OILFIELD RESEARCH LABORATORIES

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15-037-20476

March 5, 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-123, and submitted to our laboratory on February 15, 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

SARTIN #21

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GENERAL INFORMATION & SUMMARY

Company Hickory Creek Oil Company Lease – Well No. HCO-123

Location –

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

Elevation, Feet	
Name of Sand	
Top of Core	178.0
Bottom of Core	211.6
Top of Sand	178.3
Bottom of Sand	210.5
Total Feet of Permeable Sand	29.2
Total Feet of Floodable Sand	17.1

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.
0 – 100	13.5	13.5
100 – 200	8.4	21.9
200 – 300	2.8	24.7
300 – 400	3.4	28.1
400 – 500	1.1	29.2

Average Permeability Millidarcys	129.9
Average Percent Porosity	22.5
Average Percent Oil Saturation	41.8
Average Percent Water Saturation	38.1
Average Oil Content, Bbls./A. Ft.	734.
Total Oil Content, Bbls./Acre	21,422.
Average Percent Oil Recovery by Laboratory Flooding Tests	5.4
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	96.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	1,647.
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
178.0 - 178.3	Gray sandy shale.
178.3 - 179.0	Brown sandstone.
179.0 - 179.7	Gray sandy shale.
179.7 - 181.1	Brown sandstone.
181.1 - 181.3	Gray sandy shale.
181.3 - 182.4	Brown sandstone.
182.4 - 182.9	Brown slightly laminated carbonaceous sandstone.
182.9 - 185.7	Brown sandstone.
185.7 - 191.1	Brown slightly laminated carbonaceous sandstone.
191.1 - 192.1	Gray sandy shale.
192.1 - 193.4	Light brown laminated shaly sandstone.
193.4 - 195.0	Brown sandstone.
195.0 - 196.9	Light brown laminated shaly sandstone.
196.9 - 201.0	Dark brown sandstone.
201.0 - 210.5	Dark carbonaceous slightly shaly sandstone.
210.5 - 211.4	Coal.
211.4 - 211.6	Gray shale.

LABORATORY FLOODING TESTS

The upper portion of the sand in this core responded well, relative to the lower portion of the sand, to laboratory flooding tests, as a total overall recovery of 1,647 barrels of oil per acre was obtained from 17.1 feet of sand. The weighted average percent oil saturation was reduced from 44.3 to 38.9, or represents an average recovery of 5.4 percent. The weighted average effective permeability of the samples is 8.12 millidarcys, while the average initial fluid production pressure is 16.8 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 18 samples tested, 11 produced water and oil, and 7 samples produced water only. This indicates that approximately 61 percent of the sand represented by these samples is floodable pay sand.

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 4,040 barrels of oil per acre. This is an average recovery of 236 barrels per acre foot from 17.1 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	30.0 / 36.3
Average porosity, percent	23.3 / 24.2
Oil saturation after flooding, percent	38.9 / 37.5

Performance factor, percent, estimated	45.0
Net floodable sand, feet	17.1 /20.1

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Hickory Creek Oil Company Lease - S 21 Well No. HCO-123

3491.9 406.5 692 2524.7

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	178.5	20.1	56	35	91	873	149.	0.7	0.7	611	104.30
3	180.5	25.1	41	43	84	798	280.	1.4	2.1	1117	392.00
5	182.5	25.5	47	34	81	930	62.	0.5	2.6	465.	31.00
6	183.5	26.5	48	32	80	967	384.	1.4	4.0	1354	537.60
8	185.5	25.5	40	35	75	791	231.	1.4	5.4	1107	323.40
9	186.5	22.1	41	39	80	703	62.	2.3	7.7	1617	142.60
11	189.5	24.4	41	43	84	776	324.	2.0	9.7	1552	648.00
12	190.5	25.1	34	48	82	662	415.	1.1	10.8	728	456.50
13	192.5	19.8	36	47	83	553	60.	1.3	12.1	719	78.00
15	194.5	20.1	34	44	78	530	101.	1.6	13.7	848	161.60
17	196.5	17.8	36	41	77	497	5.1	1.9	15.6	944	9.69
19	198.5	21.7	49	34	83	825	101.	2.1	17.7	1733	212.10
21	200.5	23.0	48	34	82	857	118.	2.0	19.7	1714	236.00
23	202.5	22.8	47	29	76	831	9.4	2.0	21.7	1662	18.80
25	204.5	23.9	37	41	78	686	72.	2.0	23.7	1372	144.00
27	206.5	23.6	43	32	75	787	130.	2.0	25.7	1574	260.00
29	208.5	23.1	51	27	78	914	14.	2.0	27.7	1828	28.00
31	210.4	16.4	25	54	79	318	7.2	1.5	29.2	477	10.80

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Hickory Creek Oil Company Lease - Well No. HCO-123

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
178.3 - 190.0	9.7	224.6	2178.90
190.0 - 210.5	19.5	82.8	1614.99
178.3 - 210.5	29.2	129.9	3793.89

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
178.3 - 190.0	9.7	24.2	43.3	38.3	807	7,823
190.0 - 210.5	19.5	21.7	41.0	38.0	697	13,599
178.3 - 210.5	29.2	22.5	41.8	38.1	734	21,422

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Hickory Creek Oil Company Lease -521 Well No. HCO-123

Sample No.	Depth, Feet	Effective Porosity Percent	Original Oil Saturation		Oil Recovery		Residual Saturation			Volume of Water Recovered cc*	127.03 Effective Permeability Millidarcys**	Initial Fluid Production Pressure Lbs./Sq./In.
			%	Bbls./A. Ft.	%	Bbls./A. Ft.	% Oil	% Water	Bbls./A. Ft.			
1	178.5	20.4	56	886	19	301	37	53	585	332	9.00	10
3	180.5	25.2	41	802	3	59	38	52	743	210	19.49	10
5	182.5	25.1	47	915	7	136	40	55	779	249	4.65	20
6	183.5	26.4	48	983	11	225	37	60	758	200	3.75	20
8	185.5	25.7	40	798	3	60	37	59	738	220	26.99	10
9	186.5	22.2	41	706	5	86	36	57	620	339	5.70	20
11	189.5	24.3	41	773	2	38	39	60	735	282	4.20	15
12	190.5	24.9	34	657	0	0	34	63	657	232	8.25	20
13	192.5	19.7	36	550	2	31	34	64	519	92	1.20	25
15	194.5	20.3	34	535	0	0	34	64	535	219	3.97	20
17	196.5	18.2	35	454	0	0	35	37	454	270	10.92	15
19	198.5	22.2	48	827	11	189	37	60	638	330	9.42	15
21	200.5	22.7	48	845	2	35	46	52	810	419	7.95	15
23	202.5	22.6	47	824	3	53	44	49	771	55	0.60	25
25	204.5	23.4	38	690	0	0	38	58	690	513	7.35	15
27	206.5	23.4	43	781	0	0	43	46	781	186	2.70	20
29	208.5	23.0	31	553	0	0	31	60	553	60	0.67	20
31	210.4	16.9	24	315	0	0	24	71	315	20	0.22	30

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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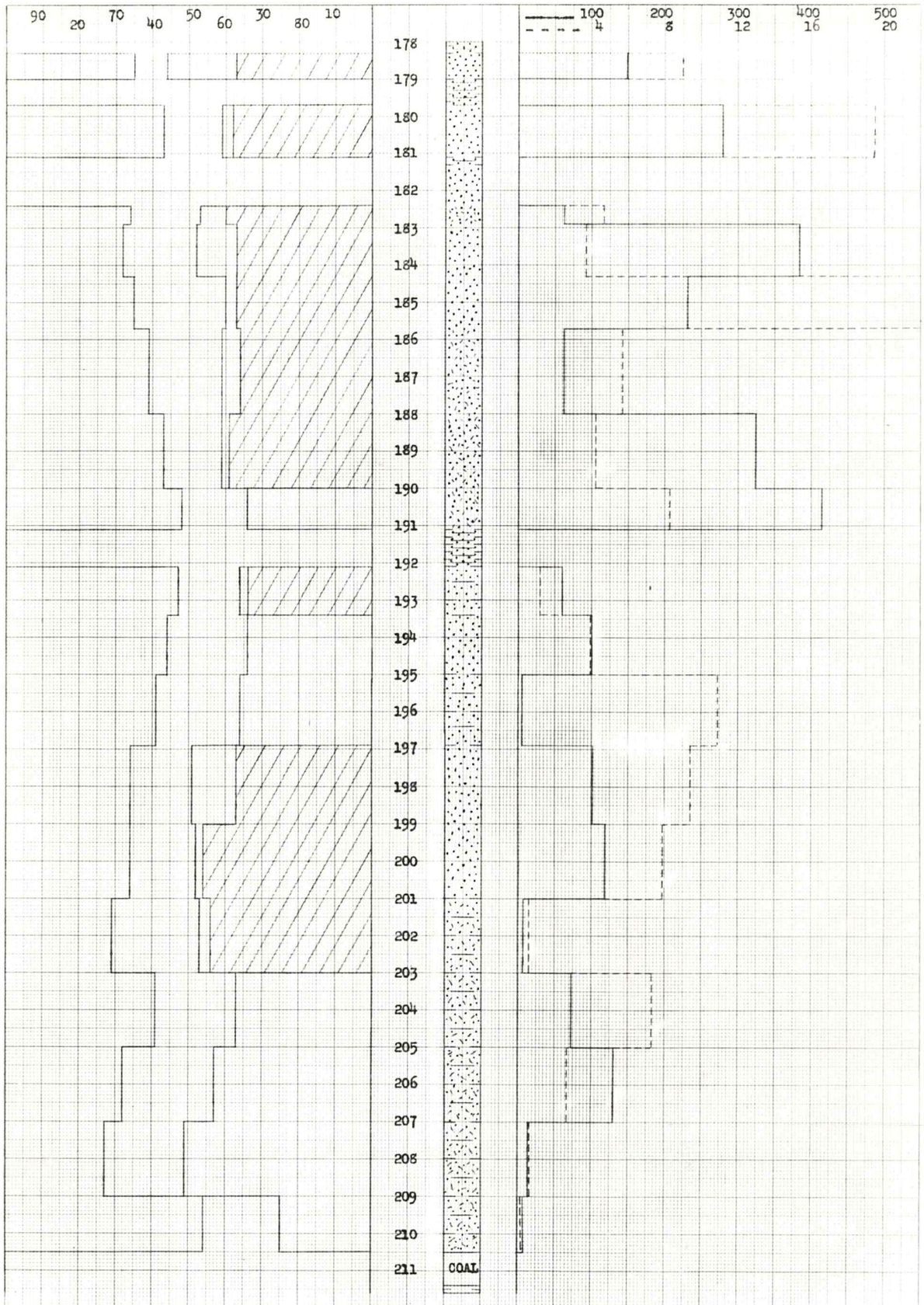
SUMMARY OF LABORATORY FLOODING TESTS

TABLE V

Company Hickory Creek Oil Company Lease - Well No. HCO-123

Depth Interval, Feet	178.3 - 190.0	190.0 - 210.5	178.3 - 210.5
Feet of Core Analyzed	9.7	7.4	17.1
Average Percent Porosity	24.2	22.0	23.3
Average Percent Original Oil Saturation	43.3	45.6	44.3
Average Percent Oil Recovery	5.8	4.8	5.4
Average Percent Residual Oil Saturation	37.5	40.8	38.9
Average Percent Residual Water Saturation	58.3	55.6	57.1
Average Percent Total Residual Fluid Saturation	95.8	96.4	96.0
Average Original Oil Content, Bbls./A. Ft.	811.	783.	798.
Average Oil Recovery, Bbls./A. Ft.	107.	83.	96.
Average Residual Oil Content, Bbls./A. Ft.	704.	700.	702.
Total Original Oil Content, Bbls./Acre	7,864.	5,789.	13,653.
Total Oil Recovery, Bbls./Acre	1,034.	613.	1,647.
Total Residual Oil Content, Bbls./Acre	6,830.	5,176.	12,006.
Average Effective Permeability, Millidarcys	10.36	5.19	8.12
Average Initial Fluid Production Pressure, p.s.i.	15.0	20.0	16.8

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



HICKORY CREEK OIL COMPANY

— LEASE WELL NO. H00 - 123

— 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
178.3 - 190.0	9.7	24.2	43.3	38.3	224.6	
190.0 - 210.5	19.5	21.7	41.0	38.0	82.8	
178.3 - 210.5	29.2	22.5	41.8	38.1	129.9	4,040 (PRIMARY & WATERFLOODING)

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CHANUTE, KANSAS
MARCH, 1950. HR