OILFIELD RESEARCH LABORATORIES

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

December 1, 1982

Rader Oil Company
R. R. # 1
Eudora, Kansas 66025

Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core taken from the Petty Lease, Well No. 5, located in Franklin County, Kansas and submitted to our laboratory on November 24, 1982.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Sanford A. Michel

SAM/rmc

5 c to Eudora, Kansas

Oilfield Research Laboratories

GENERAL INFORMATION & SUMMARY

Company Rader Oil Company Lease Petty Well No. 5

Location

Section 9 Twp. 16S Rge. 21E County Franklin State Kansas

Elevation, Feet	
Name of Sand	First Squirrel
Top of Core	660.0
Bottom of Core	674.8
Top of Sand	660.0
Bottom of Sand	674.8
Total Feet of Permeable Sand	9.8
Total Feet of Floodable Sand	7.0

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.
0 - 8	4.1	4.1
24 - 45	5.1	9.2
100 - 102	0.6	9.8

Average Permeability Millidarcys	25.4
Average Percent Porosity	19.4
Average Percent Oil Saturation	46.7
Average Percent Water Saturation	43.2
Average Oil Content, Bbls./A. Ft.	714.
Total Oil Content, Bbls./Acre	6,998.
Average Percent Oil Recovery by Laboratory Flooding Tests	16.5
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	273.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	1,908.
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. The core was reported to be from a non-virgin area.

FORMATION CORED

The detailed log of the formation cored is as follows:

Depth Interval, Feet	Description
660.0 - 660.4	Light brown sandstone wtih mica partings.
660.4 - 663.0	Brown sandstone.
663.0 - 665.2	Brown sandstone with gray shale and mica partings.
665.2 - 665.4	Gray sandy shale.
665.4 - 666.3	Brown sandstone.
666.3 - 667.3	Grayish brown shaly sandstone.
667.3 - 667.6	Grayish brown slightly shaly sandstone.
667.6 - 669.6	Grayish brown shaly sandstone.
669.6 - 672.0	No core.
672.0 - 673.0	Grayish brown very shaly sandstone.
673.0 - 674.0	No core.
674.0 - 674.4	Grayish brown very shaly sandstone.
674.4 - 674.8	Brown slightly shaly sandstone.

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 1,908 barrels of oil per acre was obtained from 7.0 feet of sand. The weighted average percent oil saturation was reduced from 49.0 to 32.5, or represents an average recovery of 16.5 percent.

The weighted average effective permeability of the samples is 2.04 millidarcys, while the average initial fluid production pressure is 22.5 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 11 samples tested, 8 produced water and oil. This indicates that approximately 73 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 2,410 barrels of oil per acre. This is an average recovery of 344 barrels per acre foot from 7.0 feet of floodable sand analyzed in this core.

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

Original formation volume factor, estimated	1.05
Reservoir water saturation, percent, estimated	25.0
Average porosity, percent	20.7
Oil saturation after flooding, percent	32.5
Performance factor, percent, estimated	55.0
Net floodable sand, feet	7.0

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Rader Oil Company Lease Petty Well No. 5

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	660.6	21.3	41	28	69	678	101.	0.6	0.6	407	60.60
2	661.5	20.5	58	28	86	922	39.	1.0	1.6	922	39.00
3	662.5	22.7	52	39	91	916	44.	1.0	2.6	916	44.00
4	663.6	22.7	53	35	88	933	24.	1.2	3.8	1120	28.80
5	664.6	21.7	38	46	84	640	36.	1.0	4.8	640	36.00
6	665.6	21.6	57	39	96	955	31.	0.9	5.7	860	27.90
7	666.5	15.5	42	54	96	505	3.7	1.0	6.7	505	3.70
8	667.5	16.1	45	52	97	562	6.2	0.3	7.0	169	1.86
9	668.3	17.7	41	50	91	563	3.1	1.4	8.4	788	4.34
10	672.5	14.2	34	61	95	375	0.16	1.0	9.4	375	0.16
11	674.5	16.7	57	39	96	739	7.4	0.4	9.8	296	2.96

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Rader Oil Company Lease Petty Well No. 5

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
660.4 - 666.3	5.7	41.5	236.30
666.3 - 674.8	4.1	3.2	13.02
660.4 - 674.8	9.8	25.4	249.32

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
660.4 - 666.3	5.7	21.8	50.4	36.3	854	4,865
666.3 - 674.8	4.1	16.1	41.4	52.7	520	2,133
660.4 - 674.8	9.8	19.4	46.7	43.2	714	6,998

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Rader Oil Company Lease Petty Well No. 5

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	660.6	21.2	41	674	10	164	31	59	510	58	0.86	25
2	661.5	20.6	58	927	28	447	30	64	480	202	3.67	10
3	662.5	22.6	52	912	25	438	27	70	474	272	4.42	15
4	663.6	22.7	53	933	18	317	35	57	616	24	0.37	30
5	664.6	21.7	38	640	8	135	30	67	505	126	2.17	20
6	665.6	21.7	57	960	20	337	37	60	623	160	2.85	20
7	666.5	15.6	42	508	6	73	36	60	435	24	0.33	30
8	667.5	16.2	45	566	9	113	36	61	453	24	0.43	30
9	668.3	18.2	40	565	0	0	40	51	565	0	Imp.	-
10	672.5	14.4	34	380	0	0	34	61	380	0	Imp.	-
11	674.5	17.0	56	739	0	0	56	40	739	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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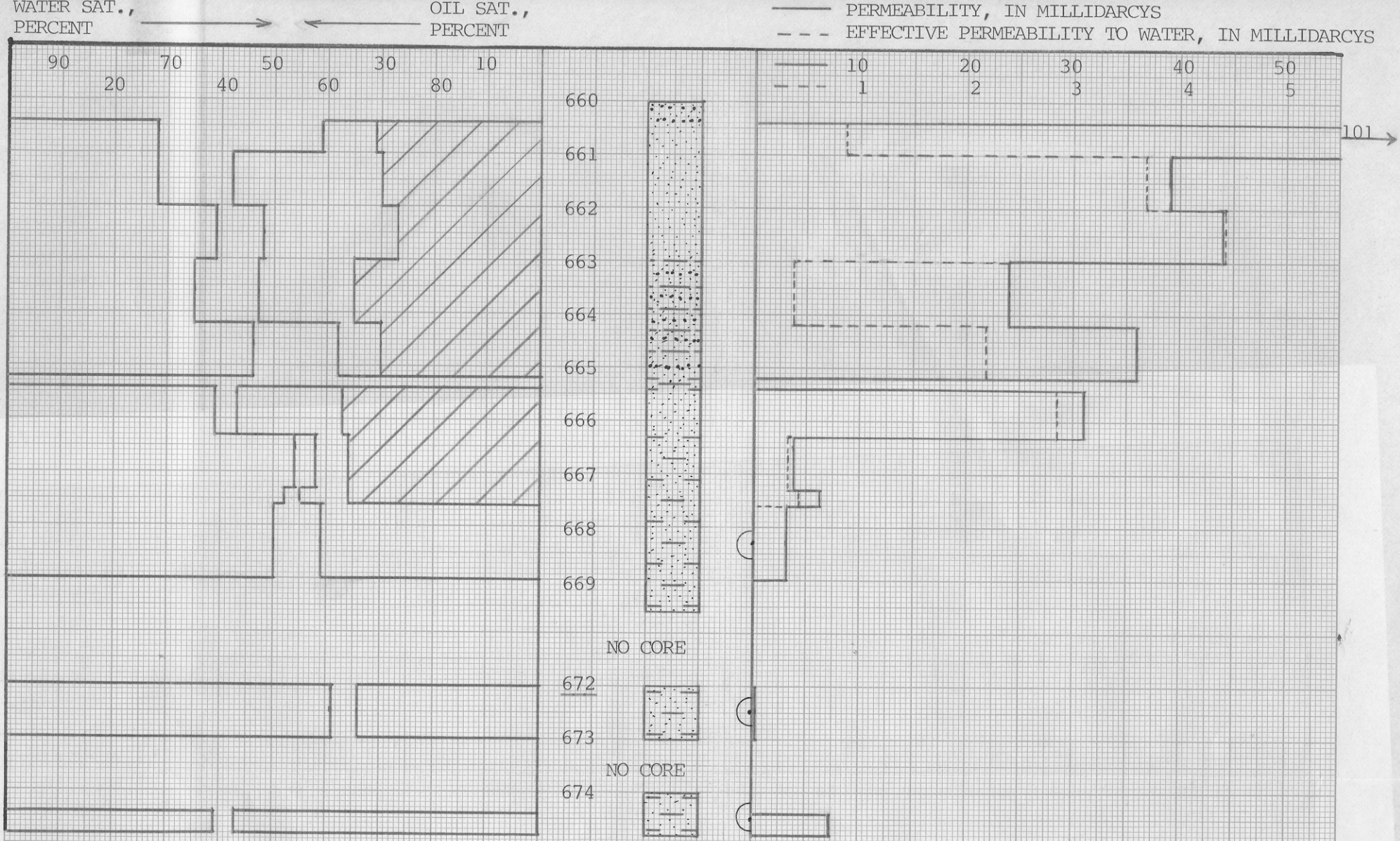
SUMMARY OF LABORATORY FLOODING TESTS

TABLE V

Company Rader Oil Company Lease Petty Well No. 5

Depth Interval, Feet	660.4 - 666.3	666.3 - 674.8	660.4 - 674.8
Feet of Core Analyzed	5.7	1.3	7.0
Average Percent Porosity	21.8	15.8	20.7
Average Percent Original Oil Saturation	50.4	42.7	49.0
Average Percent Oil Recovery	18.7	6.7	16.5
Average Percent Residual Oil Saturation	31.7	36.0	32.5
Average Percent Residual Water Saturation	62.9	60.2	62.4
Average Percent Total Residual Fluid Saturation	94.6	96.2	94.9
Average Original Oil Content, Bbls./A. Ft.	854.	521.	792.
Average Oil Recovery, Bbls./A. Ft.	316.	82.	273.
Average Residual Oil Content, Bbls./A. Ft.	538.	439.	519.
Total Original Oil Content, Bbls./Acre	4,866.	678.	5,544.
Total Oil Recovery, Bbls./Acre	1,801.	107.	1,908.
Total Residual Oil Content, Bbls./Acre	3,065.	571.	3,636.
Average Effective Permeability, Millidarcys	2.42	0.35	2.04
Average Initial Fluid Production Pressure, p.s.i.	20.0	30.0	22.5

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


WATER SAT., PERCENT
OIL SAT., PERCENT
PERMEABILITY, IN MILLIDARCYS
EFFECTIVE PERMEABILITY TO WATER, IN MILLIDARCYS
90 70 50 30 10
20 40 60 80
10 20 30 40 50
1 2 3 4 5
101
660
661
662
663
664
665
666
667
668
669
NO CORE
672
673
NO CORE
674
KEY:
SANDSTONE
SANDY SHALE
IMPERMEABLE TO WATER
SHALY SANDSTONE
SANDSTONE WITH MICA PARTINGS
SANDSTONE WITH MICA AND SHALE PARTINGS
FLOODPOT RESIDUAL OIL SATURATION

○ IMPERMEABLE TO WATER

▨ FLOODPOT RESIDUAL OIL SATURATION

RADER OIL COMPANY

PETTY LEASE WELL NO. 5

FRANKLIN COUNTY, KANSAS

DEPTH INTERVAL, FEET	FEET OF CORE ANALYZED	AVERAGE PERCENT POROSITY	AVG. OIL SATURATION PERCENT	AVG. WATER SATURATION PERCENT	AVERAGE PERMEABILTIY, MILLIDARCYS	CALCULATED OIL RECOVERY BBLS. / ACRE
660.4 - 666.3	5.7	21.8	50.4	36.3	41.5	
666.3 - 674.8	4.1	16.1	41.4	52.7	3.2	
660.4 - 674.8	9.8	19.4	46.7	43.2	25.4	2,410. (PRIMARY AND WATERFLOODING)

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CHANUTE, KANSAS
NOVEMBER, 1982 PDC