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

April 17, 1981

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 Parmley Lease, Well No. 6, located in Coffey County, Kansas and submitted to our laboratory on March 31, 1981.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

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 Parmley Well No. 6

Location SW NW SW¼

Section 29 Twp. 22S Rge. 17E County Coffey State Kansas

Elevation, Feet	
Name of Sand	Lower Squirrel
Top of Core	976.0
Bottom of Core	988.0
Top of Sand	977.5
Bottom of Sand (Tested)	984.0
Total Feet of Permeable Sand	6.5
Total Feet of Floodable Sand	2.0

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.
0 - 10	3.6	3.6
10 - 20	1.9	5.5
145 & Above	1.0	6.5

Average Permeability Millidarcys	29.4
Average Percent Porosity	16.8
Average Percent Oil Saturation	67.4
Average Percent Water Saturation	17.2
Average Oil Content, Bbls./A. Ft.	871.
Total Oil Content, Bbls./Acre	5,661.
Average Percent Oil Recovery by Laboratory Flooding Tests	12.5
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	174.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	347.
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. 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
976.0 - 976.8	Hard gray fossiliferous calcareous sandy shale.
976.8 - 977.5	Gray sandy shale.
977.5 - 978.4	Brown sandstone.
978.4 - 985.5	Brown and gray laminated sandstone and shale.
985.5 - 988.0	Gray sandy shale.

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 347 barrels of oil per acre was obtained from 2.0 feet of sand. The weighted average percent oil saturation was reduced from 58.0 to 45.5, or represents an average recovery of 12.5 percent. The weighted average effective permeability of the samples is 0.49 millidarcys, while the average initial fluid production pressure is 47.5 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 7 samples tested, 2 produced water and oil. This indicates that approximately 29 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 560 barrels of oil per acre. This is an average recovery of 280 barrels per acre foot from 2.0 feet of floodable sand analyzed in this core.

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

Original formation volume factor, estimated	1.06
Reservoir water saturation, percent, estimated	5.0
Average porosity, percent	17.8
Oil saturation after flooding, percent	45.5
Performance factor, percent, estimated	45.0
Net floodable sand, feet	2.0

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Lincoln 77 Lease Parmley Well No. 6

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	977.8	18.6	60	16	76	866	19.	0.9	0.9	779	17.10
2	978.8	15.3	85	14	99	1009	4.1	0.6	1.5	605	2.46
3	979.6	17.7	46	29	75	632	149.	1.0	2.5	632	149.00
4	980.6	15.8	80	10	90	981	3.1	1.0	3.5	981	3.10
5	981.7	18.0	70	8	78	978	14.	1.0	4.5	978	14.00
6	982.6	15.0	71	21	92	826	0.54	1.0	5.5	826	0.54
7	983.7	16.8	66	21	87	860	4.6	1.0	6.5	860	4.60

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Lincoln 77 Lease Parmley Well No. 6

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
977.5 - 984.0	6.5	29.4	190.80

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
977.5 - 984.0	6.5	16.8	67.4	17.2	871	5,661

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Lincoln 77 Lease Parmley Well No. 6

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	977.8	18.3	61	866	0	0	61	17	866	0	Imp.	-
2	978.8	15.3	85	1009	0	0	85	14	1009	0	Imp.	-
3	979.6	17.6	46	628	5	68	41	49	560	26	0.67	45
4	980.6	16.0	79	981	0	0	79	11	981	0	Imp.	-
5	981.7	18.0	70	978	20	279	50	41	699	8	0.30	50
6	982.6	14.8	72	827	0	0	72	22	827	0	Imp.	-
7	983.7	17.0	65	857	0	0	65	24	857	0	Imp.	-

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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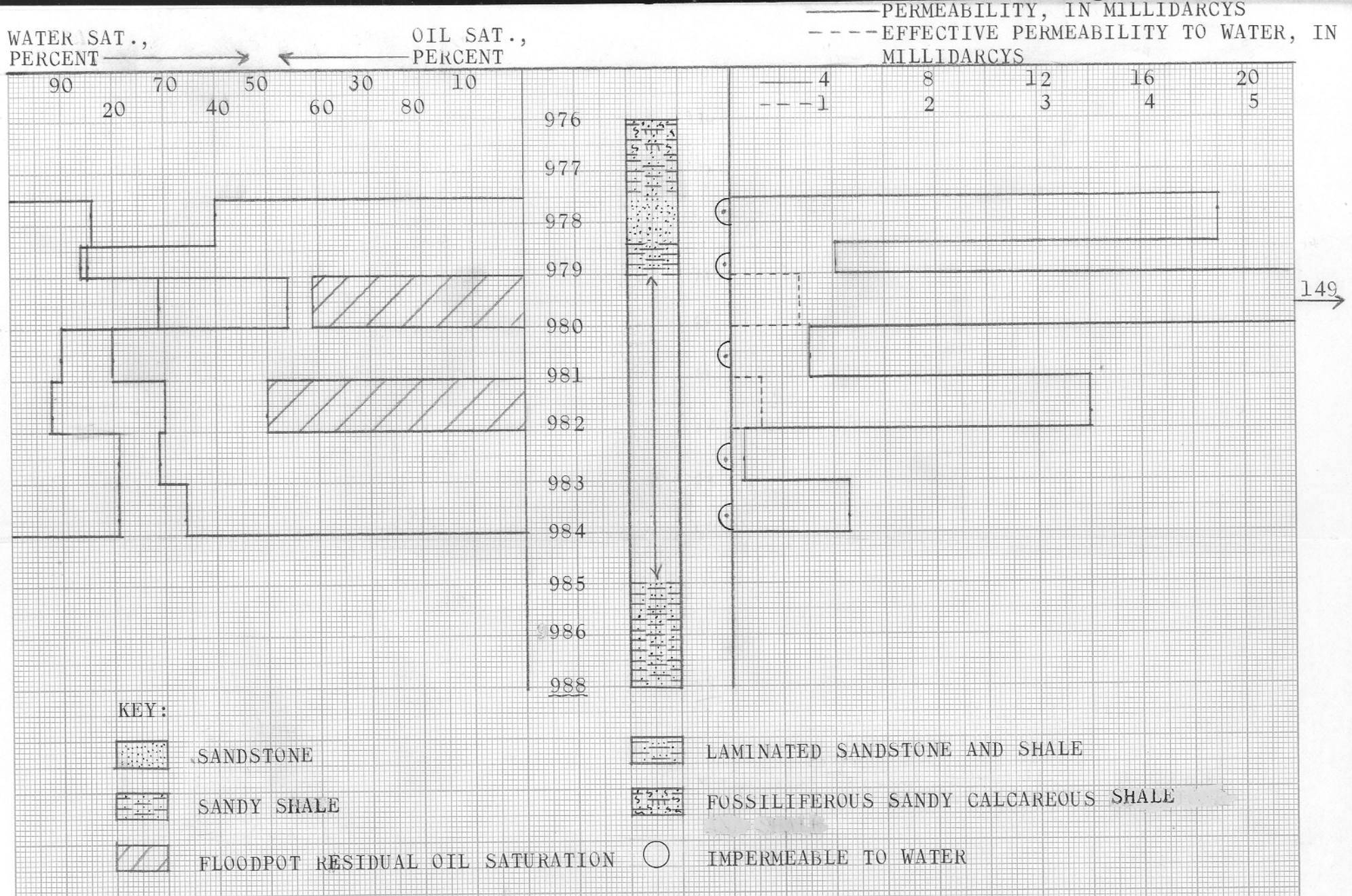
SUMMARY OF LABORATORY FLOODING TESTS

TABLE V

Company Lincoln 77 Lease Parmley Well No. 6

Depth Interval, Feet	977.5 - 984.0
Feet of Core Analyzed	2.0
Average Percent Porosity	17.8
Average Percent Original Oil Saturation	58.0
Average Percent Oil Recovery	12.5
Average Percent Residual Oil Saturation	45.5
Average Percent Residual Water Saturation	45.0
Average Percent Total Residual Fluid Saturation	90.5
Average Original Oil Content, Bbls./A. Ft.	804.
Average Oil Recovery, Bbls./A. Ft.	174.
Average Residual Oil Content, Bbls./A. Ft.	630.
Total Original Oil Content, Bbls./Acre	1,606.
Total Oil Recovery, Bbls./Acre	347.
Total Residual Oil Content, Bbls./Acre	1,259.
Average Effective Permeability, Millidarcys	0.49
Average Initial Fluid Production Pressure, p.s.i.	47.5

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


WATER SAT., PERCENT
OIL SAT., PERCENT
90 70 50 30 10
20 40 60 80
PERMEABILITY, IN MILLIDARCYS
EFFECTIVE PERMEABILITY TO WATER, IN MILLIDARCYS
4 8 12 16 20
1 2 3 4 5
976
977
978
979
980
981
982
983
984
985
986
988
149
KEY:
SANDSTONE
SANDY SHALE
FLOODPOT RESIDUAL OIL SATURATION
LAMINATED SANDSTONE AND SHALE
FOSSILIFEROUS SANDY CALCAREOUS SHALE
IMPERMEABLE TO WATER

LINCOLN 77

PARMLEY LEASE WELL NO. 6

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
977.5 - 984.0	6.5	16.8	67.4	17.2	29.4	560 (PRIMARY AND WATERFLOODING)

OILFIELD RESEARCH LABORATORIES
CHANUTE, KANSAS
APRIL, 1981

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