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RUSSELL ENGINEERING
PETROLEUM CONSULTANTS
CORE ANALYSTS
101 PETROLEUM BUILDING
ABILENE, TEXAS

May 28, 1959

Wayne Petroleum Company
111 Crescendo Building
Abilene, Texas

Re: Core Analysis
M. S. Brecheisen Core Test No. 1
Anderson County, Kansas

Gentlemen:

The Squirrel Sandstone of Pennsylvanian Age was cored in the above well using rotary diamond coring equipment and water base mud as coring fluid. Core, taken under the supervision of a representative of the Wayne Petroleum Company was sealed in airtight containers at the wellsite and transported to our laboratory in Abilene, Texas for detailed sampling and analysis. Results and interpretations of these analyses are shown herein in both tabular and graphical form.

Laboratory data indicate that the reservoir represented by this core contains two sections totaling 19 net feet, in which the permeability capacity is sufficiently high to allow the production of oil in commercial quantities. Estimates of oil recoverable from the reservoir represented by this core, by primary methods from both zones combined, are placed at 50 stock tank barrels per acre-foot or the equivalent of 950 barrels per acre. No prior production has been considered in this estimate. Estimated additional oil recoverable from this reservoir by water flooding after depletion of primary reserves, from both zones combined, is placed at 225 barrels per acre-foot, or 4,300 barrels per acre.

Very truly yours,

RUSSELL ENGINEERING

James E. Russell

ALJ:cw/dc

CORING DATA

Formation Cored	SQUIRREL SANDSTONE
Date Cored	5-17-59
County	Anderson
State	Kansas
Field	-
Elevation, Feet	1037 'G. L.
Type Core	Diamond 2"
Coring Fluid	Water Base Mud
Top of Core, Feet	840.0
Bottom of Core, Feet	906.0
Total Feet Cored	66.0
Total Feet Recovered	66.0
Core Loss, Feet	0.0
Top of Pay Cored, Feet	868.0
Bottom of Pay Cored, Feet	899.0
Total Net Feet of Productive Pay Cored	19.0*
Number of Samples Analyzed	38 Complete 8 Flood Pot Tests

RESERVE ESTIMATES *

	Primary and Secondary			Pressure Maintenance	
Oil Recovery, Barrels Stock Tank	Solution Gas Energy	Increase by Water Flood	Total [1]	Total [2]	Increase over Primary and Secondary
Barrels Per Acre Foot	50	225	275		
Barrels per Acre	950	4300	5250		

* Sections 1 and 2 combined

1. By deferring water injection until after primary depletion.
2. By natural water drive or water injection sufficient to maintain reservoir pressure at or above saturation pressure.

DISCUSSION

The Squirrel Sandstone Section of Pennsylvanian Age was cored in the above well between the depths of 840.0 and 906.0 feet. Three cores were taken, as follows: Core No. 1, 840.0 to 864 0 feet, Core No 2, 864.0 to 888 0 feet and Core No. 3, 888.0 to 906 0 feet. Complete core recovery was obtained in all instances.

Microscopic examination of this sand indicated that it was tan, very fine grained to fine grained, well sorted, sub-rounded to rounded, micaceous and contained varying amounts of interstitial silt and clay together with shale in the form of laminae and thin beds scattered throughout. The core contained good tan to dark brown stain, good yellow fluorescence and very good odor.

Interpretation: Results of analyses indicated that the reservoir represented by this core could be divided into two permeable sections containing permeability capacity sufficiently high to indicate oil production in commercial amount. Section No. 1 contained 10.0 net feet of formation between the depths of 868.0 and 878.0 feet. Section No. 2 contained 9.0 net feet between the depths of 887.0 and 899.0 feet. The balance of the cored interval contained relatively low capacity and is interpreted as capable of producing oil but in limited amount.

Physical Properties: The weighted average values of the 10 0 net feet of oil productive formation in Section No. 1 contained the following weighted average values: porosity 16.8 percent, permeability 4.8 millidarcys, permeability capacity 48 millidarcy-feet, core oil saturation 30 6 percent and core water saturation 46.1 percent.

Section No. 2, containing 9.0 net feet of permeable formation, had the following weighted average values: porosity 15.7 percent, permeabiltiy 7.7 millidarcys, permeability capacity 69 millidarcy-feet, core oil saturation 35.0 percent, and core water saturation 46.1 percent.

Laboratory Water Flood Susceptibility Tests: Three representative samples of full diameter core taken from Section No. 1 were radially back flushed to remove drilling mud contaminants, brought to 100 percent liquid saturation in pressure-vacuum apparatus and dynamically flooded with brine to irreducible oil satuation. Results of these tests indicated no plugging action and yielded an average minimum residual (irreducible) oil saturation of 28.0 percent.

Three representative samples of full diameter core taken from Section No. 2 were prepared in the same manner and dynamically

flooded to irreducible oil saturation. No evidence of plugging was noted during either test. Average irreducible oil saturation was 30.3 percent.

Oil Recovery Estimates: Estimates of oil recoverable from Sections No. 1 and No. 2 combined, by solution gas expansion are placed at 50 stock tank barrels per acre-foot or 950 stock tank barrels per acre. Estimated additional oil recoverable by water flooding both Sections combined are placed at 225 stock tank barrels per acre-foot, equivalent to 4,300 barrels per acre. Water flood recovery values are based upon the use of a dispersed pattern type flood and an overall sweep efficienty factor of 65 percent.

Respectfully submitted,

A. L. Jenke

A. L. Jenke

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SUMMARY OF CORE ANALYSIS

COMPANY Wayne Petroleum Company LEASE M. S. Brecheisen WELL No. 1

	ZONE I	ZONE II
FORMATION	SQUIRREL SANDSTONE	
DEPTH INTERVAL, FEET	868.0-878.0	887.0-899.0
NET FEET OF PAY	10.0	9.0
POROSITY, PERCENT	16.8	15.7
CONVENTIONAL CORE ANALYSIS		
EFFECTIVE PERMEABILITY TO AIR, MILLIDARCYS	4.8	7.7
CAPACITY (FT. X MD.)	48	69
OIL SATURATION, PER CENT	30.6	35.0
WATER SATURATION, PER CENT	46.1	46.1
TOTAL SATURATION, PER CENT	76.7	81.1
FLOOD POT CORE ANALYSIS		
EFFECTIVE PERMEABILITY TO WATER, MILLIDARCYS	-	-
CAPACITY (FT. X MD.)	-	-
RESIDUAL OIL SATURATION, PER CENT	25.6	30.3
WATER SATURATION, PER CENT	74.4	69.7
TOTAL SATURATION, PER CENT	100.0	100.0
OIL RECOVERY ESTIMATES		
CONNATE WATER SATURATION, PER CENT	40*	
ESTIMATED RESERVOIR VOLUME FACTOR	1.08*	
PRIMARY GAS EXPANSION, BBL./AC. FT.	50*	
WATER FLOOD @ ORIGINAL CONDITIONS, BBL./AC. FT.	-	
WATER FLOOD @ DEPLETED CONDITIONS, BBL./AC. FT.	225*	

* Section 1 and 2 combined.

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RESULTS OF CORE ANALYSIS

COMPANY Wayne Petroleum Company LEASE M. S. Brecheisen WELL NO. 1

SAMPLE NO.	DEPTH FEET	NO. FEET	PERMEABILITY MILLIDARCYS	POROSITY PERCENT	PERCENT SATURATION			PROBABLE FLUID
					OIL	WATER	TOTAL	
1	858.5	1.0	0.0	10.2	2.6	61.5	64.1	None
2	859.5	1.0	-0.1	8.0	29.7	62.5	92.2	Oil
3	860.5	1.0	0.1	9.8	13.4	73.2	86.6	Oil
4	861.5	1.0	0.0	7.5	2.9	80.0	82.9	None
5	862.5	1.0	0.1	13.8	13.0	62.0	75.0	Oil
6	863.5	1.0	0.1	8.8	7.6	45.5	53.1	Oil
7	864.5	1.3	0.0	7.0	7.4	77.8	85.2	None
8	867.5	1.0	0.0	8.5	6.5	90.3	96.8	None
9	868.5	1.0	1.8	17.3	25.8	45.5	71.3	Oil
10	869.5	1.0	8.2	19.2	25.4	53.8	79.2	Oil
11	870.5	1.0	7.6	18.9	36.0	35.3	71.3	Oil
12	871.5	1.0	4.9	18.4	17.6	43.2	60.8	Oil
13	872.5	1.0	6.0	18.1	30.4	43.5	73.9	Oil
14	873.5	1.0	9.6	16.3	30.6	43.5	74.1	Oil
15	874.5	1.0	2.6	14.4	38.5	53.8	92.3	Oil
16	875.5	1.0	3.3	15.4	41.9	43.5	85.4	Oil
17	876.5	1.0	3.2	16.3	34.2	49.1	83.3	Oil
18	877.5	1.0	1.2	13.8	28.6	52.4	81.0	Oil
19	878.2	0.5	-0.1	12.8	18.6	74.5	93.1	Oil
20	880.5	1.0	0.0	10.4	33.7	58.7	92.4	None
21	881.5	1.0	-0.1	12.2	29.3	63.0	92.3	Oil
22	882.5	0.8	1.2	13.8	34.0	50.0	74.0	Oil
23	883.8	0.5	7.6	17.3	8.9	41.1	50.0	Oil
24	884.5	1.0	0.0	11.0	20.0	75.0	95.0	None
25	885.5	0.7	0.2	11.5	33.3	58.3	91.6	Oil
26	887.5	1.0	1.4	13.9	23.5	49.0	72.5	Oil
27	888.5	1.0	0.0	12.8	16.0	64.0	80.0	None
28	889.5	1.0	0.2	10.9	11.5	84.6	96.1	Oil
29	890.5	1.0	0.2	14.9	11.4	68.4	79.8	Oil
30	891.5	1.0	5.4	15.8	39.7	50.0	89.7	Oil
31	892.5	1.0	6.7	17.0	41.4	43.1	84.5	Oil
32	893.5	1.0	3.2	14.6	41.8	52.5	94.3	Oil
33	894.5	1.0	4.8	15.2	31.1	41.0	72.1	Oil

F - WATER FLOOD SAMPLE. CALCULATED BY ADDING FLOOD RECOVERY PLUS RESIDUAL UNLESS OTHERWISE NOTED.

H - HORIZONTAL PLUG

V - VERTICAL PLUG

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RESULTS OF CORE ANALYSIS

COMPANY Wayne Petroleum Company LEASE M. S. Brecheisen WELL NO. 1

SAMPLE NO.	DEPTH FEET	NO. FEET	PERMEABILITY MILLIDARCYS	POROSITY PERCENT	PERCENT SATURATION			PROBABLE FLUID
					OIL	WATER	TOTAL	
34	895.5	1.0	10	17.0	27.7	55.4	83.1	Oil
35	896.5	1.0	18	17.9	28.4	40.7	69.1	Oil
36	897.5	1.0	12	16.0	44.3	41.4	85.7	Oil
37	898.5	1.0	8.1	14.2	36.8	42.1	78.9	Oil
38	899.5	1.4	0.5	12.8	43.4	54.3	97.7	Oil

F - WATER FLOOD SAMPLE. CALCULATED BY ADDING FLOOD RECOVERY PLUS RESIDUAL UNLESS OTHERWISE NOTED.

H - HORIZONTAL PLUG

V - VERTICAL PLUG

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LABORATORY WATER FLOODING TESTS

COMPANY Wayne Petroleum Company LEASE M. S. Brecheisen WELL NO. 1

SAMPLE NO.	DEPTH FEET	POROSITY PERCENT	AIR PERMEABILITY MILLIDARCYS	MAX. PRESS PSI.	WATER THROUGH		WATER PERMEABILITY MILLIDARCYS @ RESIDUAL OIL SAT.	RESIDUAL SATURATION PERCENT	
					CC.	P.V.		OIL	WATER
2F	859.8	8.6		60	0	0		13.8	86.2
10F	869.2	20.5		60	478	46		24.4	75.6
13F	872.8	16.7		60	155	11		31.7	68.3
16F	875.8	16.5		60	478	33		33.3	66.7
22F	882.2	14.3		60	46	3.5		31.6	68.4
26F	887.8	15.7		60	237	15		31.8	68.2
31F	893.8	18.4		60	4941	330		30.0	70.0
36F	897.8	16.4		60	1600	131		32.2	67.8

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LAB No. 1191

Core Analysis Data

for

WAYNE PETROLEUM COMPANY

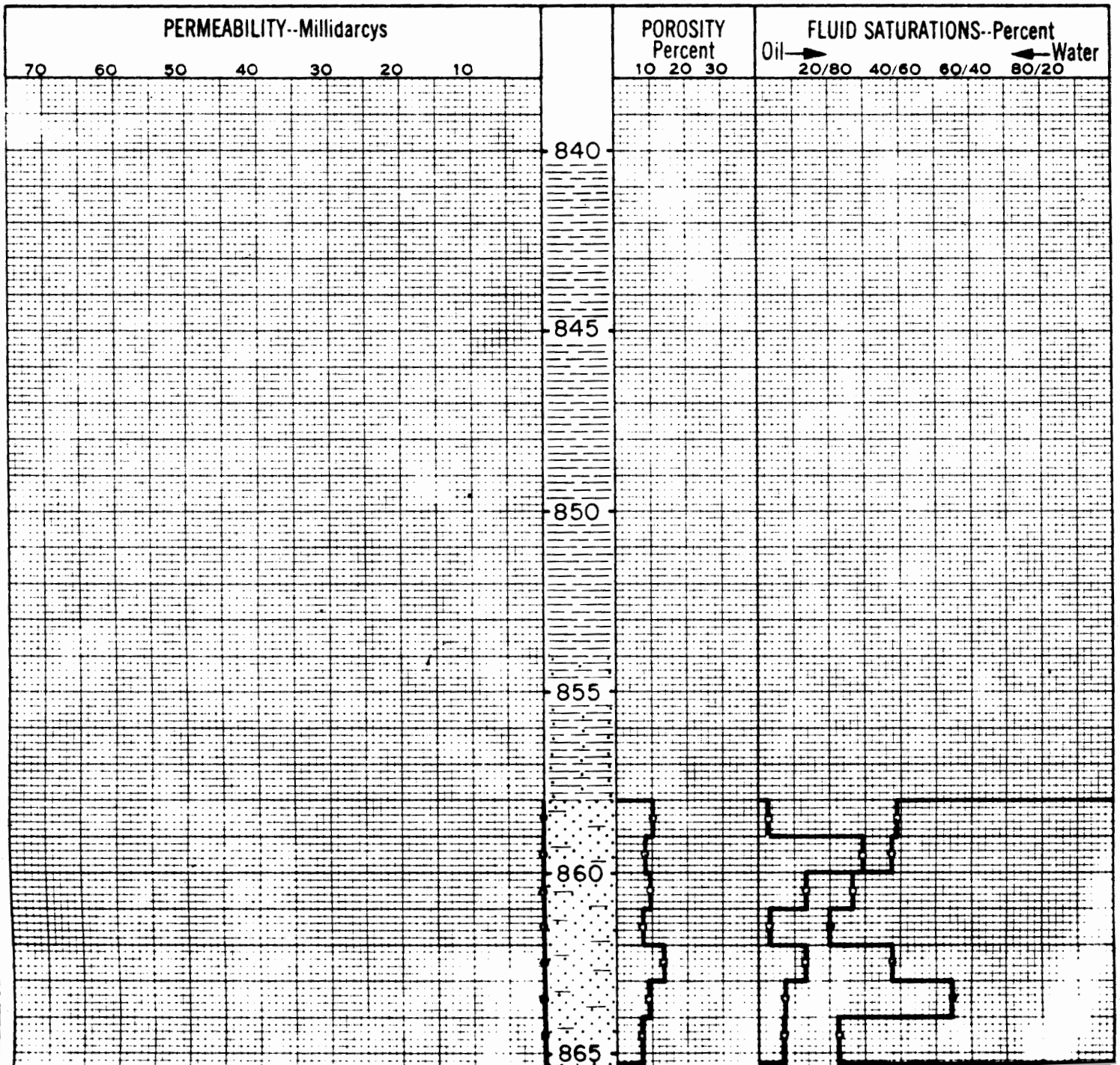
WELL M. S. Brecheisen – Core Test No. 1 DATE CORED May 17, 1959 ELEV. 1037' G L

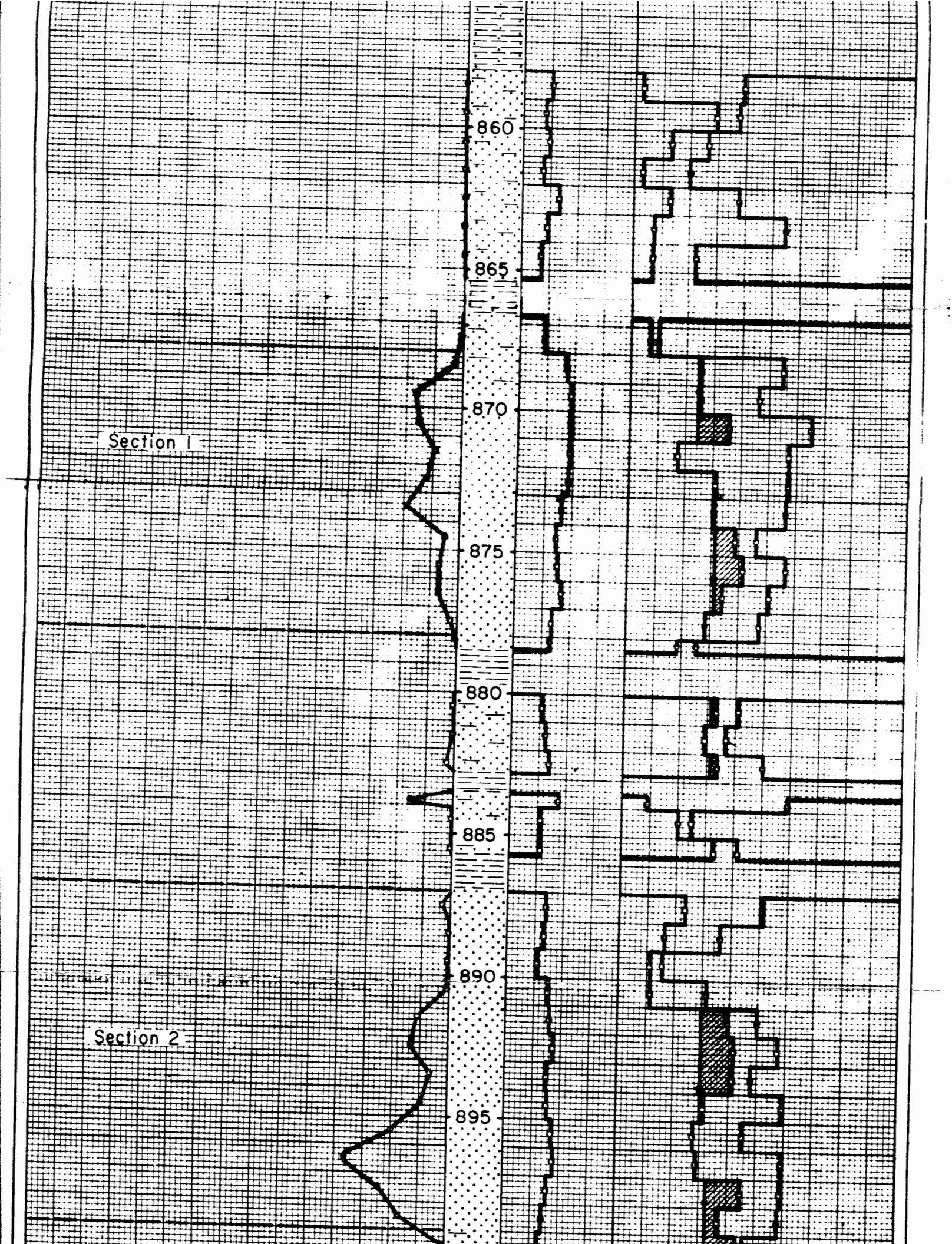
FIELD Regular TYPE OF CORE Diamond 2"

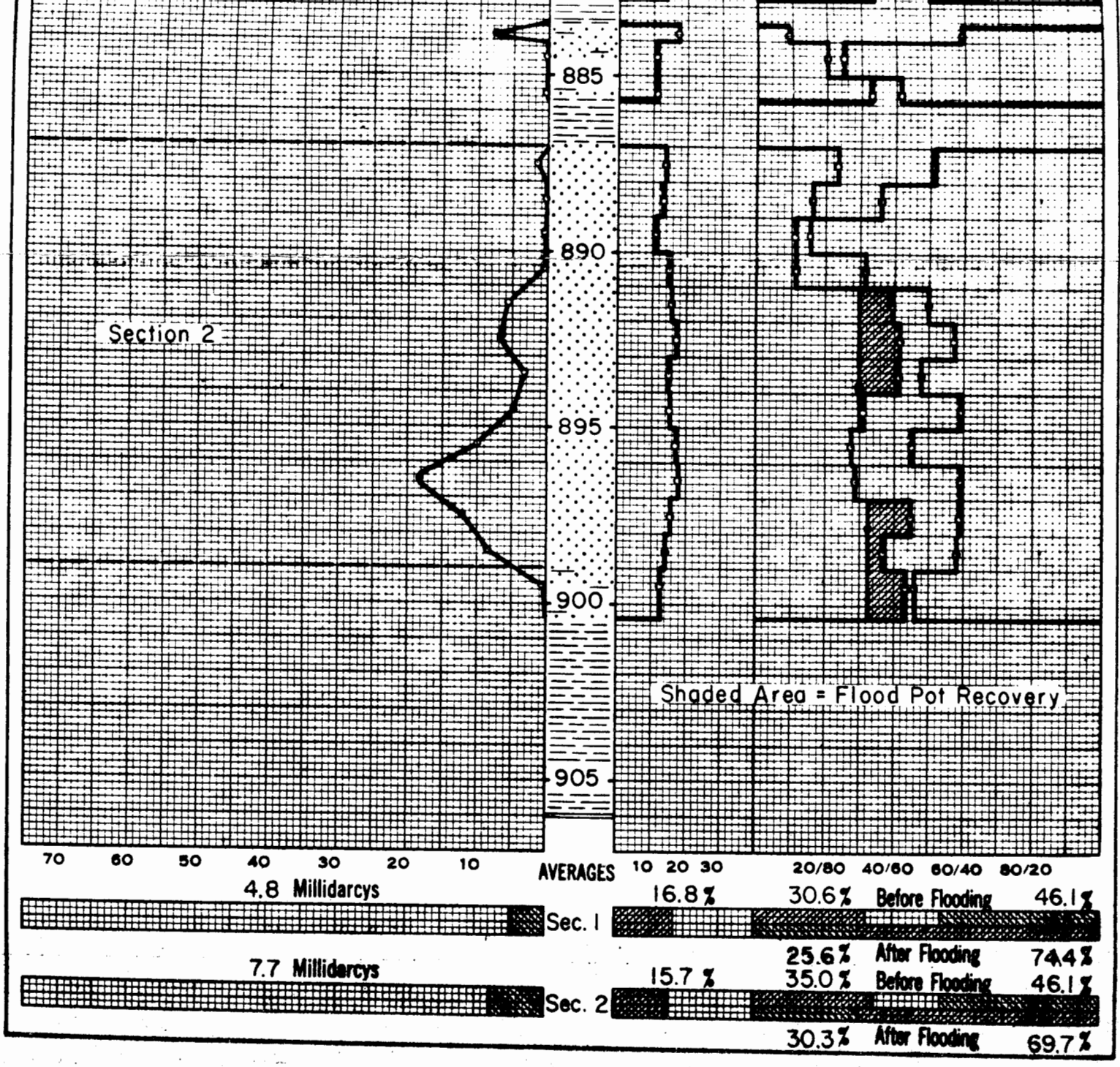
COUNTY Anderson STATE Kansas DRLG. FLUID Water Base Mud

LOCATION 2050' FWL, 635' FNL of SW 1/4 FORMATION Squirrel Sandstone

of Sec. 5, T-23-S, R-18-E. INTERVAL CORED: 840.0' TO 906.0'




860
865
870
875
880
885
890
895
Section 1
Section 2


885
890
895
900
905
Section 2
Shaded Area = Flood Pot Recovery
70 60 50 40 30 20 10
AVERAGES
10 20 30 20/80 40/60 60/40 80/20
4.8 Millidarcys
Sec. 1
16.8 %
30.6 %
Before Flooding
46.1 %
25.6 %
After Flooding
74.4 %
7.7 Millidarcys
Sec. 2
15.7 %
35.0 %
Before Flooding
46.1 %
30.3 %
After Flooding
69.7 %