

HICKORY CREEK OIL COMPANY

CORE ANALYSIS REPORT

WELL NO. HCO-133

*Section 48*

OILFIELD RESEARCH LABORATORIES

536 N. HIGHLAND

CHANUTE, KANSAS



# OILFIELD RESEARCH LABORATORIES

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

March 31, 1980

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

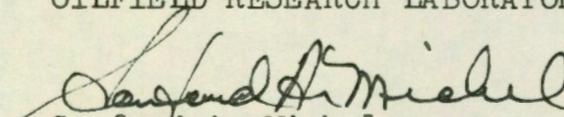
Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core taken from Well No. HCO-133, and submitted to our laboratory on March 4, 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

- REGISTERED ENGINEERS -

CORE ANALYSIS - WATER ANALYSIS - REPRESSURING ENGINEERING - SURVEYING & MAPPING - PROPERTY EVALUATION & OPERATION

# Oilfield Research Laboratories

## GENERAL INFORMATION & SUMMARY

Company Hickory Creek Oil Company Lease      Well No. HCO-133

Location     

Section      Twp.      Rge.      County      State     

Elevation, Feet	-
Name of Sand	-
Top of Core	175.0
Bottom of Core	255.3
Top of Sand	175.8
Bottom of Sand	248.0
	(Tested)
Total Feet of Permeable Sand	46.2
	(Tested)
Total Feet of Floodable Sand	9.8
	(Tested)

**Distribution of Permeable Sand:**  
Permeability Range  
Millidarcys

	Feet	Cum. Ft.
0 - 5	25.4	25.4
5 - 10	5.8	31.2
20 - 30	4.8	36.0
30 - 100	8.2	44.2
100 - 130	2.0	46.2

Average Permeability Millidarcys	19.3
Average Percent Porosity	19.0
Average Percent Oil Saturation	43.0
Average Percent Water Saturation	41.9
Average Oil Content, Bbls./A. Ft.	635.
Total Oil Content, Bbls./Acre	31,864.
Average Percent Oil Recovery by Laboratory Flooding Tests	4.0
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	67.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	652.
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:

<u>Depth Interval, Feet</u>	<u>Description</u>
175.0 - 175.8	Gray sandy shale.
175.8 - 176.8	Brown shaly sandstone.
176.8 - 184.0	Gray sandy shale.
184.0 - 191.6	Gray laminated sandstone and shale.
191.6 - 195.0	Brown shaly sandstone.
195.0 - 196.3	Gray laminated sandstone and shale.
196.3 - 197.2	Brown shaly sandstone.
197.2 - 200.2	Brown and gray laminated sandstone and shale.
200.2 - 201.8	Brownish gray conglomeratic shaly sandstone.
201.8 - 203.1	Gray sandy shale.
203.1 - 204.0	Brown shaly sandstone.
204.0 - 204.5	Gray sandy shale.
204.5 - 211.0	Grayish brown shaly sandstone.
211.0 - 223.0	Brown sandstone.
223.0 - 224.8	Light brown shaly sandstone.
224.8 - 228.8	Brown sandstone.
228.8 - 236.7	Brown and black carbonaceous shaly sandstone.
236.7 - 238.0	Gray sandy shale.
238.0 - 239.6	Brown shaly sandstone.
239.6 - 240.8	Gray sandy shale.

240.8 - 248.0	Brown carbonaceous slightly conglomeratic shaly sandstone.
248.0 - 255.3	Gray laminated sandstone and shale.

#### LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 652 barrels of oil per acre was obtained from 9.8 feet of sand. The weighted average percent oil saturation was reduced from 37.8 to 33.8, or represents an average recovery of 4.0 percent. The weighted average effective permeability of the samples is 6.17 millidarcys, while the average initial fluid production pressure is 16.0 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 33 samples tested, 5 produced water and oil, and 5 samples produced water only. This indicates that approximately 16 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 3,510 barrels of oil per acre. This is an average recovery of 359 barrels per acre foot from 9.8 feet of floodable sand analyzed in this core.

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

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Hickory Creek Oil Company

Lease - D 48

Well No. HCO-133

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	176.3	13.3	49	38	87	506	0.63	1.0	1.0	506	0.63
2	192.3	17.5	50	37	87	679	1.2	1.4	2.4	951	1.68
3	193.5	19.6	53	37	90	806	7.5	1.0	3.4	806	7.50
4	194.4	15.5	50	44	94	601	8.3	1.0	4.4	601	8.30
5	195.5	16.9	26	58	84	341	2.1	1.3	5.7	443	2.73
7	197.4	15.3	27	70	97	321	Imp.	1.4	7.1	449	0.00
9	199.6	15.2	35	61	96	413	Imp.	1.6	8.7	661	0.00
11	201.5	16.7	17	54	71	220	9.4	1.6	10.3	352	15.04
12	203.3	18.9	44	44	88	645	4.2	0.9	11.2	581	3.78
14	205.5	19.5	36	42	78	545	2.4	1.5	12.7	818	3.60
16	207.5	18.7	45	37	82	653	3.6	2.0	14.7	1306	7.20
18	210.5	18.3	37	47	84	525	2.3	2.0	16.7	1050	4.60
20	212.5	20.2	36	42	78	564	32.	2.0	18.7	1128	64.00
21	214.4	21.9	41	39	80	697	62.	2.0	20.7	1394	124.00
23	216.3	21.8	42	38	80	710	89.	2.0	22.7	1420	178.00
25	218.5	22.8	28	56	84	495	121.	2.0	24.7	990	242.00
27	220.4	22.8	35	49	84	619	26.	2.0	26.7	1238	52.00
29	222.6	20.7	29	55	84	466	21.	1.0	27.7	466	21.00
31	224.3	18.3	37	47	84	525	2.3	1.8	29.5	945	4.14
33	226.4	18.4	30	54	84	428	32.	2.2	31.7	942	70.40
35	228.5	20.8	33	46	79	533	25.	1.8	33.5	959	45.00
37	230.3	22.0	42	38	80	717	8.0	2.2	35.7	1577	17.60
39	232.5	22.9	75	15	90	1332	3.5	2.0	37.7	2664	7.00
41	234.6	21.0	65	22	87	1059	0.76	2.0	39.7	2118	1.52
43	236.4	17.8	78	18	96	1080	2.0	1.7	41.4	1836	3.40
44	238.4	15.7	56	37	93	682	Imp.	1.0	42.4	682	0.00
45	239.4	16.2	56	33	89	704	1.3	0.6	43.0	422	0.78
46	241.4	18.5	37	39	76	531	0.44	2.2	45.2	1168	0.97
47	243.3	16.0	42	44	86	521	0.36	1.0	46.2	521	0.36

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Hickory Creek Oil Company

Lease -

D48

Well No. HCO-133

7241.3

610.9

1379

471.85

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.		
48	244.3	19.0	42	53	95	619	1.3	1.0	47.2	619	1.30
49	245.4	18.3	64	24	88	909	0.92	1.0	48.2	909	0.92
50	246.5	11.2	62	27	89	538	0.73	1.0	49.2	538	0.73
51	247.5	19.2	54	34	88	804	0.61	1.0	50.2	804	0.61

2135.2

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## SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Hickory Creek Oil Company Lease - Well No. HCO-133

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
175.8 - 211.0	13.7	4.0	55.06
212.0 - 224.8	12.8	53.5	685.14
224.8 - 248.0	19.7	7.6	150.59
175.8 - 248.0	46.2	19.3	890.79

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
175.8 - 211.0	16.7	17.2	40.0	47.8	510	8,524
212.0 - 224.8	12.8	21.3	35.9	45.9	592	7,581
224.8 - 248.0	20.7	19.0	51.5	34.5	761	15,759
175.8 - 248.0	50.2	19.0	43.0	41.9	635	31,864

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Hickory Creek Oil Company

Lease

D 48

Well No.

HCO-133

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	176.3	13.6	48	506	0	0	48	42	506	0	Imp.	-
2	192.3	17.9	48	667	0	0	48	42	667	0	Imp.	-
3	193.5	19.1	53	785	0	0	53	40	785	0	Imp.	-
4	194.4	15.7	49	597	0	0	49	46	597	0	Imp.	-
5	195.5	16.6	27	348	0	0	27	61	348	0	Imp.	-
7	197.4	15.3	27	320	0	0	27	70	320	0	Imp.	-
9	199.6	15.5	35	421	0	0	35	62	421	0	Imp.	-
11	201.5	16.7	17	220	0	0	17	63	220	0	Imp.	-
12	203.3	18.5	45	646	0	0	45	45	646	0	Imp.	-
14	205.5	19.3	36	539	0	0	36	57	539	25	0.40	40
16	207.5	19.0	43	634	0	0	43	50	634	0	Imp.	-
18	210.5	17.9	38	528	0	0	38	53	528	0	Imp.	-
20	212.5	20.0	36	559	2	31	34	59	528	286	6.00	15
21	214.4	22.3	41	709	8	138	33	60	571	125	3.40	20
23	216.3	21.7	42	707	5	84	37	58	623	143	4.00	20
25	218.5	22.6	28	491	0	0	28	58	491	246	18.00	10
27	220.4	22.8	35	619	2	35	33	64	584	290	13.24	10
29	222.6	20.8	29	468	0	0	29	68	468	328	4.90	15
31	224.3	18.2	37	522	3	42	34	64	480	147	4.00	15
33	226.4	18.4	30	428	0	0	30	60	428	0	Imp.	-
35	228.5	20.7	33	530	0	0	33	59	530	44	0.90	30
37	230.3	22.2	42	723	0	0	42	52	723	25	0.50	30
39	332.5	23.0	75	1338	0	0	75	19	1338	0	Imp.	-
41	234.6	21.0	65	1059	0	0	65	31	1059	0	Imp.	-
43	236.4	18.1	76	1067	0	0	76	20	1067	0	Imp.	-
44	238.4	16.0	55	683	0	0	55	40	683	0	Imp.	-
45	239.4	16.0	56	695	0	0	56	36	695	0	Imp.	-
46	241.4	18.2	38	537	0	0	38	42	537	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.

528 = 48.0

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Hickory Creek Oil Company Lease - D48 Well No. HCO-133

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.			
							1426.				55.34	
47	243.3	16.4	41	522	0	0	41	49	522	0	Imp.	-
48	244.3	18.8	42	613	0	0	42	53	613	0	Imp.	-
49	245.4	18.6	63	909	0	0	63	27	909	0	Imp.	-
50	246.5	11.5	62	533	0	0	62	30	533	0	Imp.	-
51	247.5	19.1	54	800	0	0	54	35	800	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	Lease	-	Well No.	HCO-133
Depth Interval, Feet	212.0 - 224.8				
Depth of Core Analyzed	9.8				
Average Percent Porosity	21.1				
Average Percent Original Oil Saturation	37.8				
Average Percent Oil Recovery	4.0				
Average Percent Residual Oil Saturation	33.8				
Average Percent Residual Water Saturation	60.9				
Average Percent Total Residual Fluid Saturation	94.7				
Average Original Oil Content, Bbls./A. Ft.	626.				
Average Oil Recovery, Bbls./A. Ft.	67.				
Average Residual Oil Content, Bbls./A. Ft.	559.				
Total Original Oil Content, Bbls./Acre	6,128.				
Total Oil Recovery, Bbls./Acre	652.				
Total Residual Oil Content, Bbls./Acre	5,476.				
Average Effective Permeability, Millidarcys	6.17				
Average Initial Fluid Production Pressure, p.s.i.	16.0				

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

1.03

20.0

50.0

FVF

RS%

21.0 A<sup>Per</sup> 9%

DisSor = 33.8

Net Available Grant 9.8