

OILFIELD RESEARCH LABORATORIES

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

July 17, 1981

Rantoul Energy Corporation
1505 SW 42nd Street
Topeka, Kansas 66609

Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core taken from the Engstrom Lease, Well No. 36-C, located in Greenwood County, Kansas and submitted to our laboratory on July 9, 1981.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Sanford A. Michel

SAM/kas

5 c to Topeka, Kansas

- REGISTERED ENGINEERS -

CORE ANALYSIS - WATER ANALYSIS - REPRESSURING ENGINEERING - SURVEYING & MAPPING - PROPERTY EVALUATION & OPERATION

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GENERAL INFORMATION & SUMMARY

Company Rantoul Energy Corporation Lease Engstrom Well No. 36-C
 Location _____
 Section 10 Twp. 27S Rgc. 13E County Greenwood State Kansas

Elevation, Feet
 Name of Sand Squirrel
 Top of Core 1210.0
 Bottom of Core 1234.7
 Top of Sand 1210.0
 Bottom of Sand 1223.3
 Total Feet of Permeable Sand 6.4
 Total Feet of Floodable Sand 2.3

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.
0 - 2	1.0	1.0
12 - 15	3.3	4.3
20 - 30	2.1	6.4

Average Permeability Millidarcys 15.6
 Average Percent Porosity 13.5
 Average Percent Oil Saturation 27.8
 Average Percent Water Saturation 45.5
 Average Oil Content, Bbls./A. Ft. 310.
 Total Oil Content, Bbls./Acre 3,256.
 Average Percent Oil Recovery by Laboratory Flooding Tests 3.0
 Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft. 38.
 Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre 88.
 Total Calculated Oil Recovery, Bbls./Acre

See "Calculated Recovery"
 Section

The core was sampled in the laboratory after being delivered by the client. Fresh water mud 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>
1210.0 - 1212.0	Hard grayish light brown calcareous very shaly sandstone.
1212.0 - 1213.2	Brown slightly calcareous sandstone.
1213.2 - 1214.2	Grayish brown slightly calcareous shaly sandstone.
1214.2 - 1217.1	Very dark brown slightly carbonaceous slightly calcareous sandstone.
1217.1 - 1218.4	Very dark brown slightly carbonaceous slightly calcareous slightly shaly sandstone with micaceous partings.
1218.4 - 1223.3	Grayish light brown slightly calcareous slightly carbonaceous shaly sandstone.
1223.3 - 1234.7	Dark gray sandy shale.

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 88 barrels of oil per acre was obtained from 2.3 feet of sand. The weighted average percent oil saturation was reduced from 33.3 to 30.3, or represents an average recovery of 3.0 percent. The weighted average effective permeability of the samples is 8.75 millidarcys, while the average initial fluid production pressure is 15.0 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 10 samples tested, 2 produced water and oil, and 1 sample produced water only. This indicates that approximately 20 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 720 barrels of oil per acre. This is an average recovery of 313 barrels per acre foot from 2.3 feet of floodable sand analyzed in this core.

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

Original formation volume factor, estimated	1.07
Reservoir water saturation, percent, estimated	20.0
Average porosity, percent	16.5
Oil saturation after flooding, percent	30.3
Performance factor, percent, estimated	55.0
Net floodable sand, feet	2.3

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Rantoul Energy Corporation Lease Engstrom Well No. 36-C

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	1210.5	6.3	21	72	93	Imp.	1.0	1.0	103	0.00
2	1211.6	5.4	17	80	97	Imp.	1.0	2.0	71	0.00
3	1212.6	19.1	44	17	61	28.	1.2	3.2	782	33.60
4	1213.4	15.1	36	45	81	1.5	1.0	4.2	422	1.50
5	1214.5	12.6	29	31	60	14.	1.0	5.2	284	14.00
6	1215.6	15.3	35	35	70	13.	1.0	6.2	415	13.00
7	1216.5	15.9	13	63	76	23.	0.9	7.1	144	20.70
8	1217.4	17.9	31	24	55	13.	1.3	8.4	560	16.90
9	1219.4	12.3	32	60	92	Imp.	1.1	9.5	336	0.00
10	1221.5	12.7	14	40	54	Imp.	1.0	10.5	139	0.00

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company		Rantoul Energy Corporation		Lease	Engstrom	Well No.		36-C
Depth Interval, Feet		Depth Interval, Feet		Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.		
1210.0 - 1222.0		1210.0 - 1222.0		6.4	15.6	99.70		
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
1210.0 - 1222.0		10.5		13.5	27.8	45.5	310	3,256

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Rantoul Energy Corporation Lease Engstrom Well No. 36-C

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	1210.5	6.4	21	104	0	0	21	73	0	Imp.	-
2	1211.6	5.5	17	73	0	0	17	80	0	Imp.	-
3	1212.6	19.2	44	655	0	0	44	52	10	0.37	50
4	1213.4	15.0	36	419	0	0	36	46	0	Imp.	-
5	1214.5	12.5	29	281	0	0	29	33	0	Imp.	-
6	1215.6	15.4	35	418	3	36	32	60	90	8.23	15
7	1216.5	16.0	13	161	0	0	13	73	0	Imp.	-
8	1217.4	17.4	32	432	3	40	29	66	97	9.15	15
9	1219.4	12.2	32	303	0	0	32	61	0	Imp.	-
10	1221.5	12.8	14	139	0	0	14	41	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

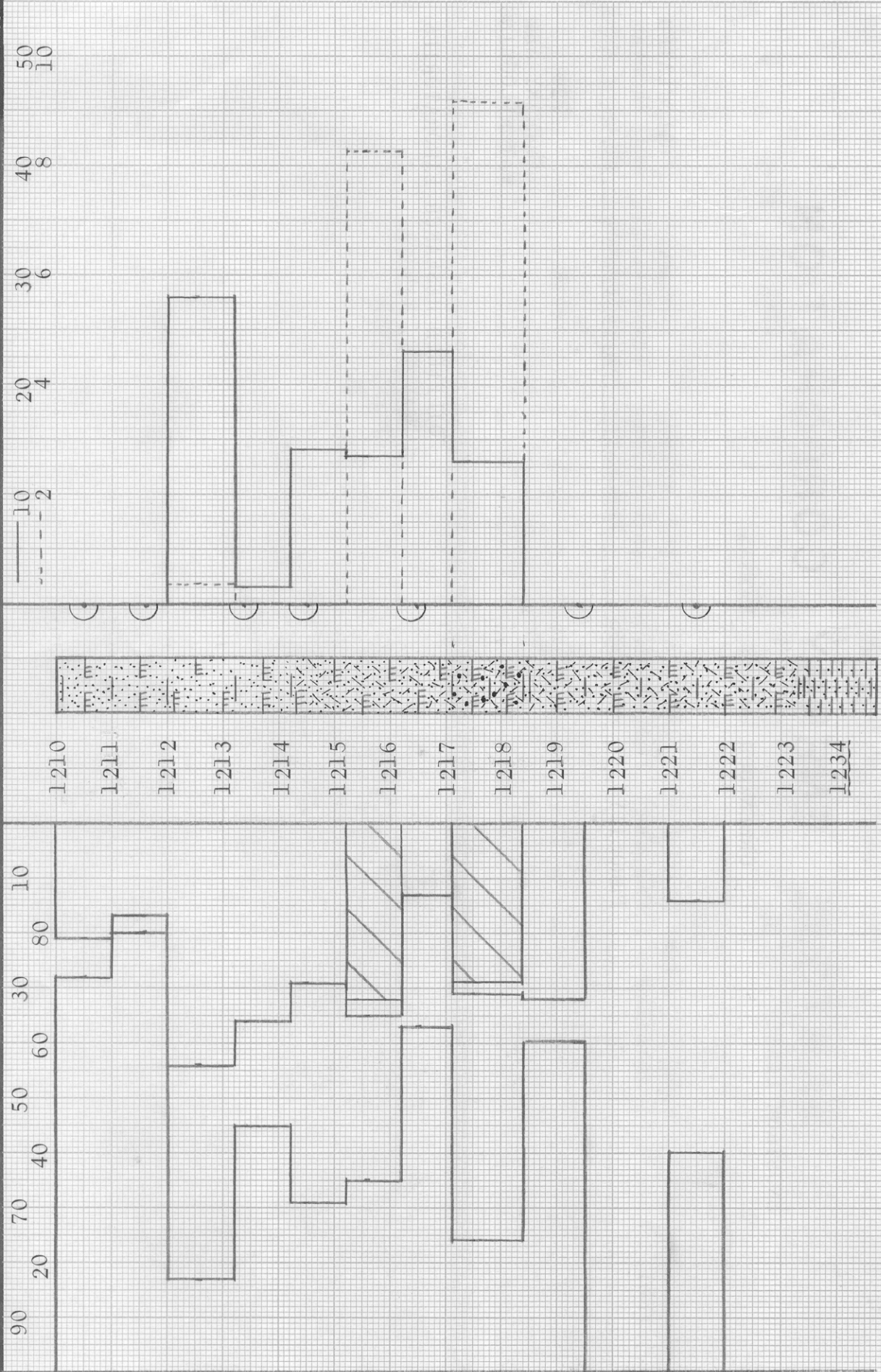
Company	Rantoul Energy Corporation	Lease	Engstrom	Well No.	36-C
Depth Interval, Feet	1210.0 - 1222.0				
Feet of Core Analyzed	2.3				
Average Percent Porosity	16.5				
Average Percent Original Oil Saturation	33.3				
Average Percent Oil Recovery	3.0				
Average Percent Residual Oil Saturation	30.3				
Average Percent Residual Water Saturation	63.4				
Average Percent Total Residual Fluid Saturation	93.7				
Average Original Oil Content, Bbls./A. Ft.	426.				
Average Oil Recovery, Bbls./A. Ft.	38.				
Average Residual Oil Content, Bbls./A. Ft.	388.				
Total Original Oil Content, Bbls./Acre	980.				
Total Oil Recovery, Bbls./Acre	88.				
Total Residual Oil Content, Bbls./Acre	892.				
Average Effective Permeability, Millidarcys	8.75				
Average Initial Fluid Production Pressure, p.s.i.	15.0				

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

WATER SAT.,
PERCENT

→ ←
OIL SAT.,
PERCENT

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PERMEABILITY, IN MILLIDARCYS
EFFECTIVE PERMEABILITY TO WATER, IN
MILLIDARCYS



KEY:

- CALCREOUS SANDSTONE
- SHALY CALCREOUS SANDSTONE
- MICACEOUS CARBONACEOUS SHALY CALCREOUS

SANDSTONE
FLOODPOT RESIDUAL OIL SATURATION

SANDY SHALE



CARBONACEOUS SHALY CALCAREOUS
SANDSTONE



IMPERMEABLE TO WATER

RANTOUL ENERGY CORPORATION

ENGSTROM LEASE

WELL NO. 36-C

GREENWOOD COUNTY, KANSAS

DEPTH INTERVAL, FEET	FEET OF CORE ANALYZED	AVERAGE		AVG. OIL		AVG. WATER		AVERAGE		CALCULATED OIL RECOVERY BBLs. / ACRE
		PERCENT		SATURATION		SATURATION		PERMEABILITY,		
		POROSITY		PERCENT		PERCENT		MILLIDARCS		

1210.0 - 1222.0	10.5	13.5	27.8	45.5	15.6	720
						(PRIMARY AND WATERFLOODING)

OILFIELD RESEARCH LABORATORIES
CHANUTE, KANSAS
JULY, 1981

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