OILFIELD RESEARCH LABORATORIES

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

May 13, 1982

Lincoln 77
3633 O Street, Suite 4
P. O. Box 30538
Lincoln, Nebraska 68510

Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core taken from the Bedwell Lease, Well No. 4, located in Coffey County, Kansas and submitted to our laboratory on May 7, 1982.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Sanford A. Michel
by A.D.

Sanford A. Michel

SAM/kas

4 c to Lincoln, Nebraska
1 c to Topeka, Kansas

Oilfield Research Laboratories

GENERAL INFORMATION & SUMMARY

Company Lincoln 77 Lease Bedwell Well No. 4

Location C. N½, N½, SW¼

Section 11 Twp. 23S Rge. 16E County Coffey State Kansas

Elevation, Feet		
Name of Sand		Lower Squirrel
Top of Core		953.0
Bottom of Core		971.0
Top of Sand	(Tested)	957.5
Bottom of Sand	(Tested)	969.0
Total Feet of Permeable Sand	(Tested)	8.6
Total Feet of Floodable Sand	(Tested)	8.6

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.
0 - 50	3.0	3.0
50 - 100	3.1	6.1
100 - 150	1.5	7.6
150 - 200	1.0	8.6

Average Permeability Millidarcys	87.6
Average Percent Porosity	22.9
Average Percent Oil Saturation	60.0
Average Percent Water Saturation	18.2
Average Oil Content, Bbls./A. Ft.	1,062.
Total Oil Content, Bbls./Acre	9,134.
Average Percent Oil Recovery by Laboratory Flooding Tests	17.5
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	310.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	2,670.
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
953.0 - 953.7	Brown sandstone.
953.7 - 956.2	Gray and brown finely laminated shale and sandstone.
956.2 - 957.5	Gray and brown laminated shale and sandstone.
957.5 - 961.5	Brown sandstone.
961.5 - 962.5	Gray and brown laminated shale and sandstone.
962.5 - 963.6	Dark brown sandstone.
963.6 - 964.1	Gray and brown laminated shale and sandstone.
964.1 - 965.0	Brown slightly shaly sandstone.
965.0 - 966.6	Brown sandstone.
966.6 - 969.0	Alternate layers gray shale and brown sandstone containing a vertical fracture.
969.0 - 971.0	Gray and brown laminated shale and sandstone.

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 2,670 barrels of oil per acre was obtained from 8.6 feet of sand. The weighted average percent oil saturation was reduced from 60.0 to 42.5, or represents an average recovery of 17.5 percent. The weighted average effective permeability of the samples is 2.58 millidarcys, while the average initial fluid production pressure is 21.8 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 11 samples tested, 11 produced water and oil. This indicates that 100 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 3,180 barrels of oil per acre. This is an average recovery of 370 barrels per acre foot from 8.6 feet of floodable sand analyzed in this core.

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

Original formation volume factor, estimated	1.07
Reservoir water saturation, percent, estimated	10.0
Average porosity, percent	22.9
Oil saturation after flooding, percent	42.5
Performance factor, percent, estimated	50.0
Net floodable sand, feet	8.6

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Lincoln 77 Lease Bedwell Well No. 4

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	957.6	24.7	48	19	67	920	188.	0.5	0.5	460	94.00
2	958.6	23.1	59	20	79	1057	89.	1.0	1.5	1057	89.00
3	959.2	24.4	56	17	73	1060	149.	1.0	2.5	1060	149.00
4	960.3	22.0	72	20	92	1229	47.	1.0	3.5	1227	47.00
5	961.4	23.4	48	27	75	871	94.	0.5	4.0	436	47.00
6	962.7	25.7	58	17	75	1156	130.	0.5	4.5	578	65.00
7	963.4	23.4	66	14	80	1198	90.	0.6	5.1	719	54.00
8	964.5	20.6	64	11	75	1023	7.2	1.0	6.1	1023	7.20
9	965.5	22.8	66	7	73	1167	97.	1.0	7.1	1167	97.00
10	966.5	23.2	65	10	75	1170	169.	0.5	7.6	585	84.50
11	968.6	21.2	50	37	87	822	21.	1.0	8.6	822	21.00

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Lincoln 77 Lease Bedwell Well No. 4

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
957.5 - 969.0	8.6	87.8	754.70

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
957.5 - 969.0	8.6	22.9	60.0	18.2	1,062	9,134

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Lincoln 77 Lease Bedwell Well No. 4

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	957.6	24.6	48	916	8	153	40	56	763	550	6.60	15
2	958.6	23.0	59	1053	18	321	41	49	732	52	0.75	25
3	959.2	24.4	56	1060	16	303	40	54	757	58	0.94	25
4	960.3	22.0	72	1229	25	427	47	49	802	103	1.35	20
5	961.4	23.4	48	871	13	236	35	63	635	119	1.57	25
6	962.7	25.8	58	1161	22	440	36	50	721	190	2.44	15
7	963.4	23.5	66	1203	19	346	47	51	857	249	3.67	20
8	964.5	20.8	64	1033	22	355	42	52	678	130	1.65	20
9	965.5	22.8	66	1167	20	354	46	48	813	113	1.57	20
10	966.5	23.3	65	1175	21	380	44	45	795	362	16.49	10
11	968.6	21.1	50	818	6	98	44	51	720	12	0.15	45

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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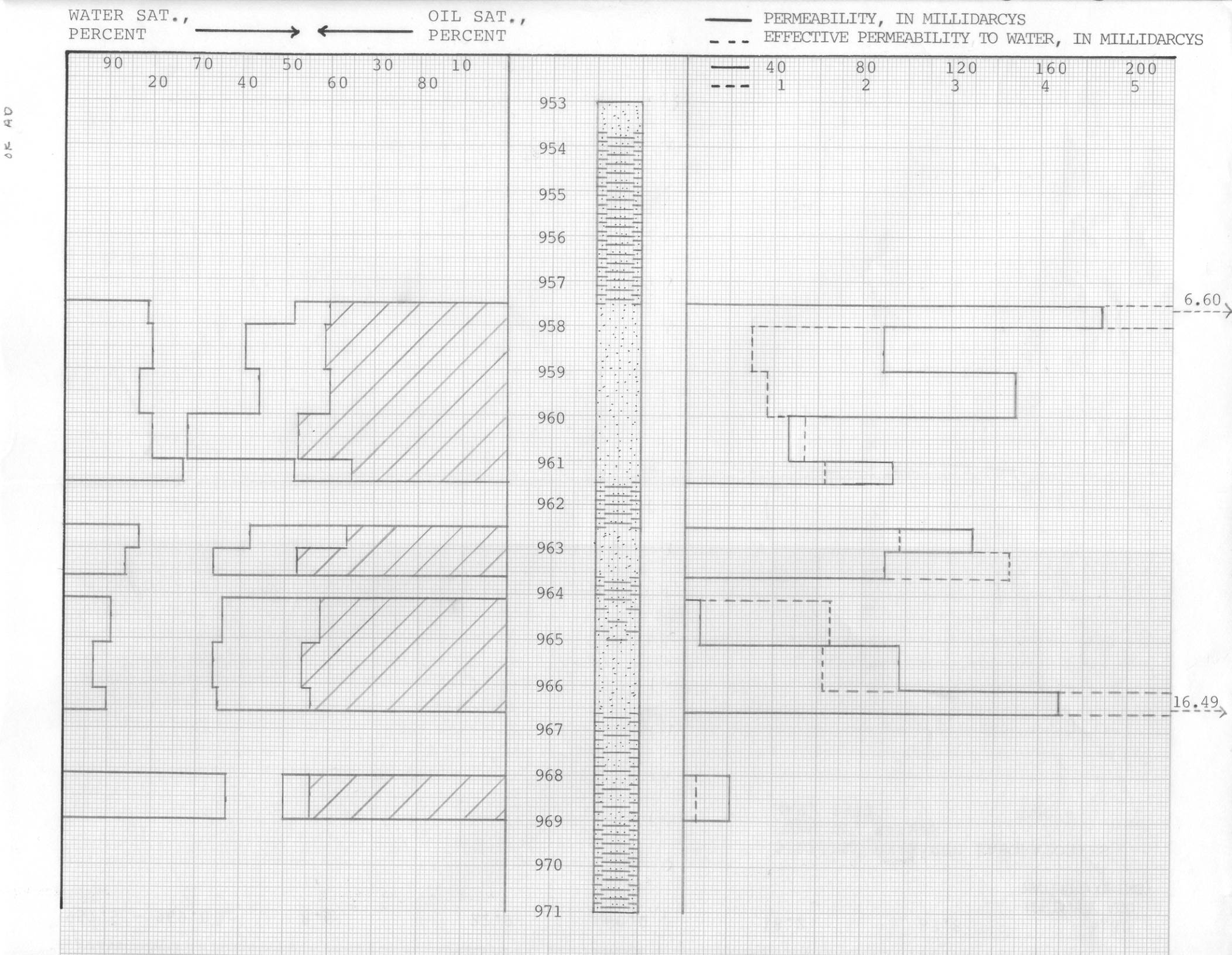
SUMMARY OF LABORATORY FLOODING TESTS

TABLE V

Company Lincoln 77 Lease Bedwell Well No. 4

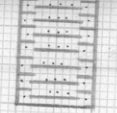
Depth Interval, Feet	957.5 - 969.0
Feet of Core Analyzed	8.6
Average Percent Porosity	22.9
Average Percent Original Oil Saturation	60.0
Average Percent Oil Recovery	17.5
Average Percent Residual Oil Saturation	42.5
Average Percent Residual Water Saturation	51.3
Average Percent Total Residual Fluid Saturation	93.8
Average Original Oil Content, Bbls./A. Ft.	1,063.
Average Oil Recovery, Bbls./A. Ft.	310.
Average Residual Oil Content, Bbls./A. Ft.	753.
Total Original Oil Content, Bbls./Acre	9,143.
Total Oil Recovery, Bbls./Acre	2,670.
Total Residual Oil Content, Bbls./Acre	6,473.
Average Effective Permeability, Millidarcys	2.58
Average Initial Fluid Production Pressure, p.s.i.	21.8

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
40 80 120 160 200
1 2 3 4 5
953
954
955
956
957
958
959
960
961
962
963
964
965
966
967
968
969
970
971
6.60
16.49

970

971



KEY:

SANDSTONE

SHALY SANDSTONE

LAMINATED SANDSTONE AND SHALE

FORMATION CONTAINING A VERTICAL FRACTURE

ALTERNATE LAYERS OF SANDSTONE AND SHALE

FLOODPOT RESIDUAL OIL SATURATION

LINCOLN 77

BEDWELL LEASE

COFFEY COUNTY, KANSAS

WELL NO. 4

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
957.5 - 969.0	8.6	22.9	60.0	18.2	87.8	3180 (PRIMARY AND WATERFLOODING)

OILFIELD RESEARCH LABORATORIES
CHANUTE, KANSAS
MAY, 1982

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