

OILFIELD RESEARCH LABORATORIES

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

March 7, 1981

Ajax Drilling Company
166 Harbor Drive
Key Biscayne, Florida 33149

Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core taken from the Kirchhoffer Lease, Well No. 10, located in Franklin County, Kansas and submitted to our laboratory on January 13, 1981.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Sanford A. Michel

SAM/mkf

4 c to Key Biscayne, Fl.
1 c to Rantoul, Ks.

- REGISTERED ENGINEERS -

CORE ANALYSIS - WATER ANALYSIS - REPRESSURING ENGINEERING - SURVEYING & MAPPING - PROPERTY EVALUATION & OPERATION

Oilfield Research Laboratories

GENERAL INFORMATION & SUMMARY

Company Ajax Drilling Co. Lease Kirchhoffer Well No. 10

Location _____

Section 29 Twp. 15S Rge. 22E County Franklin State Kansas

Elevation, Feet - - - - -

Name of Sand - - - - - Upper Squirrel

Top of Core - - - - - 726.0

Bottom of Core - - - - - 742.7

Top of Sand - - - - - 726.0

Bottom of Sand - - - - - 742.7

Total Feet of Permeable Sand - - - - - 15.7

Total Feet of Floodable Sand - - - - - 7.5

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.
0 - 30	4.4	4.4
30 - 60	5.4	9.8
60 - 90	1.9	11.7
90 & Above	4.0	15.7

Average Permeability Millidarcys - - - - - 57.5

Average Percent Porosity - - - - - 21.0

Average Percent Oil Saturation - - - - - 55.4

Average Percent Water Saturation - - - - - 30.1

Average Oil Content, Bbls./A. Ft. - - - - - 901.

Total Oil Content, Bbls./Acre - - - - - 14,151.

Average Percent Oil Recovery by Laboratory Flooding Tests - - - - - 13.4

Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft. - - - - - 223.

Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre - - - - - 1,669.

Total Calculated Oil Recovery, Bbls./Acre - - - - - See "Calculated Recovery" Section

The core was sampled by a representative of Oilfield Research Laboratories. Fresh water mud was used as a drilling fluid.

FORMATION CORED

The detailed log of the formation cored is as follows:

<u>Depth Interval,</u> <u>Feet</u>	<u>Description</u>
726.0 - 728.6	Dark brown slightly calcareous sandstone.
728.6 - 729.3	Brown and gray laminated slightly calcareous sandstone and shale.
729.3 - 730.1	Dark brown slightly calcareous sandstone.
730.1 - 730.4	Gray sandy shale.
730.4 - 740.2	Dark brown slightly calcareous sandstone.
740.2 - 740.8	Brown slightly calcareous slightly shaly sandstone.
740.8 - 742.7	Dark brown slightly calcareous sandstone.

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 1669 barrels of oil per acre was obtained from 7.3 feet of sand. The weighted average percent oil saturation was reduced from 57.8 to 44.4, or represents an average recovery of 13.4 percent. The weighted average effective permeability of the samples is 7.29 millidarcys, while the average initial fluid production pressure is 28.1 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 17 samples tested, 8 produced water and oil, and 6 samples produced water only. This indicates that approximately 47 percent of the sand represented by these samples is floodable pay sand.

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CALCULATED RECOVERY

It would appear from a study of the core data, that efficient primary and waterflood operations in the vicinity of this well should recover approximately 2360 barrels of oil per acre. This is an average recovery of 314 barrels per acre foot from 7.5 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	21.9
Oil saturation after flooding, percent	44.4
Performance factor, percent, estimated	50.0
Net floodable sand, feet	7.5

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Ajax Drilling Company Lease Kirchhoffer Well No. 10

Sample No.	Depth, Feet	Effective Porosity Percent	Percent Saturation			Oil Content Bbbs. / A Ft.	Perm., Mill.	Feet of Sand		Total Oil Content	Perm. Capacity Ft. X md.
			Oil	Water	Total			Ft.	Cum. Ft.		
1	726.6	20.3	55	38	93	866	34.	1.0	1.0	866	34.00
2	727.5	18.8	63	31	94	919	18.	1.0	2.0	919	18.00
3	728.5	15.6	39	57	96	472	43.	0.6	2.6	283	25.80
4	729.5	25.5	47	25	72	930	28.	0.8	3.4	744	22.40
5	730.5	23.4	46	25	71	835	19.	1.0	4.4	835	19.00
6	731.5	20.1	64	30	94	998	49.	1.0	5.4	998	49.00
7	732.5	20.8	33	39	72	533	43.	0.8	6.2	426	34.40
8	733.4	26.6	52	20	72	1073	70.	1.0	7.2	1073	70.00
9	734.7	18.8	69	29	98	1006	105.	1.0	8.2	1006	105.00
10	735.5	23.6	57	20	77	1044	118.	1.0	9.2	1044	118.00
11	736.5	24.2	45	24	69	845	92.	1.0	10.2	845	92.00
12	737.6	21.3	74	19	93	1223	44.	1.0	11.2	1223	44.00
13	738.7	20.7	66	22	88	1060	110.	1.0	12.2	1060	110.00
14	739.5	16.1	47	45	92	587	24.	1.0	13.2	587	24.00
15	740.5	19.0	50	41	91	737	9.4	0.6	13.8	442	5.64
16	741.6	20.6	57	31	88	911	58.	1.0	14.8	911	58.00
17	742.5	19.9	64	31	95	988	82.	0.9	15.7	889	73.80

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company	Lease	Kirchhoffer	Well No.			
Ajax Drilling Company				10		
Depth Interval, Feet	Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.		
	726.0 - 733.2	6.2	32.7	202.60		
	733.2 - 742.7	9.5	73.7	700.44		
	726.0 - 742.7	15.7	57.5	903.04		
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
726.0 - 733.2	6.2	20.8	50.9	33.8	818	5,071
733.2 - 742.7	9.5	21.2	58.4	27.6	956	9,080
726.0 - 742.7	15.7	21.0	55.4	30.1	901	14,151

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

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			
1	726.6	20.3	55	866	0	0	55	43	8	0.30	50
2	727.5	19.3	62	926	0	0	62	33	48	1.07	35
3	728.5	15.2	40	472	0	0	40	56	0	Imp.	-
4	729.5	25.4	47	926	0	0	47	30	0	Imp.	-
5	730.5	23.9	45	834	0	0	45	28	0	Imp.	-
6	731.5	20.2	64	1003	0	0	64	33	12	0.30	50
7	732.5	21.0	33	538	0	0	33	57	82	1.35	25
8	733.4	26.6	52	1073	14	289	38	47	278	12.33	15
9	734.7	18.9	69	1012	26	381	43	55	316	15.37	20
10	735.5	23.4	57	1035	13	236	44	54	162	3.45	30
11	736.5	24.1	45	841	5	93	40	51	300	11.99	15
12	737.6	21.5	74	1234	0	0	74	20	28	0.75	40
13	738.7	20.9	66	1070	16	259	50	40	164	9.93	20
14	739.5	16.2	47	591	0	0	47	50	244	4.50	25
15	740.5	19.2	50	745	5	74	45	47	34	0.94	40
16	741.6	20.8	57	920	9	145	48	43	30	0.75	40
17	742.5	19.9	64	988	16	247	48	48	14	0.33	45

Well No. 10

Lease Kirchhoffer

Company Ajax Drilling Company

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

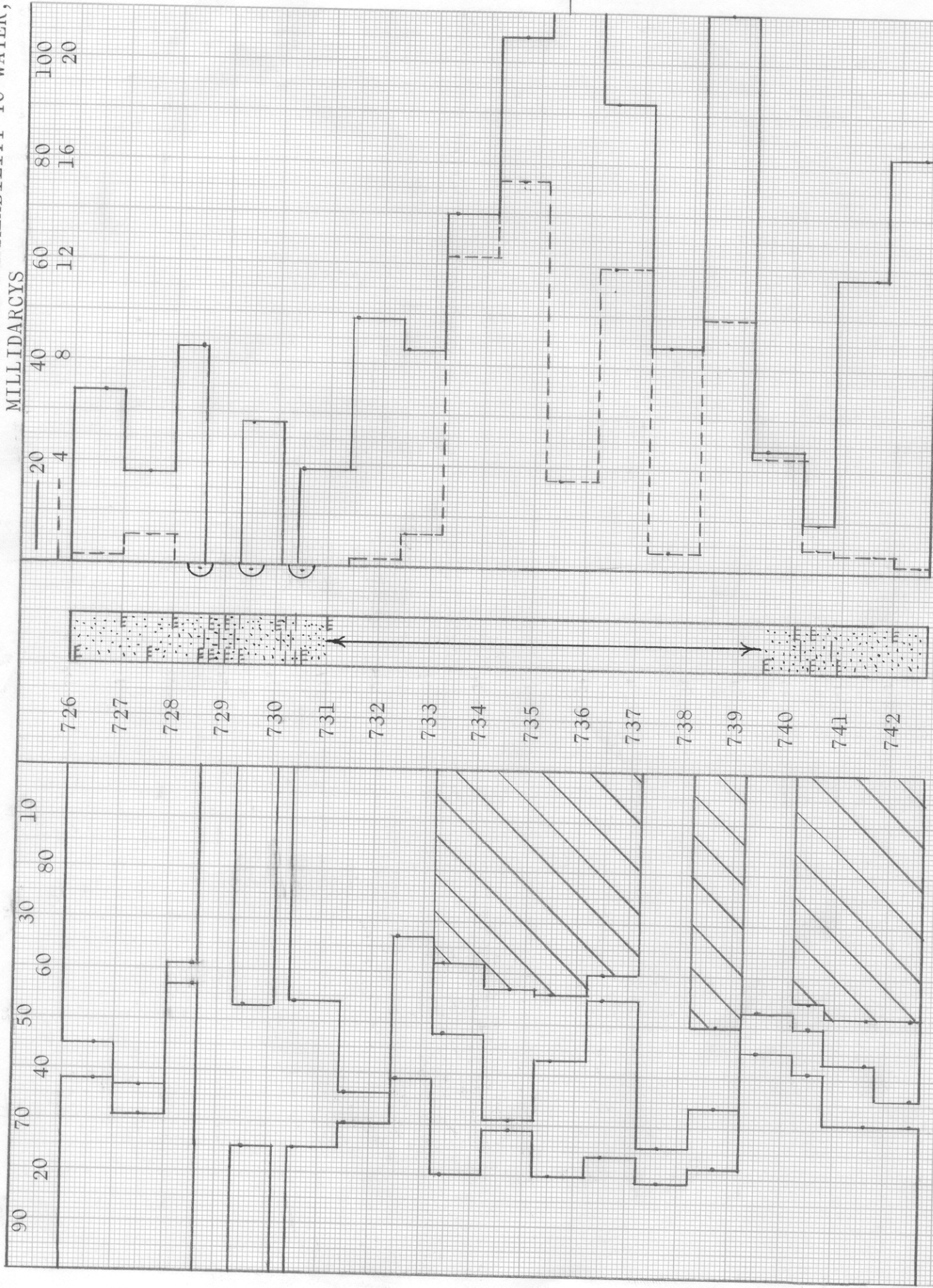
TABLE V

Company	Ajax Drilling Company	Lease	733.2 - 742.7	Well No.	10
				Kirchhoffer	
Depth Interval, Feet			733.2 - 742.7		
Feet of Core Analyzed			7.5		
Average Percent Porosity			21.9		
Average Percent Original Oil Saturation			57.8		
Average Percent Oil Recovery			13.4		
Average Percent Residual Oil Saturation			44.4		
Average Percent Residual Water Saturation			48.2		
Average Percent Total Residual Fluid Saturation			92.6		
Average Original Oil Content, Bbbls./A. Ft.			972.		
Average Oil Recovery, Bbbls./A. Ft.			223.		
Average Residual Oil Content, Bbbls./A. Ft.			749.		
Total Original Oil Content, Bbbls./Acre			7,287.		
Total Oil Recovery, Bbbls./Acre			1,669.		
Total Residual Oil Content, Bbbls./Acre			5,618.		
Average Effective Permeability, Millidarcys			7.29		
Average Initial Fluid Production Pressure, p.s.i.			28.1		

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

PERMEABILITY, IN MILLIDARCYS
EFFECTIVE PERMEABILITY TO WATER, IN
MILLIDARCYS

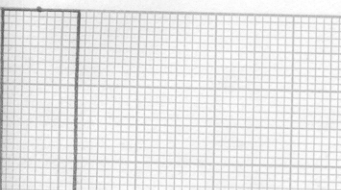
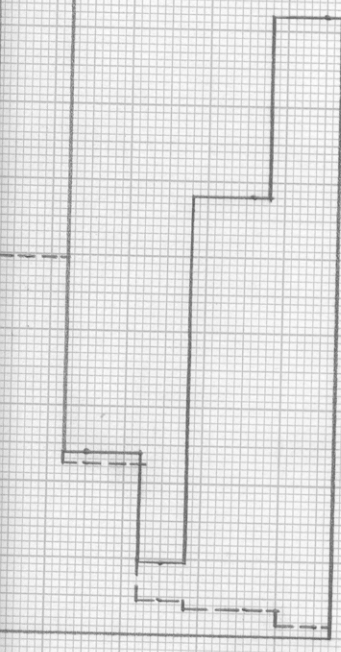
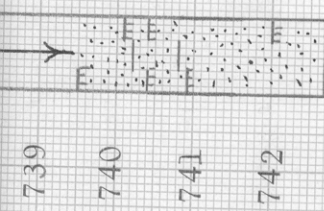
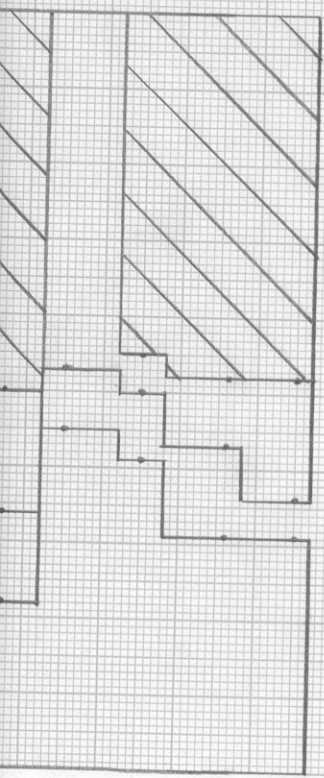
WATER SAT., PERCENT
OIL SAT., PERCENT






KEY:




SANDY SHALE

LAMINATED CALCAREOUS SANDSTONE AND SHALE



KEY:

-  SANDY SHALE
-  CALCAREOUS SANDSTONE
-  SHALY CALCAREOUS SANDSTONE

-  LAMINATED CALCAREOUS SANDSTONE AND SHALE
-  FLOODPOT RESIDUAL OIL SATURATION
-  IMPERMEABLE TO WATER

AJAX DRILLING COMPANY

KIRCHHOFFER LEASE

FRANKLIN COUNTY, KANSAS

WELL NO. 10

DEPTH INTERVAL, FEET	FEET OF CORE ANALYZED	AVERAGE PERCENT POROSITY	AVG. OIL SATURATION PERCENT	AVG. WATER SATURATION PERCENT	AVERAGE PERMEABILITY, MILLIDARCYS	CALCULATED OIL RECOVERY BBLs. / ACRE
726.0 - 733.2	6.2	20.8	50.9	33.8	32.7	
733.2 - 742.7	9.5	21.2	58.4	27.6	73.7	
726.0 - 742.7	15.7	21.0	55.4	30.1	57.5	2360

(PRIMARY AND
WATERFLOODING)

OILFIELD RESEARCH LABORATORIES
CHANUTE, KANSAS
MARCH, 1981

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