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

December 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 Ard Lease, Well No. 5-A, located in Allen County, Kansas and submitted to our laboratory on November 13, 1980.

Your business is greatly appreciated.

Very truly yours,
OILFIELD RESEARCH LABORATORIES

Sanford A. Michel

SAM/mkf

3 c to Abilene, Tx.
2 c to Chanute, Ks.

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GENERAL INFORMATION & SUMMARY

Company James E. Russell Petroleum, Inc. Lease Ard Well No. 5-A

Location 1990' SNL & 2485' EWL SE¼

Section 10 Twp. 26S Rge. 20E County Allen State Kansas

Datum: Mean Sea Level (G. L.)

Elevation, Feet	991.2
Name of Sand	Bartlesville
Top of Core	695.0
Bottom of Core	735.3
Top of Sand	695.6
Bottom of Sand (Analyzed)	730.9
Total Feet of Permeable Sand	22.5
Total Feet of Floodable Sand	12.9

Distribution of Permeable Sand:

Permeability Range Millidarcys	Feet	Cum. Ft.
1.2 - 9.0	5.2	5.2
13 - 30	9.2	14.4
30 & Above	8.1	22.5

Average Permeability Millidarcys	32.4
Average Percent Porosity	16.4
Average Percent Oil Saturation	32.8
Average Percent Water Saturation	54.6
Average Oil Content, Bbls./A. Ft.	427.
Total Oil Content, Bbls./Acre	11,460.
Average Percent Oil Recovery by Laboratory Flooding Tests	3.9
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	51.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	657.
Total Calculated Oil Recovery, Bbls./Acre	See "Calculated Recovery" Section

Fresh water mud was used as the circulating fluid while taking this core. The well was drilled in non virgin territory.

An Oilfield Research Laboratory representative sampled the core.

FORMATION CORED

The detailed log of the formation cored is as follows:

Depth Interval, Feet	Description
695.0 - 695.6	Shale, gray, sandy.
695.6 - 696.7	Sandstone and shale, light brown and gray, laminated.
696.7 - 698.1	Shale gray sandy.
698.1 - 700.8	Sandstone and shale light brown and gray, laminated.
700.8 - 704.3	Sandstone, light brown.
704.3 - 705.1	Sandstone, grayish brown, very shaly.
705.1 - 707.2	Sandstone, light brown, shaly.
707.2 - 707.9	Sandstone light brown very shaly, containing a vertical fracture.
707.9 - 710.2	Shale, gray sandy, containing a vertical fracture.
710.2 - 711.4	Sandstone, brown.
711.4 - 712.0	Sandstone, brown, slightly shaly.
712.0 - 712.5	Sandstone, brown.
712.5 - 713.0	Shale, gray sandy.
713.0 - 714.0	Sandstone, brown, shaly.
714.0 - 715.3	Sandstone, brown, slightly calcareous.

715.3 - 715.8	Sandstone, brown shaly, slightly calcareous.
715.8 - 721.7	Sandstone, brown slightly calcareous.
721.7 - 726.0	Shale, gray sandy, containing a vertical fracture.
726.0 - 730.9	Sandstone, brown, slightly calcareous, containing a vertical fracture.
730.9 - 731.4	Sandstone, brown shaly.
731.4 - 735.3	Shale, gray sandy.

LABORATORY FLOODING TESTS

Portions of the sand in this core responded to laboratory flooding tests, as a total recovery of 657 barrels of oil per acre was obtained from 12.9 feet of sand. The weighted average percent oil saturation was reduced from 37.9 to 34.0, or represents an average recovery of 3.9 percent. The weighted average effective permeability of the samples is 3.18 millidarcys, while the average initial fluid production pressure is 26.6 pounds per square inch (See Table V).

CALCULATED RECOVERY

The results of the laboratory testing indicate that efficient primary and waterflooding operations in the vicinity of this well should recover approximately 2540 barrels of oil per acre. This is an average recovery of 197 barrels per acre foot from the 12.9 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	30.0
Average porosity, percent	17.3
Oil saturation after flooding, percent	35.0
Performance factor, percent, estimated	45.0
Net floodable pay sand, feet	12.9

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company James E. Russell Petroleum, Inc. Lease Ard Well No. 5-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	696.5	10.9	6	73	79	51	Imp.	1.1	1.1	56	0.00
2	698.5	7.9	3	91	94	18	2.1	1.0	2.1	18	2.10
3	699.4	15.0	27	55	82	314	Imp.	1.0	3.1	314	0.00
4	700.5	14.8	35	53	88	402	Imp.	0.7	3.8	282	0.00
5	701.5	12.2	29	69	98	275	1.9	1.0	4.8	275	19.00
6	702.7	17.3	42	49	91	564	29.	1.0	5.8	564	29.00
7	703.5	15.8	39	57	96	478	19.	1.5	7.3	717	28.50
8	704.5	17.9	38	47	85	528	Imp.	0.8	8.1	421	0.00
9	705.5	18.8	44	50	94	642	7.9	1.0	9.1	642	7.90
10	706.5	17.6	41	55	96	560	7.7	1.1	10.2	616	8.47
11	707.8	15.1	13	63	76	152	Imp.	0.7	10.9	106	0.00
12	710.5	15.3	35	62	97	415	13.	1.2	12.1	499	15.60
13	711.8	14.3	60	33	93	666	8.9	0.6	12.7	400	5.34
14	712.4	22.6	32	59	91	561	86.	0.5	13.2	281	43.00
15	713.5	12.7	43	52	95	424	3.9	1.0	14.2	424	3.90
16	714.5	19.4	31	47	78	467	28.	1.3	15.5	608	36.40
17	715.5	17.4	36	55	91	486	1.2	0.5	16.0	243	0.60
18	716.5	19.3	32	56	88	479	22.	1.2	17.2	575	26.40
19	717.5	20.4	29	59	88	459	13.	1.0	18.2	459	13.00
20	718.5	16.2	35	62	97	440	35.	1.0	19.2	440	35.00
21	719.5	16.2	20	62	82	251	28.	1.0	20.2	251	28.00
22	720.5	19.2	24	67	91	358	94.	1.0	21.2	358	94.00
23	721.5	19.5	30	55	85	454	71.	0.7	21.9	318	49.70
24	726.5	17.5	44	34	78	597	61.	1.0	22.9	597	61.00
25	727.5	16.5	45	31	76	576	46.	1.0	23.9	576	46.00
26	728.5	18.0	34	33	67	475	78.	1.0	24.9	475	78.00
27	729.5	18.2	36	47	83	508	72.	1.0	25.9	508	72.00
28	730.4	14.6	43	44	87	487	30.	0.9	26.8	438	27.00

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company James E. Russell Petroleum, Inc. Lease Ard Well No. 5-A

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
695.6 - 712.0	8.4	13.8	115.91
712.0 - 730.9	14.1	43.5	614.00
695.6 - 730.9	22.5	32.4	729.91

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
695.6 - 712.0	12.7	14.8	31.2	59.3	386	4,909
712.0 - 730.9	14.1	17.7	34.2	50.4	465	6,551
695.6 - 730.9	26.8	16.4	32.8	54.6	427	11,460

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company James E. Russell Petroleum, Inc. Lease Ard Well No. 5-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	696.5	11.3	8	70	0	0	8	75	70	0	Imp.	-
2	698.5	7.7	4	24	0	0	4	92	24	0	Imp.	-
3	699.4	15.1	27	316	0	0	27	57	316	0	Imp.	-
4	700.5	15.0	36	419	0	0	36	55	419	0	Imp.	-
5	701.5	12.6	30	293	0	0	30	69	293	0	Imp.	-
6	702.7	17.5	42	570	2	27	40	55	543	40	0.60	25
7	703.5	15.6	39	472	2	24	37	60	448	8	0.15	50
8	704.5	17.7	38	522	0	0	38	49	522	0	Imp.	-
9	705.5	18.5	46	660	0	0	46	52	660	0	Imp.	-
10	706.5	17.6	41	560	0	0	41	57	560	0	Imp.	-
11	707.8	15.0	11	128	0	0	11	67	128	0	Imp.	-
12	710.5	15.7	35	426	0	0	35	53	426	24	0.45	35
13	711.8	14.0	62	673	0	0	62	35	673	0	Imp.	-
14	712.4	22.3	32	554	6	104	26	68	450	155	2.70	20
15	713.5	13.1	43	437	6	61	37	56	376	29	0.30	25
16	714.5	19.9	31	479	3	46	28	71	433	183	3.45	25
17	715.5	17.1	36	478	6	80	30	66	398	320	4.20	25
18	716.5	19.0	32	472	2	29	30	68	443	33	0.45	25
19	717.5	20.8	29	468	0	0	29	70	468	287	7.96	15
20	718.5	16.7	35	453	4	52	31	68	401	345	6.30	20
21	719.5	16.0	20	248	0	0	20	72	248	110	2.85	20
22	720.5	19.7	25	382	0	0	25	70	382	341	7.65	15
23	721.5	19.2	30	447	0	0	30	67	447	312	10.50	15
24	726.5	17.7	44	604	5	69	39	57	535	320	12.00	15
25	727.5	16.3	45	569	4	51	41	49	518	76	1.65	35
26	728.5	18.4	34	485	2	29	32	63	456	246	4.05	25
27	729.5	18.6	36	519	5	72	31	62	447	284	6.30	20
28	730.4	15.0	43	500	7	81	36	62	419	106	1.25	35

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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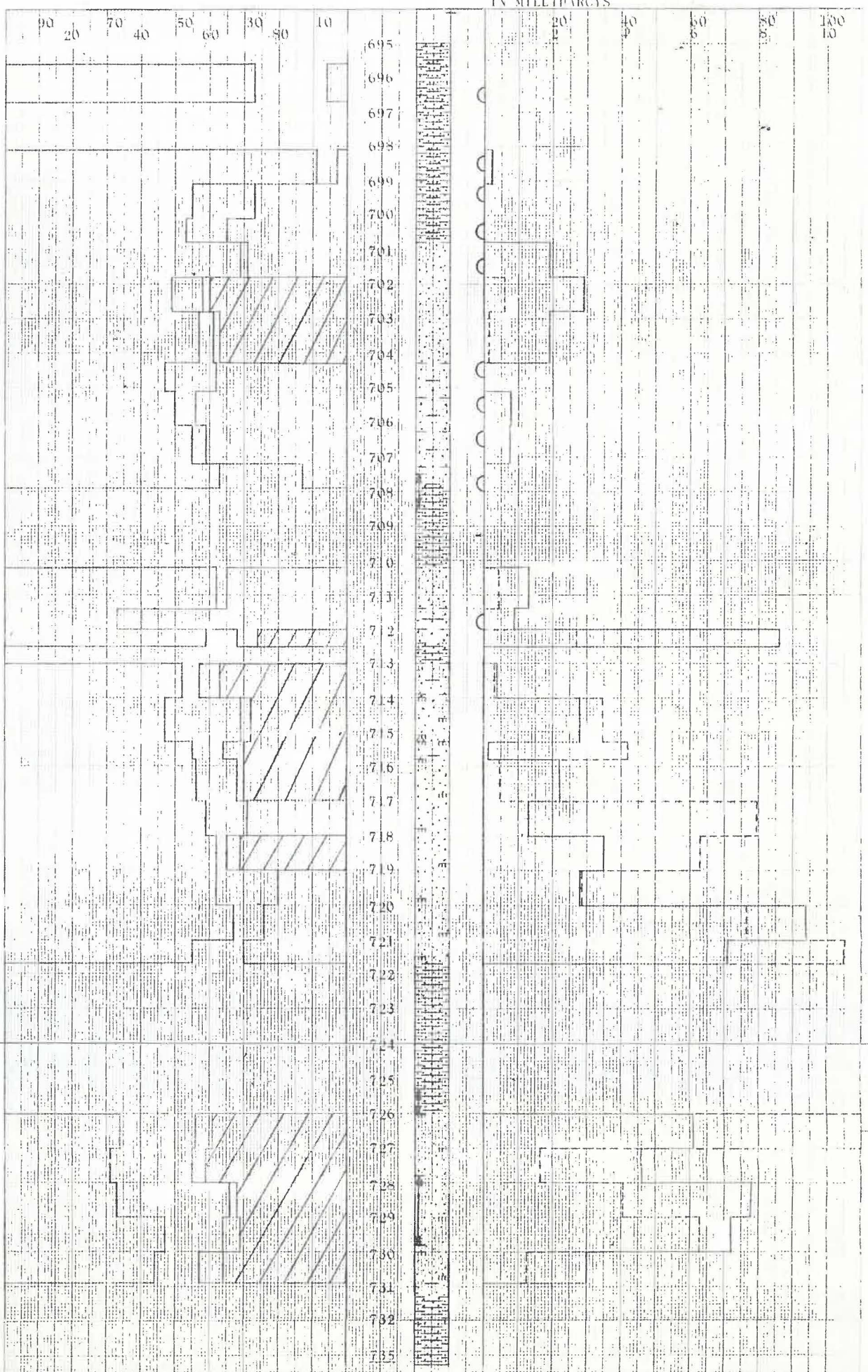
SUMMARY OF LABORATORY FLOODING TESTS

TABLE V

Company James E. Russell Petroleum, Inc. Lease Ard Well No. 5-A

Depth Interval, Feet	695.6 - 712.0	712.0 - 730.9	695.6 - 730.9
Feet of Core Analyzed	2.5	10.4	12.9
Average Percent Porosity	16.4	17.6	17.3
Average Percent Original Oil Saturation	40.2	37.3	37.9
Average Percent Oil Recovery	2.0	4.3	3.9
Average Percent Residual Oil Saturation	38.2	33.0	34.0
Average Percent Residual Water Saturation	58.2	62.7	61.9
Average Percent Total Residual Fluid Saturation	96.4	95.7	95.9
Average Original Oil Content, Bbls./A. Ft.	511.	502.	505.
Average Oil Recovery, Bbls./A. Ft.	25.	57.	51.
Average Residual Oil Content, Bbls./A. Ft.	486.	445.	454.
Total Original Oil Content, Bbls./Acre	1277.	5222.	6499.
Total Oil Recovery, Bbls./Acre	63.	594.	657.
Total Residual Oil Content, Bbls./Acre	1214.	4628.	5842.
Average Effective Permeability, Millidarcys	0.33	3.87	3.18
Average Initial Fluid Production Pressure, p.s.i.	37.5	24.5	26.6

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



KEY:

SANDY SHALE	LAMINATED SANDSTONE & SHALE
SANDSTONE	SHALY SANDSTONE
CALCAREOUS SANDSTONE	SHALY CALCAREOUS SANDSTONE
FLOODPOT RESIDUAL OIL SATURATION	IMPERMEABLE TO WATER

JAMES E. RUSSELL PETROLEUM, INC.

ARD LEASE — ALLEN COUNTY, KANSAS — WELL NO. 5-A

DEPTH INTERVAL, FEET	FEET OF CORE ANALYZED	AVERAGE POROSITY PERCENT	AVG. OIL SATURATION PERCENT	AVG. WATER SATURATION PERCENT	AVERAGE PERMEABILITY MILLIDARCYS	CALCULATED OIL RECOVERY BBLS./ACRE
695.6 - 712.0	12.7	14.8	31.2	57.3	33.8	
712.0 - 730.9	14.1	17.7	34.2	50.4	43.5	
695.6 - 730.9	26.8	16.4	32.8	54.6	32.4	2,540 (PRIMARY & WATERFLOODING)

NOTE: ELEVATION, FEET — DATUM: MEAN SEA LEVEL (G.L.) 991.2

OILFIELD RESEARCH LABORATORIES
CHANUTE, KANSAS
DECEMBER, 1950