OILFIELD RESEARCH LABORATORIES
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September 5, 1980

Lincoln 77
8485 Kathy Lane
Lincoln, Nebraska 68526

Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core taken from the Gleue Lease, Well No. 8, Coffey County, Kansas and submitted to our laboratory on June 11, 1980.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Sanford A. Michel

SAM/ks

5 c to Lincoln, Nebraska

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GENERAL INFORMATION & SUMMARY

Company Lincoln 77 Lease Gleue Well No. 8

Location NW¼ – NE¼ – SE¼

Section 21 Twp. 22S Rge. 16E County Coffey State Kansas

Elevation, Feet	–
Name of Sand	Squirrel
Top of Core	1010.0
Bottom of Core	1030.6
Top of Sand	1010.0
Bottom of Sand	1018.7
Total Feet of Permeable Sand	6.3
Total Feet of Floodable Sand	1.6

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.
0 – 1	2.7	2.7
1 – 5	2.2	4.9
90 – 100	0.7	5.6
200 – 300	0.7	6.3

Average Permeability Millidarcys	39.7
Average Percent Porosity	14.2
Average Percent Oil Saturation	27.8
Average Percent Water Saturation	58.0
Average Oil Content, Bbls./A. Ft.	330.
Total Oil Content, Bbls./Acre	2868.
Average Percent Oil Recovery by Laboratory Flooding Tests	7.4
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	98.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	156.
Total Calculated Oil Recovery, Bbls./Acre	See "Calculated Recovery" Section

The core was sampled in the laboratory after being delivered by the client. Fresh water mud was used as a drilling fluid.

FORMATION CORED

The detailed log of the formation cored is as follows:

Depth Interval, Feet	Description
1010.0 - 1010.8	Gray shaly sandstone.
1010.8 - 1013.8	Grayish brown very shaly sandstone.
1013.8 - 1014.7	Grayish brown shaly sandstone.
1014.7 - 1016.3	Gray and brown laminated sandstone and shale.
1016.3 - 1017.7	Dark brown sandstone.
1017.7 - 1018.7	Grayish brown very shaly sandstone.
1018.7 - 1030.6	Gray shale.

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 156 barrels of oil per acre was obtained from 1.6 feet of sand. The weighted average percent oil saturation was reduced from 40.4 to 33.0, or represents an average recovery of 7.4 percent. The weighted average effective permeability of the samples is 10.20 millidarcys, while the average initial fluid production pressure is 25.0 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 9 samples tested, 2 produced water and oil, and 1 sample produced water only. This indicates that approximately 22 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 380 barrels of oil per acre. This is an average recovery of 239 barrels per acre foot from 1.6 feet of floodable sand analyzed in this core.

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

Original formation volume factor, estimated	1.08
Reservoir water saturation, percent, estimated	20.0
Average porosity, percent	15.0
Oil saturation after flooding, percent	33.0
Performance factor, percent, estimated	50.0
Net floodable sand, feet	1.6

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Lincoln 77 Lease Gleue Well No. 8

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	1010.5	12.0	9	89	98	84	Imp.	0.8	0.8	67	0.00
2	1012.2	13.6	24	60	84	253	0.87	1.7	2.5	430	1.48
3	1013.5	14.2	34	47	81	375	1.5	1.3	3.8	488	1.95
4	1014.5	12.1	36	61	97	338	4.1	0.9	4.7	304	3.69
5	1015.7	13.7	14	74	88	149	Imp.	1.3	6.0	194	0.00
6	1016.1	22.6	51	25	76	894	*	0.3	6.3	268	*
7	1016.7	18.8	51	25	76	744	255.	0.7	7.0	521	178.50
8	1017.3	18.3	46	26	72	653	92.	0.7	7.7	457	64.40
9	1018.2	11.2	16	76	92	139	0.18	1.0	8.7	139	0.18

* Unable to obtain permeability plug.

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Lincoln 77 Lease Gleue Well No. 8

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
1010.0 - 1018.7	6.3	39.7	250.20

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
1010.0 - 1018.7	8.7	14.2	27.8	58.0	330	2,868

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Lincoln 77 Lease Gleue Well No. 8

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	1010.5	12.1	9	84	0	0	9	89	84	0	Imp.	-
2	1012.2	14.0	23	250	0	0	23	62	250	0	Imp.	-
3	1013.5	14.1	34	372	0	0	34	50	344	0	Imp.	-
4	1014.5	12.3	36	344	3	29	33	64	315	16	0.15	40
5	1015.7	13.8	14	150	0	0	14	76	150	19	0.15	40
6	1016.1	22.5	51	890	0	0	51	26	890	0	Imp.	-
7	1016.7	19.2	50	745	0	0	50	29	745	0	Imp.	-
8	1017.3	18.4	46	657	13	186	33	50	471	196	23.24	10
9	1018.2	11.5	16	143	0	0	16	76	143	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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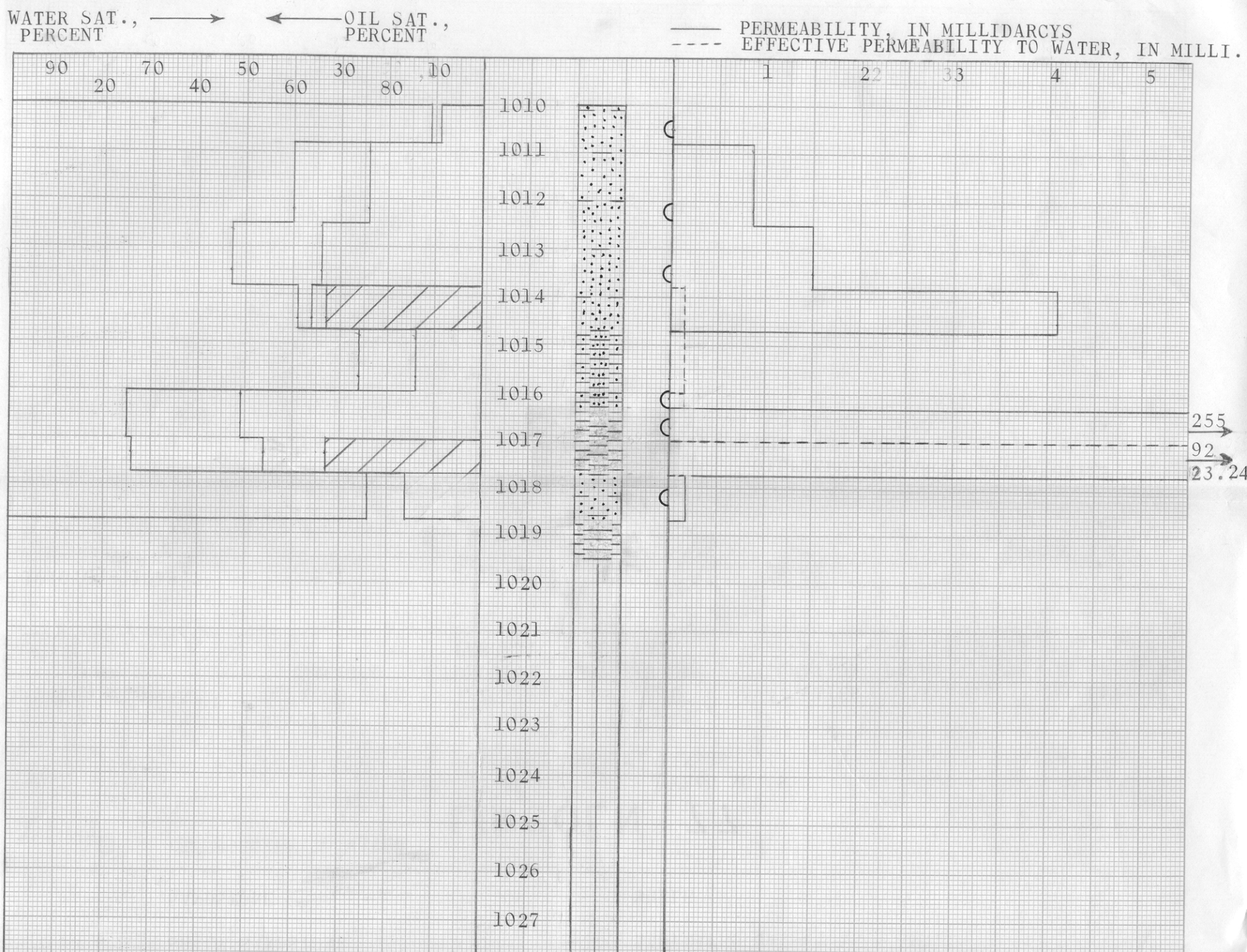
SUMMARY OF LABORATORY FLOODING TESTS

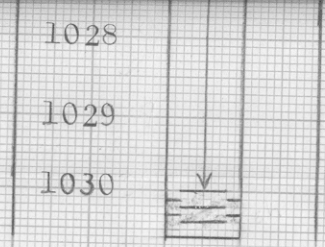
TABLE V

Company Lincoln 77 Lease Gleue Well No. 8

Depth Interval, Feet	1010.0 - 1018.7
Feet of Core Analyzed	1.6
Average Percent Porosity	15.0
Average Percent Original Oil Saturation	40.4
Average Percent Oil Recovery	7.4
Average Percent Residual Oil Saturation	33.0
Average Percent Residual Water Saturation	57.9
Average Percent Total Residual Fluid Saturation	90.9
Average Original Oil Content, Bbls./A. Ft.	481.
Average Oil Recovery, Bbls./A. Ft.	98.
Average Residual Oil Content, Bbls./A. Ft.	383.
Total Original Oil Content, Bbls./Acre	769.
Total Oil Recovery, Bbls./Acre	156.
Total Residual Oil Content, Bbls./Acre	613.
Average Effective Permeability, Millidarcys	10.20
Average Initial Fluid Production Pressure, p.s.i.	25.0

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





KEY:

SHALY SANDSTONE

SANDSTONE

IMPERMEABLE TO WATER

LAMINATED SANDSTONE & SHALE

SHALE

LINCOLN 77

GLEUE LEASE WELL NO. 8

COFFEY COUNTY, KANSAS

DEPTH INTERVAL, FEET	FEET OF CORE ANALYZED	AVERAGE POROSITY PERCENT	AVG. OIL SATURATION PERCENT	AVG. WATER SATURATION PERCENT	AVERAGE PERMEABILITY MILLIDARCYS	CALCULATED OIL RECOVERY BBLS./ACRE
1010.0 - 1018.7	8.7	14.2	27.8	58.0	39.7	380 (PRIMARY & WATERFLOODING)