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

September 4, 1981

Hearne Christopher
13130 Metcalf
Shawnee Mission, Kansas 66213

Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core taken from the H. Christopher Lease, Well No. 1, located in Johnson County, Kansas and submitted to our laboratory on August 29, 1981.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Sanford A. Michel

SAM/kas

5 c to Shawnee Mission, Kansas

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GENERAL INFORMATION & SUMMARY

Company Hearne Christopher Lease H. Christopher Well No. 1

Location 165' EWL & 165' NSL, SW¼ NE¼

Section 30 Twp. 13S Rge. 25E County Johnson State Kansas

Elevation, Feet	
Name of Sand	Squirrel
Top of Core	554.0
Bottom of Core	560.0
Top of Sand	554.0
Bottom of Sand	560.0
Total Feet of Permeable Sand	4.6
Total Feet of Floodable Sand	4.0

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.
30 - 60	3.0	3.0
60 - 100	1.6	4.6

Average Permeability Millidarcys	57.8
Average Percent Porosity	22.7
Average Percent Oil Saturation	54.5
Average Percent Water Saturation	31.7
Average Oil Content, Bbls./A. Ft.	964.
Total Oil Content, Bbls./Acre	4,433.
Average Percent Oil Recovery by Laboratory Flooding Tests	8.8
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	157.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	626.
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. Fresh water mud was used as a drilling fluid. The core was reported to be from a virgin area.

FORMATION CORED

The detailed log of the formation cored is as follows:

Depth Interval, Feet	Description
554.0 - 555.0	Gray and brown laminated shale and sandstone.
555.0 - 555.3	Brown slightly carbonaceous sandstone.
555.3 - 557.4	Gray and brown laminated shale and sandstone.
557.4 - 560.0	Brown slightly carbonaceous sandstone.

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 626 barrels of oil per acre was obtained from 4.0 feet of sand. The weighted average percent oil saturation was reduced from 56.1 to 47.3, or represents an average recovery of 8.8 percent. The weighted average effective permeability of the samples is 0.49 millidarcys, while the average initial fluid production pressure is 37.5 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 5 samples tested, 4 produced water and oil, and 1 sample produced water only. This indicates that approximately 80 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 1,060 barrels of oil per acre. This is an average recovery of 264 barrels per acre foot from 4.0 feet of floodable sand analyzed in this core.

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

Original formation volume factor, estimated	1.04
Reservoir water saturation, percent, estimated	20.0
Average porosity, percent	23.0
Oil saturation after flooding, percent	47.3
Performance factor, percent, estimated	50.0
Net floodable sand, feet	4.0

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Hearne Christopher Lease H. Christopher Well No. 1

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	554.6	21.7	50	35	85	842	34.	1.0	1.0	842	34.00
2	555.5	23.6	61	20	81	1126	52.	1.0	2.0	1126	52.00
3	557.6	21.2	43	43	86	707	60.	0.6	2.6	424	36.00
4	558.4	23.9	52	29	81	964	90.	1.0	3.6	964	90.00
5	559.5	22.4	62	36	98	1077	54.	1.0	4.6	1077	54.00

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Hearne Christopher Lease H. Christopher Well No. 1

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
554.0 - 560.0	4.6	57.8	266.00

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
554.0 - 560.0	4.6	22.7	54.5	31.7	964	4,433

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Hearne Christopher Lease H. Christopher Well No. 1

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	554.6	21.9	50	850	6	102	44	46	748	20	0.30	40
2	555.5	23.7	61	1122	11	202	50	36	919	14	0.15	45
3	557.6	21.0	43	701	0	0	43	48	701	28	0.94	40
4	558.4	23.8	52	960	6	111	46	42	849	36	0.52	35
5	559.5	22.7	61	1074	12	211	49	49	863	78	0.97	30

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 Hearne Christopher Lease H. Christopher Well No. 1

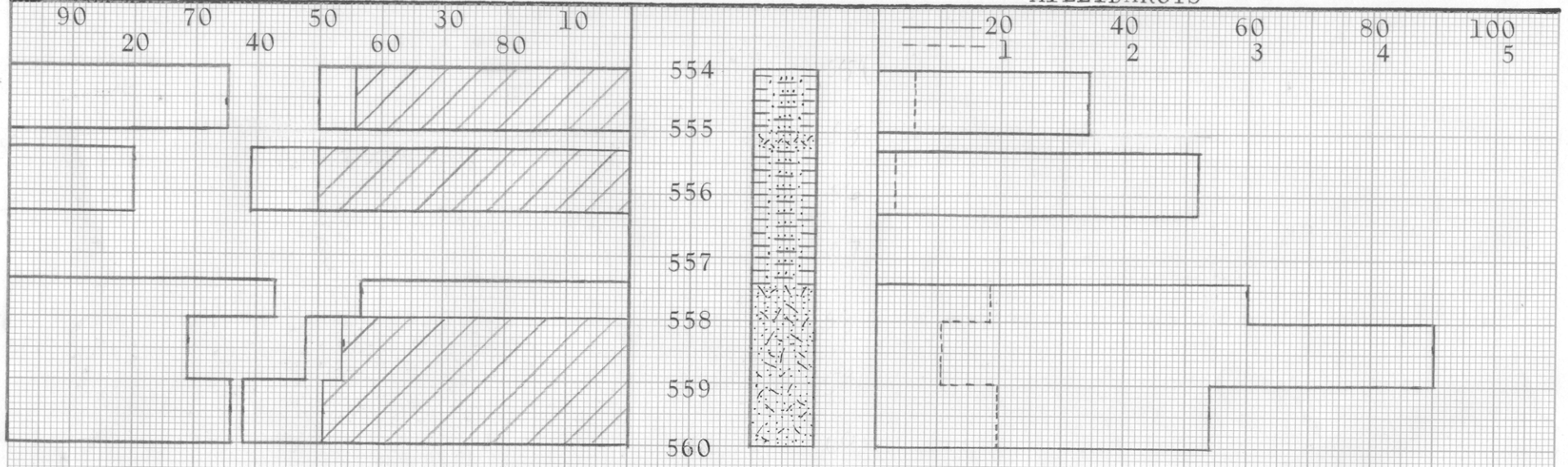
Depth Interval, Feet	554.0 - 560.0
Feet of Core Analyzed	4.0
Average Percent Porosity	23.0
Average Percent Original Oil Saturation	56.1
Average Percent Oil Recovery	8.8
Average Percent Residual Oil Saturation	47.3
Average Percent Residual Water Saturation	43.3
Average Percent Total Residual Fluid Saturation	90.6
Average Original Oil Content, Bbls./A. Ft.	1,002.
Average Oil Recovery, Bbls./A. Ft.	157.
Average Residual Oil Content, Bbls./A. Ft.	845.
Total Original Oil Content, Bbls./Acre	4,005.
Total Oil Recovery, Bbls./Acre	626.
Total Residual Oil Content, Bbls./Acre	3,379.
Average Effective Permeability, Millidarcys	0.49
Average Initial Fluid Production Pressure, p.s.i.	37.5

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:

CARBONACEOUS SANDSTONE

LAMINATED SANDSTONE AND SHALE

FLOODPOT RESIDUAL OIL SATURATION

HEARNE CHRISTOPHER

H. CHRISTOPHER LEASE

WELL NO. 1

JOHNSON COUNTY, KANSAS

DEPTH INTERVAL,	FEET OF CORE	AVERAGE	AVG. OIL	AVG. WATER	AVERAGE	CALCULATED

HEARNE CHRISTOPHER

H. CHRISTOPHER LEASE WELL NO. 1

JOHNSON COUNTY, KANSAS

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
554.0 - 560.0	4.6	22.7	54.5	31.7	57.8	1060 (PRIMARY AND WATERFLOODING)

OILFIELD RESEARCH LABORATORIES
CHANUTE, KANSAS
SEPTEMBER, 1981

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