OILFIELD RESEARCH LABORATORIES

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

June 7, 1982

Miller Brothers Production Company
427 South Parker
Olathe, Kansas 66061

Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core taken from the Miller Brothers Lease, Well No. 3, located in Johnson County, Kansas and submitted to our laboratory on May 28, 1982.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Sanford A. Michel

SAM/dlb

5 c to Olathe, Kansas

Oilfield Research Laboratories

GENERAL INFORMATION & SUMMARY

Company Miller Brothers Production Co. Lease Miller Bros. Well No. 3

Location

Section 14 Twp. 13S Rge. 23E County Johnson State Kansas

Elevation, Feet	
Name of Sand	Upper Squirrel
Top of Core	634.4
Bottom of Core	649.0
Top of Sand	634.4
Bottom of Sand	639.0
Total Feet of Permeable Sand	10.2
Total Feet of Floodable Sand	5.0

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.
0 - 10	3.0	3.0
10 - 20	2.5	5.5
30 - 50	3.2	8.7
50 - 90	1.5	10.2

Average Permeability Millidarcys	26.7
Average Percent Porosity	19.6
Average Percent Oil Saturation	30.5
Average Percent Water Saturation	59.0
Average Oil Content, Bbls./A. Ft.	482.
Total Oil Content, Bbls./Acre	5,332.
Average Percent Oil Recovery by Laboratory Flooding Tests	4.0
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	63.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	316.
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 with polymer and bentonite were used as a drilling fluid.

FORMATION CORED

The detailed log of the formation cored is as follows:

Depth Interval, Feet	Description
634.4 - 635.7	Brown sandstone with fine shale partings.
635.7 - 636.3	Gray slightly sandy shale.
636.3 - 637.3	Grayish light brown shaly sandstone.
637.3 - 639.5	Brown sandstone.
639.5 - 640.0	Gray slightly sandy shale.
640.0 - 640.4	Grayish light brown shaly sandstone.
640.4 - 640.9	Brown sandstone.
640.9 - 641.5	Grayish very light brown shaly sandstone.
641.5 - 641.9	Gray slightly sandy shale.
641.9 - 642.4	Very shaly sandstone.
642.4 - 642.7	Gray slightly sandy shale.
642.7 - 644.8	Grayish brown shaly sandstone with shale inclusions.
644.8 - 645.8	Brown sandstone.
645.8 - 646.8	Brown slightly shaly sandstone.
646.8 - 649.0	Brown sandstone with scattered shale partings.

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 316 barrels of oil per acre was obtained from 5.0 feet of sand. The weighted average percent oil saturation was reduced from 36.2 to 32.2, or represents an average recovery of 4.0 percent. The weighted average effective permeability of the samples

is 1.17 millidarcys, while the average initial fluid production pressure is 38.0 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 13 samples tested, 6 produced water and oil, and 2 samples water only. This indicates that approximately 46 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 950 barrels of oil per acre. This is an average recovery of 190 barrels per acre foot from 5.0 feet of floodable sand analyzed in this core.

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

Original formation volume factor, estimated	1.04
Reservoir water saturation, percent, estimated	40.0
Average porosity, percent	21.4
Oil saturation after flooding, percent	32.2
Performance factor, percent, estimated	45.0
Net floodable sand, feet	5.0

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Miller Brothers Production Co. Lease Miller Brothers Well No. 3

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	635.6	20.4	38	54	92	601	11.	1.3	1.3	781	14.30
2	636.6	16.1	10	84	94	125	0.25	1.0	2.3	125	0.25
3	637.5	22.9	30	51	81	533	41.	1.0	3.3	533	41.00
4	638.6	23.3	33	54	87	597	42.	0.7	4.0	418	29.40
5	639.3	23.3	31	43	74	560	50.	0.5	4.5	280	25.00
6	640.7	24.6	32	51	83	611	57.	0.5	5.0	306	28.50
7	641.4	17.6	7	77	84	96	Imp.	0.6	5.6	58	0.00
8	642.2	14.0	35	61	96	380	Imp.	0.5	6.1	190	0.00
9	643.5	17.0	37	59	96	488	6.0	1.0	7.1	488	6.00
10	645.6	18.3	28	61	89	398	30.	1.0	8.1	398	30.00
11	646.5	18.9	40	54	94	587	4.9	1.0	9.1	587	4.90
12	647.5	17.4	28	70	98	378	13.	1.2	10.3	454	15.60
13	648.5	23.0	40	42	82	714	87.	1.0	11.3	714	87.00

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Miller Brothers Production Company Lease Miller Brothers Well No. 3

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
634.4 - 640.9	5.0	27.7	138.45
640.9 - 649.0	5.2	27.6	143.50
634.4 - 649.0	10.2	27.6	281.95

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
634.4 - 640.9	5.0	21.2	28.8	58.0	489	2,443
640.9 - 649.0	6.3	18.4	31.8	59.8	459	2,889
634.4 - 649.0	11.3	19.6	30.5	59.0	482	5,332

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Miller Brothers Production Company Lease Miller Brothers Well No. 3

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	635.6	20.5	38	604	3	48	35	60	556	20	0.22	40
2	636.6	16.0	10	124	0	0	10	85	124	0	Imp.	-
3	637.5	22.8	30	531	0	0	30	57	531	30	0.37	35
4	638.6	23.2	33	594	2	36	31	62	558	37	0.45	30
5	639.3	23.3	31	560	3	54	28	62	506	49	0.67	30
6	640.7	24.7	32	613	2	38	30	57	575	18	0.22	40
7	641.4	17.6	7	96	0	0	7	78	96	0	Imp.	-
8	642.2	14.4	34	380	0	0	34	63	380	0	Imp.	-
9	643.5	17.1	37	491	7	93	30	66	398	134	2.32	20
10	645.6	18.2	28	395	0	0	28	69	395	8	0.15	45
11	646.5	19.4	39	587	0	0	39	56	587	0	Imp.	-
12	647.5	17.1	29	385	0	0	29	69	385	0	Imp.	-
13	648.5	22.9	40	711	5	89	35	58	622	151	2.47	30

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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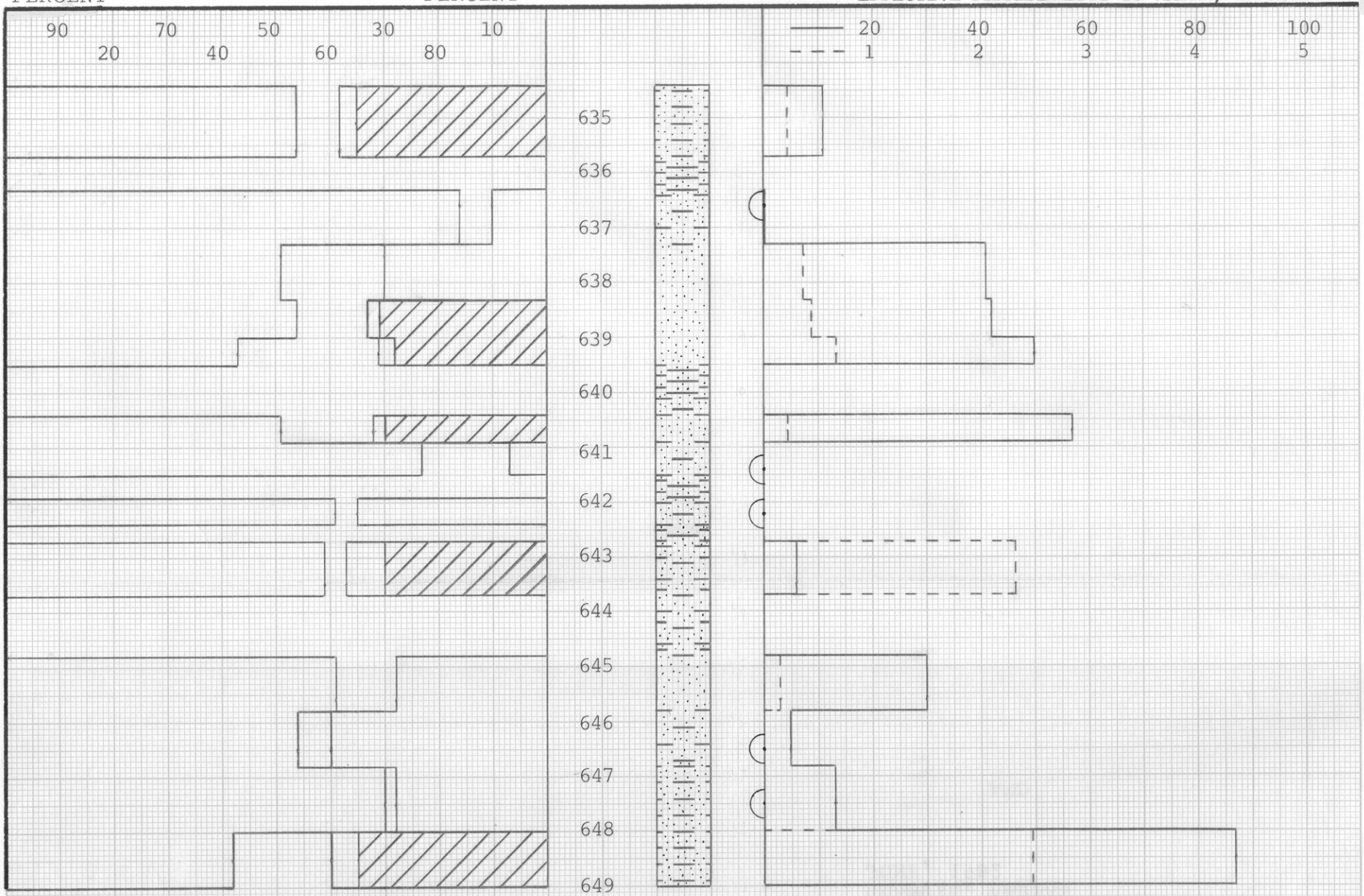
SUMMARY OF LABORATORY FLOODING TESTS

TABLE V

Company Miller Brothers Production Company Lease Miller Brothers Well No. 3

Depth Interval, Feet	634.4 - 640.9	640.9 - 649.0	634.4 - 649.0
Feet of Core Analyzed	3.0	2.0	5.0
Average Percent Porosity	22.3	20.0	21.4
Average Percent Original Oil Saturation	38.7	38.5	36.2
Average Percent Oil Recovery	2.6	6.0	4.0
Average Percent Residual Oil Saturation	32.1	32.5	32.2
Average Percent Residual Water Saturation	60.3	62.0	61.0
Average Percent Total Residual Fluid Saturation	92.4	94.5	93.2
Average Original Oil Content, Bbls./A. Ft.	590.	601.	594.
Average Oil Recovery, Bbls./A. Ft.	45.	91.	63.
Average Residual Oil Content, Bbls./A. Ft.	545.	510.	531.
Total Original Oil Content, Bbls./Acre	1,770.	1,202.	2,972.
Total Oil Recovery, Bbls./Acre	134.	182.	316.
Total Residual Oil Content, Bbls./Acre	1,636.	1,020.	2,656.
Average Effective Permeability, Millidarcys	0.35	2.40	1.17
Average Initial Fluid Production Pressure, p.s.i.	35.0	25.0	31.7

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



KEY:

SANDSTONE

SHALY SANDSTONE WITH SHALE INCLUSIONS

SANDSTONE WITH SHALE PARTINGS

KEY:


SANDSTONE


SHALY SANDSTONE


SANDY SHALE


SHALY SANDSTONE WITH SHALE INCLUSIONS


SANDSTONE WITH SHALE PARTINGS


FLOODPOT RESIDUAL OIL SATURATION


IMPERMEABLE TO WATER

MILLER BROTHERS PRODUCTION COMPANY

MILLER BROTHERS LEASE

JOHNSON COUNTY, KANSAS

WELL NO. 3

DEPTH INTERVAL, FEET	FEET OF CORE ANALYZED	AVERAGE PERCENT POROSITY	AVG. OIL SATURATION PERCENT	AVG. WATER SATURATION PERCENT	AVERAGE PERMEABLILITY, MILLIDARCYS	CALCULATED OIL RECOVERY BBLS. / ACRE
634.4 - 640.9	5.0	21.2	28.8	58.0	27.7	-
640.9 - 649.0	6.3	18.4	31.8	59.8	27.6	-
634.4 - 649.0	11.3	19.6	30.5	59.0	27.6	950 (PRIMARY AND WATERFLOODING)

OILFIELD RESEARCH LABORATORIES
CHANUTE, KANSAS
JUNE, 1982

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