

OILFIELD RESEARCH LABORATORIES

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

May 5, 1982

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 Meats Lease, Well No. 9, located in Coffey County, Kansas and submitted to our laboratory on April 30, 1982.

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

- REGISTERED ENGINEERS -

CORE ANALYSIS - WATER ANALYSIS - REPRESSURING ENGINEERING - SURVEYING & MAPPING - PROPERTY EVALUATION & OPERATION

Oilfield Research Laboratories

GENERAL INFORMATION & SUMMARY

Company Lincoln 77 Lease Meats Well No. 9
 Location 1447' SNL & 1032' WEL, SW $\frac{1}{4}$
 Section 12 Twp. 23S Rge. 16E County Coffey State Kansas

Elevation, Feet

Name of Sand.....

Lower Squirrel

Top of Core

937.0

Bottom of Core

951.0

Top of Sand

938.0

Bottom of Sand

948.9

Total Feet of Permeable Sand

8.0

Total Feet of Floodable Sand

6.1

Distribution of Permeable Sand:
Permeability Range
Millidarcys

Feet

Cum. Ft.

13 - 25

3.5

3.5

25 - 45

3.5

7.0

130 - 140

1.0

8.0

Average Permeability Millidarcys

39.2

Average Percent Porosity

20.5

Average Percent Oil Saturation

54.5

Average Percent Water Saturation.....

16.3

Average Oil Content, Bbls./A. Ft.

870.

Total Oil Content, Bbls./Acre.....

6,961.

Average Percent Oil Recovery by Laboratory Flooding Tests.....

14.5

Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.

233.

Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre

1,423.

Total Calculated Oil Recovery, Bbls./Acre.....

See "Calculated Recovery"
Section

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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 semi-virgin area, and the client also reported that the depth interval 934.0 - 954.0 was cored, however, only the depth interval 937.0 - 951.0 was delivered to the laboratory.

FORMATION CORED

The detailed log of the formation cored is as follows:

<u>Depth Interval, Feet</u>	<u>Description</u>
937.0 - 938.0	Gray shale.
938.0 - 939.0	Brown sandstone with scattered gray shale partings.
939.0 - 942.5	Brown sandstone.
942.5 - 943.4	Brown sandstone with gray shale partings.
943.4 - 943.8	Brown sandstone.
943.8 - 944.2	Brown sandstone with gray shale partings.
944.2 - 946.1	Brown sandstone.
946.1 - 947.7	Gray shale with widely scattered brown sandstone partings.
947.7 - 948.9	Brown sandstone.
948.9 - 951.0	Gray shale with widely scattered brown sandstone partings.

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 1,423 barrels of oil per acre was obtained from 6.1 feet of sand. The weighted average percent oil saturation was reduced from 57.3 to 42.8, or represents an average recovery of 14.5 percent.

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The weighted average effective permeability of the samples is 0.50 millidarcys, while the average initial fluid production pressure is 29.4 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 10 samples tested, 8 produced water and oil. This indicates that approximately 80 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 2,350 barrels of oil per acre. This is an average recovery of 384 barrels per acre foot from 6.1 feet of floodable sand analyzed in this core.

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

Original formation volume factor, estimated	1.05
Reservoir water saturation, percent, estimated	10.0
Average porosity, percent	21.0
Oil saturation after flooding, percent	42.8
Performance factor, percent, estimated	55.0
Net floodable sand, feet	6.1

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

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	938.2	17.2	43	18	61	574	18.	1.0	1.0	574	18.00
2	939.5	20.1	60	13	73	936	30.	1.0	2.0	936	30.00
3	940.4	20.0	53	15	68	822	32.	1.0	3.0	822	32.00
4	941.4	19.5	55	18	73	832	25.	1.0	4.0	832	25.00
5	942.3	20.0	62	13	75	962	20.	0.5	4.5	481	10.00
6	943.5	20.5	50	20	70	795	24.	0.4	4.9	318	9.60
7	944.5	20.5	49	19	68	779	13.	0.9	5.8	701	11.70
8	945.5	24.0	55	19	74	1024	139.	1.0	6.8	1024	139.00
9	947.8	22.3	58	14	72	1003	43.	0.5	7.3	502	21.50
10	948.3	21.5	66	12	78	1101	24.	0.7	8.0	771	16.80

Company Lincoln 77

Lease Meats

Well No. 9

Oilfield Research Laboratories

SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company		Lincoln 77	Lease	Meats	Well No.	9
Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.			
938.0 - 948.9	8.0	39.2	313.60			
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 Bbl./Acre
938.0 - 948.9	8.0	20.5	54.5	16.3	870	6,961

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Lincoln 77			Lease Meats			Well No. 9					
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.
			%	Bbbls./A. Ft.	%	Bbbls./A. Ft.	% Oil	% Water			
1	938.2	17.7	42	577	0	0	42	19	0	Imp.	-
2	939.5	20.2	60	940	25	392	35	51	42	0.60	30
3	940.4	20.1	53	826	14	218	39	52	40	0.60	10
4	941.4	19.4	55	828	10	151	45	45	16	0.23	30
5	942.3	19.9	62	957	18	278	44	45	30	0.45	30
6	943.5	20.4	50	791	8	127	42	44	10	0.15	45
7	944.5	21.0	48	782	0	0	48	20	0	Imp.	-
8	945.5	23.9	55	1020	10	185	45	43	52	0.82	20
9	947.8	22.4	58	1008	9	156	49	40	52	0.75	25
10	948.3	21.4	66	1096	18	299	48	42	14	0.23	45

Company Lincoln 77

Lease Meats

Well No. 9

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.

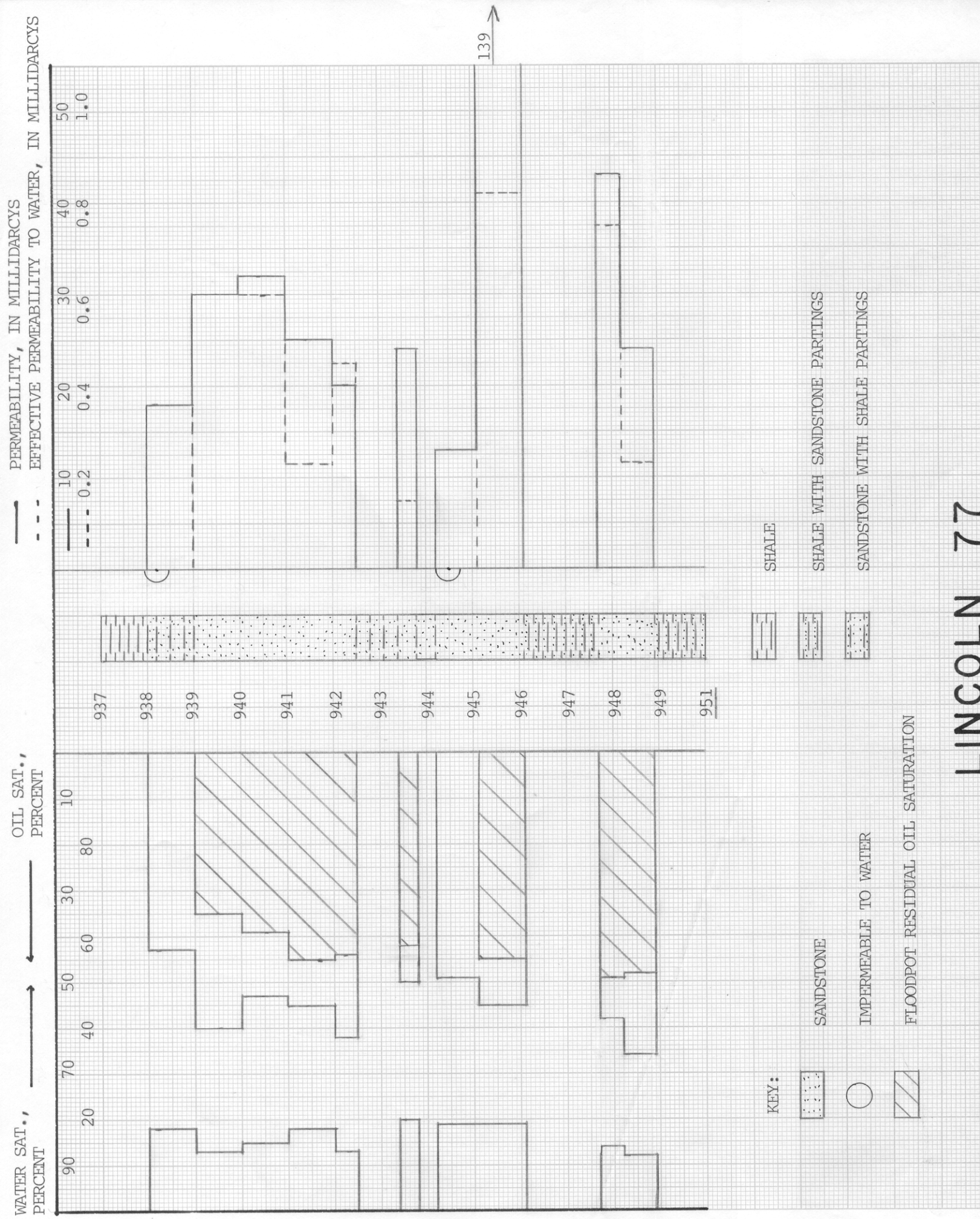
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SUMMARY OF LABORATORY FLOODING TESTS

TABLE V

Company	Lincoln 77	Lease	Meats	Well No.	9
Depth Interval, Feet	938.0 - 948.9				
Feet of Core Analyzed	6.1				
Average Percent Porosity	21.0				
Average Percent Original Oil Saturation	57.3				
Average Percent Oil Recovery	14.5				
Average Percent Residual Oil Saturation	42.8				
Average Percent Residual Water Saturation	46.0				
Average Percent Total Residual Fluid Saturation	88.8				
Average Original Oil Content, Bbls./A. Ft.	931.				
Average Oil Recovery, Bbls./A. Ft.	233.				
Average Residual Oil Content, Bbls./A. Ft.	698.				
Total Original Oil Content, Bbls./Acre	5,681.				
Total Oil Recovery, Bbls./Acre	1,423.				
Total Residual Oil Content, Bbls./Acre	4,258.				
Average Effective Permeability, Millidarcys	0.50				
Average Initial Fluid Production Pressure, p.s.i.	29.4				

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



IMPERMEABLE TO WATER



SANDSTONE WITH SHALE PARTINGS



FLOODPOT RESIDUAL OIL SATURATION

LINCOLN 77

MEATS LEASE

WELL NO. 9

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
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938.0 - 948.9

8.0

20.5

54.5

16.3

39.2

2350

(PRIMARY AND
WATERFLOODING)

OILFIELD RESEARCH LABORATORIES
CHANUTE, KANSAS
MAY, 1982
PDC