

OILFIELD RESEARCH LABORATORIES

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

October 5, 1981

M & M Oil Exploration
Box 321
Colony, Kansas 66015

Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core taken from the Wolfe Lease, Well No. 2, located in Linn County, Kansas and submitted to our laboratory on September 16, 1981.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Sanford A. Michel

SAM/kas

5 c to Colony, Kansas

- REGISTERED ENGINEERS -

CORE ANALYSIS - WATER ANALYSIS - REPRESSURING ENGINEERING - SURVEYING & MAPPING - PROPERTY EVALUATION & OPERATION

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GENERAL INFORMATION & SUMMARY

Company M & M Oil Exploration Lease Wolfe Well No. 2
 Location 440' EWL & 220' NSL NE $\frac{1}{4}$
 Section 30 Twp. 19S Rge. 25E County Linn State Kansas

Elevation, Feet

Name of Sand.....

Bartlesville

Top of Core

394.0

Bottom of Core

405.0

Top of Sand

394.0

Bottom of Sand

405.0

Total Feet of Permeable Sand

9.6

Total Feet of Floodable Sand

2.1

Distribution of Permeable Sand: Permeability Range Millidarcys

	Feet	Cum. Ft.
0 - 5	4.6	4.6
10 - 20	3.2	7.8
20 & Above	1.8	9.6

Average Permeability Millidarcys

14.2

Average Percent Porosity

16.8

Average Percent Oil Saturation

38.0

Average Percent Water Saturation

48.7

Average Oil Content, Bbls./A. Ft.

498.

Total Oil Content, Bbls./Acre

5,027.

Average Percent Oil Recovery by Laboratory Flooding Tests

5.0

Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.

73.

Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre

153.

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.

FORMATION CORED

The detailed log of the formation cored is as follows:

<u>Depth Interval, Feet</u>	<u>Description</u>
394.0 - 394.5	Grayish light brown shaly sandstone.
394.5 - 399.5	Alternate layers gray shale and brown sandstone with micaceous partings.
399.5 - 399.9	Gray shale.
399.9 - 401.0	Grayish light brown shaly sandstone.
401.0 - 401.5	Gray shaly sandstone.
401.5 - 405.0	Grayish light brown shaly sandstone.

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 153 barrels of oil per acre was obtained from 2.1 feet of sand. The weighted average percent oil saturation was reduced from 43.4 to 38.4, or represents an average recovery of 5.0 percent. The weighted average effective permeability of the samples is 3.20 millidarcys, while the average initial fluid production pressure is 32.5 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 11 samples tested, 2 produced water and oil. This indicates that approximately 18 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 500 barrels of oil per acre. This is an average recovery of 240 barrels per acre foot from 2.1 feet of floodable sand analyzed in this core.

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

Original formation volume factor, estimated	1.03
Reservoir water saturation, percent, estimated	30.0
Average porosity, percent	19.0
Oil saturation after flooding, percent	38.4
Performance factor, percent, estimated	55.0
Net floodable sand, feet	2.1

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company M & M Oil Exploration Lease Wolfe Well No. 2

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	394.4	15.2	24	59	83	283	Imp.	0.5	0.5	142	0.00
2	395.5	19.0	40	48	88	590	13.	1.1	1.6	649	14.30
3	396.5	18.8	47	36	83	686	15.	1.0	2.6	686	15.00
4	397.6	17.7	24	48	72	330	17.	1.1	3.7	363	18.70
5	398.5	18.9	56	31	87	821	27.	0.9	4.6	739	24.30
6	399.4	19.0	34	51	85	501	64.	0.9	5.5	451	57.60
7	400.4	15.9	24	60	84	296	2.0	1.1	6.6	326	2.20
8	401.6	15.4	37	52	89	442	1.6	0.5	7.1	221	0.80
9	402.4	14.8	48	44	92	551	0.60	1.0	8.1	551	0.60
10	403.6	14.7	37	61	98	422	0.34	1.0	9.1	422	0.34
11	404.4	14.3	43	50	93	477	2.1	1.0	10.1	477	2.10

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company	M & M Oil Exploration		Lease		Wolfe		Well No.		2
	Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.					
	394.0 - 399.5	5.0	26.0	129.90					
	399.9 - 405.0	4.6	1.3	6.04					
	394.0 - 405.0	9.6	14.2	135.94					

	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
	394.0 - 399.5	5.5	18.4	38.3	44.5	551	3,030
	399.9 - 405.0	4.6	15.0	37.6	53.7	434	1,997
	394.0 - 405.0	10.1	16.8	38.0	48.7	498	5,027

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company		M & M Oil Exploration			Lease		Wolfe			Well No.	
										2	
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	394.4	15.6	23	278	0	0	23	61	0	Imp.	-
2	395.5	19.1	40	593	4	59	36	55	76	4.20	35
3	396.5	18.8	47	685	6	88	41	48	42	2.10	30
4	397.6	18.0	23	321	0	0	23	49	0	Imp.	-
5	398.5	18.6	57	823	0	0	57	32	0	Imp.	-
6	399.4	19.0	34	501	0	0	34	53	0	Imp.	-
7	400.4	15.8	24	294	0	0	24	60	0	Imp.	-
8	401.6	15.9	36	444	0	0	36	54	0	Imp.	-
9	402.4	14.7	48	547	0	0	48	45	0	Imp.	-
10	403.6	14.7	37	422	0	0	37	61	0	Imp.	-
11	404.4	14.1	44	481	0	0	44	49	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

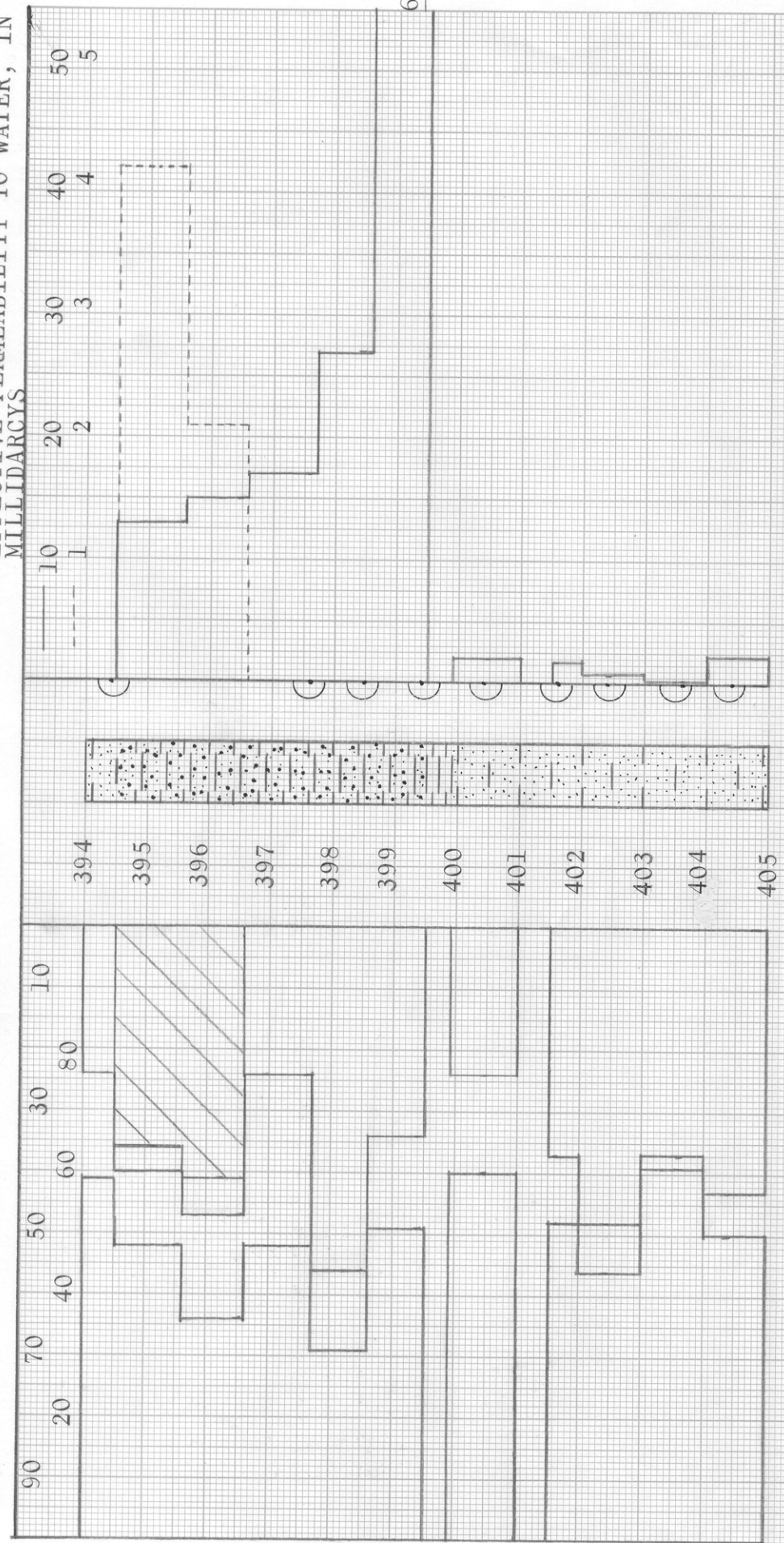
TABLE V

Company	M & M Oil Exploration	Lease	Wolfe	Well No.
				2
Depth Interval, Feet	394.0 - 399.5			
Feet of Core Analyzed	2.1			
Average Percent Porosity	19.0			
Average Percent Original Oil Saturation	43.4			
Average Percent Oil Recovery	5.0			
Average Percent Residual Oil Saturation	38.4			
Average Percent Residual Water Saturation	51.7			
Average Percent Total Residual Fluid Saturation	90.1			
Average Original Oil Content, Bbls./A. Ft.	637.			
Average Oil Recovery, Bbls./A. Ft.	73.			
Average Residual Oil Content, Bbls./A. Ft.	564.			
Total Original Oil Content, Bbls./Acre	1,337.			
Total Oil Recovery, Bbls./Acre	153.			
Total Residual Oil Content, Bbls./Acre	1,184.			
Average Effective Permeability, Millidarcys	3.20			
Average Initial Fluid Production Pressure, p.s.i.	32.5			

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

PERCENT
OIL SAT.,
PERCENT

PERMEABILITY, IN MILLIDARCYS
EFFECTIVE PERMEABILITY TO WATER, IN
MILLIDARCYS



KEY:

- SHALE
- ALTERNATE LAYERS OF SHALE AND MICACEOUS SANDSTONE
- SHALY SANDSTONE
- FLOODPOT RESIDUAL OIL SATURATION
- IMPERMEABLE TO WATER

M & M OIL EXPLORATION

WOLFE LEASE

LINN COUNTY, KANSAS

WELL NO. 2

WOLFE LEASE

LINN COUNTY, KANSAS

WELL NO. 2

DEPTH INTERVAL, FEET	FEET OF CORE ANALYZED	AVERAGE PERCENT POROSITY	AVG. OIL SATURATION PERCENT	AVG. WATER SATURATION PERCENT	AVERAGE PERMEABILITY, MILLIDARCYS	CALCULATED OIL RECOVERY BBLs. / ACRE
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394.0 - 399.5

5.5

18.4

38.3

44.5

26.0

399.9 - 405.0

4.6

15.0

37.6

53.7

1.3

394.0 - 405.0

10.1

16.8

38.0

48.7

14.2

500

(PRIMARY AND
WATERFLOODING)

OILFIELD RESEARCH LABORATORIES
CHANUTE, KANSAS
OCTOBER, 1981

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