

June 7, 1950

**Rantoul Oil Company
Iola, Kansas**

Attention: Mr. C. L. Hoyt

Gentlemen:

Enclosed herewith is the report of the analysis made on the No. 6 Baker barrel core taken from the Stanbro Lease, Well No. 17, Franklin County, Kansas, and submitted to our laboratory on June 1, 1950.

Very truly yours,

OIL FIELD RESEARCH LABORATORIES

Carl L. Pate

CLP:bb

RANTOUL OIL COMPANY

CORE ANALYSIS REPORT

STANBRO LEASE

WELL NO. 17

FRANKLIN COUNTY, KANSAS

OIL FIELD RESEARCH LABORATORIES

CHANUTE, KANSAS

JUNE 7, 1950

Oil Field Research Laboratories

GENERAL INFORMATION & SUMMARY

Company Rantoul Oil Company Lease Stanbro Well No. 17

Location N₁ NE₁

Section 22 Twp. 17S Rge. 21E County Franklin State Kansas

Name of Sand	Peru
Top of Core	432.00
Bottom of Core	452.00
Pay Top of Sand	442.50
Bottom of Sand	450.10
Total Feet of Permeable Sand	5.01

Distribution of Permeable Sand:

Permeability Range Millidarcys	Feet	Cum. Ft.
0 - 10	0.53	0.53
10 - 20	2.28	2.81
20 - 30	1.10	3.91
30 & above	1.10	5.01

Average Permeability, Millidarcys	20.97
Average Percent Porosity	18.38
Average Percent Oil Saturation	29.23
Average Percent Water Saturation	57.37
Average Oil Content, Bbls./A. Ft.	412.
Total Oil Content, Bbls./Acre	2,938.
Average Percent Oil Recovery by Laboratory Flooding Tests	4.63
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	65.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	360.
Total Calculated Oil Recovery, Bbls./Acre	1,400.
Packer Setting, Feet	-
Viscosity, Centipoises @	
A. P. I. Gravity, degrees @ 60 °F	

Water was used as a circulating fluid in the coring of the sand in this well.

FORMATION CORED

The detailed log of the formation cored is as follows:

<u>Depth Interval, Feet</u>	<u>Description</u>
432.00 - 433.05	Sandy limestone.
433.05 - 434.15	Limestone.
434.15 - 435.40	Calcareous conglomerate.
435.40 - 438.65	Laminated calcareous sandstone and shale.
438.65 - 439.13	Limestone.
439.13 - 439.30	Laminated calcareous sandstone and shale.
439.30 - 439.70	Gray calcareous shale.
439.70 - 439.85	Laminated calcareous sandstone and shale.
439.85 - 440.13	Laminated micaceous calcareous shaley sandstone.
440.13 - 440.30	Laminated calcareous sandstone and shale.
440.30 - 440.55	Limestone.
440.55 - 440.85	Laminated micaceous calcareous slightly shaley sandstone.
440.85 - 441.10	Light brown fine grained micaceous calcareous shaley sandstone.
441.10 - 441.35	Brown fine grained slightly laminated micaceous calcareous shaley sandstone.
441.35 - 441.45	Laminated calcareous sandstone and shale.
441.45 - 441.68	Brown fine grained micaceous calcareous shaley sandstone.
441.68 - 442.50	Laminated calcareous sandstone and shale.
442.50 - 443.35	Brown fine grained micaceous slightly calcareous sandstone.
443.35 - 443.47	Laminated sandstone and shale.
443.47 - 446.15	Brown fine grained slightly laminated micaceous shaley sandstone.

446.15 - 447.10 - Brown fine grained micaceous sandstone.
447.10 - 447.50 - Limestone.
447.50 - 449.00 - Loss.
449.00 - 449.40 - Brown fine grained micaceous slightly shaley sandstone.
449.40 - 450.10 - Brown fine grained micaceous sandstone.
450.10 - 450.75 - Laminated shale and sandstone.
450.75 - 451.00 - Limestone.
451.00 - 452.00 - Discarded at well.

Coring was started at a depth of 432.00 feet in sandy limestone, and completed at 452.00 feet probably in limestone. This core shows a total of 7.13 feet of formation containing oil. There was a loss extending from 447.50 to 449.00 feet. The cored section is rather broken with layers of sandstone and shale and limestone. For the most part, the floodable sand is made up of fine grained micaceous to shaley sandstone.

PERMEABILITY

For the sake of distribution the core was divided into two sections. The weighted average permeability of the upper and lower sections are 1.72 and 22.04 millidarcys respectively; the overall average being 20.97 (See Table II). By observing the data given on the coregraph it is noticeable that the floodable sand section has a fairly uniform permeability profile.

PERCENT SATURATION & OIL CONTENT

The sand in this core shows a fair weighted average percent oil saturation, namely, 29.23. The weighted average percent oil saturation

of the upper and lower sections are 19.70 and 31.88 respectively. The weighted average percent water saturation of the upper and lower sections are 73.26 and 52.74 respectively; the overall average being 57.37 (See Table IV). This gives an overall weighted average total fluid saturation of 86.60 percent.

In order to get some idea of the degree of flushing of the sand during coring, all of the saturation samples were analyzed for chloride content. The results of these tests are given in Tables VII and VIII. By observing the data given in these tables and on the coregraph, it is evident that some flushing of the sand did occur during coring.

The weighted average oil content of the upper and lower sections are 254 and 456 barrels per acre foot respectively; the overall average being 412 barrels per acre foot. The total oil content, as shown by this core, is 2,938 barrels per acre (See Table IV).

LABORATORY FLOODING TESTS

The sand in this core did not respond very well to laboratory flooding tests as a total recovery of 360 barrels per acre was obtained from 5.58 feet of sand. However, this is to be expected as most of the recoverable oil was lost during coring. The weighted average percent oil saturation was reduced from 31.01 to 26.38, or represents an average recovery of 4.63 percent.

The weighted average effective permeability of the samples is 1.05 millidarcys, while the average initial fluid production pressure is 22.5 pounds per square inch (See Table VI).

By observing the data given in Table V you will note that of the seven samples tested, all took water and six produced oil. This would indicate that all of the sand represented by these samples is floodable. The data also shows that the sand has a low effective permeability.

CONCLUSION

From a study of the above data we believe an efficient water flood within the vicinity of this well will recover approximately 1,400 barrels of oil per acre. In calculating this recovery an allowance was made for oil lost during coring, and it was assumed that the true water saturation of the sand is 38.0 percent. The principle drawback of this core is the fact that it contains only 5.58 feet of good floodable sand. Of course, part of the loss may have been sandstone.

Oil Field Research Laboratories
RESULTS OF PERMEABILITY TESTS
TABLE I

Company Rantoul Oil Company Lease Stanbro Well No. 17

Sample No.	Depth, Feet	Permeability Millidarcys	Feet of Core		Permeability Capacity Ft. x Md.
			Ft.	Cum. Ft.	
1	440.08	1.7	0.28	0.28	0.48
2	440.65	Imp.	0.30	0.58	0.00
3	441.25	1.7	0.25	0.83	0.43
4	442.15	Imp.	0.60	1.43	0.00
5	443.15	28.	0.45	1.88	12.60
6	443.50	15.	0.53	2.41	7.95
7	444.60	30.	0.55	2.96	16.50
8	445.15	34.	0.55	3.51	18.70
9	445.70	11.	0.45	3.96	4.95
10	446.00	26.	0.30	4.26	7.80
11	446.55	16.	0.60	4.86	9.60
12	446.95	29.	0.35	5.21	10.15
13	450.00	15.	0.70	5.91	10.50

Oil Field Research Laboratories

SUMMARY OF PERMEABILITY TESTS

TABLE II

Company	Rantoul Oil Company	Lease	Stanbro	Well No.	17
Depth Interval Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity, Ft. x Md.		
440.85 - 442.50	0.25	1.72	0.43		
442.50 - 450.10	4.48	22.04	98.75		
440.85 - 450.10	4.73	20.97	99.18		

Oil Field Research Laboratories

RESULTS OF SATURATION TESTS

TABLE III

Company Rantoul Oil Company Lease Stanbro Well No. 17

Sat. No.	Depth, Feet	Effective Porosity Percent	Percent Saturation			Oil Content Bbls./A. Ft.	Feet of Core		Total Oil Content Bbls./Acre
			Oil	Water	Total		Ft.	Cum. Ft.	
4	440.93	16.7	16.7	78.8	95.5	216	0.50	0.50	108
F5A	441.60	17.3	20.6	-	-	276	0.23	0.73	64
5	441.98	16.4	21.2	69.8	91.0	270	0.82	1.55	222
6	442.73	17.9	29.2	55.2	84.4	406	0.85	2.40	345
7	443.82	18.0	27.4	55.8	84.2	383	0.83	3.23	318
8	444.87	19.1	31.4	50.0	81.4	456	1.85	5.08	844
9	446.37	19.9	33.6	51.4	85.0	518	0.60	5.68	311
F10A	446.83	20.0	30.8	-	-	478	0.35	6.03	167
11	449.15	22.4	32.4	56.0	88.4	563	0.40	6.43	225
F11A	449.60	18.2	33.8	-	-	477	0.70	7.13	334
Total -							Total -		2,938
Note: The samples with the letter "A" were taken after the core arrived at the laboratory.									

Oil Field Research Laboratories

SUMMARY OF SATURATION TESTS

TABLE IV

Company	Rantoul Oil Company			Lease	Stanbro		Well No.	17
Depth Interval, Feet	Feet of Core Analyzed	Average Percent Porosity	Average Percent Oil Saturation	Average Percent Water Saturation	Average Oil Content Bbls./A. Ft.	Total Oil Content Bbls./Acre		
440.85-442.50	1.55	16.08	19.70	73.26	254	394		
442.50-450.10	5.58	19.01	31.88	52.74	456	2,544		
440.85-450.10	7.13	18.38	29.23	57.37	412	2,936		

Oil Field Research Laboratories

RESULTS OF LABORATORY FLOODING TESTS

TABLE V

Company	Rantoul Oil Company	Lease	Stanbro	Well No.	17
---------	---------------------	-------	---------	----------	----

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.
			Percent	Bbls./A. Ft.	Percent	Bbls./A. Ft.	% Oil	% Water	Bbls./A. Ft.			
5A	441.60	17.3	20.6	276	0.0	0	20.6	70.6	276	1.5	0.127	45
6	442.58	15.9	29.1	359	2.4	30	26.7	70.6	329	24	0.610	25
7	443.62	17.4	29.2	393	5.6	75	23.6	71.3	318	11	0.274	30
8	445.05	17.7	31.1	427	6.1	84	25.0	72.6	343	23	1.10	20
9	446.23	20.9	31.0	502	2.8	45	28.2	67.8	457	20	0.917	20
10A	446.83	20.0	30.8	478	5.4	84	25.4	68.7	394	78.5	2.63	15
11A	449.60	18.2	33.8	477	3.9	55	29.9	68.0	422	66	1.46	25

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.
Samples with the letter "A" were taken after the core arrived at the laboratory.

Oil Field Research Laboratories

SUMMARY OF LABORATORY FLOODING TESTS

TABLE VI

Company	Lease	Well No.
Rantoul Oil Company	Stanbro	17
Depth, Interval, Feet	442.50 - 450.10	
Feet of Core Analyzed	5.58	
Average Percent Porosity	17.96	
Average Percent Original Oil Saturation	31.01	
Average Percent Oil Recovery	4.63	
Average Percent Residual Oil Saturation	26.38	
Average Percent Residual Water Saturation	70.43	
Average Percent Total Residual Fluid Saturation	96.81	
Average Original Oil Content, Bbls./A. Ft.	433.	
Average Oil Recovery, Bbls./A. Ft.	65.	
Average Residual Oil Content, Bbls./A. Ft.	368.	
Total Original Oil Content, Bbls./Acre	2,414.	
Total Oil Recovery, Bbls./Acre	360.	
Total Residual Oil Content, Bbls./Acre	2,054.	
Average Effective Permeability, Millidarcys	1.05	
Average Initial Fluid Production Pressure, p.s.i.	22.5	

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

Oil Field Research Laboratories
RESULTS OF WATER DIFFERENTIATION TESTS
TABLE VII

Company Rantoul Oil Company Lease Stanbro Well No. 17

Sample No.	Depth, Feet	Chloride Content of Brine in Sand ppm	Percent Water Saturation		
			Connate	Drilling & Foreign	Total
4	440.93	15,800			
5	441.98	14,600			
6	442.73	8,720			
7	443.82	9,170			
8	444.87	12,100			
9	446.37	5,980			
11	449.15	9,210			
Note: ppm - parts per million					

Oil Field Research Laboratories

SUMMARY OF WATER DIFFERENTIATION TESTS

TABLE VIII

Company	Lease	Well No.
Rantoul Oil Company	Stanbro	17
Depth Interval, Feet	Chloride Content of Brine in Sand, ppm	Average Percent Connate Water
		Average Percent Drilling & Foreign Water
440.85 - 442.50	15,053	
442.50 - 449.40	9,863	
440.85 - 449.40	11,034	

Note: ppm - parts per million.