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**0046**

GEOLOGICAL SURVEY OF CANADA  
COMMISSION GÉOLOGIQUE DU CANADA

OTTAWA

**1971**

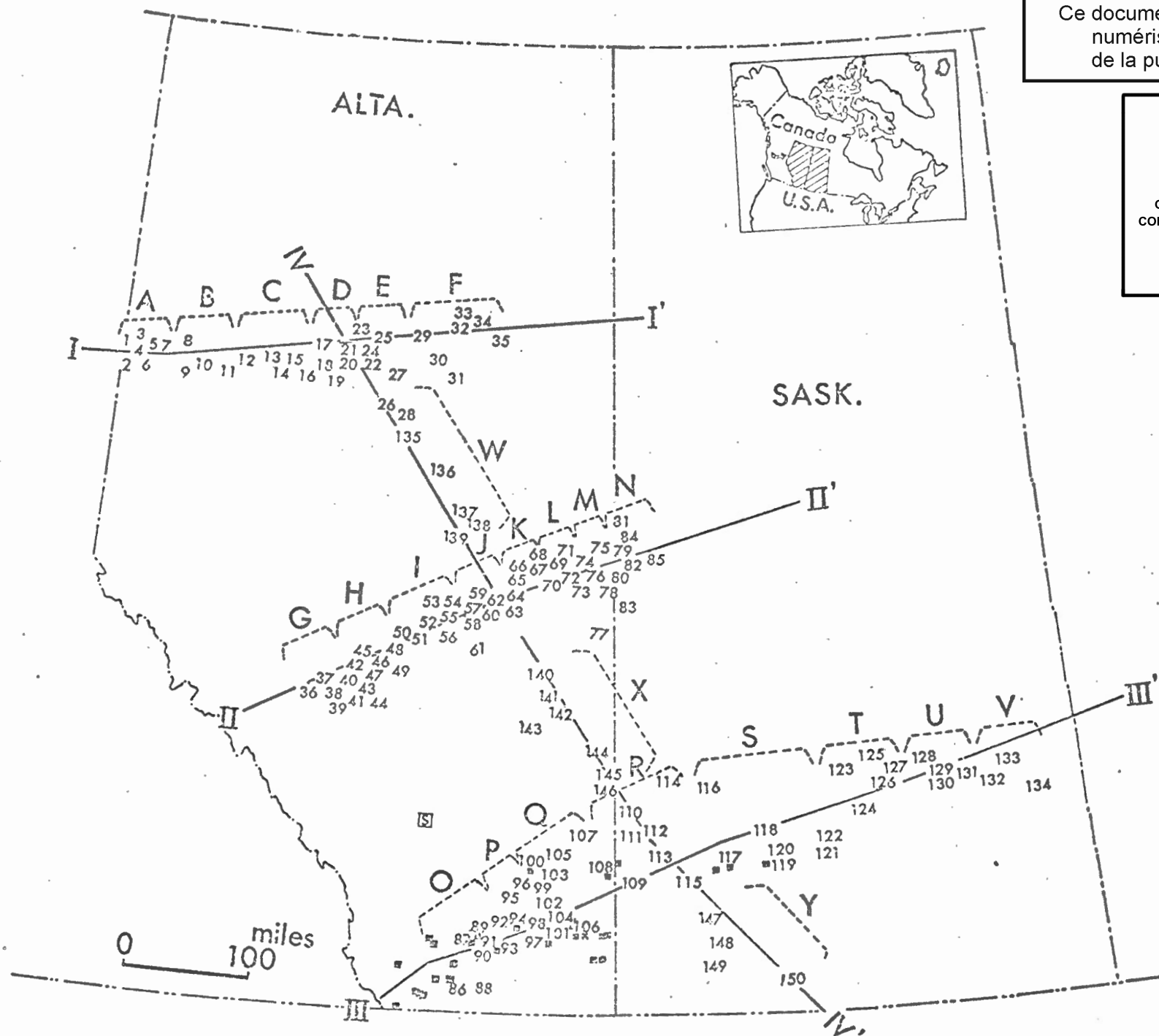


FIG. 1

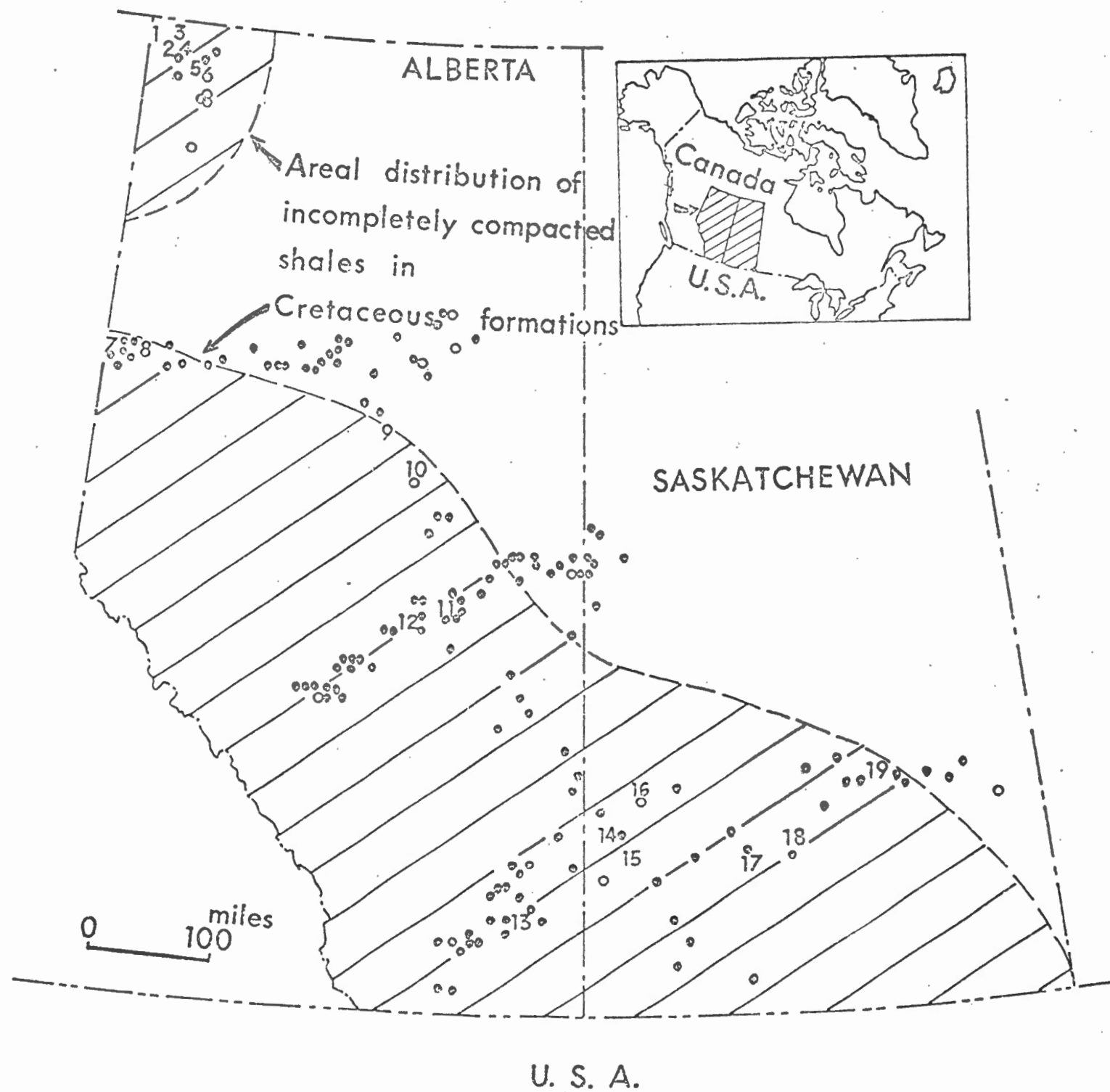


FIG. 1A

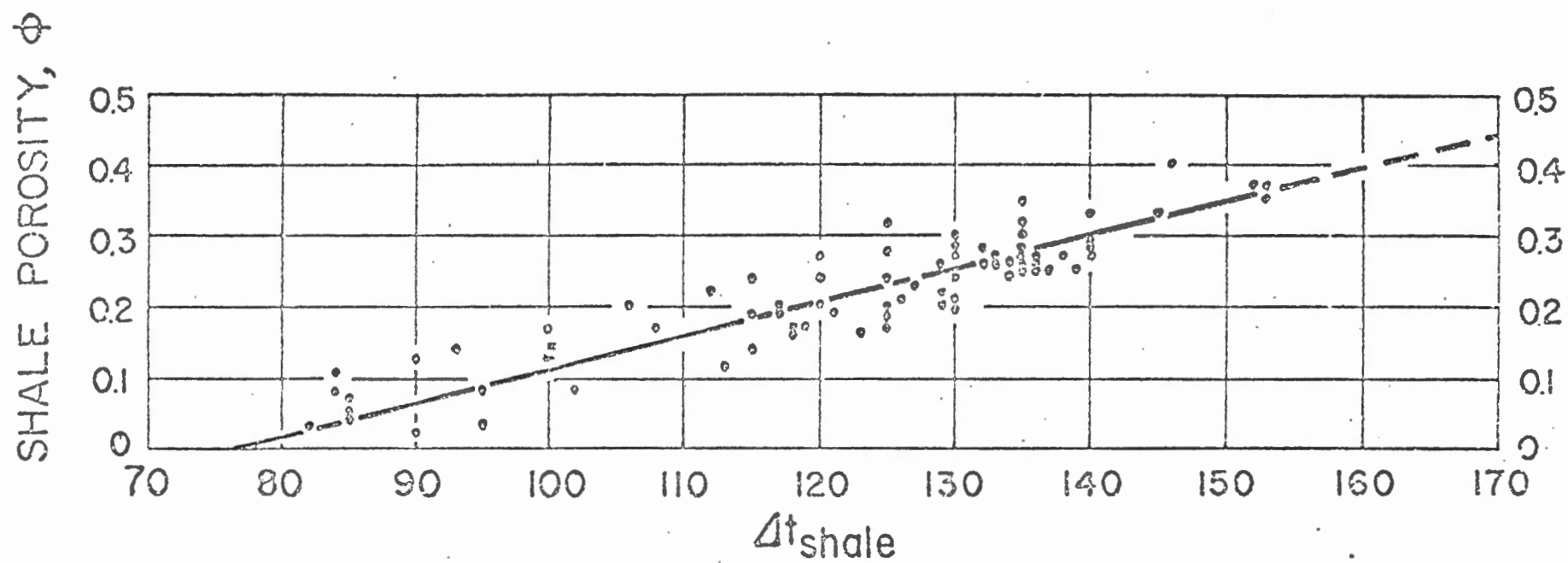


FIG.2

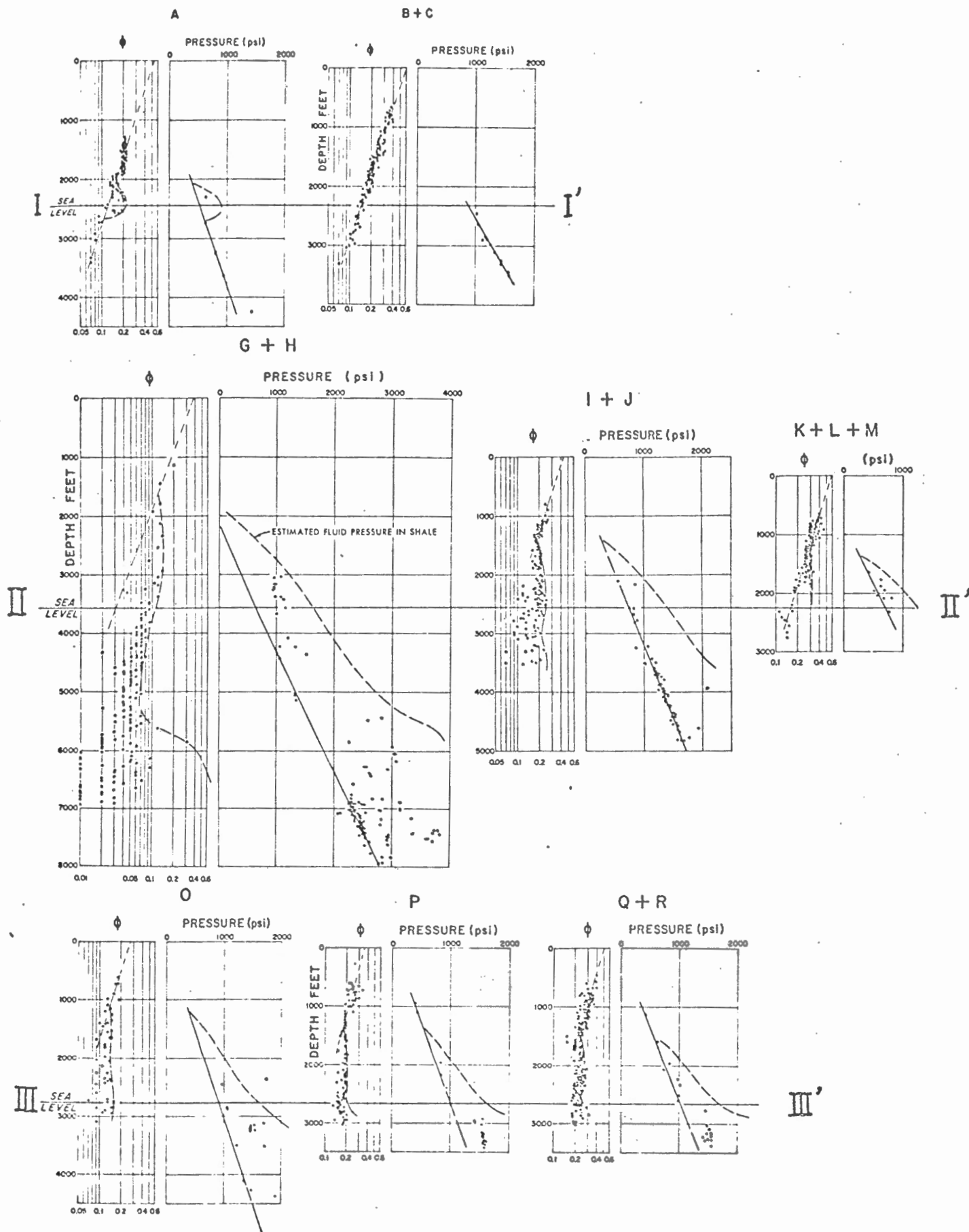


FIG.3

# SHALE POROSITY →

$\log \phi$

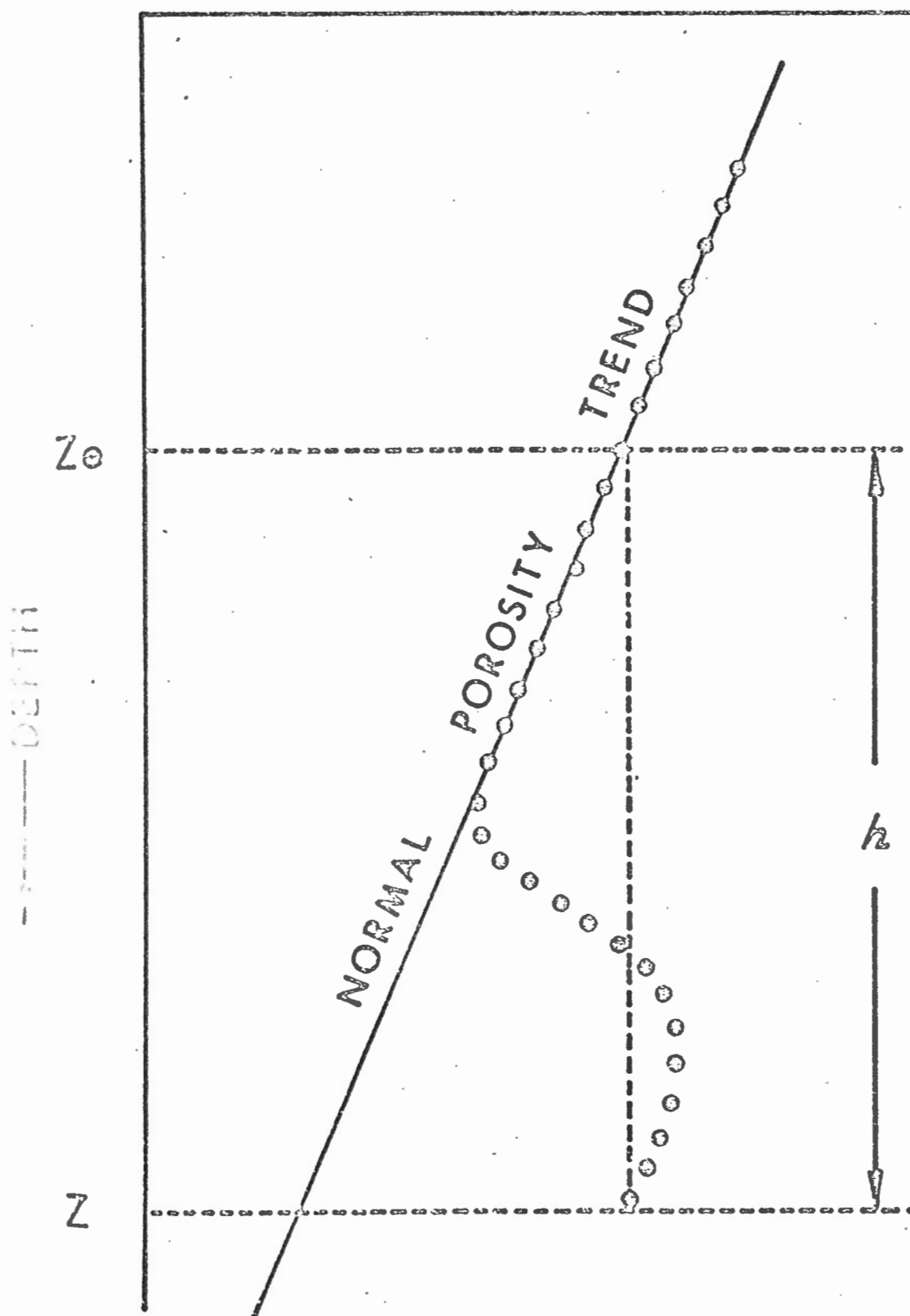


FIG. 4

# SHALE POROSITY $\longrightarrow$

Log  $\Phi$

DEPTH  $\longrightarrow$

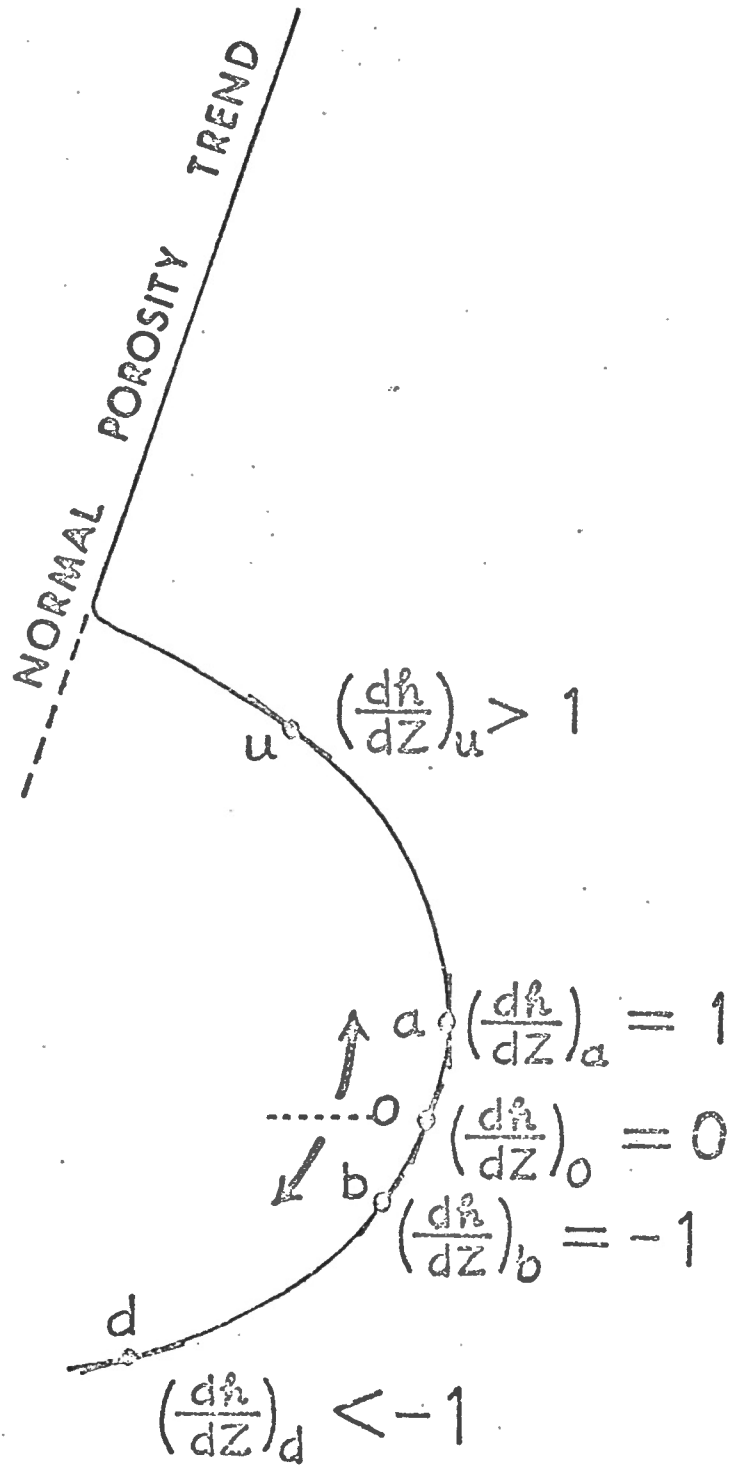


FIG. 5

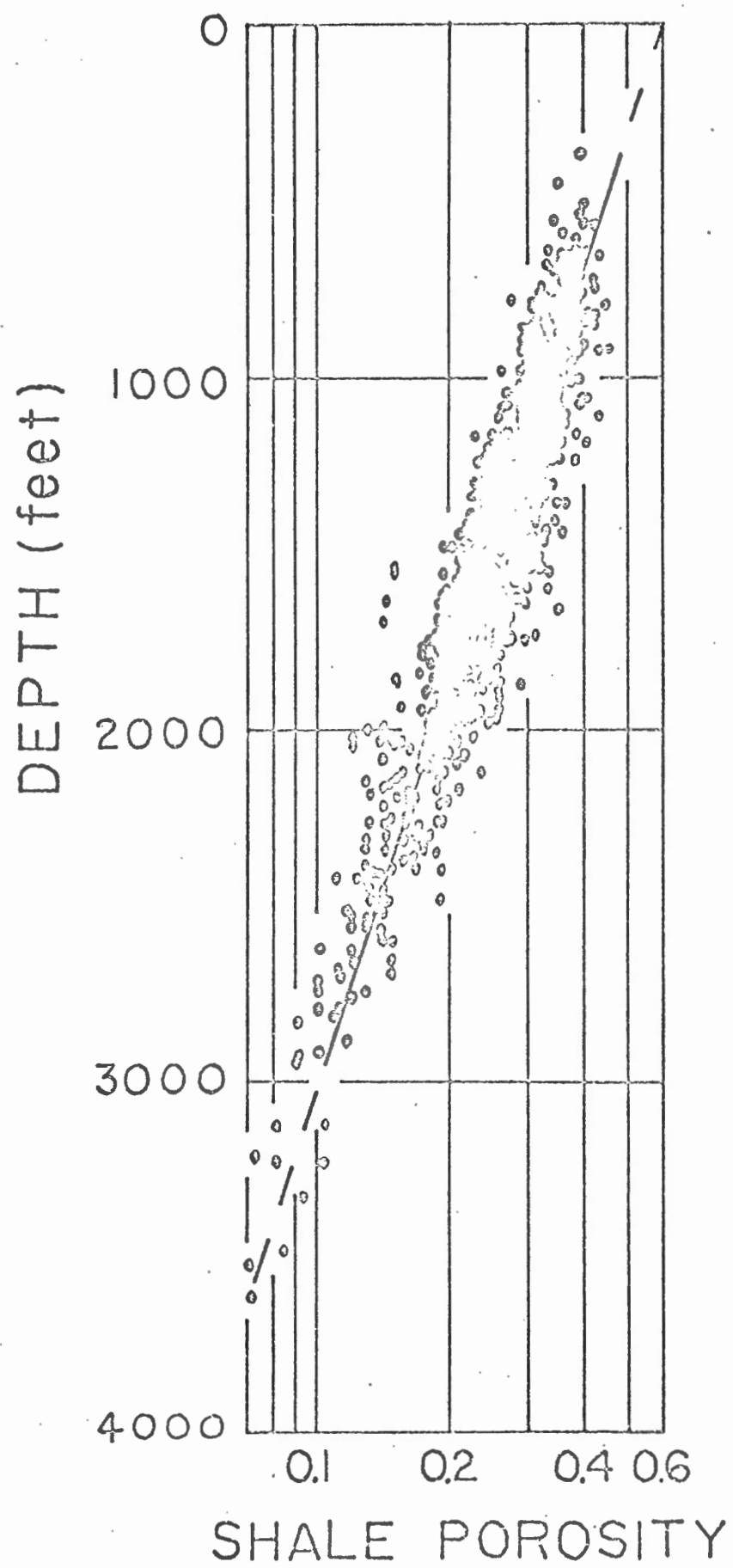


FIG. 6

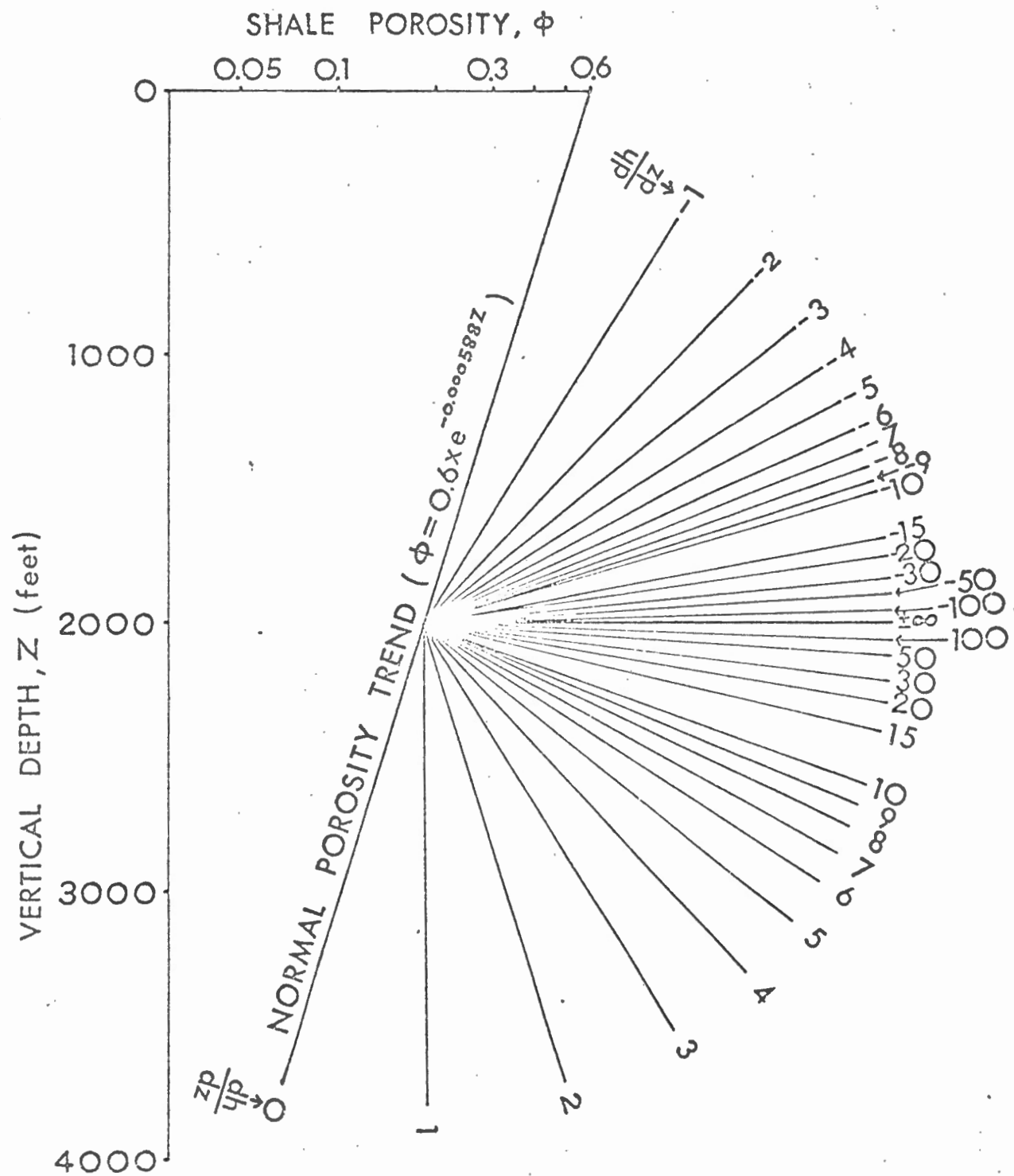


FIG. 7



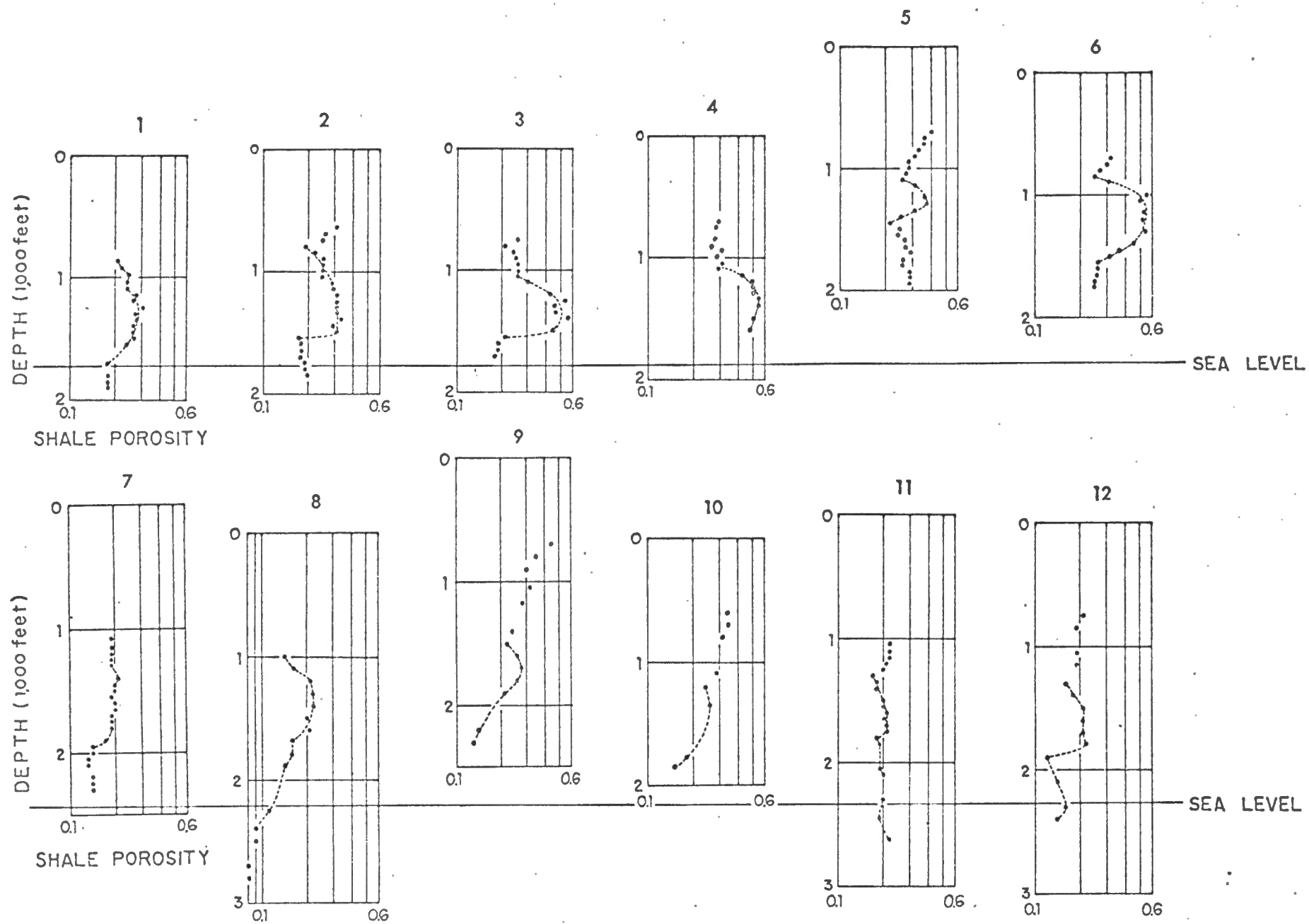


FIG.8

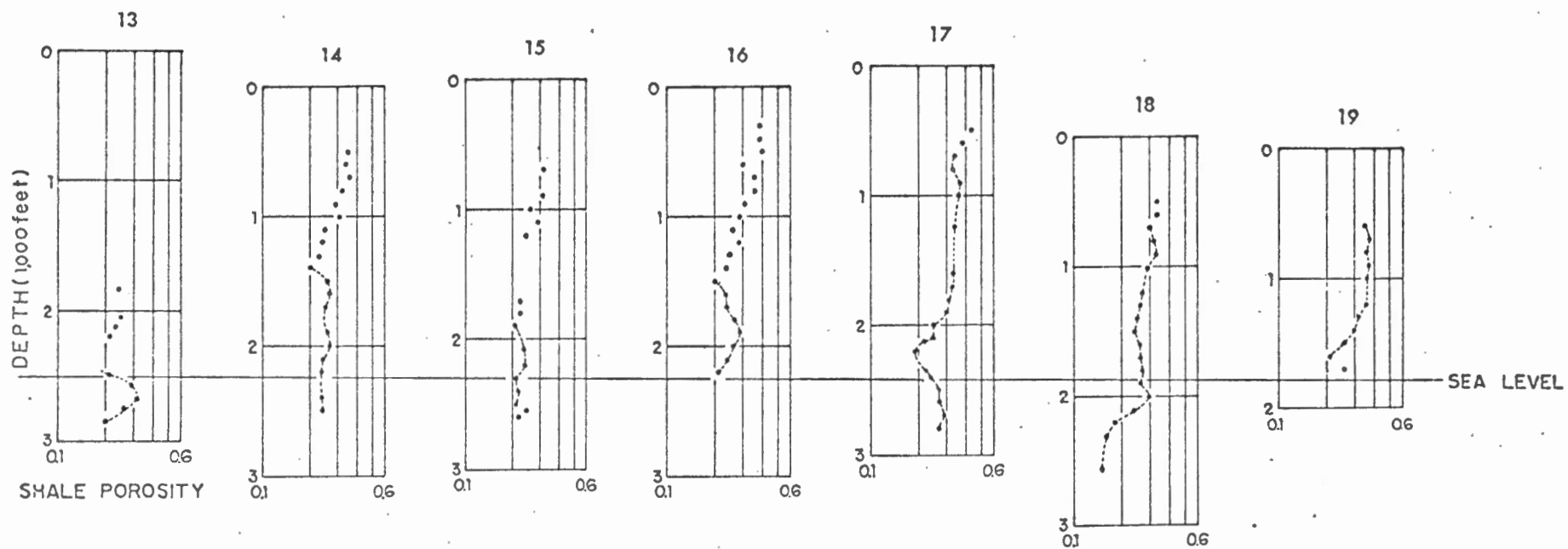


FIG.9

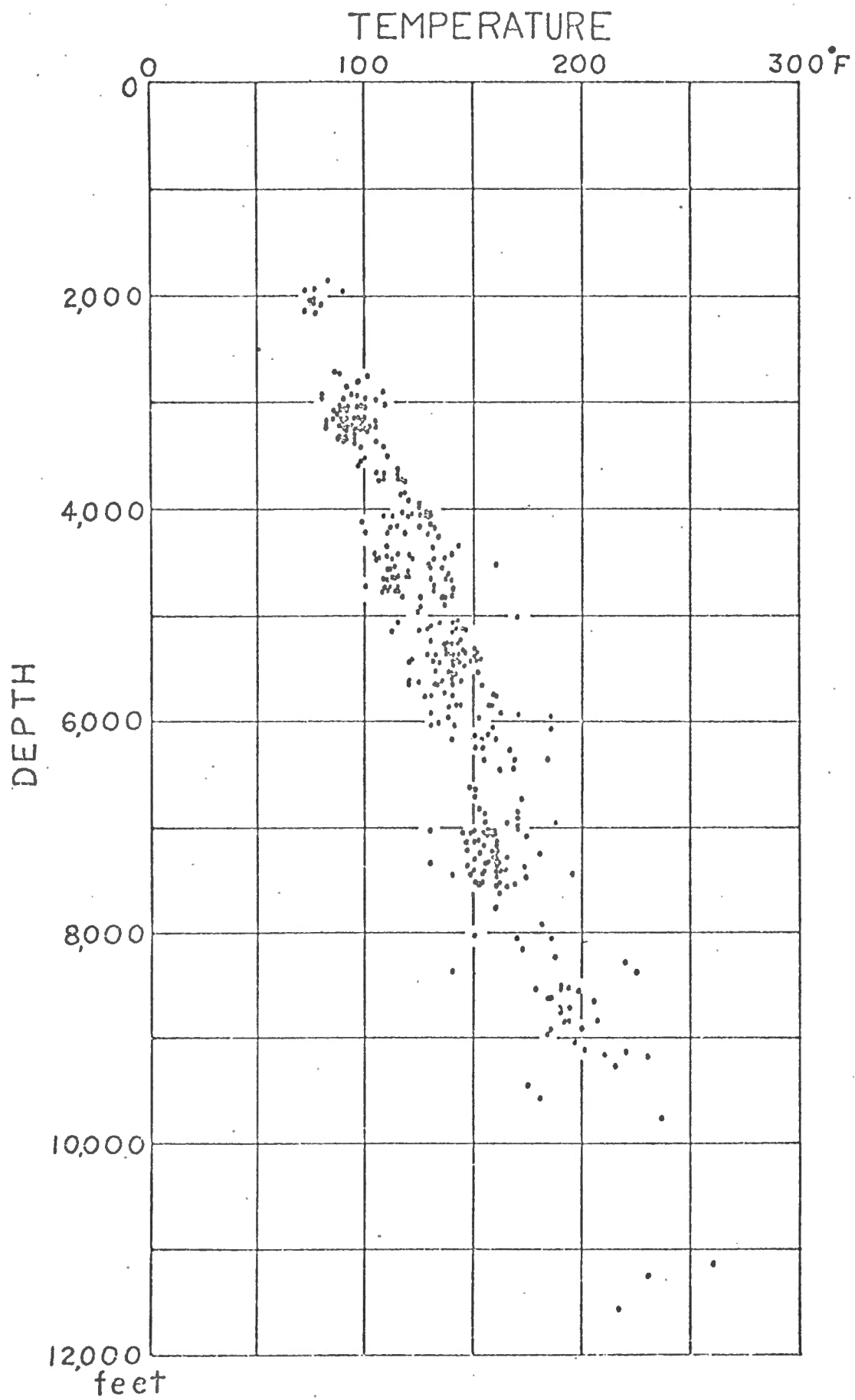


FIG. 10

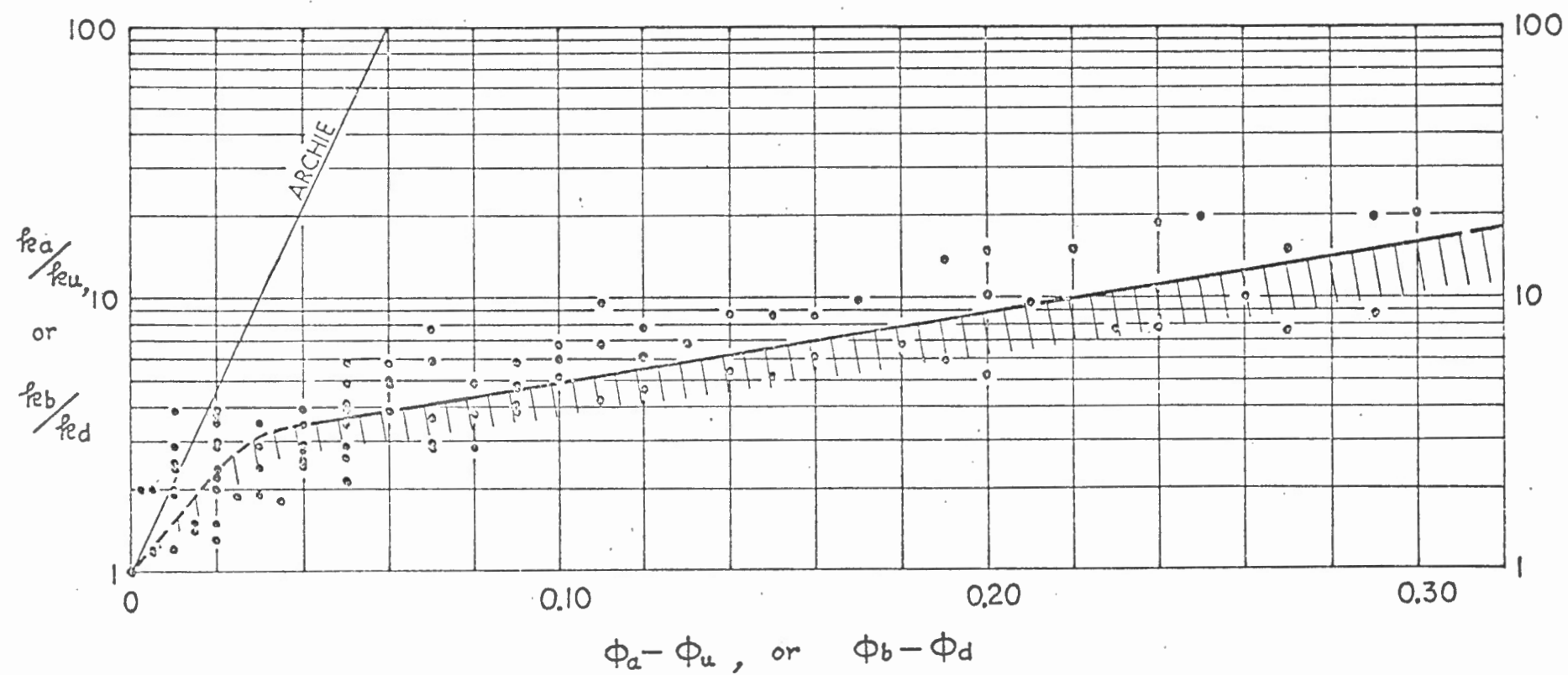


FIG.11

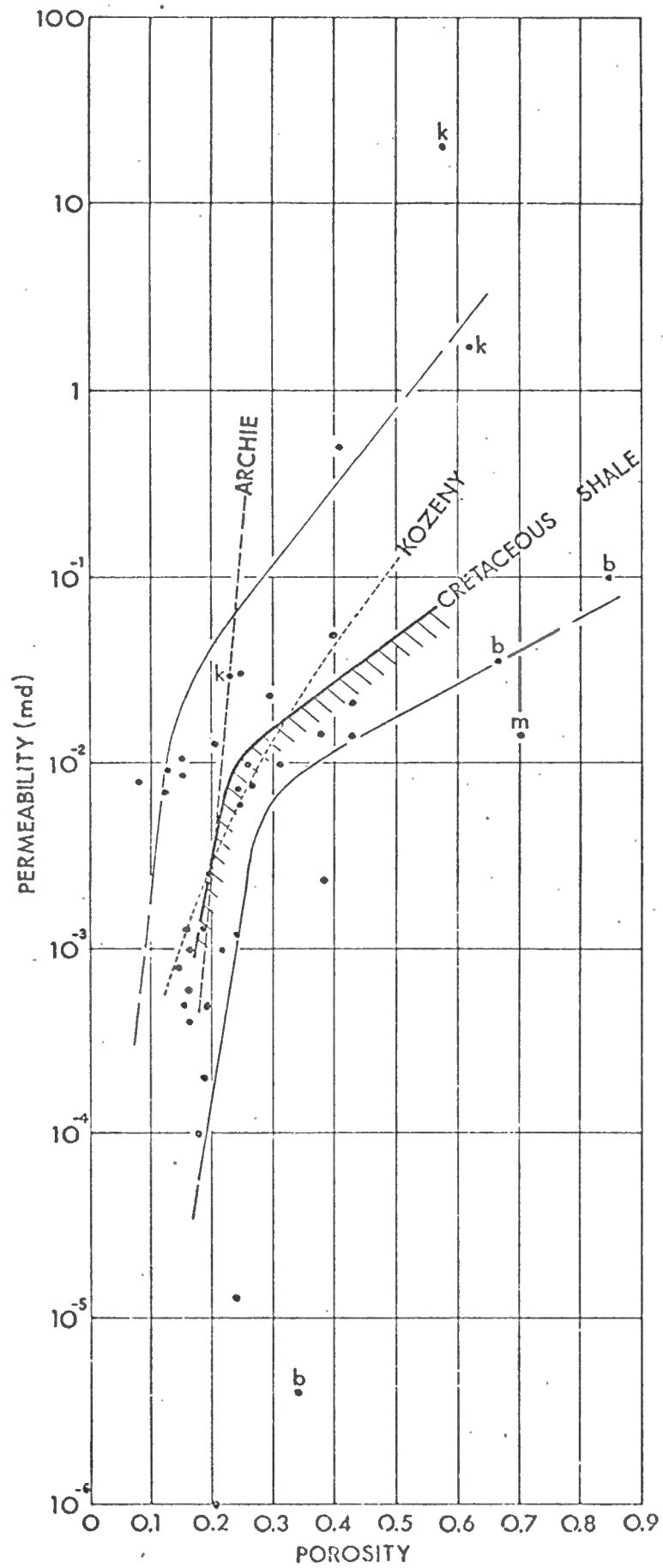


FIG. 12

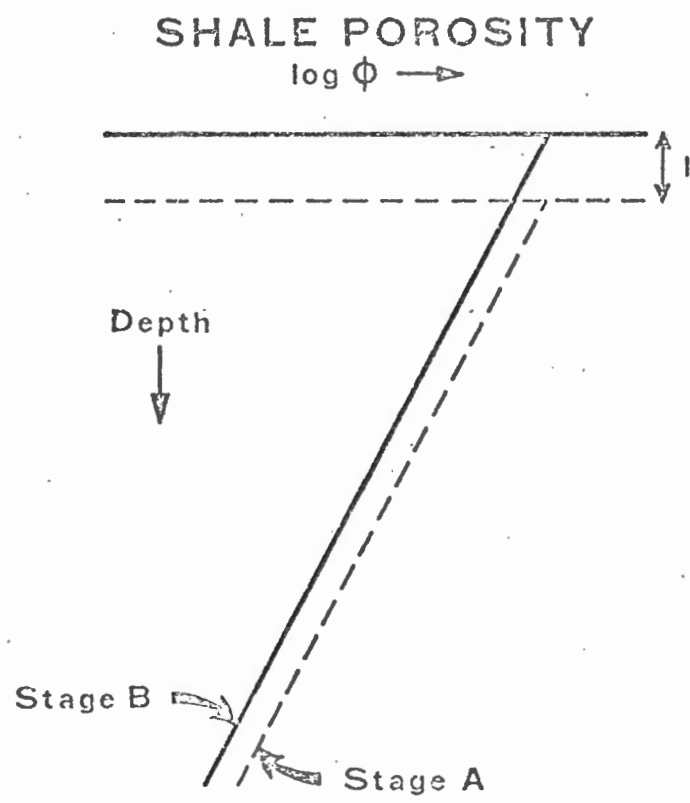


FIG.13

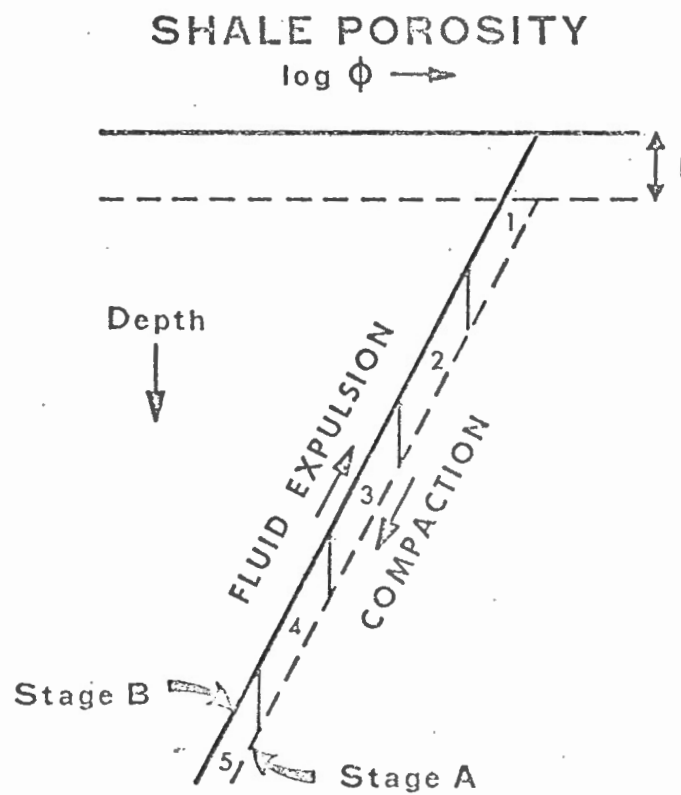


FIG.14

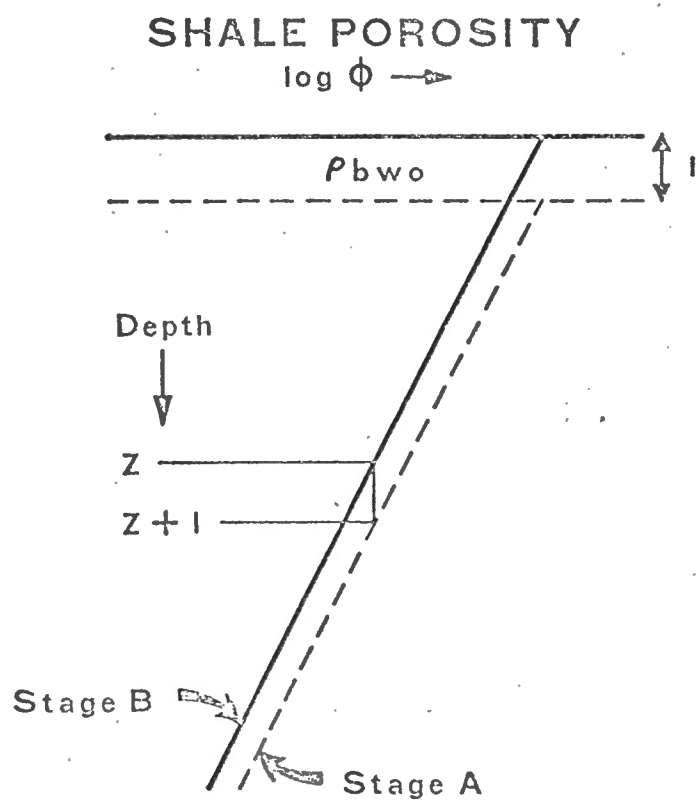


FIG.15



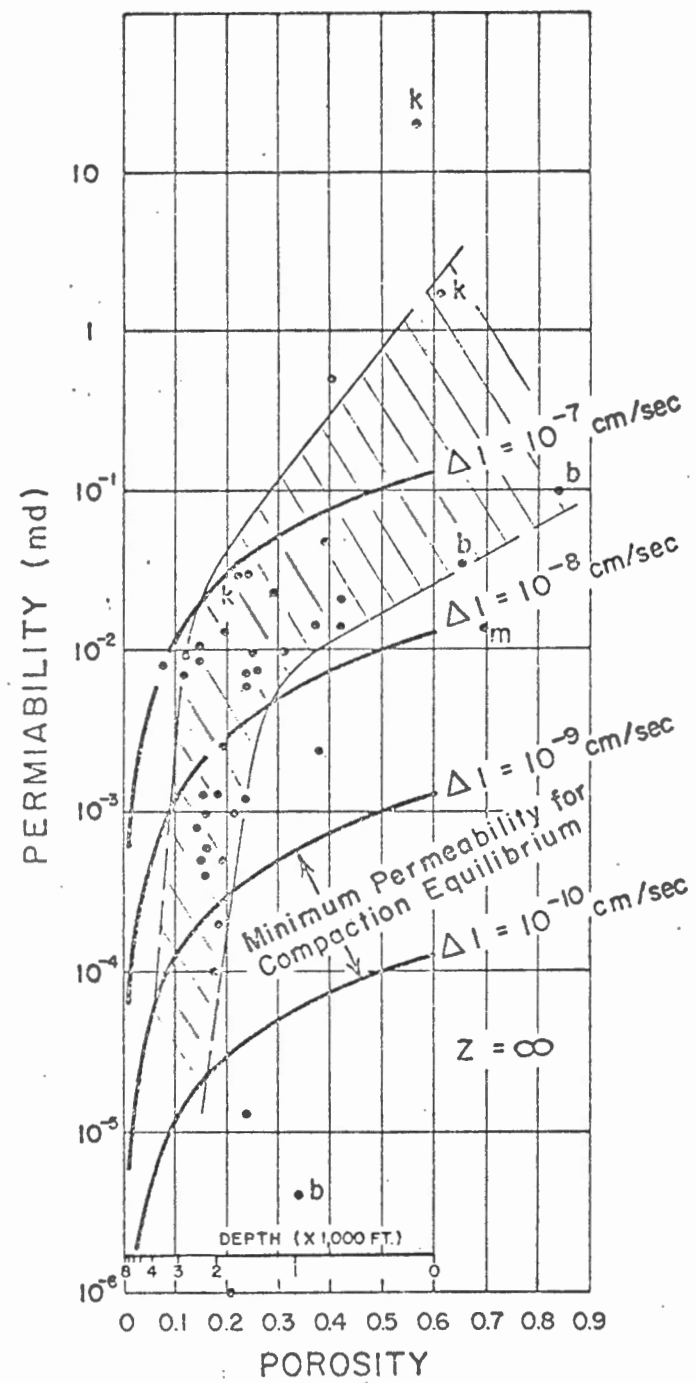


FIG.16

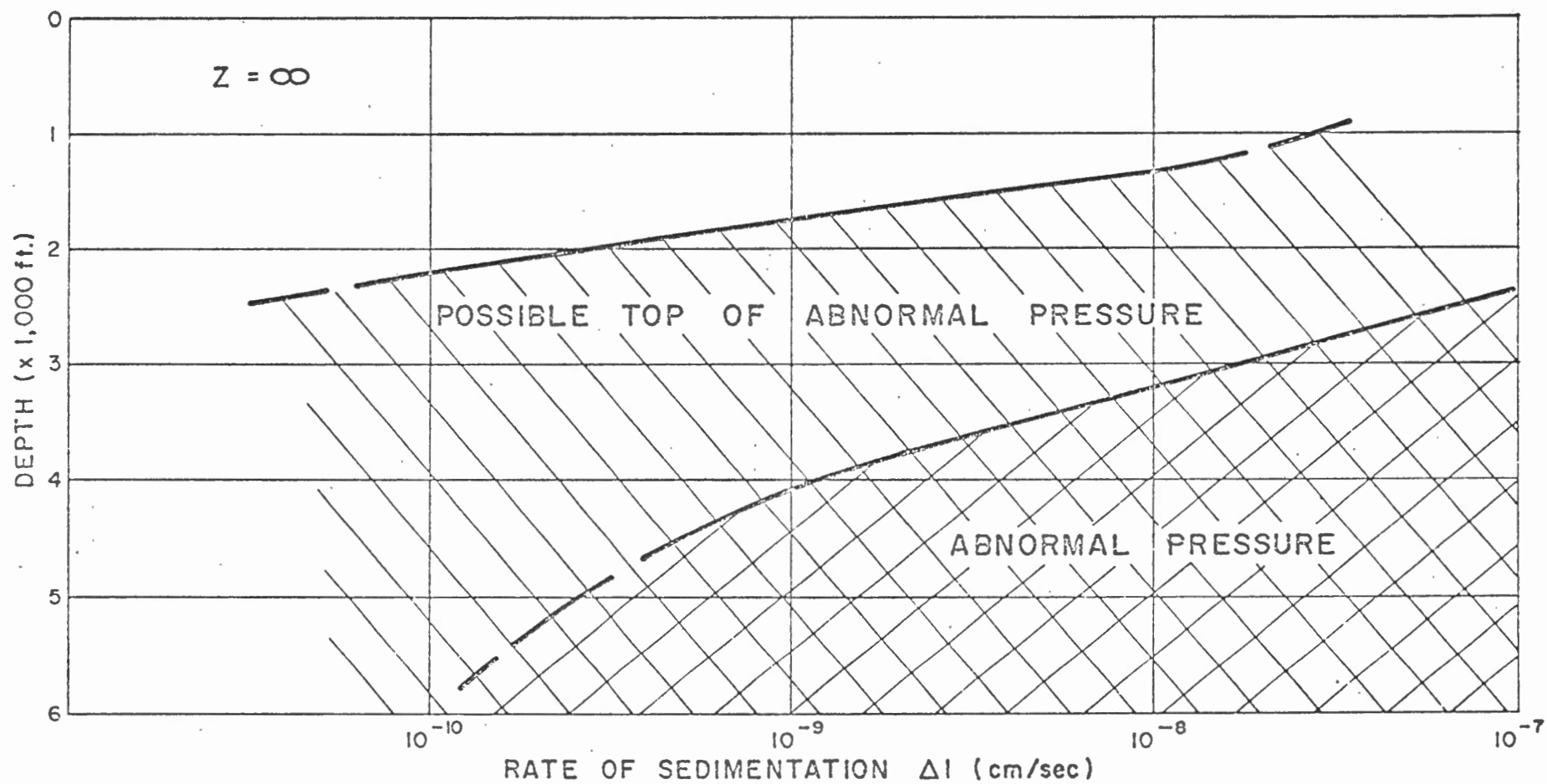


FIG.17

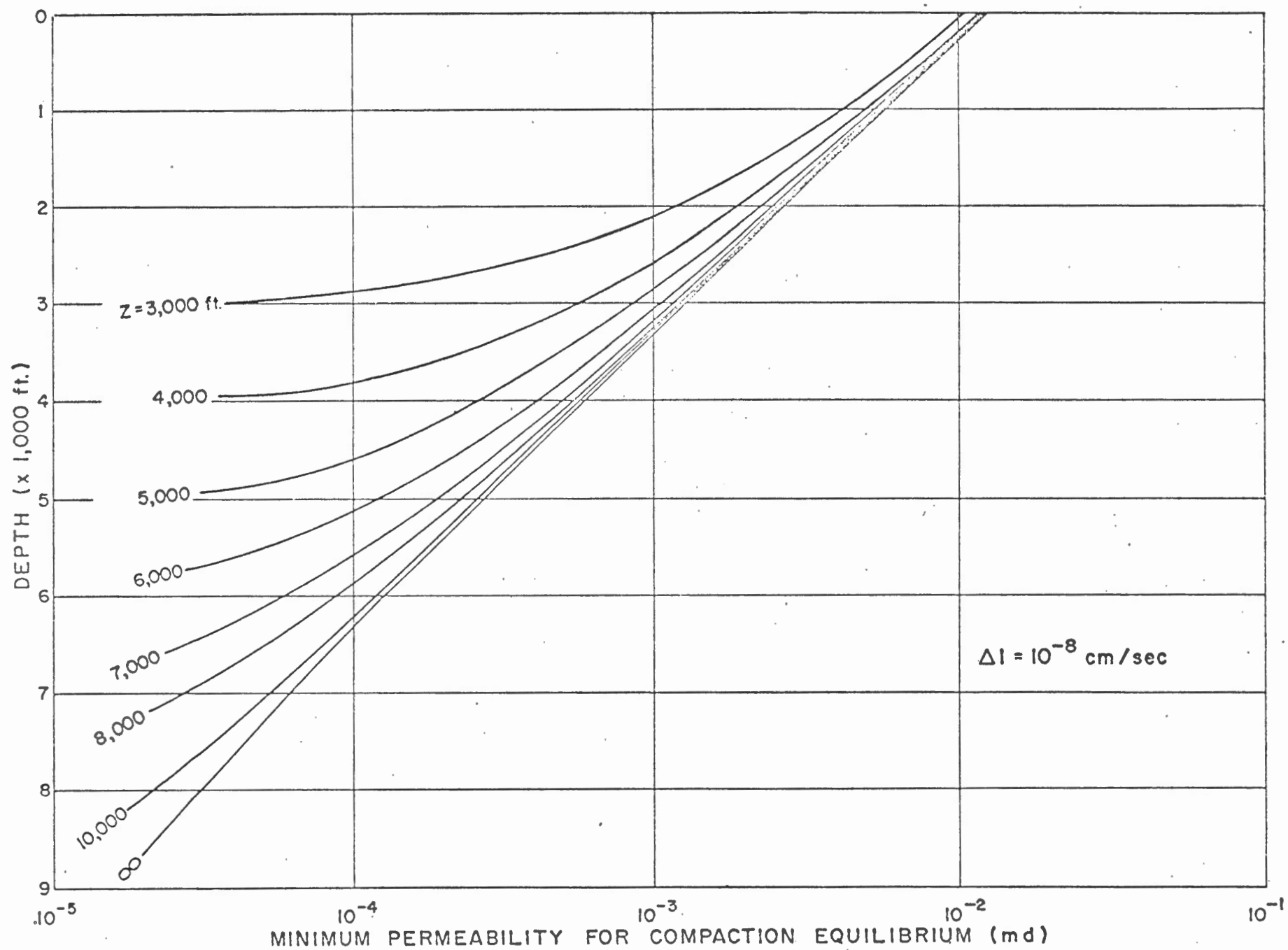


FIG. 18

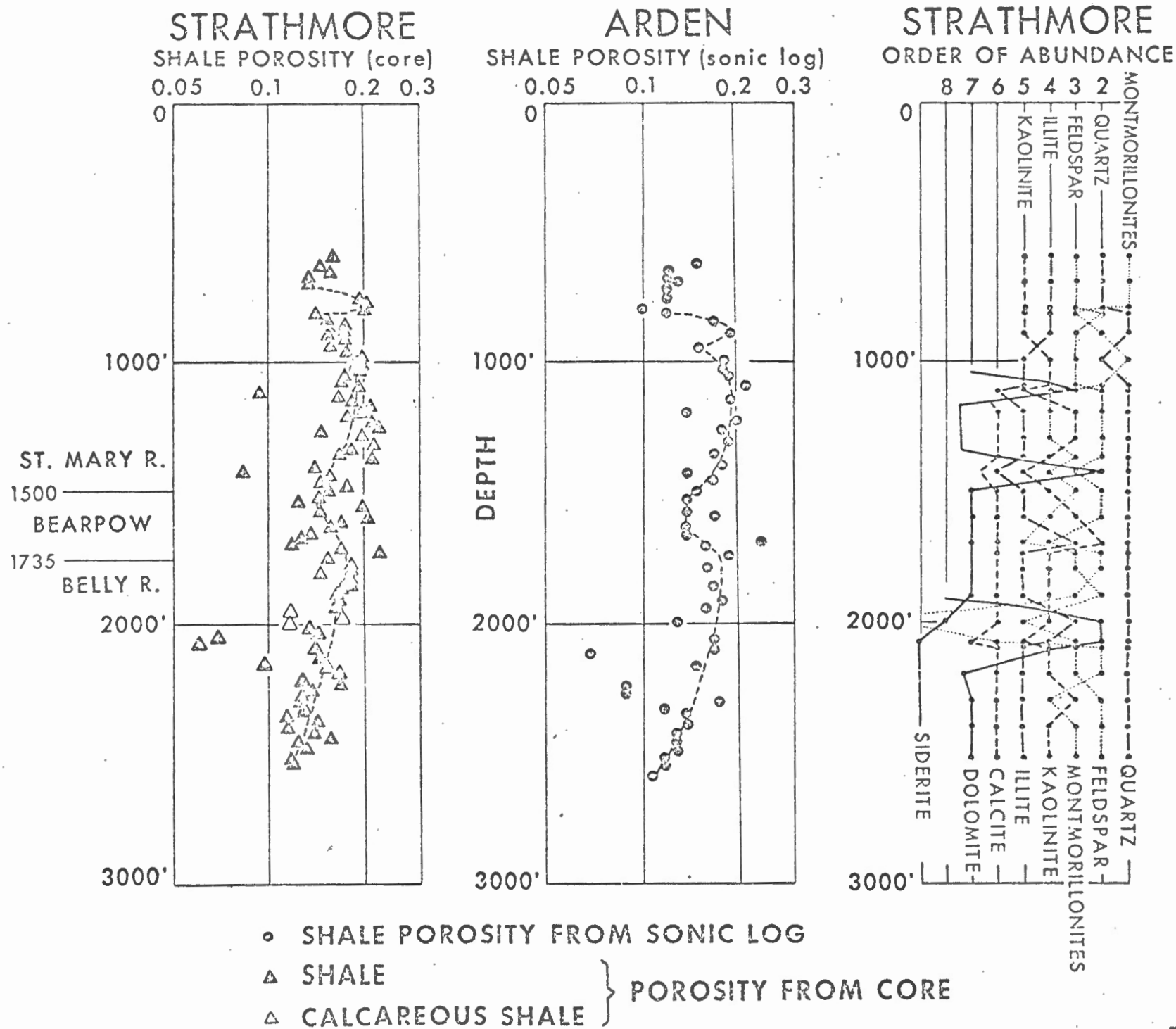
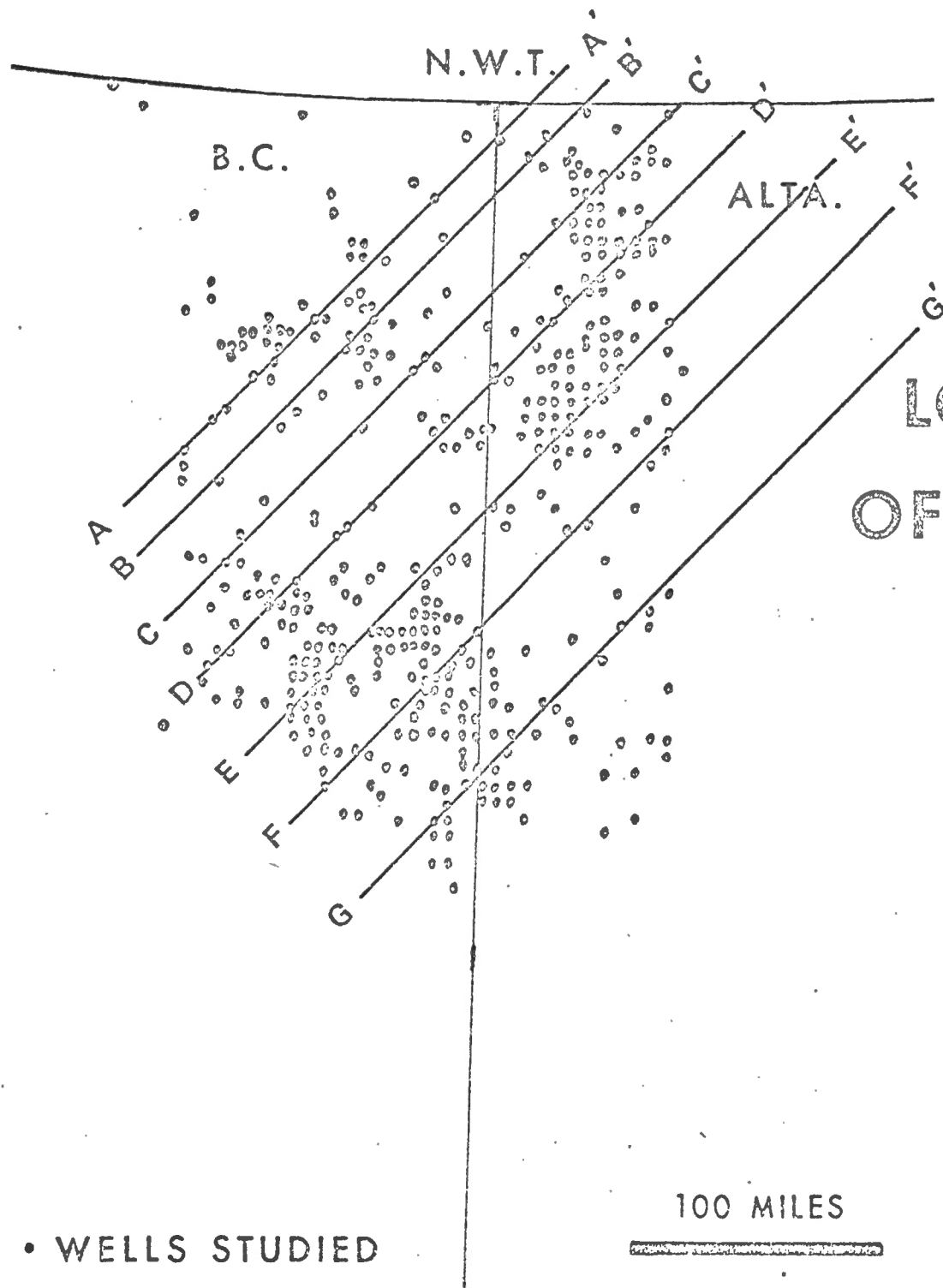


FIG. 19



## LOCATION MAP OF WELLS STUDIED

• WELLS STUDIED

100 MILES

# SHALE POROSITY PROFILES

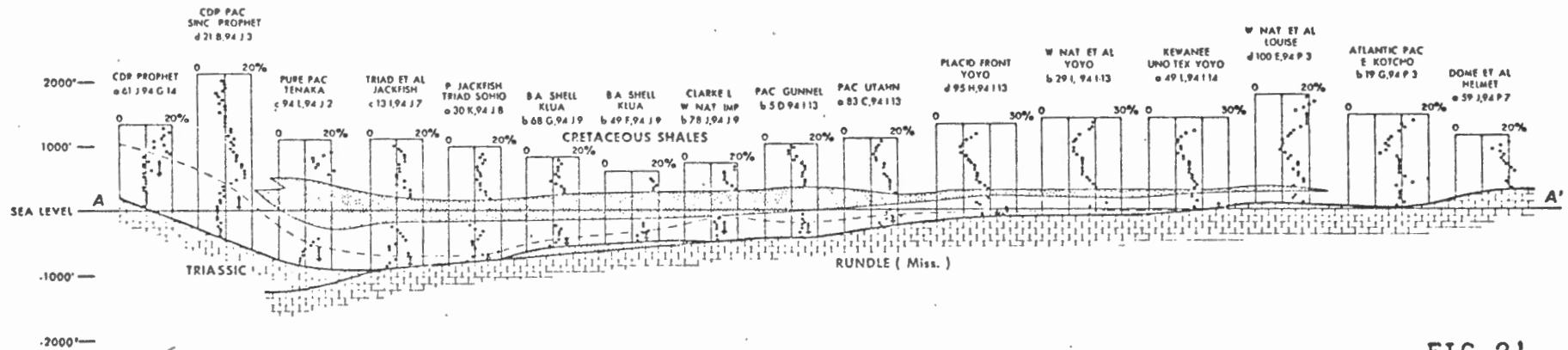


FIG.21

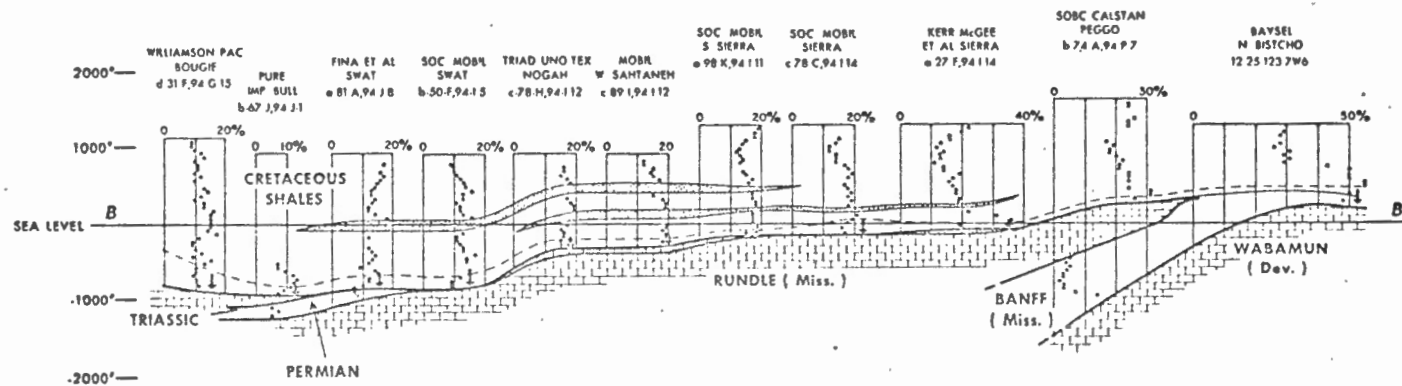


FIG.22

# SHALE POROSITY PROFILES

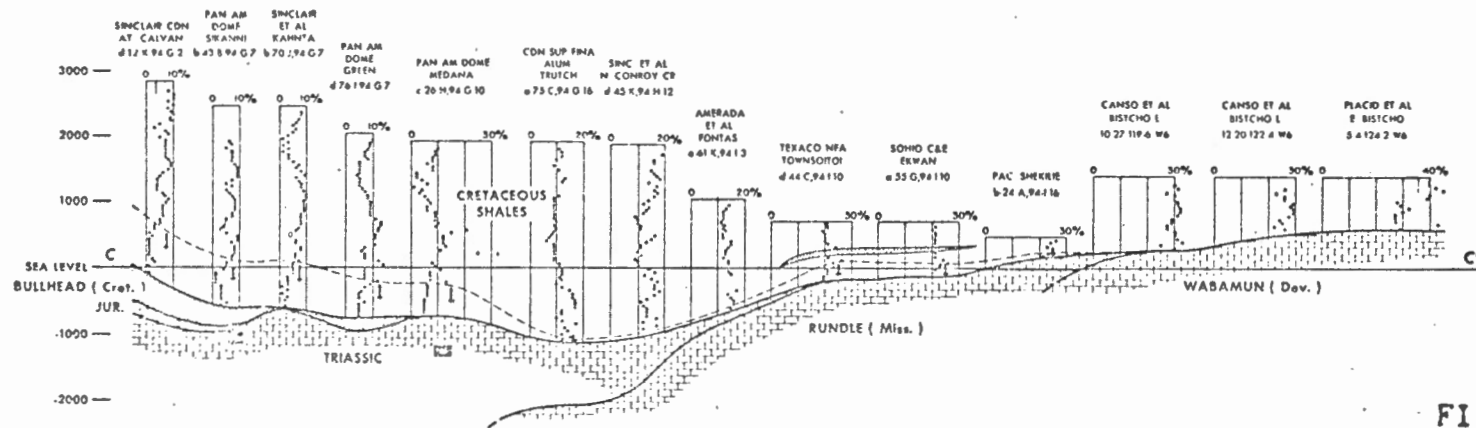


FIG.23

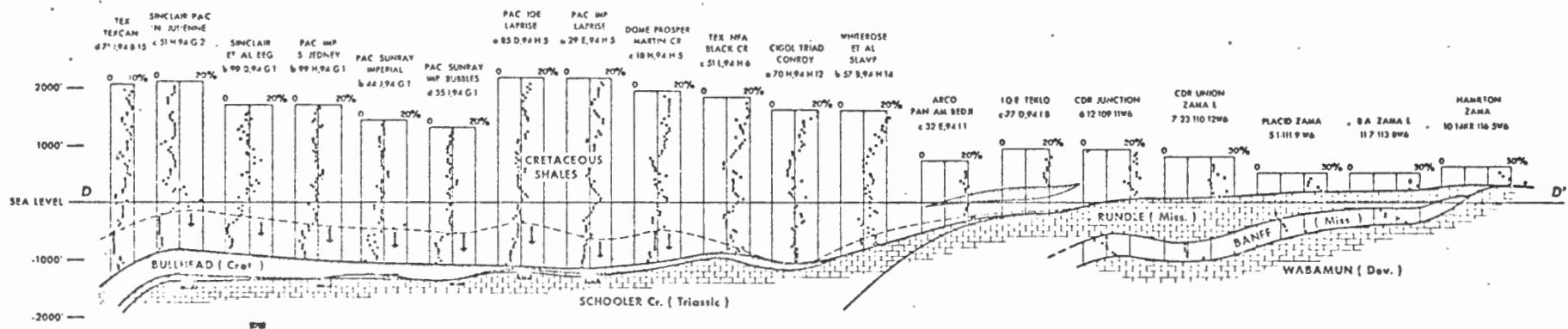


FIG.24

# SHALE POROSITY PROFILES

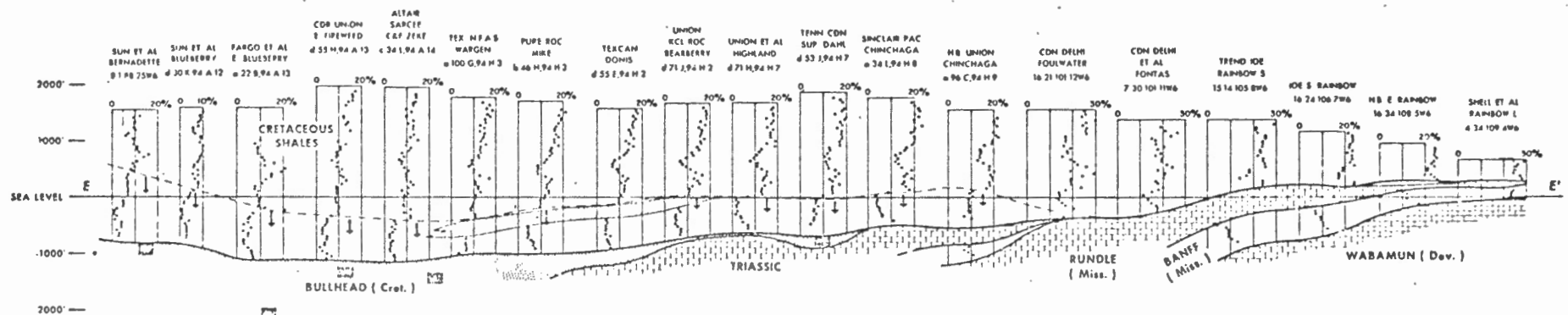


FIG.25

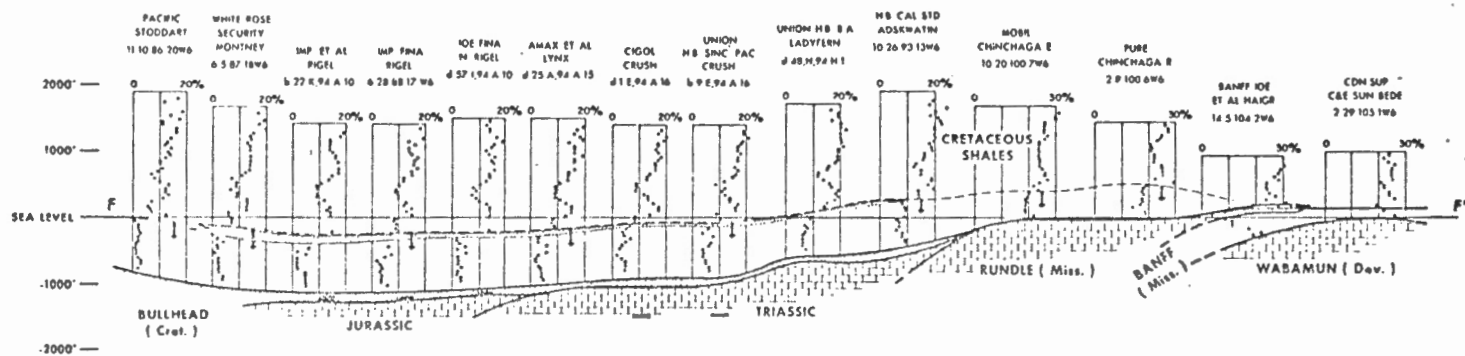


FIG.26



# SHALE POROSITY PROFILE

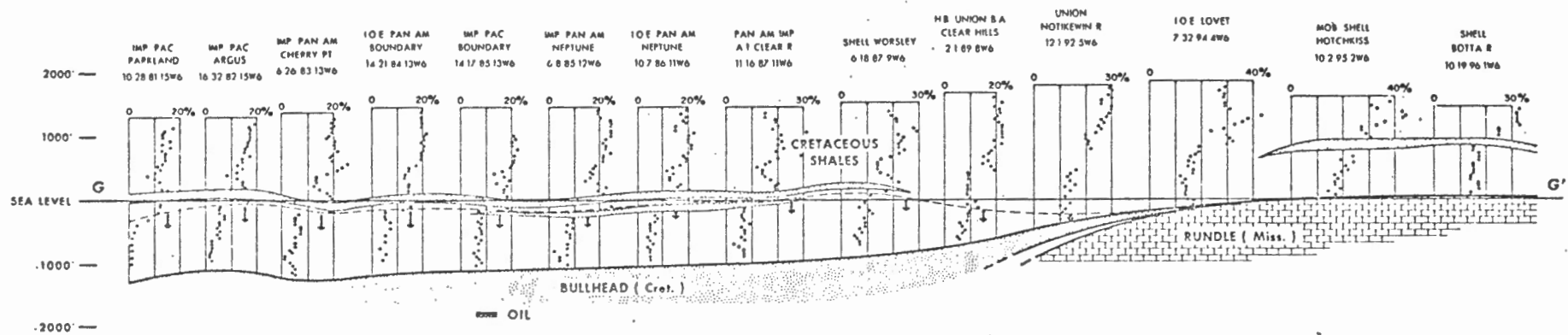
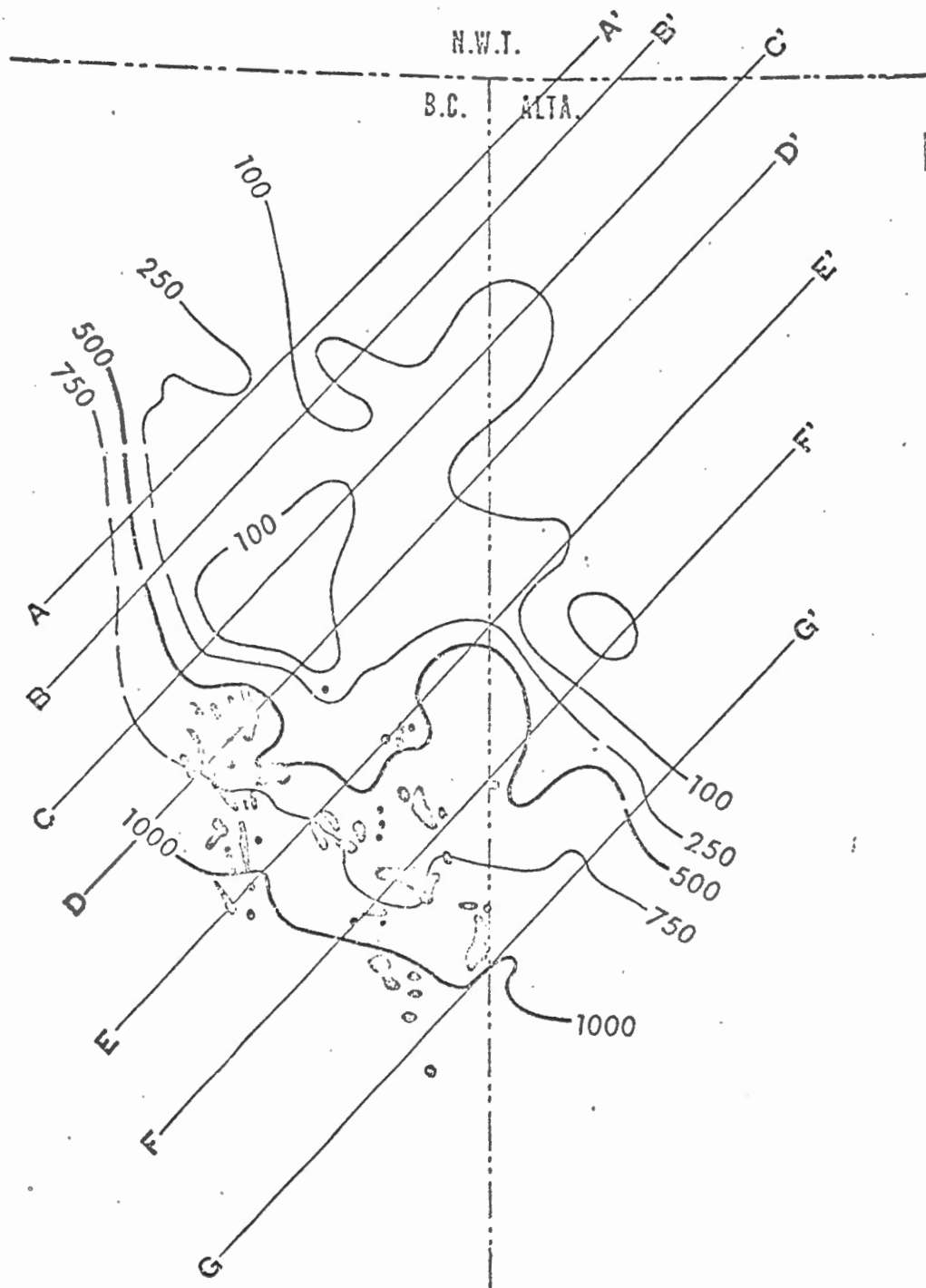


FIG.27

# THICKNESS OF DOWNWARD MIGRATION ZONE



CONTOURS SHOWING  
SHALE THICKNESS (ft.)  
WHICH CAUSED  
DOWNWARD MIGRATION

OIL & GAS POOLS IN  
LOWER CRETACEOUS,  
JURASSIC & TRIASSIC  
FORMATIONS

50 MILES

FIG.28

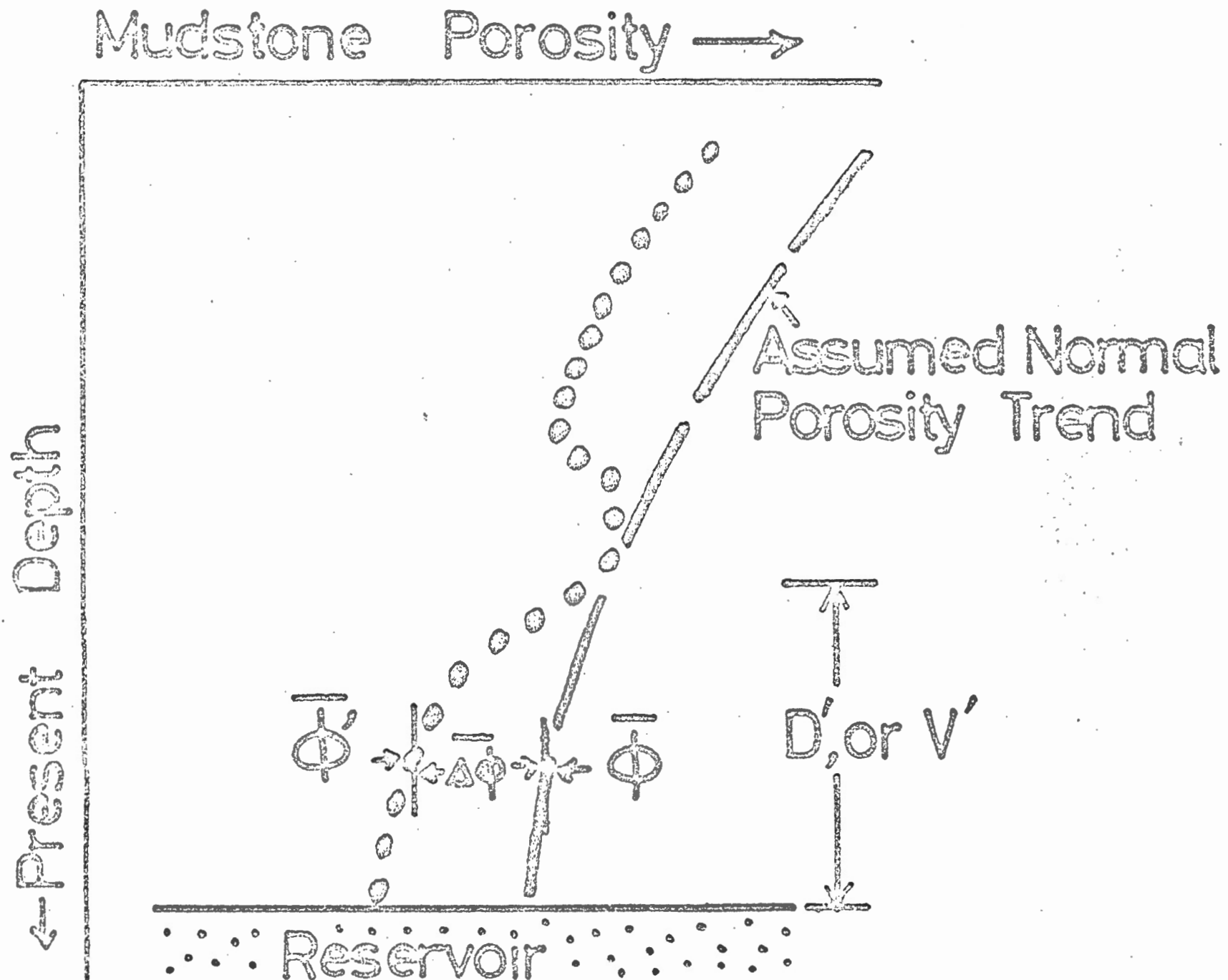
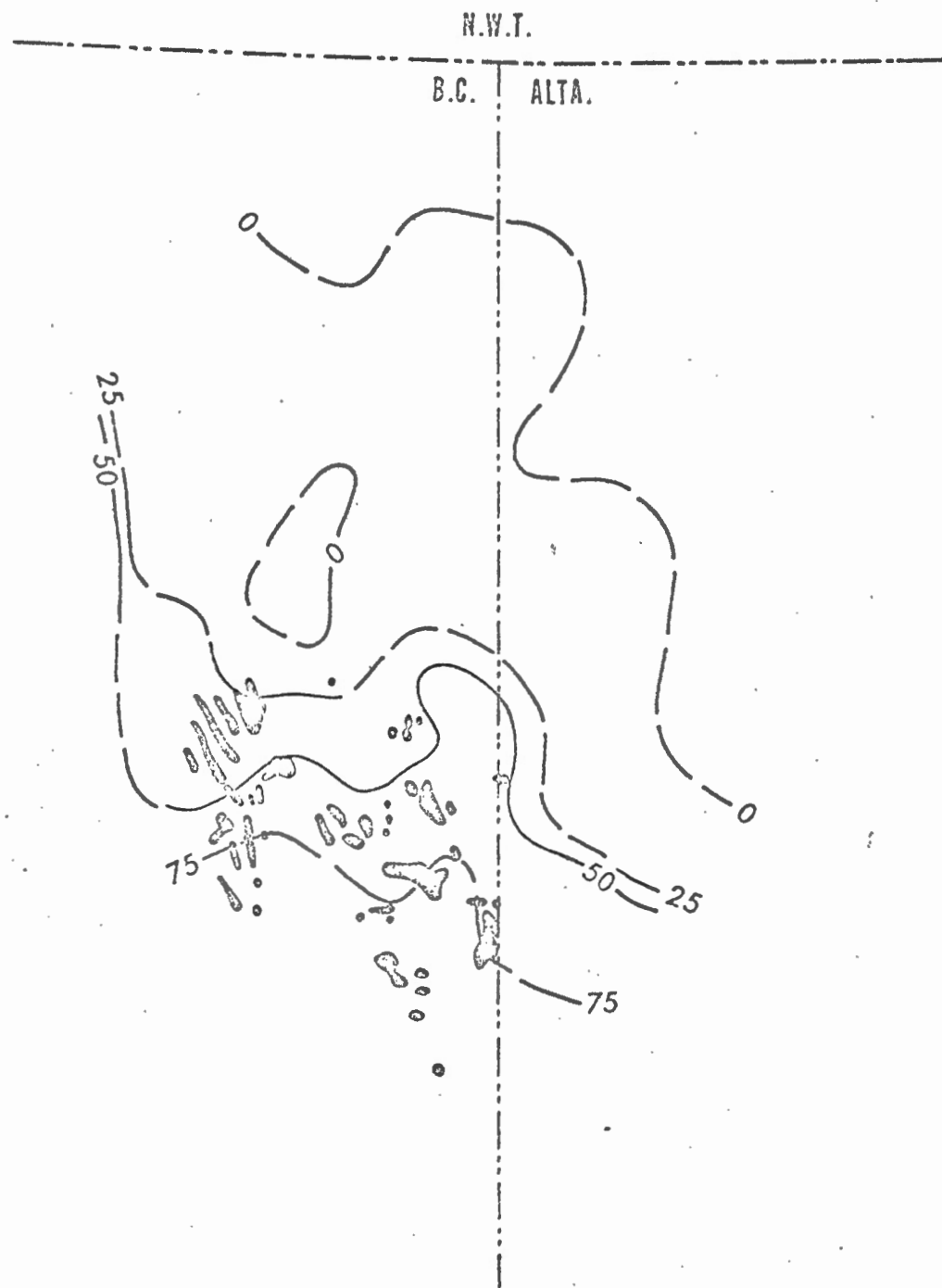


FIG.29



## VOLUME OF FLUIDS



CONTOURS SHOWING  
VOLUME OF FLUIDS  
(cu.ft./ft.<sup>2</sup>) EXPELLED  
DOWNWARD FROM  
CRETACEOUS SHALES



OIL & GAS POOLS IN  
LOWER CRETACEOUS,  
JURASSIC & TRIASSIC  
FORMATIONS

50 MILES

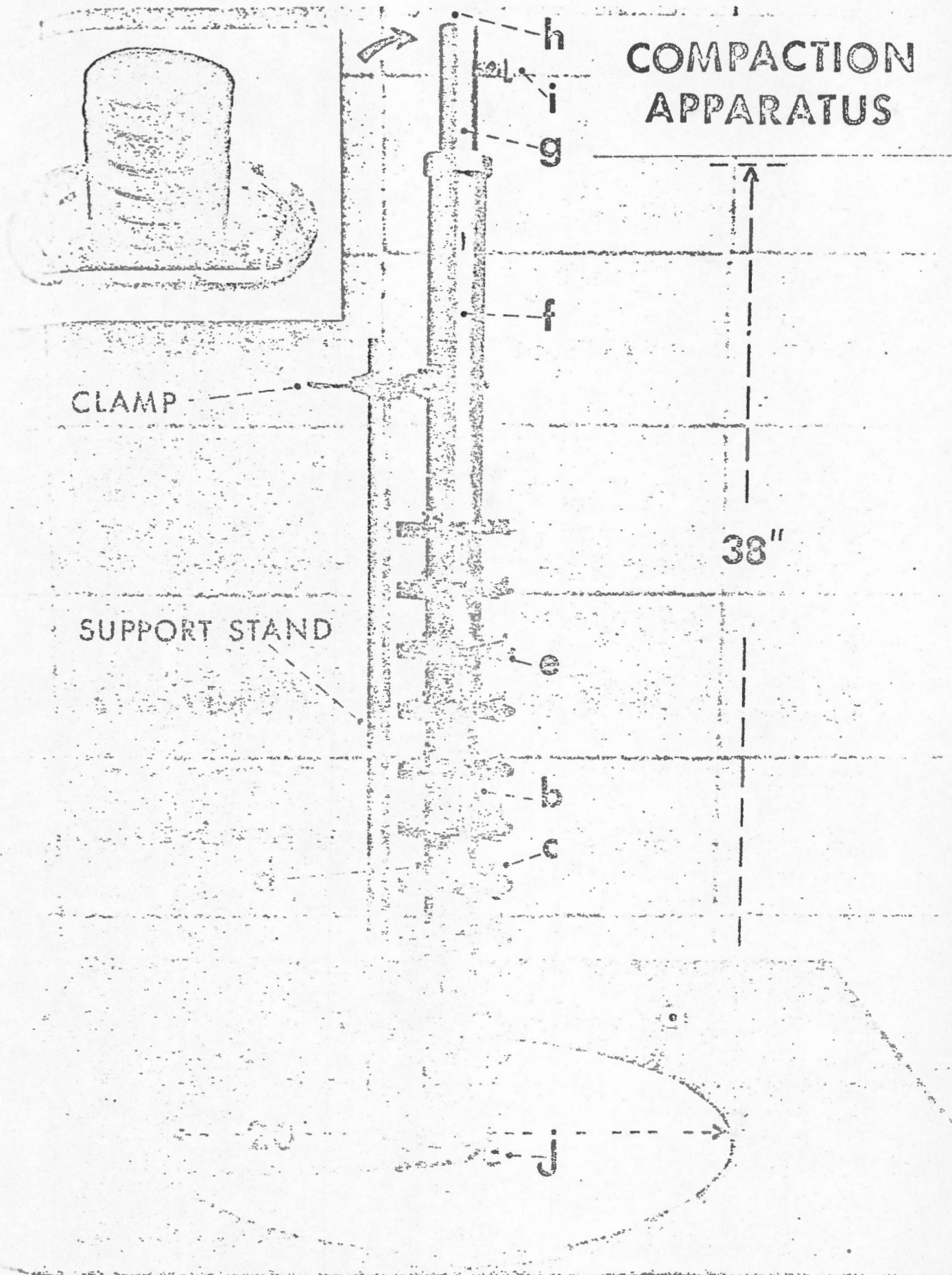


FIG.31

# COMPACTION EXPERIMENT

## A. MONTMORILLONITE +1.5 N NaCl WATER

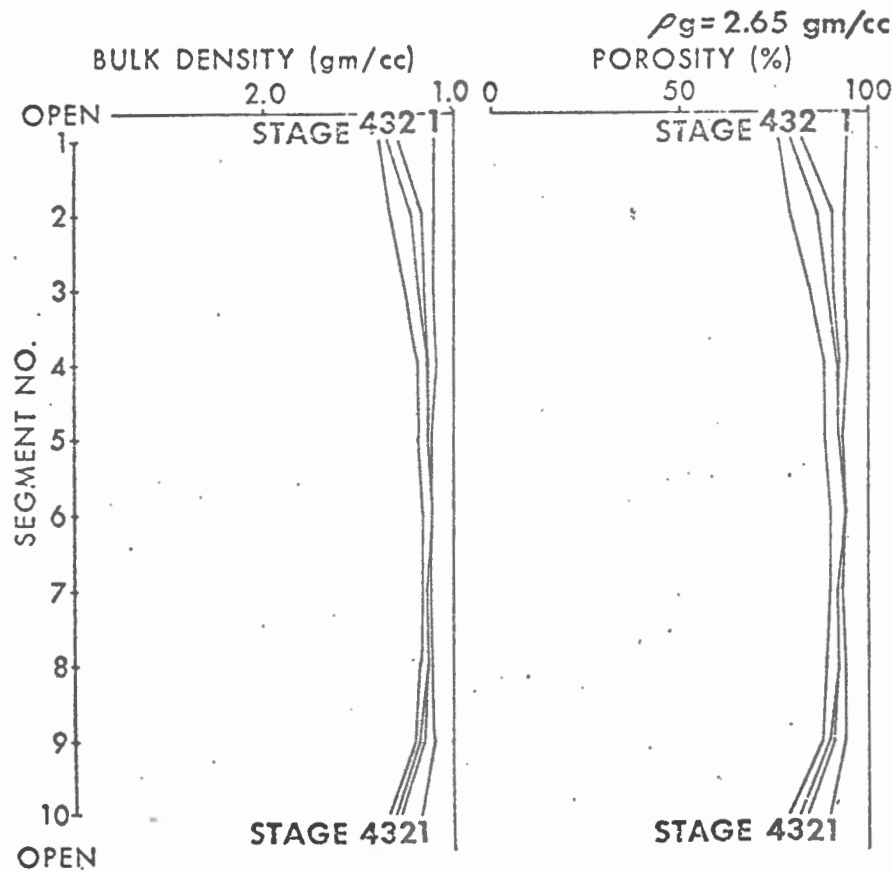


FIG.32

## B. MONTMORILLONITE +1.5 N NaCl WATER

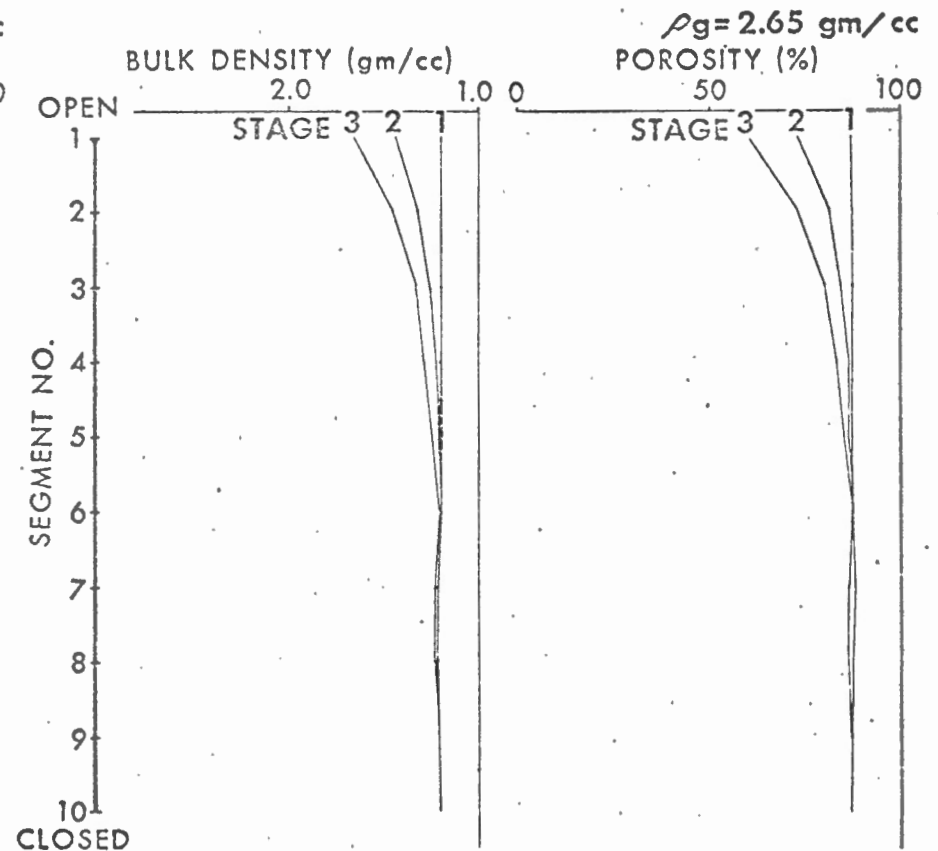


FIG.33

# CHANGE OF PISTON HEIGHT WITH TIME

EXPERIMENT B - MONTMORILLONITE, STAGE No.2 - No.3

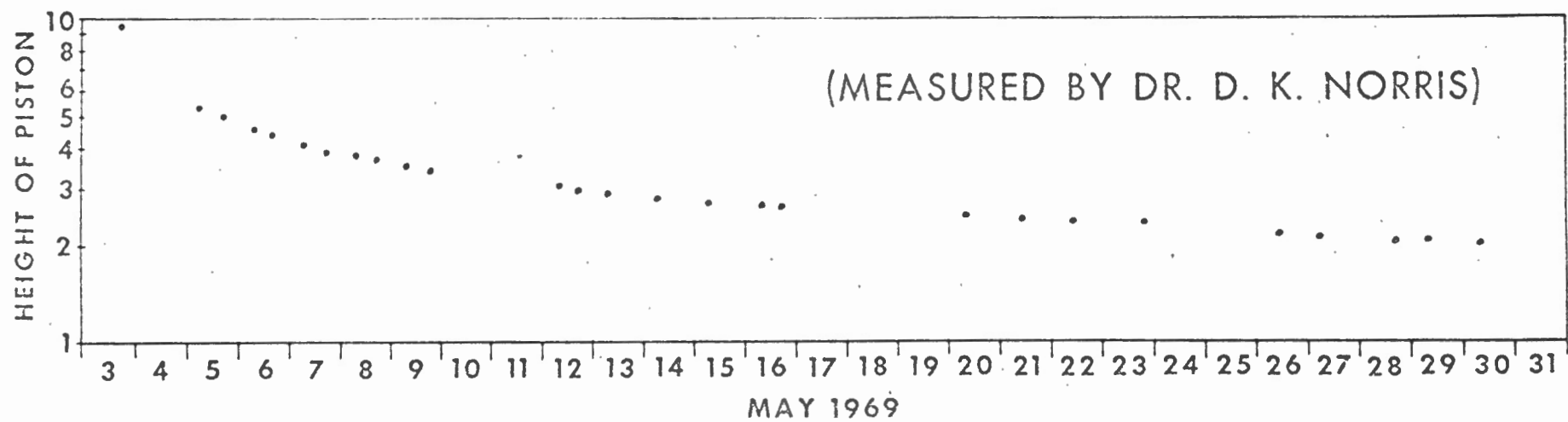


FIG.34

# COMPACTION EXPERIMENT

C. MONTMORILLONITE + FRESH WATER & SALT WATER

$$\rho_g = 2.65 \text{ gm./cc}$$

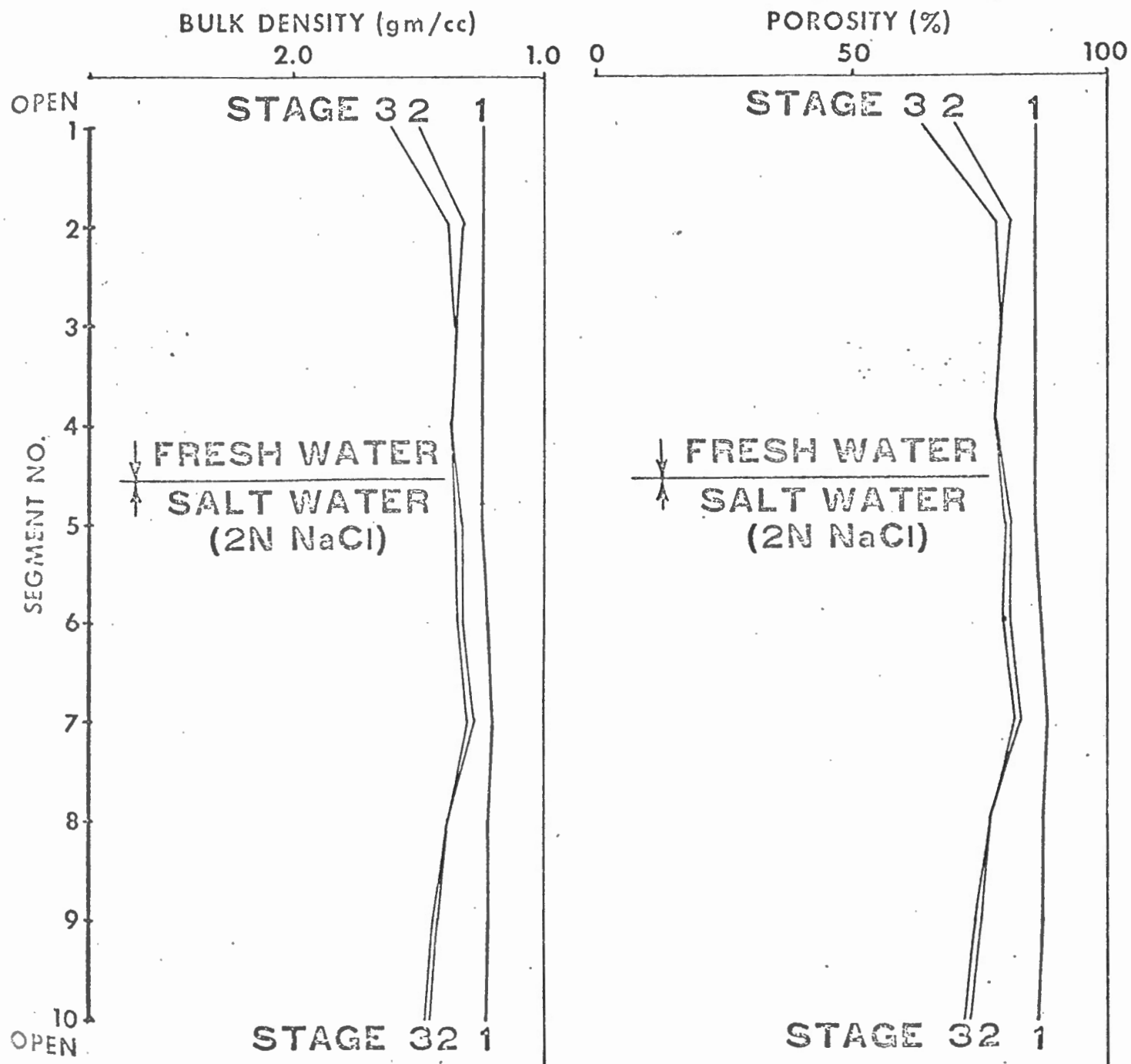


FIG. 35



# COMPACTION EXPERIMENT

## D. KAOLINITE+2N NaCl WATER

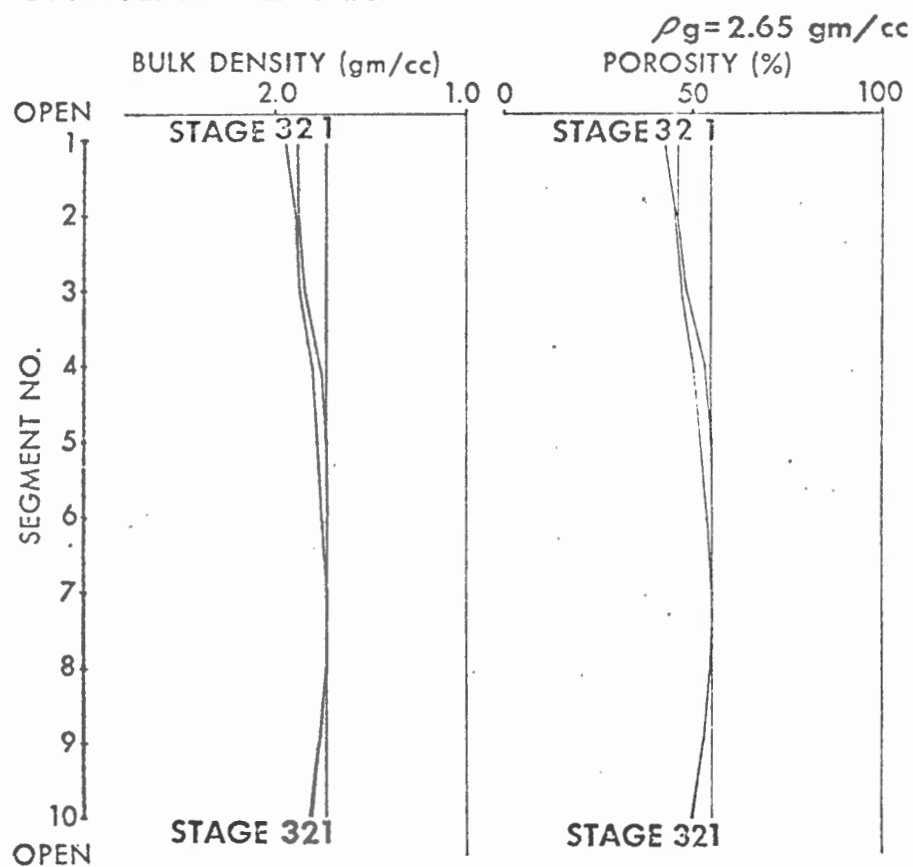


FIG.36

## E. MONTMORILLONITE + KAOLINITE (2N NaCl WATER)

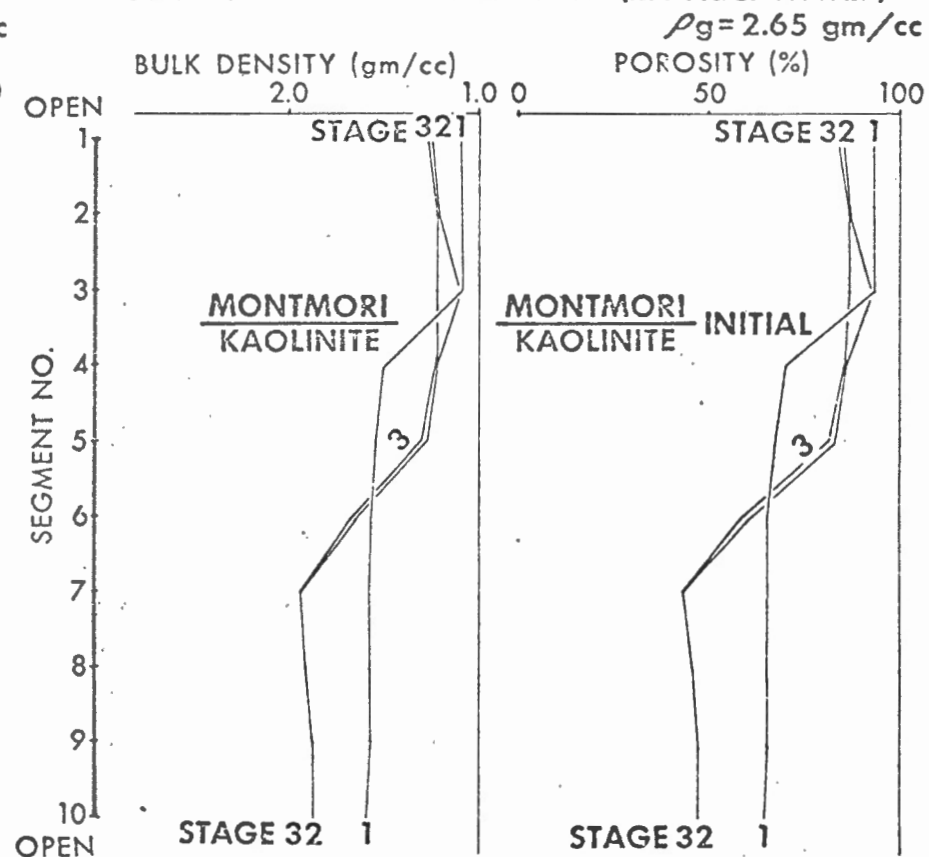


FIG.37

# COMPACTION EXPERIMENT

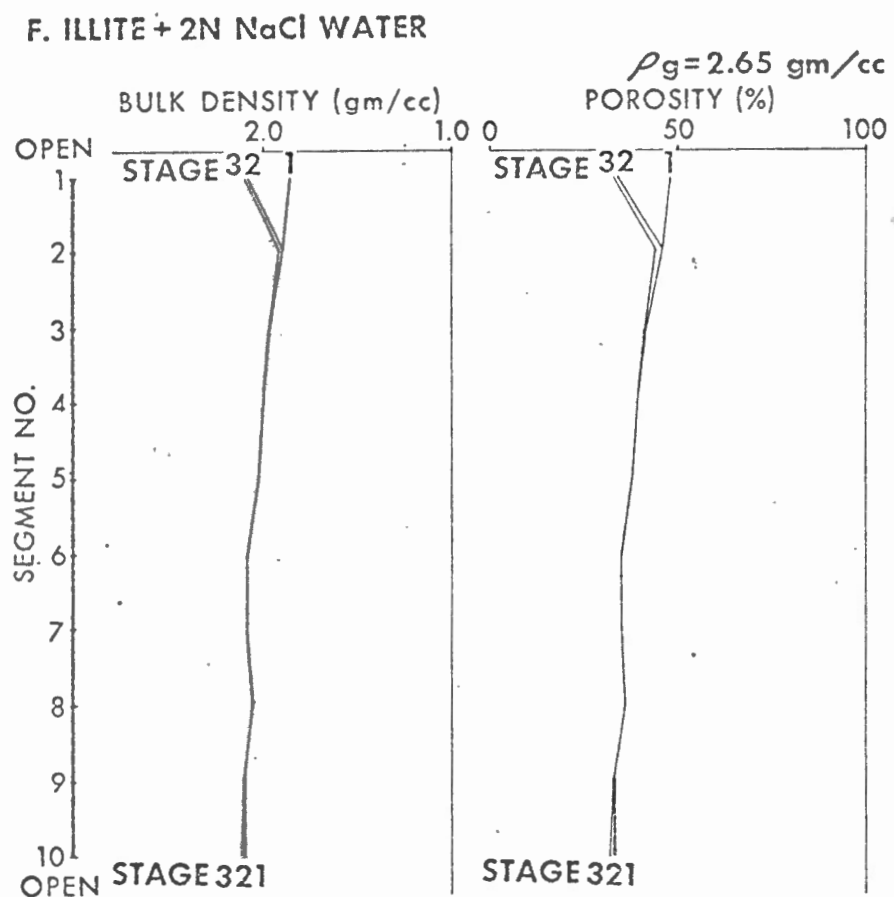


FIG.38

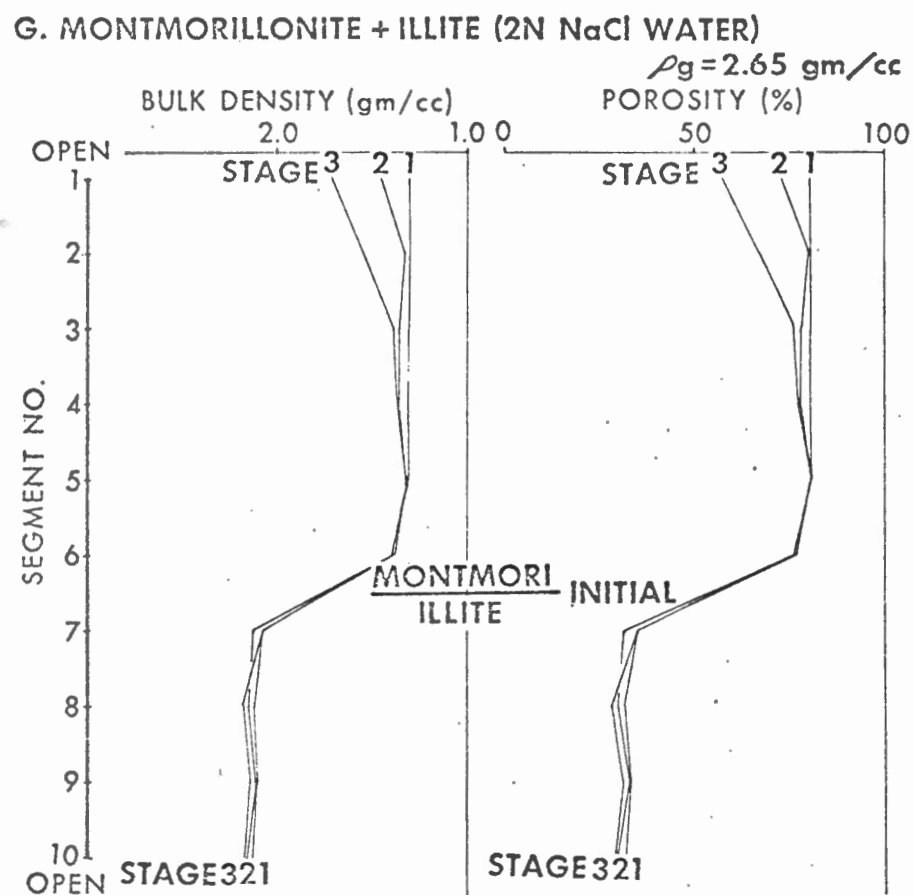


FIG.39

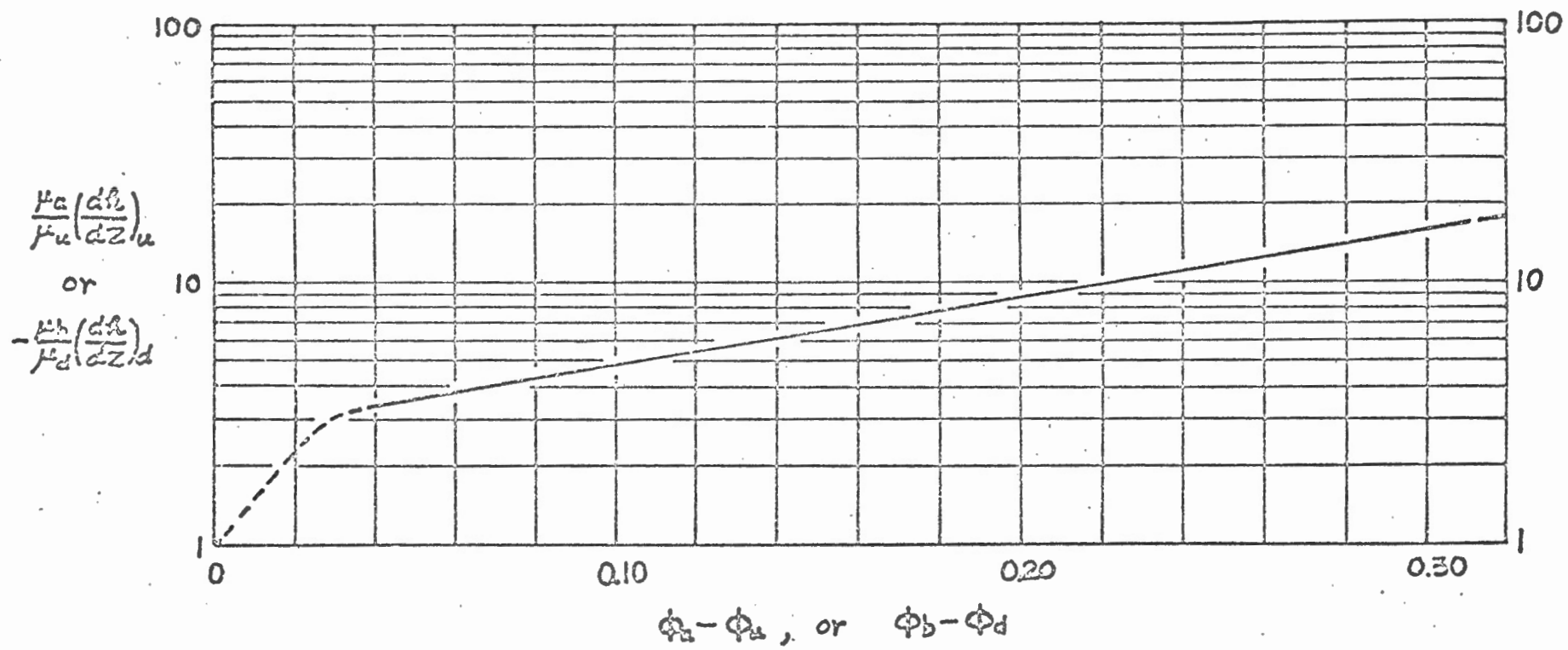


FIG. 40

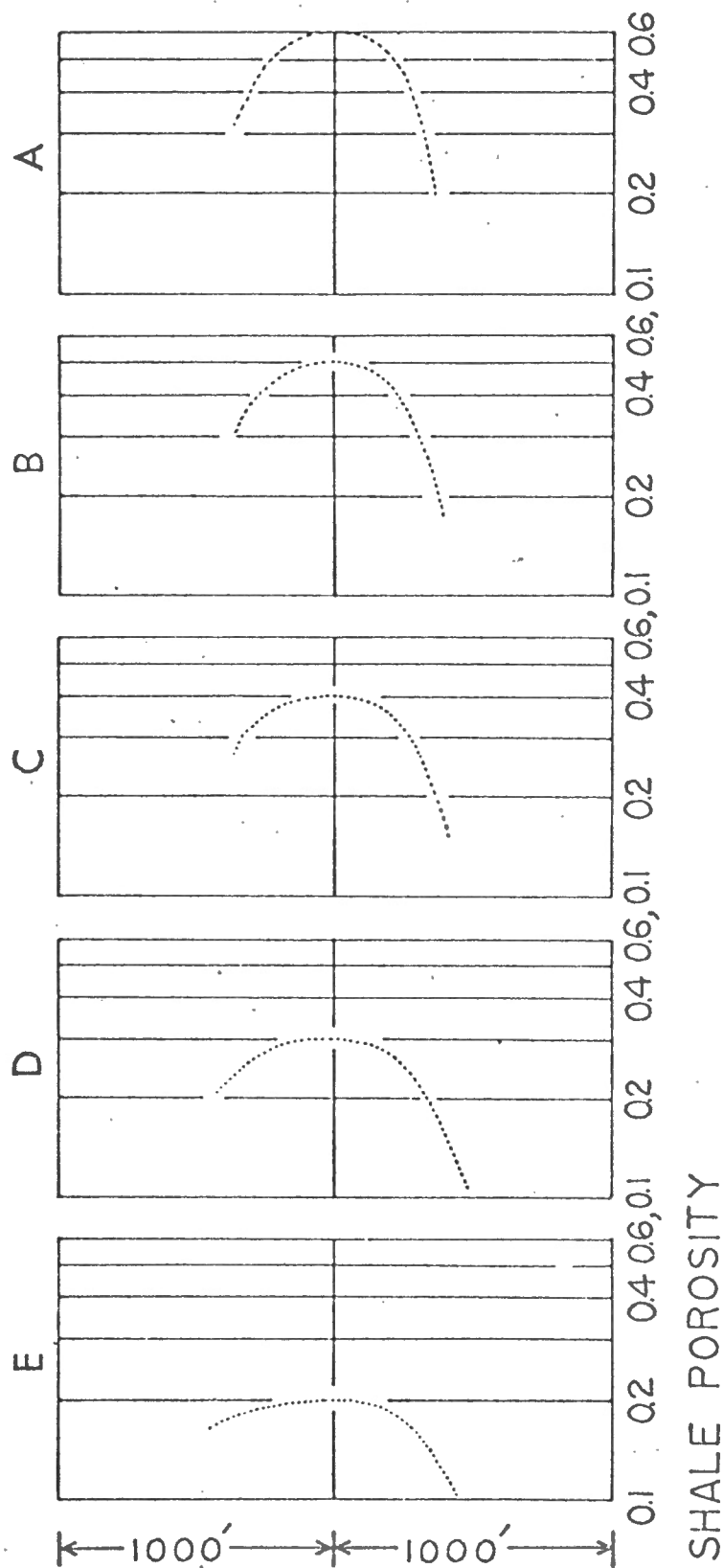


FIG.41 Constructed porosity distributions of incompletely compacted shales  
 (A:  $\phi_a = 0.6$ , B:  $\phi_a = 0.5$ , C:  $\phi_a = 0.4$ , D:  $\phi_a = 0.3$ , E:  $\phi_a = 0.2$ ).

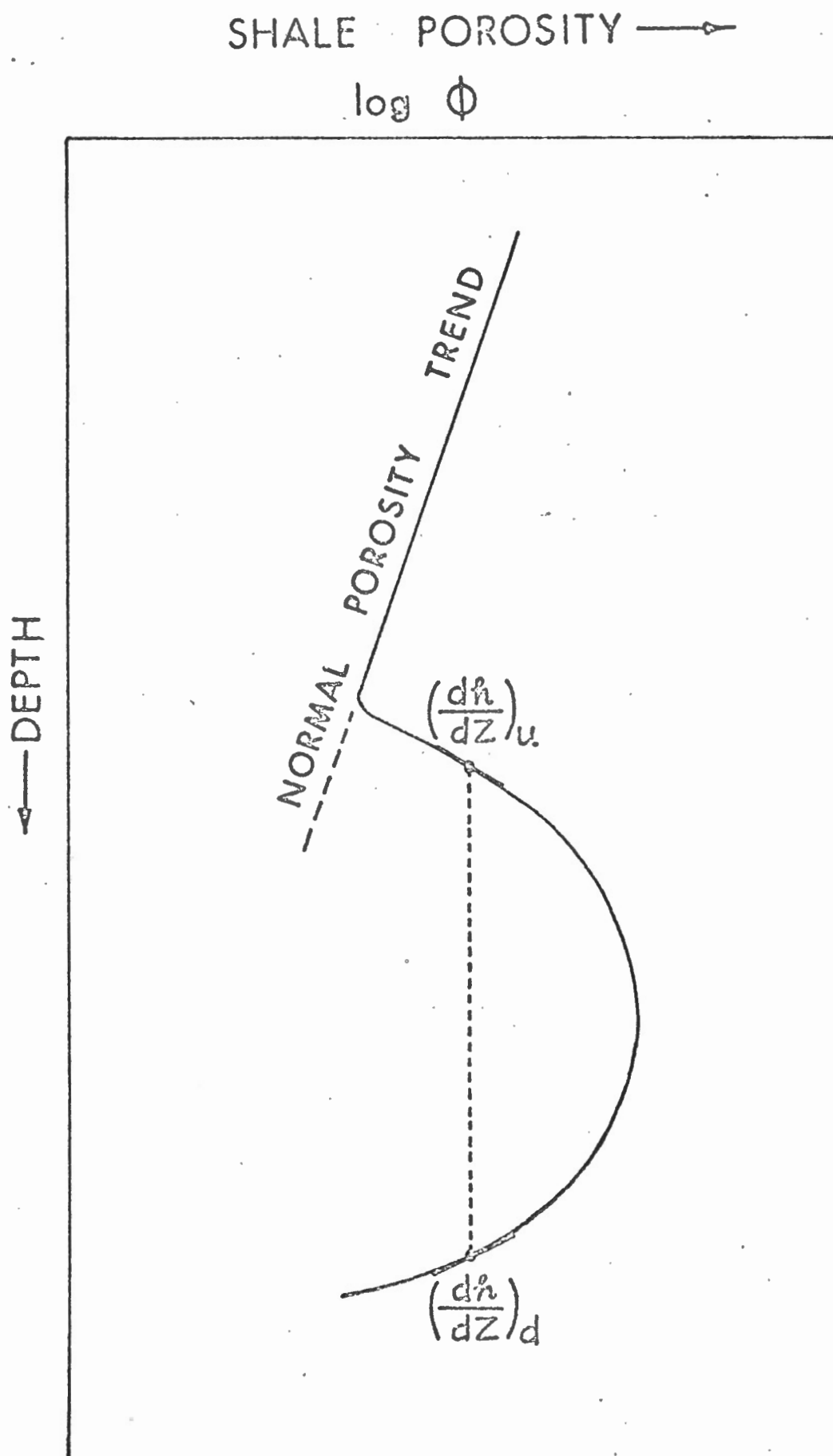


FIG. 42

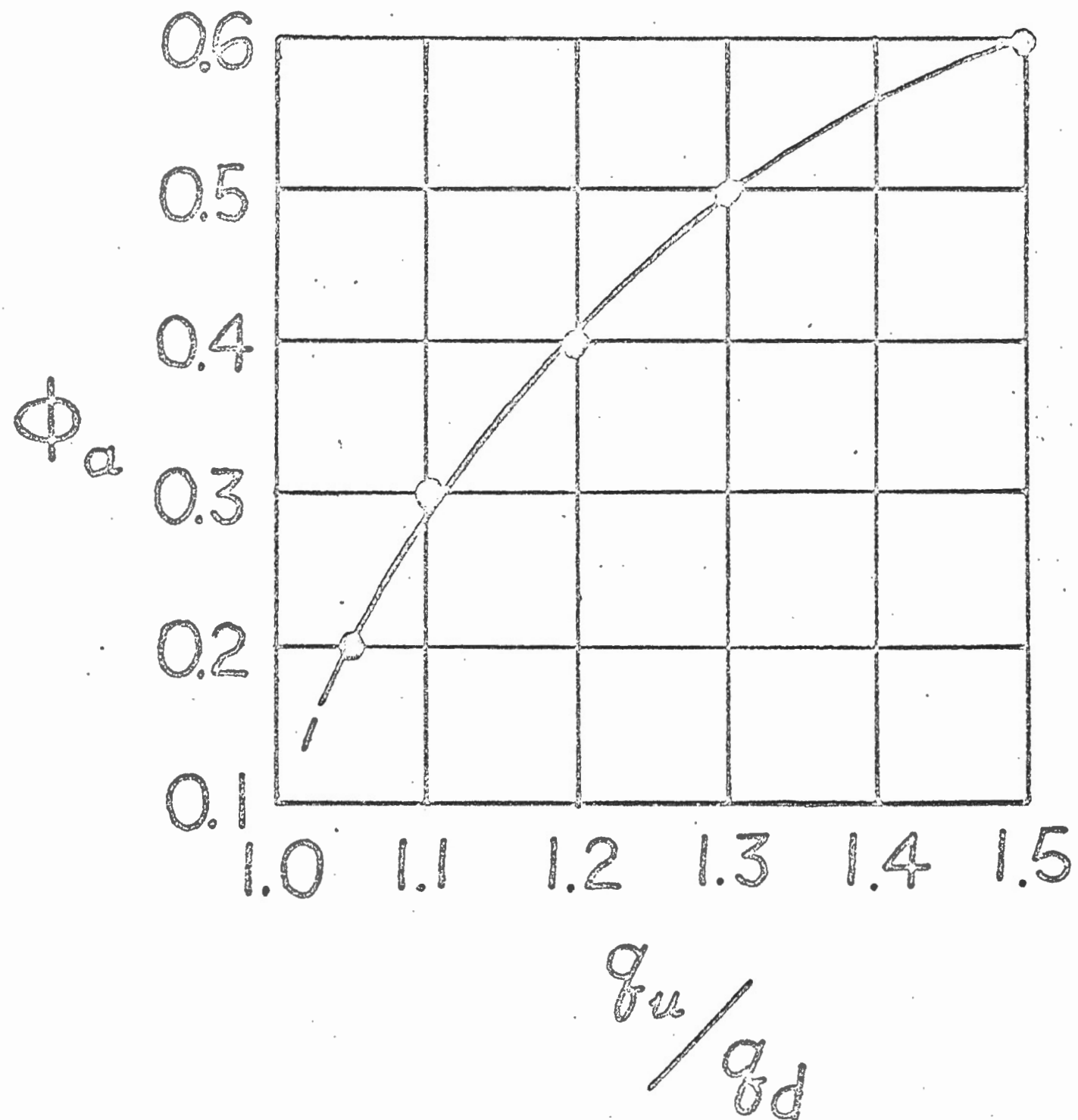
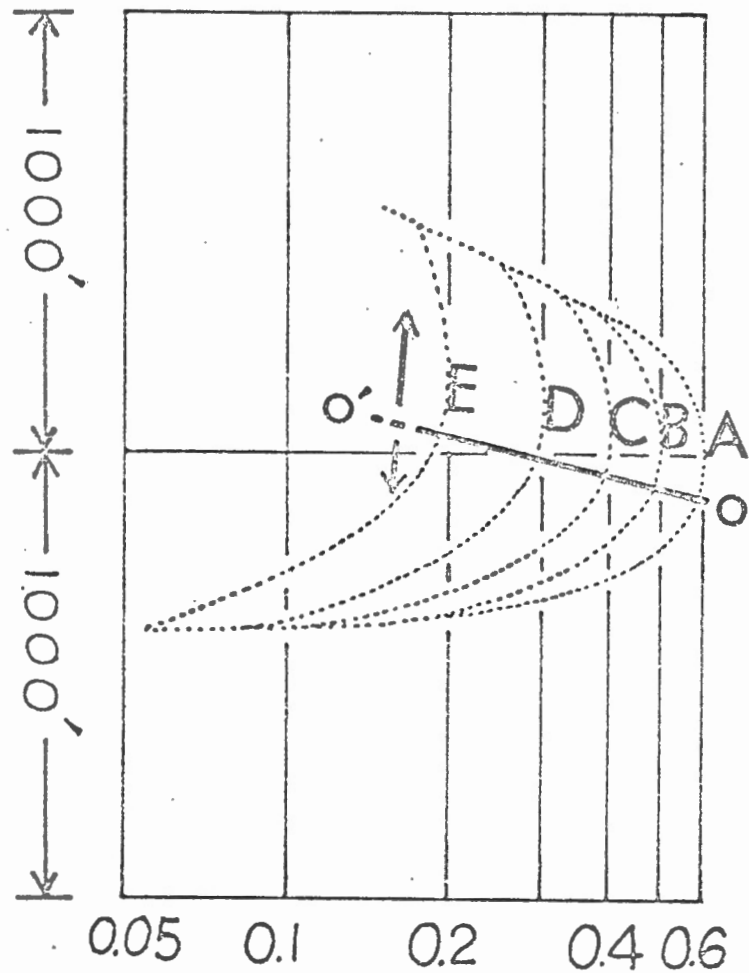


FIG. 43

# SHALE POROSITY



STAGES	AMOUNT OF WATER EXPULSION per 1 ft <sup>2</sup>	
	UPWARD	DOWNWARD
A - B	30 ft <sup>3</sup>	22 ft <sup>3</sup>
B - C	31	25
C - D	33	29
D - E	40	37

STAGE    A :  $\Phi_a = 0.6$   
           B :  $\Phi_a = 0.5$   
           C :  $\Phi_a = 0.4$   
           D :  $\Phi_a = 0.3$   
           E :  $\Phi_a = 0.2$

# SHALE POROSITY DISTRIBUTION AS A PERMEABILITY INDICATOR

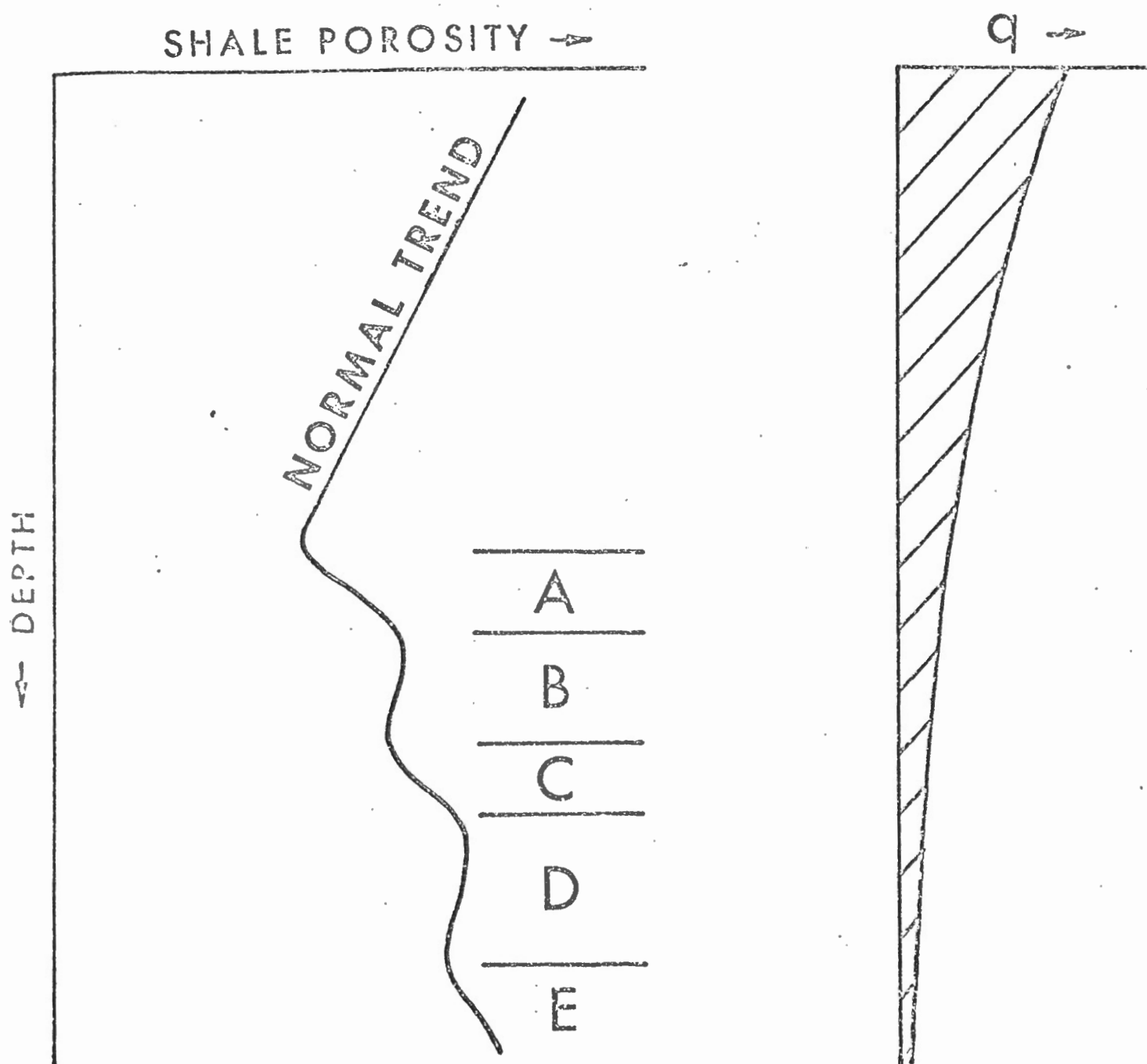


FIG. 45