



OILFIELD RESEARCH LABORATORIES

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December 28, 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 S. Meats Lease, Well No. 6, Coffey County, Kansas, and submitted to our laboratory on December 4, 1979.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES


Benjamin R. Pearman

BRP/tem
4 c to Lincoln, Nebraska
1 c to Topeka, Kansas

Oilfield Research Laboratories

GENERAL INFORMATION & SUMMARY

Company	Lincoln 77	Lease	S. Meats	Well No.	6
Location	E $\frac{1}{2}$ E $\frac{1}{2}$ E $\frac{1}{2}$ SW				
Section	12	Twp.	23S	Rge.	16E
		County	Coffey		State Kansas
Name of Sand					Lower Squirrel
Top of Core					934.0
Bottom of Core					952.0
Top of Sand					937.6
Bottom of Sand					950.4
Total Feet of Permeable Sand					7.0
Total Feet of Floodable Sand					3.8
Distribution of Permeable Sand:					
Permeability Range Millidarcys	Feet	Cum. Ft.			
0 - 3	2.7	2.7			
9 - 50	1.9	4.6			
50 - 101	0.9	5.5			
101 & Above	1.5	7.0			
Average Permeability Millidarcys					59.8
Average Percent Porosity					18.0
Average Percent Oil Saturation					58.3
Average Percent Water Saturation					29.3
Average Oil Content, Bbls./A. Ft.					711.
Total Oil Content, Bbls./Acre					4,971.
Average Percent Oil Recovery by Laboratory Flooding Tests					8.4
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.					129.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre					489.
Total Calculated Oil Recovery, Bbls./Acre					See "Calculated Recovery" Section.
Packer Setting, Feet					
Viscosity, Centipoises @					
A. P. I. Gravity, degrees @ 60 °F					
Elevation, Feet					

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The core was sampled and the samples sealed in plastic bags by a representative of the client. The well was reported to have been drilled in virgin territory using fresh water mud as the circulating fluid.

FORMATION CORED

The detailed log of the formation cored is as follows:

<u>Depth Interval, Feet</u>	<u>Description</u>
934.0 - 937.0	Reported to be gray shale.
937.0 - 937.6	Gray sandy shale.
937.6 - 938.4	Brown shaly sandstone.
938.4 - 940.0	Brown slightly shaly sandstone.
940.0 - 941.1	Gray slightly sandy shale.
941.1 - 942.0	Brown sandstone containing thin widely scattered streaks of shale.
942.0 - 942.5	Gray and light brown laminated shale and sandstone.
942.5 - 942.8	Brown sandstone.
942.8 - 944.0	Gray and light brown laminated shale and sandstone.
944.0 - 945.0	Brown sandstone containing thin streaks of shale.
945.0 - 946.0	Gray and brown laminated shale and sandstone, 40% sandstone.
946.0 - 949.0	Reported to be gray shale.
949.0 - 950.4	Light brown and gray laminated sandstone and shale, 60% sandstone.
950.4 - 950.8	Gray and light brown laminated shale and sandstone, 10% sandstone.
950.8 - 952.0	Gray sandy shale.

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LABORATORY FLOODING TESTS

Please note that the coregraph now presents residual oil saturation after flooding tests instead of recovery as in the past.

The upper portion of the sand in this core (938.4 - 945.0 feet) responded to laboratory flooding tests, as a total recovery of 489 barrels of oil per acre was obtained from 3.8 feet of sand. The weighted average percent oil saturation was reduced from 52.5 to 44.1, or represents an average recovery of 8.4 percent. The weighted average effective permeability of the samples is 5.04 millidarcys, while the average initial fluid production pressure is 22.9 pounds per square inch (See Table V).

CALCULATED RECOVERY

A study of the results of the laboratory testing indicates that efficient primary and waterflooding operations in the vicinity of this well should recover approximately 1,020 barrels of oil per acre. This is an average recovery of 269 barrels per acre foot from the 3.8 feet of floodable pay 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	12.0
Average porosity, percent	19.4
Oil saturation after flooding, percent	44.1
Performance factor, percent, estimated	45.0
Net floodable pay sand, feet	3.8

RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Lincoln 77

Lease S. Meats

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	937.8	15.5	52	34	86	625	1.6	0.8	0.8	500	1.28
2	938.5	17.9	48	25	73	667	24.	0.6	1.4	400	14.40
3	939.3	16.8	53	17	70	691	203.	1.0	2.4	691	203.00
4	941.2	16.8	55	34	89	717	57.	0.4	2.8	287	22.80
5	941.8	20.2	56	18	74	878	2.4	0.5	3.3	439	1.20
6	942.7	21.2	59	14	73	970	42.	0.3	3.6	291	12.60
7	944.1	23.7	48	21	69	883	203.	0.5	4.1	442	101.50
8	944.9	20.7	53	19	72	851	101.	0.5	4.6	426	50.50
9	945.6	15.7	60	29	89	731	9.2	1.0	5.6	731	9.20
10	949.2	17.7	36	36	72	494	0.75	0.5	6.1	247	0.38
11	949.8	17.7	45	34	79	618	2.7	0.5	6.6	309	1.35
12	950.3	17.6	38	37	75	519	0.29	0.4	7.0	208	0.12

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Lincoln 77 Lease S. Meats Well No. 6

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.	Average Percent Oil Saturation	Average Percent Water Saturation	Average Percent Porosity	Feet of Core Analyzed	Average Oil Content Bbl./A. Ft.	Total Oil Content Bbls./Acre
937.6 - 950.4	7.0	59.8	418.33						
937.6 - 950.4	7.0			58.3	29.3	18.0	7.0	711	4,971

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Lincoln 77 Lease S. Meats 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			
1	937.8	15.8	50	612	0	0	50	38	0	Imp.	-
2	938.5	17.4	48	648	3	40	45	47	11	0.30	20
3	939.3	17.2	53	706	8	107	45	47	66	2.48	30
4	941.2	17.3	55	738	13	174	42	44	17	0.53	25
5	941.8	20.5	56	890	11	175	45	40	14	0.45	30
6	942.7	21.7	59	991	17	286	42	41	12	0.45	30
7	944.1	24.0	48	893	7	130	41	48	208	17.48	15
8	944.9	20.8	53	854	6	97	47	44	190	14.33	10
9	945.6	15.5	59	709	0	0	59	30	0	Imp.	-
10	949.2	18.0	34	474	0	0	34	40	0	Imp.	-
11	949.8	17.7	45	616	0	0	45	36	0	Imp.	-
12	950.3	17.7	40	549	0	0	40	38	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	S. Meats	Well No.	6
Depth Interval, Feet	938.4 - 945.0				
Feet of Core Analyzed	3.8				
Average Percent Porosity	19.4				
Average Percent Original Oil Saturation	52.5				
Average Percent Oil Recovery	8.4				
Average Percent Residual Oil Saturation	44.1				
Average Percent Residual Water Saturation	45.1				
Average Percent Total Residual Fluid Saturation	89.2				
Average Original Oil Content, Bbls./A. Ft.	793.				
Average Oil Recovery, Bbls./A. Ft.	129.				
Average Residual Oil Content, Bbls./A. Ft.	664.				
Total Original Oil Content, Bbls./Acre	3,009.				
Total Oil Recovery, Bbls./Acre	489.				
Total Residual Oil Content, Bbls./Acre	2,520.				
Average Effective Permeability, Millidarcys	5.04				
Average Initial Fluid Production Pressure, p.s.i.	22.9				

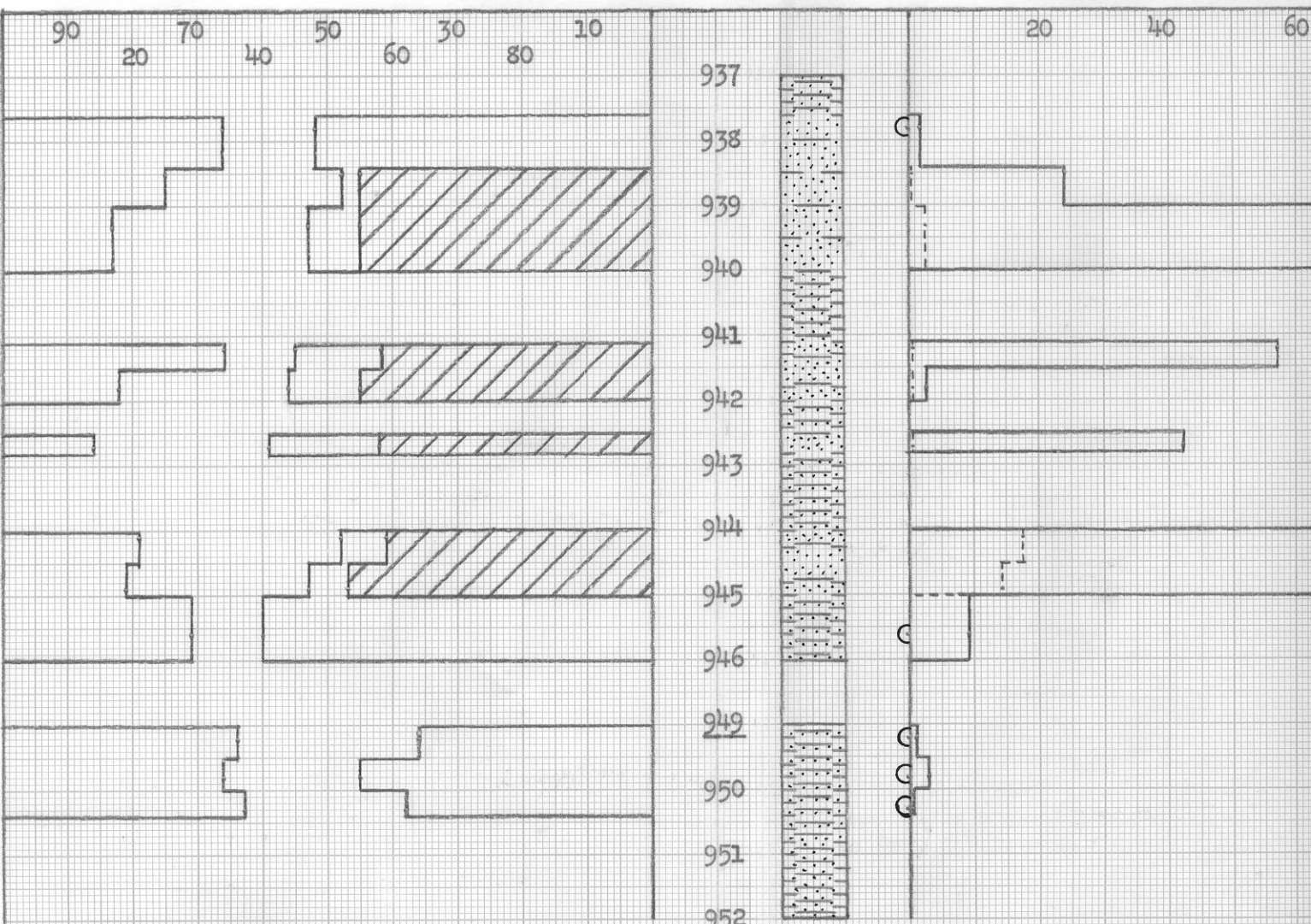
NOTE: Only those samples which recovered oil were used in calculating the above averages.

WATER SAT.,
PERCENT



OIL SAT.,
PERCENT

— PERMEABILITY, MILLI
--- EFFECTIVE PERMEABIL



KEY:



FLOODPOT RESIDUAL OIL SATURATION



SANDSTONE



SHALY SANDSTONE



IMPERMEABLE TO WATER



SANDSTONE CONTAINING SHALE ST



LAMINATED SANDSTONE AND SHALE



SANDY SHALE

LINCOLN 77

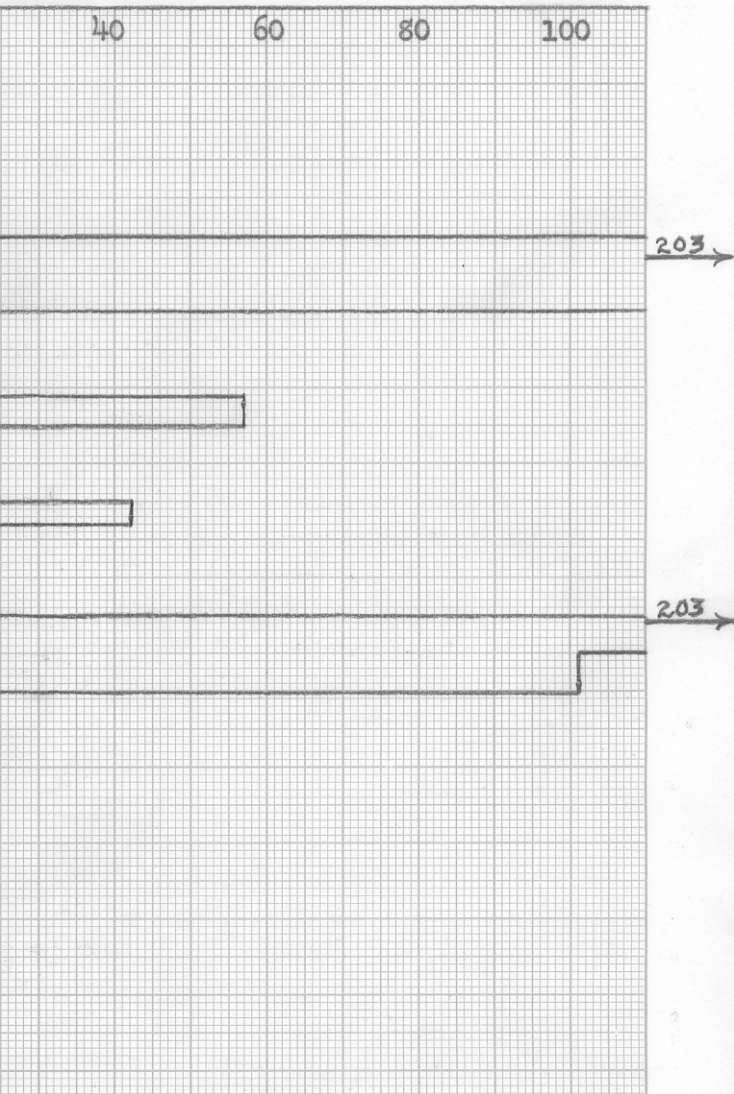
S. MEATS LEASE

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	
937.6 - 950.4	7.0	18.0	58.3	29.3	59.8	1

PERMEABILITY, MILLIDARCYS
EFFECTIVE PERMEABILITY TO WATER, MILLIDARCYS



CONTAINING SHALE STREAKS
SANDSTONE AND SHALE

AVERAGE PERMEABILITY, MILLIDARCYS	CALCULATED OIL RECOVERY BBLs./ACRE
59.8	1,020 (PRIMARY & WATERFLOODING)