OILFIELD RESEARCH LABORATORIES
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September 5, 1979

Jackson Well Servicing Company
P.O. Box 116
R.R. #1
Bronson, Kansas 66716

Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core taken from the Hermann Lease, Well No. 10-P, Anderson County, Kansas, and submitted to our laboratory on August 29, 1979.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Benjamin R. Pearman

Benjamin R. Pearman

SAM:km
2 c to Bronson, Kansas

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GENERAL INFORMATION & SUMMARY

Company Jackson Well Servicing Co. Lease Hermann Well No. 10-P

Location 600' NSL & 670' WEL

Section 15 Twp. 23S Rge. 21E County Anderson State Kansas

Name of Sand	Bartlesville
Top of Core	655.0
Bottom of Core	673.0
Top of Sand	655.0
Bottom of Sand	673.0
Total Feet of Permeable Sand	16.4
Total Feet of Floodable Sand	15.4

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.
30 - 100	6.5	6.5
100 - 200	6.4	12.9
200 - 300	2.5	15.4
300 - 400	1.0	16.4

Average Permeability Millidarcys	127.3
Average Percent Porosity	20.4
Average Percent Oil Saturation	42.7
Average Percent Water Saturation	34.9
Average Oil Content, Bbls./A. Ft.	686.
Total Oil Content, Bbls./Acre	11,245.
Average Percent Oil Recovery by Laboratory Flooding Tests	10.5
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	177.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	2,547.
Total Calculated Oil Recovery, Bbls./Acre (Primary & Waterflooding)	4,650.
Packer Setting, Feet	
Viscosity, Centipoises @	
A. P. I. Gravity, degrees @ 60 °F	
Elevation, Feet	

The core was sampled and the samples sealed in plastic bags by an agent of the client. Fresh water mud was used as a drilling fluid. The core was reported to be from a virgin area.

FORMATION CORED

The detailed log of the formation cored is as follows:

Depth Interval, Feet	Description
655.0 - 657.0	Brown sandstone.
657.0 - 658.0	Brown and gray laminated sandstone and shale; 80% sandstone.
658.0 - 658.6	Gray sandy shale.
658.6 - 667.0	Brown sandstone.
667.0 - 668.0	Gray sandy shale.
668.0 - 673.0	Brown sandstone.

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 2,547 barrels of oil per acre was obtained from 14.4 feet of sand. The weighted average percent oil saturation was reduced from 44.7 to 34.2, or represents an average recovery of 10.5 percent. The weighted average effective permeability of the samples is 8.37 millidarcys, while the average initial fluid production pressure is 24.1 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 13 samples tested, 13 produced water and 11 oil. This indicates that approximately 85 percent of the sand

represented by these samples is floodable pay sand.

CALCULATED RECOVERY

It would appear from a study of the data, that efficient primary and waterflood operations in the vicinity of this well should recover approximately 4,650 barrels of oil per acre. This is an average recovery of 302 barrels per acre foot from 15.4 feet of floodable sand analyzed in this core.

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

Original formation volume factor	1.05
Reservoir water saturation, percent	25.0
Average porosity, percent	20.9
Oil saturation after flooding, percent	34.2
Performance factor, percent	50.0
Net floodable pay sand, feet	15.4

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Jackson Well Servicing Company **Lease** Hermann **Well No.** 10-P

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	655.2	21.3	33	30	63	545	94.	1.0	1.0	545	94.00
2	656.4	23.3	35	26	61	633	189.	1.0	2.0	633	189.00
3	657.8	16.1	25	51	76	312	335.	1.0	3.0	312	335.00
4	658.9	15.0	33	38	71	384	62.	1.0	4.0	384	62.00
5	660.0	18.7	32	43	75	464	31.	1.0	5.0	464	31.00
6	661.6	18.0	37	46	83	517	165.	1.4	6.4	724	231.00
7	662.8	23.1	47	34	81	842	62.	1.5	7.9	1,263	93.00
8	664.2	20.1	38	36	74	593	230.	1.5	9.4	890	345.00
9	665.4	22.3	40	30	70	692	110.	1.0	10.4	692	110.00
10	666.8	22.9	55	31	86	977	203.	1.0	11.4	977	203.00
11	668.6	26.5	56	26	82	1,151	118.	1.0	12.4	1,151	118.00
12	669.8	18.7	55	31	86	798	103.	2.0	14.4	1,596	206.00
13	671.8	20.4	51	33	84	807	35.	2.0	16.4	1,614	70.00

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Jackson Well Servicing Company Lease Hermann Well No. 10-P

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
655.0 - 662.0	6.4	147.2	942.00
662.0 - 673.0	10.0	114.5	1145.00
655.0 - 673.0	16.4	127.3	2087.00

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
655.0 - 662.0	6.4	18.7	32.8	39.4	478	3,062
662.0 - 673.0	10.0	21.5	49.1	32.0	818	8,183
655.0 - 673.0	16.4	20.4	42.7	34.9	686	11,245

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Jackson Well Servicing Company Lease Hermann Well No. 10-P

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	655.2	20.8	33	533	3	48	30	62	485	217	4.87	20
2	656.4	23.3	35	633	5	90	30	65	543	321	20.35	20
3	657.8	16.5	25	320	0	0	25	62	320	52	1.50	25
4	658.9	14.5	33	371	3	34	30	33	337	17	0.45	35
5	660.0	18.4	32	457	0	0	32	63	457	15	0.37	35
6	661.6	18.4	37	528	5	71	32	62	457	30	0.75	35
7	662.8	23.1	47	842	16	287	31	66	555	296	12.18	20
8	664.2	20.6	38	607	6	96	32	62	511	198	13.28	20
9	665.4	23.2	40	720	11	198	29	65	522	242	9.16	20
10	666.8	23.3	55	994	25	452	30	59	542	342	23.03	20
11	668.6	26.0	56	1,130	18	363	38	56	767	274	18.21	20
12	669.8	19.0	55	811	17	251	38	57	560	91	2.17	25
13	671.8	20.0	51	791	6	93	45	50	698	39	0.67	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 Jackson Well Servicing Company Lease Hermann Well No. 10-P

Depth Interval, Feet	655.0 - 662.0	662.0 - 673.0	655.0 - 673.0
Feet of Core Analyzed	4.4	10.0	14.4
Average Percent Porosity	19.2	21.6	20.9
Average Percent Original Oil Saturation	34.7	49.1	44.7
Average Percent Oil Recovery	4.1	13.3	10.5
Average Percent Residual Oil Saturation	30.6	35.8	34.2
Average Percent Residual Water Saturation	56.1	58.6	57.8
Average Percent Total Residual Fluid Saturation	86.7	94.4	92.0
Average Original Oil Content, Bbls./A. Ft.	518.	823.	729.
Average Oil Recovery, Bbls./A. Ft.	62.	228.	177.
Average Residual Oil Content, Bbls./A. Ft.	456.	595.	552.
Total Original Oil Content, Bbls./Acre	2,276.	8,222.	10,498.
Total Oil Recovery, Bbls./Acre	271.	2,276.	2,547.
Total Residual Oil Content, Bbls./Acre	2,005.	5,946.	7,951.
Average Effective Permeability, Millidarcys	6.07	9.43	8.37
Average Initial Fluid Production Pressure, p.s.i.	27.5	22.1	24.1

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

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RESULTS OF WATER DIFFERENTIATION TESTS

TABLE VI

Company Jackson Well Servicing Co. Lease Hermann Well No. 10-P

Sample No.	Depth, Feet	Chloride Content of Brine in Sand ppm	Percent Water Saturation Connate	Drilling & Foreign	Total
1	655.2	18,519			
2	656.4	14,617			
3	657.8	19,439			
4	658.9	19,953			
5	660.0	17,499			
6	661.6	22,821			
7	662.8	15,021			
8	664.2	20,837			
9	665.4	13,406			
10	666.8	20,699			
11	668.6	18,315			
12	669.8	27,079			
13	671.8	33,488			

Note: ppm — parts per million