OILFIELD RESEARCH LABORATORIES
536 NORTH HIGHLAND - CHANUTE, KANSAS - PHONE HE1-2650
700 NORTH MISSION - OKMULGEE, OKLAHOMA - PHONE SK6-4444

Chanute, Kansas

April 21, 1965

George Sheehan Interests,
Robert K. Butcher, Operator
510 Thompson Building
Tulsa, Oklahoma

Gentlemen:

Enclosed herewith is the report of the analysis of the Rotary core taken from the Ellis Lease, Well No. 74, Greenwood County, Kansas, and submitted to our laboratory on April 15, 1965.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Carl L. Pate

CLP:rf

3 c. - Madison, Kansas
1 c. - Tulsa, Oklahoma
1 c. - Shreveport, La.

Oilfield Research Laboratories

GENERAL INFORMATION & SUMMARY

Company George Sheehan Interests, Robert K. Butcher, Opr. Lease Ellis Well No. 74

Location NE SW SW

Section 26 Twp. 23S Rge. 11E County Greenwood State Kansas

Name of Sand	Bartlesville
Top of Core	1860.0
Bottom of Core	1875.0
Top of Sand	1868.8
Bottom of Sand	1874.5
Total Feet of Permeable Sand	5.7
Total Feet of Floodable Sand	5.7

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.
0 - 100	2.8	2.8
100 & above	2.9	5.7

Average Permeability Millidarcys	255.5
Average Percent Porosity	15.2
Average Percent Oil Saturation	35.8
Average Percent Water Saturation	49.7
Average Oil Content, Bbls./A. Ft.	320.
Total Oil Content, Bbls./Acre	2,392.
Average Percent Oil Recovery by Laboratory Flooding Tests	12.
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	143.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	817.
Total Calculated Oil Recovery, Bbls./Acre	992.
Packer Setting, Feet	
Viscosity, Centipoises @	
A. P. I. Gravity, degrees @ 60 °F	
Elevation, Feet	

A fresh water mud was used as a circulating fluid in the coring of the sand in this well. The core was sampled by an employee of Oilfield Research Laboratories.

FORMATION CORED

The detailed log of the formation cored is as follows:

Depth Interval, Feet	Description
1860.0 - 1868.8	Shale.
1868.8 - 1874.5	Brown, slightly calcareous sandstone.
1874.5 - 1885.0	Shale.

Coring was started at a depth of 1860.0 feet in shale and completed at 1875.0 feet in same type of material. This core shows a total of 5.7 feet of sandstone. The pay is made up of brown, medium grained, slightly calcareous sandstone.

PERMEABILITY

The weighted average permeability of the cored section is 255.5 millidarcys. 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 47. to a maximum of 926. millidarcys.

PERCENT SATURATION & OIL CONTENT

The sand in this core shows a fair weighted average percent oil saturation, namely, 35.8. The weighted average percent water saturation of the cored section is 49.7. This gives an overall weighted average total fluid saturation of 85.5 percent.

The weighted average oil content of the cored section is 320 barrels per acre foot. The total oil content, as shown by this core, is 2,392 barrels per acre.

LABORATORY FLOODING TESTS

The sand in this core responded very well to laboratory flooding

tests, as a total recovery of 817 barrels of oil per acre was obtained from 5.7 feet of sand. The weighted average percent oil saturation was reduced from 35.7 to 23.5, or represents an average recovery of 12.2 percent. The weighted average effective permeability of the samples is 5.84 millidarcys, while the average initial fluid production pressure is 22.1 pounds per square inch (See Table V).

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

CONCLUSION

From a study of the above data we estimate that a minimum of 992 barrels of oil per acre or an average of 174 barrels per acre foot can be recovered from the area, represented by this core, by efficient water-flooding. We do not know the location of this well with respect to the other wells, however, we assume it is an edge well. If this is the case, the well will drain a thicker sand section than that shown by this core. The following data was used in calculating the above oil recovery value:

Original formation volume factor	1.17
Present formation volume factor	1.05
Estimated irreducible water saturation, percent	37.0
Estimated primary oil recovery, percent	7.0
Estimated present oil saturation, percent	51.5
Percent porosity	15.3
Oil saturation after flooding, percent	23.5
Performance factor	0.55
Net feet of pay sand	5.7

This core shows a thin sand section having a fair oil saturation, a rather high water saturation and a wide variation in permeability.

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company George Sheehan Interests, Robert K. Butcher, Operator Lease Ellis Well No. 74

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	1869.1	13.2	41	39	80	420	47.	0.8	0.8	336	37.60
2	1870.1	14.8	38	59	97	436	59.	1.0	1.8	436	59.00
3	1871.1	16.4	33	49	82	419	74.	1.0	2.8	419	74.00
4	1872.1	16.3	37	45	82	467	108.	1.0	3.8	467	108.00
5	1873.1	15.8	29	58	87	355	926.	1.0	4.8	355	926.00
6	1874.1	14.3	38	46	84	421	280.	0.9	5.7	379	252.00
								Total		2,392	

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company George Sheehan Interests, Robert K. Butcher, Operator Lease Ellis Well No. 74

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	1869.1	13.7	41	436	19	202	22	64	234	23	0.600	30
2	1870.1	14.5	38	428	15	169	23	75	259	32	0.700	25
3	1871.1	16.6	33	425	9	116	24	61	309	84	2.50	20
4	1872.1	16.4	37	471	12	153	25	66	318	102	2.90	20
5	1873.1	15.5	29	349	6	72	23	70	277	196	26.00	10
6	1874.1	14.8	38	437	14	161	24	66	276	26	0.80	30

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 George Sheehan Interests, Robert K. Butcher, Operator Lease Ellis Well No. 74

Depth Interval, Feet	1868.8 - 1874.5
Feet of Core Analyzed	5.7
Average Percent Porosity	15.3
Average Percent Original Oil Saturation	35.7
Average Percent Oil Recovery	12.2
Average Percent Residual Oil Saturation	23.5
Average Percent Residual Water Saturation	67.2
Average Percent Total Residual Fluid Saturation	90.7
Average Original Oil Content, Bbls./A. Ft.	424.
Average Oil Recovery, Bbls./A. Ft.	143.
Average Residual Oil Content, Bbls./A. Ft.	281.
Total Original Oil Content, Bbls./Acre	2,416.
Total Oil Recovery, Bbls./Acre	817.
Total Residual Oil Content, Bbls./Acre	1,599.
Average Effective Permeability, Millidarcys	5.84
Average Initial Fluid Production Pressure, p.s.i.	22.1

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