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CORE LABORATORIES, INC.
Petroleum Reservoir Engineering
DALLAS, TEXAS

CORE ANALYSIS REPORT

FOR

BWAB, INC.

CHANEY NO. 27-33 WELL
CHANEY FIELD
KIMBALL COUNTY, NEBRASKA

CODELL
CORE

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Petroleum Reservoir Engineering

DALLAS, TEXAS

BWAB, INC.
CHANEY NO. 27-33 WELL
CHANEY FIELD
KIMBALL COUNTY, NEBRASKA

DATE ON : 18-MAY-83 OFF: 24-MAY-83
FORMATION : CONIACIAN-TURONIAN CODELL
DRLG. FLUID: WATER BASE MUD
LOCATION : NW SE SEC. 27-T13N-R57W

FILE NO : 3806-7141
LABORATORY: AURORA
ANALYSTS : MJ:JN:FD
ELEVATION : 5157 GL

CONVENTIONAL CORE ANALYSIS--BOYLE'S LAW POROSITY

SAMPLE NUMBER	DEPTH FEET	PERM MD MAX Ka	He POR	OIL% PORE	WTR% PORE	GRAIN DEN	DESCRIPTION
	6353.0-73.0						SHALE - NO ANALYSIS
1	6373.0-74.0	0.02	8.7	0.0	74.3	2.63	SAND GRAY VF V SHALY ARG
2	6374.0-75.0	0.13	8.2	2.0	73.7	2.63	SAND GRAY VF V SHALY ARG
3	6375.0-76.0	0.07	8.4	1.9	75.3	2.63	SAND GRAY VF V SHALY ARG
4	6376.0-77.0	0.12	10.4	1.6	72.9	2.66	SAND GRAY VF V SHALY ARG PYR
5	6377.0-78.0	0.07	8.9	4.6	73.8	2.63	SAND GRAY VF V SHALY ARG
6	6378.0-79.0	0.04	10.2	0.7	72.6	2.64	SAND GRAY VF V SHALY ARG
7	6379.0-80.0	0.04	10.5	0.8	75.0	2.64	SAND GRAY VF V SHALY ARG
8	6380.0-81.0	0.05	11.2	0.8	75.2	2.64	SAND GRAY VF V SHALY ARG
9	6381.0-82.0	0.08	11.9	1.3	69.8	2.64	SAND GRAY VF V SHALY ARG
10	6382.0-83.0	0.06	10.2	1.5	70.8	2.63	SAND GRAY VF V SHALY ARG
11	6383.0-84.0	0.11	11.1	1.5	73.1	2.63	SAND GRAY VF V SHALY ARG
12	6384.0-85.0	0.06	10.3	1.5	73.8	2.63	SAND GRAY VF V SHALY ARG
13	6385.0-86.0	0.15	13.6	10.4	66.1	2.65	SAND GRAY VF V SHALY ARG
14	6386.0-87.0	0.11	12.2	10.1	65.8	2.63	SAND GRAY VF V SHALY ARG
15	6387.0-88.0	0.10	12.0	14.0	62.6	2.63	SAND GRAY VF V SHALY ARG
16	6388.0-89.0	0.19	12.9	19.1	52.2	2.64	SAND GRAY VF V SHALY ARG
17	6389.0-90.0	0.12	13.6	16.7	52.5	2.69	SAND GRAY VF ARG
18	6390.0-91.0	0.14	13.5	20.3	48.1	2.67	SAND GRAY VF ARG
19	6391.0-92.0	0.18	14.1	19.6	46.5	2.65	SAND GRAY VF ARG
20	6392.0-93.0	0.19	14.2	20.9	45.4	2.65	SAND GRAY VF ARG
21	6393.0-94.0	0.57	11.7	20.0	47.5	2.62	SAND GRAY VF SHALY ARG
22	6394.0-95.0	0.26	16.3	19.8	52.7	2.64	SAND GRAY VF ARG
	6395.0- 5.0						SHALE - NO ANALYSIS
23	6405.0- 6.0	0.05	6.1	2.2	53.7	2.64	SAND GRAY VF V SHALY ARG
	6406.0-14.0						SHALE - NO ANALYSIS

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DALLAS, TEXAS

BWAB, INC.
CHANEY NO. 27-33 WELL

DATE : 18-MAY-83
FORMATION : CONIACIAN-TURONIAN CODELL

FILE NO. : 3806-7141
ANALYSTS : MJ:JN:FD

*** CORE SUMMARY AND CALCULATED RECOVERABLE OIL ***

DEPTH INTERVAL: 6373.0 TO 6406.0

FEET OF CORE ANALYZED : 23.0 FEET OF CORE INCLUDED IN AVERAGES: 23.0

-- SAMPLES FALLING WITHIN THE FOLLOWING RANGES WERE AVERAGED --

PERMEABILITY HORZONTAL RANGE (MD.)	:	0.00	TO 1.0	(UNCORRECTED FOR SLIPPAGE)
HELIUM POROSITY RANGE (%)	:	5.0	TO 100.0	
OIL SATURATION RANGE (%)	:	0.0	TO 21.0	
WATER SATURATION RANGE (%)	:	45.0	TO 76.0	

SHALE SAMPLES EXCLUDED FROM AVERAGES.

AVERAGE PERMEABILITY (MILLIDARCIES)			
ARITHMETIC PERMEABILITY	:	0.13	
GEOMETRIC PERMEABILITY	:	0.10	
HARMONIC PERMEABILITY	:	0.08	
PRODUCTIVE CAPACITY (MILLIDARCY-FEET)			
ARITHMETIC CAPACITY	:	2.9	
GEOMETRIC CAPACITY	:	2.2	
HARMONIC CAPACITY	:	1.7	
AVERAGE POROSITY (PERCENT)	:	11.3	
AVERAGE RESIDUAL OIL SATURATION (PERCENT OF PORE SPACE)	:	9.6	
AVERAGE TOTAL WATER SATURATION (PERCENT OF PORE SPACE)	:		62.7
AVERAGE CONNATE WATER SATURATION (PERCENT OF PORE SPACE)	:	(E)	35.0
OIL GRAVITY (API)	:	(E)	40.0
ORIGINAL FORMATION VOLUME FACTOR (BBLS SATURATED OIL/STOCK-TANK BBL)	:	(E)	1.30
ORIGINAL STOCK-TANK OIL IN PLACE (BARRELS PER ACRE-FOOT)	:	(C)	439.

INTERPRETATION OF DATA

6385.0-6395.0 OIL PRODUCTIVE

(C) CALCULATED (E) ESTIMATED (M) MEASURED (*) REFER TO ATTACHED LETTER.

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PERMEABILITY VS POROSITY

COMPANY: BWAB, INC. WELL : CHANEY NO. 27-33 WELL
FIELD : CHANEY FIELD COUNTY, STATE: KIMBALL COUNTY, NEBRASKA

AIR PERMEABILITY : MD - HORIZONTAL (UNCORRECTED FOR SLIPPAGE)
POROSITY : PERCENT (HELIUM)

DEPTH INTERVAL	RANGE & SYMBOL	PERMEABILITY MINIMUM	PERMEABILITY MAXIMUM	POROSITY MIN.	POROSITY MAX.	POROSITY AVERAGE	PERMEABILITY AVERAGES ARITHMETIC	HARMONIC	GEOMETRIC
6373.0 - 6406.0	1 (+)	0.001	1.0	5.0	17.0	11.3	0.13	0.08	0.10

EQUATION OF REDUCED LINE RELATING PERMEABILITY(K) TO POROSITY :
LOG(K) = (SLOPE)(POROSITY) + LOG OF INTERCEPT
K = ANTILOG((SLOPE)(POROSITY) + LOG OF INTERCEPT)

RANGE	EQUATION OF THE LINE
1	PERM = ANTILOG((0.1330)(POROSITY) + -2.5167)

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Petroleum Reservoir Engineering
DALLAS, TEXAS

STATISTICAL DATA FOR POROSITY AND PERMEABILITY HISTOGRAM

COMPANY: BWAB, INC.
FIELD : CHANEY FIELD
WELL : CHANEY NO. 27-33 WELL
COUNTY, STATE: KIMBALL COUNTY, NEBRASKA

AIR PERMEABILITY : MD. (HORIZONTAL) RANGE USED 0.001 TO 1.
POROSITY : PERCENT (HELIUM) RANGE USED 5.0 TO 46.0

(PERMEABILITY UNCORRECTED FOR SLIPPAGE)

DEPTH LIMITS : 6373.0 - 6406.0 INTERVAL LENGTH : 33.0
FEET ANALYZED IN ZONE : 23.0 LITHOLOGY EXCLUDED : NONE

DATA SUMMARY

POROSITY	PERMEABILITY AVERAGES		
AVERAGE	ARITHMETIC	HARMONIC	GEOMETRIC
11.3	0.13	0.08	0.10

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STATISTICAL DATA FOR POROSITY AND PERMEABILITY HISTOGRAM

COMPANY: BWAB, INC. WELL : CHANEY NO. 27-33 WELL
FIELD : CHANEY FIELD COUNTY, STATE: KIMBALL COUNTY, NEBRASKA

GROUPING BY POROSITY RANGES

POROSITY RANGE	FEET IN RANGE	AVERAGE POROSITY	AVERAGE PERM. (GEOM.)	AVERAGE PERM. (ARITH)	FREQUENCY (PERCENT)	CUMULATIVE FREQUENCY (%)
6.0 - 8.0	1.0	6.1	0.050	0.050	4.3	4.3
8.0 - 10.0	4.0	8.6	0.060	0.072	17.4	21.7
10.0 - 12.0	9.0	10.8	0.082	0.126	39.1	60.9
12.0 - 14.0	6.0	13.0	0.132	0.135	26.1	87.0
14.0 - 16.0	2.0	14.2	0.185	0.185	8.7	95.7
16.0 - 18.0	1.0	16.3	0.260	0.260	4.3	100.0

TOTAL NUMBER OF FEET = 23.0

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STATISTICAL DATA FOR POROSITY AND PERMEABILITY HISTOGRAM

COMPANY: BWAB, INC. WELL : CHANEY NO. 27-33 WELL
FIELD : CHANEY FIELD COUNTY, STATE: KIMBALL COUNTY, NEBRASKA

GROUPING BY PERMEABILITY RANGES

PERMEABILITY RANGE	FEET IN RANGE	AVERAGE PERM. (GEOM.)	AVERAGE PERM. (ARITH)	AVERAGE POROSITY	FREQUENCY (PERCENT)	CUMULATIVE FREQUENCY (%)
0.020 - 0.039	1.0	0.020	0.020	8.7	4.3	4.3
0.039 - 0.078	8.0	0.054	0.055	9.5	34.8	39.1
0.078 - 0.156	9.0	0.116	0.118	11.8	39.1	78.3
0.156 - 0.312	4.0	0.203	0.205	14.4	17.4	95.7
0.312 - 0.625	1.0	0.570	0.570	11.7	4.3	100.0

TOTAL NUMBER OF FEET = 23.0

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Petroleum Reservoir Engineering
DALLAS, TEXAS

STATISTICAL DATA FOR POROSITY AND PERMEABILITY HISTOGRAM

COMPANY: BWAB, INC.
FIELD : CHANEY FIELD

WELL : CHANEY NO. 27-33 WELL
COUNTY, STATE: KIMBALL COUNTY, NEBRASKA

POROSITY-FEET OF STORAGE CAPACITY LOST FOR SELECTED POROSITY CUT OFF

POROSITY CUT OFF	FEET LOST	CAPACITY LOST (%)	FEET REMAINING	CAPACITY REMAINING (%)	ARITH MEAN	MEDIAN
0.0	0.0	0.0	23.0	100.0	11.3	11.4
2.0	0.0	0.0	23.0	100.0	11.3	11.4
4.0	0.0	0.0	23.0	100.0	11.3	11.4
6.0	0.0	0.0	23.0	100.0	11.3	11.4
8.0	1.0	2.3	22.0	97.7	11.6	11.6
10.0	5.0	15.5	18.0	84.5	12.2	12.0
12.0	14.0	53.0	9.0	47.0	13.6	
14.0	20.0	82.9	3.0	17.1	14.9	
16.0	22.0	93.7	1.0	6.3	16.3	
18.0	23.0	100.0	0.0	0.0		

TOTAL STORAGE CAPACITY IN POROSITY-FEET = 260.2

at ft at 12%
122.29 ø/h

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STATISTICAL DATA FOR POROSITY AND PERMEABILITY HISTOGRAM

COMPANY: BWAB, INC.
FIELD : CHANEY FIELD
WELL : CHANEY NO. 27-33 WELL
COUNTY, STATE: KIMBALL COUNTY, NEBRASKA

MILLIDARCY-FEET OF FLOW CAPACITY LOST FOR SELECTED PERMEABILITY CUT OFF

PERMEABILITY CUT OFF	FEET LOST	CAPACITY LOST (%)	FEET REMAINING	CAPACITY REMAINING (%)	GEOM MEAN	MEDIAN
0.005	0.0	0.0	23.0	100.0	0.10	0.09
0.010	0.0	0.0	23.0	100.0	0.10	0.09
0.020	0.0	0.0	23.0	100.0	0.10	0.09
0.039	1.0	0.7	22.0	99.3	0.10	0.10
0.078	9.0	15.8	14.0	84.2	0.15	
0.156	18.0	52.2	5.0	47.8	0.25	
0.312	22.0	80.4	1.0	19.6	0.57	
1.	23.0	100.0	0.0	0.0		

TOTAL FLOW CAPACITY IN MILLIDARCY-FEET(ARITHMETIC) = 2.91

.12 md

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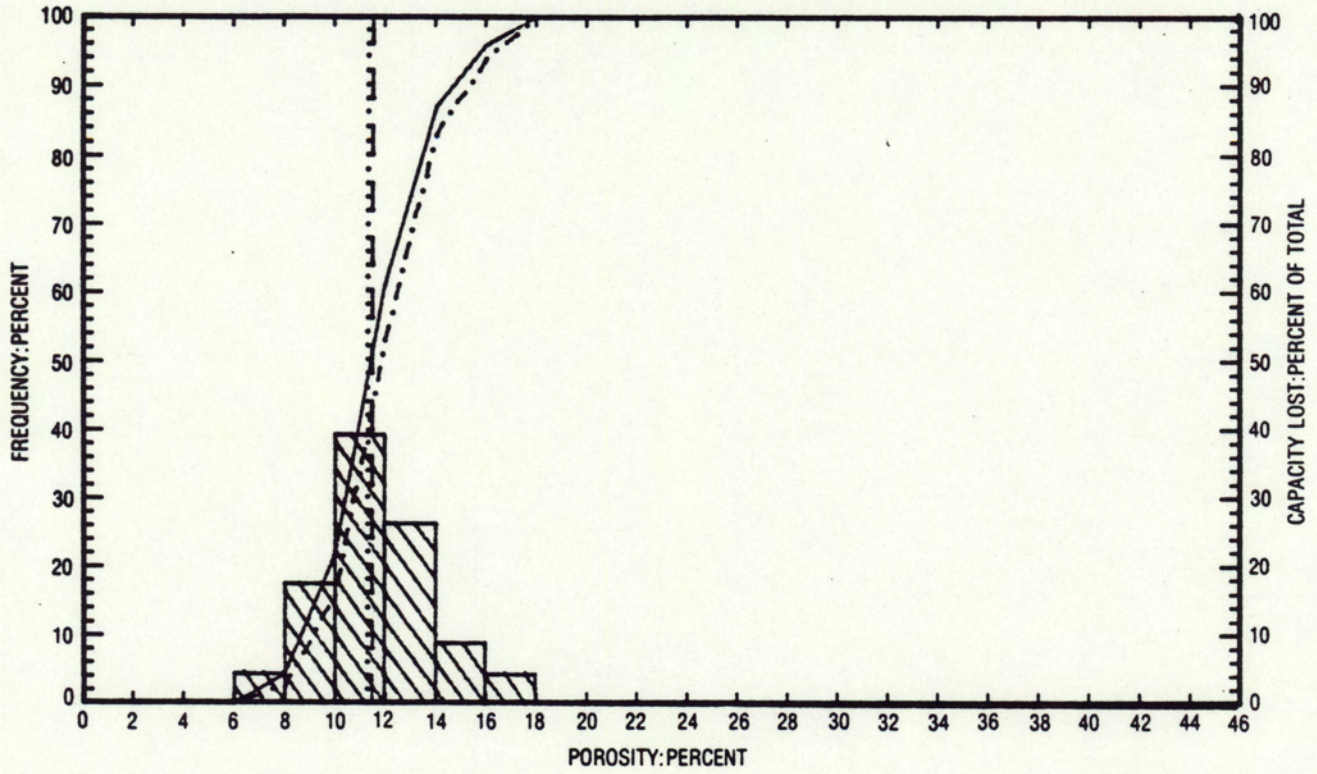

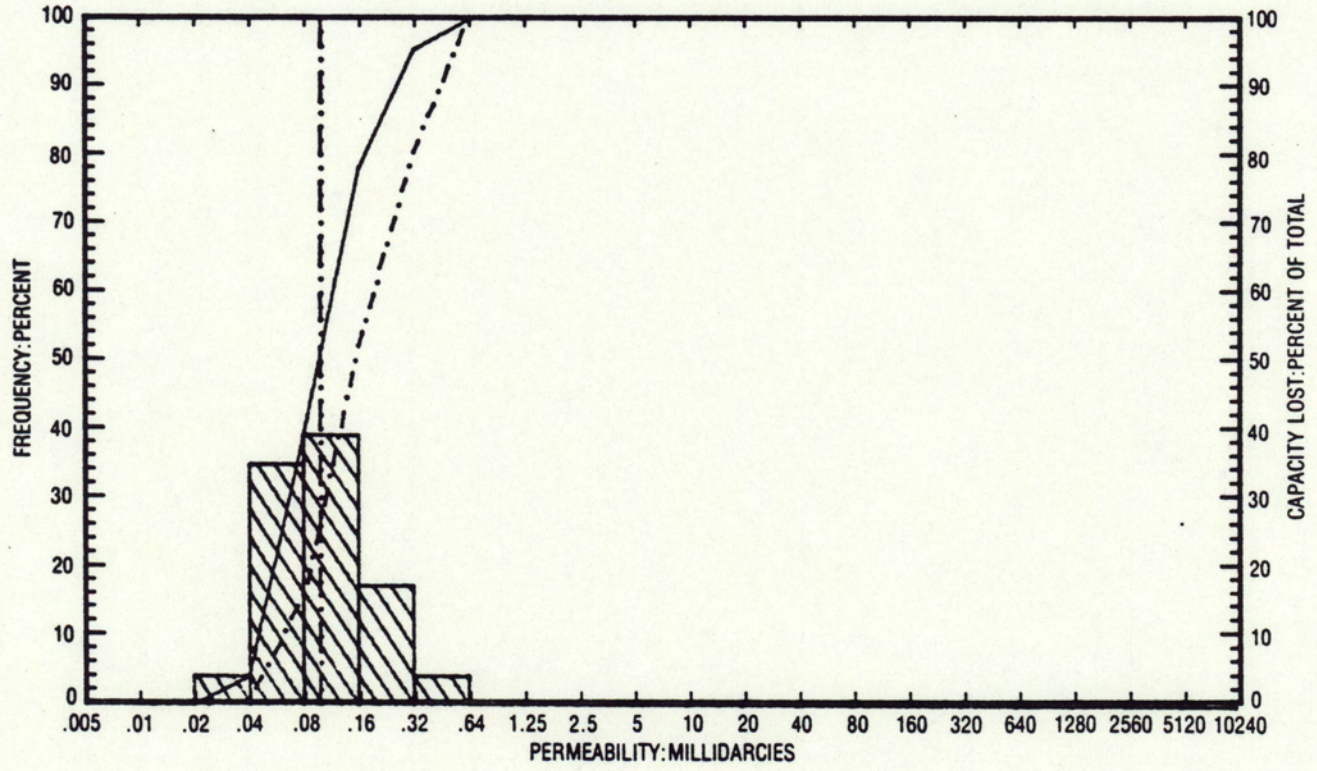

PERMEABILITY AND POROSITY HISTOGRAMS

BWAB, INC.
CHANEY NO. 27-33 WELL
CHANEY FIELD
KIMBALL COUNTY, NEBRASKA

LEGEND

- ARITHMETIC MEAN POROSITY
- GEOMETRIC MEAN PERMEABILITY
- MEDIAN VALUE
- CUMULATIVE FREQUENCY
- CUMULATIVE CAPACITY LOST

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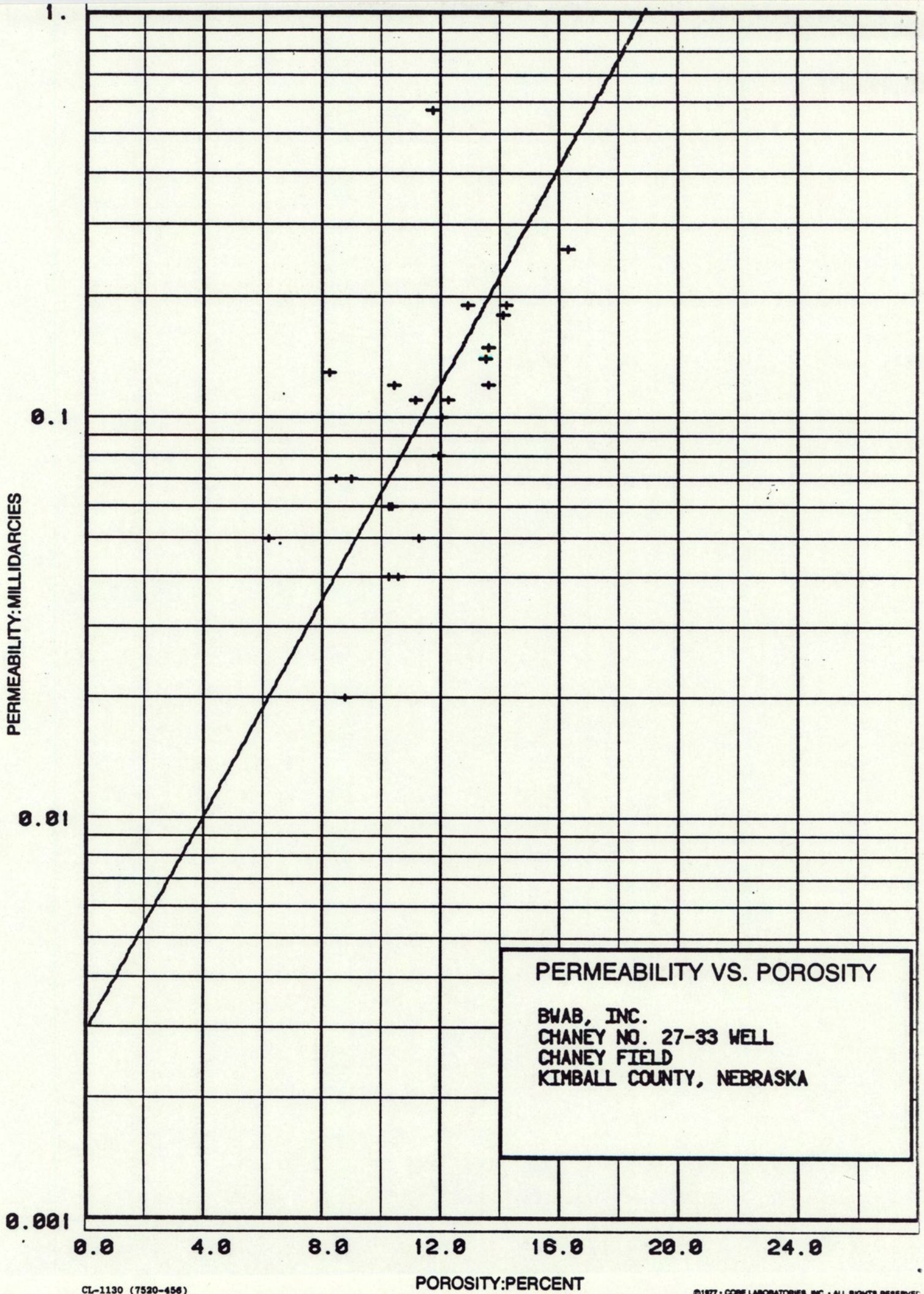

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COMPANY BWAB, INC FILE NO. 3806-7141

WELL CHANEY NO. 27-33 WELL DATE 18-MAY-83 ENGRS. MJ:JN:FD

FIELD CHANEY FORMATION CONTACIAN-TURONIAN ELEV. 5157 GL

COUNTY KIMBALL STATE NEBRASKA DRLG. FLD. WATER BASE MUD CORES

CoRes Log

CORE and RESISTIVITY EVALUATION

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RESISTIVITY PARAMETERS: a = 1.00 m = 2.00 n = 2.00 . Depths 6373.0 to 6406.0 .

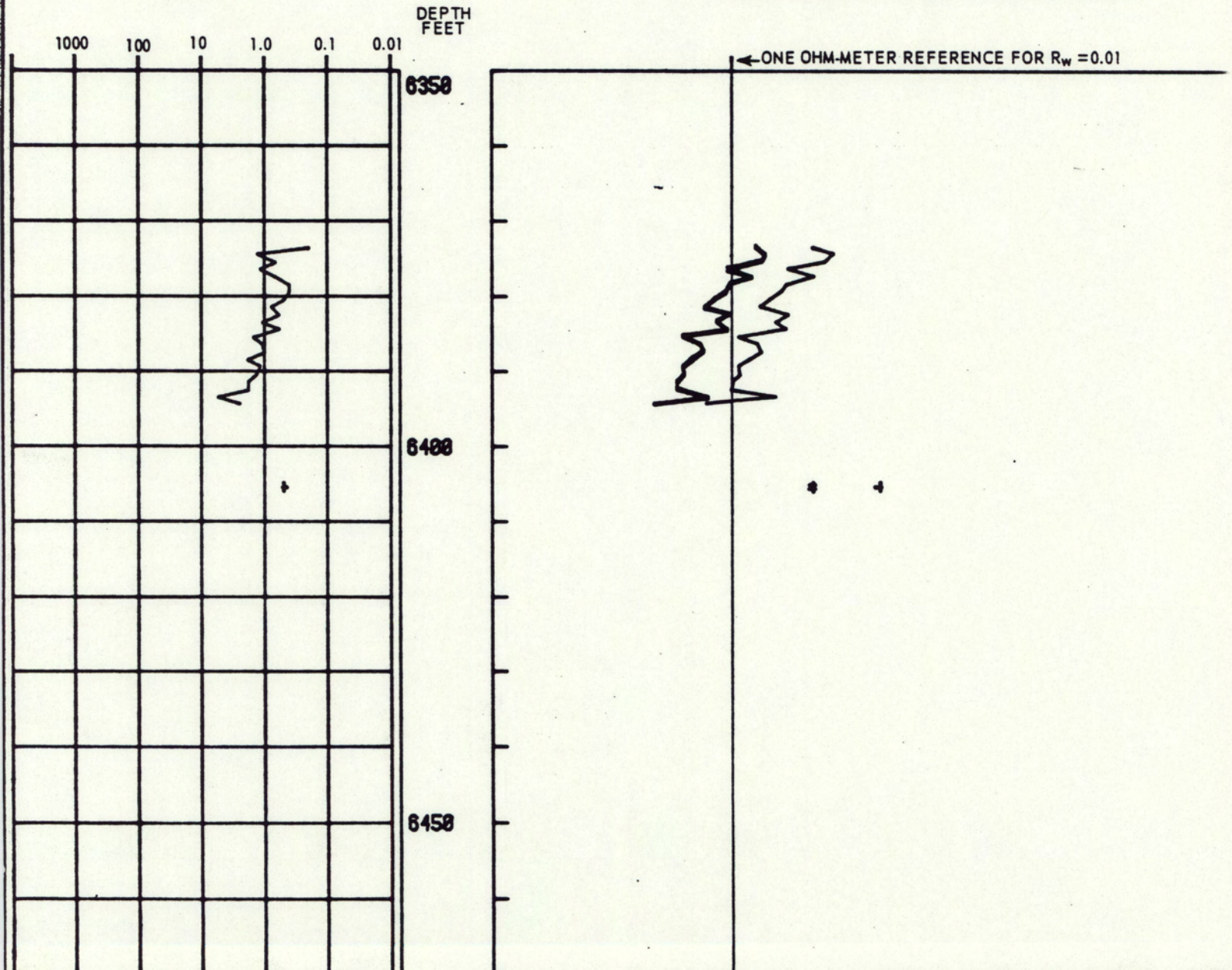
a = _____ m = _____ n = _____ . Depths _____ to _____ .

PERMEABILITY
MILLIDARCIES

CORE ANALYSIS CALCULATED RESISTIVITY

R_o = OHM-METERS AT 100% S_w _____

R_{mp} = OHM-METERS AT CRITICAL S_w _____



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COMPANY BWAB, INC.
WELL CHANEY NO. 27-33
FIELD CHANEY
COUNTY KIMBALL STATE NEBRASKA
LOCATION NW SE SEC. T13N-R57E

FILE NO. 3806-7141
DATE 18-MAY-83
FORMATION CONIACIAN-TURONIAN
ELEV. 5157 GL
DRLG. FLD. WATER BASE MUD
CORES

CORRELATION COREGRAPH

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VERTICAL SCALE: 5" = 100'

Gamma Ray
RADIATION INCREASE →

Permeability
MILLIDARCIES
100 10 1.0 .1

Depth Feet
6350
6400

Porosity
PERCENT
30 20 10 0

Total Water
PERCENT PORE SPACE
100 80 60 40 20 0

Oil Saturation
PERCENT PORE SPACE
0 20 40 60 80 100

CORRELATION COREGRAPH

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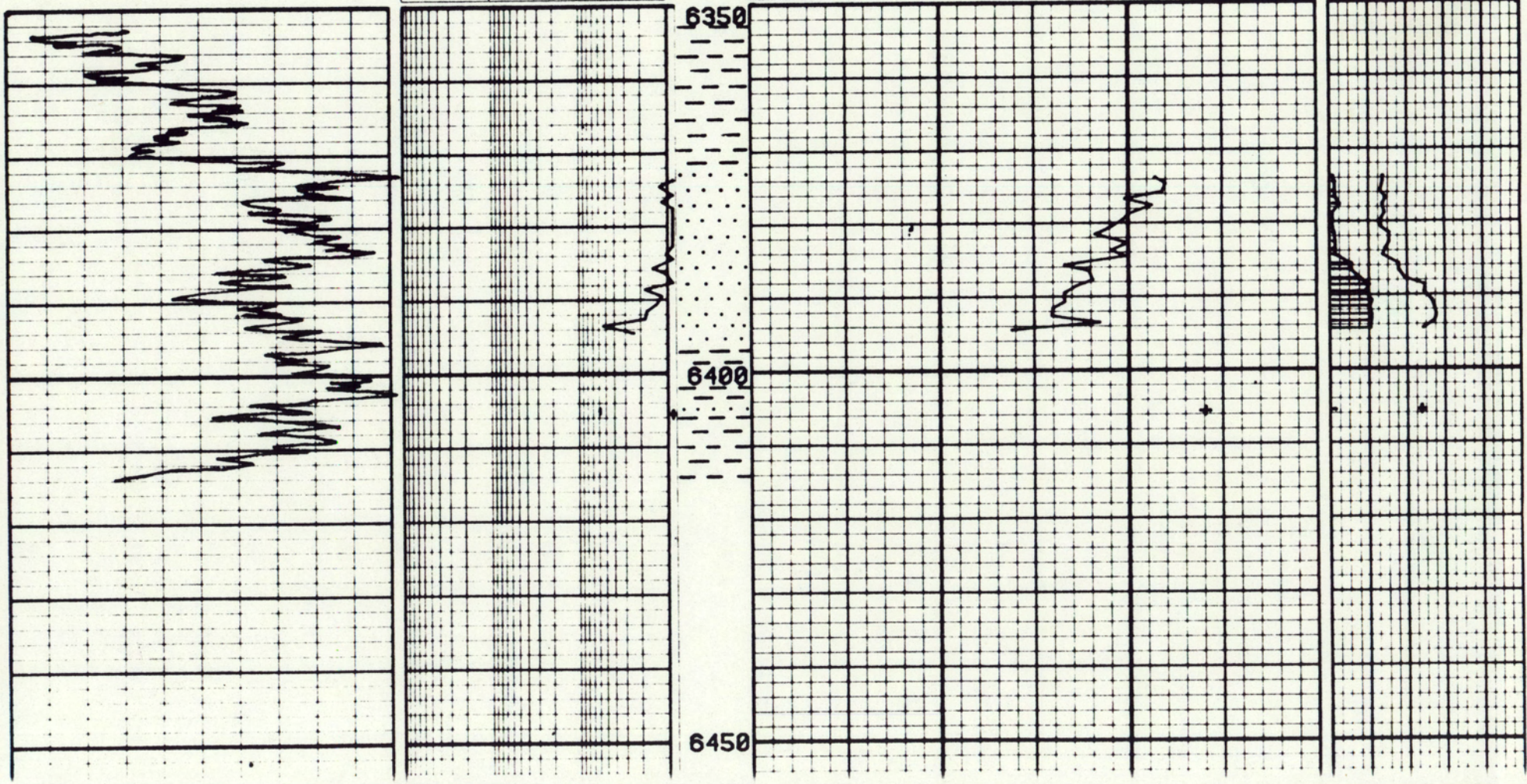
VERTICAL SCALE: 5" = 100'

Total Water ____
PERCENT PORE SPACE
100 80 60 40 20 0

Gamma Ray
RADIATION INCREASE →

Permeability ____
MILLIDARCIES
100 10 1.0 .1

Depth Feet
6350
6400
6450

Porosity ____
PERCENT
30 20 10 0

Oil Saturation
PERCENT PORE SPACE
0 20 40 60 80 100