



OILFIELD RESEARCH LABORATORIES

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January 15, 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 C. McGhee Lease, Well No. 20, Anderson County, Kansas, and submitted to our laboratory on December 13, 1979.

Your business is greatly appreciated.

Very truly yours, ,

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Sanford A. Michel

SAM/tem
3 c to Abilene, Texas
2 c to Chanute, Kansas

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GENERAL INFORMATION & SUMMARY Inc.

Company James E. Russell Petroleum, Inc. Lease C. McGhee Well No. 20

Location 1980' NSL & 660' WEL SE $\frac{1}{4}$

Section 10 Twp. 23S Rge. 19E County Anderson State Kansas

Name of Sand - - - - - Squirrel

Top of Core - - - - - 729.0

Bottom of Core - - - - - 769.0

Top of Sand - - - - - (Tested) 748.0

Bottom of Sand - - - - - (Tested) 764.6

Total Feet of Permeable Sand - - - - - 13.5

Total Feet of Floodable Sand - - - - - 2.5

Distribution of Permeable Sand:
Permeability Range
Millidarcys

Feet

Cum. Ft.

0 - 5 3.8 3.8

5 - 10 8.7 12.5

10 - 15 1.0 13.5

Average Permeability Millidarcys - - - - - 7.0

Average Percent Porosity - - - - - 16.5

Average Percent Oil Saturation - - - - - 35.6

Average Percent Water Saturation - - - - - 40.6

Average Oil Content, Bbls./A. Ft. - - - - - 459.

Total Oil Content, Bbls./Acre - - - - - 6428.

Average Percent Oil Recovery by Laboratory Flooding Tests - - - - - 5.3

Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft. - - - - - 75.

Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre - - - - - 188.

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

Packer Setting, Feet - - - - -

Viscosity, Centipoises @ - - - - -

A. P. I. Gravity, degrees @ 60 °F - - - - -

Elevation, Feet Datum Mean Sea Level (Ground Level) 1073.2

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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 semi-virgin area.

FORMATION CORED

The detailed log of the formation cored is as follows:

<u>Depth Interval, Feet</u>	<u>Description</u>
729.0 - 729.2	Shale and sandstone, laminated, gray and light brown; first oil stain.
729.2 - 731.2	Shale, gray.
731.2 - 748.0	Shale, gray, containing thin streaks of light brown sandstone; sandstone streaks thickening slightly with depth; odor and color of sandstone becoming better with depth but very light and scattered.
748.0 - 749.6	Shale and sandstone, laminated, gray, and light brown.
749.6 - 750.4	Shale, gray, slightly sandy.
750.4 - 750.9	Shale, gray laminated with thin streaks of light brown sandstone.
750.9 - 755.0	Sandstone, light brown, shaly.
755.0 - 756.2	Shale, gray, sandy.
756.2 - 761.7	Sandstone, light brown, shaly.
761.7 - 762.3	Shale, gray, sandy.
762.3 - 764.6	Sandstone, light brown, shaly.
764.6 - 765.0	Shale, gray, sandy.
765.0 - 765.3	Sandstone, light brown, shaly.
765.3 - 767.5	Shale, gray, sandy.

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LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 188 barrels of oil per acre was obtained from 2.5 feet of sand. The weighted average percent oil saturation was reduced from 42.3 to 37.0, or represents an average recovery of 5.3 percent. The weighted average effective permeability of the samples is 0.10 millidarcys, while the average initial fluid production pressure is 48.3 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 16 samples tested, 3 produced water and oil, and 1 sample produced water only. This indicates that approximately 19 percent of the sand represented by these samples is floodable pay sand.

Please note that the coregraph now presents residual oil saturation instead of recovery, as in the past.

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 600 barrels of oil per acre. This is an average recovery of 240 barrels per acre foot from 2.5 feet of floodable sand analyzed in this core.

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

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Original formation volume factor, estimated	1.05
Reservoir water saturation, percent, estimated	25.0
Average porosity, percent	18.0
Oil saturation after flooding, percent	37.0
Performance factor, percent, estimated	50.0
Net floodable sand, feet	2.5

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company James E. Russell Petroleum, Inc.

Lease C. McGhee

Well No. 20

Sample No.	Depth, Feet	Effective Porosity Percent	Percent Saturation		Oil Content Bbbls. / A Ft.	Perm., Mill.	Feet of Sand		Total Oil Content	Perm. Capacity Ft. X md.
			Oil	Water			Ft.	Cum. Ft.		
1	748.4	13.7	39	49	415	2.5	1.0	1.0	415	2.50
2	749.5	18.6	28	39	404	7.7	0.6	1.6	242	4.62
3	750.5	17.9	28	39	389	Imp.	0.5	2.1	195	0.00
4	751.5	12.9	17	71	170	0.16	1.1	3.2	187	0.18
5	752.5	13.5	34	58	356	10.	1.0	4.2	356	10.00
6	753.5	18.5	30	39	431	9.3	1.0	5.2	431	9.30
7	754.4	18.3	17	50	241	10.	1.0	6.2	241	10.00
8	756.5	18.7	44	29	638	9.6	0.8	7.0	510	7.68
9	757.5	17.6	46	31	628	12.	1.0	8.0	628	12.00
10	758.5	17.4	42	31	567	7.4	1.0	9.0	567	7.40
11	759.5	16.9	37	36	485	8.2	1.0	10.0	485	8.20
12	760.5	16.2	49	30	616	6.5	1.0	11.0	616	6.50
13	761.5	15.4	33	46	394	3.4	0.7	11.7	276	2.38
14	762.7	17.4	41	32	554	9.2	0.7	12.4	388	6.44
15	763.5	16.4	43	32	547	3.8	1.0	13.4	547	3.80
16	764.5	16.4	45	30	573	5.3	0.6	14.0	344	3.18

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company		James E. Russell Petroleum, Inc.	Lease	C. McGhee	Well No.	20
Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.			
748.0 - 764.6	13.5	7.0	94.18			
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
748.0 - 764.6	14.0	16.5	35.6	40.6	459	6,428

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Well No. 20

C. McGhee

Lease

James E. Russell Petroleum, Incorporated

Company

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	748.4	14.0	38	413	0	0	38	50	0	Imp.	-
2	749.5	18.4	28	400	0	0	28	52	4	0.30	45
3	750.5	17.7	28	385	0	0	28	57	0	Imp.	-
4	751.5	13.0	17	171	0	0	17	71	0	Imp.	-
5	752.5	13.3	34	351	0	0	34	68	0	Imp.	-
6	753.5	18.1	31	435	0	0	31	57	4	0.30	40
7	754.4	18.2	17	240	0	0	17	60	0	Imp.	-
8	756.5	18.8	44	642	9	131	35	47	0	0.02	45
9	757.5	17.6	46	628	0	0	46	40	0	Imp.	-
10	758.5	17.6	42	573	4	54	38	45	0	0.01	50
11	759.5	17.0	42	554	0	0	42	40	0	Imp.	-
12	760.5	16.7	48	622	0	0	48	37	0	Imp.	-
13	761.5	15.7	33	402	0	0	33	49	0	Imp.	-
14	762.7	17.8	41	566	3	41	38	36	4	0.30	50
15	763.5	16.4	43	420	0	0	43	35	0	Imp.	-
16	764.5	16.4	44	560	0	0	44	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, Incorporated Lease C. McGhee Well No. 20

Depth Interval, Feet	748.0 - 764.6
Feet of Core Analyzed	2.5
Average Percent Porosity	18.0
Average Percent Original Oil Saturation	42.3
Average Percent Oil Recovery	5.3
Average Percent Residual Oil Saturation	37.0
Average Percent Residual Water Saturation	43.1
Average Percent Total Residual Fluid Saturation	80.1
Average Original Oil Content, Bbls./A. Ft.	593.
Average Oil Recovery, Bbls./A. Ft.	75.
Average Residual Oil Content, Bbls./A. Ft.	518.
Total Original Oil Content, Bbls./Acre	1,483.
Total Oil Recovery, Bbls./Acre	188.
Total Residual Oil Content, Bbls./Acre	1,295.
Average Effective Permeability, Millidarcys	0.10
Average Initial Fluid Production Pressure, p.s.i.	48.3

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