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

September 11, 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 Christopher Lease, Well No. 2, located in Johnson County, Kansas and submitted to our laboratory on September 3, 1981.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Sanford A. Michel

SAM/mkf

5 c to Shawnne Mission, Ks.

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GENERAL INFORMATION & SUMMARY

Company Hearne Christopher Lease Christopher Well No. 2

Location

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

Elevation, Feet	
Name of Sand	SQUIRREL
Top of Core	532.0
Bottom of Core	551.5
Top of Sand	532.0
Bottom of Sand (Tested)	550.0
Total Feet of Permeable Sand	18.0
Total Feet of Floodable Sand	3.0

Distribution of Permeable Sand; Permeability Range Millidarcys	Feet	Cum. Ft.
1 - 10	4.9	4.9
10 - 20	7.0	11.9
20 - 65	3.1	15.0
40 - 65	2.0	17.0
180 & Above	1.0	18.0

Average Permeability Millidarcys	28.8
Average Percent Porosity	20.7
Average Percent Oil Saturation	33.5
Average Percent Water Saturation	48.0
Average Oil Content, Bbls./A. Ft.	539.
Total Oil Content, Bbls./Acre	9,693.
Average Percent Oil Recovery by Laboratory Flooding Tests	4.7
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	77.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	231.
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
532.0 - 533.0	Brown sandstone.
533.0 - 535.2	Gray and brown laminated shale and sandstone.
535.2 - 536.0	Grayish brown shaly sandstone.
536.0 - 538.0	Brown sandstone with shale partings.
538.0 - 542.0	Gray and brown laminated shale and sandstone.
542.0 - 542.9	Grayish brown shaly sandstone.
542.9 - 547.0	Brown sandstone.
547.0 - 549.0	Brown sandstone with shale partings.
549.0 - 550.0	Brown sandstone with fine shale parting.
550.0 - 551.5	Light brown sandstone.

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 231 barrels of oil per acre was obtained from 3.0 feet of sand. The weighted average percent oil saturation was reduced from 44.0 to 39.3, or represents an average recovery of 4.7 percent. The weighted average effective permeability of the samples is 0.25 millidarcys, while the average initial fluid production pressure is 40.0 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 18 samples tested, 3 produced water and oil, and 3 samples produced water only. This indicates that approximately 17 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 570 barrels of oil per acre. This is an average recovery of 191 barrels per acre foot from 3.0 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	35.0
Average porosity, percent	21.2
Oil saturation after flooding, percent	39.3
Performance factor, percent, estimated	55.0
Net floodable sand, feet	3.0

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Hearne Christopher Lease Christopher Well No. 2

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	532.4	24.3	43	24	67	811	60.	1.0	1.0	811	60.00
2	533.4	19.8	14	61	75	215	10.	1.0	2.0	215	10.00
3	534.5	20.3	21	57	78	331	4.7	1.2	3.2	397	5.64
4	535.4	18.6	20	64	84	289	3.3	0.8	4.0	231	2.64
5	536.4	20.4	38	45	83	601	19.	1.0	5.0	601	19.00
6	537.5	21.8	18	46	64	304	40.	1.0	6.0	304	40.00
7	538.4	19.6	46	45	91	700	13.	1.0	7.0	700	13.00
8	539.4	19.9	39	45	84	602	20.	1.0	8.0	602	20.00
9	540.5	17.9	45	51	96	625	4.0	1.0	9.0	625	4.00
10	541.4	19.5	39	46	85	590	14.	1.0	10.0	590	14.00
11	542.4	20.6	19	56	75	304	9.5	0.9	10.9	274	8.55
12	543.6	21.2	34	44	78	559	20.	1.1	12.0	615	22.00
13	544.4	20.0	50	37	87	776	19.	1.0	13.0	776	19.00
14	545.4	20.7	46	41	87	739	12.	1.0	14.0	739	12.00
15	546.5	20.8	49	42	91	791	17.	1.0	15.0	791	17.00
16	547.5	19.0	13	68	81	192	8.0	1.0	16.0	192	8.00
17	548.5	21.8	38	56	94	643	23.	1.0	17.0	643	23.00
18	549.5	26.1	29	39	68	587	184.	1.0	18.0	587	184.00

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Hearne Christopher Lease Christopher Well No. 2

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
532.0 - 542.9	10.9	21.4	232.83
542.9 - 550.0	7.1	40.1	285.00
532.0 - 550.0	18.0	28.8	517.83

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
532.0 - 542.9	10.9	20.3	31.2	48.9	491	5,350
542.9 - 550.0	7.1	21.4	37.0	46.7	612	4,343
532.0 - 550.0	18.0	20.7	33.5	48.0	539	9,693

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Hearne Christopher Lease Christopher Well No. 2

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	532.4	24.4	43	814	0	0	43	40	814	18	0.30	40
2	533.4	20.1	13	203	0	0	13	63	203	0	Imp.	-
3	534.5	20.4	21	332	0	0	21	57	332	0	Imp.	-
4	535.4	19.1	19	282	0	0	19	66	282	0	Imp.	-
5	536.4	20.4	38	610	0	0	38	46	601	0	Imp.	-
6	537.5	21.3	19	314	0	0	19	47	314	0	Imp.	-
7	538.4	20.1	45	702	0	0	45	46	702	0	Imp.	-
8	539.4	20.0	39	605	0	0	39	49	605	14	0.45	50
9	540.5	18.5	44	632	0	0	46	50	632	0	Imp.	-
10	541.4	19.9	38	587	0	0	38	47	587	0	Imp.	-
11	542.4	20.5	19	302	0	0	19	60	302	0	Imp.	-
12	543.6	21.6	33	553	0	0	33	47	553	0	Imp.	-
13	544.4	20.2	50	784	0	0	50	37	784	0	Imp.	-
14	545.4	20.8	46	742	4	65	42	48	677	10	0.15	50
15	546.5	21.3	48	793	8	132	40	53	661	12	0.30	30
16	547.5	18.9	13	191	0	0	13	69	191	0	Imp.	-
17	548.5	21.6	38	637	2	34	36	59	603	20	0.30	40
18	549.5	26.0	29	585	0	0	29	56	585	378	11.10	15

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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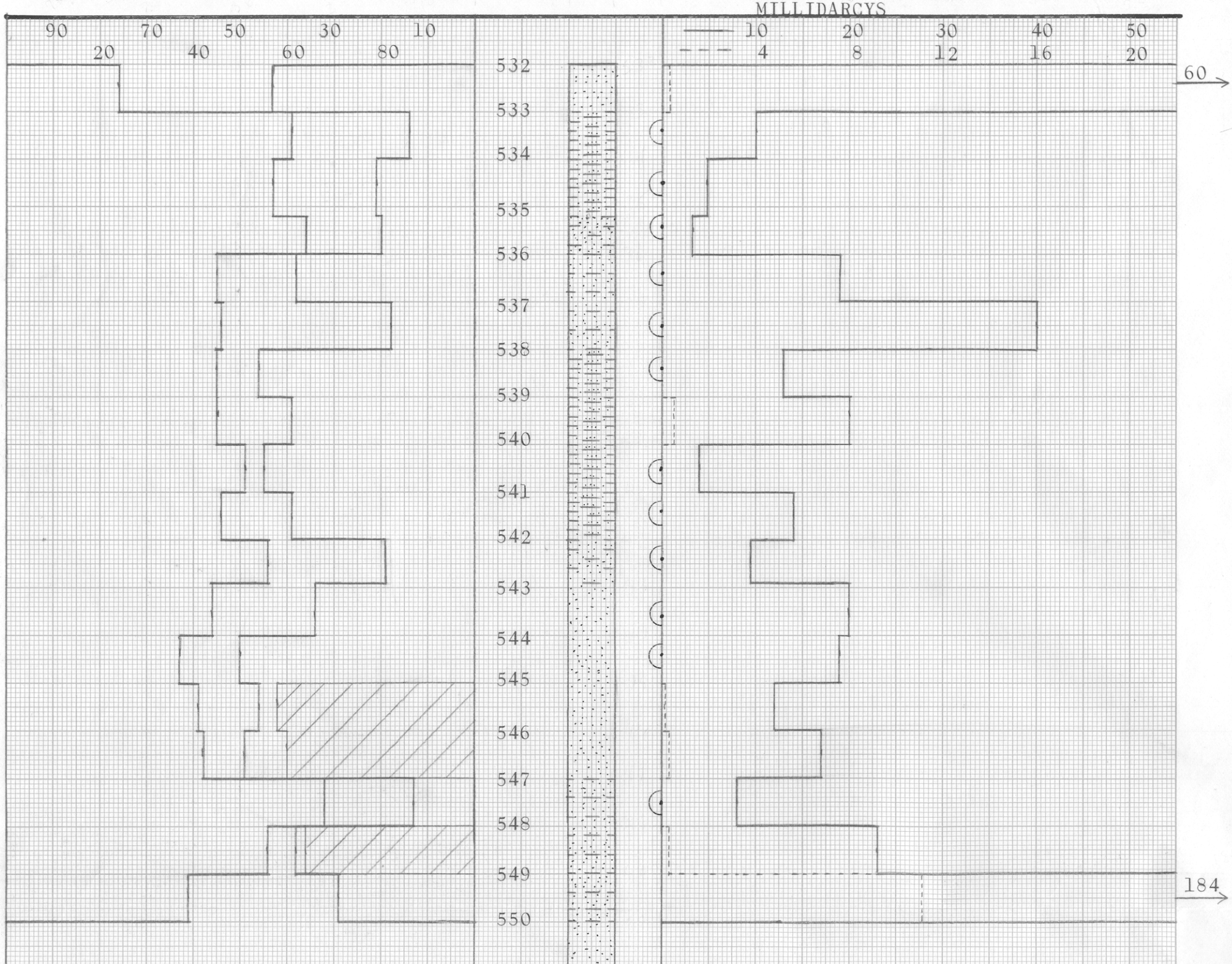
SUMMARY OF LABORATORY FLOODING TESTS

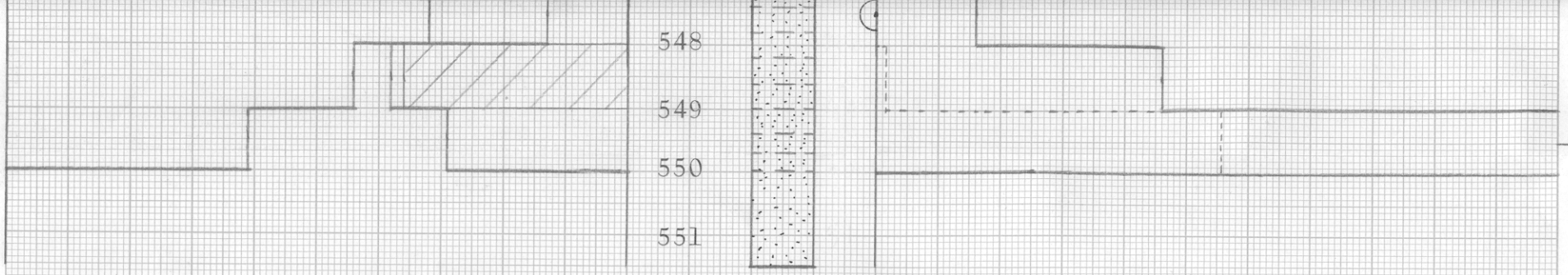
TABLE V

Company Hearne Christopher Lease Christopher Well No. 2

Depth Interval, Feet	532.0 - 550.0
Feet of Core Analyzed	3.0
Average Percent Porosity	21.2
Average Percent Original Oil Saturation	44.0
Average Percent Oil Recovery	4.7
Average Percent Residual Oil Saturation	39.3
Average Percent Residual Water Saturation	53.3
Average Percent Total Residual Fluid Saturation	92.6
Average Original Oil Content, Bbls./A. Ft.	724.
Average Oil Recovery, Bbls./A. Ft.	77.
Average Residual Oil Content, Bbls./A. Ft.	647.
Total Original Oil Content, Bbls./Acre	2,172.
Total Oil Recovery, Bbls./Acre	231.
Total Residual Oil Content, Bbls./Acre	1,941.
Average Effective Permeability, Millidarcys	0.25
Average Initial Fluid Production Pressure, p.s.i.	40.0

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
90 70 50 30 10
20 40 60 80
10 20 30 40 50
4 8 12 16 20
532
533
534
535
536
537
538
539
540
541
542
543
544
545
546
547
548
549
550
60
184



KEY:

SANDSTONE

SHALY SANDSTONE

SANDSTONE WITH SHALE PARTINGS

LAMINATED SANDSTONE AND SHALE

FLOODPOT RESIDUAL OIL SATURATION

IMPERMEABLE

HEARNE CHRISTOPHER

CHRISTOPHER LEASE WELL NO. 2

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
532.0 - 542.9	10.9	20.3	31.2	48.9	21.4	
542.9 - 550.0	7.1	21.4	37.0	46.7	40.1	
532.0 - 550.0	18.0	20.7	33.5	48.0	28.8	570 (PRIMARY AND WATERFLOODING)

OILFIELDLRESEARCH LABORATORIES
CHANUTE, KANSAS
SEPTEMBER, 1981

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