KANSAS GEOLOGICAL SURVEY
OPEN-FILE REPORT 78-8

PETROLOGIC ANALYSIS OF NIOBRARA CHALK, NEITZEL 1-28, WALZ B1-33, AND CARTER 1-22, CHEYENNE COUNTY, KANSAS

by

Laurel Babcock

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1930 Constant Avenue
University of Kansas
Lawrence, KS 66047-3726

Amoco Production Company

Tulsa, Oklahoma
February 13, 1978

File: Technical Service 5107SJ

Dan Hartmann
Denver Division

Subject: Petrologic Analysis of Niobrara Chalk, Neitzel 1-28, Walz B1-33, and Carter 1-22, Cheyenne County, Kansas.

X-ray analysis and SEM photographs of these samples have been completed and the results are enclosed with this memo. Thin sections are being prepared and will be sent when ready.

The x-ray data (Table 1) show that most of the samples are fairly pure chalks, consisting mainly of calcite. The most common impurities are quartz, clay (illite, kaolinite) and pyrite. Sample 1 from the Carter well is a black shale and consequently high in clay.

Figures 1-5 are representative of the samples chosen for SEM photography. For the most part, the samples are clean, coccolith-rich chalks with little evidence of solution or tight cementation. More impure samples (Figures 3 and 5) contain fewer coccoliths and exhibit very fine flakes of clay.

The porosities, permeabilities, grain densities, and mercury injection curves measured by Routine Testing and Analysis are enclosed. Inasmuch as the grain densities are anomalously low for carbonates, the porosities should probably be considered as minimum figures, and may actually be somewhat higher.

Laurel Babcock

Laurel Babcock

LB:km
1174

cc: H. D. Winland
D. L. Boyne/J. L. Severson

TABLE 1. X-RAY DIFFRACTION MINERAL PERCENTAGES

LOCALITY Murphin 1-28 Neitzel, Cheyenne Co., Kansas

FORMATION Niobrara AGE T. S. NO. 5108 SJ

SAMPLE IDENTIFICATION NUMBER	QUARTZ	FELDSPAR	CALCITE	DOLOMITE	SIDERITE	ANHYDRITE	GYPSUM	PYRITE	BARITE	KAOLINITE	ILLITE	CHLORITE	MONTMORILLONITE	MIXED LAYER ILLITE/MONT.	MIXED LAYER CHLORITE/MONT.						
1 1275'	3	TR	95				TR	1		1	TR										10
2 1277'	2		98				TR	TR		TR											10
3 1279'	2		98				TR	TR		TR											1
4 1285'	2	TR	93				1	3		1											10
5 1287'	6	1	88					5													1
6 1291'	3	TR	93					4		TR											10
7 1293'	3	TR	92				1	2		2											10
8 1306'	7	TR	89				1	3													10
9 1318'	11	TR	85				TR	4													10
10 1325'	11	TR	77	TR			TR	3		2	7										10
11 1330'	7	1	83	TR				4		2	3										10

TR = < 1.0 %

X-RAY DIFFRACTION MINERAL PERCENTAGES

LOCALITY Murphin B1-33 Walz, Cheyenne Co., Kansas

FORMATION Niobrara AGE T. S. NO. 5108 SJ

SAMPLE IDENTIFICATION NUMBER	QUARTZ	FELDSPAR	CALCITE	DOLOMITE	SIDERITE	ANHYDRITE	GYPSUM	PYRITE	BARITE	KAOLINITE	ILLITE	CHLORITE	MONTMORILLONITE	MIXED LAYER ILLITE/MONT.	MIXED LAYER CHLORITE/MONT.						TOTAL
1 1269'	28	TR	50	1			TR	3		3	15										100
2 1283'	13	TR	76	TR				3		2	6										100
4 1300'	2	TR	98				TR														100
6 1309'	3		97				TR														100
														TR =	<	1.0	%				

X-RAY DIFFRACTION MINERAL PERCENTAGES

LOCALITY Murphin 1-22 L. Carter, Cheyenne Co., Kansas

FORMATION Niobrara AGE T. S. NO. 5108 SJ

SAMPLE IDENTIFICATION NUMBER	QUARTZ	FELDSPAR	CALCITE	DOLOMITE	SIDERITE	ANHYDRITE	GYPSUM	PYRITE	BARITE	KAOLINITE	ILLITE	CHLORITE	MONTMORILLONITE	MIXED LAYER ILLITE/MONT.	MIXED LAYER CHLORITE/MONT.						TOTAL
1 1263'	51	4		TR				3		2	30	2	8								100
2 1269'	21	TR	59	1				3		2	14										100
3 1285'	12	TR	77	TR				3		TR	8										100
4 1292	6	TR	91					3													100
7 1303'	4	1	92					3													100

TR = < 1.0%

AMOCO PRODUCTION COMPANY
Research Department

CORE ANALYSIS SUMMARY

Well Murphin, Neitzel 1-28, Walz B1-33, Carter 1-22 Lab No. F-236
Field _____ Date Cored _____
Location Cheyenne County, Kansas Date Analyzed _____
Formation Analyzed Niobrara Elev. _____
Transmittal Letter by Dale Winland Date 2-2-78 File No. 5110X

CORING DATA

Type of Analysis Core Plug, Type A and Mercury Injection
Number of Samples 22

Remarks:

Explanatory Notes:

(1) Analysis could not be performed due to the physical nature of the sample as received; i.e., shattered, fractured, unconsolidated, or shale.

By Robert A. Sawyer Date 2-9-78

cc: J. L. Severson
H. D. Winland
W. S. Spaulding
W. W. Owens
W. E. Jenkins

Small Core

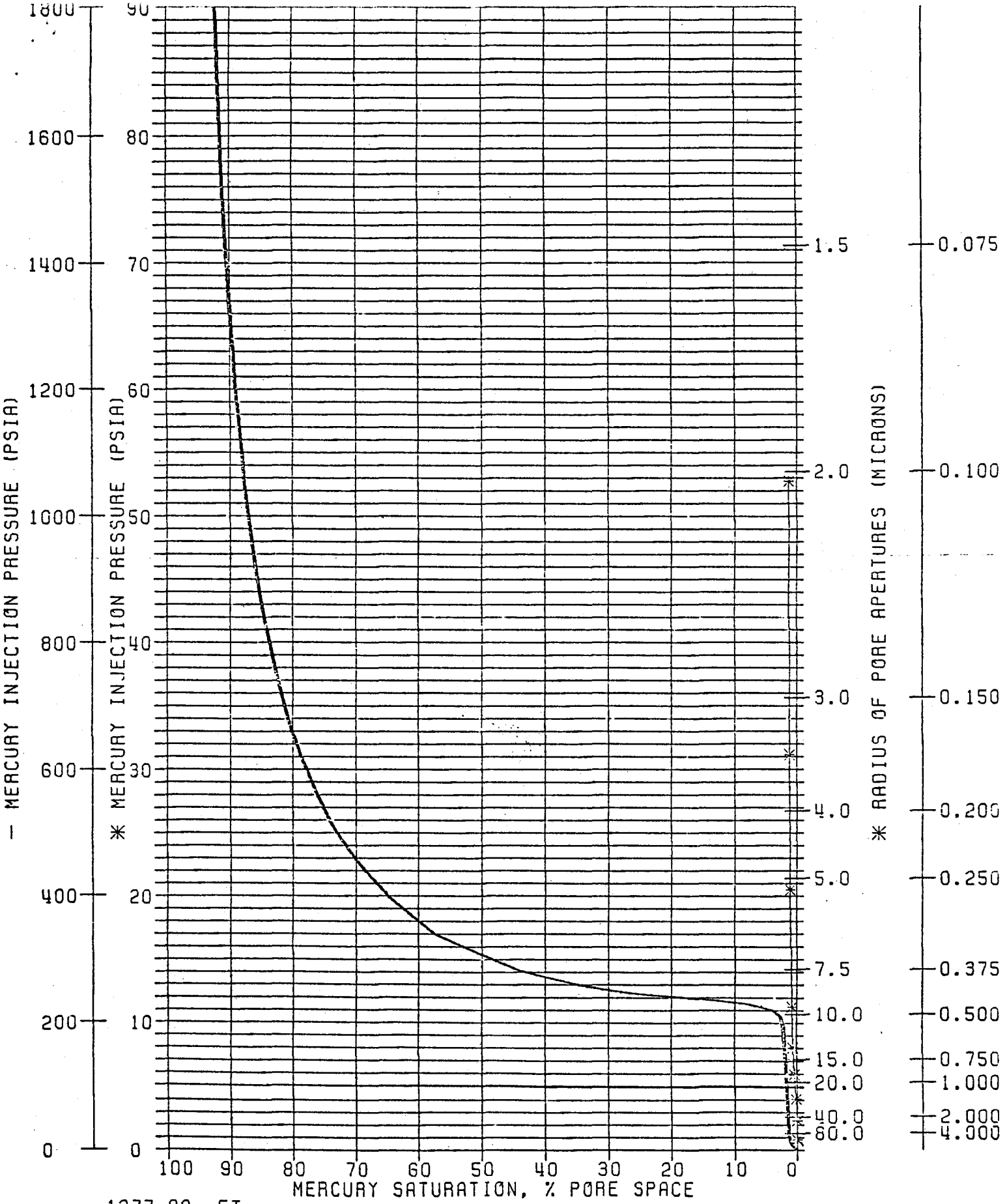
Lab No. F-236

Date

Core Analysis Data Record

Well 1-28, Bl-33, 1-22 Field State Kansas

Sample Number	Depth ft	Well & Lithologic Description	Permeability-md		Porosity %	Saturation - % PV		Grain Density gm/cc
			Horiz.	Vert.		Oil	Water	
		Neitzel 1-28						
A	1275	SN	9.36		43.4			2.66
B	1277	SN	16.1		44.7			2.65
C	1279	SN	11.0		41.3			2.67
D	1285	SN	5.90		41.8			2.64
E	1287	SN	2.18		38.4			2.63
F	1291	SN	2.03		41.3			2.62
G	1293	SN	5.98		41.5			2.61
H	1306	SN & SH	2.64		37.1			2.57
I	1318	SN	1.96		32.7			2.61
J	1325	SN	3.41		29.6			2.60
K	1330	SN	1.33		34.1			2.60
		Walz Bl-33						
L	1283	SN & SH	(1)		26.1			2.53
M	1293	SN	2.60		41.0			2.62
N	1300	SN	1.81		42.0			2.63
O	1307	SN	1.33		39.6			2.60
P	1309	SN	3.12		40.6			2.62
		L. Carter 1-22						
Q	1269	SN & SH	(1)		24.4			2.56
R	1285	SN	0.46		32.3			2.59
S	1292	SN	4.65		41.1			2.63
T	1296	SN	2.66		43.2			2.63
U	1299	SN	2.48		40.5			2.66
V	1303	SN	2.20		40.8			2.61



1277.00 FT.

POROSITY (%) =44.7 PERMEABILITY (MD) = 16.10

FORMATION: NIOBRARA

FIELD:

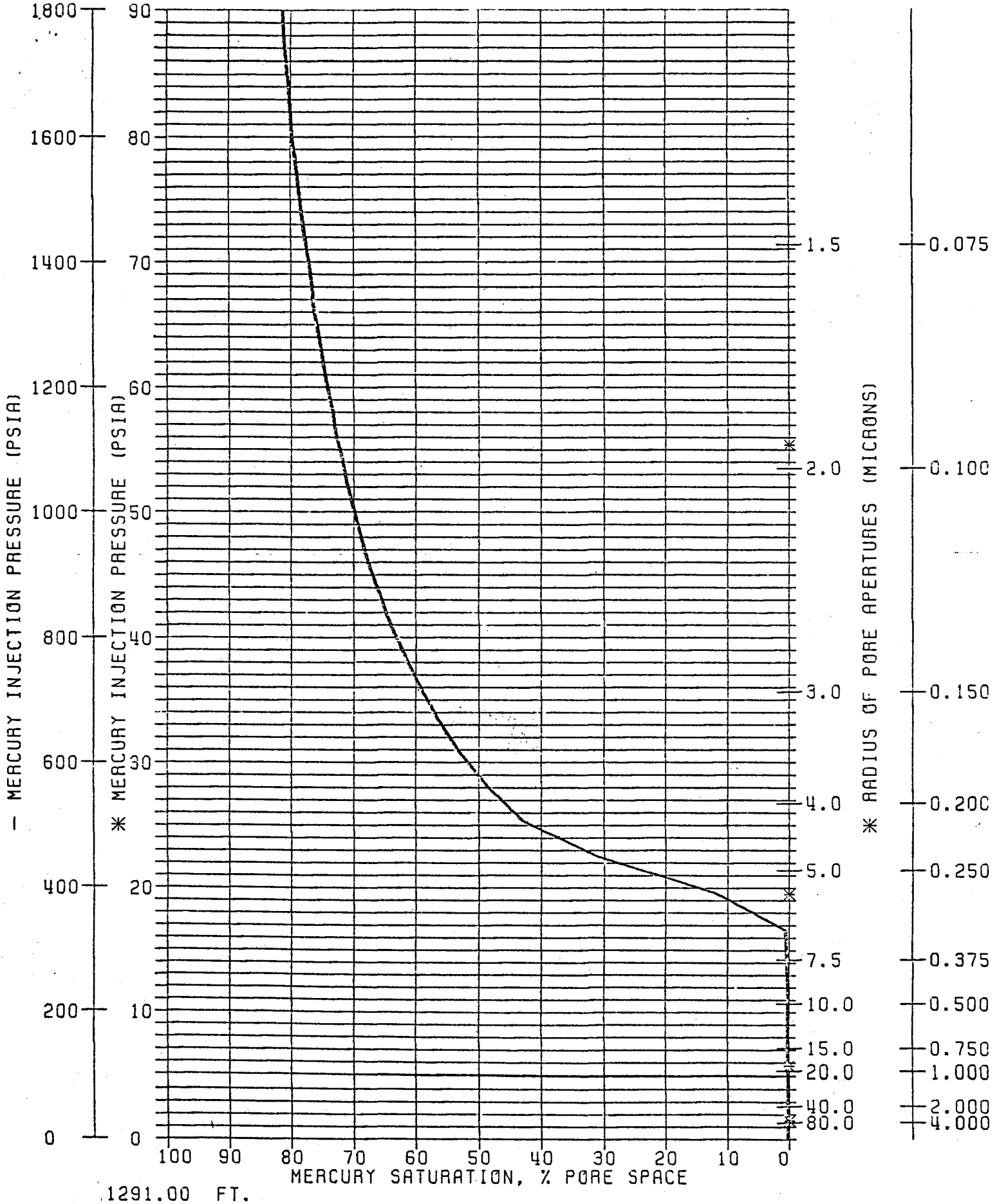
WELL: NEITZEL 1-28

LOCALITY: CHEYENNE CO., KANSAS

FEB 8,1978

LAB NO.: F-236

SAMPLE NO.: 8



1291.00 FT.

POROSITY (%) =41.3 PERMEABILITY (MD) = 2.03

FORMATION: NIOBRARA

FIELD:

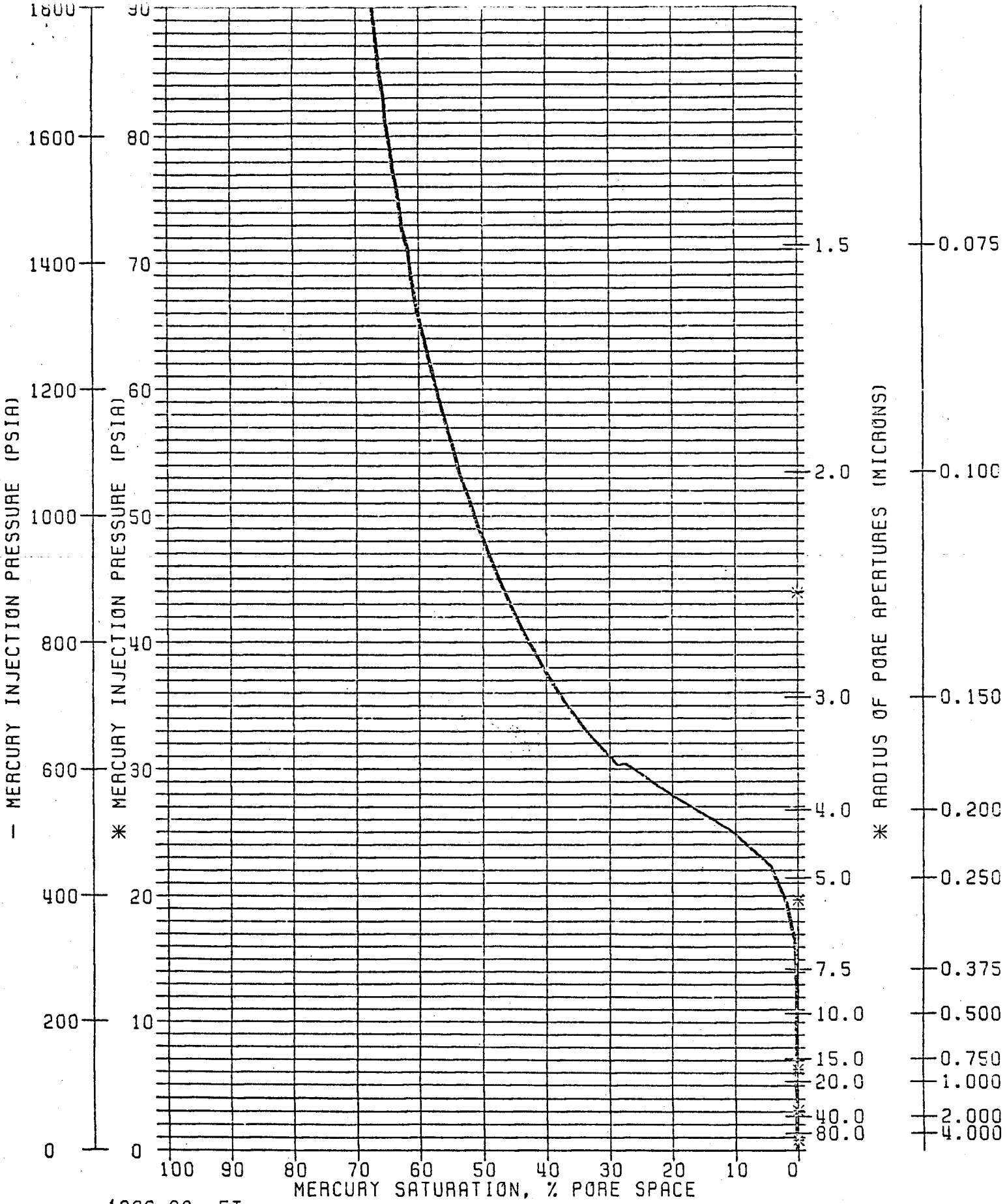
WELL: NEITZEL 1-28

LOCALITY: CHEYENNE CO., KANSAS

FEB 8,1978

LAB NO.: F-236

SAMPLE NO.: F



1306.00 FT.

POROSITY (%) =37.1 PERMEABILITY (MD) = 2.64

FORMATION: NIOBRARA

FIELD:

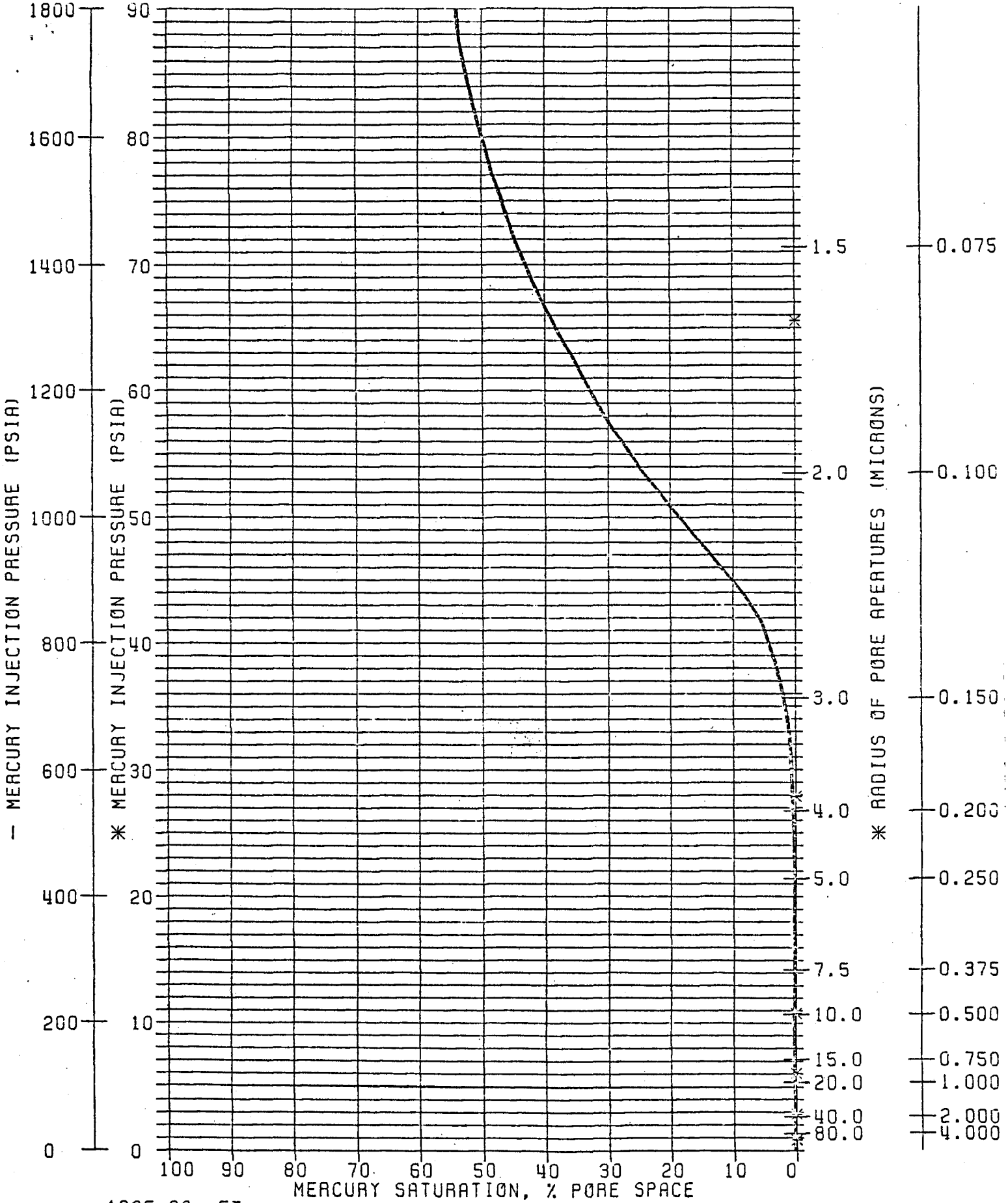
WELL: NEITZEL 1-28

LOCALITY: CHEYENNE CO., KANSAS

FEB 8,1978

LAB NO.: F-236

SAMPLE NO.: H



1325.00 FT.

POROSITY (%) =29.6 PERMEABILITY (MD) = 3.41

FORMATION: NIOBRARA

FIELD:

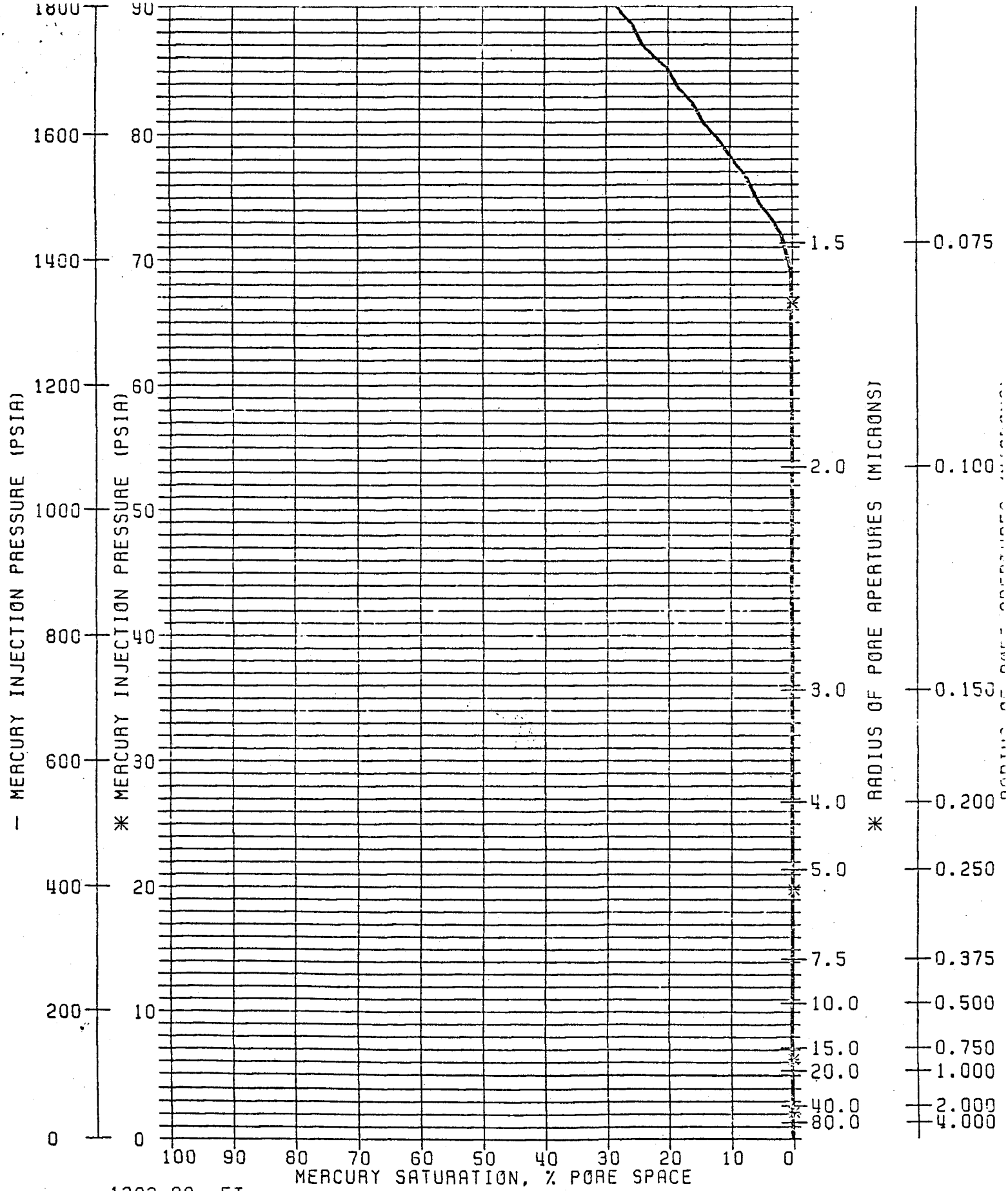
WELL: NEITZEL 1-28

LOCALITY: CHEYENNE CO., KANSAS

FEB 8,1978

LAB NO.:.F-236

SAMPLE NO.: J



1283.00 FT.

POROSITY (%) =26.1 PERMEABILITY (MD) = (1)

FORMATION: NIOBRARA

FIELD:

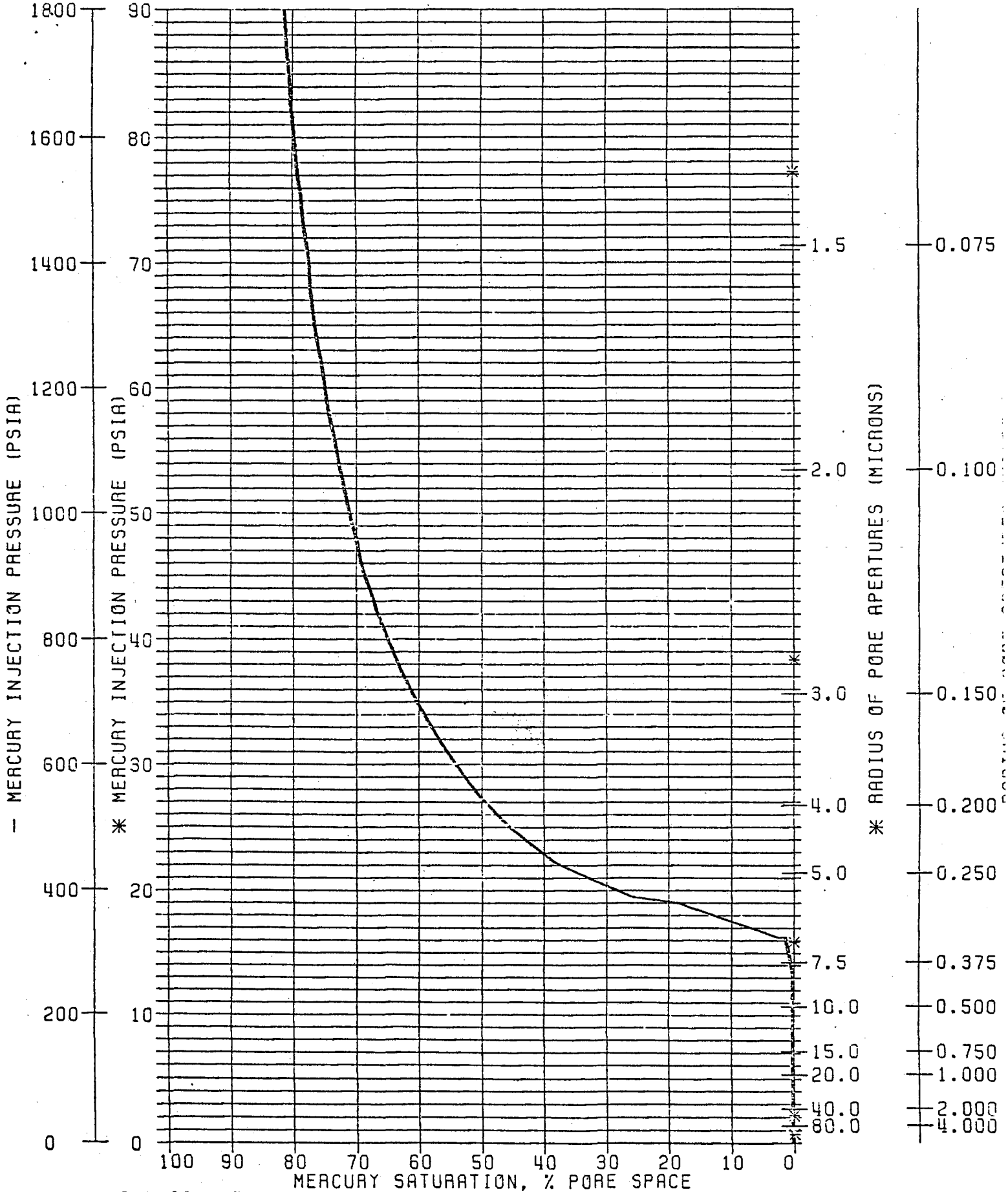
WELL: WALZ B1-33

LOCALITY: CHEYENNE CO., KANSAS

FEB 8,1978

LAB NO.: F-236

SAMPLE NO.: L



1309.00 FT.

POROSITY (%) =40.6 PERMEABILITY (MD) = 3.12

FORMATION: NIOBRARA

FIELD:

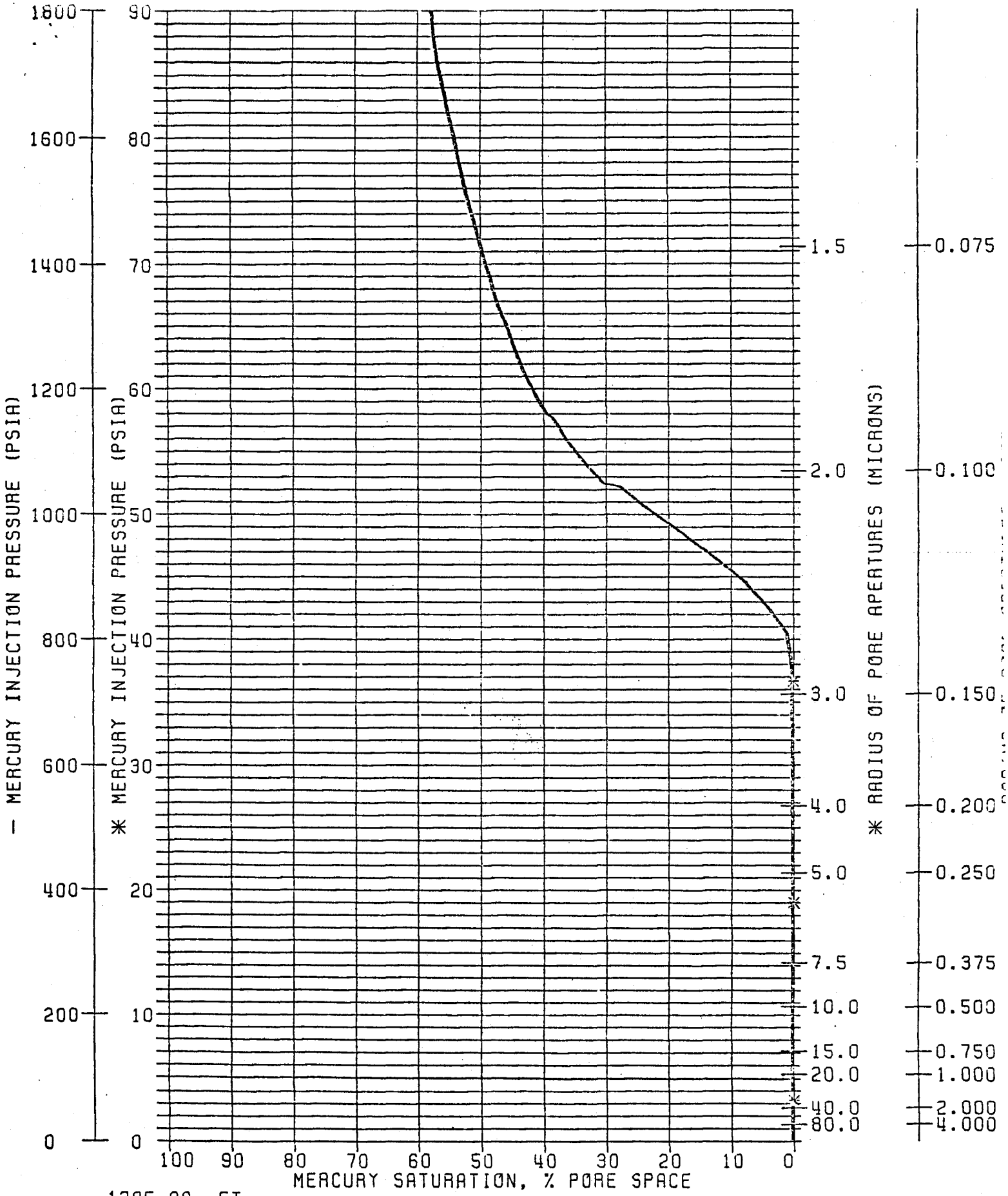
WELL: WALZ B1-33

LOCALITY: CHEYENNE CO., KANSAS

FEB 8,1978

LAB NO.: F-236

SAMPLE NO.: P



1285.00 FT.

POROSITY (%) =32.3 PERMEABILITY (MD) = 0.46

FORMATION: NIOBRARA

FIELD:

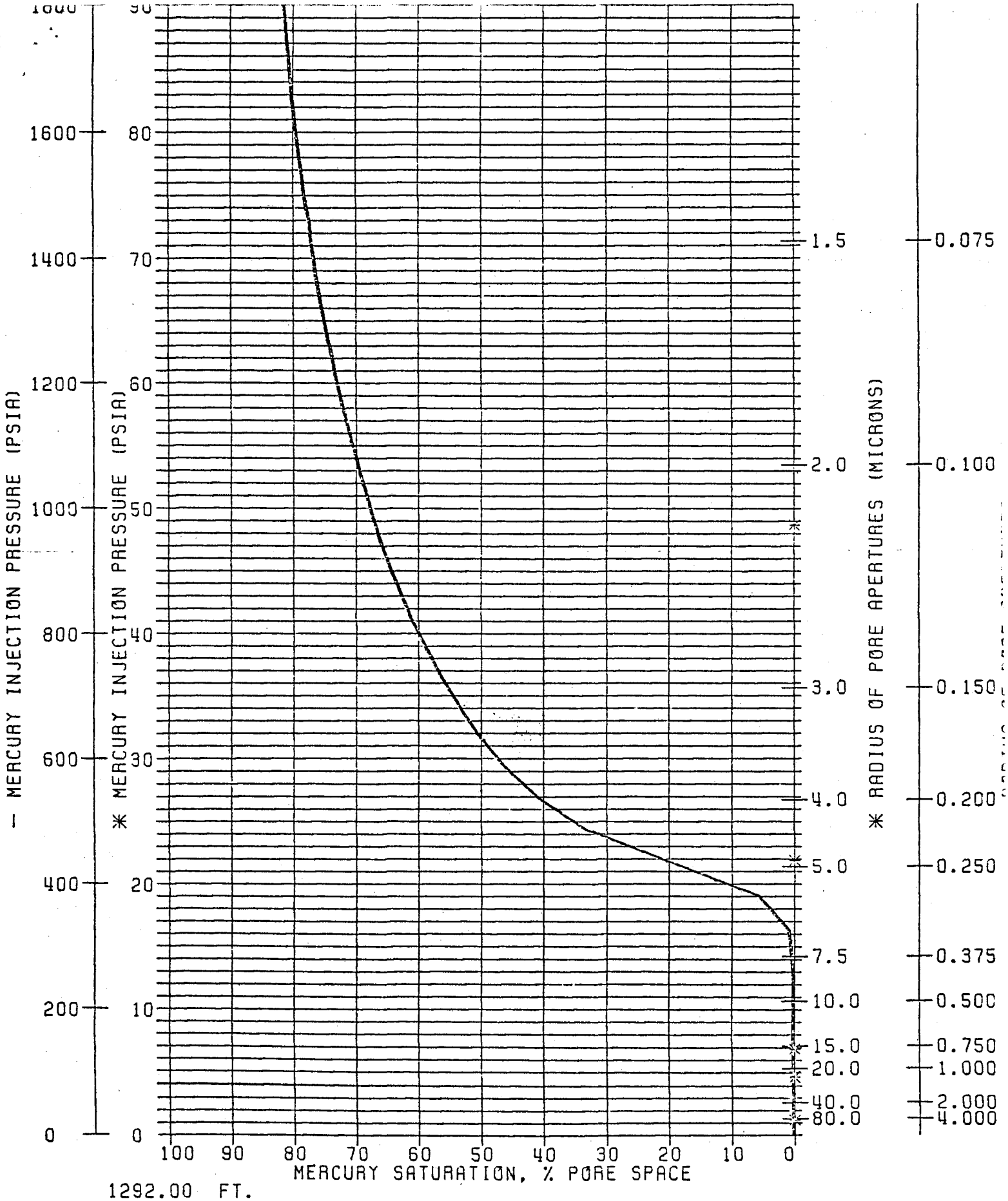
WELL: CARTER 1-22

LOCALITY: CHEYENNE CO., KANSAS

FEB 8,1978

LAB NO.: F-235

SAMPLE NO.: A



1292.00 FT.

POROSITY (%) =41.1 PERMEABILITY (MD) = 4.65

FORMATION: NIOBRARA

FIELD:

WELL: CARTER 1-22

LOCALITY: CHEYENNE CO., KANSAS

FEB 8,1978

LAB NO.: F-236

SAMPLE NO.: S

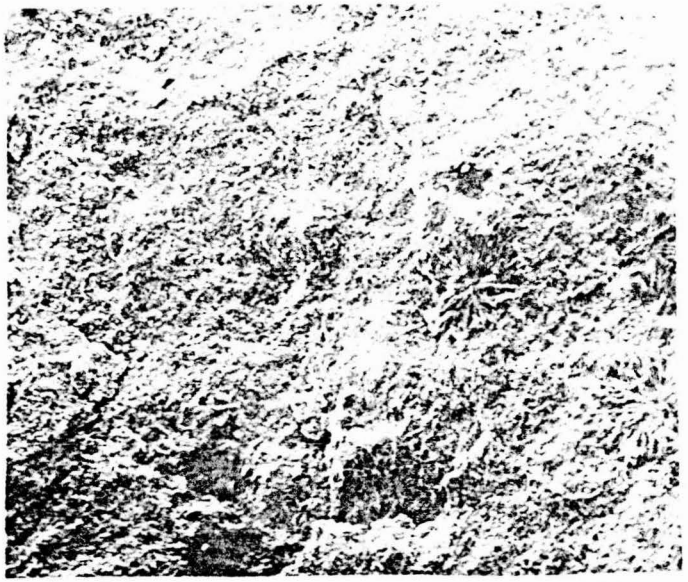
CORE SAMPLES, CRETACEOUS NIOBRARA CHALK, CHEYENNE COUNTY, KANSAS

Murphin
Neitzel #1-28

Sample 2
1277'

POR 44.7%

PERM 16.1md

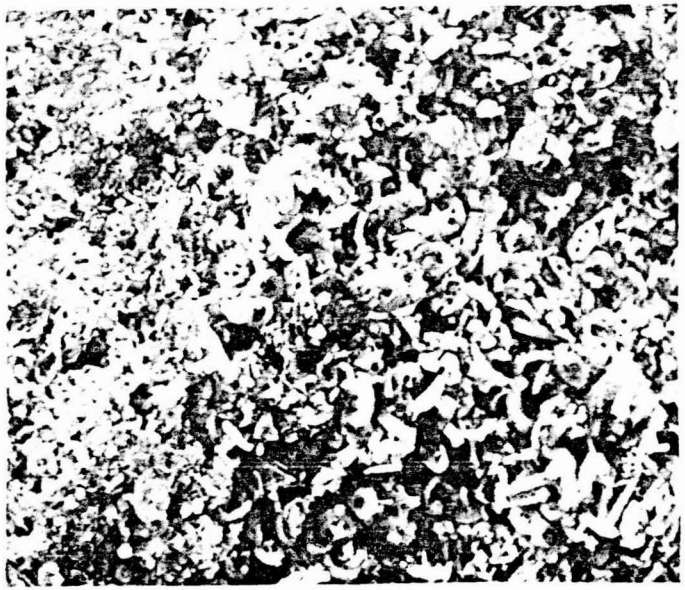


A. 50X 200 μ

Typical chalk texture; inorganic calcite spherulites (right)

B. 200X 50 μ

No macroporosity



C. 1000X 10 μ

Jumble of coccoliths; very high microporosity

D. 5000X 2 μ

Little evidence of solution or tight cementation

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FIGURE 1

CORE SAMPLES, CRETACEOUS NIOBRARA CHALK, CHEYENNE COUNTY, KANSAS

Murphin
Neitzel #1-28

Sample 10
1325'

POR 29.6%

PERM 3.41md

A. 50X

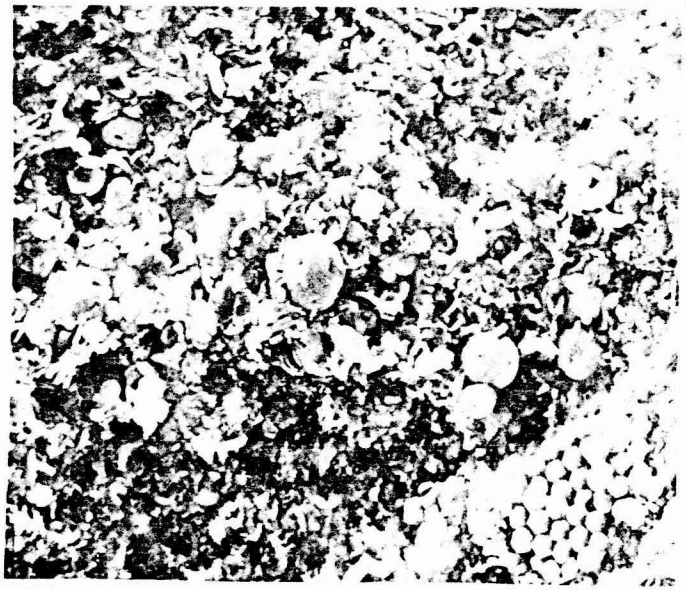
200 µ

Typical chalk texture

B. 200X

50 µ

No macroporosity



C. 1000X

10 µ

High microporosity among coccoliths and coccospheres; pyrite crystals (right)

D. 5000X

2 µ

Well-preserved coccosphere

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FIGURE 2

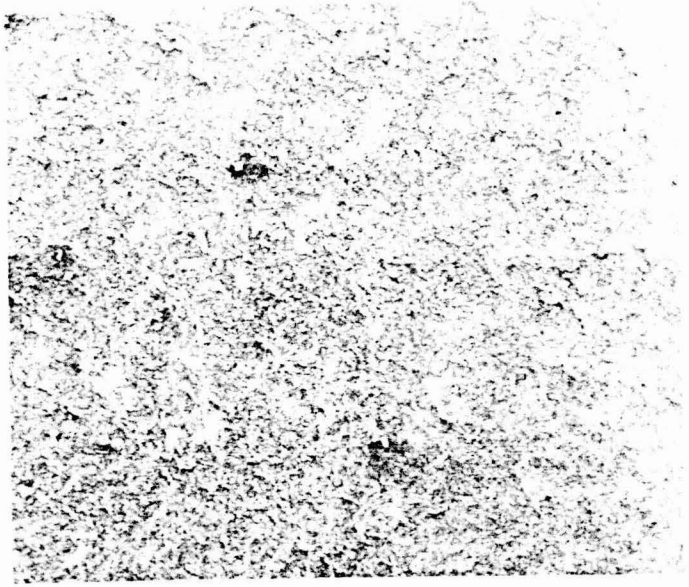
CORE SAMPLES, CRETACEOUS NIOBRARA CHALK, CHEYENNE COUNTY, KANSAS

Murphin
Walz #B1-33

Sample 2
1283'

POR 26.1%

PERM (not measured)

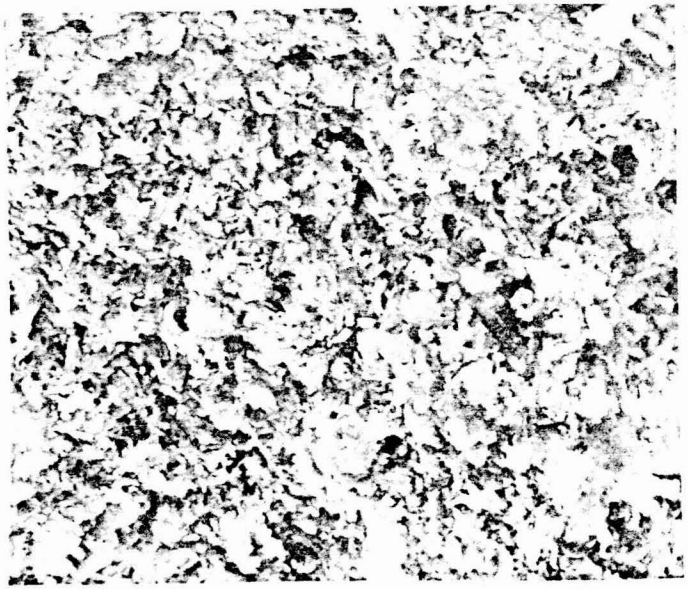


A. 50X

200 µ

B. 200X

50 µ



C. 1000X

10 µ

Impure chalk with sparse coccoliths

D. 5000X

2 µ

Scattered illite flakes; lower microporosity

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FIGURE 3

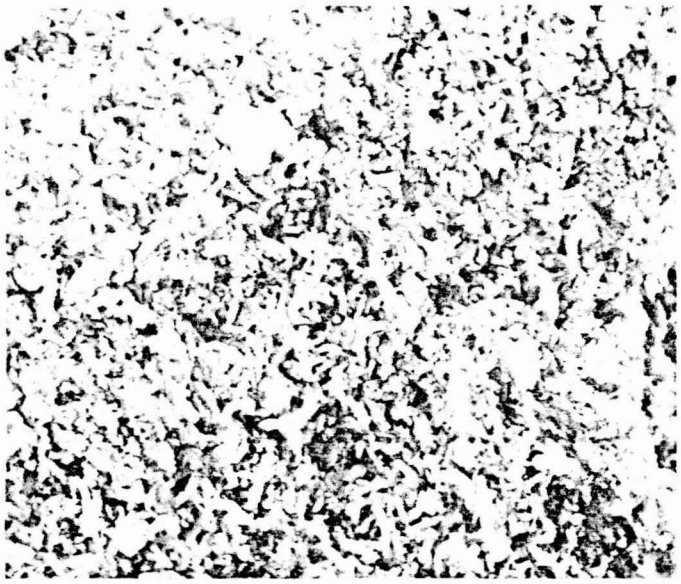
CORE SAMPLES, CRETACEOUS NIOBRARA CHALK, CHEYENNE COUNTY, KANSAS

Murphin
Walz #B1-33

Sample 6
1309'

POR 40.6%

PERM 3.12md



A. 1000X 10 μ
Coccolith-rich chalk

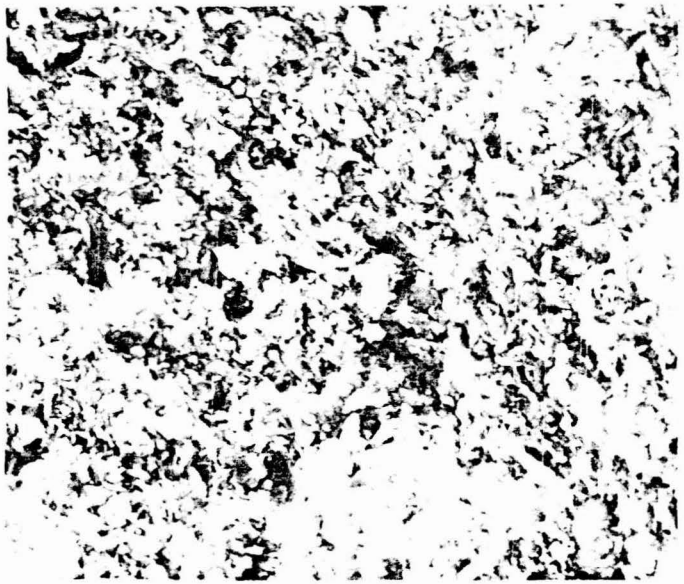
B. 5000X 2 μ
High microporosity

Murphin
Carter #1-22

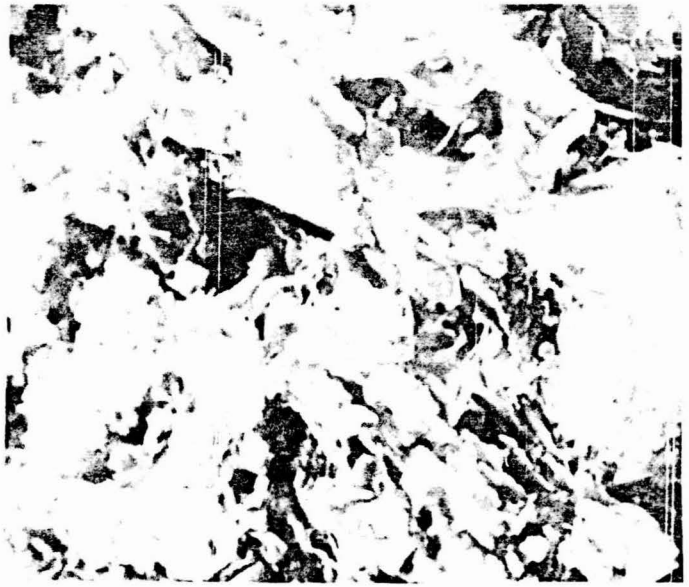
Sample 3
1285'

POR 32.3%

PERM 0.46md



C. 1000X 10 μ
Impure chalk with scattered illite flakes, fewer coccoliths



D. 5000X 2 μ

TS. NO. 5107SJ DATE 2/7/78 FIGURE 4

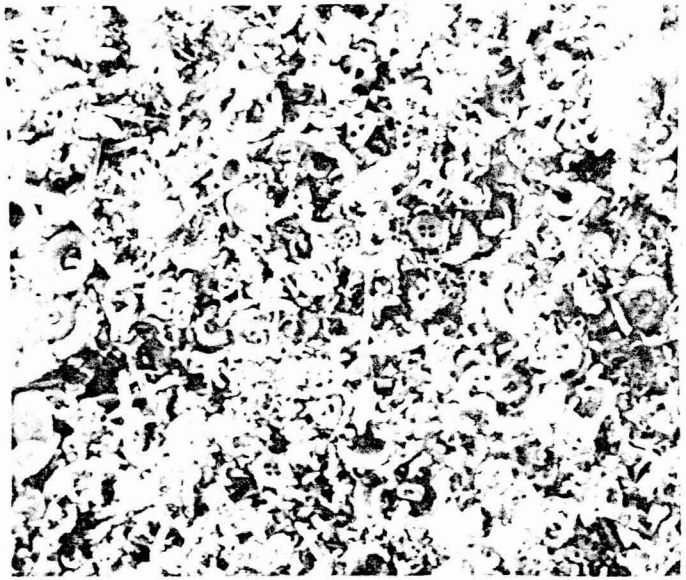
CORE SAMPLES, CRETACEOUS NIOBRARA CHALK, CHEYENNE COUNTY, KANSAS

Murphin
Carter #1-22

Sample 4
1292'

POR 41.1%

PERM 4.65md



A. 1000X 10 μ
Coccolith-rich chalk

B. 5000X 2 μ
Very high microporosity

Murphin
Carter #1-22

Sample 7
1303'

POR 40.8%

PERM 2.20md

C. 1000X 10 μ
High microporosity

D. 5000X 2 μ
Well-preserved coccospheres

TS. NO. 5107SJ DATE 2/7/78 FIGURE 5