



OILFIELD RESEARCH LABORATORIES

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August 18, 1980

James E. Russell Petroleum, Inc.
P. O. Box 2618
Abilene, Texas 79604

Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core taken from the Minckley B, Sec. 9 Lease, Well No. 95, Anderson County, Kansas and submitted to our laboratory on June 7, 1980.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES


Sanford A. Michel

SAM/ks

3 c to Abilene, Texas
2 c to Chanute, Kansas

Oilfield Research Laboratories

GENERAL INFORMATION & SUMMARY

Company James E. Russell Petroleum, Inc. Lease Minckley B, Sec. 9 Well No. 95
 Location 1540' SNL & 1980' EWL - NE $\frac{1}{4}$
 Section 9 Twp. 23S Rge. 19E County Anderson State Kansas

Elevation, Feet . Datum: Mean Sea Level (G.L.) . . . 1022.8

Name of Sand	- - - - -	Squirrel
Top of Core	- - - - -	712.0
Bottom of Core	- - - - -	752.0
Top of Sand	- - - - -	712.4
Bottom of Sand	- - - - -	737.0
Total Feet of Permeable Sand	- - - - -	22.0
Total Feet of Floodable Sand	- - - - -	4.4

Distribution of Permeable Sand: Permeability Range Millidarcys

	Feet	Cum. Ft.
0 - 1	5.2	5.2
1 - 5	6.5	11.7
5 - 10	5.3	17.0
10 - 20	4.0	21.0
20 - 30	1.0	22.0

Average Permeability Millidarcys	- - - - -	6.6
Average Percent Porosity	- - - - -	17.0
Average Percent Oil Saturation	- - - - -	44.7
Average Percent Water Saturation	- - - - -	29.8
Average Oil Content, Bbls./A. Ft.	- - - - -	596.
Total Oil Content, Bbls./Acre	- - - - -	14,433.
Average Percent Oil Recovery by Laboratory Flooding Tests	- - - - -	9.3
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	- - - - -	137.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	- - - - -	602.
Total Calculated Oil Recovery, Bbls./Acre	- - - - -	See "Calculated Recovery" Section

The core was sampled by a representative of Oilfield Research Laboratories. Fresh water mud was used as a drilling fluid. The core was from a non-virgin area.

FORMATION CORED

The detailed log of the formation cored is as follows:

<u>Depth Interval, Feet</u>	<u>Description</u>
712.0 - 712.4	Sandstone, grayish brown shaly.
712.4 - 713.0	Sandstone, brown.
713.0 - 713.3	Shale, gray sandy.
713.3 - 714.0	Sandstone, grayish brown very shaly.
714.0 - 717.2	Sandstone, grayish brown shaly.
717.2 - 717.9	Sandstone, grayish brown very shaly.
717.9 - 719.0	Sandstone, grayish brown shaly.
719.0 - 722.3	Sandstone, brown slightly calcareous slightly shaly.
722.3 - 723.7	Sandstone, shaly slightly calcareous brown.
723.7 - 726.0	Sandstone, brown slightly calcareous.
726.0 - 729.1	Sandstone and shale, gray and brown laminated.
729.1 - 730.2	Sandstone, brown slightly calcareous.
730.2 - 731.0	Sandstone, brown slightly shaly slightly calcareous.
731.0 - 732.0	Sandstone, brown slightly calcareous.
732.0 - 732.9	Sandstone, shaly, slightly calcareous, brown.
732.9 - 734.8	Sandstone, gray carbonaceous slightly calcareous shaly.
734.8 - 735.7	Sandstone, black carbonaceous slightly calcareous shaly.
735.7 - 737.0	Sandstone, grayish brown very shaly.
737.0 - 750.4	Shale, gray.
750.4 - 751.1	Shale, hard gray calcareous fossiliferous.
751.1 - 752.0	Shale, gray.

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 602 barrels of oil per acre was obtained from 4.4 feet of sand. The weighted average percent oil saturation was reduced from 48.9 to 39.6, or represents an average recovery of 9.3 percent. The weighted average effective permeability of the samples is 0.45 millidarcys, while the average initial fluid production pressure is 40.0 pounds per square inch (see Table V).

By observing the data given in Table IV, you will note that of the 25 samples tested, 4 produced water and oil, and 1 sample produced water only. This indicates that approximately 16 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 1310 barrels of oil per acre. This is an average recovery of 297 barrels per acre foot from 4.4 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	15.0
Average porosity, percent	18.5
Oil saturation after flooding, percent	39.6
Performance factor, percent, estimated	50.0
Net floodable sand, feet	4.4

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

James E. Russell
Company Petroleum, Inc.

Lease Minckley B, Sec. 9

Well No. 95

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			Ft.	Cum. Ft.		
1	712.5	16.6	30	42	386	13.	0.6	0.6	232	7.80
2	713.5	15.2	26	57	307	0.38	0.7	1.3	215	0.27
3	714.5	18.1	41	33	576	4.2	1.0	2.3	576	4.20
4	715.5	16.6	39	39	502	1.5	1.0	3.3	502	1.50
5	716.5	14.0	40	42	434	6.4	1.2	4.5	521	7.68
6	717.5	16.6	50	28	644	0.20	0.7	5.2	451	0.14
7	718.5	16.1	47	35	587	2.4	1.1	6.3	646	2.64
8	719.5	19.9	49	20	757	6.6	1.0	7.3	757	6.60
9	720.5	18.3	50	25	710	6.8	1.0	8.3	710	6.80
10	721.5	18.4	50	24	714	9.1	1.3	9.6	928	11.83
11	722.5	16.3	35	36	443	1.7	0.7	10.3	310	1.19
12	723.5	15.9	49	31	604	3.3	0.7	11.0	423	2.31
13	724.5	18.1	48	23	674	12.	1.3	12.3	876	15.60
14	725.5	20.4	52	19	823	27.	1.0	13.3	823	27.00
15	726.5	17.0	43	30	567	0.32	1.0	14.3	567	0.32
16	727.5	14.9	39	42	451	Imp.	1.0	15.3	451	0.00
17	728.5	15.4	42	33	502	3.8	1.1	16.4	552	4.18
18	729.5	19.6	51	19	776	18.	1.1	17.5	854	19.80
19	730.5	17.5	41	28	557	8.9	0.8	18.3	446	7.12
20	731.5	18.9	55	19	806	14.	1.0	19.3	806	14.00
21	732.5	17.4	47	24	634	2.3	0.9	20.2	571	2.07
22	733.5	15.2	42	30	495	0.20	1.1	21.3	545	0.22
23	734.5	14.5	43	29	484	0.25	0.8	22.1	387	0.20
24	735.5	16.5	54	19	691	0.63	0.9	23.0	622	0.57
25	736.5	16.0	41	32	509	Imp.	1.3	24.3	662	0.00

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company James E. Russell Petroleum, Inc. Lease Minckley B, Sec. 9 Well No. 95

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
712.4 - 723.7	11.0	4.8	52.96
723.7 - 737.0	11.0	8.3	91.08
712.4 - 737.0	22.0	6.6	144.04

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
712.4 - 723.7	11.0	16.9	43.1	33.5	570	6,271
723.7 - 737.0	13.3	17.1	46.0	26.8	614	8,162
712.4 - 737.0	24.3	17.0	44.7	29.8	596	14,433

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company James E. Russell Petroleum, Inc. Lease Minckley B, Sec. 9 Well No. 95

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.	%	Bbls./A. Ft.	% Oil	% Water			
1	712.5	16.9	380	29	0	0	0	29	45	0	Imp.	-
2	713.5	15.0	303	26	0	0	0	26	58	0	Imp.	-
3	714.5	18.1	576	41	0	0	0	41	35	0	Imp.	-
4	715.5	17.0	501	38	0	0	0	38	40	0	Imp.	-
5	716.5	14.3	433	39	0	0	0	39	44	0	Imp.	-
6	717.5	16.5	640	50	0	0	0	50	29	0	Imp.	-
7	718.5	16.2	591	47	88	7	503	40	51	12	0.15	30
8	719.5	19.7	749	49	153	10	596	39	44	11	0.15	30
9	720.5	18.5	718	50	0	0	718	50	27	0	Imp.	-
10	721.5	18.4	714	50	0	0	714	50	26	0	Imp.	-
11	722.5	15.8	441	36	0	0	441	36	39	0	Imp.	-
12	723.5	16.1	612	49	0	0	612	49	32	0	Imp.	-
13	724.5	18.2	678	48	113	8	565	40	51	11	0.37	50
14	725.5	20.3	819	52	205	13	614	39	43	48	1.20	50
15	726.5	17.3	564	42	0	0	564	42	35	0	Imp.	-
16	727.5	15.1	457	39	0	0	457	39	44	0	Imp.	-
17	728.5	15.8	503	41	0	0	503	41	35	0	Imp.	-
18	729.5	19.5	772	51	0	0	772	51	36	24	0.45	50
19	730.5	17.6	560	41	0	0	560	41	29	0	Imp.	-
20	731.5	18.9	806	55	0	0	806	55	19	0	Imp.	-
21	732.5	17.0	607	46	0	0	607	46	26	0	Imp.	-
22	733.5	14.7	490	43	0	0	490	43	34	0	Imp.	-
23	734.5	14.7	490	43	0	0	490	43	30	0	Imp.	-
24	735.5	16.2	679	54	0	0	679	54	20	0	Imp.	-
25	736.5	16.4	509	40	0	0	509	40	36	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	James E. Russell Petroleum, Inc.	Lease	Minckley B, Sec. 9	Well No.	95
Depth Interval, Feet	712.4 - 723.7	723.7 - 737.0	712.4 - 737.0		
Feet of Core Analyzed	2.1	2.3	4.4		
Average Percent Porosity	17.9	19.1	18.5		
Average Percent Original Oil Saturation	47.9	49.8	48.9		
Average Percent Oil Recovery	8.4	10.2	9.3		
Average Percent Residual Oil Saturation	39.5	39.6	39.6		
Average Percent Residual Water Saturation	47.7	47.5	47.6		
Average Percent Total Residual Fluid Saturation	87.2	87.1	87.2		
Average Original Oil Content, Bbls./A. Ft.	666.	739.	705.		
Average Oil Recovery, Bbls./A. Ft.	119.	153.	137.		
Average Residual Oil Content, Bbls./A. Ft.	547.	586.	568.		
Total Original Oil Content, Bbls./Acre	1399.	1701.	3100.		
Total Oil Recovery, Bbls./Acre	250.	352.	602.		
Total Residual Oil Content, Bbls./Acre	1149.	1349.	2498.		
Average Effective Permeability, Millidarcys	0.15	0.73	0.45		
Average Initial Fluid Production Pressure, p.s.i.	30.0	50.0	40.0		

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