

# OILFIELD RESEARCH LABORATORIES

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

August 23, 1983

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 Nelson Lease, Well No. RW-16, located in Allen County, Kansas and submitted to our laboratory on August 17, 1983.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

A handwritten signature in cursive script, appearing to read "Sanford A. Michel".

Sanford A. Michel

SAM/rmc

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

**Oilfield Research Laboratories**  
GENERAL INFORMATION & SUMMARY

Company James E. Russell Petroleum, Inc. Lease Nelson Well No. RW-16  
 Location 1380' WEL & 750' SNL, NW $\frac{1}{4}$   
 Section 28 Twp. 26S Rge. 21E County Allen State Kansas

Elevation, Feet ..... Datum: Mean Sea Level (Ground Level) 1074.1  
 Name of Sand..... Bartlesville  
 Top of Core ..... 658.0  
 Bottom of Core ..... 694.2  
 Top of Sand ..... (Tested)..... 658.4  
 Bottom of Sand ..... 681.9  
 Total Feet of Permeable Sand ..... 6.1  
 Total Feet of Productive Sand ..... 3.1

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.
0 - 1	2.5	2.5
1 - 4	1.8	4.3
6 - 10	1.8	6.1

	Laboratory	Net
Average Permeability Millidarcys .....	3.2	5.7
Average Percent Porosity .....	10.4	16.7
Average Percent Oil Saturation .....	22.1	31.0
Average Percent Water Saturation .....	66.3	47.6
Average Oil Content, Bbls./A. Ft. ....	201.	402.
Total Oil Content, Bbls./Acre .....	2,487.	1,245.
Average Percent Oil Recovery by Laboratory Flooding Tests .....	2.0	-
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft. ....	26.	-

**OILFIELD RESEARCH LABORATORIES**

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The core was sampled by a representative of Oilfield Research Laboratories. Salt water mud with 2 percent KCl was used as a drilling fluid.

FORMATION CORED

The detailed log of the formation cored is as follows:

<u>Depth Interval, Feet</u>	<u>Description</u>
658.0 - 658.4	Sandstone, shaly, light grayish brown, with scattered shale partings.
658.4 - 658.8	Sandstone, shaly, grayish brown.
658.8 - 659.1	Sandstone, shaly, slightly carbonaceous, brownish black.
659.1 - 659.4	Shale, gray.
659.4 - 660.2	Sandstone, slightly shaly, grayish brown, with scattered shale partings.
660.2 - 660.4	Shale, gray.
660.4 - 660.9	Sandstone, very shaly, grayish brown.
660.9 - 661.1	Shale, gray.
661.1 - 662.1	Sandstone, shaly, grayish brown, with scattered shale partings.
662.1 - 663.0	Sandstone, very shaly, grayish brown, with scattered shale partings.
663.0 - 663.3	Sandstone, shaly, slightly carbonaceous, brownish black.
663.3 - 664.6	Sandstone, very shaly, light grayish brown, with scattered shale partings.
664.6 - 664.9	Shale, gray.
664.9 - 665.3	Sandstone, very shaly, light grayish brown.
665.3 - 665.8	Shale, gray.
665.8 - 666.1	Sandstone, very shaly, light grayish brown.

## OILFIELD RESEARCH LABORATORIES

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<u>Depth Interval, Feet</u>	<u>Description</u>
666.1 - 666.3	Shale, gray.
666.3 - 666.6	Sandstone, very shaly, light grayish brown.
666.6 - 668.0	Shale, gray.
668.0 - 669.2	Sandstone, very shaly, grayish brown, with scattered shale partings.
669.2 - 669.5	Shale, sandy, gray.
669.5 - 670.1	Sandstone, very shaly, light grayish brown, with scattered shale partings.
670.1 - 670.4	Shale, sandy, gray.
670.4 - 671.0	Sandstone, very shaly, light grayish brown, with scattered shale partings.
671.0 - 671.5	Shale, sandy, gray.
671.5 - 673.1	Shale, gray.
673.1 - 673.5	Sandstone, very shaly, calcareous, grayish brown, with scattered coal partings.
673.5 - 674.0	Shale, calcareous, black.
674.0 - 674.6	Coal.
674.6 - 676.7	Shale, grayish brown.
676.7 - 678.9	Sandstone, very shaly, light gray.
678.9 - 679.3	Sandstone, very shaly, calcareous, light gray.
679.3 - 679.9	Sandstone, very shaly, light gray.
679.9 - 680.9	Sandstone, very shaly, calcareous, light gray.
680.9 - 681.9	Sandstone, very shaly, light gray.
681.9 - 685.0	Shale, gray.
685.0 - 685.8	Shale, dark gray.
685.8 - 686.6	Shale, gray.
686.6 - 690.0	Shale, slightly sandy, gray.

<u>Depth Interval, Feet</u>	<u>Description</u>
690.0 - 693.0	Shale, light gray.
693.0 - 693.7	Shale, slightly sandy, light gray.
693.7 - 694.2	Shale, light gray.

#### LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 47 barrels of oil per acre was obtained from 1.8 feet of sand. The weighted average percent oil saturation was reduced from 32.1 to 30.1, or represents an average recovery of 2.0 percent. The weighted average effective permeability of the samples is 0.76 millidarcys, while the average initial fluid production pressure is 32.5 pounds per square inch.

#### PRIMARY RECOVERY

A detailed analysis of the core data would indicate that the pay sand section is from 658.4 feet to 663.0 feet. A well in this area should produce approximately 38 barrels of oil per acre foot by primary methods. These recovery estimates assume a pressured, virgin reservoir.

Any oil previously produced from the area represented by this core should be deducted from the above estimate.

WATERFLOOD RECOVERY

The estimated additional oil recovery from a well in this vicinity by waterflood is approximately 159 barrels per acre foot.

	PRIMARY AND SECONDARY		
Oil Recovery Barrels Stock Tank	Solution Gas Energy	Increase By Waterflood After Primary	Total
Barrels per Acre Foot	38	159	197

**RESULTS OF SATURATION & PERMEABILITY TESTS**

Company James E. Russell Petroleum, Inc. Lease Nelson Well No. RW-16

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	658.5	17.9	28	40	68	389	3.0	0.4	0.4	156	1.20
2	659.5	18.1	31	52	83	435	9.7	0.8	1.2	348	7.76
3	660.5	10.6	4	90	94	33	1.6	0.5	1.7	17	0.80
4	661.5	16.5	33	45	78	422	6.8	1.0	2.7	422	6.80
5	662.5	15.2	30	50	80	354	2.0	0.9	3.6	319	1.80
6	663.7	13.6	26	54	80	274	0.62	0.7	4.3	192	0.43
7	664.4	10.9	16	70	86	135	0.14	0.6	4.9	81	0.08
8	666.5	6.7	32	64	96	166	Imp.	0.3	5.2	50	0.00
9	668.5	13.5	26	66	92	272	0.48	1.2	6.4	326	0.58
10	669.7	9.9	23	75	98	177	Imp.	0.6	7.0	106	0.00
11	670.5	6.8	37	61	98	195	Imp.	0.6	7.6	117	0.00
12	677.6	7.2	16	62	78	89	Imp.	1.0	8.6	89	0.00
13	678.5	8.5	23	69	92	152	Imp.	1.2	9.8	182	0.00
14	679.5	2.1	11	87	98	18	Imp.	0.6	10.4	11	0.00
15	680.5	4.0	9	89	98	28	Imp.	1.0	11.4	28	0.00
16	681.4	4.6	12	84	96	43	Imp.	1.0	12.4	43	0.00
			<u>AVERAGES</u>							<u>TOTALS</u>	
	658.4 - 663.0	15.9	27.2	53.5			5.1		3.6	1,262	18.36
	663.3 - 681.9	8.1	20.0	71.6			0.44		8.8	1,225	1.09
	658.4 - 681.9	10.4	22.1	66.3			3.2		12.4	2,487	19.45

**RESULTS OF LABORATORY FLOODING TESTS**

Company James E. Russell Petroleum, Inc. Lease Nelson Well No. RW-16

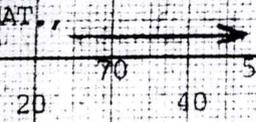
Sample No.	Depth, Feet	Effective Porosity Percent	Original Oil Saturation		Oil Recovery		Residual Saturation			Volume of Water Recovered cc*	Effective Permeability Millidarcys**	Initial Fluid Production Pressure Lbs./Sq./In.
			%	Bbbs./A. Ft.	%	Bbbs./A. Ft.	% Oil	% Water	Bbbs./A. Ft.			
1	658.5	17.5	29	394	0	0	29	41	394	0	Imp.	-
2	659.5	18.2	31	438	2	28	29	61	410	70	1.00	30
3	660.5	10.5	4	33	0	0	4	90	33	0	Imp.	-
4	661.5	16.4	33	420	2	25	31	51	395	32	0.56	35
5	662.5	15.7	29	353	0	0	29	52	353	0	Imp.	-
6	663.7	13.1	27	274	0	0	27	54	274	0	Imp.	-
7	664.4	10.9	16	135	0	0	16	70	135	0	Imp.	-
8	666.5	6.8	32	169	0	0	32	65	169	0	Imp.	-
9	668.5	13.6	26	274	0	0	26	66	274	0	Imp.	-
10	669.7	10.2	22	174	0	0	22	76	174	0	Imp.	-
11	670.5	7.3	35	198	0	0	35	63	198	0	Imp.	-
12	677.6	7.7	15	90	0	0	15	64	90	0	Imp.	-
13	678.5	8.2	24	153	0	0	24	69	153	0	Imp.	-
14	679.5	2.1	11	18	0	0	11	87	18	0	Imp.	-
15	680.5	4.1	9	29	0	0	9	89	29	0	Imp.	-
16	681.4	4.3	13	43	0	0	13	84	43	0	Imp.	-
						<u>AVERAGES</u>						
658.4 - 663.0		17.2			2.0	26	30.1	55.4	402		0.76	32.5

Notes: cc—cubic centimeter.

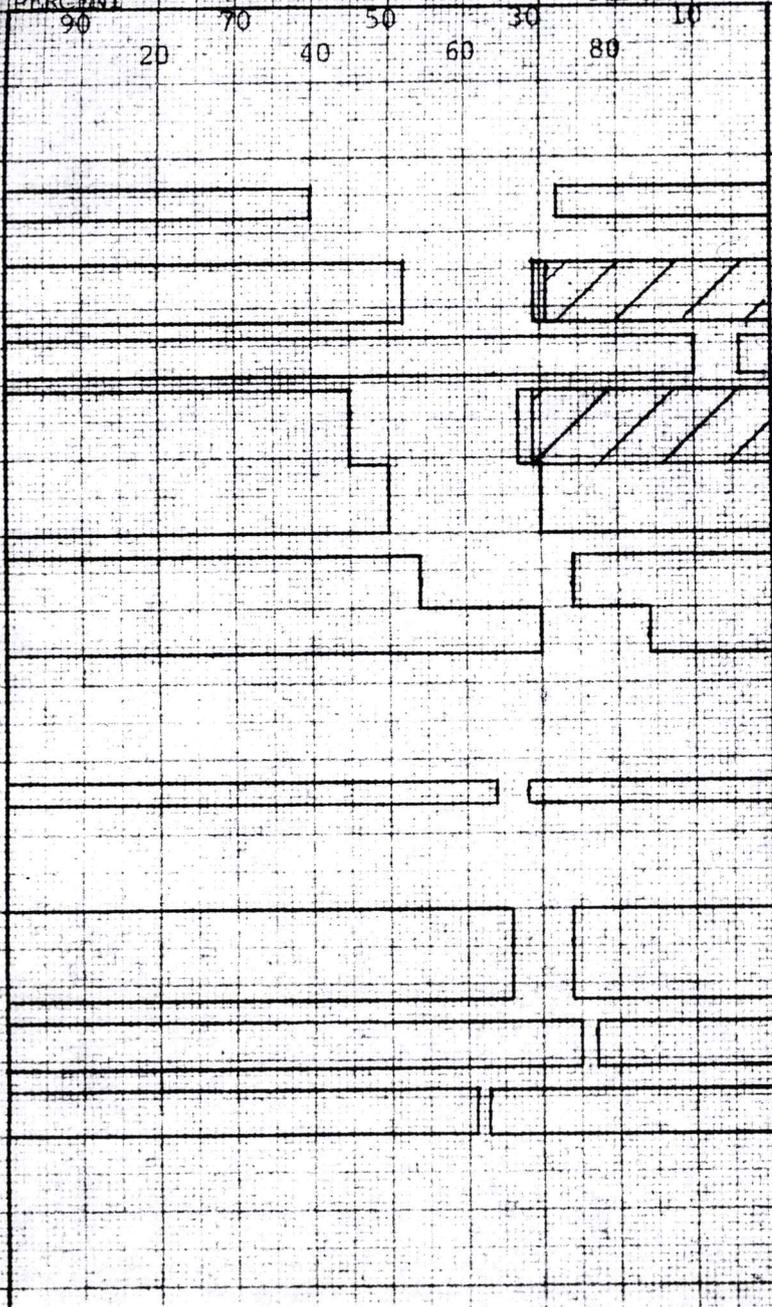
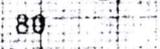
\*—Volume of water recovered at the time of maximum oil recovery.

\*\*—Determined by passing water through sample which still contains residual oil.

WATER SAT., PERCENT

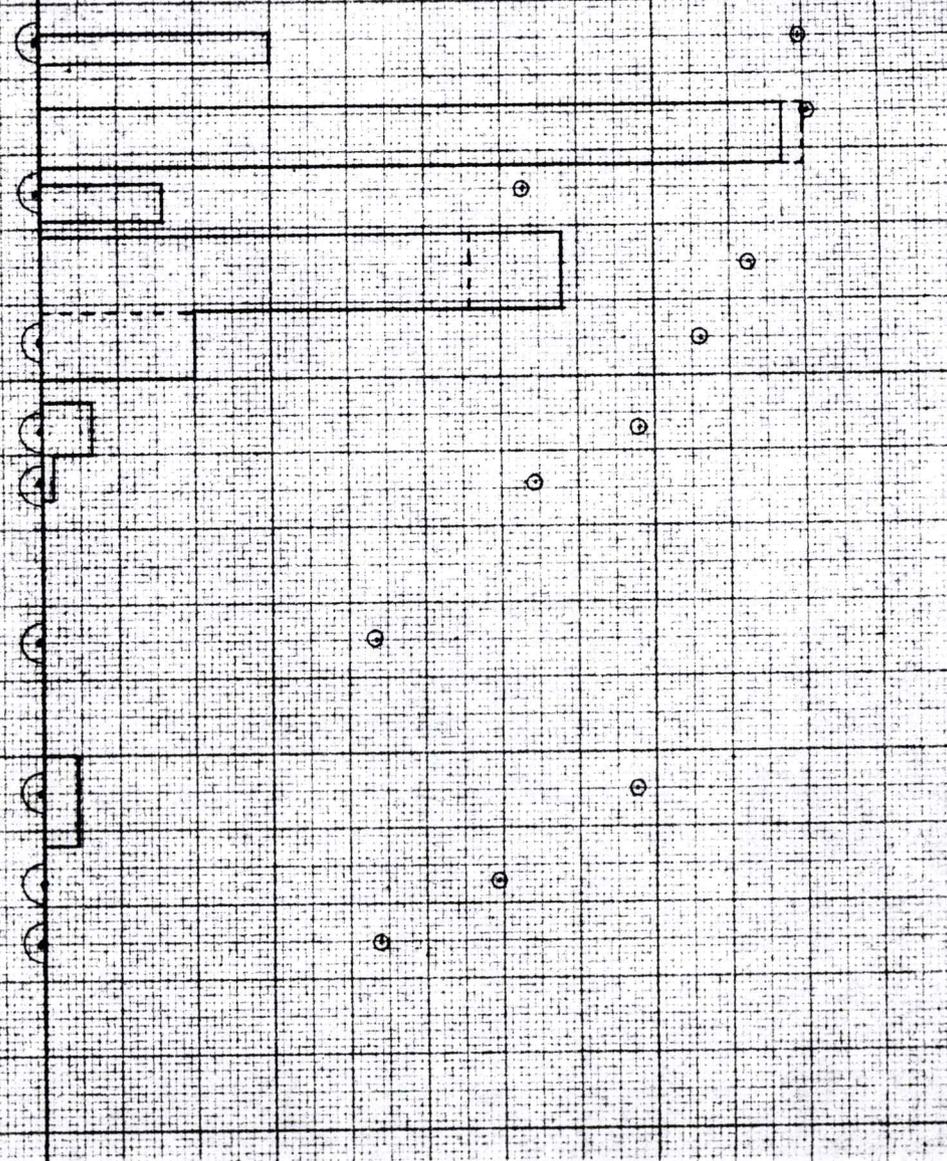


OIL SAT., PERCENT



PERMEABILITY, IN MILLIDARCY  
EFFECTIVE PERMEABILITY TO WATER, IN MILLIDARCY  
POROSITY, PERCENT

0 2 4 6 8 10 12 14 16 18  
0.2 0.4 0.6 0.8 1.0



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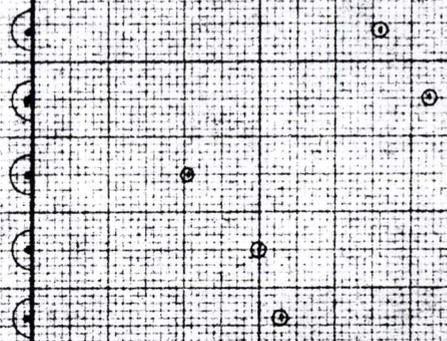
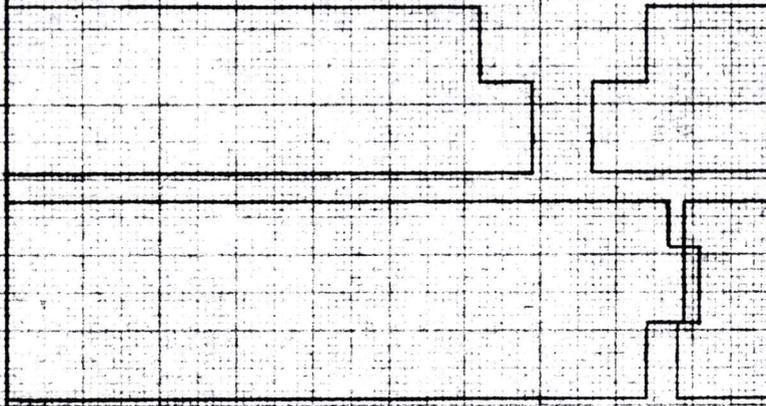
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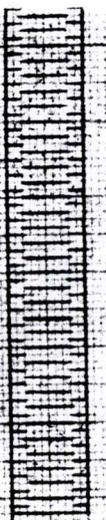
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KEY:

-  SHALE
-  SANDY SHALE
-  SHALY SANDSTONE
-  COAL
-  IMPERMEABLE TO WATER

-  SHALY SANDSTONE WITH SHALE PARTINGS
-  SHALY CARBONACEOUS SANDSTONE
-  SHALY CALCAREOUS SANDSTONE WITH COAL PARTINGS
-  CALCAREOUS SHALE
-  SHALY CALCAREOUS SANDSTONE
-  FLOODROT RESIDUAL OIL SATURATION

# JAMES E. RUSSELL PETROLEUM, INC.

NELSON LEASE

ALLEN COUNTY, KANSAS

WELL NO. RW-16

DEPTH INTERVAL, FEET	AVERAGE PERCENT POROSITY	AVERAGE OIL SATURATION PERCENT	AVERAGE WATER SATURATION PERCENT	AVERAGE PERMEABILITY, MILLIDARCYS
658.4 - 663.0	15.9	27.2	53.5	5.1
663.3 - 681.9	8.1	20.0	71.6	0.44
658.4 - 681.9	10.4	22.1	66.3	3.2