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

June 8, 1979

Lincoln 77
8485 Kathy Lane
Lincoln, Nebraska 68526

Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core taken from the Edwards Lease, Well No. 3, Coffey County, Kansas, and submitted to our laboratory on May 31, 1979.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Benjamin R. Pearman

BRP:cgb

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

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GENERAL INFORMATION & SUMMARY

Company Lincoln 77 Lease Edwards Well No. 3

Location N½ NW SW

Section 22 Twp. 22S Rge. 16E County Coffey State Kansas

Name of Sand	Lower Squirrel
Top of Core	1007.0
Bottom of Core	1016.0
Top of Sand	1007.0
Bottom of Sand	1011.6
Total Feet of Permeable Sand	4.6
Total Feet of Floodable Sand	2.0

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.
2 - 38	2.6	2.6
38 - 92	2.0	4.6

Average Permeability Millidarcys	51.9
Average Percent Porosity	17.4
Average Percent Oil Saturation	46.0
Average Percent Water Saturation	31.1
Average Oil Content, Bbls./A. Ft.	634.
Total Oil Content, Bbls./Acre	2,917.
Average Percent Oil Recovery by Laboratory Flooding Tests	20.0
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	295.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	589.
Total Calculated Oil Recovery, Bbls./Acre (Primary & Waterflooding)	660.
Packer Setting, Feet	
Viscosity, Centipoises @	
A. P. I. Gravity, degrees @ 60 °F	
Elevation, Feet	

The core was sampled and the samples sealed in plastic bags by a representative of the client. The well was drilled in semi-virgin territory. Fresh water mud was used as the circulating fluid while taking this core.

FORMATION CORED

The detailed log of the formation cored is as follows:

Depth Interval, Feet	Description
1007.0 - 1011.6	Brown laminated shaly sandstone.
1011.6 - 1016.0	Gray shale.

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 589 barrels of oil per acre was obtained from 2.0 feet of sand. The weighted average percent oil saturation was reduced from 57.0 to 37.0, or represents an average recovery of 20.0 percent. The weighted average effective permeability of the samples is 18.90 millidarcys, while the average initial fluid production pressure is 20.0 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 5 samples tested, 2 produced water and oil. This indicates that approximately 40 percent of the sand represented by these samples is floodable pay sand. The tests also show that the sand is rather laminated, particularly in the lower portion.

CALCULATED RECOVERY

A study of the results of the laboratory tests indicates that efficient primary and waterflooding operations in the vicinity of this well should recover approximately 660 barrels of oil per acre. This is an average recovery of 331 barrels per acre foot from the 2.0 feet of floodable pay sand analyzed in this core.

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

Original formation volume factor	1.04
Reservoir water saturation, percent	15.0
Average porosity, percent	19.2
Oil saturation after flooding, percent	37.0
Performance factor, percent	50.0
Net floodable pay sand, feet	2.0

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Lincoln 77 **Lease** Edwards **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	1007.3	17.6	59	22	81	806	84.	1.0	1.0	806	84.00
2	1008.3	20.8	55	16	71	888	23.	1.0	2.0	888	23.00
3	1009.7	17.4	34	40	74	459	38.	1.0	3.0	459	38.00
4	1010.5	15.6	38	41	79	460	92.	1.0	4.0	460	92.00
5	1011.5	14.5	45	40	85	506	2.6	0.6	4.6	304	1.56

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Lincoln 77 Lease Edwards Well No. 3

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
1007.0 - 1011.6	4.6	51.9	238.56

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
1007.0 - 1011.6	4.6	17.4	46.0	31.1	634	2,917

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Lincoln 77 Lease Edwards 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	1007.3	18.0	59	823	23	321	36	61	502	146	4.80	20
2	1008.3	20.3	55	865	17	268	38	60	597	299	33.00	20
3	1009.7	17.9	36	500	0	0	36	41	500	0	Imp.	-
4	1010.5	16.4	37	471	0	0	37	48	471	6	0.15	25
5	1011.5	14.9	45	519	0	0	45	45	519	12	0.38	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 Edwards Well No. 3

Depth Interval, Feet	1007.0 - 1011.6
Feet of Core Analyzed	2.0
Average Percent Porosity	19.2
Average Percent Original Oil Saturation	57.0
Average Percent Oil Recovery	20.0
Average Percent Residual Oil Saturation	37.0
Average Percent Residual Water Saturation	60.5
Average Percent Total Residual Fluid Saturation	97.5
Average Original Oil Content, Bbls./A. Ft.	845.
Average Oil Recovery, Bbls./A. Ft.	295.
Average Residual Oil Content, Bbls./A. Ft.	550.
Total Original Oil Content, Bbls./Acre	1,688.
Total Oil Recovery, Bbls./Acre	589.
Total Residual Oil Content, Bbls./Acre	1,099.
Average Effective Permeability, Millidarcys	18.90
Average Initial Fluid Production Pressure, p.s.i.	20.0

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