



# OILFIELD RESEARCH LABORATORIES

536 NORTH HIGHLAND - CHANUTE, KANSAS - PHONE HE1-2650

April 6, 1966

V & R Oil Company  
P. O. Box 30  
Emporia, Kansas

Gentlemen:

Enclosed herewith is the report of the analysis of the Rotary core samples taken from the Pixlee Lease, Well No. 3, Greenwood County, Kansas, and submitted to our laboratory on April 1, 1966.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

A handwritten signature in cursive script, appearing to read "Carl L. Pate".

Carl L. Pate

CLP:rf

5 c.

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## GENERAL INFORMATION & SUMMARY

Company V & R Oil Company Lease Pixlee Well No. 3

Location \_\_\_\_\_

Section \_\_\_\_\_ Twp. \_\_\_\_\_ Rge. \_\_\_\_\_ County Greenwood State Kansas

Name of Sand - - - - - Bartlesville(?)

Top of Core - - - - - 2318.5

Bottom of Core - - - - - 2349.5

Top of Sand - - - - - (Analyzed) - - - - - 2318.5

Bottom of Sand - - - - - (Analyzed) - - - - - 2349.5

Total Feet of Permeable Sand (Analyzed) - - - - - 6.5

Total Feet of Floodable Sand (Analyzed) - - - - - 6.5

Distribution of Permeable Sand:  
Permeability Range  
Millidarcys

Feet

Cum. Ft.

0 - 10	1.5	1.5
10 - 50	2.0	3.5
50 & above	3.0	6.5

Average Permeability Millidarcys - - - - - 152.4

Average Percent Porosity - - - - - 19.0

Average Percent Oil Saturation - - - - - 21.3

Average Percent Water Saturation - - - - - 52.2

Average Oil Content, Bbls./A. Ft. - - - - - 313.

Total Oil Content, Bbls./Acre - - - - - (Sand Analyzed) - - - - - 2,193.

Average Percent Oil Recovery by Laboratory Flooding Tests - - - - - 4.6

Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft. - - - - - 75.

Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre (Sand Analyzed) - - - - - 411.

Total Calculated Oil Recovery, Bbls./Acre - (Primary & Secondary) - - - - - 2,094.

Packer Setting, Feet - - - - -

Viscosity, Centipoises @ - - - - -

A. P. I. Gravity, degrees @ 60 °F - - - - -

Elevation, Feet - - - - -

The core samples were sealed in plastic bags and submitted to us by a representative of the client. Seven samples were taken out of 31.0 feet of core.

FORMATION CORED

The detailed log of the formation cored is as follows:

<u>Depth Interval, Feet</u>	<u>Description</u>
2318.5 - 2319.5	- Light brown, slightly shaly sandstone.
2319.5 - 2322.5	- Core not received.
2322.5 - 2323.5	- Light brown, slightly shaly sandstone.
2323.5 - 2329.5	- Core not received.
2329.5 - 2330.5	- Light brown, coarse grained sandstone.
2330.5 - 2332.5	- Core not received.
2332.5 - 2333.5	- Light brown, coarse grained sandstone.
2333.5 - 2337.5	- Core not received.
2337.5 - 2338.5	- Light brown, coarse grained sandstone.
2338.5 - 2341.5	- Core not received.
2341.5 - 2342.5	- Light brown, coarse grained sandstone.
2342.5 - 2348.5	- Core not received.
2348.5 - 2349.5	- Light brown, coarse grained sandstone.

Coring was started at a depth of 2318.5 feet in light brown, slightly shaly sandstone and completed at 2349.5 feet in light brown, coarse grained sandstone. These core samples represent a total of 7.0 feet of sandstone. For the most part, the pay is made up of light brown, coarse grained to slightly shaly sandstone.

PERMEABILITY

The weighted average permeability of the cored section is 152.4 millidarcys (See Table III). By observing the data given on the coregraph, it is noticeable that the sand has a very irregular permeability profile. The permeability of the sand varies from 5.8 to a maximum of 814.0 millidarcys.

PERCENT SATURATION & OIL CONTENT

The sand in this core shows a low weighted average percent oil saturation, namely, 21.3. The weighted average percent water saturation of the cored section is 52.2 (See Table III). This gives an overall weighted average total fluid saturation of 73.5 percent. This fairly low total fluid saturation indicates some fluid was lost during coring which was probably oil.

The weighted average oil content of the cored section is 313 barrels per acre foot. The total oil content, as shown by the samples is 2,193 barrels per acre (See Table III).

LABORATORY FLOODING TESTS

When taking into consideration that the sand samples had a low oil saturation, one would expect very little oil to be recovered by laboratory flooding tests; however, a total recovery of 411 barrels of oil per acre was obtained from 5.5 feet of sand. The weighted average percent oil saturation was reduced from 21.6 to 17.0, or represents an average recovery of 4.6 percent. The weighted average effective permeability of the samples is 13.6 millidarcys, while the

average initial fluid production pressure is 28.2 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 7 samples tested, all produced water and 6 oil. This indicates that approximately 86 percent of the sand represented by these samples is floodable pay sand. The tests also show that the sand has a very wide variation in effective permeability.

#### CONCLUSION

From a study of the above data we estimate that approximately 1,190 barrels of oil per acre can be recovered from the area, represented by the samples, by efficient primary production methods. An additional oil recovery of approximately 904 barrels per acre can be expected from efficient water-flooding. We want to emphasize that the above values are for the 6.5 feet of floodable pay sand analyzed. The following data and assumptions were used in calculating the recovery values:

Original formation volume factor	1.21
Irreducible water saturation, percent	40.0
Primary recovery, estimated, percent	None
Present oil saturation, percent	51.6
Average porosity, percent	19.0
Oil saturation after flooding, percent	17.0
Performance factor	0.50
Net floodable pay sand, feet (analyzed)	6.5

The core samples show a rather clean sand section having a good

porosity, a low oil saturation, a rather high water saturation and a wide variation in permeability. No doubt, the low oil and rather high water saturations are partly due to flushing of the sand during the coring of same.

Any oil that has been recovered from the area represented by the samples would have to be subtracted from the above values.

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE I-B

Company V & R Oil Company

Lease Pixlee

Well No. 3

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	2319.0	18.0	21	43	64	293	11.	1.0	1.0	293	11.00
2	2322.9	16.9	18	39	57	236	5.8	0.5	1.5	118	2.90
F-2	2323.1	19.4	18	-	-	271	-	0.5	2.0	135	-
3	2330.0	17.7	16	65	81	220	61.	1.0	3.0	220	61.00
4	2333.0	17.3	18	58	76	215	57.	1.0	4.0	215	57.00
5	2338.0	18.6	25	58	83	360	6.8	1.0	5.0	360	6.80
6	2342.0	19.7	24	49	73	366	38.	1.0	6.0	366	38.00
7	2349.0	23.2	27	47	74	486	814.	1.0	7.0	486	814.00
								Total	-----	2,193	

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## SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company	Lease	Well No.				
V & R Oil Company	Pixlee	3				
	Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.		
	2318.5 - 2349.5	6.5	152.4	990.70		
	Depth Interval, Feet	Feet of Core Analyzed	Average Percent Saturation	Average Percent Water Saturation	Average Oil Content Bbl./A. Ft.	Total Oil Content Bbls./Acre
	2318.5 - 2349.5	7.0	19.0	21.3	52.2	313
						2,193

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## RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company V & R Oil Company Lease Pixlee Well No. 3

Sample No.	Depth, Feet	Effective Porosity Percent	Original Oil Saturation		Oil Recovery		Residual Saturation		Volume of Water Recovered cc's	Effective Permeability Millidarcys**	Initial Fluid Production Pressure Lbs./Sq./In.
			%	Bbls./A. Ft.	%	Bbls./A. Ft.	% Oil	% Water			
1	2319.0	18.2	21	297	0	0	18	60	9	0.200	50
2	2323.1	19.4	18	271	1	15	17	69	86	2.60	30
3	2330.0	18.1	16	225	1	14	15	81	250	6.20	20
4	2333.0	17.0	18	237	1	13	17	78	26	0.600	40
5	2338.0	18.3	25	355	4	57	21	77	16	0.400	50
6	2342.0	19.4	24	361	6	90	18	76	161	3.70	20
7	2349.0	22.8	27	478	13	230	14	83	306	62.50	10

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	V & R Oil Company	Lessee	Pixlee	Well No.	3
Depth Interval, Feet	2322.5 - 2349.5				
Feet of Core Analyzed	5.5				
Average Percent Porosity	19.0				
Average Percent Original Oil Saturation	21.6				
Average Percent Oil Recovery	4.6				
Average Percent Residual Oil Saturation	17.0				
Average Percent Residual Water Saturation	78.2				
Average Percent Total Residual Fluid Saturation	95.2				
Average Original Oil Content, Bbls./A. Ft.	326.				
Average Oil Recovery, Bbls./A. Ft.	75.				
Average Residual Oil Content, Bbls./A. Ft.	251.				
Total Original Oil Content, Bbls./Acre	1,791.				
Total Oil Recovery, Bbls./Acre	411.				
Total Residual Oil Content, Bbls./Acre	1,380.				
Average Effective Permeability, Millidarcys	13.6				
Average Initial Fluid Production Pressure, p.s.i.	28.2				

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