

OILFIELD RESEARCH LABORATORIES

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L & L Oil Company
P. O. Box 13
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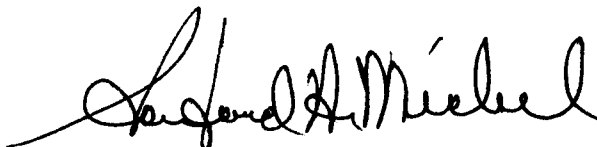
Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core taken from the Morton Lease, Well No. 10-A, located in Wilson County, Kansas and submitted to our laboratory on October 29, 1980.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES


Sanford A. Michel

SAM/mkf

5 c to Benedict, Ks.

- REGISTERED ENGINEERS -

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

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GENERAL INFORMATION & SUMMARY

Company L. & L. Oil Co. Lease Morton Well No. 10-A

Location -

Section 13 Twp. 28S Rge. 15E County Wilson State Kansas

Elevation, Feet - - - - -

Name of Sand - - - - - Bartlesville

Top of Core - - - - - 1012.5

Bottom of Core - - - - - 1032.6

Top of Sand - - - - - 1012.5

Bottom of Sand - - - - - 1032.0

Total Feet of Permeable Sand - - - - - 14.5

Total Feet of Floodable Sand - - - - - 4.7

Distribution of Permeable Sand:
Permeability Range
Millidarcys

Feet

Cum. Ft.

0 - 5	5.7	5.7
5 - 10	2.3	8.0
10 - 20	3.4	11.4
20 - 30	1.9	13.3
30 & Above	1.2	14.5

Average Permeability Millidarcys - - - - - 18.0

Average Percent Porosity - - - - - 14.6

Average Percent Oil Saturation - - - - - 38.5

Average Percent Water Saturation - - - - - 30.0

Average Oil Content, Bbls./A. Ft. - - - - - 460.

Total Oil Content, Bbls./Acre - - - - - 8002.

Average Percent Oil Recovery by Laboratory Flooding Tests - - - - - 10.5

Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft. - - - - - 130.

Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre - - - - - 611.

Total Calculated Oil Recovery, Bbls./Acre - - - - - See "Calculated Recovery" Section

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The core was sampled and the samples sealed in plastic bags by a representative of the client. Salt water 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>
1012.5 - 1016.0	Gray and light brown laminated shale and sandstone.
1016.0 - 1017.0	Light brown shaly sandstone.
1017.0 - 1018.1	Light brown and gray laminated sandstone and shale.
1018.1 - 1018.9	Brown shaly sandstone.
1018.9 - 1020.7	Brown sandstone.
1020.7 - 1021.8	Brown shaly sandstone.
1021.8 - 1025.2	Brown sandstone.
1025.2 - 1026.7	Grayish brown shaly sandstone.
1026.7 - 1028.0	Brown sandstone.
1028.0 - 1029.1	Grayish brown shaly sandstone.
1029.1 - 1031.2	Gray sandy shale.
1031.2 - 1032.0	Grayish brown shaly sandstone.
1032.0 - 1032.6	Gray sandy shale.

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 611 barrels of oil per acre was obtained from 4.7 feet of sand. The weighted average percent oil saturation was reduced from 49.1 to 38.6, or represents an average recovery of 10.5 percent. The weighted average effective permeability

of the samples is 1.09 millidarcys, while the average initial fluid production pressure is 32.0 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 17 samples tested, 5 produced water and oil. This indicates that approximately 29 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 1460 barrels of oil per acre. This is an average recovery of 311 barrels per acre foot from 417 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	15.0
Average porosity, percent	18.2
Oil saturation after flooding, percent	38.6
Performance factor, percent, estimated	55.0
Net floodable sand, feet	4.7

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company L & L Oil Co. Lease Morton Well No. 10-A

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	1013.5	10.1	34	41	75	266	0.45	1.5	1.5	399	0.68
2	1014.5	4.1	22	70	92	70	Imp.	1.0	2.5	70	0.00
3	1015.3	13.3	41	26	67	423	0.30	1.0	3.5	423	0.30
4	1016.5	12.3	19	8	27	181	1.5	1.0	4.5	181	1.50
5	1017.5	9.6	17	50	67	127	Imp.	1.1	5.6	140	0.00
6	1018.5	15.0	51	20	71	594	7.1	0.8	6.4	475	5.68
7	1019.5	17.5	46	16	62	625	19.	1.1	7.5	688	20.90
8	1020.5	18.0	50	16	66	688	22.	0.7	8.2	482	15.40
9	1021.5	13.3	61	18	79	629	2.7	1.1	9.3	692	2.97
10	1022.5	15.9	49	24	73	604	121.	1.2	10.5	725	145.20
11	1023.5	24.6	31	16	47	592	14.	1.0	11.5	592	14.00
12	1024.5	17.5	56	14	70	760	24.	1.2	12.7	912	28.80
13	1025.5	17.3	41	33	74	550	5.3	0.8	13.5	440	4.24
14	1026.5	17.6	43	24	67	587	6.8	0.7	14.2	411	4.76
15	1027.5	18.4	40	27	67	571	12.	1.3	15.5	742	15.60
16	1028.5	17.4	39	28	67	527	0.19	1.1	16.6	580	0.21
17	1031.5	6.8	12	83	95	63	Imp.	0.8	17.4	50	0.00

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company		L & L Oil Co.		Lease		Morton		Well No.		10-A	
Depth Interval, Feet		Feet of Core Analyzed		Average Permeability, Millidarcys		Permeability Capacity Ft. x Md.					
1012.5 - 1020.0		5.4		5.4		29.06					
1020.0 - 1032.0		9.1		25.4		231.18					
1012.5 - 1032.0		14.5		18.0		260.24					

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	
1012.5 - 1020.0		7.5		11.6		32.4		33.9		317		2,376	
1020.0 - 1032.0		9.9		16.8		43.1		27.1		568		5,626	
1012.5 - 1032.0		17.4		14.6		38.5		30.0		460		8,002	

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company			L. & L. Oil Co.			Lease			Morton			Well No. 10-A		
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	1013.5	10.4	33	266	00	0	33	44	0	Imp.	-			
2	1014.5	4.1	22	70	0	0	22	72	0	Imp.	-			
3	1015.3	12.9	42	420	0	0	42	27	0	Imp.	-			
4	1016.5	12.2	19	180	0	0	19	12	0	Imp.	-			
5	1017.5	9.8	17	129	0	0	17	50	0	Imp.	-			
6	1018.5	15.5	50	601	0	0	50	23	0	Imp.	-			
7	1019.5	17.7	46	632	0	0	46	20	0	Imp.	-			
8	1020.5	17.9	50	694	11	153	39	43	27	0.70	40			
9	1021.5	13.5	61	639	21	220	40	41	35.0	1.05	20			
10	1022.5	16.0	49	608	0	0	49	24	0	Imp.	-			
11	1023.5	24.5	31	589	2	38	29	56	111	1.65	25			
12	1024.5	17.5	56	760	9	122	47	35	32	0.81	40			
13	1025.5	17.8	40	552	0	0	40	35	0	Imp.	-			
14	1026.5	17.7	43	590	8	110	35	52	54	1.20	35			
15	1027.5	18.0	41	573	0	0	41	28	0	Imp.	-			
16	1028.5	17.4	39	526	0	0	39	28	0	Imp.	-			
17	1031.5	7.1	11	61	0	0	11	84	0	Imp.	-			

Company L & L Oil Co.

Lease Morton

Well No. 10-A

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	L & L Oil Co.	Lease	Morton	Well No.	10-A
Depth Interval, Feet	1020.0 - 1032.0				
Feet of Core Analyzed	4.7				
Average Percent Porosity	18.2				
Average Percent Original Oil Saturation	49.1				
Average Percent Oil Recovery	10.5				
Average Percent Residual Oil Saturation	38.6				
Average Percent Residual Water Saturation	44.6				
Average Percent Total Residual Fluid Saturation	83.2				
Average Original Oil Content, Bbls./A. Ft.	662.				
Average Oil Recovery, Bbls./A. Ft.	130.				
Average Residual Oil Content, Bbls./A. Ft.	532.				
Total Original Oil Content, Bbls./Acre	3112.				
Total Oil Recovery, Bbls./Acre	611.				
Total Residual Oil Content, Bbls./Acre	2501.				
Average Effective Permeability, Millidarcys	1.09				
Average Initial Fluid Production Pressure, p.s.i.	32.0				

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