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

Chanute, Kansas

May 27, 1965

Ward A. McGinnis
114 West 4th
Eureka, Kansas

Dear Sir:

Enclosed herewith is the report of the analysis of the Rotary core taken from the Aagard-Olson Lease, Well No. 8, Greenwood County, Kansas, and submitted to our laboratory on May 23, 1965.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Benjamin R. Pearman

Benjamin R. Pearman

BRP:rf

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GENERAL INFORMATION & SUMMARY

Company Ward A. McGinnis Lease Aagard-Olson Well No. 8

Location

Section Twp. Rge. County Greenwood State Kansas

Name of Sand	Bartlesville
Top of Core	2288.0
Bottom of Core	2300.0
Top of Sand	2291.0
Bottom of Sand	2299.8
Total Feet of Permeable Sand	7.8
Total Feet of Floodable Sand	6.0

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.
1 - 5	3.8	3.8
5 - 11	4.0	7.8

Average Permeability Millidarcys	6.3
Average Percent Porosity	13.4
Average Percent Oil Saturation	30.2
Average Percent Water Saturation	40.3
Average Oil Content, Bbls./A. Ft.	322.
Total Oil Content, Bbls./Acre	2,831.
Average Percent Oil Recovery by Laboratory Flooding Tests	16.2
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	192.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	1,149.
Total Calculated Oil Recovery, Bbls./Acre	1,160.
Packer Setting, Feet	
Viscosity, Centipoises @	
A. P. I. Gravity, degrees @ 60 °F	
Elevation, Feet	

Water was used as the coring fluid. The core was sampled after being received in the laboratory. The well was drilled in non-virgin territory.

FORMATION CORED

The detailed log of the formation cored is as follows:

Depth Interval, Feet	Description
2288.0 - 2291.0	Gray shaly sandstone.
2291.0 - 2299.8	Light brown, slightly shaly sandstone.
2299.8 - 2300.0	Black shale.

Coring was started at a depth of 2288.0 feet in gray sandy shale and completed at 2300.0 feet in black shale. This core shows a total of 8.8 feet of sandstone. For the most part, the pay is made up of light brown, slightly shaly sandstone.

PERMEABILITY

The weighted average permeability of the core is 6.3 millidarcys (See Table III). By observing the data given on the coregraph, it is noticeable that the sand has an irregular permeability profile. The permeability of the sand varies from impermeable to a maximum of 11. millidarcys.

PERCENT SATURATION & OIL CONTENT

The sand in this core shows a good weighted average percent oil saturation, namely, 30.2. The weighted average percent water saturation is 40.3 (See Table III). This gives an overall weighted average total fluid saturation of 70.5 percent. This low total fluid saturation indicates considerable fluid was lost during coring most of which was probably oil.

The weighted average oil content of the core is 322 barrels per acre foot. The total oil content, as shown by this core, is 2,831

barrels per acre of which 2,388 barrels are in the pay sand section (See Table III).

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 1,149 barrels of oil per acre was obtained from 6.0 feet of sand. The weighted average percent oil saturation was reduced from 33.9 to 17.7, or represents an average recovery of 16.2 percent. The weighted average effective permeability of the samples is 0.550 millidarcys, while the average initial fluid production pressure is 43.3 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 9 samples tested, 7 produced water and 6 oil. This indicates that approximately 67 percent 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 to water.

CONCLUSION

Based on the results of the laboratory tests, it appears that an efficient water-flood in the vicinity of this well should recover approximately 1,160 barrels of oil per acre or an average of 176 barrels per acre foot from the 6.6 feet of pay sand analyzed in this core. These recovery values were calculated using the following data and assumptions:

Original formation volume factor	1.20
Present formation volume factor	1.09
Reservoir water saturation, percent	28.0
Primary recovery, estimated, percent	15.0
Present oil saturation, percent	50.4
Average porosity, percent	15.1

Oil saturation after flooding, percent	17.7
Performance factor, percent	50.0
Net floodable pay sand, feet	6.6

This core shows a pay sand section having a good oil saturation, a moderate water saturation and a wide variation in effective permeability to water.

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Ward A. McGinnis **Lease** Aagard-Olson **Well No.** 8

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	2291.1	16.9	28	29	57	367	4.0	0.6	0.6	220	2.40
2	2292.1	15.8	38	33	71	466	11.	1.0	1.6	466	11.00
3	2293.1	16.2	34	38	72	427	9.2	1.0	2.6	427	9.20
4	2294.1	12.9	34	39	73	340	7.5	1.0	3.6	340	7.50
5	2295.1	14.7	32	36	68	365	11.	1.0	4.6	365	11.00
6	2296.1	15.9	38	53	91	469	1.5	1.0	5.6	469	1.50
7	2297.1	6.2	35	47	82	168	Imp.	1.0	6.6	168	0.00
8	2298.1	14.0	27	36	63	293	3.4	1.0	7.6	293	3.40
9	2299.1	9.9	9	46	55	69	2.6	1.2	8.8	83	3.12
								Total		2,831	

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Ward A. McGinnis Lease Aagard-Olson Well No. 8

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
2291.0 - 2299.8	7.8	6.3	49.12

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
2291.0 - 2299.8	8.8	13.4	30.2	40.3	322	2,831

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Ward A. McGinnis Lease Aagard-Olson Well No. 8

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	2291.1	16.6	29	374	0	0	29	32	374	0	Imp.	-
2	2292.1	16.1	38	474	22	275	16	72	199	4	0.200	50
3	2293.1	16.6	34	438	16	206	18	75	232	14	0.300	50
4	2294.1	13.3	34	350	14	144	20	68	206	8	0.300	50
5	2295.1	15.0	32	372	16	186	16	82	186	47	1.30	30
6	2296.1	15.4	38	454	19	227	19	78	227	34	0.900	30
7	2297.1	6.4	36	179	0	0	36	48	179	0	Imp.	-
8	2298.1	14.3	27	300	10	111	17	70	189	14	0.300	50
9	2299.1	10.4	11	89	0	0	11	87	89	6	0.100	50

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 Ward A. McGinnis Lease Aagard-Olson Well No. 8

Depth Interval, Feet	2291.0 - 2299.8
Feet of Core Analyzed	6.0
Average Percent Porosity	15.1
Average Percent Original Oil Saturation	33.9
Average Percent Oil Recovery	16.2
Average Percent Residual Oil Saturation	17.7
Average Percent Residual Water Saturation	74.2
Average Percent Total Residual Fluid Saturation	91.9
Average Original Oil Content, Bbls./A. Ft.	398.
Average Oil Recovery, Bbls./A. Ft.	192.
Average Residual Oil Content, Bbls./A. Ft.	206.
Total Original Oil Content, Bbls./Acre	2,388.
Total Oil Recovery, Bbls./Acre	1,149.
Total Residual Oil Content, Bbls./Acre	1,239.
Average Effective Permeability, Millidarcys	0.550
Average Initial Fluid Production Pressure, p.s.i.	43.3

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