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

November 19, 1979

Tutcher Oil & Gas Company
P.O. Box 308
Overbrook, Kansas 66524

Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core taken from the Etta Williamson Lease, Well No. 6, Coffey County, Kansas and submitted to our laboratory on October 31, 1979.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Benjamin R. Pearman

Benjamin R. Pearman

BRP/tem

4 c to Overbrook, Kansas
1 c to Topeka, Kansas

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GENERAL INFORMATION & SUMMARY

Company Tutcher Oil & Gas Company Lease Etta Williamson Well No. 6

Location 200' SNL & 160' EWL E 1/2 NE

Section 4 Twp. 23S Rge. 16E County Coffey State Kansas

Name of Sand	Lower Squirrel
Top of Core	1014.0
Bottom of Core	1030.5
Top of Sand	1014.0
Bottom of Sand	1026.2
Total Feet of Permeable Sand	7.6
Total Feet of Floodable Sand	2.4

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.
2.5 - 5.0	3.5	3.5
20 - 65	4.1	7.6

Average Permeability Millidarcys	21.6
Average Percent Porosity	17.6
Average Percent Oil Saturation	47.4
Average Percent Water Saturation	33.0
Average Oil Content, Bbls./A. Ft.	655.
Total Oil Content, Bbls./Acre	6,552.
Average Percent Oil Recovery by Laboratory Flooding Tests	2.6
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	40.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	95.
Total Calculated Oil Recovery, Bbls./Acre	See "Calculated Recovery" Section.
Packer Setting, Feet	
Viscosity, Centipoises @	
A. P. I. Gravity, degrees @ 60 °F	
Elevation, Feet	

Fresh water mud was the circulating fluid while taking this core. The well was reportedly drilled in semi-virgin territory. The core was sampled by a representative of Oilfield Research Laboratories.

FORMATION CORED

The detailed log of the formation cored is as follows:

Depth Interval, Feet	Description
1014.0 - 1015.0	Gray and brown laminated shale and sandstone, 40% sandstone.
1015.0 - 1016.4	Brown slightly shaly sandstone.
1016.4 - 1020.7	Brown laminated shaly sandstone.
1020.7 - 1021.6	Gray and brown laminated shale and sandstone, 40% sandstone.
1021.6 - 1022.6	Gray very shaly sandstone.
1022.6 - 1023.6	Gray shaly carbonaceous sandstone.
1023.6 - 1025.8	Gray sandy shale.
1025.8 - 1026.2	Gray shaly carbonaceous sandstone.
1026.2 - 1030.5	Gray sandy shale.

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 95 barrels of oil per acre was obtained from 2.4 feet of sand. The weighted average percent oil saturation was reduced from 54.1 to 51.5, or represents an average recovery of 2.6 percent. The weighted average effective permeability of the samples is 0.79 millidarcys, while the average initial fluid production pressure is 30.0 pounds per square inch (See Table V).

CALCULATED RECOVERY

The results of the laboratory testing indicate that efficient primary and waterflooding operations in the vicinity of this well should recover approximately 536 barrels of oil per acre. This is an average recovery of 223 barrels per acre foot from the 2.4 feet of floodable sand analyzed in this core.

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

Original formation volume factor, estimated	1.05
Reservoir water saturation, percent, estimated	15.0
Average porosity, percent	19.6
Oil saturation after flooding, percent	51.5
Performance factor, percent	50.0
Net floodable pay sand, feet	2.4

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Tutcher Oil & Gas Company **Lease** Etta Williamson **Well No.** 6

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	1014.5	17.2	41	39	80	547	3.5	1.0	1.0	547	3.50
2	1015.5	19.7	57	17	74	871	62.	1.4	2.4	1,220	86.80
3	1016.5	16.5	47	41	88	602	3.8	0.6	3.0	361	2.28
4	1017.5	17.4	23	53	76	311	4.7	1.0	4.0	311	4.70
5	1018.5	18.3	50	27	77	710	24.	1.0	5.0	710	24.00
6	1019.5	19.3	50	26	76	749	21.	1.0	6.0	749	21.00
7	1020.5	18.1	55	25	80	772	29.	0.7	6.7	541	20.30
8	1021.5	18.6	65	25	90	938	2.5	0.9	7.6	844	2.25
9	1022.5	14.6	26	57	83	295	Imp.	1.0	8.6	295	0.00
10	1023.5	16.2	61	25	86	767	Imp.	1.0	9.6	767	0.00
11	1026.0	14.8	45	37	82	517	Imp.	0.4	10.0	207	0.00

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Tutcher Oil & Gas Company Lease Etta Williamson Well No. 6

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
1014.0 - 1026.2	7.6	21.6	164.83

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
1014.0 - 1026.2	10.0	17.6	47.4	33.0	655	6,552

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Tutcher Oil & Gas Company Lease Etta Williamson Well No. 6

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	1014.5	17.3	42	564	0	0	42	41	564	0	Imp.	-
2	1015.5	20.1	57	889	3	47	54	44	842	50	0.98	25
3	1016.5	16.3	47	594	0	0	47	43	594	0	Imp.	-
4	1017.5	17.6	26	355	0	0	26	54	355	0	Imp.	-
5	1018.5	18.8	50	729	2	29	48	50	700	25	0.53	35
6	1019.5	19.5	50	756	0	0	50	46	756	7	0.23	45
7	1020.5	18.0	54	754	0	0	54	27	754	0	Imp.	-
8	1021.5	18.8	63	919	0	0	63	26	919	0	Imp.	-
9	1022.5	14.6	26	295	0	0	26	59	295	0	Imp.	-
10	1023.5	16.0	60	745	0	0	60	27	745	0	Imp.	-
11	1026.0	15.0	47	547	0	0	47	37	547	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 Tutcher Oil & Gas Company Lease Etta Williamson Well No. 6

Depth Interval, Feet	1014.0 - 1026.2
Feet of Core Analyzed	2.4
Average Percent Porosity	19.6
Average Percent Original Oil Saturation	54.1
Average Percent Oil Recovery	2.6
Average Percent Residual Oil Saturation	51.5
Average Percent Residual Water Saturation	46.6
Average Percent Total Residual Fluid Saturation	98.1
Average Original Oil Content, Bbls./A. Ft.	824.
Average Oil Recovery, Bbls./A. Ft.	40.
Average Residual Oil Content, Bbls./A. Ft.	784.
Total Original Oil Content, Bbls./Acre	1,974.
Total Oil Recovery, Bbls./Acre	95.
Total Residual Oil Content, Bbls./Acre	1,879.
Average Effective Permeability, Millidarcys	0.79
Average Initial Fluid Production Pressure, p.s.i.	30.0

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