

OILFIELD RESEARCH LABORATORIES

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June 12, 1981

Quad Energy
P. O. Box 358
Sedan, Kansas 67361

Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core taken from the Mundy Lease, Well No. 10-B, located in Chautauqua County, Kansas and submitted to our laboratory on June 3, 1981.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Sanford A. Michel

SAM/kas

5 c to Sedan, Kansas

- REGISTERED ENGINEERS -

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

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GENERAL INFORMATION & SUMMARY

Company Quad Energy Lease Mundy Well No. 10-B

Location _____

Section 3 Twp. 34S Rge. 12E County Chautauqua State Kansas

Elevation, Feet

Name of Sand..... Wiser

Top of Core 997.0

Bottom of Core 1016.0

Top of Sand 997.0

Bottom of Sand 1016.0

Total Feet of Permeable Sand 18.0

Total Feet of Floodable Sand 3.0

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.
2 - 6	6.0	6.0
12 - 20	6.0	12.0
20 - 30	3.0	15.0
30 - 40	2.0	17.0
45 - 50	1.0	18.0

Average Permeability Millidarcys 17.2

Average Percent Porosity 15.6

Average Percent Oil Saturation 18.7

Average Percent Water Saturation 56.0

Average Oil Content, Bbls./A. Ft. 227.

Total Oil Content, Bbls./Acre 4,305.

Average Percent Oil Recovery by Laboratory Flooding Tests 2.7

Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft. 30.

Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre 91.

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

Samples only were delivered to the laboratory by a representative of the client. It was assumed that each sample represented one foot of core. 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>
997.0 - 1000.0	Light brown slightly calcareous sandstone.
1000.0 - 1005.0	Grayish light brown slightly calcareous sandstone.
1005.0 - 1007.0	Grayish light brown shaly slightly calcareous sandstone.
1007.0 - 1009.0	Grayish light brown slightly calcareous sandstone.
1009.0 - 1011.0	Grayish light brown shaly slightly calcareous sandstone.
1011.0 - 1012.0	Light brown and gray laminated slightly calcareous sandstone and shale.
1012.0 - 1013.0	Light brown slightly calcareous sandstone.
1013.0 - 1015.0	Grayish light brown shaly slightly calcareous sandstone.
1015.0 - 1016.0	Grayish light brown slightly calcareous sandstone.

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 91 barrels of oil per acre was obtained from 3.0 feet of sand. The weighted average percent oil saturation was reduced from 28.0 to 25.3, or represents an average recovery of 2.7 percent. The weighted average effective permeability of the samples is 2.74 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 19 samples tested, 3 produced water and oil, and 16 produced water only. This indicates that approximately 16.0 percent of the sand represented by these samples is floodable pay sand.

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 610 barrels of oil per acre. This is an average recovery of 204 barrels per acre foot from 3.0 feet of floodable sand analyzed in this core.

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

Original formation volume factor, estimated	1.07
Reservoir water saturation, percent, estimated	30.0
Average porosity, percent	14.6
Oil saturation after flooding, percent	25.3
Performance factor, percent, estimated	45.0
Net floodable sand, feet	3.0

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Quad Energy Lease Mundy Well No. 10-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	997.5	19.1	24	39	63	356	35.	1.0	1.0	356	35.00
2	998.5	16.4	19	40	59	242	31.	1.0	2.0	242	31.00
3	999.5	17.1	34	35	69	451	47.	1.0	3.0	451	47.00
4	1000.5	15.8	9	67	76	110	21.	1.0	4.0	110	21.00
5	1001.5	15.3	16	67	83	190	16.	1.0	5.0	190	16.00
6	1002.5	14.8	12	65	77	138	17.	1.0	6.0	138	17.00
7	1003.5	15.3	38	46	84	451	17.	1.0	7.0	451	17.00
8	1004.5	15.0	21	52	73	244	17.	1.0	8.0	244	17.00
9	1005.5	13.8	12	70	82	129	2.9	1.0	9.0	129	2.90
10	1006.5	14.2	22	64	86	242	3.6	1.0	10.0	242	3.60
11	1007.5	14.6	21	58	79	238	12.	1.0	11.0	238	12.00
12	1008.5	16.2	16	67	83	201	19.	1.0	12.0	201	19.00
13	1009.5	15.0	24	60	84	279	3.1	1.0	13.0	279	3.10
14	1010.5	14.1	19	54	73	208	5.5	1.0	14.0	208	5.50
15	1011.5	13.6	22	50	72	232	*	1.0	15.0	232	*
16	1012.5	16.3	3	69	72	38	22.	1.0	16.0	38	38.00
17	1013.5	16.4	7	62	69	89	2.6	1.0	17.0	89	2.60
18	1014.5	15.0	18	55	73	210	2.1	1.0	18.0	210	2.10
19	1015.5	18.4	18	39	57	257	20.	1.0	19.0	257	20.00

NOTE: * No permeability sample obtainable.

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company		Quad Energy	Lease	Mundy	Well No.	10-B
Depth Interval, Feet	Feet of Core Analyzed	Average Porosity	Average Percent Oil Saturation	Average Percent Water Saturation	Average Oil Content Bbl./A. Ft.	Total Oil Content Bbls./Acre
997.0 - 1016.0	19.0	15.6	18.7	56.0	227	4,305
997.0 - 1016.0	18.0	17.2	309.80			

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Well No. 10-B

Mundy

Quad Energy

Company

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	997.5	19.0	24	354	0	0	24	65	354	28	0.37	35
2	998.5	16.5	19	243	0	0	19	76	243	44	0.60	30
3	999.5	17.4	33	445	0	0	33	45	445	42	0.52	30
4	1000.5	15.9	9	111	0	0	9	88	111	338	6.60	15
5	1001.5	15.5	16	192	0	0	16	70	192	372	6.96	15
6	1002.5	14.9	12	139	0	0	12	79	139	296	5.55	15
7	1003.5	15.2	38	448	3	35	35	61	413	132	2.02	15
8	1004.5	15.2	21	248	0	0	21	53	248	84	0.97	20
9	1005.5	13.9	12	129	0	0	12	82	129	88	1.08	20
10	1006.5	14.0	23	250	0	0	23	64	250	46	0.37	15
11	1007.5	14.7	21	239	0	0	21	73	239	298	5.02	15
12	1008.5	16.4	16	204	0	0	16	70	204	62	0.75	15
13	1009.5	15.1	24	281	3	35	21	75	246	348	5.83	15
14	1010.5	13.8	20	214	0	0	20	76	214	38	0.45	25
15	1011.5	13.5	22	230	2	21	20	74	209	30	0.37	30
16	1012.5	16.2	3	38	0	0	3	91	38	20	0.30	45
17	1013.5	16.7	7	91	0	0	7	85	91	38	0.45	30
18	1014.5	15.5	17	204	0	0	17	78	204	22	0.30	40
19	1015.5	18.2	18	254	0	0	18	75	254	28	0.30	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.

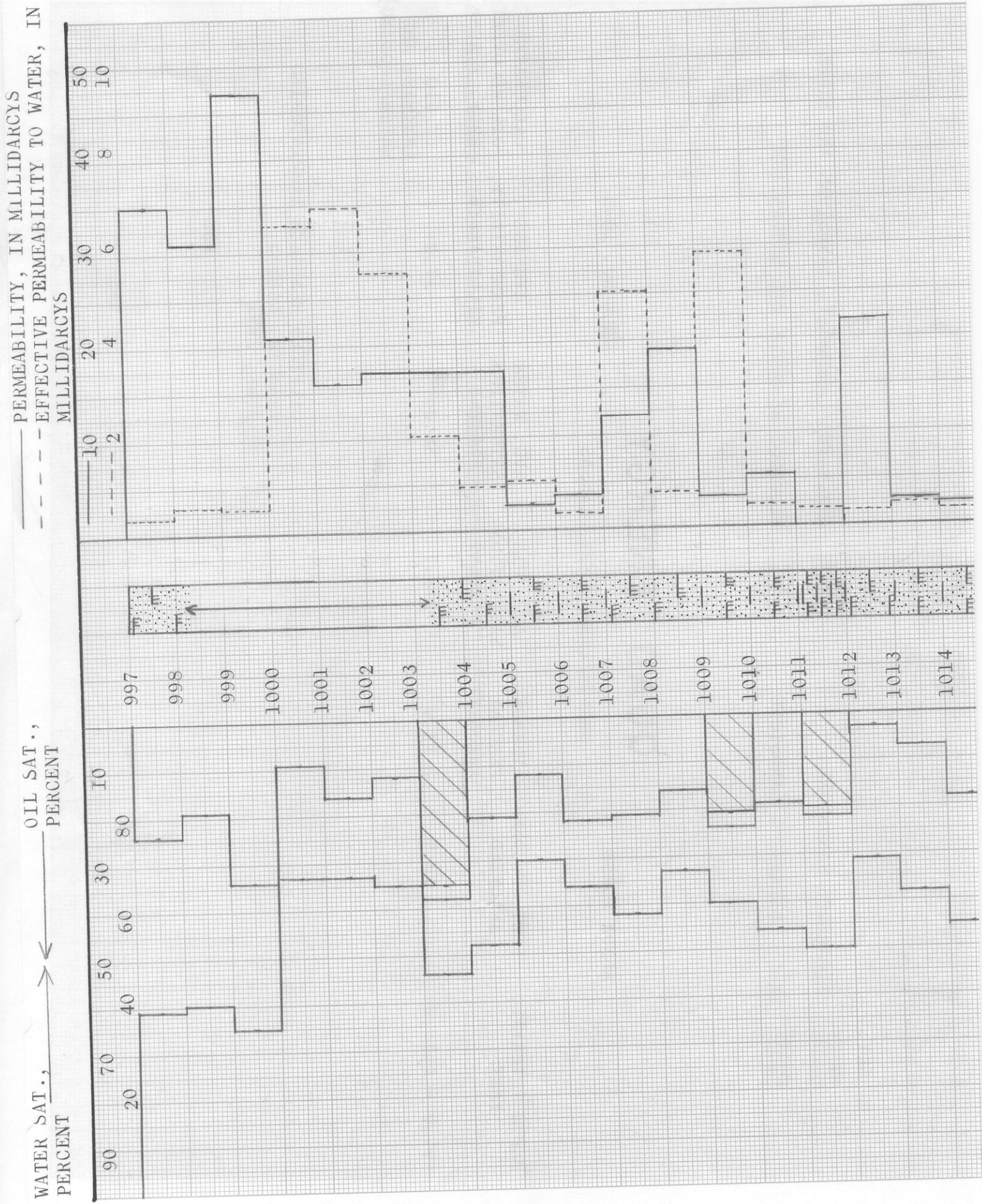
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SUMMARY OF LABORATORY FLOODING TESTS

TABLE V

Company	Quad Energy	Lease	Mundy	Well No.
				10-B
Depth Interval, Feet	997.0 - 1016.0			
Feet of Core Analyzed	3.0			
Average Percent Porosity	14.6			
Average Percent Original Oil Saturation	28.0			
Average Percent Oil Recovery	2.7			
Average Percent Residual Oil Saturation	25.3			
Average Percent Residual Water Saturation	70.0			
Average Percent Total Residual Fluid Saturation	95.3			
Average Original Oil Content, Bbls./A. Ft.	319.			
Average Oil Recovery, Bbls./A. Ft.	30.			
Average Residual Oil Content, Bbls./A. Ft.	289.			
Total Original Oil Content, Bbls./Acre	959.			
Total Oil Recovery, Bbls./Acre	91.			
Total Residual Oil Content, Bbls./Acre	868.			
Average Effective Permeability, Millidarcys	2.74			
Average Initial Fluid Production Pressure, p.s.i.	20.			

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



1015
1016

KEY:



CALCAREOUS SANDSTONE



LAMINATED CALCAREOUS SANDSTONE AND SHALE



SHALY CALCAREOUS SANDSTONE



FLOODPOT RESIDUAL OIL SATURATION

QUAD ENERGY

MUNDY LEASE

WELL NO. 10-B

CHAUTAUQUA COUNTY, KANSAS

DEPTH INTERVAL, FEET	FEET OF CORE ANALYZED	AVERAGE POROSITY	AVG. OIL SATURATION PERCENT	AVG. WATER SATURATION PERCENT	AVERAGE PERMEABILITY, MILLIDARCS	CALCULATED OIL RECOVERY BBLs. / ACRE
997.0 - 1016.0	19.0	15.6	18.7	56.0	17.2	610 (PRIMARY AND WATERFLOODING)

OILFIELD RESEARCH LABORATORIES
CHANUTE, KANSAS
JUNE, 1981

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