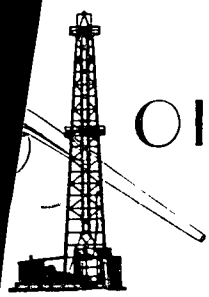

OILFIELD RESEARCH LABORATORIES

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

API: 15-133-21296

February 11, 1980

Hickory Creek Oil Company
P.O. Box 379
Parsons, Kansas 67356

Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core taken from Well No. HCO-99, and submitted to our laboratory on January 8, 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

Oilfield Research Laboratories

GENERAL INFORMATION & SUMMARY

Company Hickory Creek Oil Company Lease – Well No. HCO-99

Location –

Section – Twp – Rge – County – State –

Elevation, Feet	–
Name of Sand	–
Top of Core	165.0
Bottom of Core	206.4
Top of Sand	165.0
Bottom of Sand	206.4
Total Feet of Permeable Sand	29.3
Total Feet of Floodable Sand	23.7

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.
0 – 5	5.8	5.8
5 – 50	9.1	14.9
50 – 150	8.4	23.3
150 – 250	6.0	29.3

Average Permeability Millidarcys	76.3
Average Percent Porosity	20.4
Average Percent Oil Saturation	44.2
Average Percent Water Saturation	36.4
Average Oil Content, Bbls./A. Ft.	694.
Total Oil Content, Bbls./Acre	23,251.
Average Percent Oil Recovery by Laboratory Flooding Tests	8.2
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	132.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	3,120.
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:

Depth Interval, Feet	Description
165.0 - 168.0	Brown laminated slightly shaly sandstone.
168.0 - 169.9	Gray shaly sandstone.
169.9 - 170.7	Brown sandstone.
170.7 - 173.8	Gray and brown laminated sandstone and shale.
173.8 - 179.2	Gray and light brown laminated shale and sandstone.
179.2 - 179.7	Brown sandstone.
179.7 - 180.2	Gray sandy shale.
180.2 - 180.6	Light brown shaly sandstone.
180.6 - 196.6	Brown sandstone.
196.6 - 197.0	Brown slightly calcareous sandstone.
197.0 - 198.2	Brown sandstone.
198.2 - 198.7	Brown slightly calcareous sandstone.
198.7 - 199.3	Brown sandstone.
199.3 - 200.6	Dark slightly carbonaceous sandstone.
200.6 - 201.3	Light brown shaly sandstone.
201.3 - 202.2	Dark slightly carbonaceous sandstone.
202.2 - 206.4	Brown sandstone.

HILLER 9

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 3,120 barrels of oil per acre was obtained from 23.7 feet of sand. The weighted average percent oil saturation was reduced from 45.8 to 37.6, or represents an average recovery of 8.2 percent. The weighted average effective permeability of the samples is 7.28 millidarcys, while the average initial fluid production pressure is 23.1 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 20 samples tested, 13 produced water and oil, and 4 samples produced water only. This indicates that approximately 65 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 7,730 barrels of oil per acre. This is an average recovery of 326 barrels per acre foot from 23.7 feet of floodable sand analyzed in this core.

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

Original formation volume factor, estimated	1.03
Reservoir water saturation, percent, estimated	15.0 / 24.0
Average porosity, percent	20.8 / 18.2

HILLER 9

OILFIELD RESEARCH LABORATORIES

Oil saturation after flooding, percent	37.6 / 40.7
Performance factor, percent, estimated	45.0
Net floodable sand, feet	23.7 / 5.0

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Hickory Creek Oil Company Lease - H9 Well No. HCO-99

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	165.4	20.2	52	25	77	815	39.	1.5	1.5	1223	58.50
3	167.5	17.9	60	27	87	833	4.3	1.5	3.0	1250	6.45
5	169.5	16.5	40	20	60	512	0.48	1.9	4.9	973	0.91
7	171.5	16.6	59	34	93	760	Imp.	2.0	6.9	1520	0.00
9	175.5	15.0	38	55	93	442	0.56	2.0	8.9	884	1.12
11	178.7	15.4	19	72	91	227	Imp.	2.2	11.1	499	0.00
13	180.3	16.6	51	39	90	657	4.9	0.4	11.5	394	2.94
15	182.4	18.8	52	22	74	758	41.	2.4	13.9	1819	98.40
17	184.4	21.6	58	15	73	972	17.	2.0	15.9	1944	34.00
19	186.5	22.6	51	26	77	894	133.	2.0	17.9	1788	266.00
21	188.6	24.4	42	32	74	795	203.	2.0	19.9	1590	406.00
23	190.5	24.4	42	29	71	795	188.	2.0	21.9	1590	376.00
25	192.5	25.3	41	33	74	805	169.	2.0	23.9	1610	338.00
27	194.5	23.4	40	33	73	726	131.	2.0	25.9	1452	262.00
29	196.5	22.5	40	56	96	698	63.	1.6	27.5	1117	100.80
31	198.5	11.4	52	40	92	460	44.	0.5	28.0	230	22.00
33	200.5	19.6	37	28	65	563	78.	1.3	29.3	732	101.40
35	202.4	19.2	43	41	84	641	35.	1.3	30.6	833	45.50
37	204.5	22.8	37	53	90	655	52.	1.5	32.1	983	78.00
39	206.3	22.2	34	55	89	586	27.	1.4	33.5	820	37.80
	3736.5	396.4		735			1230.24				

Oilfield Research Laboratories

SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Hickory Creek Oil Company Lease – Well No. HCO-99

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
165.0 - 180.6	7.3	9.6	69.92
180.6 - 206.4	22.0	98.5	2165.90
165.0 - 206.4	29.3	76.3	2235.82

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
165.0 - 180.6	11.5	17.0	44.4	41.4	586	6,743
180.6 - 206.4	22.0	22.1	44.1	33.9	750	16,508
165.0 - 206.4	33.5	20.4	44.2	36.4	694	23,251

Oilfield Research Laboratories

RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Hickory Creek Oil Company Lease - H-9 Well No. HCO-99

Sample No.	Depth, Feet	Effective Porosity Percent	Original Oil Saturation %	Original Oil Saturation Bbls./A. Ft.	Oil Recovery %	Oil Recovery Bbls./A. Ft.	Residual Saturation % Oil	Residual Saturation % Water	Residual Saturation Bbls./A. Ft.	Volume of Water Recovered cc*	Effective Permeability Millidarcys**	Initial Fluid Production Pressure Lbs./Sq./In.
1	165.4	20.0	52	807	8	124	44	54	683	12	0.30	40
3	167.5	17.8	60	829	18	249	42	49	580	39	0.52	30
5	169.5	16.8	40	521	4	52	36	55	469	27	0.37	20
7	171.5	16.3	59	746	0	0	59	34	746	0	Imp.	-
9	175.5	15.0	38	442	2	23	36	60	419	5	0.22	50
11	178.5	15.3	19	226	0	0	19	72	226	0	Imp.	-
13	180.3	16.8	51	665	0	0	51	42	665	0	Imp.	-
15	182.4	19.0	52	766	13	192	39	50	574	136	1.58	25
17	184.4	21.3	58	958	25	413	33	40	545	175	2.25	25
19	186.5	22.9	51	906	15	266	36	55	640	284	9.16	20
21	188.6	24.2	42	789	3	56	39	52	733	304	10.62	15
23	190.5	24.8	42	808	4	77	38	53	731	260	11.24	15
25	192.5	25.2	41	802	0	0	41	50	802	194	11.00	15
27	194.5	23.2	40	720	3	54	37	55	666	415	16.50	15
29	196.5	22.3	40	692	2	35	38	51	657	105	25.99	15
31	198.5	11.5	52	464	0	0	52	44	464	15	0.15	40
33	200.5	19.7	37	565	0	0	37	53	565	103	1.20	25
35	202.4	19.6	43	654	4	61	39	55	593	436	5.92	15
37	204.5	22.8	37	654	3	53	34	62	601	278	11.63	15
39	206.3	22.4	34	591	0	0	34	61	591	355	8.33	15
							5 or 3 = 40.7	784			116.98	

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.

Oilfield Research Laboratories

SUMMARY OF LABORATORY FLOODING TESTS

TABLE V

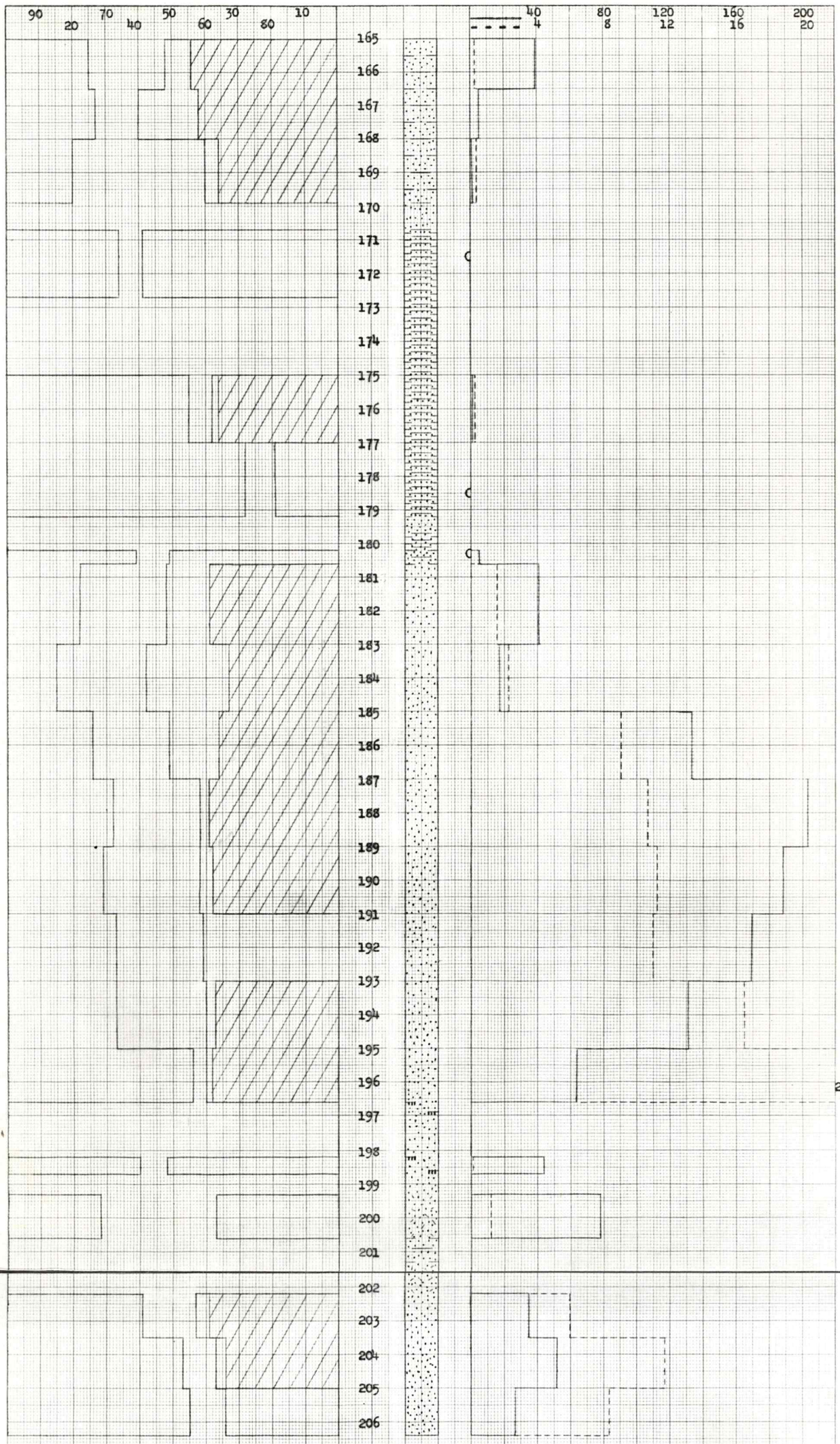
Company Hickory Creek Oil Company Lease - Well No. HCO-99

Depth Interval, Feet	165.0 - 180.6	180.6 - 206.4	165.0 - 206.4
Feet of Core Analyzed	6.9	16.8	23.7
Average Percent Porosity	17.2	22.3	20.8
Average Percent Original Oil Saturation	46.3	45.6	45.8
Average Percent Oil Recovery	7.3	8.6	8.2
Average Percent Residual Oil Saturation	39.0	37.0	37.6
Average Percent Residual Water Saturation	54.9	52.2	53.0
Average Percent Total Residual Fluid Saturation	93.9	89.2	90.6
Average Original Oil Content, Bbls./A. Ft.	627.	783.	738.
Average Oil Recovery, Bbls./A. Ft.	102.	144.	132.
Average Residual Oil Content, Bbls./A. Ft.	525.	639.	606.
Total Original Oil Content, Bbls./Acre	4,328.	13,147.	17,475.
Total Oil Recovery, Bbls./Acre	704.	2,416.	3,120.
Total Residual Oil Content, Bbls./Acre	3,624.	10,731.	14,355.
Average Effective Permeability, Millidarcys	0.34	10.12	7.28
Average Initial Fluid Production Pressure, p.s.i.	35.0	17.8	23.1

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

WATER SAT., PERCENT ——→ ←—— OIL SAT., PERCENT

——— PERMEABILITY, IN MILLIDARCYS
- - - - EFFECTIVE PERMEABILITY TO WATER, IN MILLIDARCYS



KEY:

- SANDSTONE
- SHALY SANDSTONE
- LAMINATED SANDSTONE AND SHALE
- FLOODPOT RESIDUAL OIL SATURATION
- CARBONACEOUS SANDSTONE
- CALCAREOUS SANDSTONE
- SANDY SHALE
- IMPERMEABLE TO WATER

HICKORY CREEK OIL COMPANY

— LEASE — WELL NO. HCO - 99

-- COUNTY, --

DEPTH INTERVAL, FEET	FEET OF CORE ANALYZED	AVERAGE PERCENT POROSITY	AVG. OIL SATURATION PERCENT	AVG. WATER SATURATION PERCENT	AVERAGE PERMEABILITY, MILLIDARCYS	CALCULATED OIL RECOVERY BBLS./ACRE
165.0 - 180.6	11.5	17.0	44.4	41.4	9.6	
180.6 - 206.4	22.0	22.1	44.1	33.9	98.5	
165.0 - 206.4	33.5	20.4	44.2	36.4	76.3	7,730 (PRIMARY AND WATERFLOODING)

OILFIELD RESEARCH LABORATORIES
CHANUTE, KANSAS
FEBRUARY, 1950. HR