OILFIELD RESEARCH LABORATORIES

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

August 6, 1981

Charles A. Neal & Company
P. O. Box 707
Chanute, Kansas 66720

Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core taken from the Tarter Lease, Well No. TW-9, located in Wilson County, Kansas and submitted to our laboratory on July 30, 1981.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Sanford A. Michel

SAM/kas

5 c to Chanute, Kansas

Oilfield Research Laboratories

GENERAL INFORMATION & SUMMARY

Company Charles A Neal & Company Lease Tarter Well No. TW-9

Location 220' FS & 220' FE, NE¼

Section 20 Twp. 28S Rge. 15E County Wilson State Kansas

Elevation, Feet	
Name of Sand	Lower Bartlesville
Top of Core	1020.0
Bottom of Core	1032.3
Top of Sand	1020.0
Bottom of Sand (Tested)	1030.6
Total Feet of Permeable Sand	7.8
Total Feet of Floodable Sand	3.2

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.
60 - 75	2.0	2.0
100 - 150	2.6	4.6
150 - 200	2.0	6.6
580 & Above	1.2	7.8

Average Permeability Millidarcys	204.
Average Percent Porosity	19.9
Average Percent Oil Saturation	41.1
Average Percent Water Saturation	34.2
Average Oil Content, Bbls./A. Ft.	568.
Total Oil Content, Bbls./Acre	4,994.
Average Percent Oil Recovery by Laboratory Flooding Tests	4.8
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	84.7
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	271.
Total Calculated Oil Recovery, Bbls./Acre	See "Calculated Recovery" Section

The core was sampled and the samples sealed in plastic bags by a representative of the client. Fresh water mud was used as a drilling fluid.

FORMATION CORED

The detailed log of the formation cored is as follows:

Depth Interval, Feet	Description
1020.0 - 1023.6	Brown sandstone.
1023.6 - 1026.4	Grayish brown shaly sandstone.
1026.4 - 1032.3	Light brown sandstone.

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 271 barrels of oil per acre was obtained from 3.2 feet of sand. The weighted average percent oil saturation was reduced from 38.9 to 34.1, or represents an average recovery of 4.8 percent. The weighted average effective permeability of the samples is 18.8 millidarcys, while the average initial fluid production pressure is 10.0 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 9 samples tested, 3 produced water and oil, and 3 produced water only. This indicates that approximately 33 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 1,010 barrels of oil per acre. This is an average recovery of 317 barrels per acre foot from 3.2 feet of floodable sand analyzed in this core.

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

Original formation volume factor, estimated	1.06
Reservoir water saturation, percent, estimated	25.0
Average porosity, percent	22.3
Oil saturation after flooding, percent	34.1
Performance factor, percent, estimated	50.0
Net floodable sand, feet	3.2

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Charles A. Neal & Company Lease Tarter Well No. TW-9

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	1020.4	20.8	42	33	75	678	70.	1.0	1.0	678	70.00
2	1021.4	22.2	41	24	65	706	195.	1.0	2.0	706	195.00
3	1022.5	19.2	45	42	87	670	198.	1.0	3.0	670	198.00
4	1023.4	21.1	44	28	72	720	114.	0.6	3.6	432	114.00
5	1024.4	9.6	38	55	93	283	Imp.	1.0	4.6	283	0.00
6	1027.3	19.7	36	27	63	550	147.	1.0	5.6	550	147.00
7	1028.2	18.8	45	39	84	656	62.	1.0	6.6	656	62.00
8	1029.1	19.7	39	29	68	569	101.	1.0	7.6	569	101.00
9	1030.4	26.7	41	29	70	849	588.	1.2	8.8	1019	706.00

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Charles A. Neal & Company Lease Tarter Well No. TW-9

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
1020.0 - 1030.6	7.8	204	1,593

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
1020.0 - 1030.6	8.8	19.9	41.1	34.2	568	4,994

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Charles A. Neal & Company Lease Tarter Well No. TW-9

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	1020.4	20.7	42	674	0	0	42	54	674	26	0.45	40
2	1021.4	22.1	41	703	0	0	41	53	703	42	0.82	40
3	1022.5	19.2	45	670	0	0	45	43	670	0	Imp.	-
4	1023.4	21.0	44	717	0	0	44	52	717	362	8.70	20
5	1024.4	9.7	38	286	0	0	38	58	286	0	Imp.	-
6	1027.3	19.8	36	553	3	46	33	63	507	218	13.99	10
7	1028.2	18.7	45	653	0	0	45	41	653	0	Imp.	-
8	1029.1	19.6	39	593	5	76	34	63	517	372	13.33	10
9	1030.4	26.6	41	846	6	124	35	50	722	348	27.48	10

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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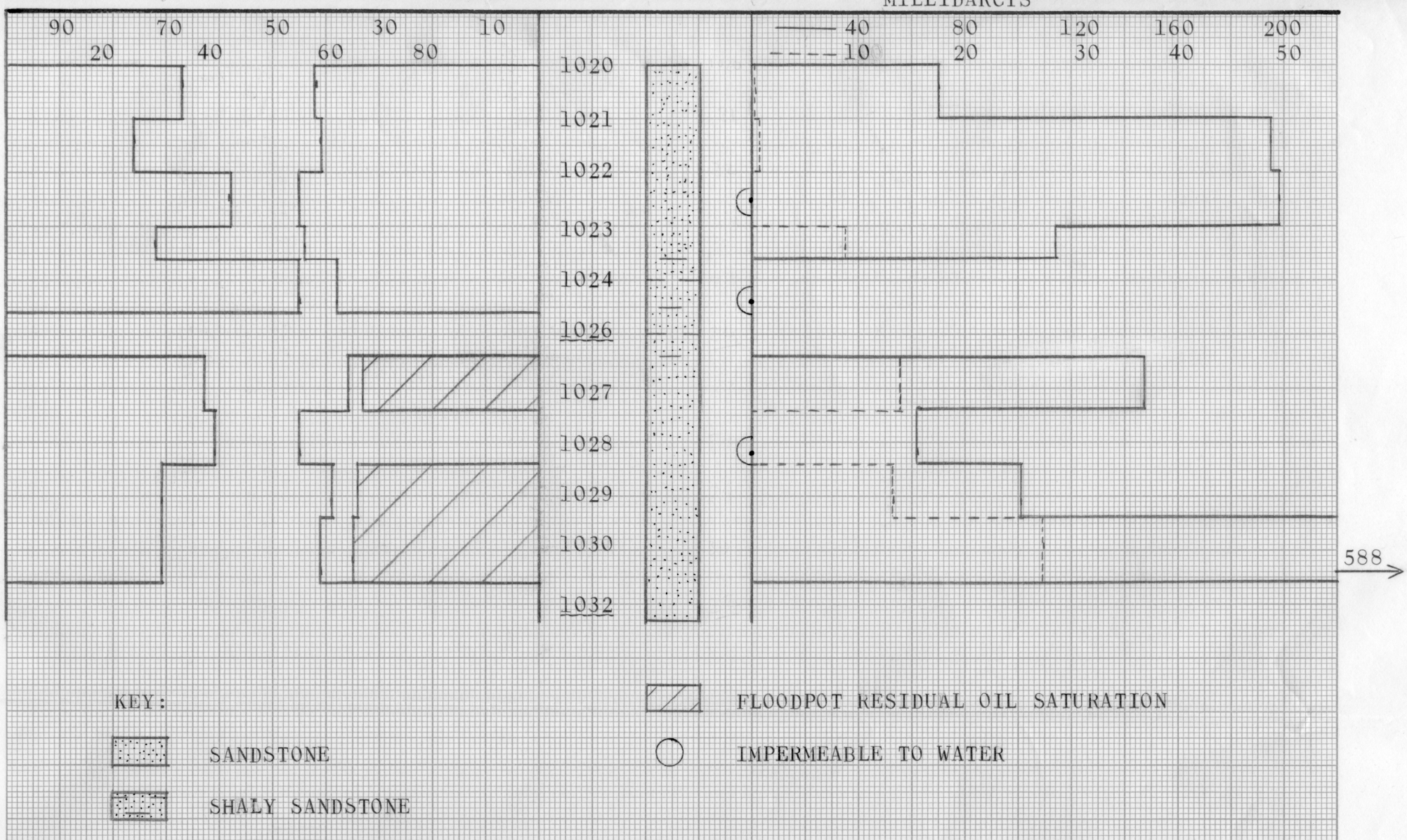
SUMMARY OF LABORATORY FLOODING TESTS

TABLE V

Company Charles A Neal & Company Lease Tarter Well No. TW-9

Depth Interval, Feet	1026.4 - 1030.6
Feet of Core Analyzed	3.2
Average Percent Porosity	22.3
Average Percent Original Oil Saturation	38.9
Average Percent Oil Recovery	4.8
Average Percent Residual Oil Saturation	34.1
Average Percent Residual Water Saturation	51.3
Average Percent Total Residual Fluid Saturation	85.4
Average Original Oil Content, Bbls./A. Ft.	676.
Average Oil Recovery, Bbls./A. Ft.	85.
Average Residual Oil Content, Bbls./A. Ft.	591.
Total Original Oil Content, Bbls./Acre	2,161.
Total Oil Recovery, Bbls./Acre	271.
Total Residual Oil Content, Bbls./Acre	1,890.
Average Effective Permeability, Millidarcys	18.8
Average Initial Fluid Production Pressure, p.s.i.	10.

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


MILLIDARCYS
90 70 50 30 10
20 40 60 80
40 80 120 160 200
10 20 30 40 50
1020
1021
1022
1023
1024
1026
1027
1028
1029
1030
1032
588
KEY:
SANDSTONE
SHALY SANDSTONE
FLOODPOT RESIDUAL OIL SATURATION
IMPERMEABLE TO WATER

CHARLES A. NEAL & COMPANY

TARTER LEASE — WELL NO. TW-9

WILSON COUNTY, KANSAS

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
1020.0 - 1030.6	8.8	19.9	41.1	34.2	204.	1010 (PRIMARY AND WATERFLOODING)

OILFIELD RESEARCH LABORATORIES
CHANUTE, KANSAS
AUGUST, 1981

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