OILFIELD RESEARCH LABORATORIES
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October 7, 1983

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 Edwards 'B' Lease, Well No. 5, located in Coffey County, Kansas and submitted to our laboratory on September 30, 1983.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Sanford A. Michel

SAM/rmc

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

Oilfield Research Laboratories

GENERAL INFORMATION & SUMMARY

Company Lincoln 77 Lease Edwards 'B' Well No. 5

Location 1640' NSL & 330' WEL, SE¼

Section 17 Twp. 22S Rge. 16E County Coffey State Kansas

Elevation, Feet	
Name of Sand	Lower Squirrel
Top of Core	1008.0
Bottom of Core	1013.7
Top of Sand (Tested)	1009.2
Bottom of Sand	1012.5
Total Feet of Permeable Sand	2.5
Total Feet of Floodable Sand	1.9

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.
50 - 80	1.0	1.0
100 - 105	0.6	1.6
275 - 285	0.9	2.5

Average Permeability Millidarcys	151.4
Average Percent Porosity	20.4
Average Percent Oil Saturation	50.8
Average Percent Water Saturation	24.6
Average Oil Content, Bbls./A. Ft.	812.
Total Oil Content, Bbls./Acre	2,029.
Average Percent Oil Recovery by Laboratory Flooding Tests	12.2
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	189.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	359.
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
1008.0 - 1008.8	Gray slightly sandy shale.
1008.8 - 1009.2	Grayish brown very shaly sandstone.
1009.2 - 1010.1	Brownish black slightly calcareous slightly carbonaceous sandstone.
1010.1 - 1010.4	Grayish brown very shaly sandstone.
1010.4 - 1011.5	Brownish black slightly calcareous slightly carbonaceous sandstone.
1011.5 - 1012.0	Alternate layers gray shale and slightly calcareous slightly carbonaceous brownish black sandstone.
1012.0 - 1012.5	Brownish black slightly calcareous slightly carbonaceous sandstone.
1012.5 - 1013.7	Gray shale with scattered brown sandstone partings.

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 359 barrels of oil per acre was obtained from 1.9 feet of sand. The weighted average percent oil saturation was reduced from 55.8 to 43.6, or represents an average recovery of 12.2 percent. The weighted average effective permeability of the samples is 7.83 millidarcys, while the average initial fluid production pressure is 21.7 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 4 samples tested, 3 produced water and oil, and 1 produced water only. This indicates that approximately 75 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 650 barrels of oil per acre. This is an average recovery of 342 barrels per acre foot from 1.9 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	15.0
Average porosity, percent	20.5
Oil saturation after flooding, percent	43.6
Performance factor, percent, estimated	60.0
Net floodable sand, feet	1.9

RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Lincoln 77 Lease Edwards 'B' Well No. 5

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	1009.6	22.6	59	19	78	1035	280.	0.9	0.9	932	252.00
2	1010.5	20.1	35	38	73	546	101.	0.6	1.5	328	60.60
3	1011.4	19.3	60	17	77	898	54.	0.5	2.0	449	27.00
4	1012.3	17.9	46	26	72	639	78.	0.5	2.5	320	39.00

SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Lincoln 77 Lease Edwards 'B' Well No. 5

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
1009.2 - 1012.5	2.5	151.4	378.60

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
1009.2 - 1012.5	2.5	20.4	50.8	24.6	812	2,029

RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Lincoln 77 Lease Edwards 'B' Well No. 5

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	1009.6	22.4	59	1025	13	209	46	48	816	244	9.16	20
2	1010.5	20.1	35	546	0	0	35	58	546	168	6.12	25
3	1011.4	19.5	60	908	18	272	42	49	636	274	7.95	20
4	1012.3	18.0	46	642	5	70	41	50	572	252	5.32	25

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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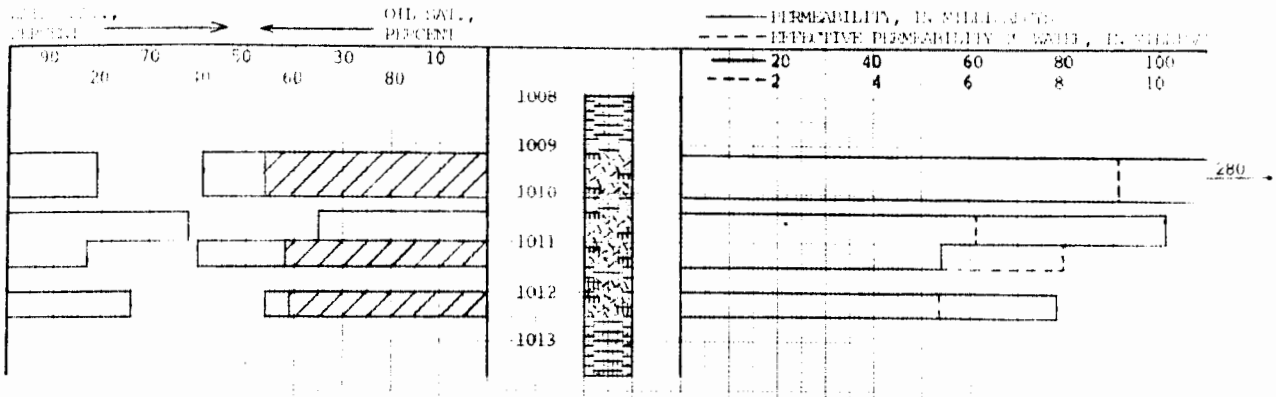
SUMMARY OF LABORATORY FLOODING TESTS

TABLE V

Company Lincoln 77 Lease Edwards 'B' Well No. 5

Depth Interval, Feet	1009.2 - 1012.5
Feet of Core Analyzed	1.9
Average Percent Porosity	20.5
Average Percent Original Oil Saturation	55.8
Average Percent Oil Recovery	12.2
Average Percent Residual Oil Saturation	43.6
Average Percent Residual Water Saturation	48.8
Average Percent Total Residual Fluid Saturation	92.4
Average Original Oil Content, Bbls./A. Ft.	893.
Average Oil Recovery, Bbls./A. Ft.	189.
Average Residual Oil Content, Bbls./A. Ft.	704.
Total Original Oil Content, Bbls./Acre	1,697.
Total Oil Recovery, Bbls./Acre	359.
Total Residual Oil Content, Bbls./Acre	1,338.
Average Effective Permeability, Millidarcys	7.83
Average Initial Fluid Production Pressure, p.s.i.	21.7

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



KEY:

- SANDY SHALE
- SHALE WITH SANDSTONE PARTINGS
- CALCAREOUS CARBONACEOUS SANDSTONE
- ALTERNATE LAYERS OF SHALE AND CALCAREOUS CARBONACEOUS SANDSTONE
- SHALY SANDSTONE
- FLOODOUT RESIDUAL OIL SATURATION

LINCOLN 77

EDWARDS "B" LEASE — WELL NO. 5

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
1009.2 - 1012.5	2.5	20.4	50.8	24.6	151.4	650 (PRIMARY AND WATERFLOODING)

OILFIELD RESEARCH LABORATORIES
CHANUTE, KANSAS
OCTOBER, 1983 RAL