OIL FIELD RESEARCH LABORATORIES
CHANUTE, KANSAS

20-28-17E

September 6, 1951

Martin & Ensminger
101½ W. Main
Chanute, Kansas

Gentlemen:

Enclosed herewith is the report of the analysis made on the 3" Rotary core taken from the Reece Lease, Well No. 1, Wilson County, Kansas, ans submitted to our laboratory on August 29, 1951.

Reece 'B' 1

Very truly yours,

OIL FIELD RESEARCH LABORATORIES

Clayton A. Nattier

CAN:eda

Reece 1

MARTIN & ENSMINGER

CORE ANALYSIS REPORT

REECE LEASE WELL NO. 1

WILSON COUNTY, KANSAS

OIL FIELD RESEARCH LABORATORIES

CHANUTE, KANSAS

SEPTEMBER 6, 1951

Oil Field Research Laboratories

GENERAL INFORMATION & SUMMARY

Company Martin & Ensminger Lease Reece "B" Well No. 1

Location NE¼ of SW¼

Section 20 Twp. 28 S Rge. 17E County Wilson State Kansas

Name of Sand	Bartlesville
Top of Core	892.50
Bottom of Core	933.90
Top of Pay Sand	907.65
Bottom of Pay Sand	914.70
Total Feet of Permeable Sand (Analyzed)	6.33
Total Feet of Floodable Sand (Analyzed)	6.18

Distribution of Permeable Sand:

Permeability Range Millidarcys	Feet	Cum. Ft.
0 - 15	0.94	0.94
15 - 30	0.40	1.34
30 - 60	1.25	2.59
60 - 90	0.90	3.49
90 - 120	1.03	4.52
120 - 150	1.13	5.65
150 & above	0.68	6.33

Average Permeability Millidarcys	85.16
Average Percent Porosity	16.27
Average Percent Oil Saturation	41.09
Average Percent Water Saturation	31.43
Average Oil Content, Bbls./A. Ft.	524.
Total Oil Content, Bbls./Acre	~~3,314.~~ 9,271
Average Percent Oil Recovery by Laboratory Flooding Tests	10.49
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	138.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	851.
Total Calculated Oil Recovery, Bbls./Acre	1050.
Packer Setting, Feet	908.00
Viscosity, Centipoises @	
A. P. I. Gravity, degrees @ 60 °F	
Elevation, Feet	

The above averages are for that part of the cored section extending from the packer setting to the top of the cement plug.

Fresh water was used as a circulating fluid in the coring of the sand in this well.

FORMATION CORED

The detailed log of the formation cored is as follows:

Depth Interval, Feet	Description
892.50 - 892.95	Laminated sandy shale.
892.95 - 893.35	Brown fine grained micaceous sandstone.
893.35 - 893.95	Laminated sandstone and shale.
893.95 - 898.55	Laminated sandy shale.
898.55 - 899.55	Laminated sandstone and shale.
899.55 - 900.20	Gray shale.
900.20 - 900.50	Laminated sandy shale.
900.50 - 900.80	Brown fine grained laminated micaceous shaley sandstone.
900.80 - 901.70	Laminated sandy shale.
901.70 - 902.80	Gray shale.
902.80 - 903.10	Brown fine grained slightly laminated micaceous shaley sandstone.
903.10 - 905.65	Laminated sandy shale.
905.65 - 905.95	Brown fine grained slightly laminated micaceous shaley sandstone.
905.95 - 907.65	Laminated sandy shale.
907.65 - 908.77	Brown fine grained micaceous sandstone.
908.77 - 908.98	Laminated sandstone and shale.
908.98 - 909.40	Brown fine grained laminated micaceous shaley sandstone.
909.40 - 909.92	Brown fine grained slightly laminated micaceous shaley sandstone.

909.92 - 910.90 - Brown fine grained micaceous sandstone.

910.90 - 911.98 - Brown fine grained micaceous calcareous sandstone.

911.98 - 914.70 - Dark brown fine grained micaceous sandstone containing four shale streaks.

914.70 - 914.85 - Dark fine grained micaceous carbonaceous sandstone.

914.85 - 915.15 - Brown fine grained micaceous sandstone.

915.15 - 915.75 - Dark fine grained micaceous shaley sandstone.

915.75 - 915.95 - Dark fine grained micaceous carbonaceous sandstone.

915.95 - 919.45 - Dark fine grained laminated micaceous carbonaceous shaley sandstone.

919.45 - 925.10 - Dark fine grained finely laminated micaceous carbonaceous shaley sandstone.

925.10 - 929.55 - Finely laminated sandstone and shale.

929.55 - 932.05 - Dark fine grained laminated micaceous shaley slightly calcareous carbonaceous sandstone.

932.05 - 933.10 - Dark fine grained micaceous slightly shaley calcareous carbonaceous sandstone.

933.10 - 933.62 - Dark fine grained micaceous carbonaceous sandstone.

933.62 - 933.90 - Gray shale.

Coring was started at a depth of 892.50 feet in laminated sandy shale and completed at 933.90 feet in gray shale. This core shows a total of 21.10 feet of sandstone, of which 6.48 feet are in the pay sand section.

PERMEABILITY

For the sake of distribution, the core was divided into two sections. The weighted average permeability of the upper and lower sections is 81.06 and 4.25 millidarcys respectively; while that of the pay sand, or that part of the cored section extending from the packer setting to the top of the cement plug, is 85.16 millidarcys (See Table II). By observing

the data given on the coregraph, it is noticeable that the sand has a very irregular permeability profile and that the sand in the bottom part of the core is very tight.

PERCENT SATURATION & OIL CONTENT

The pay sand in this core shows a good weighted average percent oil saturation, namely, 41.09. The weighted average percent oil saturation of the upper and lower sections is 41.03 and 46.99 respectively. The weighted average percent water saturation of the upper and lower sections is 32.25 and 35.69 respectively; while that of the pay sand is 31.43 (See Table IV). This is an overall weighted average total fluid saturation of 72.52 percent.

In an effort to determine the degree of flushing that occurred during coring, each of the saturation samples was analyzed for chloride content. The results of these tests, which are given in Tables VII and VIII, indicate that some flushing did occur particularly in the pay sand section.

The weighted average oil content of the upper and lower sections is 519 and 583 barrels per acre foot respectively; while that of the pay sand is 524 barrels per acre foot. The total oil content, as shown by this core, is 9,271 barrels per acre, of which 3,314 barrels are in the pay sand section (See Table IV).

LABORATORY FLOODING TESTS

This core responded poorly to laboratory flooding tests, in that approximately half of the sand analyzed took water and produced oil. A total oil recovery of 851 barrels per acre was obtained from 6.18 feet of floodable sand represented by the samples. The weighted average percent oil saturation was reduced from 41.38 to 30.89, or represents an

average recovery of 10.49 percent. The weighted average effective permeability of the samples is 4.70 millidarcys, while the average initial fluid production pressure is 16.3 pounds per square inch (See Table VI).

By observing the data given in Table V, you will note that of the 15 samples tested, 7 produced water and oil. This indicates that approximately half of the sand analyzed is floodable. The tests also show that the pay sand has a wide variation in effective permeability.

CONCLUSION

From a study of the above data, we believe that an efficient water flood within the vicinity of this well will recover approximately 1,050 barrels of oil per acre. This is an average recovery of 170 barrels of oil per acre foot from the 6.18 feet of floodable sand analyzed. In calculating the above recovery, an allowance was made for oil lost during coring, and it was assumed that the sand is not pressured up.

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SHOT RECOMMENDATION

Company Martin & Ensminger Lease Reece Well No. 1

Depth Interval, Feet	Feet of Sand	Size of Shell Inches	Qts./Ft.	Total Quarts
912.00 - 915.00	3.0	4½	2.5	7.5

Recommended Packer Setting 908.00

Note: Plug hole back to 915.00

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RESULTS OF PERMEABILITY TESTS

TABLE I

Company Martin & Ensminger Lease Reece Well No. 1

Sample No.	Depth, Feet	Permeability Millidarcys	Feet of Core		Permeability Capacity Ft. x Md.
			Ft.	Cum. Ft.	
1	907.80	12.	0.35	0.35	4.20
2	908.23	15.	0.40	0.75	6.00
3	908.62	54.	0.37	1.12	19.98
4	909.00	11.	0.42	1.54	4.62
5	909.45	3.1	0.20	1.74	0.62
6	909.75	11.	0.32	2.06	3.52
7	910.06	57.	0.38	2.44	21.66
8	910.60	86.	0.60	3.04	51.60
9	911.12	41.	0.50	3.54	20.50
10	911.62	147.	0.58	4.12	85.26
11	912.12	195.	0.33	4.45	64.35
12	912.68	145.	0.35	4.80	50.75
13	913.02	161.	0.35	5.15	56.35
14	913.35	121.	0.20	5.35	24.20
15	913.87	110.	0.88	6.23	96.80
16	914.42	63.	0.30	6.53	18.90
17	914.95	93.	0.30	6.83	27.90
18	915.40	4.3	0.60	7.43	2.58
19	916.03	1.7	0.25	7.68	0.43
20	916.30	1.7	0.25	7.93	0.43
21	916.60	1.8	0.35	8.28	0.63
22	917.07	0.89	0.40	8.68	0.36
23	917.33	2.2	0.30	8.98	0.66
24	917.72	0.89	0.50	9.48	0.45
25	918.30	1.4	0.40	9.88	0.56
26	918.58	0.68	0.30	10.18	0.21
27	918.90	0.84	0.40	10.58	0.34
28	919.40	0.83	0.35	10.93	0.29
29	919.90	0.60	0.65	11.58	0.39
30	920.25	Imp.	0.40	11.98	0.00
31	920.83	0.39	0.50	12.48	0.20
32	921.28	2.1	0.40	12.88	0.84
33	921.60	Imp.	0.40	13.28	0.00
34	922.10	2.0	0.50	13.78	1.00
35	922.50	0.82	0.40	14.18	0.33
36	922.91	1.3	0.40	14.58	0.52
37	923.35	0.55	0.50	15.08	0.28
38	923.81	0.60	0.40	15.48	0.24
39	924.20	0.51	0.50	15.98	0.26
40	924.79	0.85	0.40	16.38	0.34
41	925.02	0.43	0.20	16.58	0.09

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SUMMARY OF PERMEABILITY TESTS

TABLE II

Company Martin & Ensminger Lease Reece Well No. 1

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity, Ft. x Md.
907.65 - 914.70	6.53	81.06	529.31
914.70 - 925.10	9.25	4.25	39.33
908.00 - 915.00	6.33	85.16	539.06

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RESULTS OF SATURATION TESTS

TABLE III

Company Martin & Eneminger Lease Reece Well No. 1

Sat. No.	Depth, Feet	Effective Porosity Percent	Percent Saturation			Oil Content, Bbls./A. Ft.	Feet of Core		Total Oil Content Bbls./Acre
			Oil	Water	Total		Ft.	Cum. Ft.	
6	908.07	15.8	40.0	39.4	79.4	491	1.12	1.12	550
7	909.27	13.7	35.7	41.5	77.2	380	0.94	2.06	357
8	910.37	14.8	37.9	37.7	75.6	435	0.98	3.04	426
9	911.48	15.8	43.6	23.9	67.5	534	1.08	4.12	577
10	912.50	17.2	43.5	25.4	68.9	580	0.68	4.80	394
11	913.68	18.5	42.6	26.4	69.0	611	1.43	6.23	874
F-12	914.62	18.3	49.4	-	-	697	0.30	6.53	209
12	914.77	18.4	46.4	20.9	67.3	663	0.15	6.68	99
F-13	915.67	16.3	49.5	-	-	626	0.60	7.28	376
13	915.82	18.8	46.9	32.4	79.3	684	0.20	7.48	137
14	916.92	17.2	50.2	30.5	80.7	670	1.55	9.03	1,039
15	918.12	14.5	42.7	45.4	88.1	480	1.10	10.13	528
16	919.21	15.7	40.9	44.1	85.0	498	0.85	10.98	423
17	920.68	15.5	53.6	25.4	79.0	645	1.75	12.73	1,128
18	921.98	16.4	54.9	30.2	85.1	698	1.30	14.03	907
19	923.22	16.5	40.8	37.1	77.9	523	1.30	15.33	680
20	924.52	14.4	39.0	48.3	87.3	436	1.30	16.63	567
							Total	- - - -	9,271

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SUMMARY OF SATURATION TESTS

TABLE IV

Company Martin & Ensminger Lease Reece Well No. 1

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
907.65 - 914.70	6.53	16.23	41.03	32.25	519	3,387
914.70 - 925.10	10.10	15.94	46.99	35.69	583	5,884
908.00 - 915.00	6.33	16.27	41.09	31.43	524	~~3,314~~ 9,271

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RESULTS OF LABORATORY FLOODING TESTS

TABLE V

Company Martin and Ensminger Lease Reece 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.
			Percent	Bbls./A. Ft.	Percent	Bbls./A. Ft.	% Oil	% Water	Bbls./A. Ft.			
6	907.91	15.3	41.9	498	7.8	93	34.1	56.4	405	10	0.282	30
7	909.12	14.2	35.1	387	3.7	41	31.4	60.0	346	17	0.323	30
8	910.20	15.2	38.8	458	5.6	66	33.2	65.6	392	58	1.75	20
9	911.32	16.2	42.5	535	10.2	128	32.3	58.8	407	117	5.00	20
10	912.37	17.2	44.6	595	18.2	243	26.4	68.6	352	161	10.18	10
11	913.52	16.2	42.8	605	14.2	201	28.6	65.0	404	112	7.93	15
12	914.62	18.3	49.4	697	20.2	283	29.2	61.8	414	169	10.47	10
13	915.67	16.3	49.5	626	0.0	0	49.5	38.7	626	0	Imp.	50+
14	916.77	17.1	50.8	674	0.0	0	50.8	32.3	674	0	Imp.	50+
15	917.97	14.8	41.6	477	0.0	0	41.6	46.8	477	0	Imp.	50+
16	919.07	15.8	42.8	525	0.0	0	42.8	45.6	525	0	Imp.	50+
17	920.52	16.0	52.0	646	0.0	0	52.0	38.7	646	0	Imp.	50+
18	921.82	16.0	55.5	689	0.0	0	55.5	32.7	689	0	Imp.	50+
19	923.07	16.5	41.9	537	0.0	0	41.9	41.7	537	0	Imp.	50+
20	924.38	14.2	38.2	422	0.0	0	38.2	51.8	422	0	Imp.	50+

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 VI

Company Martin & Ensminger Lease Reece Well No. 1

Depth Interval, Feet	907.65 - 914.70	908.00 - 915.00
Feet of Core Analyzed	6.53	6.18
Average Percent Porosity	16.23	16.29
Average Percent Original Oil Saturation	41.40	41.38
Average Percent Oil Recovery	10.34	10.49
Average Percent Residual Oil Saturation	31.06	30.89
Average Percent Residual Water Saturation	62.06	62.38
Average Percent Total Residual Fluid Saturation	93.12	93.27
Average Original Oil Content, Bbls./A. Ft.	525.	527.
Average Oil Recovery, Bbls./A. Ft.	135.	138.
Average Residual Oil Content, Bbls./A. Ft.	390.	389.
Total Original Oil Content, Bbls./Acre	3,427.	3,253.
Total Oil Recovery, Bbls./Acre	883.	851.
Total Residual Oil Content, Bbls./Acre	2,544.	2,402.
Average Effective Permeability, Millidarcys	4.46	4.70
Average Initial Fluid Production Pressure, p.s.i.	19.3	16.3

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

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RESULTS OF WATER DIFFERENTIATION TESTS

TABLE VII

Company Martin & Enseminger Lease Reece Well No. 1

Sample No.	Depth, Feet	Chloride Content of Brine in Sand ppm	Percent Water Saturation		
			Connate	Drilling & Foreign	Total
6	908.07	35,000			
7	909.27	40,600			
8	910.37	34,900			
9	911.48	29,400			
10	912.50	28,600			
11	913.68	30,100			
12	914.77	42,000			
13	915.82	33,900			
14	916.92	39,200			
15	918.12	38,400			
16	919.21	37,000			
17	920.68	42,600			
18	921.98	49,300			
19	923.22	44,000			
20	924.52	41,100			

Note: ppm - parts per million.

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SUMMARY OF WATER DIFFERENTIATION TESTS

TABLE VIII

Company Martin & Ensminger Lease Reece Well No. 1

Depth Interval, Feet	Chloride Content of Brine in Sand, ppm	Average Percent Connate Water	Average Percent Drilling & Foreign Water
907.65 - 914.35	33,035		
914.70 - 925.10	41,768		
908.00 - 915.00	33,152		

Note: ppm - parts per million.