OILFIELD RESEARCH LABORATORIES

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

15-133-21231

September 28, 1979

Hickory Creek Oil Company
1128 Main
Parsons, Kansas 67357

Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core, Well No. HCO-41, and submitted to our laboratory on September 21, 1979.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Benjamin R. Pearman

Benjamin R. Pearman

SAM:cgb

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-41

Location –

Section – Twp – Rge – County – State –

Name of Sand	–
Top of Core	178.0
Bottom of Core	198.6
Top of Sand	178.0
Bottom of Sand	198.6
Total Feet of Permeable Sand	20.3
Total Feet of Floodable Sand	17.6

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.
30 – 100	7.3	7.3
100 – 200	3.2	10.5
200 – 300	8.8	19.3
300 – 400	1.0	20.3

Average Permeability Millidarcys	164.5
Average Percent Porosity	22.9
Average Percent Oil Saturation	47.4
Average Percent Water Saturation	27.1
Average Oil Content, Bbls./A. Ft.	851.
Total Oil Content, Bbls./Acre	17,267.
Average Percent Oil Recovery by Laboratory Flooding Tests	9.1
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	168.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	12,921.
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

The detailed log of the formation cored is as follows:

Depth Interval, Feet	Description
178.0 - 183.0	Dark brown sandstone.
183.0 - 183.7	Grayish brown slightly shaly sandstone.
183.7 - 184.7	Dark brown sandstone with carbonaceous streaks.
184.7 - 186.2	Dark brown sandstone.
186.2 - 186.8	Brown slightly shaly sandstone.
186.8 - 188.3	Dark brown sandstone.
188.3 - 190.0	Brown slightly carbonaceous sandstone.
190.0 - 194.1	Dark brown sandstone.
194.1 - 195.1	Dark brown slightly carbonaceous sandstone.
195.1 - 195.4	Gray very shaly sandstone.
195.4 - 196.1	Dark brown sandstone.
196.1 - 196.7	Dark brown slightly carbonaceous sandstone.
196.7 - 198.6	Dark brown sandstone.

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 2,951 barrels of oil per acre was obtained from 17.6 feet of sand. The weighted average percent oil saturation was reduced from 49.2 to 40.1, or

represents an average recovery of 9.1 percent. The weighted average effective permeability of the samples is 10.68 millidarcys, while the average initial fluid production pressure is 17.5 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 21 samples tested, 18 produced water and oil, and 2 samples produced water only. This indicates that approximately 86 percent of the sand represented by these samples is floodable pay sand.

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 7,660 barrels of oil per acre. This is an average recovery of 435 barrels per acre foot from 17.6 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	10.0 / 15.0
Average porosity, percent	23.7 / 24.4
Oil saturation after flooding, percent	40.1 / 39.6
Performance factor, percent	50.0
Net floodable sand, feet	17.6 / 5.0

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Hickory Creek Oil Company Lease G-14 Well No. HCO-41

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	24.3	57	12	69	1075	280.	1.0	1.0	1075	280.00
2	179.5	25.8	40	15	55	801	384.	1.0	2.0	801	384.00
3	180.5	24.3	67	18	85	1263	146.	1.0	3.0	1263	146.00
4	181.5	23.7	61	15	76	1122	284.	1.0	4.0	1122	284.00
5	182.5	23.2	61	15	76	1098	216.	1.0	5.0	1098	216.00
6	183.5	13.8	17	75	92	182	78.	0.7	5.7	127	54.60
7	184.5	22.6	44	24	68	772	40.	1.0	6.7	772	40.00
8	185.5	25.4	45	26	71	887	260.	1.5	8.2	1331	390.00
9	186.5	21.9	47	31	78	799	13.	0.6	8.8	479	7.80
10	187.5	23.2	45	28	73	810	111.	1.5	10.3	1215	166.50
11	188.5	20.7	50	31	81	803	31.	0.7	11.0	562	21.70
12	189.2	22.3	41	31	72	709	30.	1.0	12.0	709	30.00
13	190.5	23.3	50	25	75	904	216.	1.0	13.0	904	216.00
14	191.2	23.0	46	30	76	821	221.	1.0	13.0	821	221.00
15	192.4	19.4	44	35	79	662	56.	1.0	15.0	662	56.00
16	193.5	24.1	46	27	73	860	60.	1.1	16.1	946	66.00
17	194.5	24.9	47	27	74	908	256.	1.0	17.1	908	256.00
18	195.5	23.3	42	31	73	759	138.	0.7	17.8	531	96.60
19	196.5	22.3	48	26	74	830	86.	0.6	18.4	498	51.60
20	197.3	22.4	44	31	75	765	247.	1.3	19.7	995	321.10
21	198.3	20.9	46	35	81	746	58.	0.6	20.3	448	34.80
	3957.4	474.8		588			3211				

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Hickory Creek Oil Company Lease - Well No. HCO-41

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
178.0 - 186.8	8.8	204.8	1802.40
186.8 - 198.6	11.5	133.7	1537.30
178.0 - 198.6	20.3	164.5	3339.70

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
178.0 - 186.8	8.8	23.3	49.7	23.8	917	8,068
186.8 - 198.6	11.5	22.6	45.6	29.6	800	9,199
178.0 - 198.6	20.3	22.9	47.4	27.1	851	17,267

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Hickory Creek Oil Company Lease - GRAY #14 Well No. HCO-41

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	178.5	24.0	57	1061	20	372	37	59	689	269	16.60	15
2	179.5	25.4	40	788	4	79	36	51	709	207	11.78	10
3	180.5	24.7	67	1284	26	498	41	53	786	332	28.73	10
4	181.5	24.1	61	1141	24	449	37	60	692	330	29.36	10
5	182.5	23.7	61	1122	24	441	37	58	681	181	22.49	10
6	183.5	14.0	17	185	0	0	17	77	185	91	2.62	25
7	184.5	23.0	44	785	7	125	37	57	660	285	6.52	15
8	185.5	25.8	45	901	6	120	39	60	781	236	12.32	15
9	186.5	22.2	47	809	13	224	34	59	585	128	3.22	20
10	187.5	23.2	45	810	3	54	42	50	756	80	1.87	25
11	188.5	20.6	50	799	8	128	42	43	671	17	0.45	35
12	189.2	22.1	41	703	0	0	41	55	703	5	0.10	50
13	190.5	23.5	50	912	8	146	42	56	766	239	9.16	20
14	191.2	23.4	46	835	4	73	42	54	762	223	8.50	15
15	192.4	19.4	44	662	0	0	44	40	662	0	Imp.	-
16	193.5	24.2	46	864	4	75	42	54	789	394	6.67	20
17	194.5	25.1	47	915	3	58	44	53	857	419	7.00	15
18	195.5	23.8	42	775	3	55	39	58	720	273	10.66	20
19	196.5	22.0	48	819	4	68	44	52	751	64	2.40	25
20	197.3	22.2	44	758	2	34	42	54	724	420	7.50	20
21	198.3	21.2	46	749	2	33	44	53	716	489	8.16	15
							11.6.5 08 65 9.6	823			196.11	

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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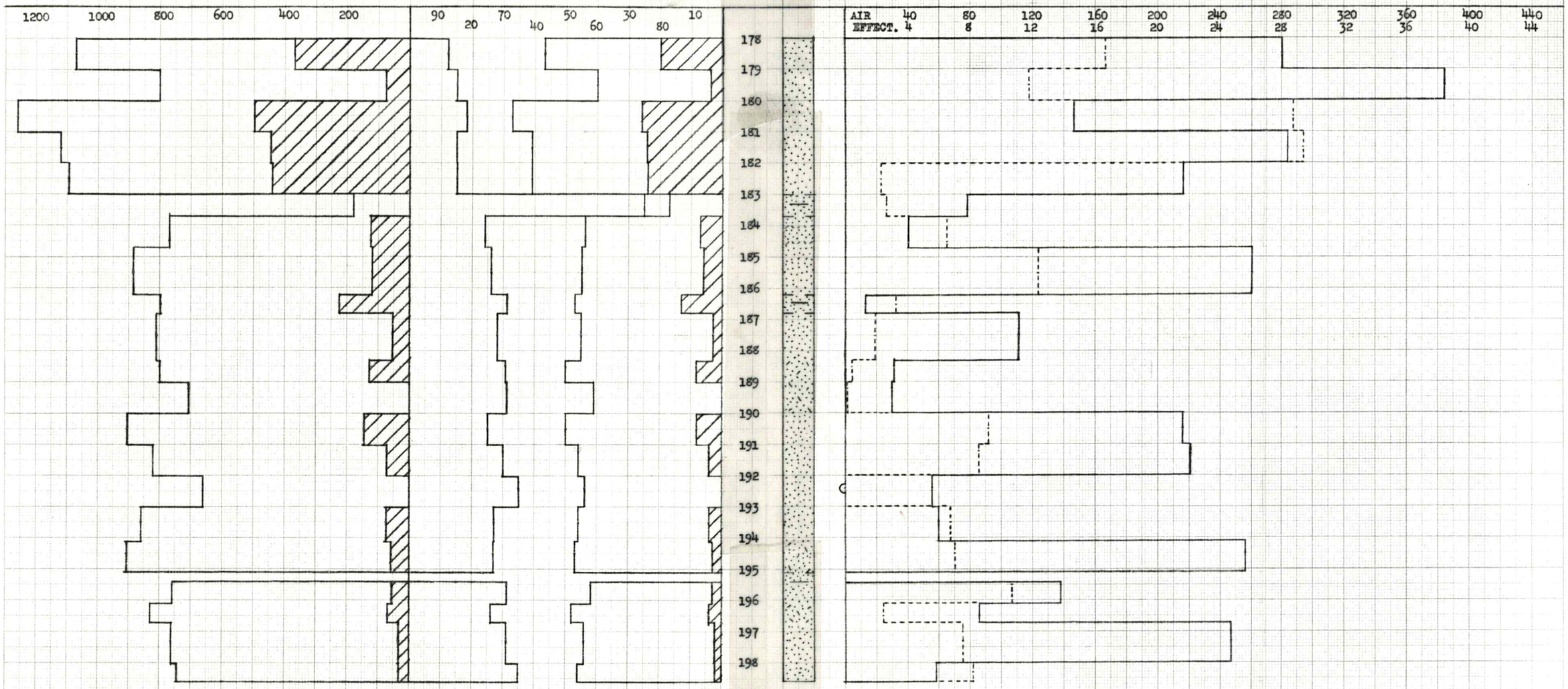
SUMMARY OF LABORATORY FLOODING TESTS

TABLE V

Company Hickory Creek Oil Company Lease - Well No. HCO-41

Depth Interval, Feet	178.0 - 186.8	186.8 - 198.6	178.0 - 198.6
Feet of Core Analyzed	8.1	9.5	17.6
Average Percent Porosity	24.3	23.1	23.7
Average Percent Original Oil Saturation	52.5	46.2	49.2
Average Percent Oil Recovery	15.0	4.0	9.1
Average Percent Residual Oil Saturation	37.5	42.2	40.1
Average Percent Residual Water Saturation	57.2	52.8	54.8
Average Percent Total Residual Fluid Saturation	95.2	94.0	94.9
Average Original Oil Content, Bbls./A. Ft.	990.	827.	902.
Average Oil Recovery, Bbls./A. Ft.	281.	71.	168.
Average Residual Oil Content, Bbls./A. Ft.	709.	756.	734.
Total Original Oil Content, Bbls./Acre	8,017.	7,855.	15,872.
Total Oil Recovery, Bbls./Acre	2,278.	673.	2,951.
Total Residual Oil Content, Bbls./Acre	5,739.	7,182.	12,921.
Average Effective Permeability, Millidarcys	15.97	6.18	10.68
Average Initial Fluid Production Pressure, p.s.i.	13.1	22.1	17.5

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



HICKORY CREEK OIL COMPANY

— LEASE WELL NO. HCO-41

— COUNTY, —

DEPTH INTERVAL, FEET	FEET OF CORE ANALYZED	AVERAGE PERCENT POROSITY	AVG. OIL SATURATION PERCENT	AVG. WATER SATURATION PERCENT	AVG. OIL CONTENT BBLS./A.FT.	TOTAL OIL CONTENT BBLS./ACRE	AVG. AIR PERMEABILITY, MILLIDARCYS	CALCULATED OIL RECOVERY, BBLS./ACRE
178.0 - 186.8	8.8	23.3	49.7	23.8	917	8,068	204.8	
186.8 - 198.6	11.5	22.6	45.6	29.6	800	9,199	133.7	
178.0 - 198.6	20.3	22.9	47.4	27.1	851	17,267	164.5	7,660 (PRIMARY & WATERFLOODING)

OILFIELD RESEARCH LABORATORIES
CHANUTE, KANSAS
SEPTEMBER, 1979 BL