



OILFIELD RESEARCH LABORATORIES

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

July 16, 1980

Unionville Exploration
3005 South Harbor Blvd.
Santa Ana, California 92704

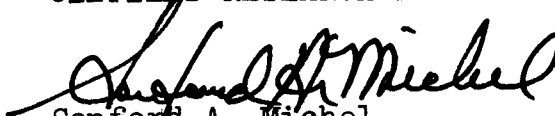
Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core taken from the Ballard F Lease, Well No. F-1, Chautauqua County, Kansas, and submitted to our laboratory on May 23, 1980.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES



Sanford A. Michel

SAM/tem

4 c to Santa Ana, California
1 c to Sedan, Kansas

Oilfield Research Laboratories

GENERAL INFORMATION & SUMMARY

Company	Unionville Exploration	Lease	Ballard F	Well No.	F-1
Location	-				
Section	32	Twp.	33S	Rge.	13E
		County	Chautauqua		State Kansas
Elevation, Feet	- - - - -				
Name of Sand	- - - - -				Wiser
Top of Core	- - - - -				987.0
Bottom of Core	- - - - -				1004.3
Top of Sand	- - - - -				987.0
Bottom of Sand	- - - - -				1004.3
Total Feet of Permeable Sand	- - - - -				16.4
Total Feet of Floodable Sand	- - - - -				2.4
Distribution of Permeable Sand:					
Permeability Range Millidarcys	Feet		Cum. Ft.		
0 - 5	4.6		4.6		
5 - 10	3.0		7.6		
10 - 20	8.8		16.4		
Average Permeability Millidarcys	- - - - -				18.4
Average Percent Porosity	- - - - -				14.9
Average Percent Oil Saturation	- - - - -				15.4
Average Percent Water Saturation	- - - - -				63.5
Average Oil Content, Bbls./A. Ft.	- - - - -				176.
Total Oil Content, Bbls./Acre	- - - - -				2,885.
Average Percent Oil Recovery by Laboratory Flooding Tests	- - - - -				3.9
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	- - - - -				49.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	- - - - -				117.
Total Calculated Oil Recovery, Bbls./Acre	- - - - -				See "Calculated Recovery" Section.

-2-

The core was sampled by a representative of Oilfield Research Laboratories. 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:

<u>Depth Interval, Feet</u>	<u>Description</u>
987.0 - 988.9	Gray shaly slightly calcareous sandstone.
988.9 - 994.7	Grayish brown slightly calcareous sandstone.
944.7 - 997.1	Brown shaly slightly calcareous sandstone.
997.1 - 997.8	Brown slightly calcareous sandstone.
997.8 - 999.0	Brown slightly shaly slightly calcareous sandstone.
999.0 - 999.9	Grayish brown very shaly sandstone.
999.9 - 1002.2	Brown slightly calcareous sandstone.
1002.2 - 1004.3	Gray shaly slightly calcareous sandstone.

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 117 barrels of oil per acre was obtained from 2.4 feet of sand. The weighted average percent oil saturation was reduced from 27.4 to 23.5, or represents an average recovery of 3.9 percent. The weighted average effective permeability of the samples is 4.15 millidarcys, while the average initial fluid production pressure is 20.0 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 16 samples tested, 2 produced water and oil, and 12 samples produced water only. This indicates that approximately 13 percent of the sand represented by these samples is floodable pay sand.

-3-

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 480 barrels of oil per acre. This is an average recovery of 201 barrels per acre foot from 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	1.08
Reservoir water saturation, percent, estimated	40.0
Average porosity, percent	16.2
Oil saturation after flooding, percent	23.5
Performance factor, percent, estimated	50.0
Net floodable sand, feet	2.4

RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

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	987.5	15.3	10	72	82	119	5.6	1.0	1.0	119	5.60
2	988.5	12.8	6	90	96	60	3.0	0.9	1.9	54	2.70
3	989.5	14.5	8	84	92	90	18.	1.1	3.0	99	19.80
4	990.1	15.4	15	65	80	179	14.	1.0	4.0	179	14.00
5	991.5	14.3	22	58	80	244	20.	1.0	5.0	244	20.00
6	992.5	15.4	18	54	72	215	14.	1.0	6.0	215	14.00
7	993.5	16.2	22	51	73	277	17.	1.0	7.0	277	17.00
8	994.5	15.3	12	61	73	142	11.	0.7	7.7	99	7.70
9	995.5	16.3	26	44	70	329	3.1	1.3	9.0	428	4.03
10	996.5	15.6	29	43	72	351	2.9	1.1	10.1	386	3.19
11	997.5	14.5	18	74	92	203	18.	0.7	10.8	52	142.10
12	998.5	14.1	19	51	70	208	8.1	1.2	12.0	250	9.72
13	1000.3	15.7	14	56	70	171	14.	1.1	13.1	188	15.40
14	1001.5	14.5	12	71	83	135	15.	1.2	14.3	162	18.00
15	1002.5	13.9	9	71	80	97	5.7	0.8	15.1	78	4.56
16	1004.0	13.4	4	80	84	42	2.4	1.3	16.4	55	3.12

Company Unionville ExplorationLease Ballard FWell No. F-1

Oilfield Research Laboratories
SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company		Lease		Well No.	
Unionville Exploration		Ballard F		F-1	
Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.		
987.0 - 994.7	7.7	13.1	100.80		
994.7 - 1004.3	8.7	23.0	200.12		
987.0 - 1004.3	16.4	18.4	300.92		

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
987.0 - 994.7	7.7	14.9	14.2	67.0	167	1,286
994.7 - 1004.3	8.7	14.8	16.5	60.4	184	1,599
987.0 - 1004.3	16.4	14.9	15.4	63.5	176	2,885

Oilfield Research Laboratories

RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Unionville Exploration Lease Ballard F Well No. F-1

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	987.5	15.3	10	119	0	0	10	73	119	0.15	45
2	988.5	12.6	6	59	0	0	6	90	59	Imp.	-
3	989.5	14.7	8	91	0	0	8	87	91	0.22	35
4	990.1	15.5	15	180	0	0	15	76	180	1.05	30
5	991.5	14.0	22	239	0	0	22	67	239	0.15	45
6	992.5	15.9	17	210	0	0	17	68	210	0.30	35
7	993.5	16.2	22	276	0	0	22	65	276	0.22	35
8	994.5	15.2	12	142	0	0	12	77	142	0.15	35
9	995.5	16.5	26	333	3	38	23	72	295	7.27	15
10	996.5	15.7	29	353	5	61	24	68	292	0.45	25
11	997.5	14.6	18	204	0	0	18	76	204	0.37	25
12	998.5	14.4	18	201	0	0	18	75	201	0.67	25
13	1000.3	16.1	13	162	0	0	13	83	162	3.15	25
14	1001.5	14.5	12	135	0	0	12	84	135	2.40	10
15	1002.5	14.0	9	98	0	0	9	82	98	1.50	20
16	1004.0	13.0	5	50	0	0	5	81	50	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.

Oilfield Research Laboratories

SUMMARY OF LABORATORY FLOODING TESTS

TABLE V

Company	Unionville Exploration	Lease	Ballard F	Well No.	F-1
Depth Interval, Feet	994.7 - 1004.3				
Feet of Core Analyzed	2.4				
Average Percent Porosity	16.2				
Average Percent Original Oil Saturation	27.4				
Average Percent Oil Recovery	3.9				
Average Percent Residual Oil Saturation	23.5				
Average Percent Residual Water Saturation	70.2				
Average Percent Total Residual Fluid Saturation	93.7				
Average Original Oil Content, Bbls./A. Ft.	343.				
Average Oil Recovery, Bbls./A. Ft.	49.				
Average Residual Oil Content, Bbls./A. Ft.	294.				
Total Original Oil Content, Bbls./Acre	822.				
Total Oil Recovery, Bbls./Acre	117.				
Total Residual Oil Content, Bbls./Acre	705.				
Average Effective Permeability, Millidarcys	4.15				
Average Initial Fluid Production Pressure, p.s.i.	20.0				

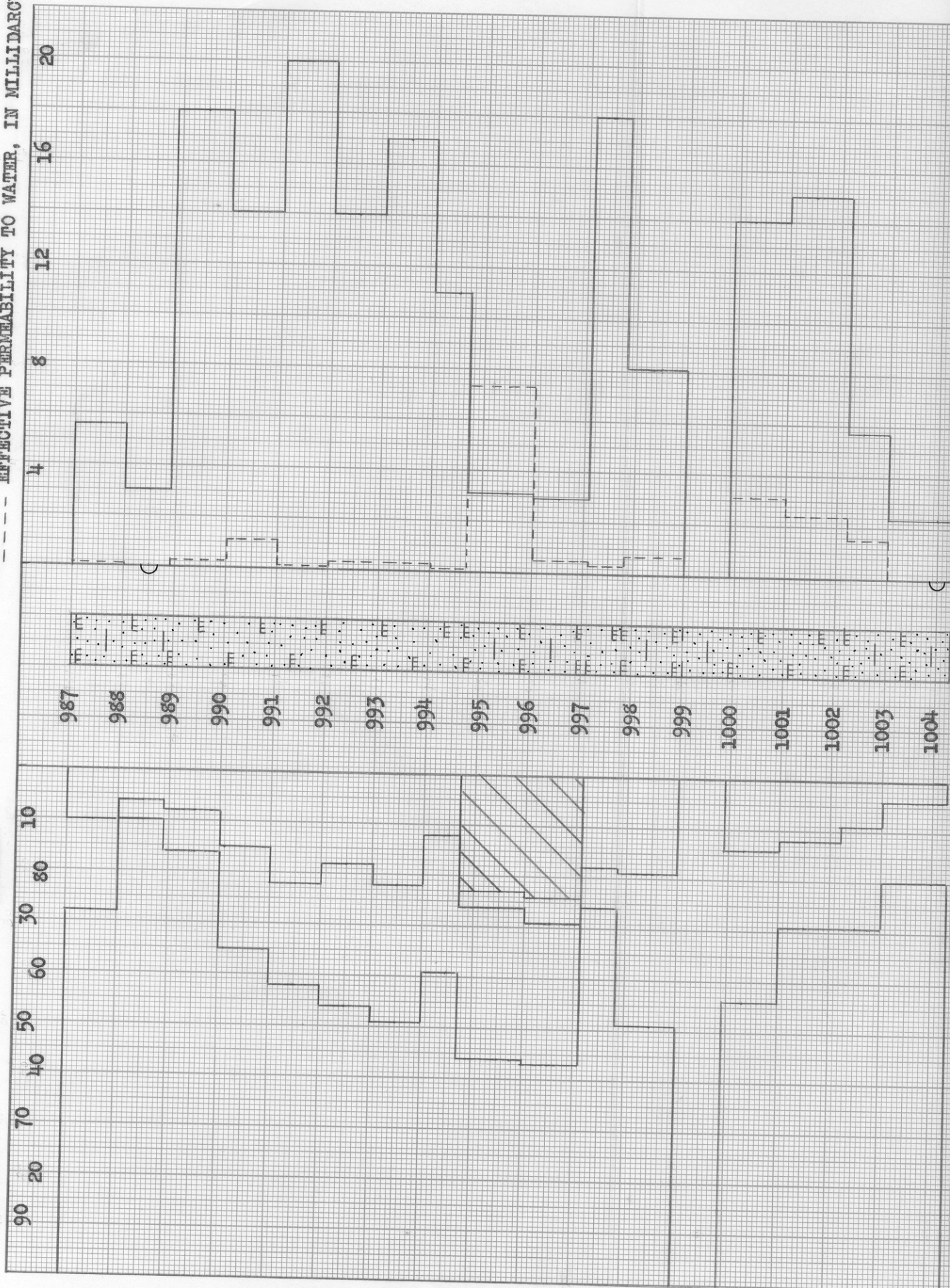
NOTE: Only those samples which recovered oil were used in calculating the above averages.

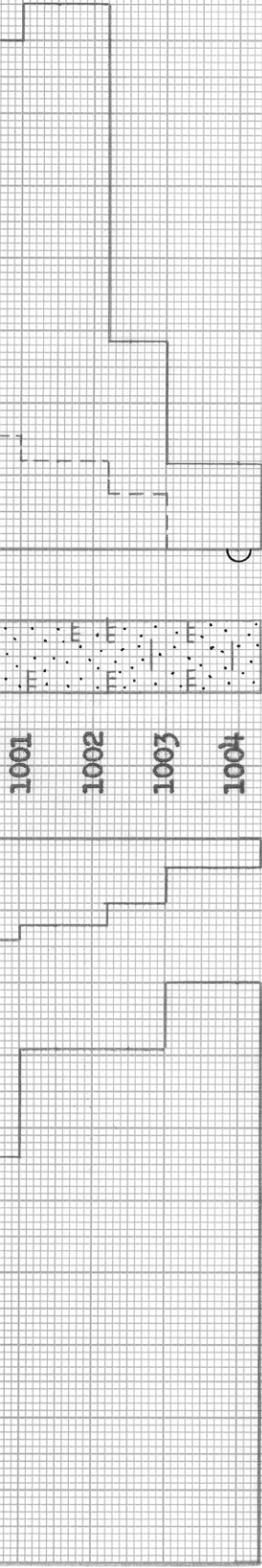
WATER SAT., PERCENT →

← OIL SAT., PERCENT

PERMEABILITY, IN MILLIDARCY

EFFECTIVE PERMEABILITY TO WATER, IN MILLIDARCY





KEY:



SHALY CALCAREOUS SANDSTONE



SHALY SANDSTONE



CALCAREOUS SANDSTONE



FLOODPOT RESIDUAL OIL SATURATION

○ IMPERMEABLE TO WATER

UNIONVILLE EXPLORATION

BALLARD F LEASE

CHAUTAUQUA COUNTY, KANSAS

WELL NO. F-1

DEPTH INTERVAL, FEET	FEET OF CORE ANALYZED	AVERAGE POROSITY PERCENT	AVG. OIL SATURATION PERCENT	AVG. WATER SATURATION PERCENT	AVERAGE PERMEABILITY MILLIDARCS	CALCULATED OIL RECOVERY, BBLS./ACRE
987.0 - 994.7	7.7	14.9	14.2	67.0	13.1	
994.7 - 1004.3	8.7	14.8	16.5	60.4	23.0	
987.0 - 1004.3	16.4	14.9	15.4	63.5	18.4	480 (PRIMARY & WATERFLOODING)