OILFIELD RESEARCH LABORATORIES
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June 27, 1980

Lincoln 77
8485 Kathy Lane
Lincoln, Nebraska 68526

Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core taken from the Leroy Martz Lease, Well No. 3, Coffey County, Kansas, and submitted to our laboratory on May 13, 1980.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Sanford A. Michel

SAM/tem
5 c to Lincoln, Nebraska

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GENERAL INFORMATION & SUMMARY

Company Lincoln 77 Lease Leroy Martz Well No. 3

Location SW¼ SW¼ NE¼

Section 13 Twp. 23S Rge. 16E County Coffey State Kansas

Elevation, Feet - - - - - - - - - - - - - - -

Name of Sand	Lower Squirrel
Top of Core	936.0
Bottom of Core	948.0
Top of Sand	936.7
Bottom of Sand	946.2
Total Feet of Permeable Sand	7.4
Total Feet of Floodable Sand	2.2

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.
0 - 5	3.7	3.7
5 - 10	2.3	6.0
10 - 15	1.4	7.4

Average Permeability Millidarcys	6.6
Average Percent Porosity	14.8
Average Percent Oil Saturation	48.4
Average Percent Water Saturation	35.6
Average Oil Content, Bbls./A. Ft.	552.
Total Oil Content, Bbls./Acre	4,086.
Average Percent Oil Recovery by Laboratory Flooding Tests	8.3
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	118.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	261.
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
936.0 - 936.2	Gray shale.
936.2 - 936.7	Hard gray fossiliferous calcareous sandy shale.
936.7 - 937.2	Brown calcareous fossiliferous shaly sandstone.
937.2 - 942.0	Brown and gray laminated sandstone and shale.
942.0 - 943.1	Gray sandy shale.
943.1 - 944.8	Brown and gray laminated sandstone and shale.
944.8 - 946.2	Brown sandstone.
946.2 - 948.0	Gray sandy shale.

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 261 barrels of oil per acre was obtained from 2.2 feet of sand. The weighted average percent oil saturation was reduced from 44.5 to 36.2, or represents an average recovery of 8.3 percent. The weighted average effective permeability of the samples is 0.20 millidarcys, while the average initial fluid production pressure is 25.0 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 8 samples tested, 2 produced water and oil. This indicates that approximately 25 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 670 barrels of oil per acre. This is an average recovery of 303 barrels per acre foot from 2.2 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	20.0
Average porosity, percent	18.4
Oil saturation after flooding, percent	36.2
Performance factor, percent, estimated	55.0
Net floodable sand, feet	2.2

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Lincoln 77 Lease Leroy Martz Well No. 3

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	936.8	12.3	70	28	98	668	5.4	0.5	0.5	334	2.70
2	937.6	11.2	72	25	97	626	4.4	0.8	1.3	501	3.52
3	938.5	10.7	41	50	91	340	7.5	1.0	2.3	340	7.50
4	939.5	15.3	56	33	89	665	3.5	1.0	3.3	665	3.50
5	940.5	12.5	24	42	66	233	4.0	1.0	4.3	233	4.00
6	943.4	16.9	52	28	80	682	3.1	0.9	5.2	614	2.79
7	944.5	17.1	40	57	97	531	6.3	0.8	6.0	425	5.04
8	945.5	19.1	47	24	71	696	14.	1.4	7.4	974	19.60

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Lincoln 77 Lease Leroy Martz Well No. 3

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
936.7 - 946.2	7.4	6.6	48.65

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
936.7 - 946.2	7.4	14.8	48.4	35.6	552	4,086

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Lincoln 77 Lease Leroy Martz Well No. 3

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	936.8	12.0	70	652	0	0	70	28	652	0	Imp.	-
2	937.6	11.4	72	637	0	0	72	25	637	0	Imp.	-
3	938.5	11.1	40	344	0	0	40	52	344	0	Imp.	-
4	939.5	15.3	56	665	0	0	56	35	665	0	Imp.	-
5	940.5	12.9	23	230	0	0	23	46	230	0	Imp.	-
6	943.4	17.0	52	686	0	0	52	29	686	0	Imp.	-
7	944.5	17.2	40	534	7	93	33	58	440	25	0.15	15
8	945.5	19.1	47	696	9	133	38	46	563	36	0.22	35

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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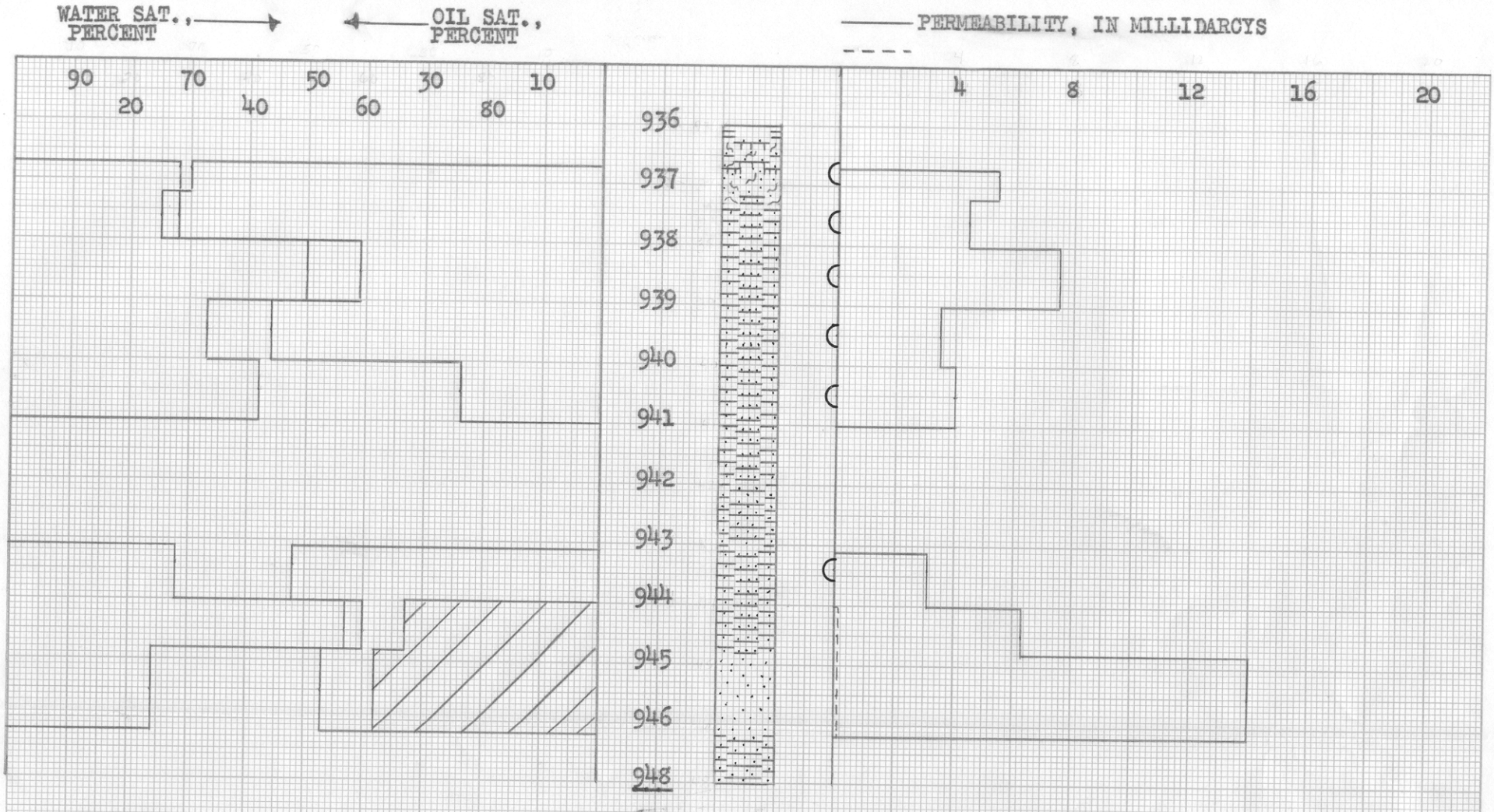
SUMMARY OF LABORATORY FLOODING TESTS

TABLE V

Company Lincoln 77 Lease Leroy Martz Well No. 3

Depth Interval, Feet	936.7 - 946.2
Feet of Core Analyzed	2.2
Average Percent Porosity	18.4
Average Percent Original Oil Saturation	44.5
Average Percent Oil Recovery	8.3
Average Percent Residual Oil Saturation	36.2
Average Percent Residual Water Saturation	50.4
Average Percent Total Residual Fluid Saturation	96.6
Average Original Oil Content, Bbls./A. Ft.	636.
Average Oil Recovery, Bbls./A. Ft.	118.
Average Residual Oil Content, Bbls./A. Ft.	518.
Total Original Oil Content, Bbls./Acre	1,401.
Total Oil Recovery, Bbls./Acre	261.
Total Residual Oil Content, Bbls./Acre	1,140.
Average Effective Permeability, Millidarcys	0.20
Average Initial Fluid Production Pressure, p.s.i.	25.0

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



KEY:

- SHALE
- CALCAREOUS FOSSILIFEROUS SHALY SANDSTONE
- SANDY SHALE
- FLOODPOT RESIDUAL OIL SATURATION
- FOSSILIFEROUS CALCAREOUS SANDY SHALE
- LAMINATED SANDSTONE & SHALE
- SANDSTONE
- IMPERMEABLE TO WATER

LINCOLN 77

SANDY SHALE

SANDSTONE

FLOODPOT RESIDUAL OIL SATURATION

IMPERMEABLE TO WATER

LINCOLN 77

LEROY MARTZ LEASE WELL NO. 3

COFFEY 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
936.7 - 946.2	7.4	14.8	48.4	35.6	6.6	670 (PRIMARY & WATERFLOODING)

OILFIELD RESEARCH LABORATORIES
CHANUTE, KANSAS
JUNE, 1980 VM