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

March 26, 1979

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

Gentlemen:

Enclosed herewith is the report of the analysis run on the rotary core taken from the Bain Tract 1 Lease, Well No. 4, Anderson County, Kansas, and submitted to our laboratory on March 12, 1979.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Benjamin R. Pearman

Benjamin R. Pearman

SAM:cb

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

Oilfield Research Laboratories

GENERAL INFORMATION & SUMMARY

Company James E. Russell Pet., Inc. Lease Bain Tract 1 Well No. 4

Location 220' EWL & 1100' SNL E½ SE¼

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

Name of Sand	Squirrel
Top of Core	726.0
Bottom of Core	766.4
Top of Sand	726.0
Bottom of Sand	763.6
Total Feet of Permeable Sand	34.7
Total Feet of Floodable Sand	3.6

Distribution of Permeable Sand:

Permeability Range Millidarcys	Feet	Cum. Ft.
0 - 1	11.2	11.2
1 - 5	14.0	25.2
5 - 10	7.3	32.5
10 - 15	2.2	34.7

Average Permeability Millidarcys	3.6
Average Percent Porosity	14.8
Average Percent Oil Saturation	26.7
Average Percent Water Saturation	52.2
Average Oil Content, Bbls./A. Ft.	308.
Total Oil Content, Bbls./Acre	11,007.
Average Percent Oil Recovery by Laboratory Flooding Tests	7.1
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	99.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	355.
Total Calculated Oil Recovery, Bbls./Acre (Primary & Waterflooding)	860.
Packer Setting, Feet	
Viscosity, Centipoises @	
A. P. I. Gravity, degrees @ 60 °F	
Elevation, Feet (Ground Level)	1,071.5

The core was sampled by a representative of Oilfield Research Laboratories. Drilling fluid consisted of fresh water mud. The core was reported to be from virgin territory.

FORMATION CORED

The detailed log of the formation cored is as follows:

Depth Interval, Feet	Description
726.0 - 730.2	Grayish light brown finely laminated very shaly sandstone; 20% sand.
730.2 - 732.0	Light brown slightly laminated shaly sandstone; 80% sand.
732.0 - 734.0	Light brown and gray finely laminated sandstone and shale; 40% sand.
734.0 - 735.2	Gray sandy shale; 20% sand.
735.2 - 737.6	Gray finely laminated sandstone and shale; 40% sand.
737.6 - 741.0	Light brown slightly shaly sandstone; 80% sand.
741.0 - 744.8	Light brown and gray finely laminated sandstone and shale; 40% sand.
744.8 - 747.0	Light brown slightly shaly sandstone; 90% sand.
747.0 - 749.0	Light brown and gray finely laminated sandstone and shale; 50% sand.
749.0 - 749.8	Light brown slightly laminated slightly shaly sandstone; 80% sand.
749.8 - 751.0	Light brown slightly shaly sandstone; 90% sand.
751.0 - 752.4	Light brown very shaly sandstone; 20% sand.
752.4 - 753.0	Light brown sandstone; 95% sand.
753.0 - 753.3	Gray sandy shale.

753.3 - 756.6	Brown slightly micaceous sandstone; 90% sand.
756.6 - 757.0	Gray sandy shale.
757.0 - 760.2	Dark brown sandstone; 90% sand.
760.2 - 761.2	Brown slightly shaly sandstone; 85% sand.
761.2 - 762.2	Light brown and gray slightly shaly sandstone; 70% sand.
762.2 - 763.0	Light brown micaceous slightly shaly sandstone; 80% sand.
763.0 - 763.6	Brown slightly shaly sandstone; 90% sand.
763.6 - 765.6	Gray sandy shale.
765.6 - 766.4	Rotten gray sandy shale with coal streaks.

SUMMARY

It would appear from a study of the data, that efficient primary and waterflood operations in the vicinity of this well should recover approximately 860 barrels of oil per acre. This is an average recovery of 240 barrels per acre foot from 3.6 feet of floodable sand analyzed in this core.

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

Original formation volume factor	1.05
Reservoir water saturation, percent	25.0
Average porosity, percent	17.5
Oil saturation after flooding, percent	36.3
Performance factor, percent	50.0
Net floodable pay sand, feet	3.6

DISCUSSION OF ADDITIONAL FLOODPOT TESTING PROCEDURE

In addition to the routine floodpot analysis, another set of samples was obtained for testing with salt water (Unit 3 - 19,000 ppm chlorides), and salt water plus polymer (Unit 3 salt water).

The salt water tests were conducted for an 8 hour period beginning at 10 psi and increased in 10 psi increments to a maximum of 50 psi and held for 3 hours. In two cases, samples #28 and #32 were still showing oil recovery at a very minimal rate when the tests were terminated.

The incoming water lines were disconnected and flushed with polymer-salt water solution. Testing was then continued with polymer-salt water solution (Polymer consisted of Dearborn #521 at 500 ppm concentration). The collecting apparatus was cleaned and all recoveries shown are over and above those shown for salt water alone.

Note: psi - pounds per square inch
ppm - parts per million

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company James E. Russell Petroleum, Inc. Lease Bain Tract 1 Well No. 4

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	726.5	13.8	17	61	78	182	0.95	1.0	1.0	182	0.95
2	727.5	14.7	13	66	79	148	0.30	1.0	2.0	148	0.30
3	728.5	14.0	16	67	83	174	3.6	1.0	3.0	174	3.60
4	729.5	12.0	18	80	98	168	0.16	1.2	4.2	202	0.19
5	730.5	15.8	18	52	70	221	1.5	0.8	5.0	177	1.20
6	731.5	15.7	15	48	63	183	1.8	1.0	6.0	183	1.80
7	732.5	12.7	15	74	89	148	0.35	1.0	7.0	148	0.35
8	733.5	15.2	35	43	78	413	1.3	1.0	8.0	413	1.30
9	735.5	12.7	22	71	93	217	0.80	0.8	8.8	174	0.64
10	736.5	13.1	20	62	82	203	0.42	1.0	9.8	203	0.42
11	737.5	11.5	18	77	95	161	1.8	0.6	10.4	97	1.08
12	738.7	15.4	18	47	65	215	5.0	1.4	11.8	301	7.00
13	739.5	12.4	14	76	90	135	5.0	1.0	12.8	135	5.00
14	740.5	15.7	18	48	66	219	3.0	1.0	13.8	219	3.00
15	741.5	14.4	22	48	70	246	0.72	1.0	14.8	246	0.72
16	742.5	13.4	29	56	85	302	0.41	1.0	15.8	302	0.41
17	743.5	14.1	17	65	82	186	1.2	1.0	16.8	186	1.20
18	744.5	12.9	25	73	98	250	1.0	0.8	17.6	200	0.80
19	745.5	15.7	21	46	67	256	7.0	1.2	18.8	307	8.40
20	746.5	14.2	12	52	64	132	4.4	1.0	19.8	132	4.40
21	747.5	14.7	23	60	83	262	Imp.	1.0	20.8	262	0.00
22	748.5	15.0	23	53	76	268	0.35	1.0	21.8	268	0.35
23	749.5	14.3	29	51	80	322	1.4	0.8	22.6	258	1.12
24	750.5	14.3	26	53	79	288	5.5	1.2	23.8	346	6.60
25	751.5	9.0	36	61	97	251	0.30	1.4	25.2	351	0.42
26	752.5	18.1	29	38	67	407	10.	0.6	25.8	244	6.00
27	753.5	18.3	27	39	66	383	8.9	0.7	26.5	268	6.23
28	754.5	14.5	43	50	93	484	3.7	1.0	27.5	484	3.70
29	755.5	17.5	31	40	71	421	6.8	1.0	28.5	421	6.80
30	756.5	15.4	34	44	78	406	4.0	0.6	29.1	244	2.40

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company James E. Russell Petroleum, Inc. Lease Bain Tract 1 Well No. 4

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.		
31	757.5	19.7	32	32	64	489	5.6	1.0	30.1	489	5.60
32	758.5	16.8	44	32	76	574	11.	1.0	31.1	574	11.00
33	759.5	18.3	51	27	78	724	13.	1.2	32.3	869	15.60
34	760.5	17.6	45	29	74	614	6.2	1.0	33.3	614	6.20
35	761.5	16.2	39	37	76	490	4.1	1.0	34.3	490	4.10
36	762.5	15.7	47	33	80	573	2.4	0.8	35.1	458	1.92
37	763.3	16.0	44	32	76	546	5.8	0.6	35.7	328	3.48

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company James E. Russell Petroleum, Inc. Lease Bain Tract 1 Well No. 4

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
726.0 - 749.0	20.8	2.1	43.11
749.0 - 763.6	13.9	5.8	81.17
726.0 - 763.6	34.7	3.6	124.28

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
726.0 - 749.0	21.8	14.1	19.9	59.6	214	4,569
749.0 - 763.6	13.9	15.9	37.5	40.6	463	6,438
726.0 - 763.6	35.7	14.8	26.7	52.2	308	11,007

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company James E. Russell Petroleum, Inc. Lease Bain Tract 1 Well No. 4

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	726.5	14.0	17	185	0	0	17	66	185	0	Imp.	-
2	727.5	14.5	15	169	0	0	15	71	169	0	Imp.	-
3	728.5	14.1	15	164	0	0	15	70	164	0	Imp.	-
4	729.5	12.2	19	180	0	0	19	67	180	0	Imp.	-
5	730.5	15.7	18	220	0	0	18	69	220	0	Imp.	-
6	731.5	15.7	13	158	0	0	13	71	158	0	Imp.	-
7	732.5	13.0	15	151	0	0	15	73	151	0	Imp.	-
8	733.5	15.0	33	384	0	0	33	57	384	0	Imp.	-
9	735.5	13.0	23	232	0	0	23	70	232	0	Imp.	-
10	736.5	12.9	22	220	0	0	22	64	220	0	Imp.	-
11	737.5	11.5	19	170	0	0	19	76	170	0	Imp.	-
12	738.7	15.9	20	247	0	0	20	65	247	8	0.29	50
13	739.5	12.6	16	157	0	0	16	72	157	0	Imp.	-
14	740.5	16.1	20	250	0	0	20	63	250	7	0.22	50
15	741.5	14.9	21	243	0	0	21	63	243	7	0.22	50
16	742.5	13.6	28	296	0	0	28	60	296	0	Imp.	-
17	743.5	14.0	19	206	0	0	19	69	206	0	Imp.	-
18	744.5	12.8	25	248	0	0	25	61	248	0	Imp.	-
19	745.5	15.2	23	272	0	0	23	64	272	2	0.15	50
20	746.5	14.2	15	165	0	0	15	73	165	0	Imp.	-
21	747.5	14.6	22	249	0	0	22	61	249	0	Imp.	-
22	748.5	14.8	22	253	0	0	22	60	253	0	Imp.	-
23	749.5	14.8	26	299	0	0	26	81	299	0	Imp.	-
24	750.5	14.3	26	289	0	0	26	79	289	0	Imp.	-
25	751.5	9.2	36	257	0	0	36	58	257	0	Imp.	-
26	752.5	18.1	29	407	0	0	29	63	407	11	0.22	45
27	753.5	18.2	27	381	0	0	27	60	381	8	0.22	45
28	754.5	14.0	43	467	0	0	43	42	467	25	0.44	40
29	755.5	17.6	31	424	2	27	29	59	395	6	0.07	45

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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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company James E. Russell Petroleum, Inc. Lease Bain Tract 1 Well No. 4

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.			
30	756.5	15.4	32	382	0	0	32	57	382	0	Imp.	–
31	757.5	19.2	32	476	0	0	32	61	476	0	Imp.	–
32	758.5	17.1	44	583	0	0	44	49	583	0	Imp.	–
33	759.5	18.8	51	744	13	189	38	53	555	10	0.37	45
34	760.5	17.7	45	618	0	0	45	44	618	0	Imp.	–
35	761.5	16.2	37	465	0	0	37	50	465	0	Imp.	–
36	762.5	16.2	47	590	7	88	40	54	502	2	0.15	50
37	763.5	16.4	44	560	4	51	40	49	509	2	0.15	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.

Oilfield Research Laboratories

RESULTS OF LABORATORY FLOODING TESTS WITH SALT WATER

TABLE IV

Company James E. Russell Petroleum, Inc. Lease Bain Tract 1 Well No. 4

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.			
28	754.5	17.9			2	28				14	0.30	40
29	755.5	18.6			1	12				7	0.15	50
30	756.5	17.7			0	0				7	0.15	50
31	757.5	16.4			0	0				0	Imp.	–
32	758.5	17.7			6	82				4	0.08	50
33	759.5	17.8			6	83				11	0.23	30
34	760.5	17.0			0	0				0	Imp.	–
35	761.5	15.5			0	0				0	Imp.	–
36	762.5	16.2			0	0				0	Imp.	–
37	763.5	16.4			0	0				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.

Oilfield Research Laboratories

RESULTS OF LABORATORY FLOODING TESTS WITH SALT WATER AND POLYMER

TABLE IV

Company James E. Russell Petroleum, Inc. **Lease** Bain Tract 1 **Well No.** 4

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.			
28	754.5	17.9			.0	0	34	62	472	12.	0.29	40
29	755.5	18.6			0.5	7	33	57	476	9.	0.29	40
30	756.5	17.7			.0	0	38	51	522	6.	0.19	45
31	757.5	16.4			TR	0	28	67	356	0.	Imp.	–
32	758.5	17.7			1.	14	38	56	522	6.	0.19	45
33	759.5	17.8			1.	14	36	58	497	17.	0.38	30
34	760.5	17.0			TR	0	37	60	488	4.	0.19	50
35	761.5	15.5			3.	36	46	52	553	.1	0.01	30
36	762.5	16.2			.0	0	40	54	503	0.	Imp.	–
37	763.5	16.4			.0	0	40	49	509	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.

Oilfield Research Laboratories

SUMMARY OF LABORATORY FLOODING TESTS

TABLE V

Company James E. Russell Petroleum, Inc. Lease Bain Tract 1 Well No. 4

Depth Interval, Feet	749.0 - 763.6
Feet of Core Analyzed	3.6
Average Percent Porosity	17.5
Average Percent Original Oil Saturation	43.4
Average Percent Oil Recovery	7.1
Average Percent Residual Oil Saturation	36.3
Average Percent Residual Water Saturation	54.2
Average Percent Total Residual Fluid Saturation	90.5
Average Original Oil Content, Bbls./A. Ft.	590.
Average Oil Recovery, Bbls./A. Ft.	99.
Average Residual Oil Content, Bbls./A. Ft.	491.
Total Original Oil Content, Bbls./Acre	2,123.
Total Oil Recovery, Bbls./Acre	355.
Total Residual Oil Content, Bbls./Acre	1,768.
Average Effective Permeability, Millidarcys	0.20
Average Initial Fluid Production Pressure, p.s.i.	47.5

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