

HICKORY CREEK OIL COMPANY

CORE ANALYSIS REPORT

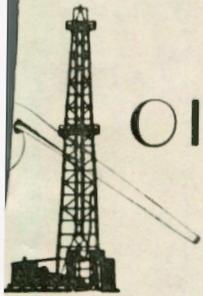
WELL NO. HCO-152

Devlin #51

OILFIELD RESEARCH LABORATORIES.

536 N. HIGHLAND

CHANUTE, KANSAS



OILFIELD RESEARCH LABORATORIES

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

May 19, 1980

Hickory Creek Oil Company
P.O. Box 379
Parsons, Kansas 67357

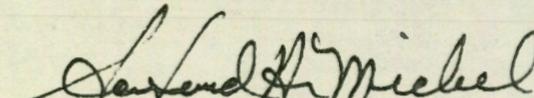
Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core taken from Well No. HCO-152, and submitted to our laboratory on April 10, 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

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GENERAL INFORMATION & SUMMARY

Company Hickory Creek Oil Company Lease - Well No. HCO-152

Location -

Section - Twp. - Rge. - County - State -

Elevation, Feet	-
Name of Sand	-
Top of Core	167.0
Bottom of Core	207.3
Top of Sand	173.4
Bottom of Sand	207.3
Total Feet of Permeable Sand	27.8
Total Feet of Floodable Sand	8.0

Distribution of Permeable Sand:
Permeability Range
Millidarcys

Feet

Cum. Ft.

	Feet	Cum. Ft.
0 - 5	9.4	9.4
5 - 10	7.9	17.3
10 - 50	6.0	23.3
50 - 100	4.5	27.8

Average Permeability Millidarcys	16.7
Average Percent Porosity	18.4
Average Percent Oil Saturation	45.0
Average Percent Water Saturation	40.9
Average Oil Content, Bbls./A. Ft.	629.
Total Oil Content, Bbls./Acre	17,476.
Average Percent Oil Recovery by Laboratory Flooding Tests	8.2
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	129.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	1,030.
Total Calculated Oil Recovery, Bbls./Acre	See "Calculated Recovery" Section.

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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:

<u>Depth Interval, Feet</u>	<u>Description</u>
167.0 - 173.4	Gray sandy shale.
173.4 - 175.0	Grayish brown shaly sandstone.
175.0 - 176.8	Brown and gray laminated sandstone and shale.
176.8 - 179.7	Dark brown slightly calcareous sandstone.
179.7 - 182.1	Grayish brown slightly calcareous shaly sandstone.
182.1 - 184.3	Gray laminated sandstone and shale.
184.3 - 186.2	Brown shaly slightly calcareous sandstone.
186.2 - 187.2	Brown slightly shaly slightly calcareous sandstone.
187.2 - 190.0	Brown shaly slightly calcareous sandstone.
190.0 - 191.1	Brown slightly calcareous sandstone.
191.1 - 191.7	Brown shaly sandstone.
191.7 - 193.0	Brown slightly calcareous sandstone.
193.0 - 194.3	Grayish brown shaly sandstone.
194.3 - 195.4	Brown slightly calcareous sandstone.
195.4 - 196.2	Brown slightly calcareous shaly sandstone.
196.2 - 199.3	Brown slightly calcareous sandstone.
199.3 - 203.2	Gray sandy shale.
203.2 - 207.3	Light brown shaly sandstone.

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LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 1,030 barrels of oil per acre was obtained from 8.0 feet of sand. The weighted average percent oil saturation was reduced from 49.0 to 40.8, or represents an average recovery of 8.2 percent. The weighted average effective permeability of the samples is 3.29 millidarcys, while the average initial fluid production pressure is 31.9 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 27 samples tested, 8 produced water and oil, and 4 samples produced water only. This indicates that approximately 30 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 2,640 barrels of oil per acre. This is an average recovery of 330 barrels per acre foot from 8.0 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	15.0 / 29.7

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Hickory Creek Oil Company Lease - D 51 Well No. HCO-152

5114.5 497.0 1097 434.15

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	13.6	9	51	60	95	4.5	0.6	0.6	57	2.70
2	174.5	13.6	25	59	84	264	0.17	1.0	1.6	264	0.17
3	176.5	17.2	47	44	91	627	1.6	1.8	3.4	1129	2.88
4	177.5	12.6	21	76	97	205	59.	1.2	4.6	246	70.80
5	178.5	21.1	52	23	75	851	69.	1.0	5.6	251	69.00
6	179.5	17.0	38	44	82	501	17.	0.7	6.3	351	11.90
7	180.5	18.5	48	39	87	689	9.9	1.0	7.3	689	9.90
8	181.5	19.4	60	35	95	903	8.9	1.4	8.7	1264	12.46
9	184.5	18.5	46	41	87	660	5.3	0.7	9.4	462	3.71
10	185.5	16.8	58	38	96	756	5.4	1.2	10.6	907	6.48
11	186.5	17.1	42	36	78	557	12.	1.0	11.6	557	12.00
12	187.5	19.0	45	39	84	663	5.2	0.8	12.4	530	4.16
13	188.5	19.2	57	27	84	849	7.7	1.0	13.4	849	7.70
14	189.5	18.8	55	28	83	802	1.9	1.0	14.4	802	1.90
15	190.5	20.1	60	20	80	936	28.	1.1	15.5	1030	30.80
16	191.5	20.8	58	21	79	936	3.8	0.6	16.1	582	2.28
17	192.5	21.3	56	31	87	925	22.	1.3	17.4	1203	28.60
18	193.5	17.5	41	51	92	557	0.89	1.3	18.7	724	1.16
19	194.5	16.4	47	41	88	598	27.	1.1	19.8	658	29.70
20	195.5	18.6	43	42	85	621	6.1	0.8	20.6	497	4.88
21	196.5	20.9	46	36	82	746	20.	0.8	21.4	597	16.00
22	197.5	22.2	44	41	85	758	55.	1.0	22.4	758	55.00
23	198.5	21.4	37	36	73	614	51.	1.3	23.7	798	66.30
24	203.5	17.9	38	50	88	528	0.51	0.8	24.5	422	0.41
25	204.5	20.1	34	55	89	530	3.8	1.0	25.5	530	3.80
26	205.5	20.6	37	46	83	591	7.5	1.0	26.5	591	7.50
27	206.5	16.8	43	47	90	560	0.98	1.3	27.8	728	1.27

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Hickory Creek Oil Company Lease - Well No. HCO-152

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
173.4 - 182.1	8.7	20.7	179.81
184.3 - 207.3	19.1	14.9	283.65
173.4 - 207.3	27.8	16.7	463.46

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
173.4 - 182.1	8.7	16.6	40.3	46.2	489	4,251
184.3 - 207.3	19.1	19.0	47.2	38.5	692	13,225
173.4 - 207.3	27.8	18.4	45.0	40.9	629	17,476

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Hickory Creek Oil Company Lease - D51 Well No. HCO-152

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.			
							1118				26.30	
1	173.5	13.2	10	102	0	0	10	81	102	6	0.20	50
2	174.5	13.8	24	257	0	0	24	73	257	0	Imp.	-
3	176.5	17.5	47	638	0	0	47	45	638	0	Imp.	-
4	177.5	12.5	21	204	0	0	21	77	204	13	0.30	20
5	178.5	20.9	52	843	20	324	32	66	519	336	8.80	20
6	179.5	17.3	38	510	3	40	35	52	470	9	0.20	45
7	180.5	18.6	48	693	14	202	34	55	491	15	0.30	35
8	181.5	19.2	60	894	0	0	60	31	894	0	Imp.	-
9	184.5	18.8	46	671	0	0	46	45	671	0	Imp.	-
10	185.5	17.0	58	765	0	0	58	40	765	0	Imp.	-
11	186.5	17.0	42	554	0	0	42	37	554	0	Imp.	-
12	187.5	19.0	45	663	0	0	45	40	663	0	Imp.	-
13	188.5	18.9	58	850	0	0	58	28	850	0	Imp.	-
14	189.5	19.0	55	811	0	0	55	34	811	0	Imp.	-
15	190.5	20.1	60	936	11	172	49	42	764	28	0.50	35
16	191.5	20.6	58	927	9	144	49	48	783	27	0.50	35
17	192.5	21.2	56	921	5	82	51	44	839	40	0.70	35
18	193.5	18.0	40	559	0	0	40	53	559	0	Imp.	-
19	194.5	16.6	47	605	0	0	47	43	605	11	0.20	45
20	195.5	19.0	42	619	0	0	42	45	619	0	Imp.	-
21	196.5	20.6	46	735	0	0	46	49	735	17	0.30	45
22	197.5	22.0	44	751	3	51	41	53	700	253	11.00	25
23	198.5	21.1	37	606	2	33	35	59	573	123	3.30	25
24	203.5	18.0	38	531	0	0	38	52	531	0	Imp.	-
25	204.5	20.0	34	528	0	0	34	55	528	0	Imp.	-
26	205.5	20.4	37	586	0	0	37	48	586	0	Imp.	-
27	206.5	17.1	42	557	0	0	42	49	557	0	Imp.	-

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.

SOR
= 41.7

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SUMMARY OF LABORATORY FLOODING TESTS

TABLE V

Company	Lease		Well No.
Hickory Creek Oil Company	-		HCO-152
Depth Interval, Feet	173.4 - 182.1	184.3 - 207.3	173.4 - 207.3
Feet of Core Analyzed	2.7	5.3	8.0
Average Percent Porosity	19.1	21.0	20.4
Average Percent Original Oil Saturation	46.9	50.2	49.0
Average Percent Oil Recovery	13.4	5.6	8.2
Average Percent Residual Oil Saturation	33.5	44.6	40.8
Average Percent Residual Water Saturation	58.3	49.4	52.4
Average Percent Total Residual Fluid Saturation	91.8	94.0	93.2
Average Original Oil Content, Bbls./A. Ft.	701.	816.	777.
Average Oil Recovery, Bbls./A. Ft.	205.	90.	129.
Average Residual Oil Content, Bbls./A. Ft.	496.	726.	648.
Total Original Oil Content, Bbls./Acre	1,893.	4,322.	6,215.
Total Oil Recovery, Bbls./Acre	554.	476.	1,030.
Total Residual Oil Content, Bbls./Acre	1,339.	3,846.	5,185.
Average Effective Permeability, Millidarcys	3.42	3.22	3.29
Average Initial Fluid Production Pressure, p.s.i.	33.2	31.0	31.9

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