.0	1334	15.60
6	179.5	16.2	39	55	94	490	1.1	2.3	6.3	1127	2.53
8	181.5	14.9	26	67	93	301	Imp.	0.4	6.7	120	0.00
9	183.5	20.8	41	25	66	662	24.	1.6	8.3	1059	38.40
11	185.5	20.0	53	26	79	822	5.4	0.7	9.0	575	3.78
13	187.5	19.0	44	43	87	649	1.5	1.9	10.9	1233	2.85
15	189.5	17.5	26	55	81	353	30.	1.2	12.1	424	36.00
16	190.5	19.7	48	33	81	734	15.	1.0	13.1	734	15.00
18	192.5	19.8	43	38	81	661	27.	2.1	15.2	1388	56.70
20	194.5	17.9	38	47	85	528	21.	2.0	17.2	1056	42.00
22	196.5	20.1	32	41	73	499	56.	2.0	19.2	998	112.00
24	198.5	21.2	47	32	79	773	4.9	1.7	20.9	1314	8.33
26	200.5	21.3	42	33	75	694	97.	2.0	22.9	1388	194.00
28	202.5	23.2	42	34	76	756	89.	2.0	24.9	1512	178.00
30	204.5	22.6	34	46	80	596	101.	2.0	26.9	1192	202.00
32	206.5	19.9	34	43	77	525	52.	2.0	28.9	1050	104.00
34	208.5	18.7	34	46	80	493	21.	2.6	31.5	1281	54.60

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Hickory Creek Oil Company Lease - Well No. HCO-111

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
173.0 - 188.8	9.5	6.8	64.16
188.8 - 210.1	20.6	48.7	1002.63
173.0 - 210.1	30.1	35.4	1066.79

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
173.0 - 188.8	10.9	17.9	39.6	43.6	562	6,130
188.8 - 210.1	20.6	20.2	38.0	40.8	599	12,337
173.0 - 210.1	31.5	19.4	38.5	41.8	586	18,467

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Hickory Creek Oil Company Lease – D39 Well No. HCO-111

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	14.0	10	109	0	0	10	73	109	0	Imp.	–
2	175.5	16.4	45	573	8	102	37	57	471	0	0.01	45
4	177.5	19.0	45	663	6	88	39	53	575	0	0.02	45
6	179.5	16.7	38	493	0	0	38	56	493	0	Imp.	–
8	181.5	14.5	28	315	0	0	28	65	315	0	Imp.	–
9	183.5	20.6	41	656	6	96	35	49	560	15	0.22	30
11	185.5	20.3	52	819	0	0	52	30	819	0	Imp.	–
13	187.5	19.4	43	647	0	0	43	48	647	0	Imp.	–
15	189.5	17.6	26	355	0	0	26	67	355	0	Imp.	–
16	190.5	19.4	48	722	8	120	40	52	602	0	0.02	45
18	192.5	19.8	43	660	3	46	40	46	614	10	0.40	45
20	194.5	18.3	36	511	0	0	36	52	511	0	Imp.	–
22	196.5	20.6	31	496	0	0	31	56	496	46	0.75	30
24	198.5	21.0	47	766	0	0	47	40	766	0	Imp.	–
26	200.5	21.7	41	690	0	0	41	43	690	0	Imp.	–
28	202.5	23.0	42	749	3	54	39	53	695	242	14.00	25
30	204.5	22.1	35	600	0	0	35	63	600	290	12.00	20
32	206.5	19.5	35	530	0	0	35	59	530	104	3.20	30
34	208.5	18.6	34	490	0	0	34	57	490	18	0.50	45

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-111

Depth Interval, Feet	173.0 - 188.8	188.8 - 210.1	173.0 - 210.1
Feet of Core Analyzed	4.6	5.1	9.7
Average Percent Porosity	19.0	20.8	19.9
Average Percent Original Oil Saturation	43.6	43.6	43.6
Average Percent Oil Recovery	6.4	4.0	5.1
Average Percent Residual Oil Saturation	37.2	39.6	38.5
Average Percent Residual Water Saturation	52.5	49.9	51.1
Average Percent Total Residual Fluid Saturation	89.7	89.5	89.6
Average Original Oil Content, Bbls./A. Ft.	641.	707.	676.
Average Oil Recovery, Bbls./A. Ft.	94.	64.	78.
Average Residual Oil Content, Bbls./A. Ft.	547.	643.	598.
Total Original Oil Content, Bbls./Acre	2,949.	3,605.	6,554.
Total Oil Recovery, Bbls./Acre	432.	324.	756.
Total Residual Oil Content, Bbls./Acre	2,517.	3,281.	5,798.
Average Effective Permeability, Millidarcys	0.09	5.66	3.02
Average Initial Fluid Production Pressure, p.s.i.	40.0	38.3	39.2

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