

HICKORY CREEK OIL COMPANY

CORE ANALYSIS REPORT

WELL NO. HCO-109

W. Berlin 38



OILFIELD RESEARCH LABORATORIES

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February 18, 1980

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

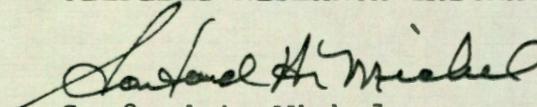
Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core taken from Well No. HCO-109, and submitted to our laboratory on January 21, 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

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GENERAL INFORMATION & SUMMARY

Company Hickory Creek Oil Company Lease --- Well No. HCO-109

Location ---

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

Elevation, Feet - - - - -

Name of Sand - - - - -

Top of Core - - - - - 169.0

Bottom of Core - - - - - 209.2

Top of Sand - - - - - 169.5

Bottom of Sand - - - - - (Tested) 207.8

Total Feet of Permeable Sand - - - - - 14.5

Total Feet of Floodable Sand - - - - - 5.4

Distribution of Permeable Sand:
Permeability Range
Millidarcys

Feet

Cum. Ft.

0 - 5	7.1	7.1
5 - 10	3.0	10.1
20 - 30	4.4	14.5

Average Permeability Millidarcys - - - - - 10.1

Average Percent Porosity - - - - - 16.8

Average Percent Oil Saturation - - - - - 34.8

Average Percent Water Saturation - - - - - 46.5

Average Oil Content, Bbls./A. Ft. - - - - - 467.

Total Oil Content, Bbls./Acre - - - - - 7,054.

Average Percent Oil Recovery by Laboratory Flooding Tests - - - - - 4.5

Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft. - - - - - 68.

Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre - - - - - 365.

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>
169.0 - 169.5	Gray sandy shale.
169.5 - 170.7	Brown shaly sandstone.
170.7 - 171.7	Brown and gray laminated sandstone and shale.
171.7 - 173.7	Gray sandy shale with sandstone partings.
173.7 - 175.5	Brown slightly shaly sandstone.
175.5 - 176.5	Gray sandy shale.
176.5 - 176.9	Brown shaly sandstone.
176.9 - 177.3	Gray sandy shale.
187.5 - 189.4	Brown shaly sandstone.
189.4 - 190.2	Gray sandy shale.
190.2 - 191.6	Brown shaly sandstone.
191.6 - 191.9	Gray sandy shale.
191.9 - 192.5	Brown shaly sandstone.
192.5 - 193.0	Gray sandy shale.
193.0 - 194.2	Brown and gray laminated sandstone and shale.
194.2 - 195.2	Brown shaly sandstone.
195.2 - 196.2	Gray sandy shale.

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196.2 - 197.4	Brown shaly sandstone.
197.4 - 197.8	Gray shale.
197.8 - 199.0	Brown shaly sandstone.
199.0 - 199.6	Gray sandy shale.
199.6 - 203.2	Brown sandstone.
203.2 - 206.6	Light brown sandstone.
206.6 - 207.2	Gray sandy shale.
207.2 - 207.8	Brown and gray laminated sandstone and shale.
207.8 - 209.2	Brown shaly sandstone.

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 365 barrels of oil per acre was obtained from 5.4 feet of sand. The weighted average percent oil saturation was reduced from 36.9 to 32.4, or represents an average recovery of 4.5 percent. The weighted average effective permeability of the samples is 0.38 millidarcys, while the average initial fluid production pressure is 41.3 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 1,500 barrels of oil per acre. This is an average recovery of 278 barrels per acre foot from 5.4 feet of floodable sand analyzed in this core.

These recovery values were calculated using the following data and assumptions:

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Original formation volume factor, estimated	✓ 1.03
Reservoir water saturation, percent, estimated	25.0 / 35.0
Average porosity, percent	19.7 / 19.4
Oil saturation after flooding, percent	32.4 / 34.0
Performance factor, percent, estimated	✓ 45.0
Net floodable sand, feet	5.4 / 3.0

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Hickory Creek Oil Company Lease - D 38 Well No. HCO-109

3002.7 262.3 763 121.28

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	169.6	16.0	42	39	81	521	5.9	0.5	0.5	261	2.95
2	170.5	17.9	49	27	76	681	6.1	0.7	1.2	477	4.27
3	171.5	11.6	18	79	97	162	1.2	1.0	2.2	162	1.20
4	174.5	19.1	49	28	77	726	10.	1.0	3.2	726	10.00
5	175.4	17.5	53	33	86	720	5.5	0.8	4.0	576	4.40
6	176.7	15.8	50	41	91	613	1.6	0.4	4.4	245	0.64
7	187.7	16.1	33	49	82	412	4.1	0.5	4.9	206	2.05
8	188.5	17.1	44	29	73	584	3.9	0.7	5.6	409	2.73
9	189.2	12.5	21	77	98	204	1.6	0.7	6.3	143	1.12
11	191.5	18.0	37	31	68	517	0.98	1.4	7.7	724	1.37
13	193.5	13.2	17	80	97	174	4.1	1.2	8.9	209	4.92
15	197.2	13.5	42	55	97	440	1.3	1.2	10.1	528	1.56
18	200.2	20.4	38	37	76	601	27.	1.0	11.1	601	27.00
21	203.7	18.8	34	40	74	496	23.	1.7	12.8	843	39.10
23	205.5	21.0	32	35	67	521	25.	1.7	14.5	886	42.50
25	207.5	13.8	9	83	92	96	Imp.	0.6	15.1	58	0.00

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Hickory Creek Oil Company Lease - Well No. HCO-109

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
169.5 - 176.9	4.4	5.3	23.46
187.5 - 207.8	10.1	12.1	122.53
169.5 - 207.8	14.5	10.1	145.99

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
169.5 - 176.9	4.4	16.3	42.0	41.6	556	2,447
187.5 - 207.8	10.7	17.1	31.8	48.5	431	4,607
169.5 - 207.8	15.1	16.8	34.8	46.5	467	7,054

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Hickory Creek Oil Company

Lease

- D38

Well No.

HCO-109

Sample No.	Depth, Feet	Effective Porosity Percent	Original Oil Saturation		Oil Recovery		547 Residual Saturation			Volume of Water Recovered cc*	1.46 Effective Permeability Millidarcys**	Initial Fluid Production Pressure Lbs./Sq./In.
			%	Bbls./A. Ft.	%	Bbls./A. Ft.	% Oil	% Water	Bbls./A. Ft.			
1	169.6	16.4	41	522	0	0	41	42	522	0	Imp.	-
2	170.5	18.0	49	684	0	0	49	30	684	0	Imp.	-
3	171.5	11.3	19	430	0	0	19	78	430	0	Imp.	-
4	174.5	18.8	49	715	14	204	35	56	511	0	0.04	40
5	175.4	17.1	54	716	0	0	54	35	716	0	Imp.	-
6	176.7	16.0	50	621	0	0	50	42	621	0	Imp.	-
7	187.7	16.3	32	405	0	0	32	53	405	0	Imp.	-
8	188.5	16.8	44	573	0	0	44	40	573	0	Imp.	-
9	189.2	12.0	23	214	0	0	23	75	214	0	Imp.	-
11	191.5	18.6	35	505	0	0	35	40	505	0	Imp.	-
13	193.5	13.2	17	174	0	0	17	70	174	0	Imp.	-
15	197.2	13.0	41	141	0	0	41	56	141	0	Imp.	-
18	200.2	20.4	38	601	2	32	36	51	569	20	0.60	45
21	203.7	19.0	34	501	3	44	31	57	457	32	0.45	40
23	205.5	20.6	32	511	2	32	30	58	479	31	0.37	40
25	207.5	13.3	10	103	0	0	10	86	103	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.

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SUMMARY OF LABORATORY FLOODING TESTS

TABLE V

Company	Hickory Creek Oil Company		Well No.	HCO-109
	Lease	-		
Depth Interval, Feet	169.5 - 176.9	187.5 - 207.8	169.5 - 207.8	
Feet of Core Analyzed	1.0	4.4	5.4	
Average Percent Porosity	18.8	19.9	19.7	
Average Percent Original Oil Saturation	49.0	34.2	36.9	
Average Percent Oil Recovery	14.0	2.4	4.5	
Average Percent Residual Oil Saturation	35.0	31.8	32.4	
Average Percent Residual Water Saturation	56.0	56.1	56.1	
Average Percent Total Residual Fluid Saturation	91.0	87.9	88.5	
Average Original Oil Content, Bbls./A. Ft.	715.	528.	563.	
Average Oil Recovery, Bbls./A. Ft.	204.	37.	68.	
Average Residual Oil Content, Bbls./A. Ft.	511.	491.	495.	
Total Original Oil Content, Bbls./Acre	715.	2,321.	3,036	
Total Oil Recovery, Bbls./Acre	204.	161.	365.	
Total Residual Oil Content, Bbls./Acre	511.	2,160.	2,671.	
Average Effective Permeability, Millidarcys	0.04	0.45	0.38	
Average Initial Fluid Production Pressure, p.s.i.	40.0	41.7	41.3	

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