

OILFIELD RESEARCH LABORATORIES

P. O. BOX 647 - CHANUTE, KANSAS 66720 - PHONE (316) 431-2650

November 8, 1983

Lincoln 77, Incorporated
P. O. Box 30538
Lincoln, Nebraska 68510

Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core taken from the Nelson Lease, Well No. 7, located in Coffey County, Kansas and submitted to our laboratory on November 3, 1983.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Benjamin R. Pearman

BRP/ph

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

Oilfield Research Laboratories
GENERAL INFORMATION & SUMMARY

Company Lincoln 77, Incorporated Lease Nelson Well No. 7
 Location NW $\frac{1}{4}$, SE $\frac{1}{4}$, NE $\frac{1}{4}$
 Section 33 Twp. 22S Rge. 16E County Coffey State Kansas

Elevation, Feet

Name of Sand.....	Lower Squirrel
Top of Core	1018.0
Bottom of Core	1030.0
Top of Sand	1018.5
Bottom of Sand (Tested)	1025.0
Total Feet of Permeable Sand	6.5
Total Feet of Floodable Sand	5.0

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.
4 - 6	1.0	1.0
11 - 16	2.5	3.5
20 - 40	3.0	6.5

Average Permeability Millidarcys	19.9
Average Percent Porosity	16.8
Average Percent Oil Saturation	51.8
Average Percent Water Saturation	31.4
Average Oil Content, Bbls./A. Ft.	678.
Total Oil Content, Bbls./Acre	4,410.
Average Percent Oil Recovery by Laboratory Flooding Tests	6.2
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	82.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	412.
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.

FORMATION CORED

The detailed log of the formation cored is as follows:

<u>Depth Interval, Feet</u>	<u>Description</u>
1018.0 - 1018.2	Gray limestone.
1018.2 - 1018.5	Grayish light brown limestone.
1018.5 - 1019.0	Brown sandstone with gray shale and mica partings.
1019.0 - 1022.0	Dark brown sandstone with scattered gray shale and mica partings.
1022.0 - 1024.0	Brownish black very slightly carbonaceous sandstone with scattered gray shale and mica partings.
1024.0 - 1025.0	Grayish brown shaly sandstone.
1025.0 - 1027.0	Gray shale with scattered brown sandstone partings.
1027.0 - 1028.0	Gray slightly sandy shale.
1028.0 - 1028.7	Grayish brown very shaly sandstone.
1028.7 - 1030.0	Gray slightly sandy shale.

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 412 barrels of oil per acre was obtained from 5.0 feet of sand. The weighted average percent oil saturation was reduced from 54.8 to 48.6, or represents an average recovery of 6.2 percent. The weighted average effective permeability of the samples is 0.75 millidarcys, while the average initial fluid production pressure is 36.0 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 7 samples tested, 5 produced water and oil. This indicates that approximately 71 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 980 barrels of oil per acre. This is an average recovery of 196 barrels per acre foot from 5.0 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	20.0
Average porosity, percent	17.1
Oil saturation after flooding, percent	48.6
Performance factor, percent, estimated	55.0
Net floodable sand, feet	5.0

RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Lincoln 77, Incorporated Lease Nelson Well No. 7

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	1018.6	15.5	42	30	72	505	11.	0.5	0.5	253	5.50
2	1019.6	17.2	48	46	94	641	15.	1.0	1.5	641	15.00
3	1020.4	16.9	54	30	84	708	12.	1.0	2.5	708	12.00
4	1021.5	17.7	56	29	85	769	20.	1.0	3.5	769	20.00
5	1022.6	16.0	60	25	85	745	32.	1.0	4.5	745	32.00
6	1023.4	17.4	56	21	77	756	39.	1.0	5.5	756	39.00
7	1024.4	16.5	42	38	80	538	5.8	1.0	6.5	538	5.80

SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Lincoln 77, Incorporated Lease Nelson Well No. 7

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
1018.5 - 1025.0	6.5	19.9	129.30

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
1018.5 - 1025.0	6.5	16.8	51.8	31.4	678	4,410

RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Lincoln 77, Incorporated Lease Nelson Well No. 7

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	1018.6	15.8	41	503	0	0	41	31	503	0	Imp.	-
2	1019.6	17.6	48	655	4	55	44	50	600	20	0.45	35
3	1020.4	17.2	54	721	7	93	47	45	628	26	0.52	30
4	1021.5	17.3	56	752	5	67	51	45	685	12	0.45	50
5	1022.6	16.3	60	759	3	38	57	41	721	22	0.37	35
6	1023.4	17.1	56	743	12	159	44	53	584	100	1.95	30
7	1024.4	17.0	41	541	0	0	41	39	541	0	Imp.	-

Notes: cc—cubic centimeter.

*—Volume of water recovered at the time of maximum oil recovery.

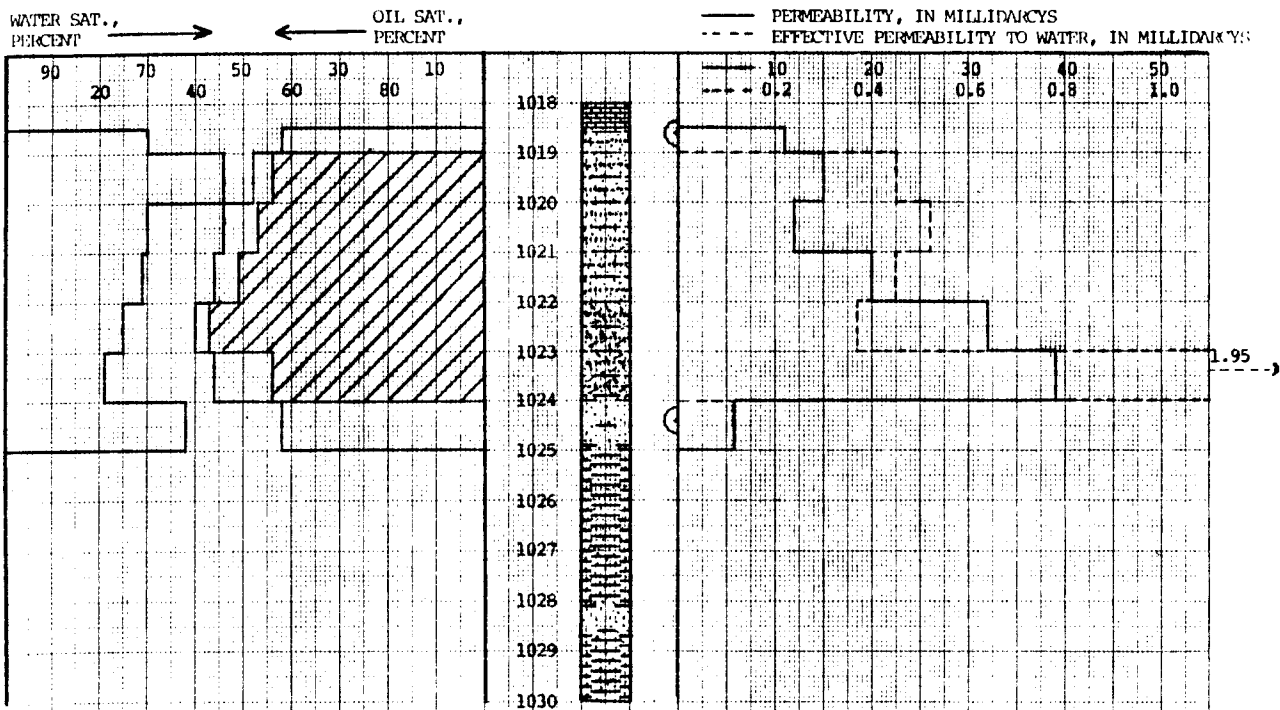
**—Determined by passing water through sample which still contains residual oil.

Oilfield Research Laboratories
SUMMARY OF LABORATORY FLOODING TESTS

TABLE V

Company	Lincoln 77, Incorporated	Lease	Nelson	Well No.	7
Depth Interval, Feet	1018.5 - 1025.0				
Feet of Core Analyzed	5.0				
Average Percent Porosity	17.1				
Average Percent Original Oil Saturation	54.8				
Average Percent Oil Recovery	6.2				
Average Percent Residual Oil Saturation	48.6				
Average Percent Residual Water Saturation	46.8				
Average Percent Total Residual Fluid Saturation	95.4				
Average Original Oil Content, Bbls./A. Ft.	726.				
Average Oil Recovery, Bbls./A. Ft.	82.				
Average Residual Oil Content, Bbls./A. Ft.	644.				
Total Original Oil Content, Bbls./Acre	3,630.				
Total Oil Recovery, Bbls./Acre	412.				
Total Residual Oil Content, Bbls./Acre	3,218.				
Average Effective Permeability, Millidarcys	0.75				
Average Initial Fluid Production Pressure, p.s.i.	36.0				

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



LINCOLN 77, INCORPORATED

NELSON LEASE

COFFEY COUNTY, KANSAS

WELL NO. 7

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
1018.5 - 1025.0	6.5	16.8	51.8	31.4	19.9	980 (PRIMARY AND WATERFLOODING)

OILFIELD RESEARCH LABORATORIES
 CHANUTE, KANSAS
 NOVEMBER, 1983 RAL

Lincoln 77, Inc.

Le

10, D3

Bartlett #9 • API # 15-031-21, 356
NE SE NE of NE $\frac{1}{4}$, Sec 12, T23S-R16E
Coffey County, Kansas LOWER SQUIRREL
3/29/83 Cored 923-943 (full Recovery)
Boxed 923-943.2 (7 Boxes) 8-m log CA

10, D3

Carmean-Wood #8 ϕ API # 15-031-21, 373
1940' EWL & 250' ^{SW SE SW} NSL of SW $\frac{1}{4}$, Sec 10, T23S-R16E,
Coffey County, Kansas LOWER SQUIRREL
5/27/83 Cored: 965-985 (Recovered 965-980.3
Boxed 967.8 - 976.6 (3 Boxes) No 8-m log no

ND, D3

Carmean-Wood #9 ϕ API # 15-031-21, 447
1650' EWL & 2310' NSL of SW $\frac{1}{4}$ or NW NESW
Sec. 10, T23S-R16E, Coffey County, Kansas
Cored 976-996 (full recovery) Boxed 976-987.5
(4 Boxes) LOWER SQUIRREL No 8-m log CI

ND, D2

OVER
SQUIRREL

Edwards "C" #3 ϕ API # 15-031-21, 428
2310 WEL & 330' NSL SE $\frac{1}{4}$ or SW SWSE
Sec. 22, T22S-R16E, Coffey County, Kansas
Cored 1015-1035 (Recovered 1015-1034.1) Oct. 1982
Boxed 1015-1018 & 1022-1025 (2 Boxes) 8-m log ^A

OVER
SQUIRREL

ND, D2

Edwards "B" #5 • API # 15-031-21, 427 9/28/83
1640 NSL & 330 WEL of SE $\frac{1}{4}$ or SE NESE, Sec. 17, T22S-R.16E
Cored 1007-1027 (full recovery) Boxed 1007.9-1013.9
(2 Boxes) 8-m log & CA Coffey County, Ka.

Lincoln 77, Inc.

2

ND, D3

Edwards "B" #6 • API # 15-031-21,435
2310 NSL & 330 WEL SE $\frac{1}{4}$ or NENESE Sec 17, T22S-R16E
Coffey County, Kansas 9/30/83
LOWER SQUIRREL CORED 1014-1034 (Full Recovery)
Boxed 1015.13-1018.3 (1 Box) 8-M log & CA

ND, D2

Lampe #2 • API # 15-207-24,513
295' EWL & 330' NSL SE $\frac{1}{4}$, Sec 19, T24S-R17E
WOODSON COUNTY, KANSAS
CORE # 1: BANDERA Quarry Ss (Marmaton)
9/13/83 743-762 (Recovered 743-761.4)
Boxed 744-756 (4 Boxes) No 8-m No

ND, D2

CORE # 2: LOWER SQUIRREL (UPPER CHEROKEE)
9/14/83 907-926 (Recovered 907-925.6)
Boxed 910-922 (4 Boxes) No 8-m log No

ND, D2

Meats #10 • API # 15-031-21,347
1320 EWL & 330 NSL SW $\frac{1}{4}$, Sec. 12, T23S-R16E
Coffey County, Kansas LOWER SQUIRREL
Cored 939-959 (Full Recovery) Boxed 939-957
(6 Boxes) 2/2/83 8-m log CA

Lincoln 77, Inc.

ND, D2 Nelson # 7 • API # 15-031-21,426
1110 WEL & 1340 SNL NE $\frac{1}{4}$, or NW SE NE
Section 33, T22S-R16E, Coffey County, Kansas
11/1/83 LOWER SQUIRREL
Cored 1018-1038 (Full Recovery) Boxed 1018-10
(4 Boxes) 8-m log & CA

D, D3 Parmely # 8 • API # 15-031-21,420
NE NW SW, Sec 29, T22S-R17E Coffey Count,
Kansas 11/16/83 Cored LOWER Squirrel
981-1001 (Full Recovery) Boxed 983.1-991.8
(3 Boxes) 8-m log & CA

D, D3 Sauder # 2 • API # 15-031-21,419
10/24/83 2310' SNL & 1547' EWL Sec 10,
T23S-R16E, Coffey County, Kansas
Core: Lower Squirrel 977-997 (Full Recover
Boxed 977-991.7 (5 Boxes) 8-m log CA

ND, D3 Smart # 1 $\odot$ API # 15-031-21,374
6/6/83 1650 EWL & 330 NSL of SW $\frac{1}{4}$
Sec. 24, T21S-R15E, Coffey County, Kansas
Cored Lower Squirrel: 1142-1162 (Full Rec
Boxed 1147-1156 (3 Boxes) No 8-m log No C

Lincoln 77, Inc

Thomas #1 ϕ API # 15-207-24,635
NE NE SE $\frac{1}{4}$, Sec 22, T23S-R16E

~~Coffey County~~ Woodson County, Kansas
No 8-in log No CA

N/D, D3

11/22/83 Core #1: Upper Squirrel 948-968

(Full Recovery) Boxed 948-957 (3 Box)

11/22/83 Core #2: Lower Squirrel 978-997

(full recovery) Boxed 981.7-993.7 (4 Box)