OILFIELD RESEARCH LABORATORIES
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December 5, 1979

W. D. Oil Company
127 West Tenth Street
Suite 430
Kansas City, Missouri 64105

Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core taken from the Freda Koopman Lease, Well No. 1, Miami County, Kansas, and submitted to our laboratory on November 29, 1979.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Benjamin R. Pearman

SAM/tem
4 c to Kansas City, Missouri
2 c to Baldwin City, Kansas

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GENERAL INFORMATION & SUMMARY

Company W.D. Oil Company Lease Freda Koopman Well No. 1

Location 150' South & 150' East of Windmill

Section 20 Twp. 18S Rge. 24E County Miami State Kansas

Name of Sand	Squirrel
Top of Core	483.0
Bottom of Core	485.0
Top of Sand	483.0
Bottom of Sand	485.0
Total Feet of Permeable Sand	2.0
Total Feet of Floodable Sand (Tested)	1.7

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.
0 - 10	0.6	0.6
10 - 20	1.4	2.0

Average Permeability Millidarcys	11.5
Average Percent Porosity	17.1
Average Percent Oil Saturation	38.5
Average Percent Water Saturation	41.0
Average Oil Content, Bbls./A. Ft.	511.
Total Oil Content, Bbls./Acre	1,022.
Average Percent Oil Recovery by Laboratory Flooding Tests	2.7
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	35.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	60.
Total Calculated Oil Recovery, Bbls./Acre	See "Calculated Recovery" Section.
Packer Setting, Feet	
Viscosity, Centipoises @	
A. P. I. Gravity, degrees @ 60 °F	
Elevation, Feet	

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 virgin area.

FORMATION CORED

The detailed log of the formation cored is as follows:

Depth Interval, Feet	Description
483.0 - 484.0	Brown slightly shaly sandstone.
484.0 - 485.0	Brown sandstone.

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 60 barrels of oil per acre was obtained from 1.7 feet of sand. The weighted average percent oil saturation was reduced from 40.1 to 37.4, or represents an average recovery of 2.7 percent. The weighted average effective permeability of the samples is 0.15 millidarcys, while the average initial fluid production pressure is 41.3 pounds per square inch (See Table V).

CALCULATED RECOVERY

It would appear from a study of the data, that efficient primary and waterflood operations in the vicinity of this well should recover approximately 390 barrels of oil per acre. This is an average recovery of 229 barrels per acre foot from 1.7 feet of floodable sand analyzed in this core.

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

Original formation volume factor, estimated	1.04
Reservoir water saturation, percent, estimated	25.0
Average porosity, percent	17.0
Oil saturation after flooding, percent	37.4
Performance factor, percent, estimated	50.0
Net floodable sand, feet	1.7

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company W.D. Oil Company Lease Freda Koopman Well No. 1

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-A	483.2	17.2	30	54	84	400	5.3	0.3	0.3	120	1.59
1	483.4	19.4	44	36	80	662	4.2	0.3	0.6	199	1.26
2	483.8	17.6	37	40	77	505	19.	0.4	1.0	202	7.60
3	484.2	15.8	40	39	79	490	14.	0.5	1.5	245	7.00
4	484.8	16.5	40	39	79	512	11.	0.5	2.0	256	5.50

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company W. D. Oil Company Lease Freda Koopman Well No. 1

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
483.0 - 485.0	2.0	11.5	22.95

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
483.0 - 485.0	2.0	17.1	38.5	41.0	511	1,022

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company W.D. Oil Company Lease Freda Koopman Well No. 1

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	483.4	19.0	44	649	3	44	41	56	605	7	0.15	40
2	483.8	17.3	37	497	4	54	33	62	443	8	0.15	40
3	484.2	16.2	40	503	2	25	38	57	478	10	0.15	40
4	484.8	16.3	40	506	2	26	38	57	480	8	0.15	45

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 W.D. Oil Company Lease Freda Koopman Well No. 1

Depth Interval, Feet	483.3 - 485.0
Feet of Core Analyzed	1.7
Average Percent Porosity	17.0
Average Percent Original Oil Saturation	40.1
Average Percent Oil Recovery	2.7
Average Percent Residual Oil Saturation	37.4
Average Percent Residual Water Saturation	55.1
Average Percent Total Residual Fluid Saturation	92.5
Average Original Oil Content, Bbls./A. Ft.	528.
Average Oil Recovery, Bbls./A. Ft.	35.
Average Residual Oil Content, Bbls./A. Ft.	493.
Total Original Oil Content, Bbls./Acre	898.
Total Oil Recovery, Bbls./Acre	60.
Total Residual Oil Content, Bbls./Acre	838.
Average Effective Permeability, Millidarcys	0.15
Average Initial Fluid Production Pressure, p.s.i.	41.3

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