OILFIELD RESEARCH LABORATORIES

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

May 31, 1979

Hickory Creek Oil Company
1128 Main
Parsons, Kansas 67357

Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core taken from the Long Lease, Well No. 5, Crawford County, Kansas, and submitted to our laboratory on May 19, 1979.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Benjamin R. Pearman

BRP:cgb
4 c to Parsons, Kansas
1 c to Chanute, Kansas

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GENERAL INFORMATION & SUMMARY

Company Hickory Creek Oil Company Lease Long Well No. 5

Location NW NW

Section 26 Twp. 30S Rge. 21E County Crawford State Kansas

Name of Sand	Skinner
Top of Core	196.0
Bottom of Core	215.5
Top of Sand	196.0
Bottom of Sand	215.5
Total Feet of Permeable Sand	19.5
Total Feet of Floodable Sand	6.0

Distribution of Permeable Sand:

Permeability Range Millidarcys	Feet	Cum. Ft.
28 - 95	7.0	7.0
100 - 200	7.5	14.5
200 & Above	5.0	19.5

Average Permeability Millidarcys	146.5
Average Percent Porosity	22.6
Average Percent Oil Saturation	32.2
Average Percent Water Saturation	54.7
Average Oil Content, Bbls./A. Ft.	577.
Total Oil Content, Bbls./Acre	11,241.
Average Percent Oil Recovery by Laboratory Flooding Tests	2.7
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	47.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	284.
Total Calculated Oil Recovery, Bbls./Acre (Primary & Waterflooding)	1,740.
Packer Setting, Feet	
Viscosity, Centipoises @	
A. P. I. Gravity, degrees @ 60 °F	
Elevation, Feet	

Fresh water mud was used as the circulating fluid while taking this core. The core was sampled and the samples sealed in plastic bags by a representative of the client. The well was reportedly drilled in virgin territory.

FORMATION CORED

The detailed log of the formation cored is as follows:

Depth Interval, Feet	Description
196.0 - 215.5	Brown sandstone containing widely scattered thin carbonaceous partings.

LABORATORY FLOODING TESTS

The sand in this core responded poorly to laboratory flooding tests, as a total recovery of 284 barrels of oil per acre was obtained from 6.0 feet of sand. The weighted average percent oil saturation was reduced from 34.4 to 31.7, or represents an average recovery of 2.7 percent. The weighted average effective permeability of the samples is 15.16 millidarcys, while the average initial fluid production pressure is 10.0 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 20 samples tested, all produced water and 6 oil.

CALCULATED RECOVERY

A study of the laboratory data indicates that efficient primary and waterflooding operations in the vicinity of this well should recover approximately 1,740 barrels of oil per acre. This is an average recovery of 290 barrels per acre foot from the 6.0 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	30.0
Average porosity, percent	22.9
Oil saturation after flooding, percent	31.7
Performance factor, percent	45.0
Net floodable sand, feet	6.0

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Hickory Creek Oil Company **Lease** Long **Well No.** 5

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	196.5	24.6	22	64	86	420	276.	1.0	1.0	420	276.00
2	197.5	24.5	33	48	81	627	244.	1.0	2.0	621	244.00
3	198.5	24.0	36	42	78	670	83.	1.0	3.0	670	83.00
4	199.5	24.0	33	55	88	614	292.	1.0	4.0	614	292.00
5	200.5	24.8	34	58	92	654	106.	1.0	5.0	654	106.00
6	201.5	24.7	32	57	89	613	247.	1.0	6.0	613	247.00
7	202.5	23.8	32	56	88	591	189.	1.0	7.0	591	189.00
8	203.5	22.9	30	57	87	533	220.	1.0	8.0	533	220.00
9	204.5	22.9	28	61	89	497	73.	1.0	9.0	497	73.00
10	205.5	23.9	27	60	87	501	107.	1.0	10.0	501	107.00
11	206.5	21.7	31	57	88	522	156.	1.0	11.0	522	156.00
12	207.5	24.5	27	59	86	513	178.	1.0	12.0	513	178.00
13	208.5	23.2	31	57	88	558	192.	1.0	13.0	558	192.00
14	209.5	20.3	33	55	88	520	101.	1.0	14.0	520	101.00
15	210.5	21.2	38	48	86	625	58.	1.0	15.0	625	58.00
16	211.5	19.8	38	58	96	584	71.	1.0	16.0	584	71.00
17	212.5	23.7	36	47	83	662	28.	1.0	17.0	662	28.00
18	213.5	21.7	32	55	87	539	81.	1.0	18.0	539	81.00
19	214.5	23.2	25	55	80	450	95.	1.0	19.0	450	95.00
20	215.4	24.2	59	35	94	1108	118.	0.5	19.5	554	59.00

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Hickory Creek Oil Company Lease Long Well No. 5

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
196.0 - 205.0	9.0	192.2	1730.00
205.0 - 215.5	10.5	107.2	1126.00
196.0 - 215.5	19.5	146.5	2856.00

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
196.0 - 205.0	9.0	24.0	31.1	55.3	580	5,213
205.0 - 215.5	10.5	22.4	33.0	54.1	574	6,028
196.0 - 215.5	19.5	22.6	32.2	54.7	577	11,241

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Hickory Creek Oil Company Lease Long Well No. 5

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	196.5	24.5	24	456	0	0	24	76	456	267	12.72	10
2	197.5	24.0	33	614	3	56	30	69	558	488	20.42	10
3	198.5	24.0	36	669	0	0	36	64	669	201	11.91	10
4	199.5	23.6	33	604	0	0	33	65	604	419	20.65	10
5	200.5	25.3	34	666	2	39	32	60	627	375	20.35	10
6	201.5	24.5	32	608	0	0	32	68	608	420	18.80	10
7	202.5	24.1	31	579	0	0	31	68	579	259	13.93	10
8	203.5	23.2	30	540	0	0	30	69	540	309	15.09	10
9	204.5	23.1	31	555	0	0	31	68	555	365	16.03	10
10	205.5	23.8	29	535	0	0	29	71	535	298	14.48	10
11	206.5	22.0	31	529	0	0	31	69	529	304	15.54	10
12	207.5	24.0	27	502	0	0	27	71	502	279	14.48	10
13	208.5	23.4	32	580	0	0	32	63	580	343	10.52	10
14	209.5	20.7	33	529	3	48	30	69	481	263	7.91	10
15	210.5	21.7	38	639	2	34	36	63	605	267	24.40	10
16	211.5	20.1	38	591	0	0	38	62	591	175	8.36	10
17	212.5	23.5	36	655	4	73	32	67	582	212	4.65	10
18	213.5	22.0	32	546	2	34	30	60	512	424	13.12	10
19	214.5	22.8	27	478	0	0	27	73	478	319	11.63	10
20	215.4	24.0	59	1099	0	0	59	41	1099	418	5.85	10

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 Long Well No. 5

Depth Interval, Feet	196.0 - 215.5
Feet of Core Analyzed	6.0
Average Percent Porosity	22.9
Average Percent Original Oil Saturation	34.4
Average Percent Oil Recovery	2.7
Average Percent Residual Oil Saturation	31.7
Average Percent Residual Water Saturation	64.6
Average Percent Total Residual Fluid Saturation	96.3
Average Original Oil Content, Bbls./A. Ft.	608.
Average Oil Recovery, Bbls./A. Ft.	47.
Average Residual Oil Content, Bbls./A. Ft.	561.
Total Original Oil Content, Bbls./Acre	3,649.
Total Oil Recovery, Bbls./Acre	284.
Total Residual Oil Content, Bbls./Acre	3,365.
Average Effective Permeability, Millidarcys	15.16
Average Initial Fluid Production Pressure, p.s.i.	10.0

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