

# **NOTICE**

**CERTAIN DATA  
CONTAINED IN THIS  
DOCUMENT MAY BE  
DIFFICULT TO READ  
IN MICROFICHE  
PRODUCTS.**

D.B. Moore  
D.B. Moore, Section Manager  
Authorized Derivative Classifier

DE92 009802

DOCUMENT NO. WSRC-RP-90-987  
Distribution Category: UC#

**CLASSIFICATION OF HYDROSTRATIGRAPHIC UNITS  
AT THE SAVANNAH RIVER SITE, SOUTH CAROLINA (U)**

Rolf K. Aadland  
Horace W. Bledsoe  
Environmental Sciences Section

Approved by:

D.B. Moore, Section Manager  
Environmental Sciences Section

Publication Date: December 1990

WESTINGHOUSE SAVANNAH RIVER COMPANY  
SAVANNAH RIVER SITE  
Aiken, SC 29802

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

**DISCLAIMER**

Prepared for the U.S. Department of Energy under Contract No. DE-AC09-89SR18035

DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED

**MASTER**

## TABLE OF CONTENTS

	Page
TABLE OF CONTENTS .....	ii
LIST OF FIGURES .....	iii
ABSTRACT .....	iv
INTRODUCTION .....	1
DISCUSSION .....	1
The Classification Scheme .....	1
Regional Context .....	6
Aquifer System I .....	7
Aquifer System II .....	8
Aquifer System I/II .....	8
Site Specific Example of the Classification: F-H Area .....	9
CONCLUSIONS .....	9
REFERENCES .....	10
APPENDIX A .....	12
Definition of Hydrostratigraphic Units .....	12
APPENDIX B .....	14
Proposed Criteria for Hydrostratigraphic Nomenclature .....	14

## LIST OF FIGURES

		Page
1	Location of the Savannah River Site	2
2	Map of the SRS	3
3	Comparison of Hydrostratigraphic Units used at SRS	4
4	Hydrostratigraphic-Lithostratigraphic Chart for SRS	5
		In Pocket
5	Regional North-South Lithostratigraphic Cross-Section	IA
6	Regional North-South Hydrostratigraphic Cross-Section	IB
7	Map of the Updip Limit of the Confining Systems	IC
8	Northwest-Southeast Hydrostratigraphic Cross-Section A-A'	II
9	West-East Hydrostratigraphic Cross-Section B-B'	III
10	West-East Hydrostratigraphic Cross-Section C-C'	IV
11	Southwest-Northeast Hydrostratigraphic Cross-Section D-D'	V
12	South-North Hydrostratigraphic Cross-Section E-E'	VI
13	West-East Hydrostratigraphic Cross-Section, GSA	VII

## ABSTRACT

A detailed synthesis of the hydrologic, geophysical and core data from wells penetrating the updip Mesozoic-Cenozoic Coastal Plain sequence at and near the Savannah River Site (SRS) was conducted to define and classify the hydrostratigraphic units. The purpose of the study was to give the SRS a single unified hydrostratigraphic classification that defines and addresses the hydrogeologic characteristics of the aquifers underlying the site. The characterization, areal distribution and classification of the aquifer and aquifer systems gives SRS the tools to evaluate ground water movement and contaminant transport in a comprehensive regional context.

An alpha-numeric nomenclature has been temporarily adopted in this report for classifying the aquifers and aquifer systems at SRS. Formal geographic names for the aquifers and aquifer systems will be proposed in the near future but must be agreed upon and ratified by the South Carolina Hydrostratigraphic Subcommittee which was in part organized for the purpose. The classification utilizes a hierarchy of terms ranked at three levels: Aquifer Systems that transmit ground water regionally; Aquifer Units which are mappable units > 400 square miles in area; and Aquifer Zones that differentiate aquifers internally on the basis of locally significant characteristics.

The basement complex is designated the Paleozoic-Triassic Basement Hydrologic System and is considered to have no present or future prospects for ground water utilization in the SRS area. Overlying the basement hydrologic system is Confining System I that forms the base of the unconsolidated Coastal Plain sequence. It includes no aquifers in the SRS region but towards the coast the system thickens considerably and includes several aquifers. Throughout most of the SRS, the remaining Coastal Plain sequence is divided into two aquifer systems; System I and System II, separated by Confining System I-II. In the northwest corner of the site, Aquifer Systems I and II coalesce forming the single Aquifer System I/II. At the southern edge of the site, Aquifer System I splits into two aquifer systems which extend southward to the coast.

Each aquifer system is subdivided into both aquifer units and confining units. Aquifer System I includes in ascending order Aquifer Units IA and IB, separated by Confining Unit IA-IB; Aquifer System II, Aquifer Units IIA and IIB, separated by Confining Unit IIA-IIB; and Aquifer System I/II, Aquifer Units I/IIA, I/IIB and I/IIC, separated by Confining Units I/IIA-I/IIB and I/IIB-I/IIC. Updip, beyond the northern boundary of the site, Aquifer System I/II acts as a single aquifer from the water table to the basement. In site specific studies, the aquifer units and/or confining units may be further subdivided into aquifer zones and confining zones as needed.

A set of comparative chronostratigraphic, lithostratigraphic and hydrostratigraphic charts and a series of lithostratigraphic and hydrostratigraphic cross-sections illustrate the classification scheme presented here.

# CLASSIFICATION OF HYDROSTRATIGRAPHIC UNITS AT THE SAVANNAH RIVER SITE, SOUTH CAROLINA

By R. K. Aadland and H. W. Bledsoe

Westinghouse Savannah River Company  
Savannah River Site  
Aiken, SC 29802

## INTRODUCTION

The Savannah River Site (SRS) is located on the Upper Coastal Plain about 20 miles southeast of the Fall Line in west central South Carolina (Figures 1&2). The Atlantic Coastal Plain is underlain by a seaward-dipping wedge of unconsolidated and consolidated sediments that extend from the contact with the crystalline Piedmont province at the Fall Line to the edge of the continental shelf. Sediment thickness increases from zero at the Fall Line to greater than 4000 feet at the South Carolina coastline (Colquhoun et al., 1983) and ranges in age from Late Cretaceous (Cenomanian) to Recent. At SRS the sediment wedge varies in thickness from approximately 750 feet at the northern boundary of the site to more than 1400 feet to the south.

Several hydrostratigraphic classifications have been devised in the past few years to describe and depict the hydrogeology beneath the site (Figures 3&4). Central to all the classification schemes has been the one to one fixed relationship between hydrostratigraphic units and lithostratigraphic units currently in use. This fixed relationship has proved difficult to implement in studies at widely separated locations due to rapid facies changes observed in the updip Coastal Plain sequence where the site is located. In many instances, lithostratigraphic units included in aquifer and confining units at some locations are not present at other locations, or confining units observed at some locations are not present or not effective elsewhere making useful models of local aquifer behavior difficult and unrealistic when applying the various classifications on a site wide basis.

A detailed synthesis of the geophysical, core and hydrologic data available from more than 156 deep wells from 20 cluster locations as well as a number of other strategically located wells both on site and in the surrounding region (Fig.2) was conducted to provide the basis for a hydrostratigraphic classification scheme applicable to the entire SRS region (Fig.3). The result is an interim hydrostratigraphic classification that defines and addresses the regional hydrogeologic characteristics of the aquifers underlying the site (Aadland et al., 1990).

The hydrostratigraphic code accounts for and accommodates the rapid lateral variation in lithofacies observed in the region and eliminates all "formal" connection between the hydrostratigraphic nomenclature and the lithostratigraphic nomenclature (Fig.4) by defining hydrostratigraphic units independently of the lithostratigraphic units. The code is robust and can be made as detailed as is needed to characterize the aquifer units and aquifer zones described in site specific studies.

**Figure 1**

**Figure 2**



**Figure 3**

Figure 4

## DISCUSSION

### The Classification Scheme

The hydrostratigraphic classification of the aquifers at SRS utilizes a hierarchy of aquifer and confining units ranked at three levels (Laney and Davidson, 1986). Please refer to Appendix A for further details.

Rank	Hydrostratigraphic Units (after Laney and Davidson, 1986)
1	Aquifer System Confining System
2	Aquifer Unit Confining Unit
3	Zone (informal)

Aquifer units and confining units, (rank 2), are the fundamental units of the classification. An aquifer unit is defined as a mappable (>400 sq.mi.) body of rock or sediments that is sufficiently permeable to conduct ground water and to yield significant quantities of the water to wells and springs (modified from Bates and Jackson, 1980). A confining unit on the other hand, is a mappable body of rock or sediment of significantly lower hydraulic conductivity than an adjacent aquifer, that serves as an impediment to ground water flow to or from the aquifer. In nature, its hydraulic conductivity may range from nearly zero to some value distinctly lower than that of the nearby aquifer. In this sense, the assignment of a rank and unit name to a hydrostratigraphic unit is not quantitatively defined and does not imply hydraulic continuity or the lack thereof, but rather distinguishes relative differences in lithology and hydraulic properties.

Aquifer and confining units may be informally subdivided into zones, (rank 3), which are characterized by properties significantly different than the rest of the unit, such as hydraulic conductivity, water chemistry, lithology, color etc. For example, an aquifer may contain a "low-permeability zone", a "high salinity zone," or a "tan clay zone," or a confining unit may contain a "high-permeability zone" or a "marl zone."

Above aquifer units and confining units, and ranked No. 1, are aquifer systems and confining systems. The aquifer system may be composed of two or more coalescing aquifer and confining units, that transmit ground water regionally. The aquifers may be separated at least locally by confining units that impede ground water movement, but that do not greatly affect the regional hydraulic conductivity of the system. A confining system may be composed of two or more confining units and aquifer units that serves as an impediment to ground water flow regionally.

The hydrostratigraphic units defined at SRS are based on the lithologic and hydraulic properties of the sediments, most significantly hydraulic conductivity, and also porosity and specific storage (Bledsoe et al., 1990). These criteria eliminate any "formal" reliance of the classification system on the lithostratigraphy, genesis, age, geologic history, paleogeographic position or other features which are not strictly lithologic or hydraulic properties of the units.

The aquifers that are described in this report, are defined by the hydraulic properties (hydraulic conductivity and transmissivity measurements, specific storage etc.) of the units (see Appendix A) relative to the hydraulic properties measured in the overlying and underlying confining units (Bledsoe et al., 1990). The aquifer and confining units are mapped on the other hand, on the basis of the thickness, areal distribution and continuity of

the attendant lithologies of the particular unit. For example, the geographic area encompassed by Confining Unit IIA-IIB (Figs. 6-12) is based on the thickness, lateral distribution and continuity of the clays, silty clays and clayey sandstones from which the hydraulic properties that define the unit were measured.

The hydrostratigraphic classification proposed here for the aquifers in the SRS region are based on the criteria suggested by the South Carolina Hydrostratigraphic Subcommittee (Burt, 1988) for naming aquifer systems, units and zones (Appendix B). The subcommittee has been instituted to assemble and implement a nomenclature for the aquifers and aquifer systems of the entire state. It is composed of workers actively involved with ground water investigations throughout South Carolina and the surrounding region. The members of the subcommittee include academics from the universities in the region, individuals from the South Carolina Water Resources Commission, South Carolina Department of Health and Environmental Control (SCDHEC), the USGS, DOE as well as industry including Westinghouse Savannah River Co. The subcommittee has recommended that Aquifer units and aquifer systems be named using geographic terms that indicate an area where the aquifer or aquifer system is of local or regional importance. Ideally the geographic terms should reflect the scale of the functional extent of the aquifer or aquifer system. For example; Aiken County Aquifer, or Augusta Aquifer; Low Country Aquifer System, or Floridian Aquifer System, etc. At this time, however, appropriate geographic names for the aquifers have not been formally agreed upon by the Subcommittee and an alpha-numeric system has been temporarily adopted until the formal nomenclature is in place (Fig. 3).

The alpha-numeric classification defines two aquifer systems, Systems I and II, at SRS, which are further subdivided into aquifer and confining units as noted in Figures 6,8,9,10,11,12. The aquifer and confining units may be further subdivided into aquifer zones and confining zones as needed in site specific studies (see later section). All the confining intervals, be they confining systems, units or zones are designated and named by hyphenating the name of the overlying and underlying aquifer. For example, the confining interval between Aquifer Systems I and II is labeled Confining System I-II; the confining interval between Aquifers Units IIA and IIB is labeled Confining Unit IIA-IIB.

## **Regional Context**

The regional lithostratigraphy of the geologic sequence along the Georgia-South Carolina border is illustrated in Figure 5, and the attendant hydrostratigraphic subdivision of the sequence that is used in this report is illustrated in Figure 6. The Basement Complex is designated as the Paleozoic-Triassic Basement Hydrologic System in the SRS area. It is generally considered to have no present or future prospects for ground water utilization.

Overlying the basement hydrologic system throughout the SRS region is Confining System I that forms the base of the unconsolidated Coastal Plain stratigraphic sequence. The system is essentially equivalent to the saprolite overlying the unweathered crystalline basement rocks and the Cretaceous aged Cape Fear Formation and includes no aquifers in the vicinity of SRS. Towards the coast, however, the system thickens considerably and includes several aquifers.

Throughout most of SRS, the Coastal Plain sequence overlying Confining System I is divided into two aquifer systems: System I and System II, separated by Confining System I-II. Northwest of Upper Three Runs Creek (UTRC) in the northwest corner of SRS (Fig.7), the individual confining beds of Confining System I-II thin and become discontinuous, and Aquifer Systems I and II coalesce forming the single larger Aquifer System I/II. The approximate updip limit of Confining System I-II is illustrated on Figures 6,7,8,12. Indeed, beyond the northern boundary of the site, in the catchment area for the

entire Coastal Plain sequence, Aquifer System I/II acts as a single aquifer unit from the water table to basement (Fig. 6).

Southward from the SRS, the Coastal Plain sequence thickens dramatically, reaching 4000' at the coastline (Colquhoun et al., 1983; Fig. 5). Here the sequence is characterized by more than the two aquifer systems delineated updip at the site. Clarke, Brooks and Faye, 1985, working immediately to the west of SRS in Georgia, suggest the Coastal Plain sequence to the south of SRS be divided into three aquifer systems (Fig. 6). Indeed Aquifer System I of this report is the result of the coalescence of the lower two of the three aquifer systems suggested by Clarke et al. The updip limit of the confining system that separates the two aquifer systems of Clarke et al., 1985, is illustrated on Figures 6,7,8,9,10,12.

Colquhoun et al., 1983, working on the South Carolina side of the border with Georgia suggest the Coastal Plain sequence south of the SRS be divided into four aquifer systems. The differences between the Clarke et al. and Colquhoun et al. schemes may be due to the relative dip position of their respective studies as noted on Figure 6. Because of this uncertainty, the hydrologic sequence to the south of the SRS is undefined in this report pending formal agreement by the South Carolina Hydrostratigraphic Subcommittee as to the number of hydrologic systems recognized in the region and the designation of formal names for each system.

### **Aquifer System I**

Aquifer System I overlies Confining System I throughout most of the SRS, from Upper Three Runs Creek (UTRC) to the southern periphery of the site where it divides into the two aquifer systems of Clarke et al., 1985 (Figs. 6,7,8,9,10,12). In general the system includes the upper Cretaceous aged sediments of the Lumbee Group (Fig. 4). It is overlain by Confining System I-II, that includes the sequence of interbedded permeable and confining beds in the Paleocene aged Black Mingo Group, and locally the confining beds in the uppermost part of the Peedee Formation.

In the main body of the SRS, Aquifer System I is divided into two aquifer units (Fig. 2). They are designated from bottom to top as Aquifer Units IA and IB (Figs. 6 through 12), separated by the Confining Unit IA-IB. Aquifer IA generally includes the sands in the Middendorf Formation and lower 1/3 of the Black Creek Formation, while Aquifer IB includes the sands in the upper 1/3 of the Black Creek Formation and the overlying Peedee Formation. They are the principal water producing aquifers at SRS.

Confining Unit IA-IB generally correlates with the confining beds in the middle 1/3 of the Black Creek Formation. The unit thins and pinches out southward between the P-27 and P-19 well clusters (Fig. 8) where Aquifer Units IA and IB are in communication, but is reestablished further south between the P-19 and P-24 well clusters and persists throughout the remainder of the site region.

Aquifer Unit IA and its hydrologic equivalent to the northwest of Upper Three Runs Creek (Aquifer Unit I/IIA of Aquifer System I/II), can be divided into two aquifer zones over much of the northern one third of the site by the persistent clay bed illustrated in Figure 8. The two aquifer zones are designated from bottom to top as Aquifer Zones IA1 and IA2 near the P-28 well cluster in Aquifer Unit IA, and as Aquifer Zones I/IIA1 and I/IIA2 in Aquifer Unit I/IIA. Near the center of the site the Confining Zone IA1-IA2 separating Aquifer Zones IA1 and IA2 pinches out in the vicinity of the P-19 well cluster. But southward, beyond the P-19 well cluster the interval consists of thin clay beds and silty sand beds that may reduce the hydraulic conductivity of the aquifer but would not be considered a confining zone.

Aquifer Unit IB of Aquifer System I is persistent throughout the SRS. However, northward beyond Upper Three Runs Creek (UTRC), the clay and silty clay beds of Confining System I-II which overlies the aquifer cease being completely effective and Aquifer Unit IB and the aquifers of Aquifer System II are locally in communication (Figs.6 and 8). Here, the larger single Aquifer System I/II is defined, and the sands of Aquifer Unit IB are incorporated into Aquifer Unit I/IIB of Aquifer System I/II along with the sands of Aquifer Unit IIA of Aquifer System II.

## **Aquifer System II**

Aquifer System II overlies Confining System I-II throughout the lower two thirds of the SRS. It includes all the sediments in the Tertiary sequence above the confining beds in the Paleocene aged Black Mingo Group (Fig. 2). The system is divided into two aquifers, in ascending order Aquifer Units IIA and IIB (Figs.6,8,9,10,11,12), separated by Confining Unit IIA-IIB.

Aquifer Unit IIA generally includes the sands of the Congaree Formation, the underlying Four Mile Member of the Fishburne Formation and locally the sands in the overlying Warley Hill Member of the Santee Formation. The unit is second only to the aquifers in Aquifer System I in water producing capability.

Confining Unit IIA-IIB which overlies Aquifer IIA, consists of the confining clay beds of the Caw Caw Member, found at and near the base of the Santee Formation. The confining unit has been informally termed the "green clay" at SRS. From UTRC to the vicinity of the P-19 well cluster (Fig.8), the confining unit generally consists of one or more of the thin but persistent Caw Caw clay beds; but south of P-19 it includes both the clay beds and the continuous limestone and carbonate-rich clastic beds that dominate that stratigraphic interval in the southern third of the site and beyond. The confining unit especially in the central and southern part of the site supports a significant head drop in wells completed in the surrounding aquifers.

Aquifer IIB consists of the sandy sediments of the Santee Formation and all the heterogeneous sediments in the overlying Barnwell Group from the water table down to Confining Unit IIA-IIB (Figs.3&4). It is not a significant aquifer on site.

## **Aquifer System I/II**

Northwest of Upper Three Runs Creek, the permeable beds that correspond to Aquifer Systems I and II are often in overall hydrologic communication due to the thin and sporadic character of the intervening clay and silty clay beds that are correlative with Confining System I-II and to erosion by the local stream systems that dissect the interval. Here Aquifer Systems I and II coalesce to form the single Aquifer System I/II (Figs. 7,8,12).

Aquifer System I/II is divided into three aquifer units; from base upwards Aquifer Units I/IIA, I/IIB, and I/IIC, separated by Confining Units I/IIA-I/IIB and I/IIB-I/IIC. Aquifer Unit I/IIA is the hydraulic equivalent of Aquifer Unit IA of Aquifer System I, and Aquifer Unit I/IIB is the equivalent of Aquifer Unit IB.

North of Upper Three Runs Creek the permeable beds that correspond to Aquifer Units IIA and IIB are in overall hydraulic communication due to the thin and intermittent character of the intervening clay beds, and to erosion by the local stream systems that dissect the interval. Here the aquifers coalesce to form the single aquifer unit I/IIC of Aquifer System I/II. Locally, as in the vicinity of A-M Area, Aquifer I/IIC can be divided into two zones, I/IIC1 and I/IIC2, by confining beds which are correlative with the clay and silty clay beds

of Confining Unit IIA-IIB that separate Aquifers IIA and IIB of Aquifer System II south of Upper Three Runs Creek.

At the northwestern edge of the SRS immediately north of A-M Area the clay and silty clay beds of Confining Unit I/IIB-I/IIC pinch out and Aquifers I/IIB and I/IIC coalesce forming a single aquifer towards the north. Indeed, beyond the northern boundary of the site, north of the C-2 well cluster site (Fig.8), all the aquifers of the Coastal Plain sequence (Aquifer Units I/IIA, I/IIB and I/IIC) are in communication due to the updip stratigraphic position of the sequence and to erosion and surface exposure of the sequence. This is the catchment area for the entire Coastal Plain sequence and it acts as a single aquifer from the water table to basement.

### **Site Specific Example of the Classification: F-H Area**

The classification scheme described above for the SRS region is flexible and for site specific studies, the aquifers and confining units can be further subdivided on the basis of locally significant confining zones or aquifer zones. Often these local zones are crucial to the understanding of the hydrologic characteristics of the local ground water regime.

An example of this flexibility is in F-H Area located between the P-28 and P-27 well clusters on Figures 8 and 9 near the center of the site. The local hydrologic system is illustrated on Figure 13 (Aadland et al., 1990&1991), where the aquifer units and confining units are defined and classified in greater detail than that noted on the regional cross-sections.

In F-H Area, Aquifer Unit IIB (Fig.13), the water table aquifer, includes the Upland Unit, Dry Branch Fm., Clinchfield Fm.(?), and varying portions of the Santee Fm. (Fig. 4). Within the Dry Branch Fm. are a series of discontinuous thin clay lenses (informally referred to as the "Tan Clay" at SRS) that act as a locally significant aquitard. Here, it is useful to divide Aquifer IIB into a lower aquifer zone, Zone IIB1; and an upper aquifer zone, Zone IIB2; separated by the "Tan Clay" or IIB1-IIB2 Confining Zone.

### **CONCLUSIONS**

The hydrostratigraphic code described in this report accounts for and accommodates the lateral variation in lithofacies observed at the SRS. In addition, the subdivision of the aquifer systems and confining systems into aquifer/confining units and zones, as illustrated in Figures 8 through 13, can be made as detailed as the complexity of the local hydrologic regime demands. Thus, the hydrostratigraphic classification scheme defined here is applicable to all locations on the SRS. The result is a unified, consistent hydrostratigraphic classification amenable to all future hydrogeological studies and reports.

Geographic names for the aquifers and aquifer systems in the SRS region will be selected by the Geotechnical Group at SRL and submitted to the South Carolina Hydrostratigraphic Subcommittee for approval in the third quarter of 1991.

## REFERENCES

- Aadland R.K., H.W. Bledsoe. Hydrostratigraphy of the Coastal Plain Sequence, Savannah River Site (SRS), South Carolina. GSA Abstracts with Programs, Vol 22, No. 7, (October 1990).
- Aadland, R.K., Harris, M.K., Lewis, C.M., Gaughan, T.F. and T.M. Westbrook. Hydrostratigraphy of the General Separations Area, Savannah River Site (SRS), South Carolina. GSA Abstracts with Programs, Vol 22, No. 7, (October 1990).
- Aadland, R.K., Harris, M.K., Lewis, C.M., Gaughan, T.F. and T.M. Westbrook. Hydrostratigraphy of the General Separations Area, Savannah River Site (SRS), South Carolina; WSRC-RP-91-13. Westinghouse Savannah River Co., Savannah River Laboratory, Aiken, South Carolina (1991).
- Aucott, W.R. The Predevelopment Ground Water Flow System and Hydrologic Characteristics of the Coastal Plain Aquifers of South Carolina. U.S. Geological Survey, Water-Resources Investigations Report 86-4347 (1988).
- Aucott, W.R., Davis, M.E. and G.K. Speiran. Geohydrologic Framework of the Coastal Plain Aquifers of South Carolina. U.S.G.S. Water-Resources Investigations Report 85-4271 (1987).
- Bates, R.L., and J.A. Jackson, eds. Glossary of Geology. American Geological Institute, Falls Church, Virginia, 857 p (1980).
- Bledsoe, H.W. SRP Baseline Hydrogeological Investigation-Phase III; DPST-88-627. E.I. du Pont de Nemours & Co. Savannah River Laboratory, Aiken, South Carolina (1988).
- Bledsoe, H.W., Aadland, R.K., and K.A. Sargent. SRS Baseline Hydrogeologic Investigation - Summary Report; WSRC-RP-90-1010. Westinghouse Savannah River Co., Savannah River Laboratory, Aiken, South Carolina (1990).
- Burt, R. Proposed Criteria for Nomenclature-Draft. South Carolina Hydrostratigraphic Subcommittee (1988).
- Clarke, J.A., Brooks, R., and R.E. Faye. Hydrogeology of the Dublin and Midville Aquifer Systems of East-Central Georgia. Georgia Geological Survey Information Circular 14 (1985).
- Colquhoun, D.J., Woollen, I.D., Van Nieuwenhuise, D.S., Padgett, G.G., Oldham, R.W., Boylan, D.C., Bishop, J.W., and Howell, P.D. Surface and Subsurface Stratigraphy, Structure and Aquifers of the South Carolina Coastal Plain. Report to the Department of Health and Environmental Control, State of South Carolina, ISBN 0-9613154-0-7, 78 p (1983).
- GeoTrans Inc. A Numerical Model of the Hydrogeological System Underlying the Savannah River Plant, Final Report submitted to Savannah River Laboratory, 136p., (June 1989).



Laney, R.L., and C.B. Davidson. Aquifer-Nomenclature Guidelines. U.S. Geological Survey Open-File Report 86-534, 46 p (1986).

Price, V., Bohannon, S.J., March, J., Fallow, W.C., and K.A. Sargent, Geology and Hydrology of the F-Area Seepage Basins: DP-1761, E.I. du Pont de Memours & Co., Savannah River Laboratory, Aiken SC, (1988).

Revised Guidelines for Classification of Hydrostratigraphic Units, October 28, 1987. South Carolina Hydrostratigraphic Subcommittee.

Seaber, P.R. Application for Amendment of North American Stratigraphic Code to Provide Procedures for Classifying and Naming Hydrostratigraphic Units: unpublished (1986).

Siple, G.E. Geology and Ground Water of the Savannah River Plant and Vicinity. South Carolina Geological Survey Water-Supply Paper 1841, 113p., Reston, VA (1967).

## APPENDIX A

### Definition of Hydrostratigraphic Units

Much of the following discussion is taken from the "Revised Guidelines for Classification of Hydrostratigraphic Units" issued by the South Carolina Hydrostratigraphic Subcommittee, October 28, 1987. The method of naming hydrostratigraphic units at SRS is modified from that developed by Laney and Davidson, 1986, is similar to the method proposed by Seaber, 1986, and follows the draft proposal for nomenclature recommended by the South Carolina Hydrostratigraphic Subcommittee. The system includes both formal and informal units and is based on a hierarchy of stratigraphic units ranked at three levels.

Rank	Hydrostratigraphic Units (after Laney and Davidson, 1986)
1	Aquifer System, Confining System
2	Aquifer Unit Confining Unit
3	Zone (informal)

The hydrostratigraphic units proposed for SRS are to be based on the lithologic and hydraulic properties of rocks and sediments, most significantly hydraulic conductivity, and also porosity and specific storage. These criteria eliminate any "formal" reliance of the classification system on lithostratigraphy, genesis, age, geological history, paleogeographic position or other features which are not strictly lithologic or hydraulic properties of the units.

The hydrostratigraphic units corresponding to rank one and rank two are formal classification units and based on lithologic and hydraulic properties of the sediments or rocks. The hydrostratigraphic unit, "zone", (rank 3), is an informal classification unit. Delineation of "zones" may incorporate hydraulic properties with other descriptive properties including lithology, water chemistry, color etc., if a useful purpose is served.

Aquifer units and confining units, (rank 2), are the fundamental units of the classification. An aquifer unit is defined as a mappable (>400 sq.mi.) body of rock or sediments that is sufficiently permeable to conduct ground water and to yield significant quantities of the water to wells and springs (modified from Bates and Jackson, 1980). A confining unit on the other hand, is a mappable body of rock or sediment of significantly lower hydraulic conductivity than an adjacent aquifer, that serves as an impediment to ground water flow to or from the aquifer. In nature, its hydraulic conductivity may range from nearly zero to some value distinctly lower than that of the nearby aquifer. In this sense, the assignment of a rank and unit name to a hydrostratigraphic unit is not quantitatively defined and does not imply hydraulic continuity or the lack thereof, but rather distinguishes relative differences in lithology and hydraulic properties.

Aquifer and confining units may be informally subdivided into zones, (rank 3), which are characterized by properties significantly different than the rest of the unit, such as hydraulic conductivity, water chemistry, lithology, color etc. For example, an aquifer may contain a "low-permeability zone", a "high salinity zone," or a "tan clay zone," or a confining unit may contain a "high-permeability zone" or a "marl zone."

Above aquifer units and confining units, and ranked No. 1, are aquifer systems and confining systems. The aquifer system may be composed of two or more coalescing

aquifer and confining units, that transmit ground water regionally. The aquifers may be separated at least locally by confining units that impede ground water movement, but that do not greatly affect the regional hydraulic conductivity of the system. A confining system may be composed of two or more confining units and aquifer units that serves as an impediment to ground water flow regionally.

## APPENDIX B

### Proposed Criteria for Hydrostratigraphic Nomenclature

The criteria for formally naming hydrostratigraphic units at SRS has been slightly modified from the recommendations of the South Carolina Hydrostratigraphic Subcommittee that were prepared by Ron Burt, August 23, 1988.

Aquifer units and aquifer systems should be named using geographic terms that indicate an area where the aquifer or aquifer system is of local or regional importance. Ideally the geographic terms should reflect the scale of the functional extent of the aquifer or aquifer system. For example; Aiken County Aquifer, or Augusta Aquifer; Low Country Aquifer System, or Floridian Aquifer System, etc.

Confining units and confining systems should be named by combining and hyphenating the two names of the aquifers or aquifer systems adjacent to and surrounding the confining unit or system. Where both an aquifer and an aquifer system are adjacent to the same surface of a confining unit or system, the name chosen for the confining unit or system should reflect its lateral extent. For example: the Coosawhatchie-Central Coastal Plain Confining Unit is named according to its position as a confining unit between the Coosawhatchie Aquifer and part of the Central Coastal Plain Aquifer. The more regionally extensive Low Country-Central Coastal Plain Confining System, which includes the Coosawhatchie-Central Coastal Plain Confining Unit, is named according to its position as a regional confining system between the Low Country Aquifer System and the Central Coastal Plain Aquifer.

Zones should be named using descriptive terms which may relate to lithology, hydraulic properties, water quality, or any other characteristics (except as noted below) which serve a useful purpose. For example, a water-bearing unit that is too small to be classified as an aquifer may be named a high-permeability zone within a confining unit, or a part of an aquifer containing ground water with a high chloride concentration may be named a salty zone.

These criteria eliminate several characteristics and descriptions of hydrostratigraphic units from use in assigning names. These include time or stratigraphically related terms, relative positions of units, alpha-numeric names, depth of occurrence, depositional environment, geologic environment, geologic history, genesis, and acronyms. Hydraulic condition, lithology, chemistry, and mineralogy are not to be used in hydrostratigraphic unit names, except for naming zones.

# PHYSIOGRAPHIC SUBPROVINCES OF THE SOUTH CAROLINA COASTAL PLAIN

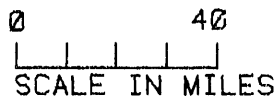
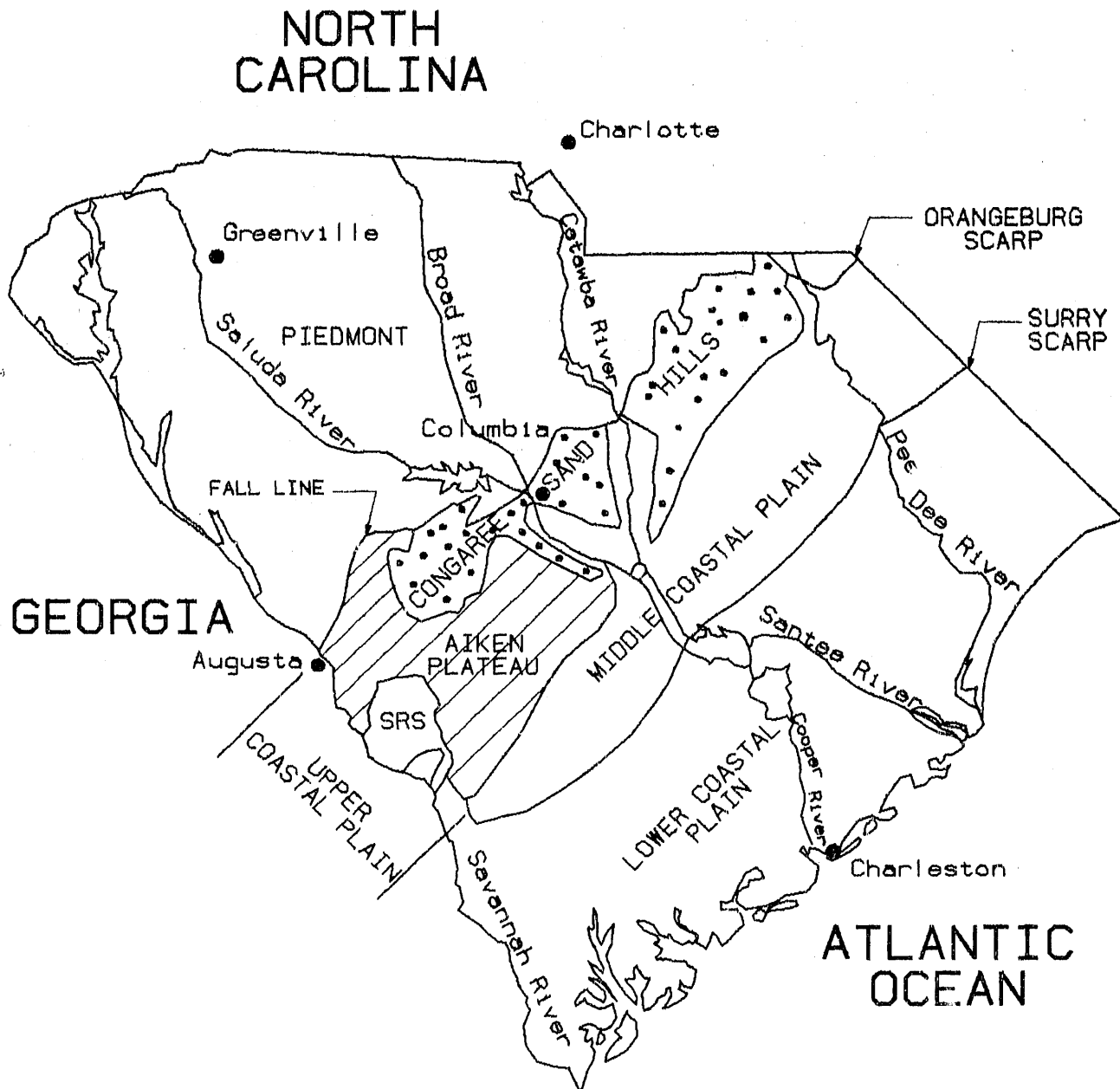
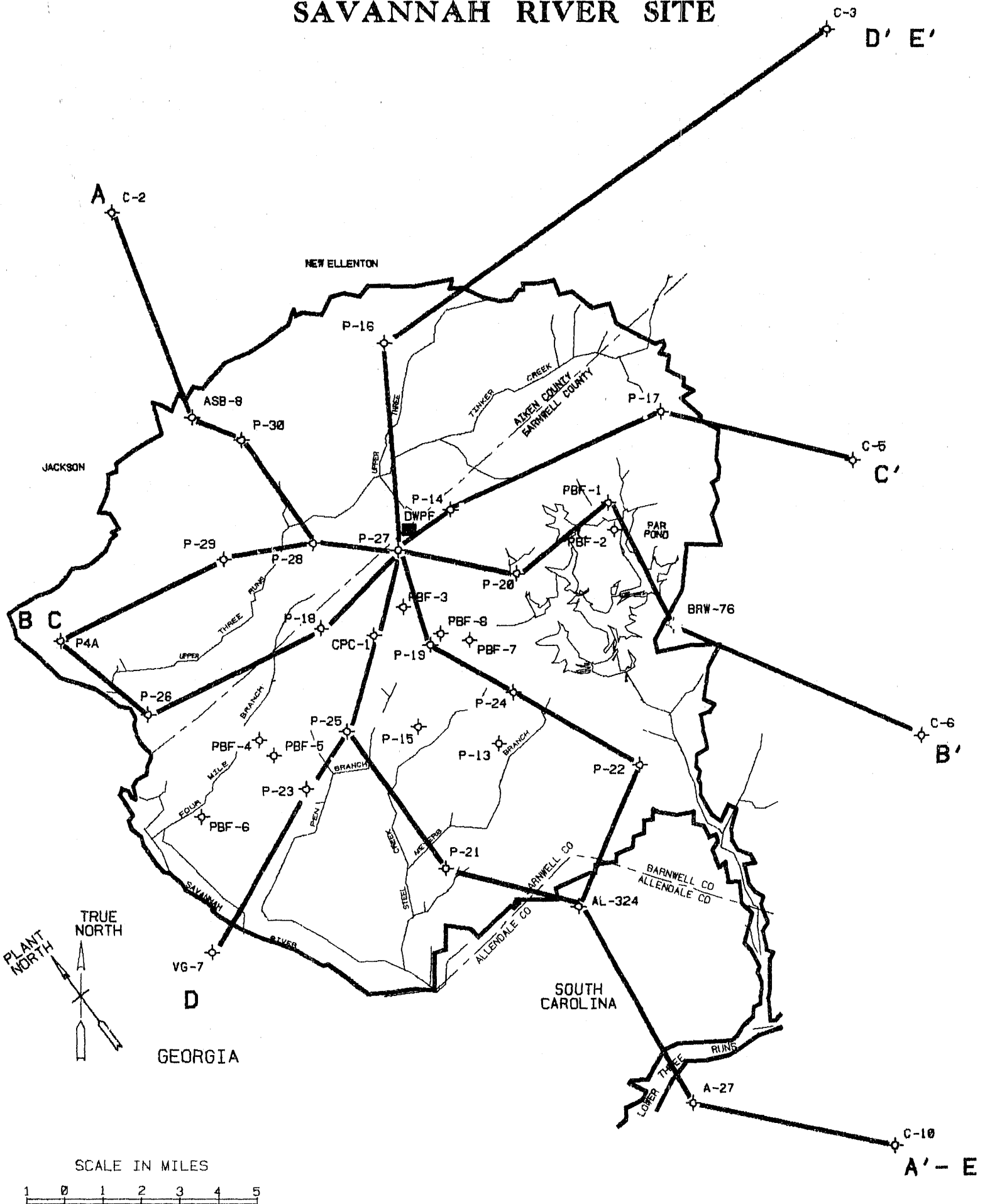


FIGURE 1

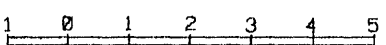
# WELL AND CROSS SECTION LOCATION MAP SAVANNAH RIVER SITE



TRUE NORTH

PLANT NORTH

SCALE IN MILES



Geologic Age	COMPARISON OF HYDROGEOLOGIC UNITS				
	Siple (1967)	SRP Baseline Hydrogeologic study	GeoTrans (1989)	Aquifer	
Tertiary	Hawthorn Aquifer	Upland Unit		Tertiary Aquifer	
	Barnwell Aquifer	Barnwell Group	Tobacco Rd FM		Aquifer 4
			Dry Branch FM		
	McBean Aquitard Green Clay	McBean Formation Green Clay			Aquifer 3
	Congaree Aquifer	Congaree			
	Ellenton Aquitard	Williamsburg Formation			
Ellenton Formation					
Cretaceous	Upper Tuscaloosa Aquifer	Peedee Formation		Black Aquifer	
	Mid Tuscaloosa Clay Aquitard	Black Creek Formation			
	Lower Tuscaloosa Aquifer	Middendorf Formation		Middle Aquifer	
	Basal Clay Aquitard	Cape Fear Formation		Confined	
Triassic or Paleozoic Basement					

NOTE:

- (1) Included within the different units can be individual zones of relatively higher or lower permeability.
- (2) Hydrostratigraphic boundaries do not necessarily coincide with stratigraphic boundaries.

SAVANNAH

Add  
Prep

# OSTRATIGRAPHIC UNITS USED AT SRS

(1987)	Price (1988)	Proposed Nomenclature Aadland & Bledsoe (1990)					
Sand st	Zone 8	Aquifer System 1/11	Aquifer unit 1/11C	Aquifer Unit 11B <sup>(1)</sup>	Aquifer System II		
	Zone 7			7a		Confining Unit 11A-11B	
				7b			
				7c			
	Zone 6			Zone 5		5b	Aquifer Unit IIA
5a							
Unit	Zone 4	Aquifer System 1/11	Confining Unit 1/11B-1/11C	Confining System 1-11	Aquifer System I		
S ek	Zone 3			3b		Aquifer Unit 1/11B	Aquifer Unit 1B <sup>(2)</sup>
				3a			
Unit	Zone 2			2c		Confining Unit 1/11A-1/11B	Confining Unit IA-B
f				2b			Aquifer unit 1/11A
		2a					
Unit	Zone 1	Confining System I		Confining System I			
		Paleozoic - Triassic Basement Hydrologic System					

RIVER SITE

Paleozoic - Triassic  
Basement  
Hydrologic System

Bledsoe, 1990

by: JA Pivovar

Fig 3



Chronostratigraphic Units

Lithostratigraphic Units  
from Price et al, 1988

Depth in Feet	Chronostratigraphic Units		Lithostratigraphic Units	
	N. American Stage	European Stage	Groups	Formations
0	Age Unknown	Age Unknown		Upland Unit*
0-100	Jacksonian	Priabonian	Barnwell Group	Tobacco Road Sand Dry Branch Formation Irwinton Sand Mbr Twiggs Clay Mbr Griffins Landing Mbr Clinchfield Formation
100-200	Clalbornian	Bartonian Lutetian	Orangeburg Group	Santee Limestone McBean Member Cow Cow Member Warley Hill Member Congaree Formation
200-300	Sabinian	Ypresian Thanetian	Black Mingo Group	4 Mile Mbr Fishburne Fm Snapp Mbr Williamsburg Fm
300-400	Midwayan	Danian		Ellenton Member, Rhems Formation
400-500	Navarroan	Maestrichtian		Steel Creek Member, Peedee Formation
500-600	Tayloran	Campanian	Lumbee Group	Black Creek Formation
600-700		Santonian		Middendorf Formation
700-800	Austinian	? Coniacian? Turonian?		Cape Fear Formation
800-900				

Paleozoic Crystalline Basement  
or Triassic Newark Supergroup

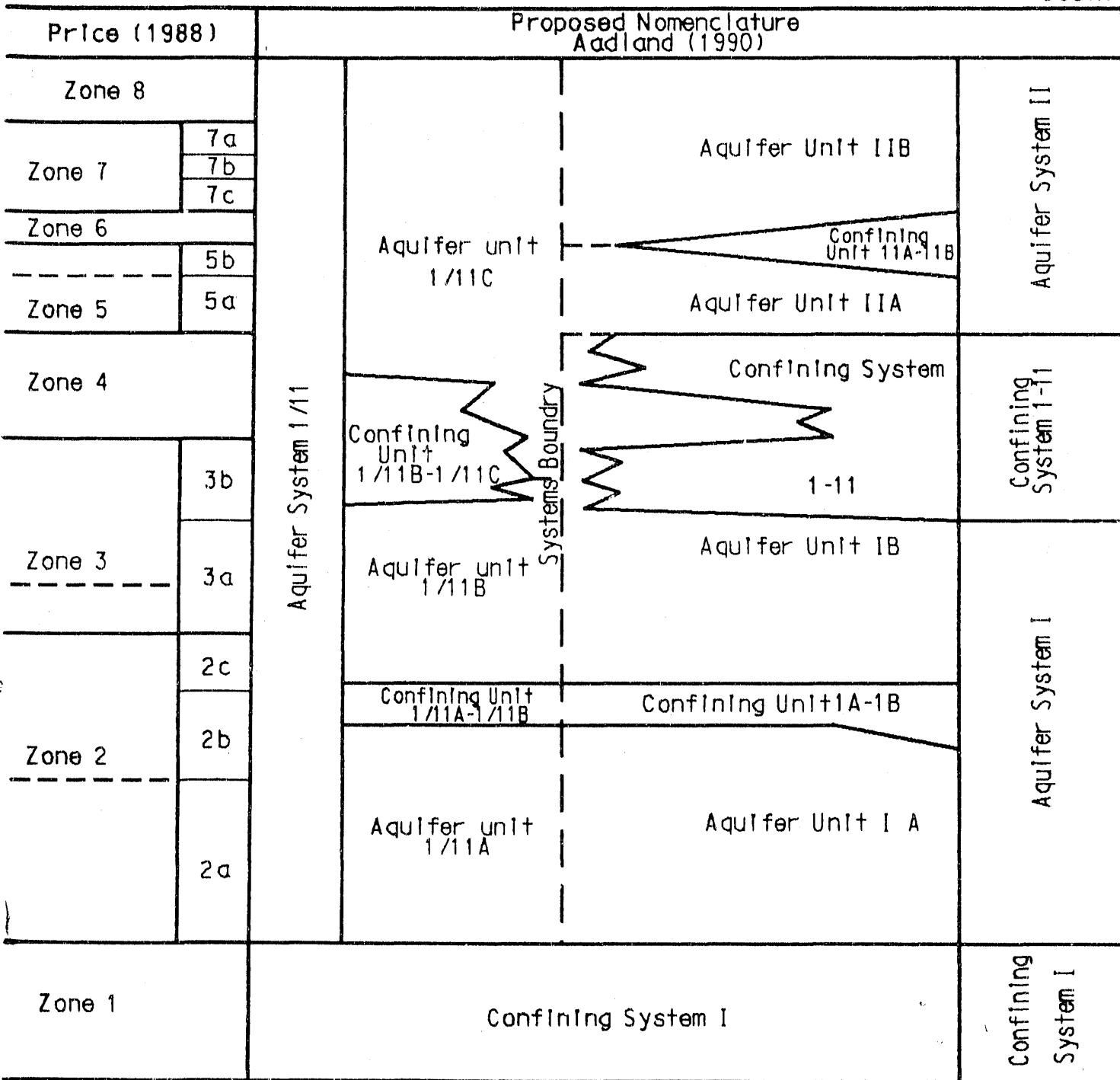
HYDRO

S

# Hydrostratigraphic Units

North

South



Paleozoic - Triassic  
Basement  
Hydrologic System

## STRATIGRAPHIC CHART

Savannah River Site

Dr. Rolf K. Aadland  
ESS-SRI, 10/26/89

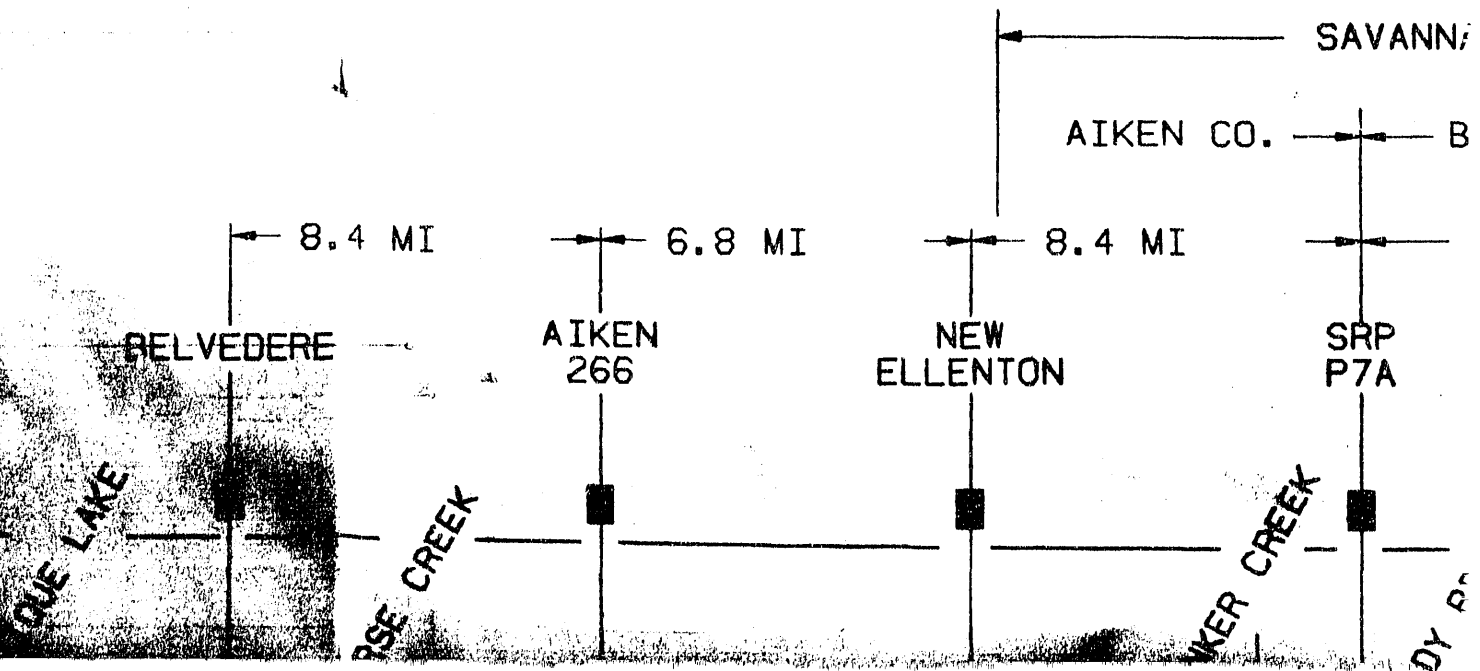
Prepared by: JA Pivovar

FIGURE 1

18

NORTHWEST

# REGIONAL

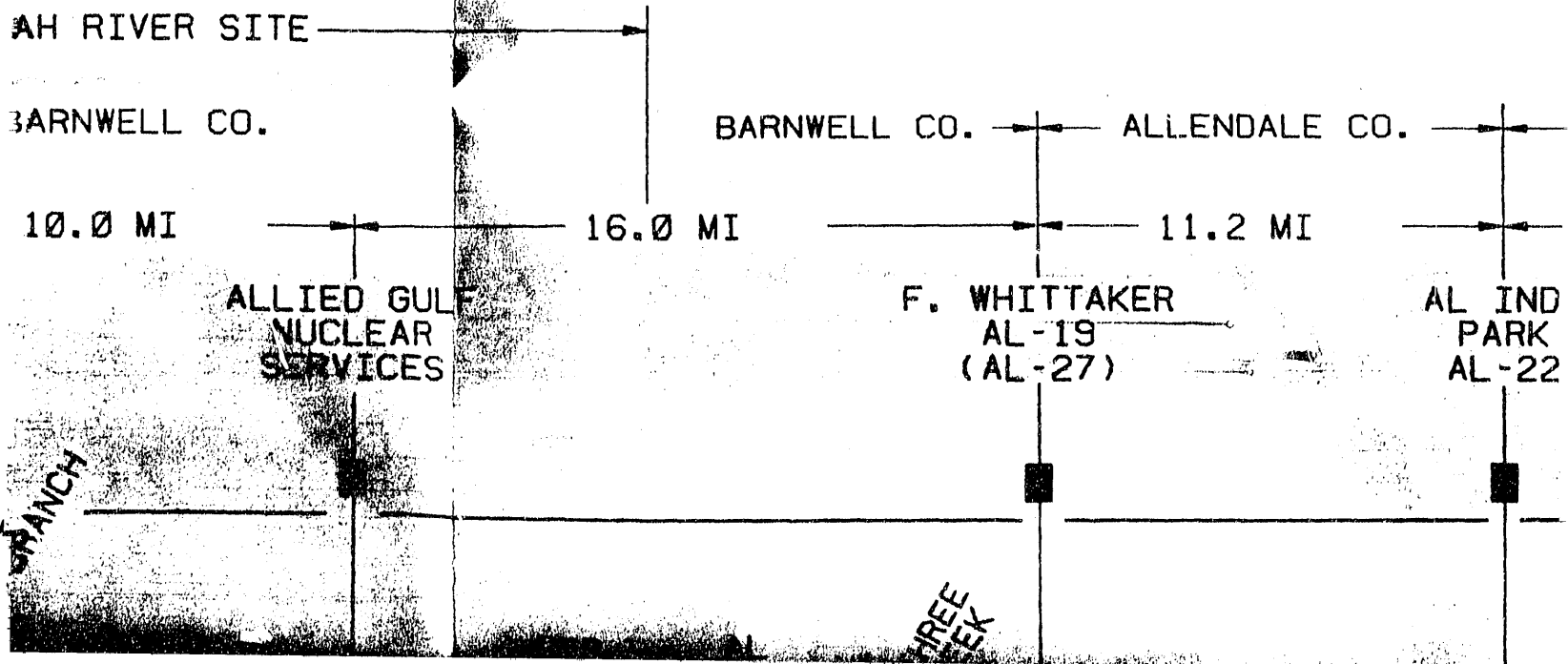


# STRATIGRAPHIC CROSS

PREPARED BY: ROLF K. AADLAND, 1989

DRAWN BY: ROD A. BOLT

MODIFIED FROM D. COLGUHOUN ETAL. 1983



# SECTION

SOUTHEAST

TON CO.

3.4 MI

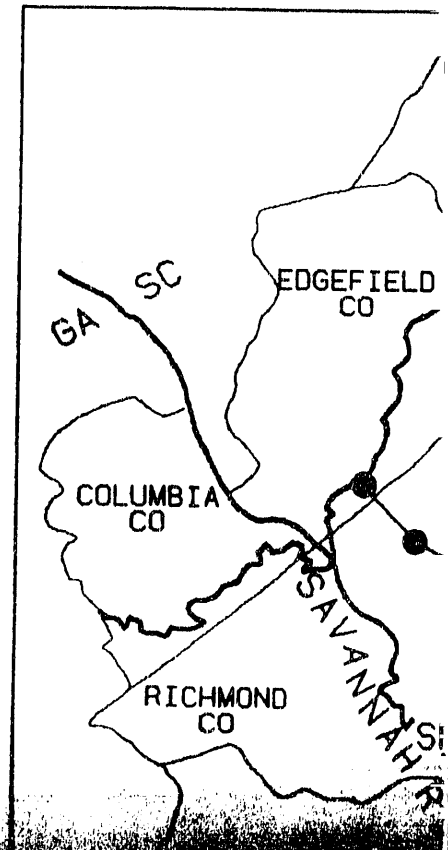
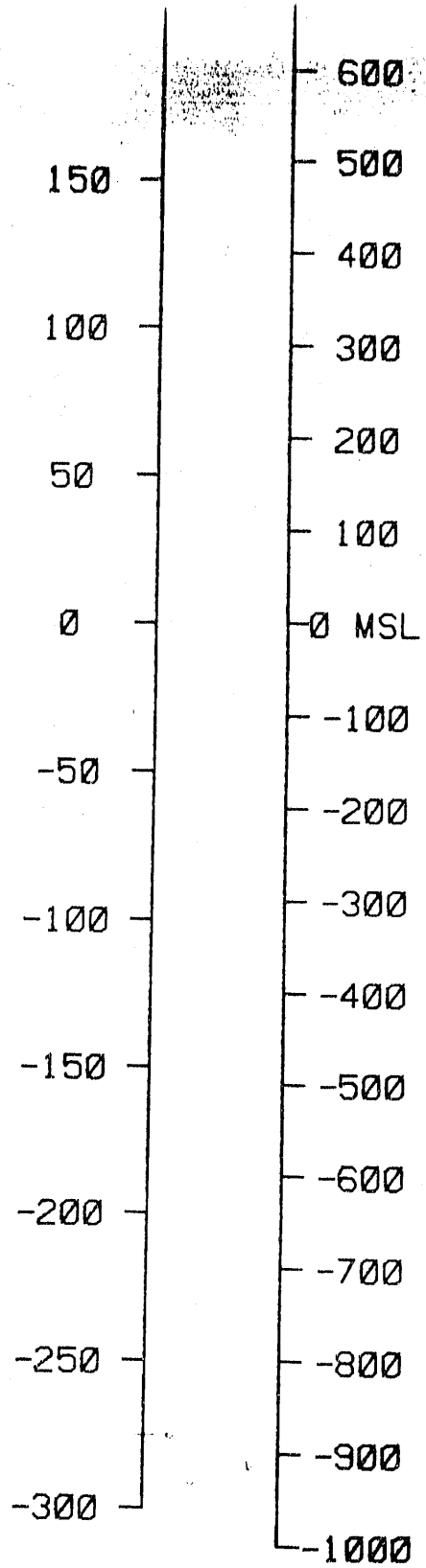
WESTINGHOUSE

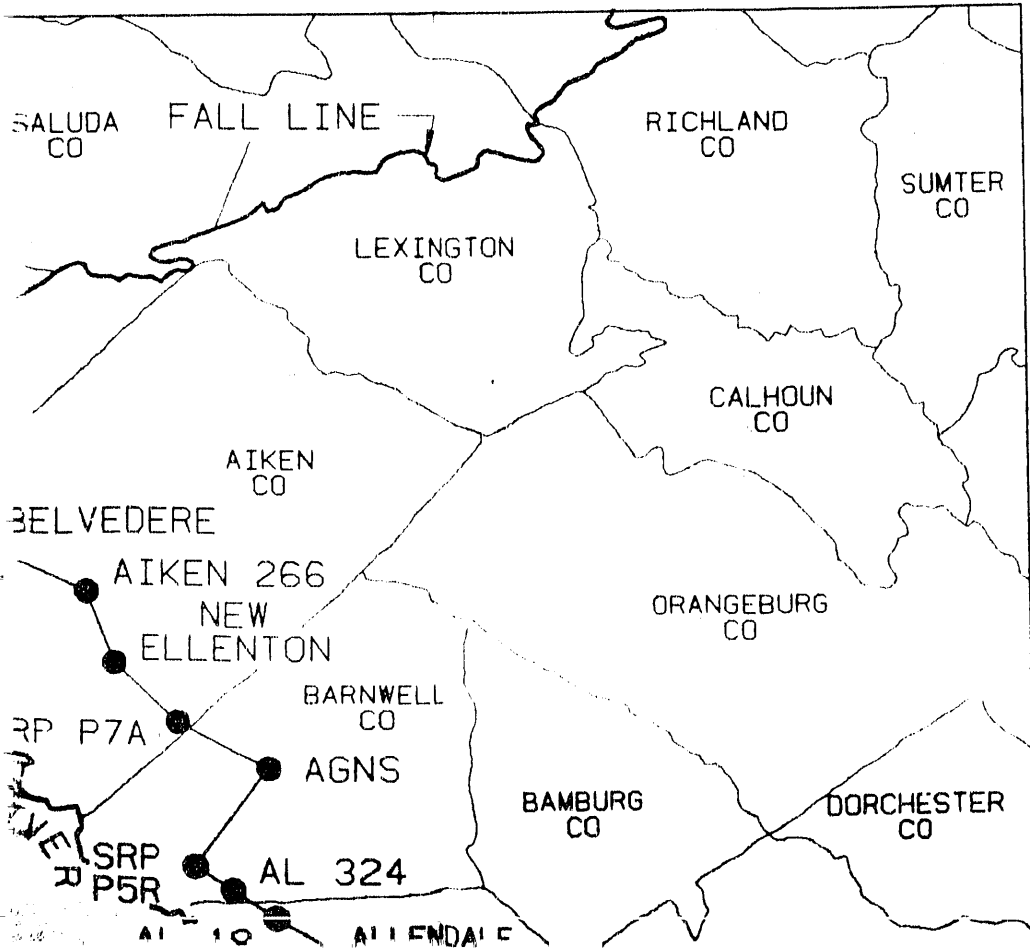
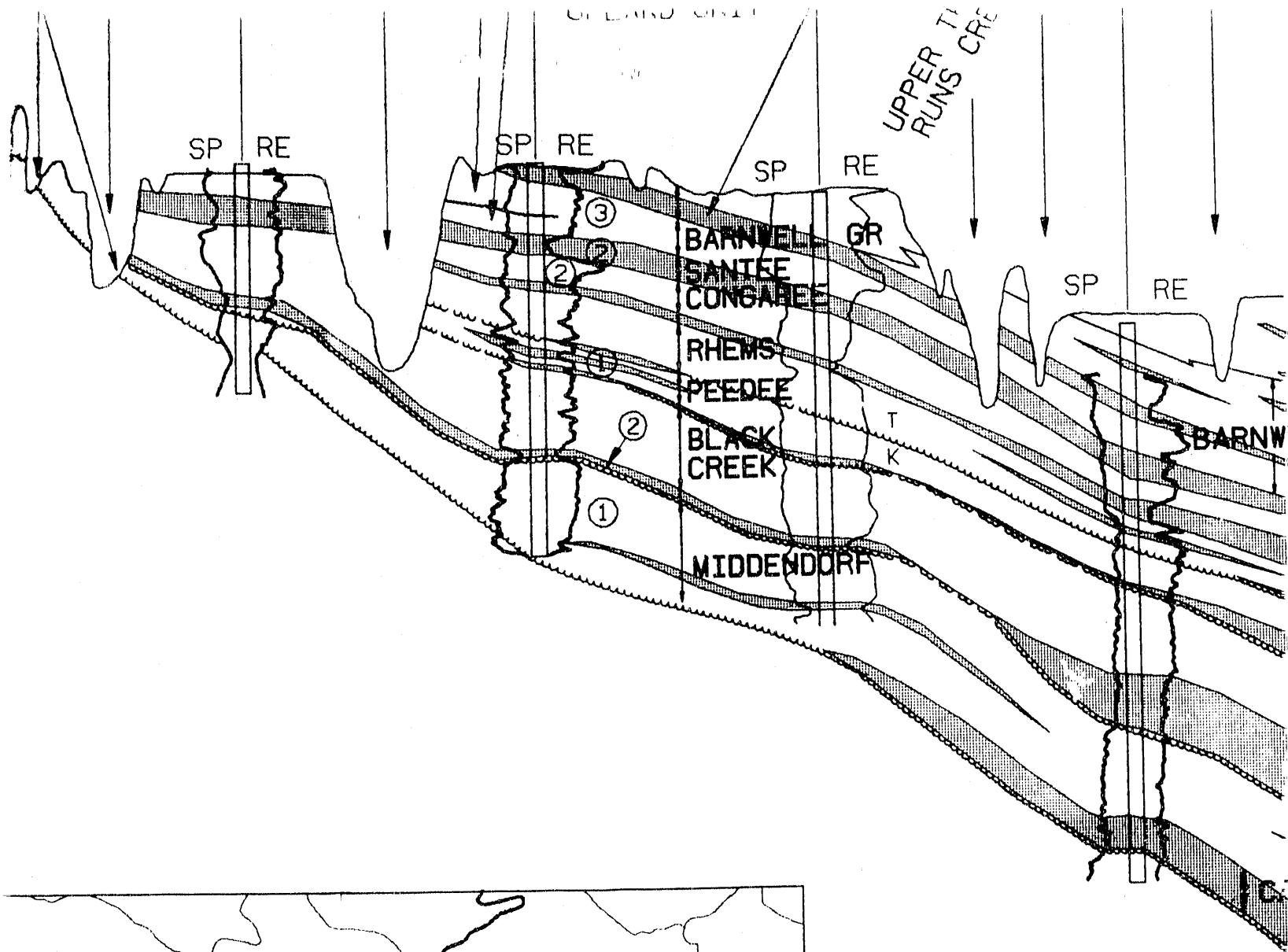
HAM

46

(38)

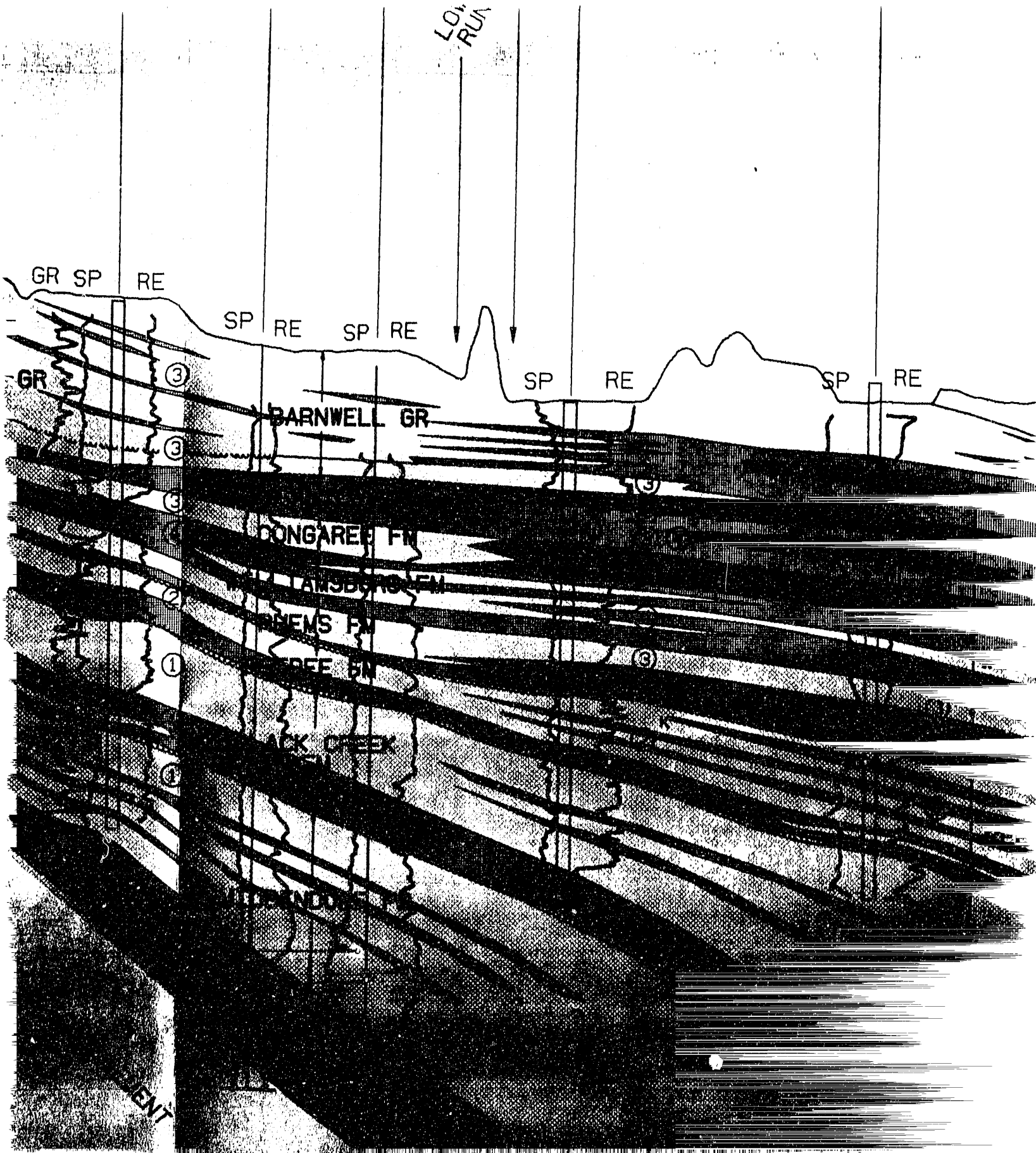
METERS FEET



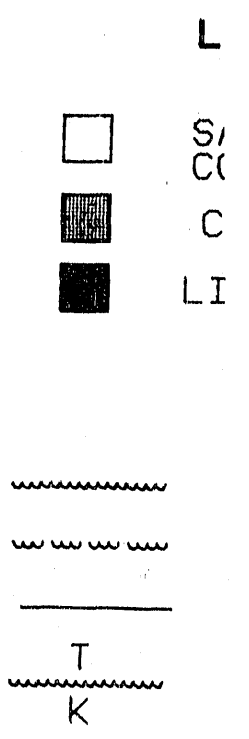
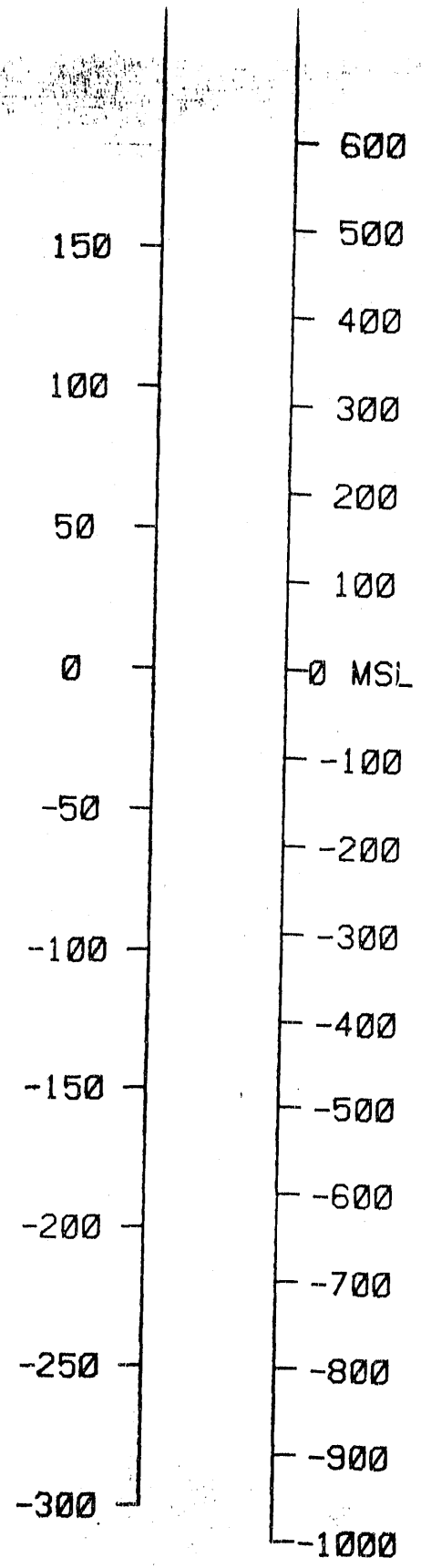
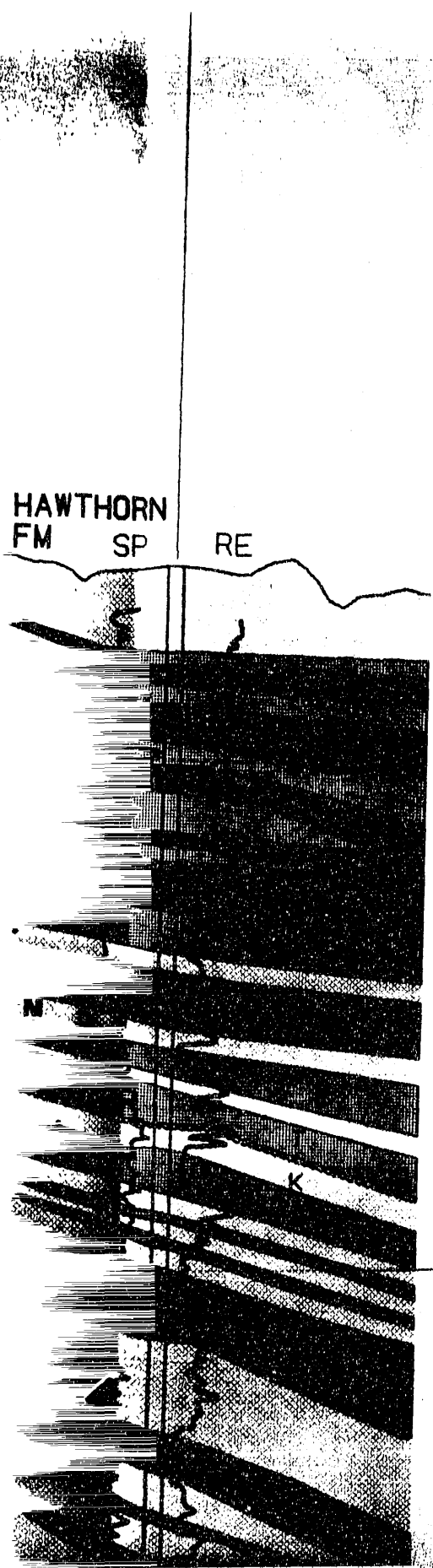




LOW  
RUN



HAWTHORN  
FM SP RE



- ① UPPER
- ② LOWER
- ③ SHALL
- ④ DEEP
- ⑤ CARBC
- SP SPC
- RE RES
- GR GAM

**PHOLOGY LEGEND:**

JD, SILTY SAND  
JGLOMERATIC SAND

AY, SILTY CLAY & MUD

ESTONE

REGIONAL EROSIONAL UNCONFORMITY

CORRELATION

LITHOFACIES CORRELATION

ERTIARY

CRETACEOUS CONTACT

DELTA PLAIN DEPOSITIONAL UNIT ASSOCIATION

DELTA PLAIN DEPOSITIONAL UNIT ASSOCIATION

LOW SILICICLASTIC SHELF DEPOSITIONAL UNIT ASSOCIATION

SILICICLASTIC SHELF DEPOSITIONAL UNIT ASSOCIATION

LATE SHELF DEPOSITIONAL UNIT ASSOCIATION

POTENTIAL LOG

STIVITY LOG

RAY LOG

-200

-250

-300

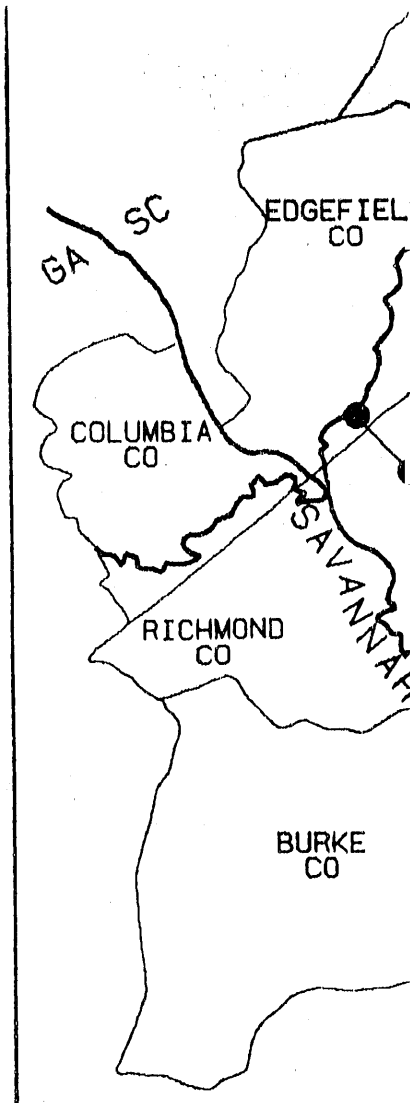
-600

-700

-800

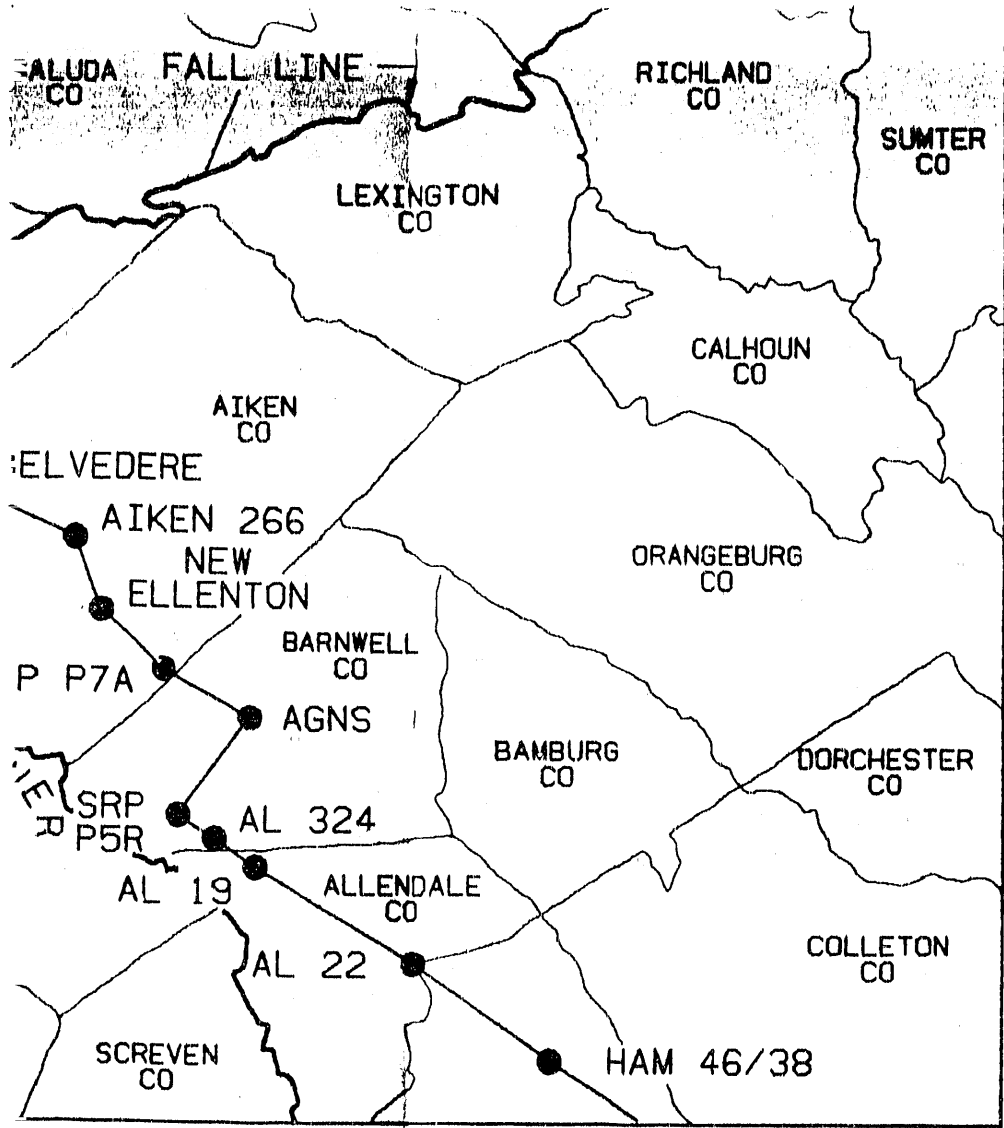
-900

-1000

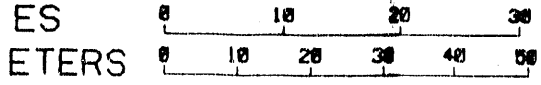


KII

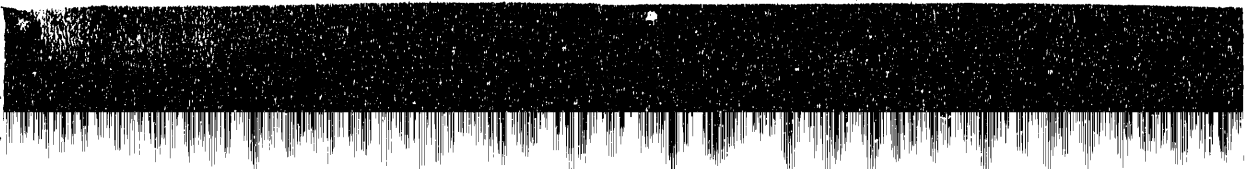
PALEOZOIC

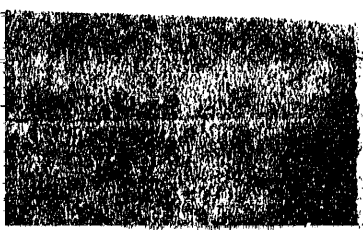
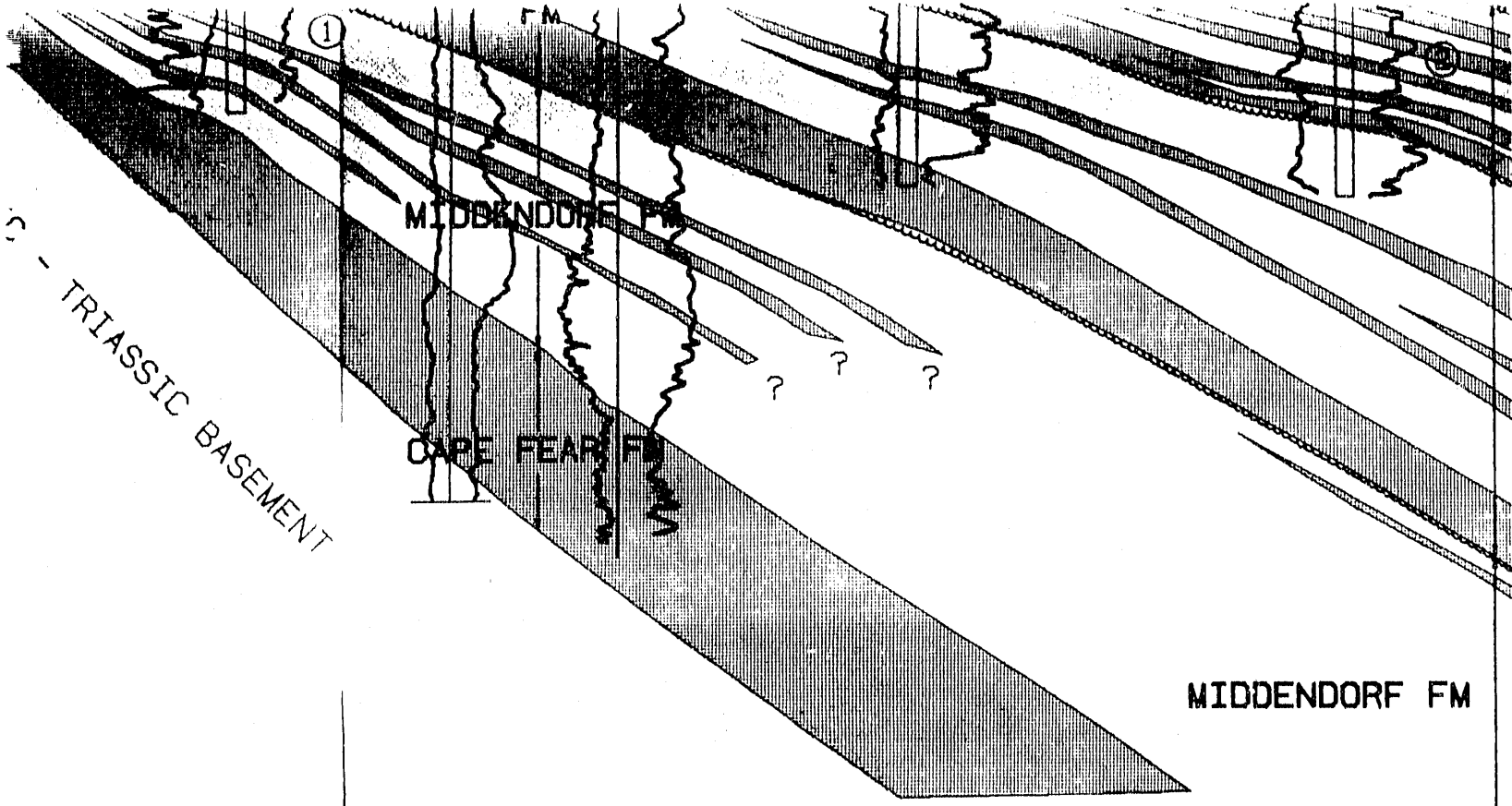


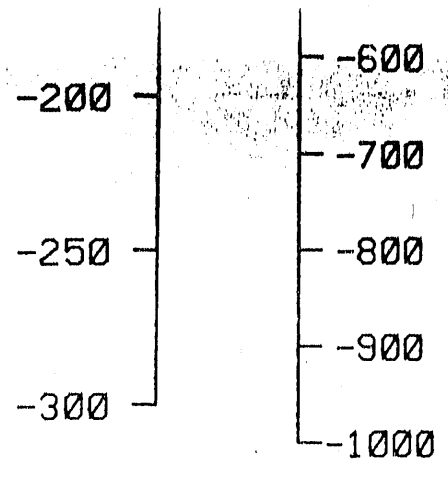
SCALE



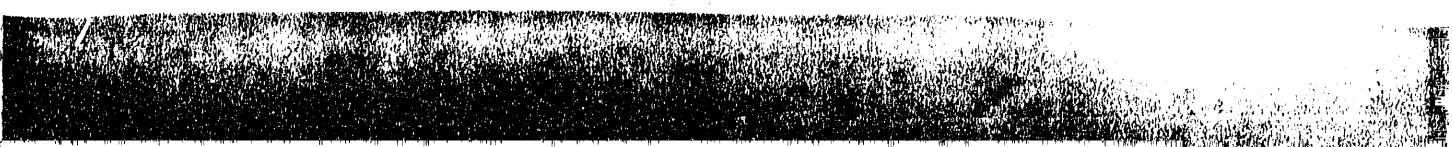
KEY PLAN







④ DL  
 ⑤ CA  
 SP  
 RE  
 GR



⑤ CARBONATE SHELF DEPOSITIONAL UNIT ASSOCIATION

SP SPONTANEOUS POTENTIAL LOG

RE RESISTIVITY LOG

GR GAMMA RAY LOG

DWG. NO. R00016

Fig. 5



NORTHWEST

METERS FEET

CHEVES CREEK

ANTIQUE LAKE

CRE

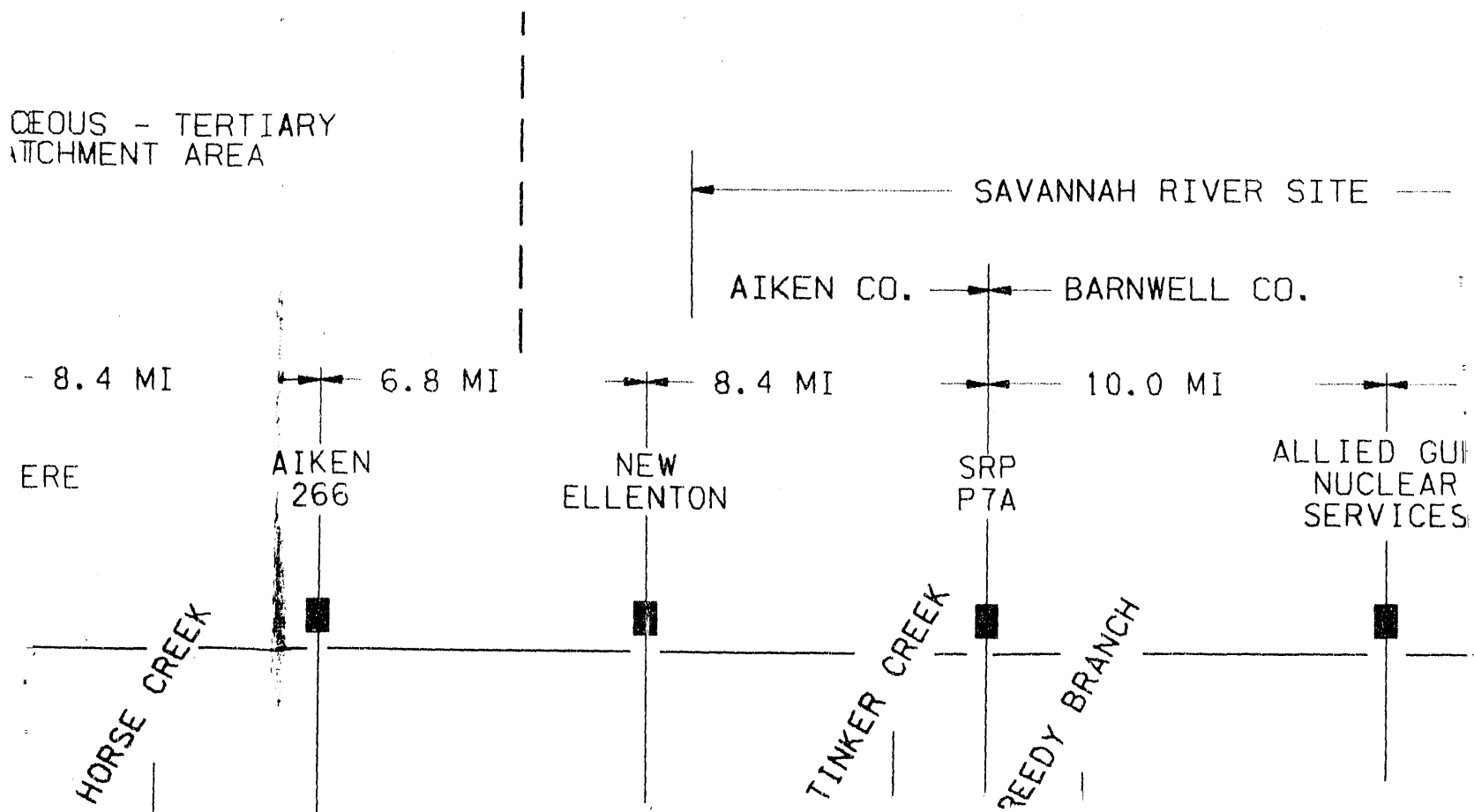
BEL

# REGIONAL HYDROSTRAT

PREPARED BY:

DRAWN

MODIFIED FROM:

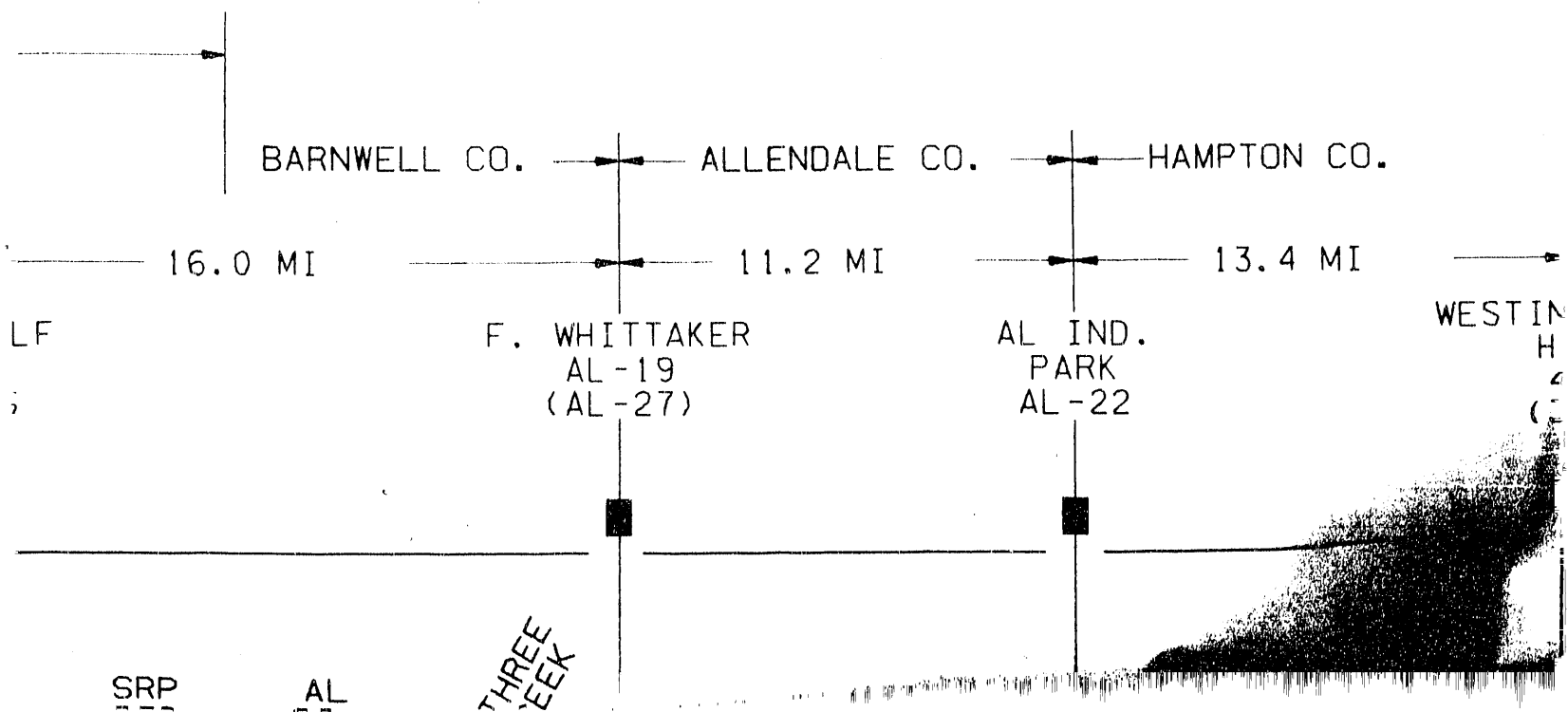


# IGRAPHIC CROSS-SECT

ROLF K. AADLAND, 1989

BY: ROD A. BOLT

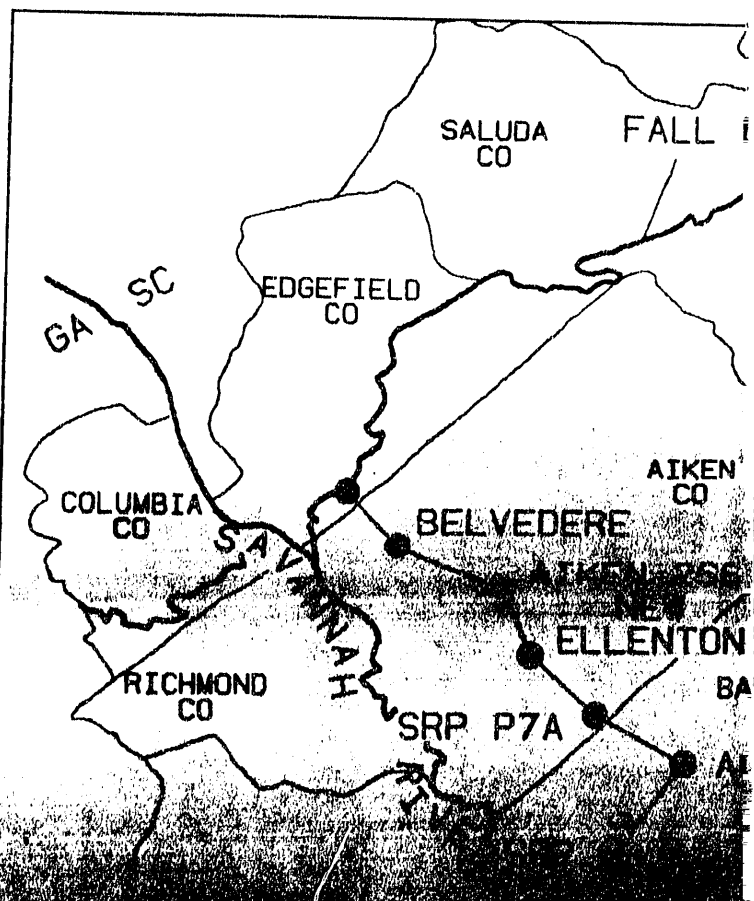
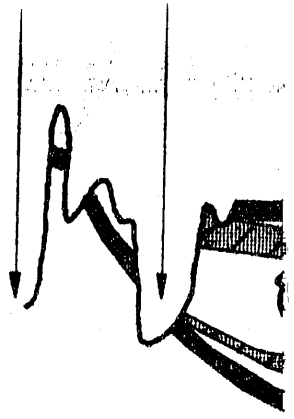
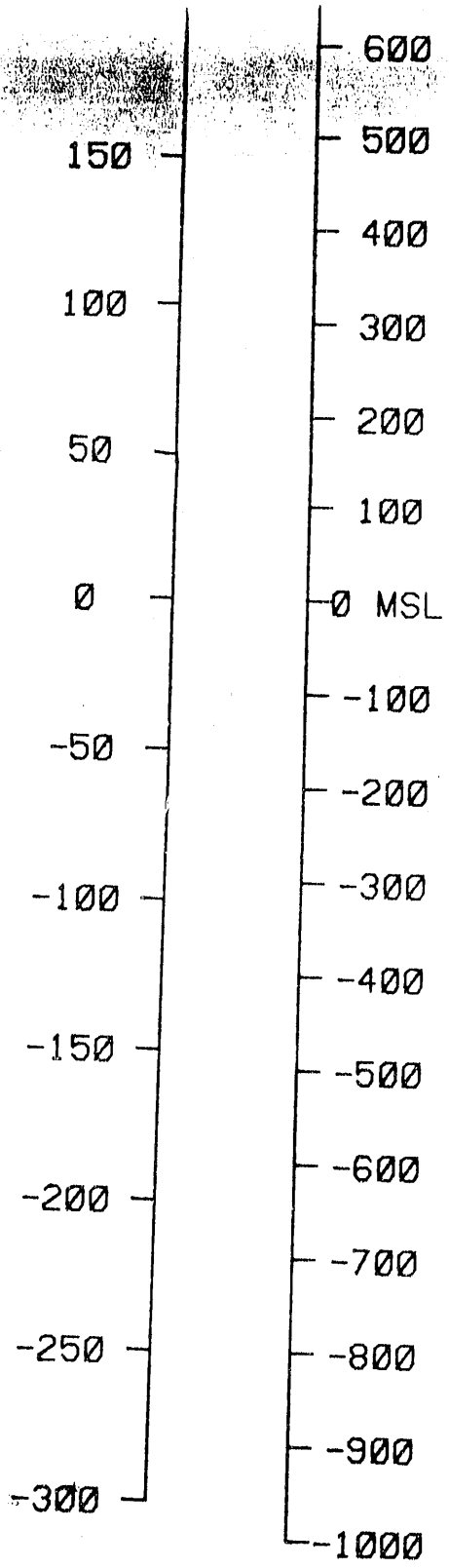
D. COLQUHOUN ETAL. 1983

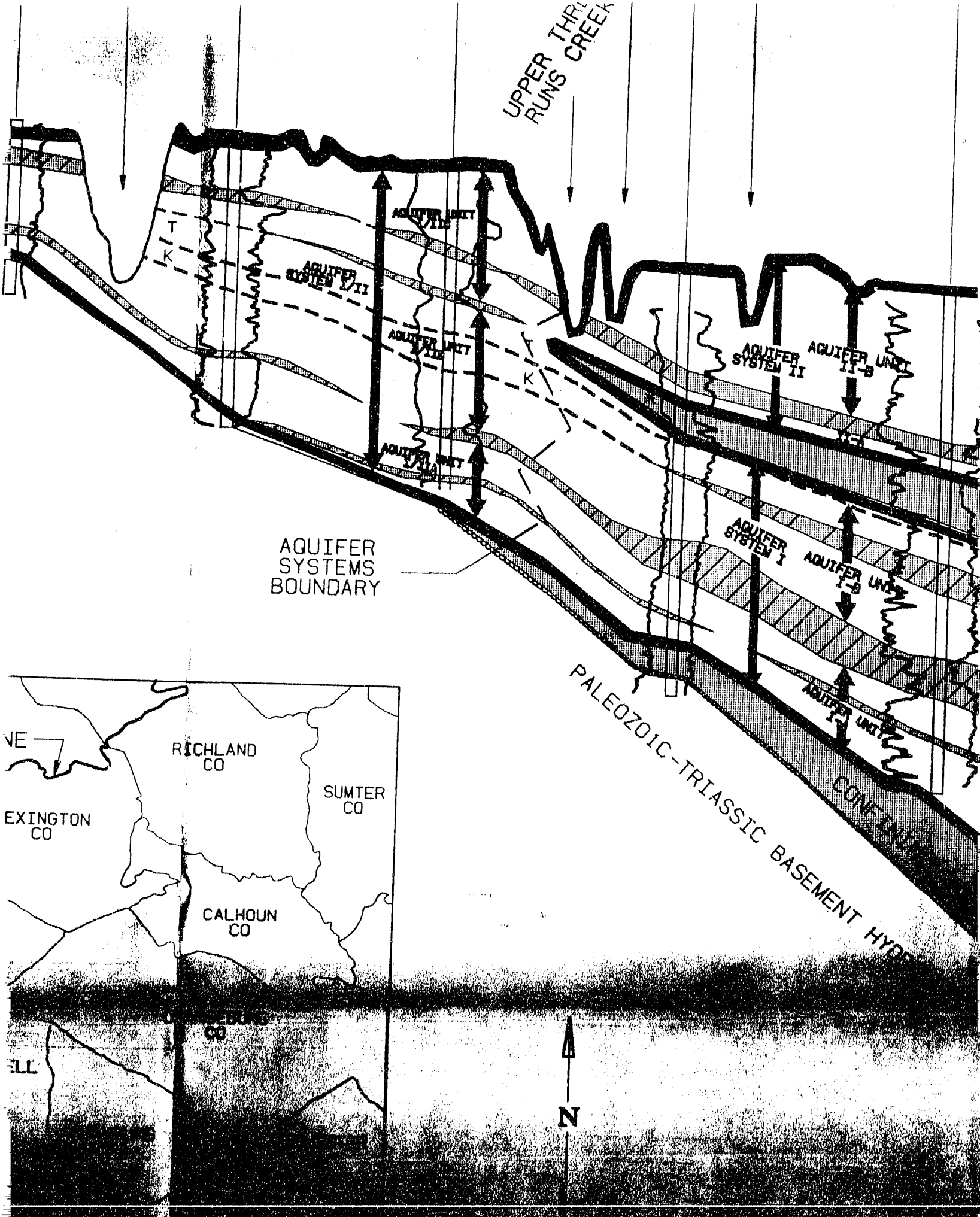


ON

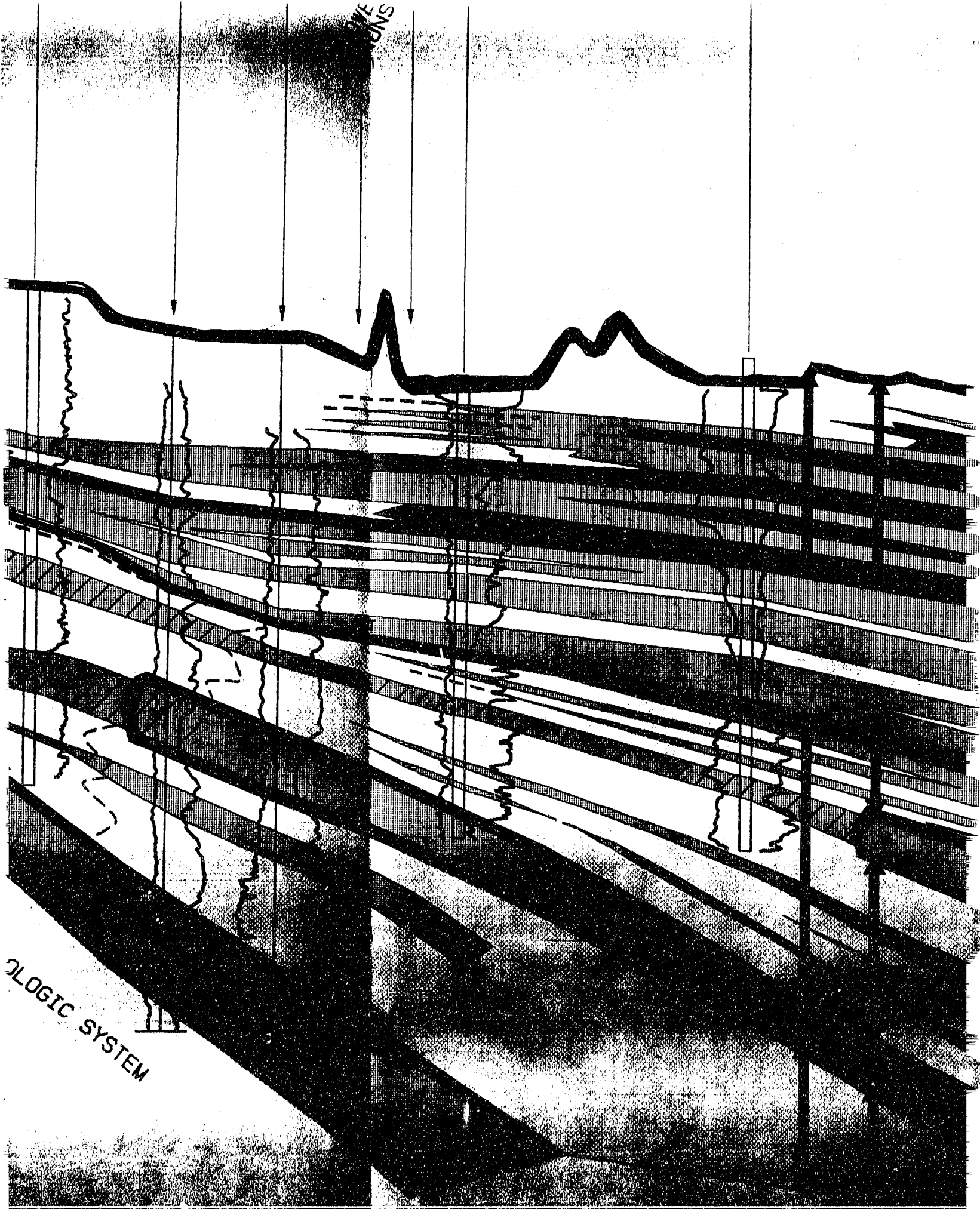
SOUTHEAST

HOUSE

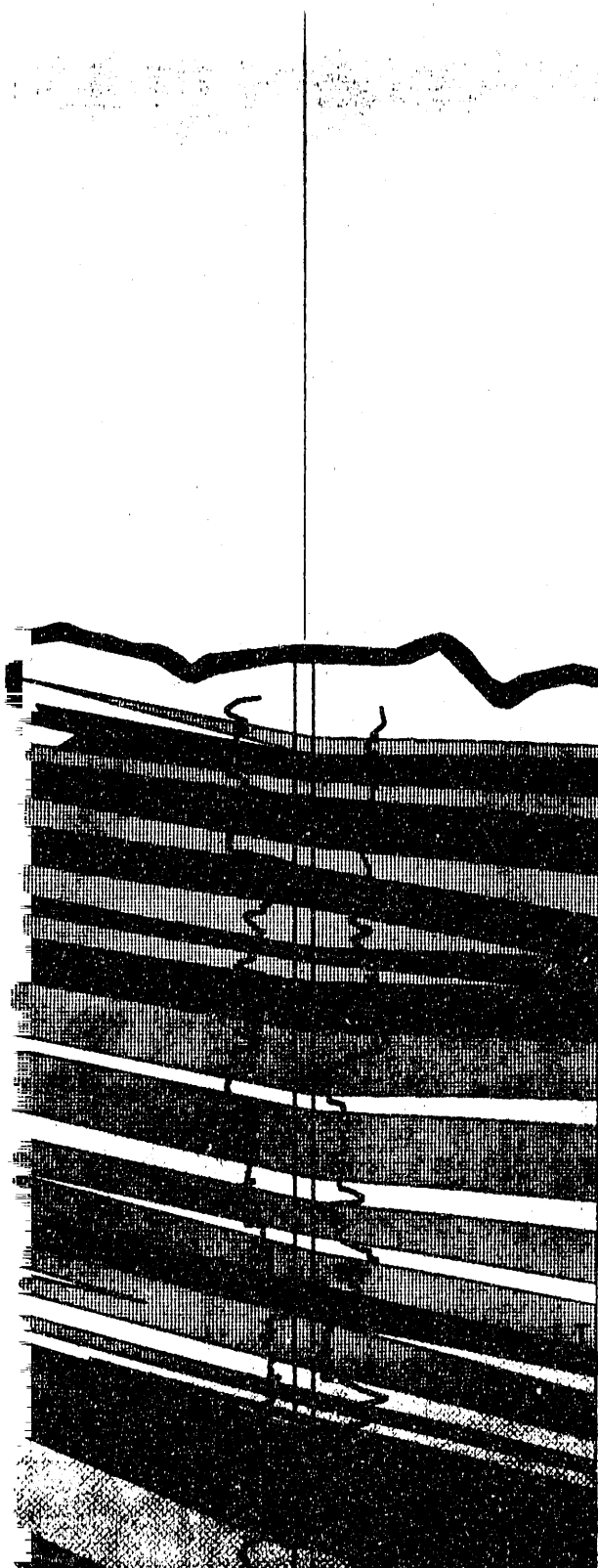




SENS






LOGIC SYSTEM



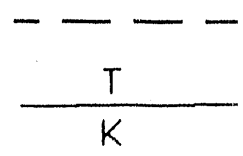
150  
100  
50  
0  
-50  
-100  
-150  
-200  
-250

600  
500  
400  
300  
200  
100  
0 MSL  
-100  
-200  
-300  
-400  
-500  
-600  
-700

**LITHO**

-  SAND CONG
-  CLAY
-  LIME

**AQUIFER SYSTEM**






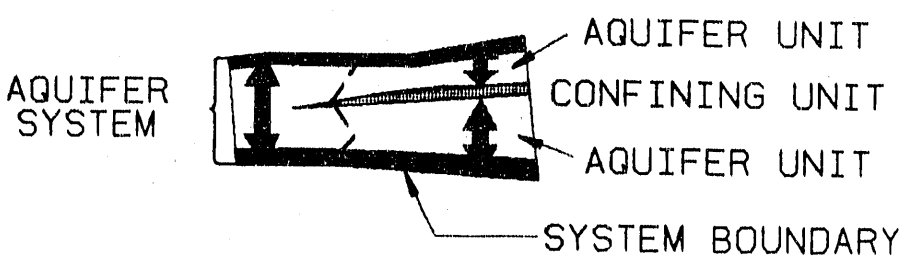
\* THE UPD SYSTEMS



- 600  
- 500  
- 400  
- 300  
200  
100  
0 MSL  
- 100  
- 200  
- 300  
- 400  
- 500  
- 600  
- 700  
- 800  
- 900  
1000

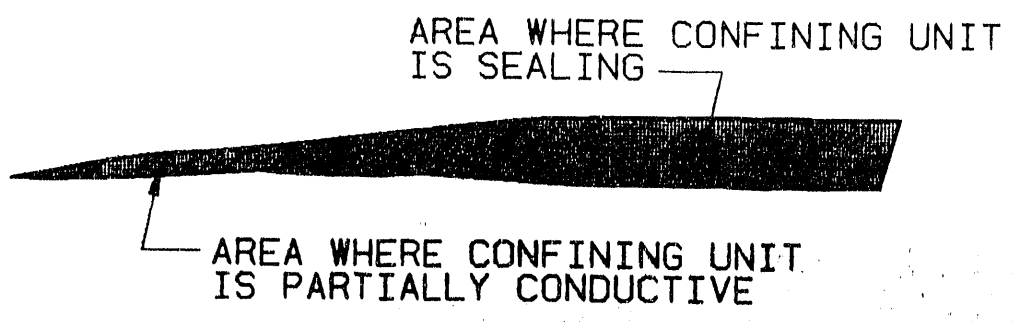
### LITHOLOGY LEGEND:

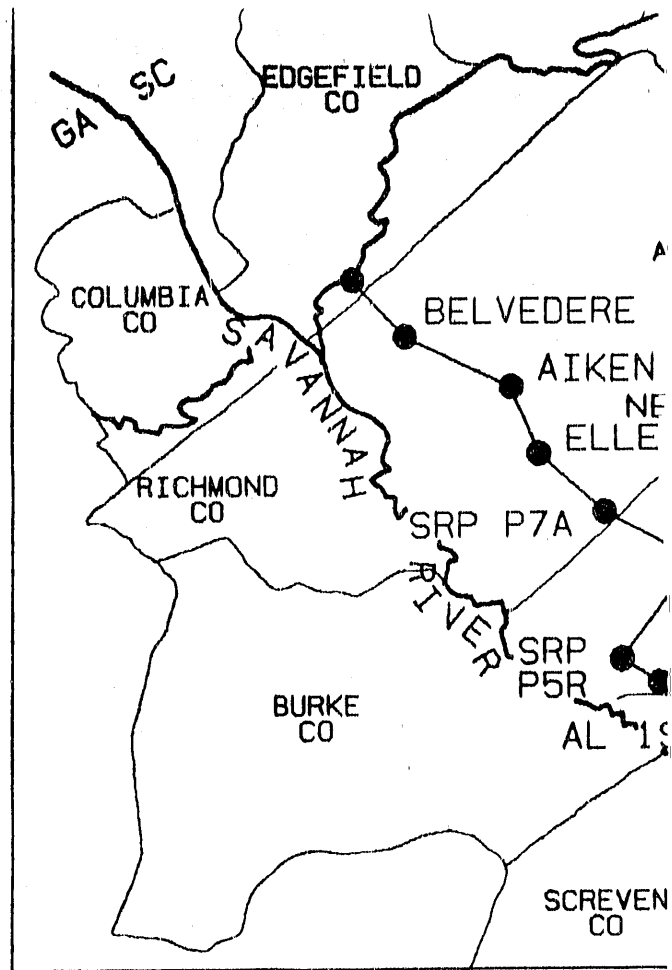
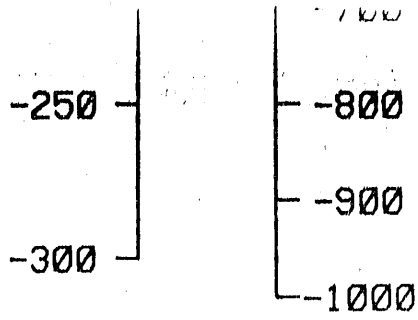
-  SAND, SILTY SAND  
CONGLOMERATIC SAND
-  CLAY, SILTY CLAY & MUD
-  LIMESTONE



--- CORRELATION  
T  
----- TERTIARY / CRETACEOUS BOUNDARY  
K

\* THE UPDIP LIMIT OF THESE CONFINING SYSTEMS IS CONJECTURAL AT THIS TIME

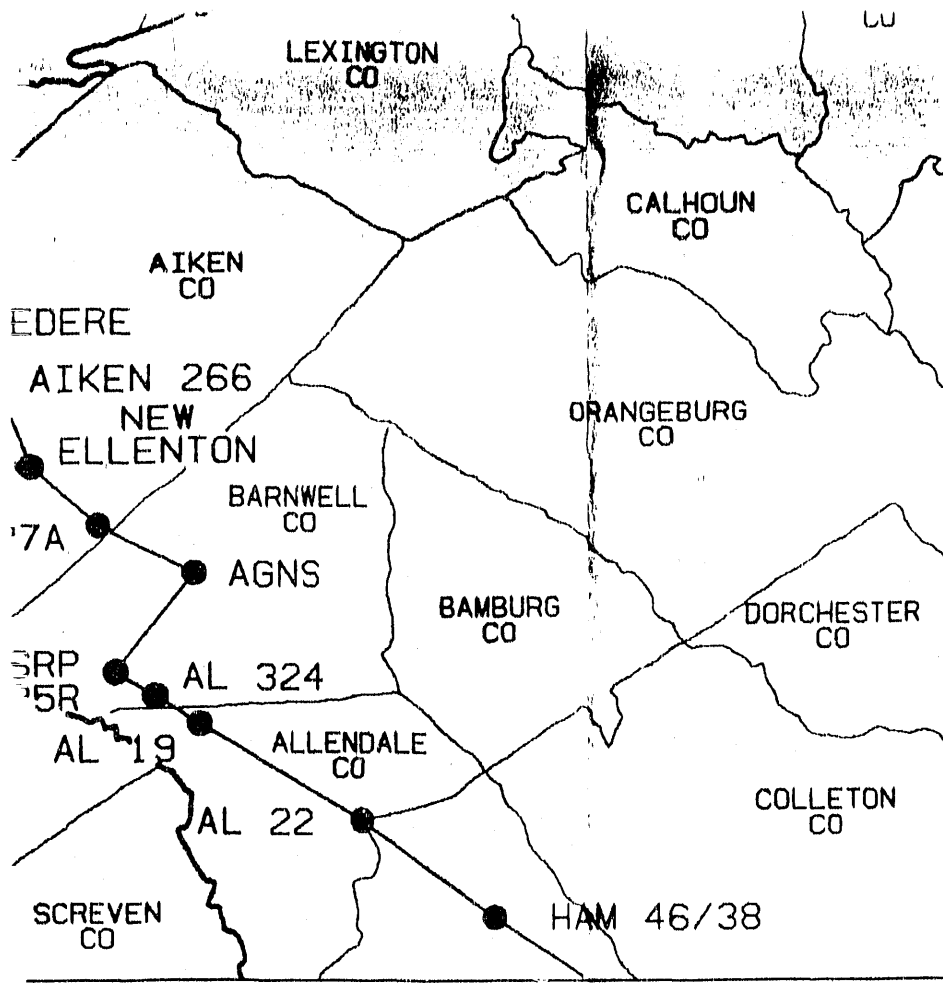




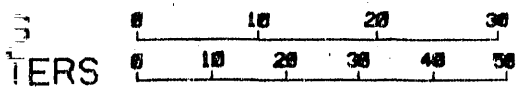
MILES   
KILOMETERS 

KE

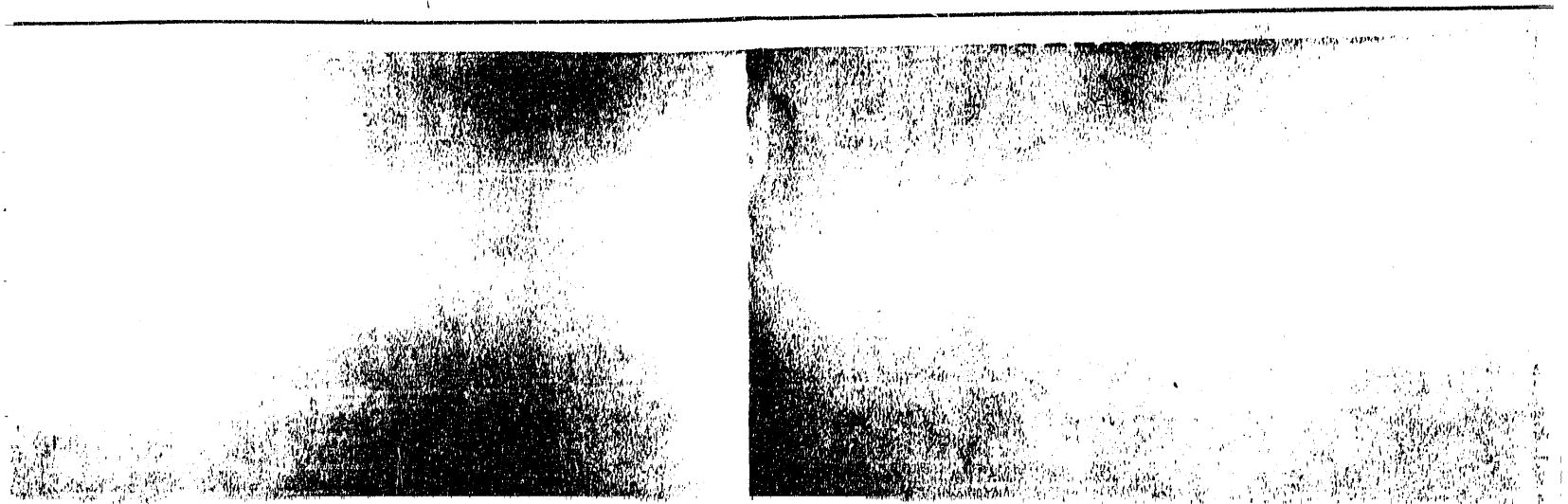
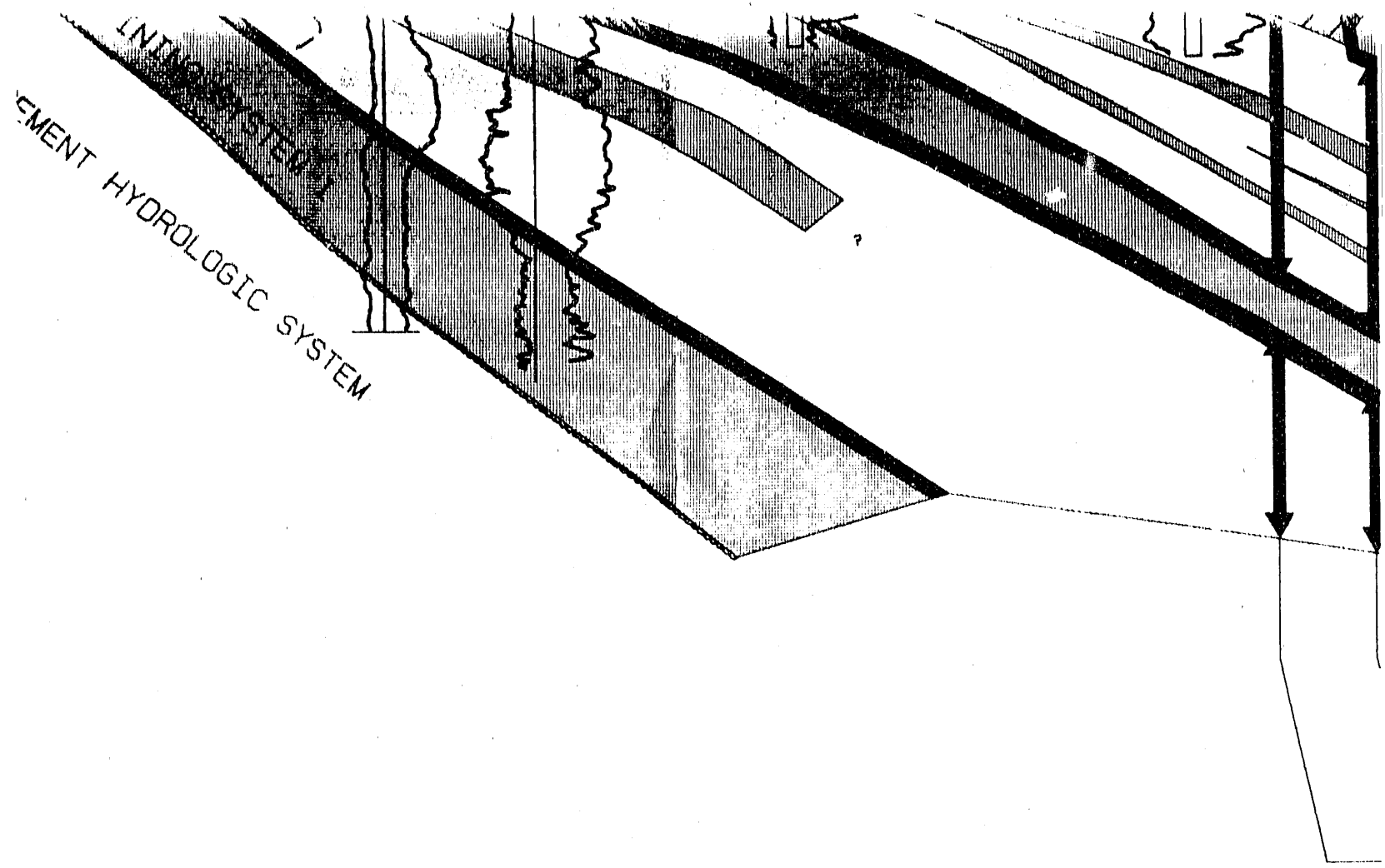
IC BASE

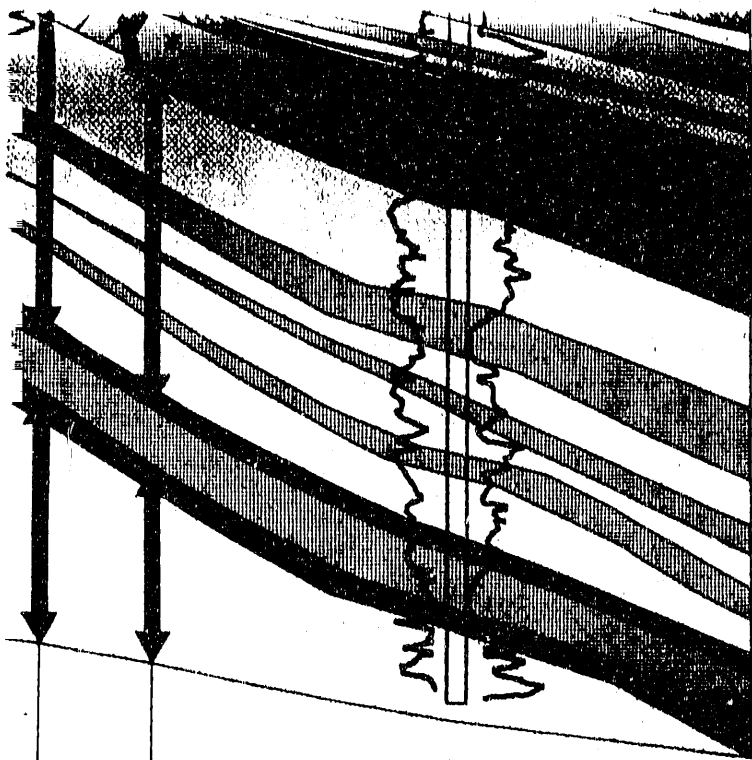


SCALE



KEY PLAN





-250

-300

-800

-900

-1000

THE FOUR HYDROLOGIC SYSTEMS  
PROPOSED BY COLQUHOUN ETAL. 1983,  
IN WESTERN SOUTH CAROLINA

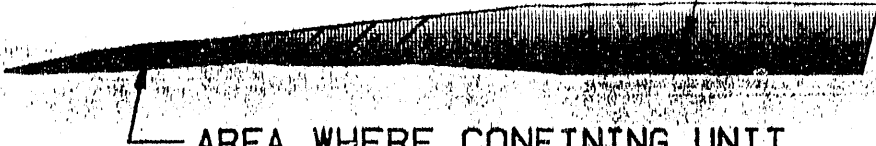
THE THREE REGIONAL HYDROLOGIC SYSTEMS  
PROPOSED BY CLARKE, BROOKS & FAYE, 1988  
IN EASTERN GEORGIA.

-700

-800

-900

-1000



AREA WHERE CONFINING UNIT  
IS PARTIALLY CONDUCTIVE

DWG. NO.

R00017

Fig. 6

# UPDIP LIMIT OF SAVANNAH WELL LOG

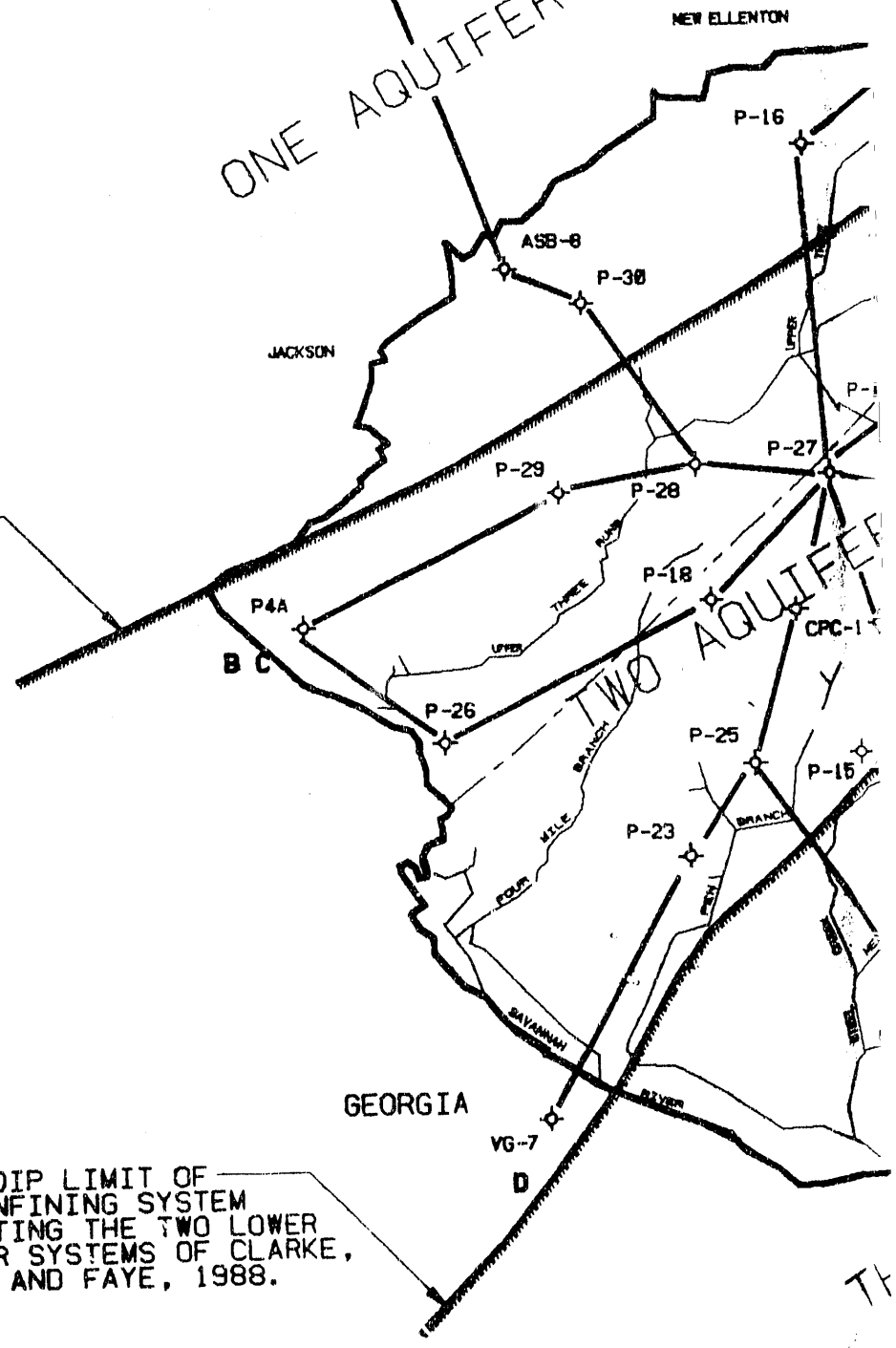
PREPARED BY  
ROLF K. KEENE  
S.F.

A  
B  
C  
D  
E  
F  
G  
H  
I  
J

ONE AQUIFER SYSTEM

THE UPDIP LIMIT OF  
CONFINING SYSTEM I - II

THE UPDIP LIMIT OF  
THE CONFINING SYSTEM  
SEPARATING THE TWO LOWER  
AQUIFER SYSTEMS OF CLARKE,  
BROOKS AND FAYE, 1988.



# CONFINING SYSTEMS

## RIVER SITE

### LOCATION MAP

PREPARED BY:  
G. AADLAND  
DRAWN BY:  
J. VICK

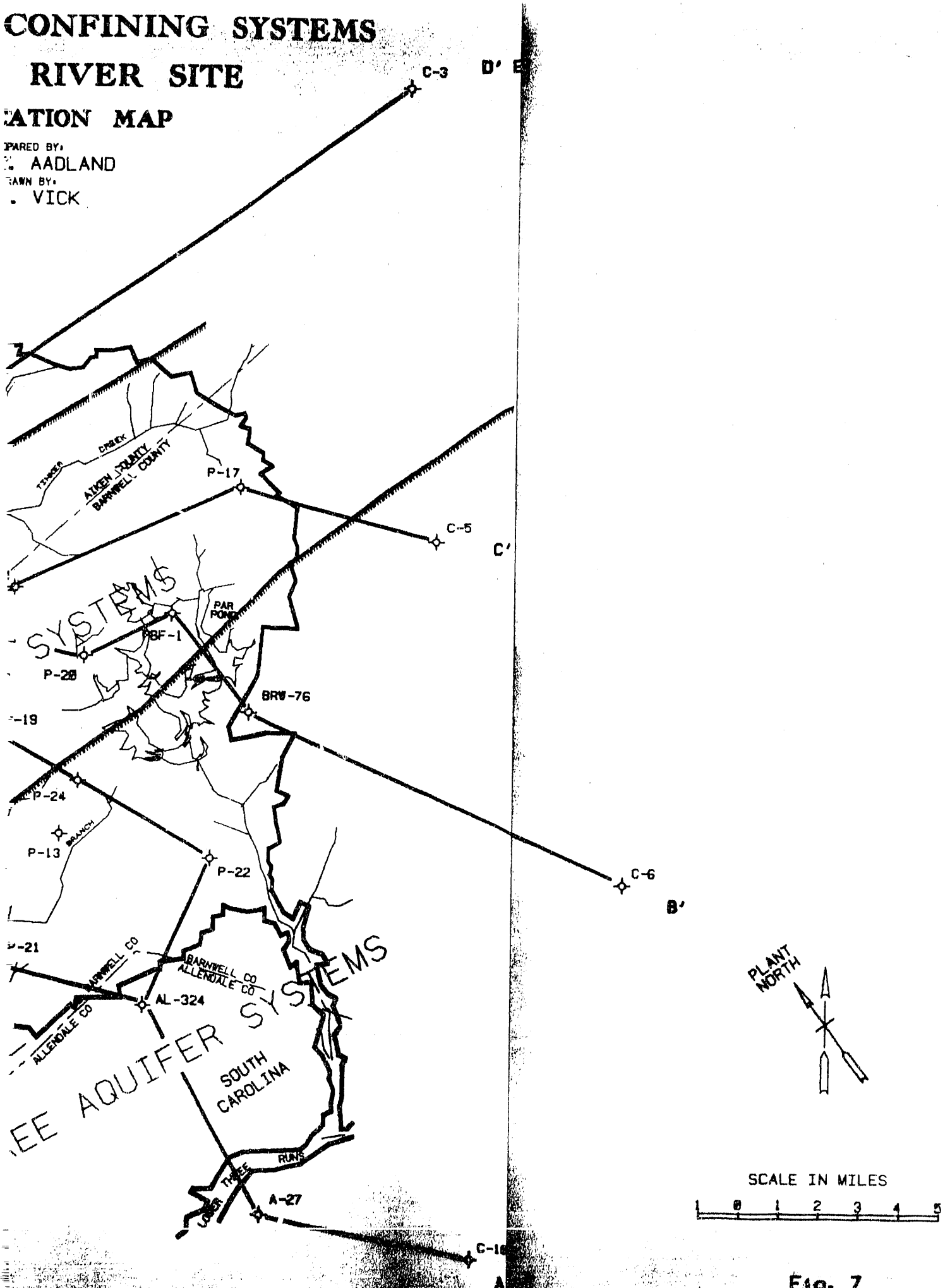
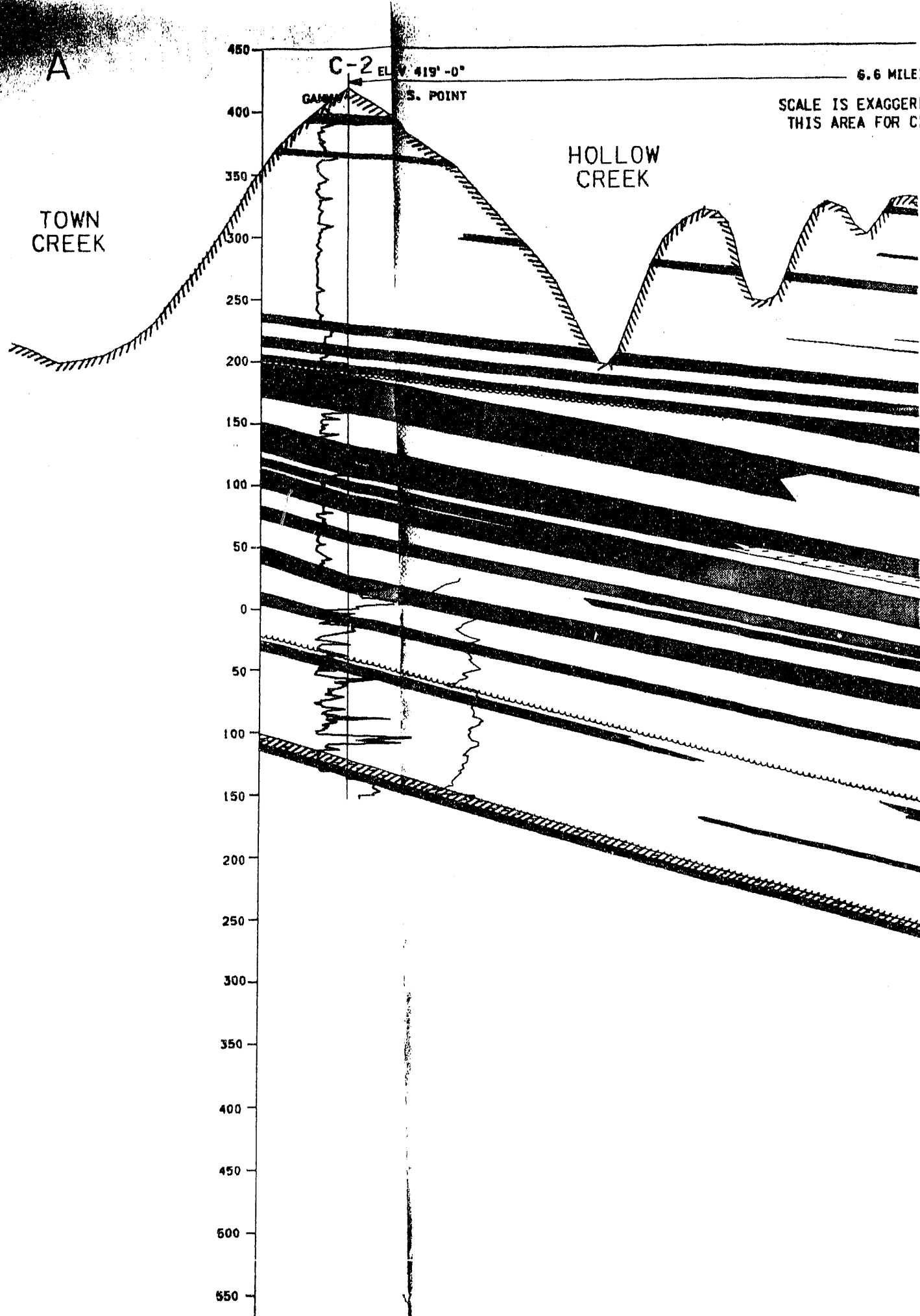


Fig. 7



A



ASB-8/MSB-12

1.6 MILES

P-30

ELEV 349'-0"

SCALE IS EXAGGERATED IN THIS AREA FOR CLARITY

ELEV 354'-0"

GAMMA RES.

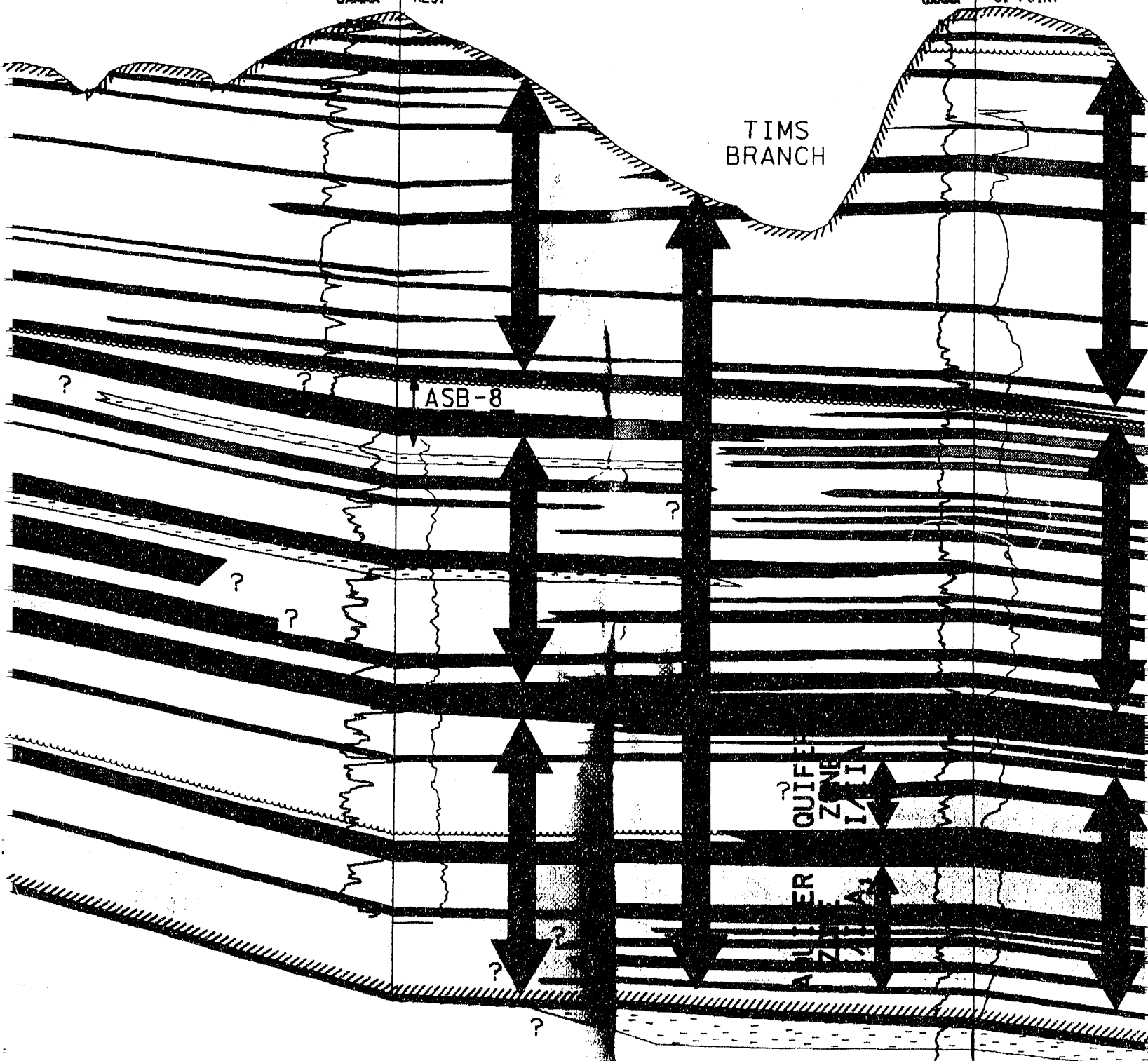
GAMMA S. POINT

TIMS BRANCH

ASB-8

QUIFF  
ZONE  
I, II

ER  
ZONE  
I, II



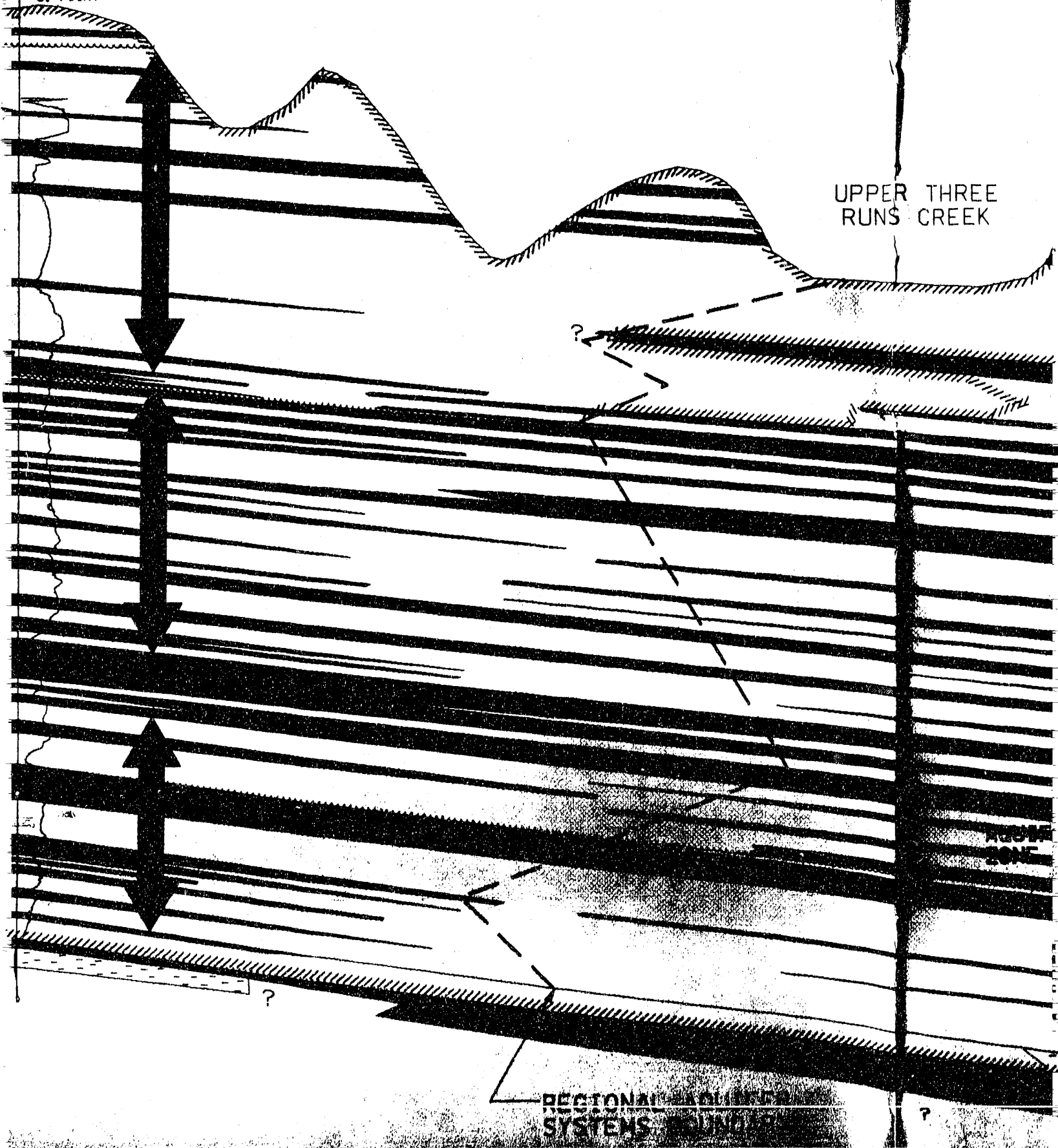
3.8 MILES

SCALE IS EXAGGERATED IN THIS AREA FOR CLARITY

354°-0°

S. POINT

UPPER THREE RUNS CREEK



NORT

P-28

ELEV 284'

2.4 MILES

SCALE IS EXAGGERATED IN  
THIS AREA FOR CLARITY

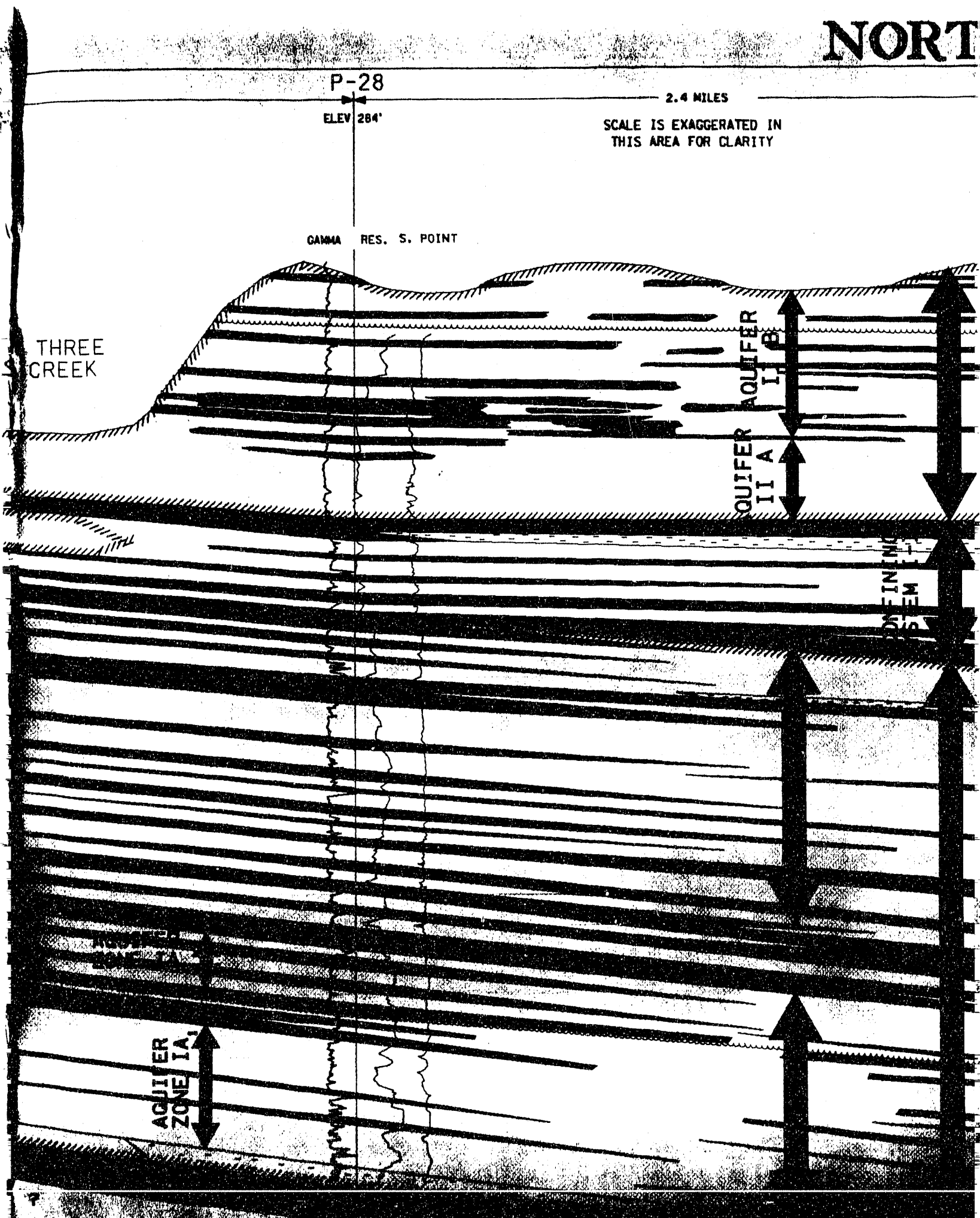
GAMMA RES. S. POINT

THREE  
CREEK

AQUIFER  
II B  
II A

CONFINING  
SYSTEM

AQUIFER  
ZONE IA



# NORTH-SOUTH REGIONAL HY

P-27

3 MILES

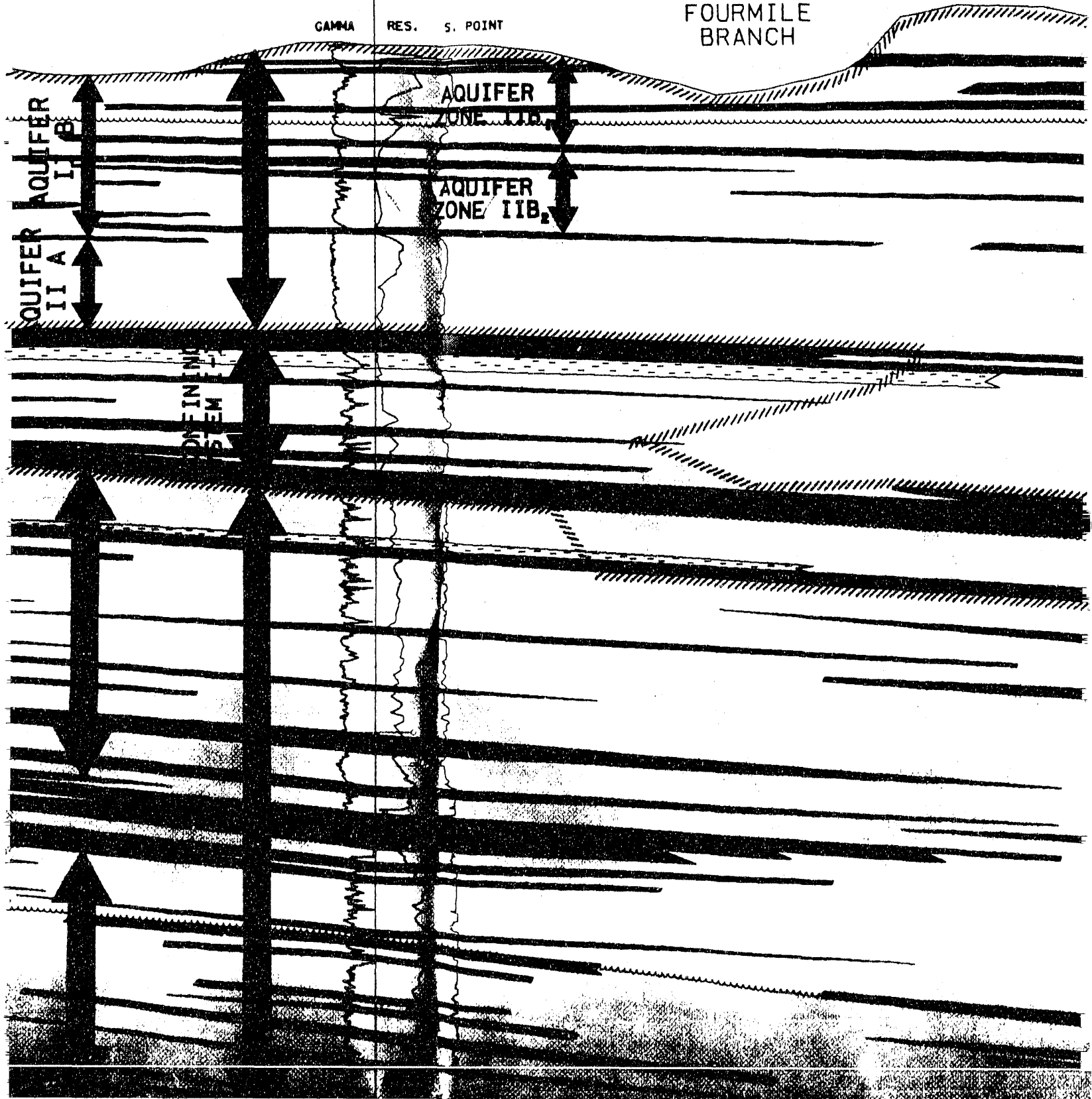
GRADED IN  
CLARITY

ELEV 278'

SCALE IS EXAGGERATED IN  
THIS AREA FOR CLARITY

GAMMA RES. S. POINT

FOURMILE  
BRANCH



4.9 MILES

SCALE IS EXAGGERATED IN  
THIS AREA FOR CLARITY

P-22

ELEV 215'

GAMMA RES.



4.9 MILES

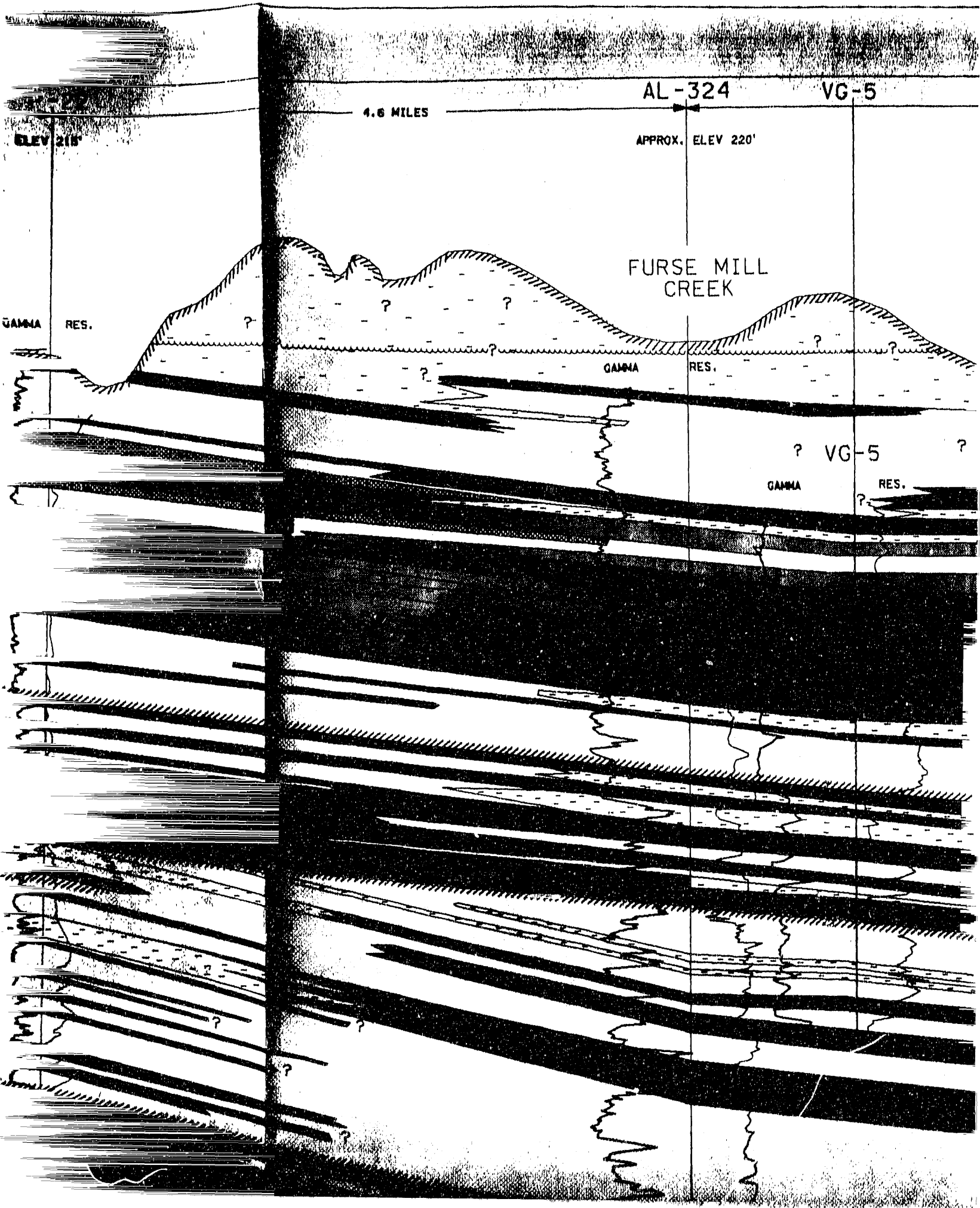
SCALE IS EXAGGERATED IN  
THIS AREA FOR CLARITY

P-22

ELEV 215'

GAMMA RES.





4.6 MILES

AL-324

VG-5

ELEV 215

APPROX. ELEV 220'

FURSE MILL CREEK

GAMMA RES.

GAMMA RES.

? VG-5 ?

GAMMA

RES.



7

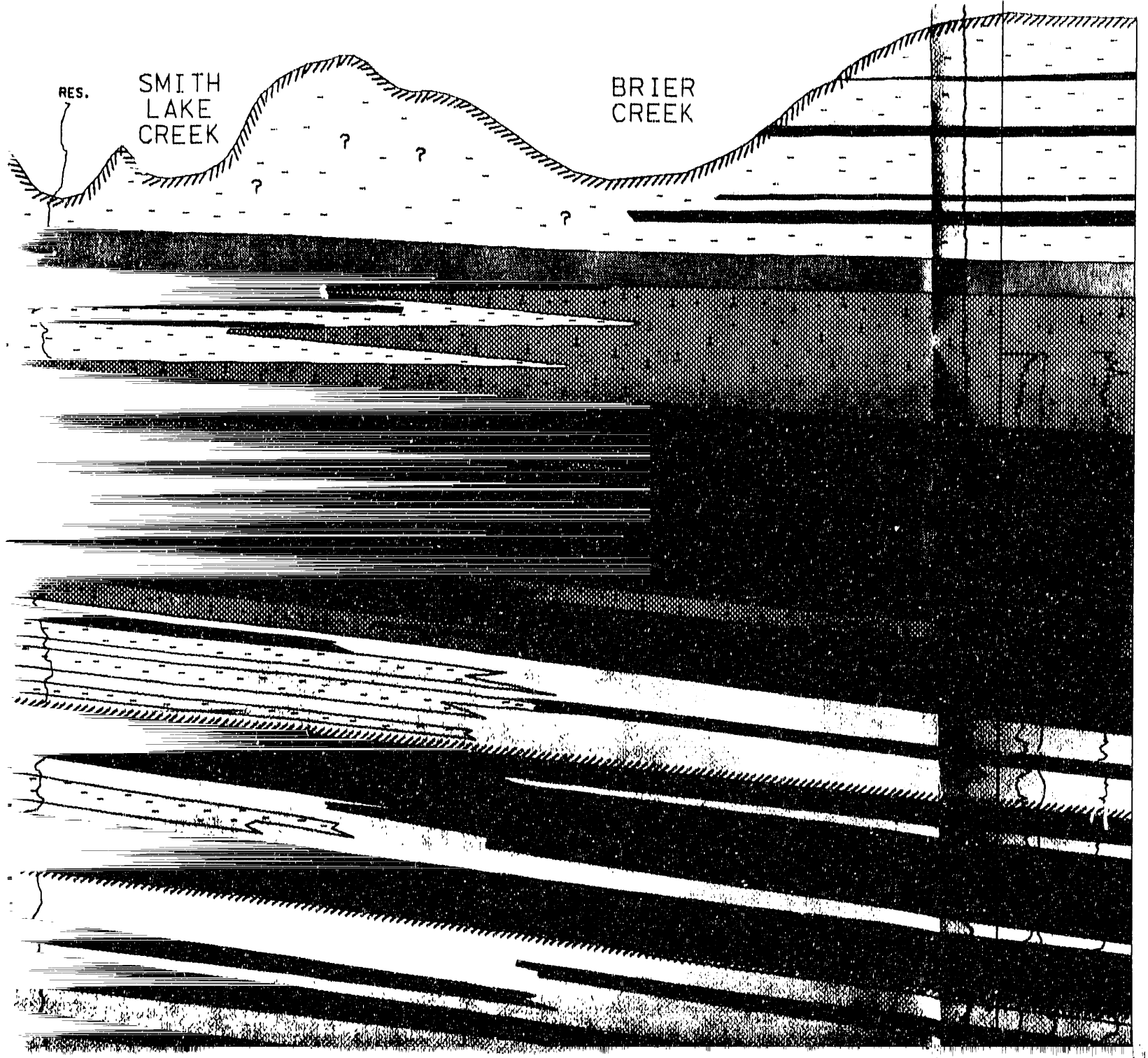
6.1 MILES

C-10

ELEV 290' APPROX.

175'

GAMMA SP RES. S. POINT



RES.

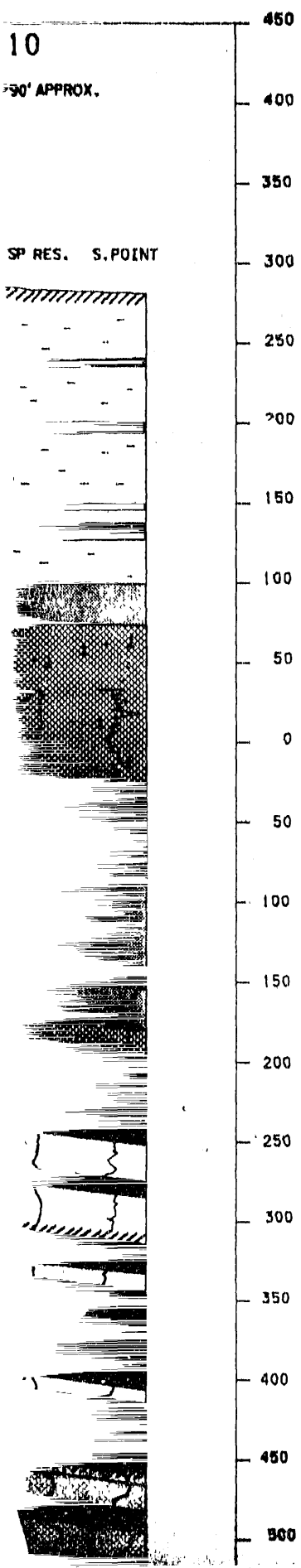
SMITH  
LAKE  
CREEK

BRIER  
CREEK

?  
-  
?  
-  
?










77

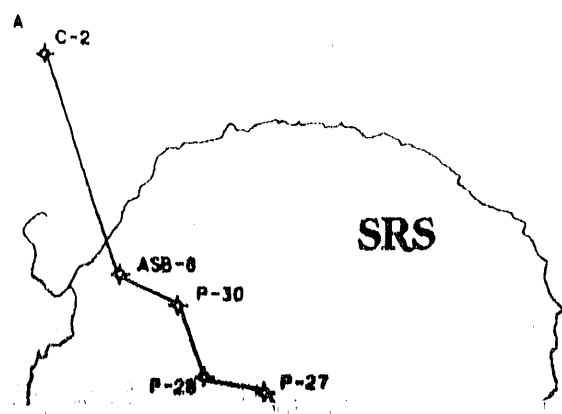
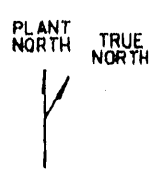
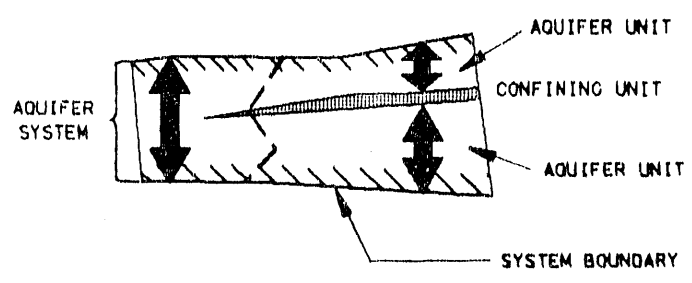
81



A'

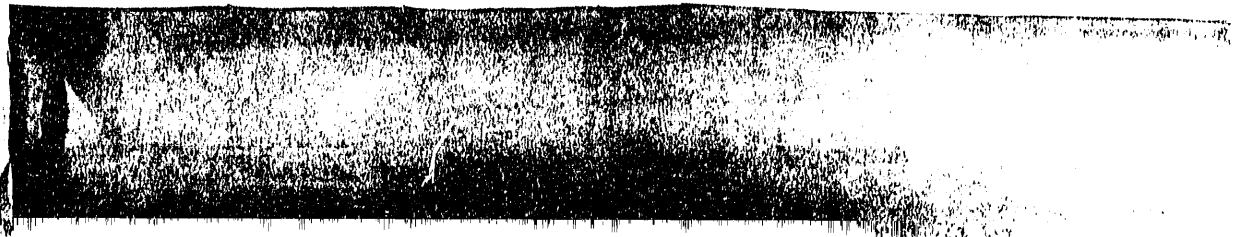
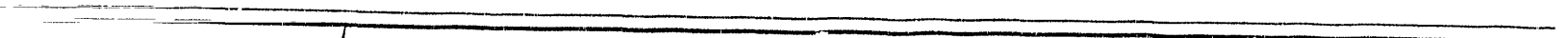
LEGEND

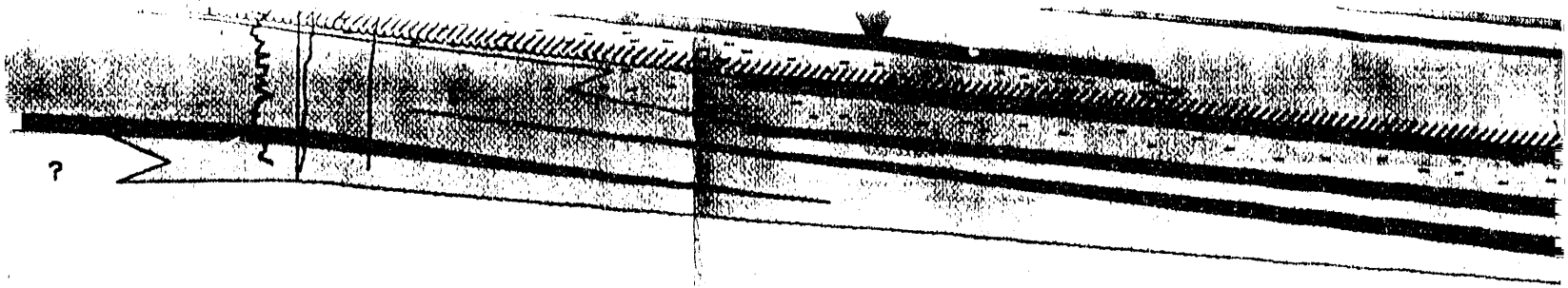
-  SAND LOCALLY CONGLOMERATIC
-  CLAYEY/SILTY SAND
-  MICACEOUS SAND
-  CLAY, SILTY CLAY
-  CALCAREOUS MUD
-  LIMESTONE
-  CLAYEY MICRITIC LIMESTONE
-  CALCAREOUS SAND
-  REGIONAL UNCONFORMITY



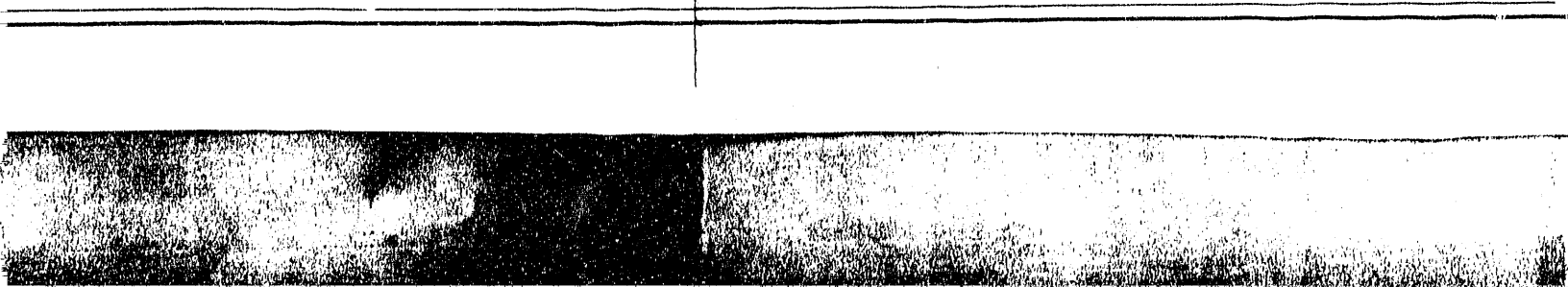


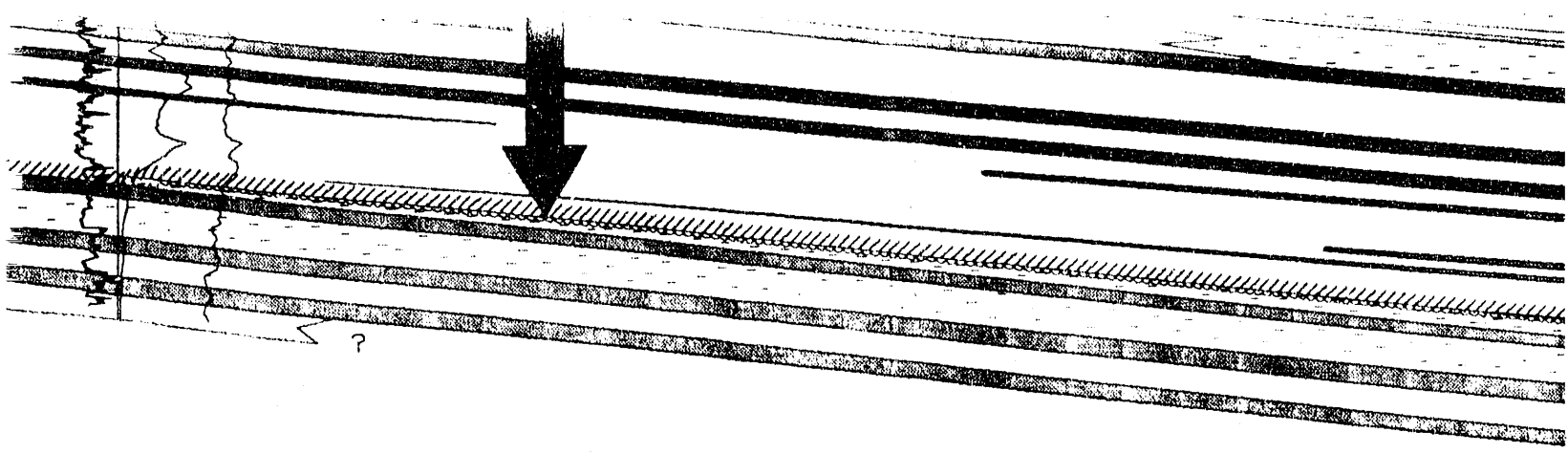
LOCATION OF THE  
PEN BRANCH FAULT





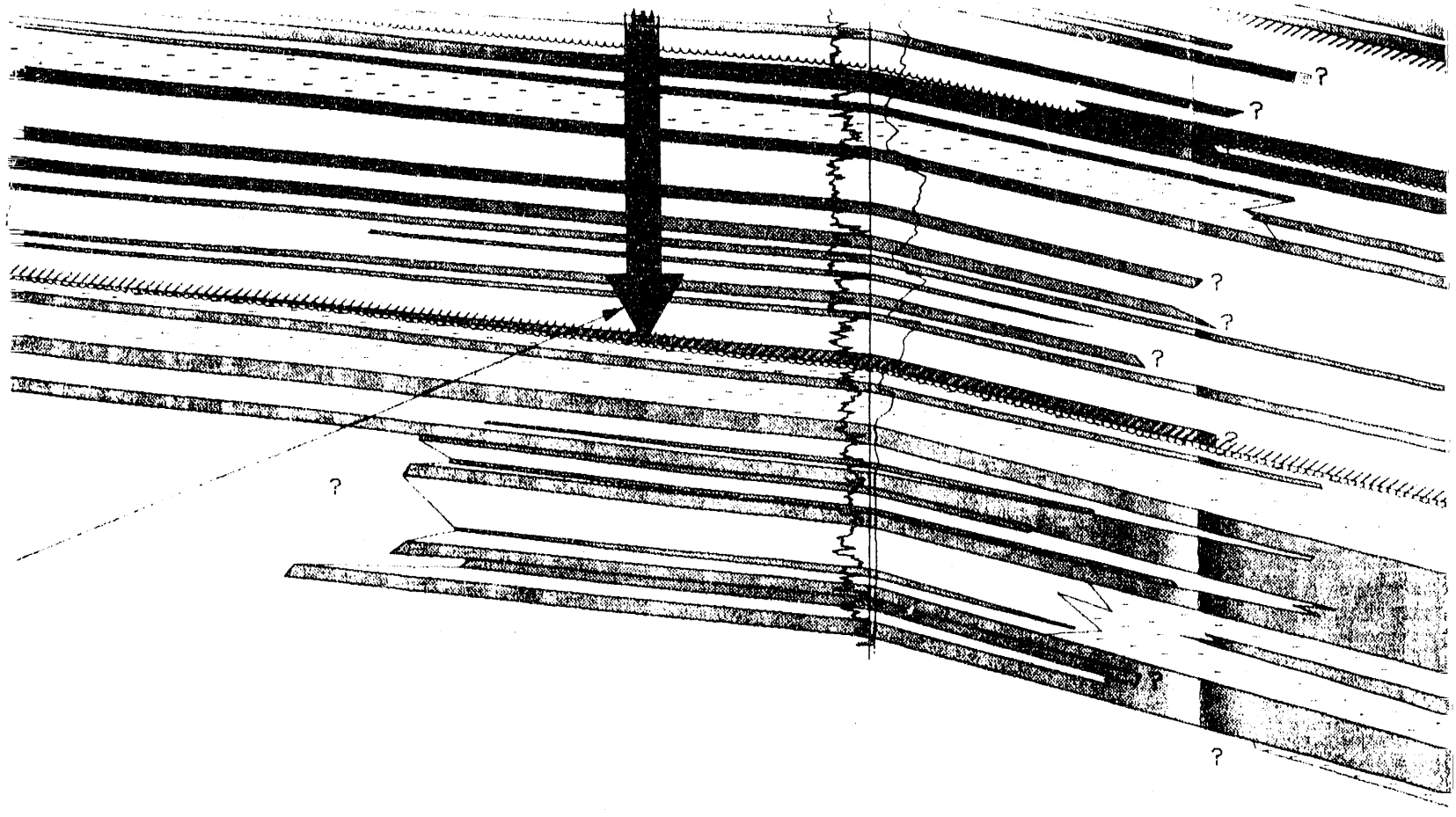
THE  
AULT

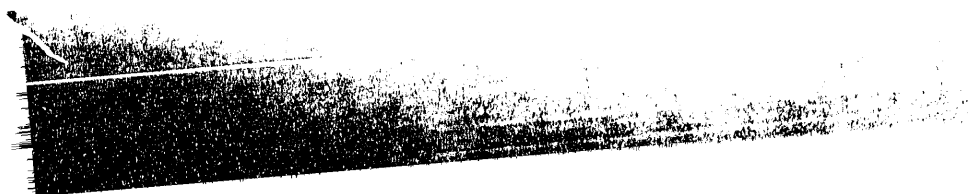


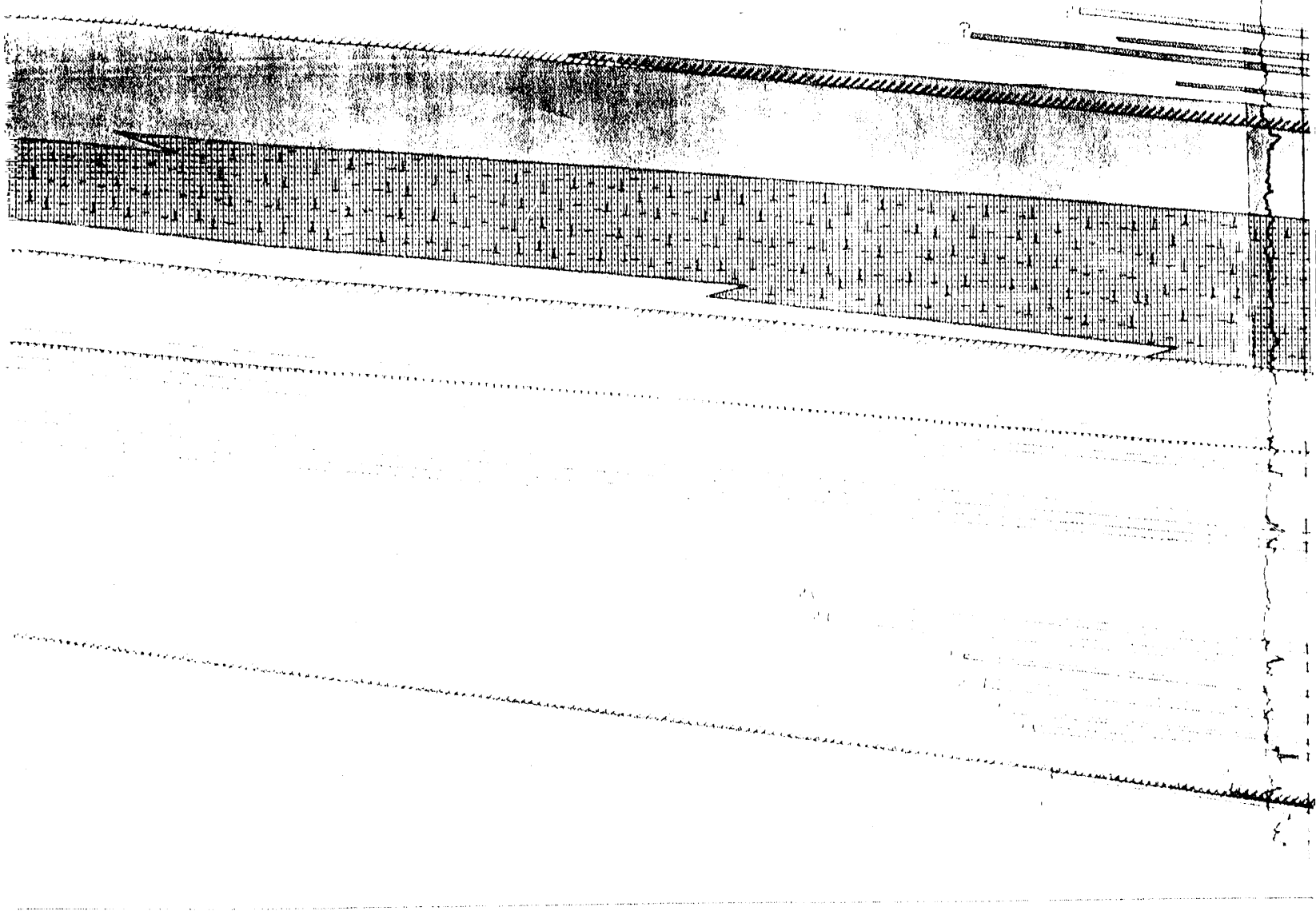


THE THREE REGIONAL  
AQUIFER SYSTEMS PROPOSED BY  
CLARK, BROOKS & FAYE, 1988  
IN EASTERN GEORGIA

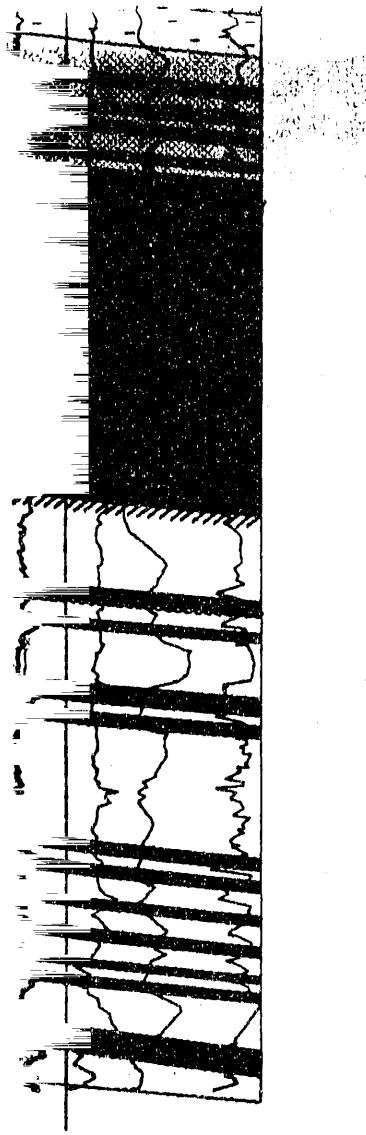




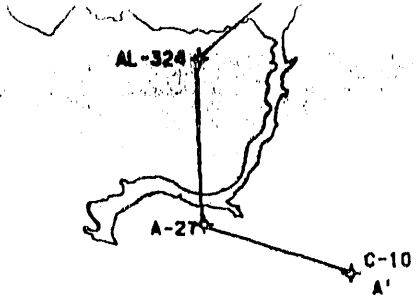








650  
700  
750  
800  
850  
900  
950  
1000  
1050  
1100  
1150



VERTICAL 0 50 100 FEET

DRG. NO. **RC0009**

<b>UNITED STATES DEPARTMENT OF ENERGY</b>			
<b>SAVANNAH RIVER SITE</b>			
<small>AREA</small> SRS REGIONAL	<small>EVR NO.</small> 866467	<small>PROJECT NO.</small> SRS REGIONAL HYDROSTRATIGRAPHIC CLASSIFICATION	
<b>NORTH-SOUTH REGIONAL HYDROSTRATIGRAPHIC CROSS-SECTION A-A'</b>		<small>DRAFTED BY</small> T. MICKLEY	<small>DATE</small>
		<small>PREPARED BY</small> R. AADLAND	<small>DATE</small>
		<small>GEOLOGY BY</small> R. AADLAND	<small>DATE</small>
		<small>REPORT NO.</small> WSRC-RP-90-987	

FIG. 8

400  
350  
300  
250  
200  
150  
100  
50  
0  
-50  
-100  
-150  
-200  
-250  
-300

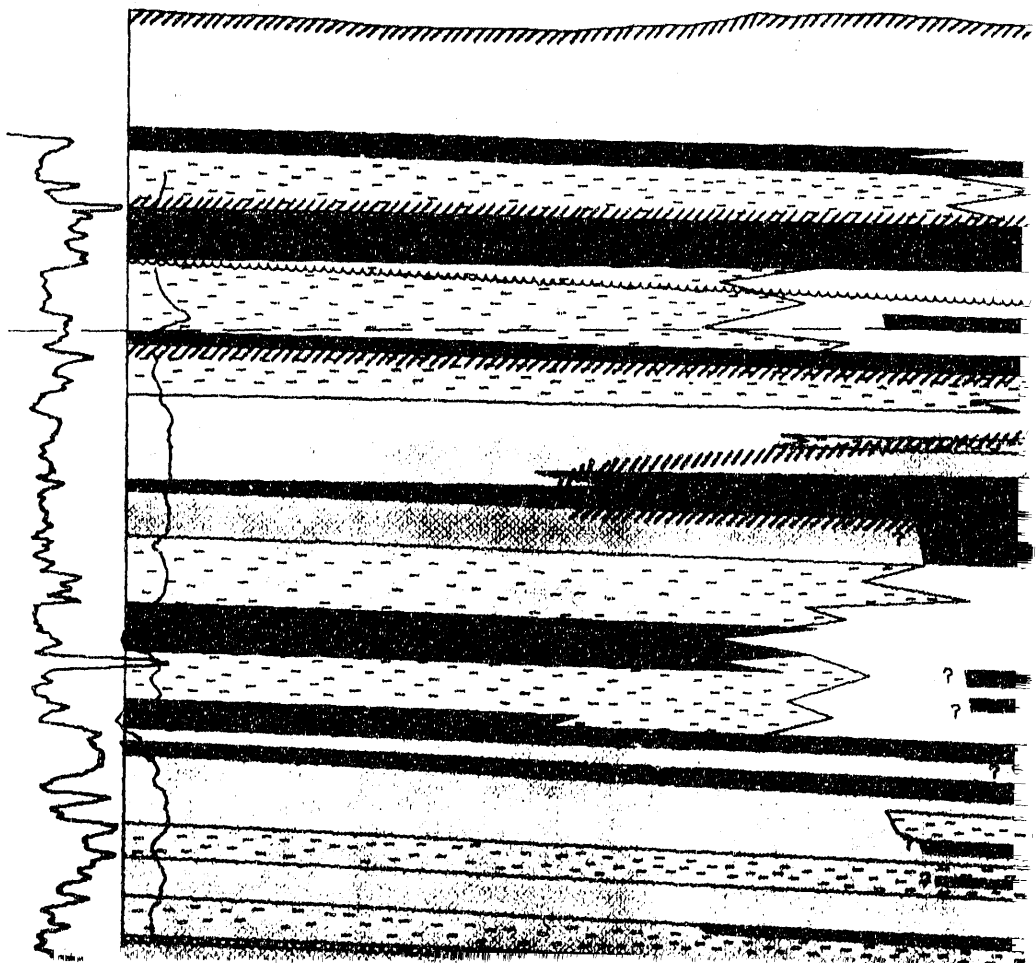
B

P-4A  
ELEV. 185'

GAMMA RES.

5.5 MILES

SAVANNAH RIVER  
FLOOD PLAIN



2.6 MILES

2.4 MILE

P-29

ELEV. 285'

GAMMA RES. S. POINT

UPPER  
THREE RUNS  
CREEK

VERY NEAR  
UPDIP LIMIT  
OF CONFINING  
SYSTEM I-II

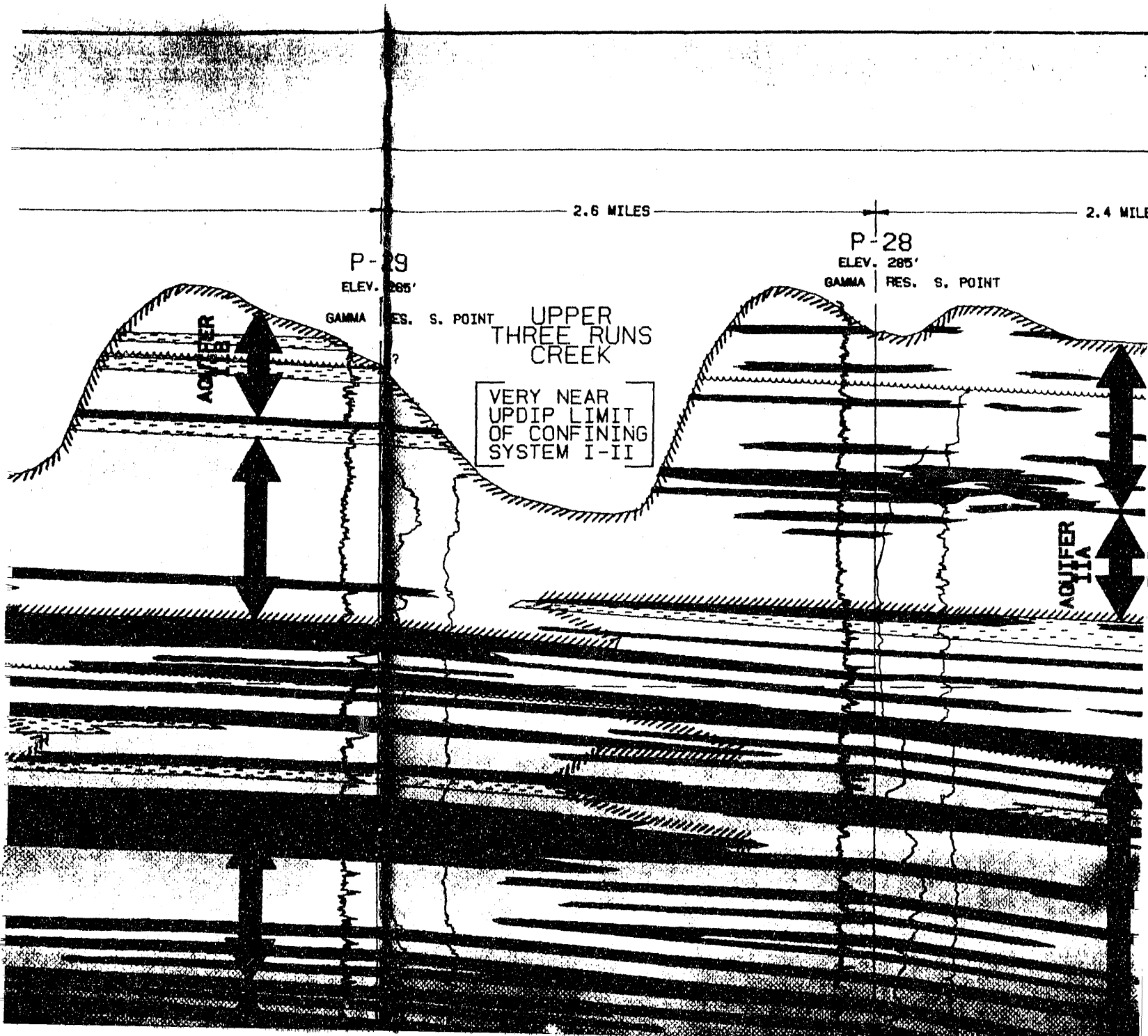
P-28

ELEV. 285'

GAMMA RES. S. POINT

AQUIFER

AQUIFER  
IIA



# WEST-EAST HYDROSTRATIG

MILES 3.5 MILES

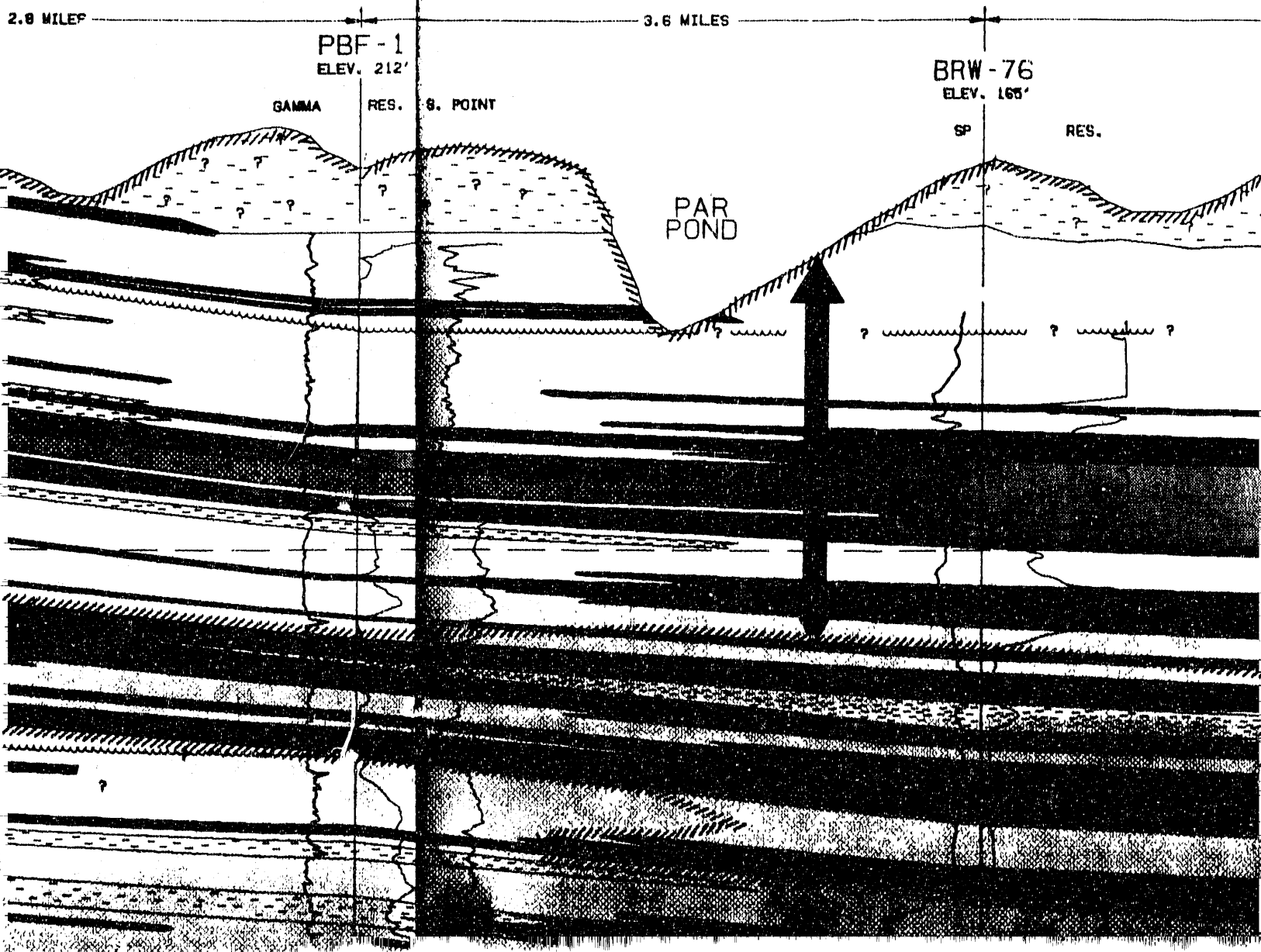
P-27  
ELEV. 276'  
GAMMA RES. S. POINT

P-20  
ELEV. 287'  
GAMMA RES. S. POINT

POND  
C



# GRAPHIC CROSS-SECTION B-B'

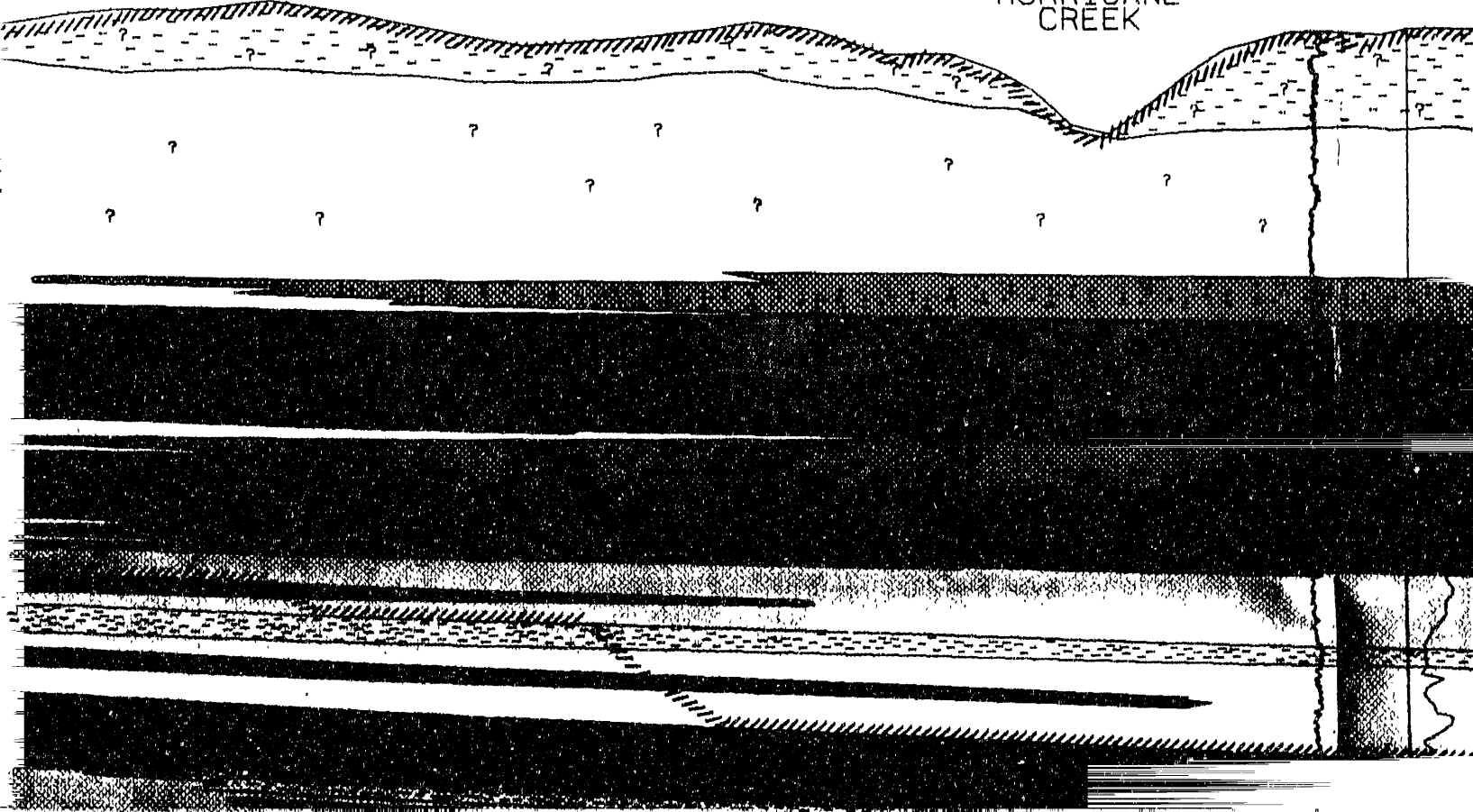


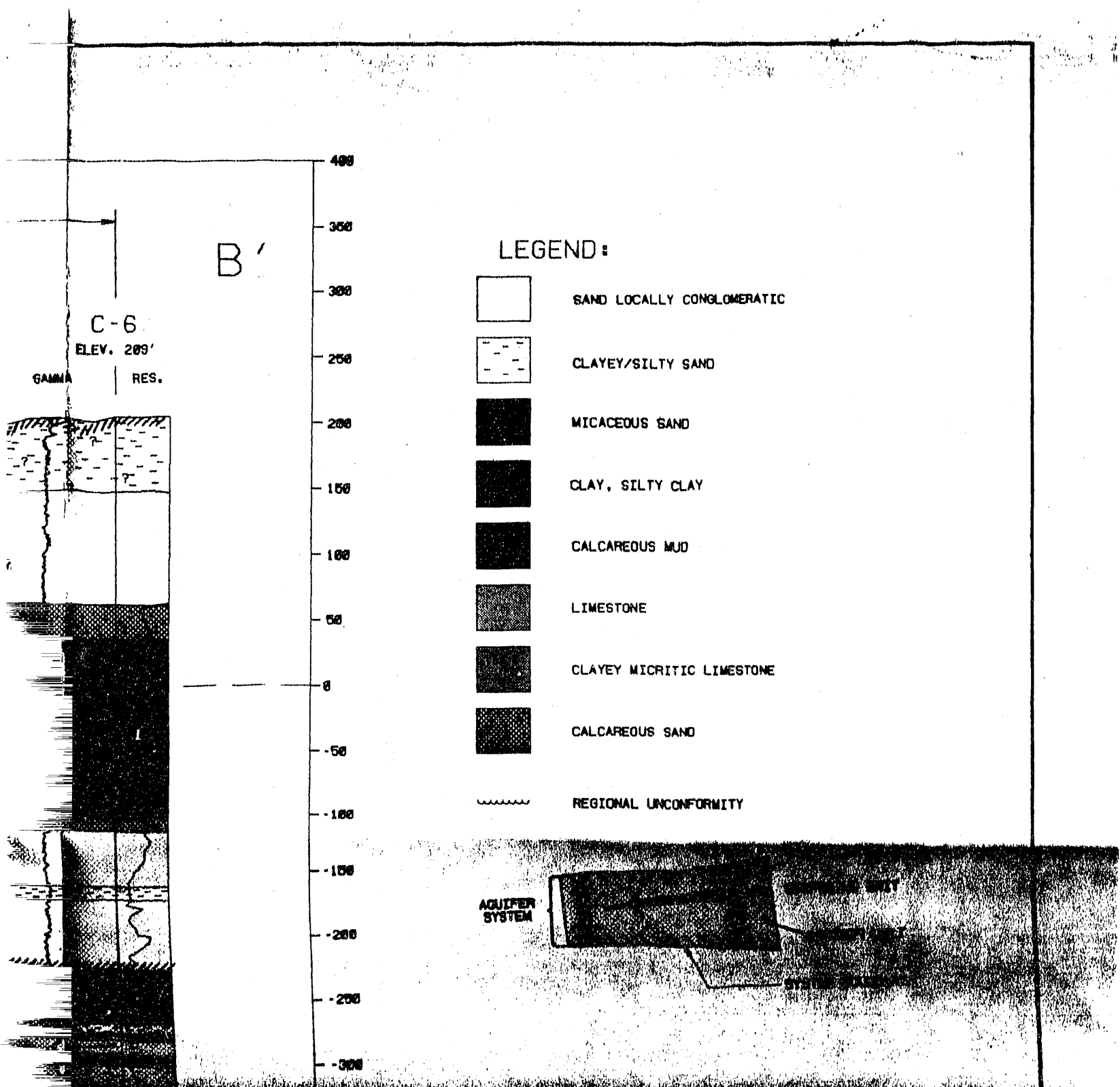
12.3 MILES

C-6  
ELEV. 209'

GAMMA RES.

HURRICANE  
CREEK





B'

C-6

ELEV. 209'

GAMMA

RES.

LEGEND:



SAND LOCALLY CONGLOMERATIC



CLAYEY/SILTY SAND



MICACEOUS SAND



CLAY, SILTY CLAY



CALCAREOUS MUD



LIMESTONE



CLAYEY MICRITIC LIMESTONE



CALCAREOUS SAND

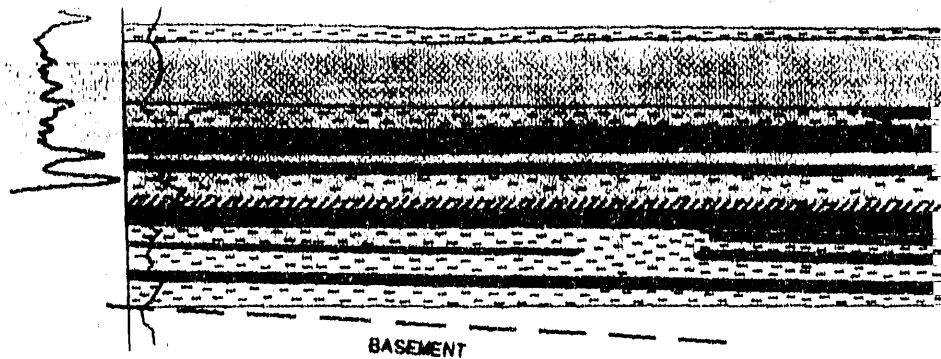


REGIONAL UNCONFORMITY

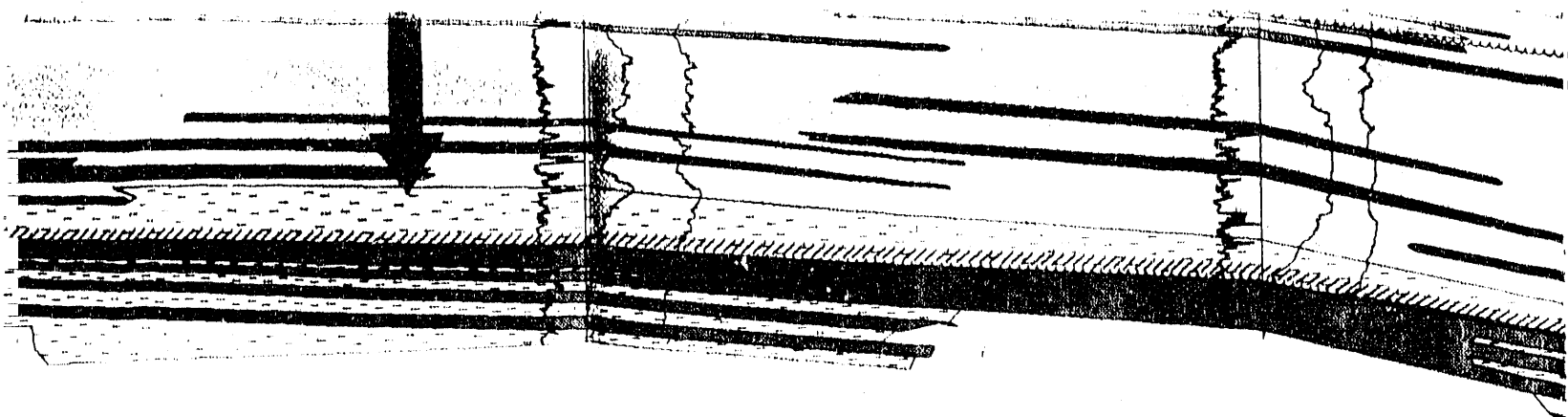
AQUIFER SYSTEM

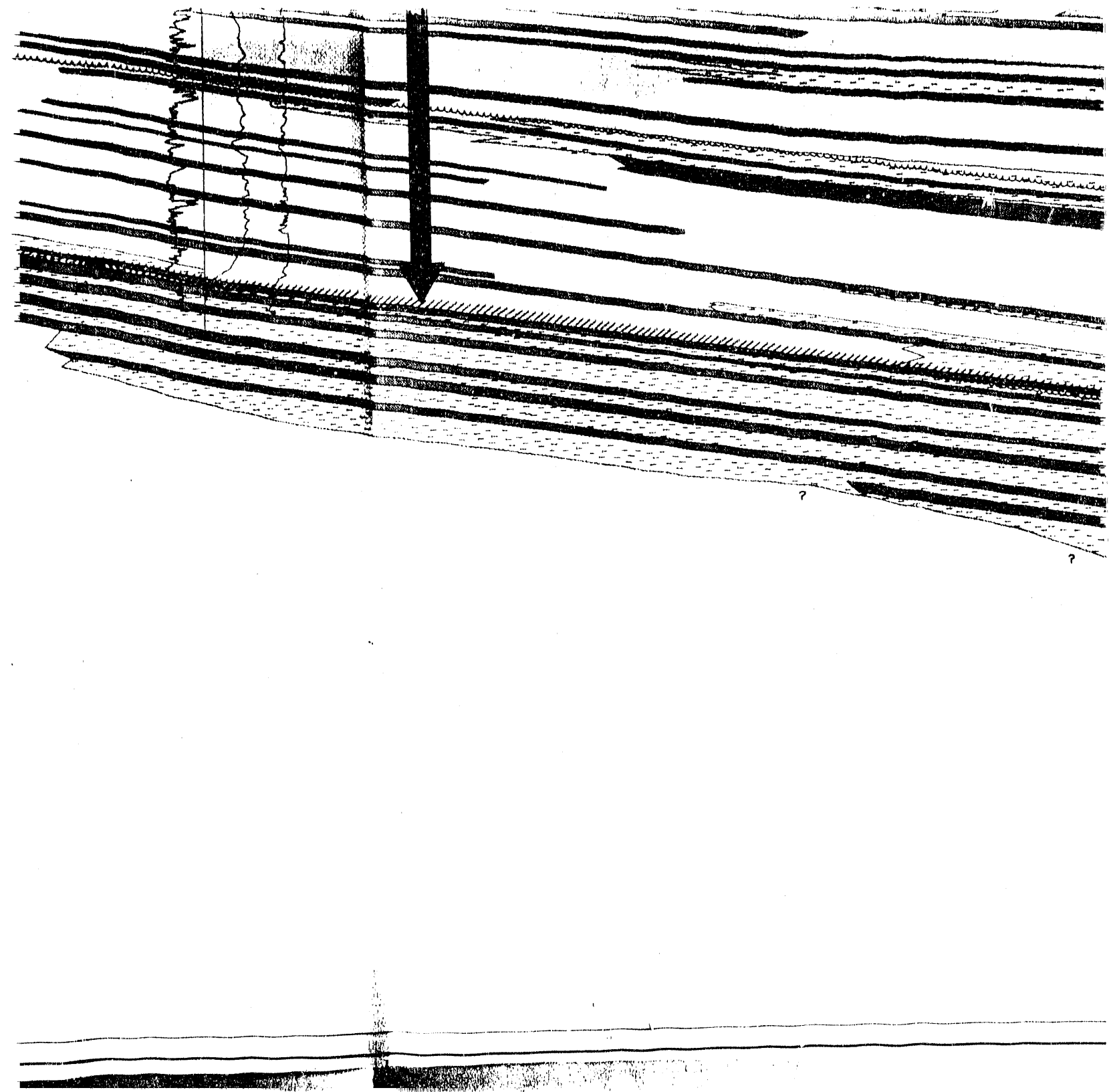
400  
350  
300  
250  
200  
150  
100  
50  
0  
-50  
-100  
-150  
-200  
-250  
-300

-400  
-450  
-500  
-550  
-600  
-650  
-700  
-750  
-800  
-850  
-900  
-950  
-1000  
-1050  
-1100  
-1150











A geological cross-section diagram showing various rock layers and aquifer systems. The layers are represented by different patterns: solid black, horizontal dashed lines, and diagonal hatching. A vertical line on the left indicates a fault. A large double-headed vertical arrow is positioned in the center-right, spanning several layers. A small upward-pointing arrow is located in the lower-left quadrant.

LOCATION OF THE  
PEN BRANCH FAULT

THE THREE REGIONAL AQUIFER  
SYSTEMS PROPOSED BY CLARK,  
BROOKS AND FAYE, 1988  
IN EASTERN GEORGIA.

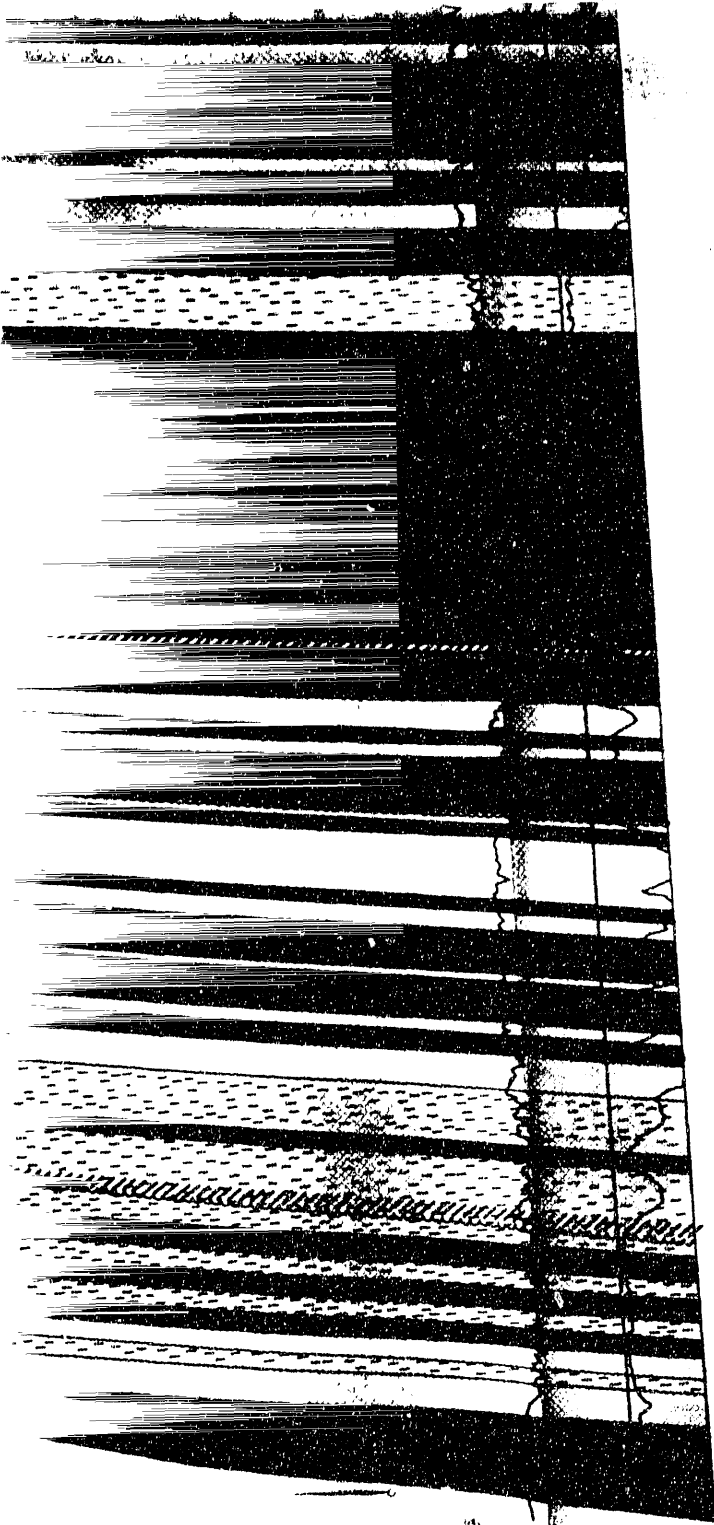
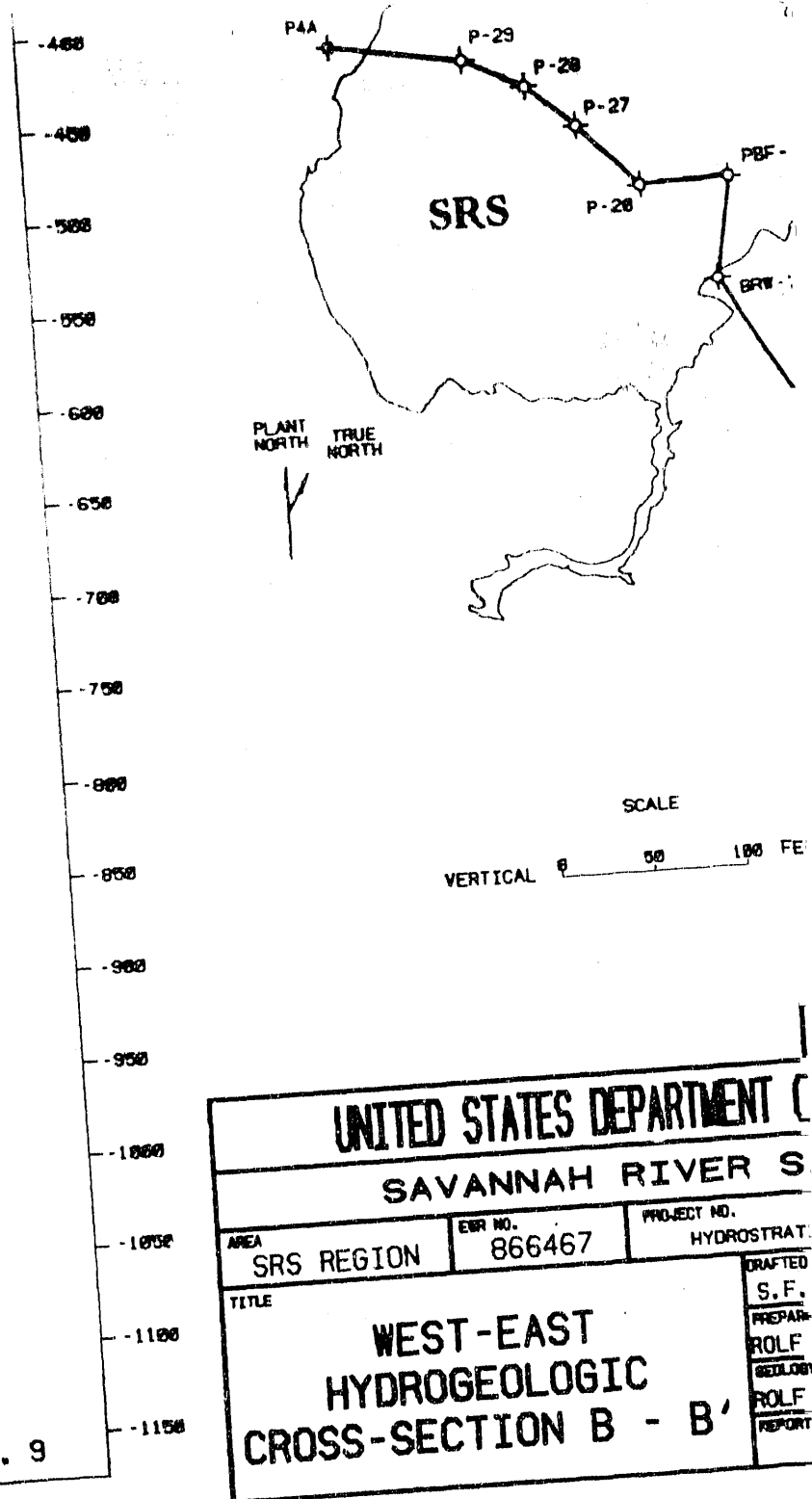
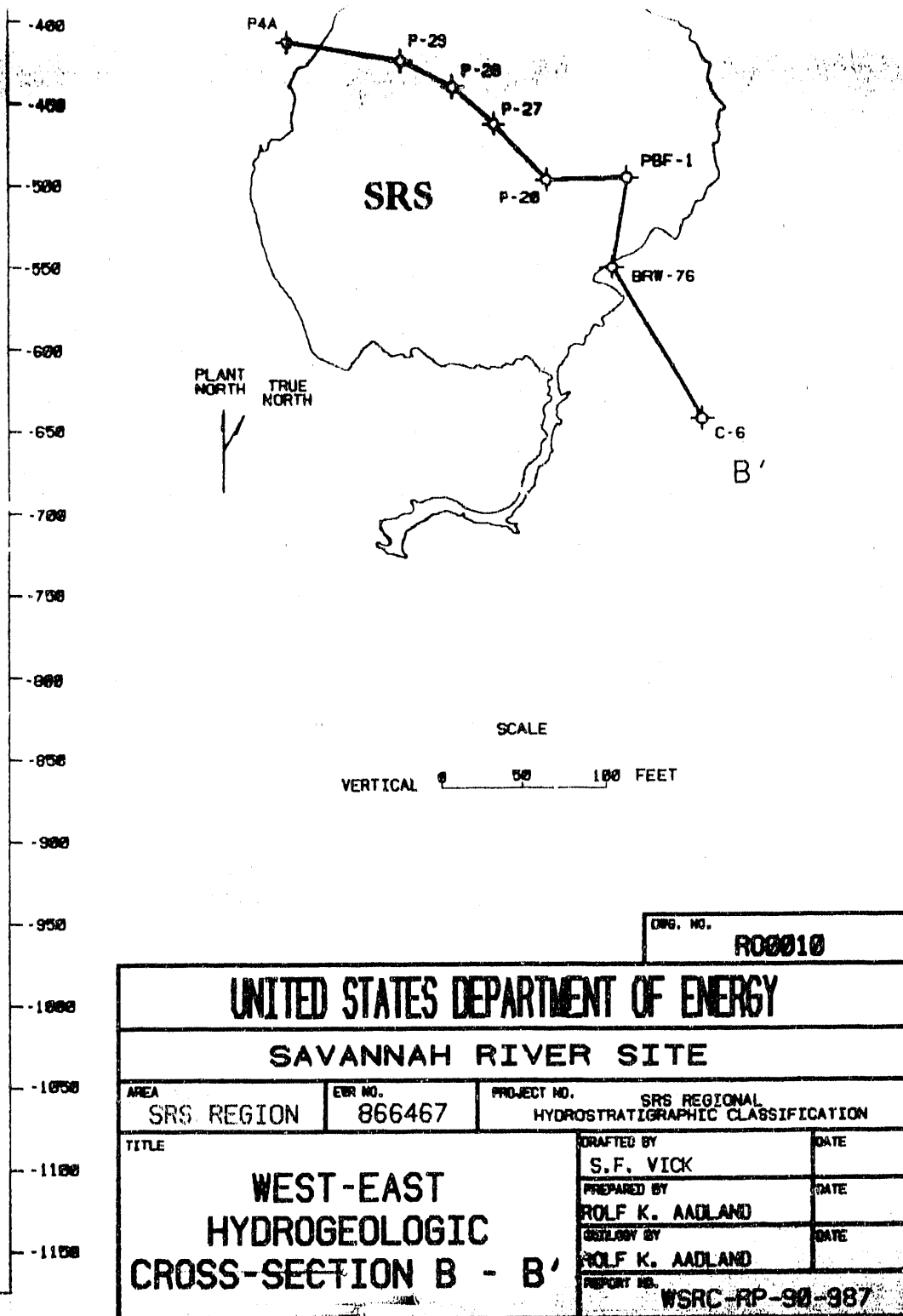


Fig. 9





P-4A  
ELEV 165'

P-26  
ELEV 151'

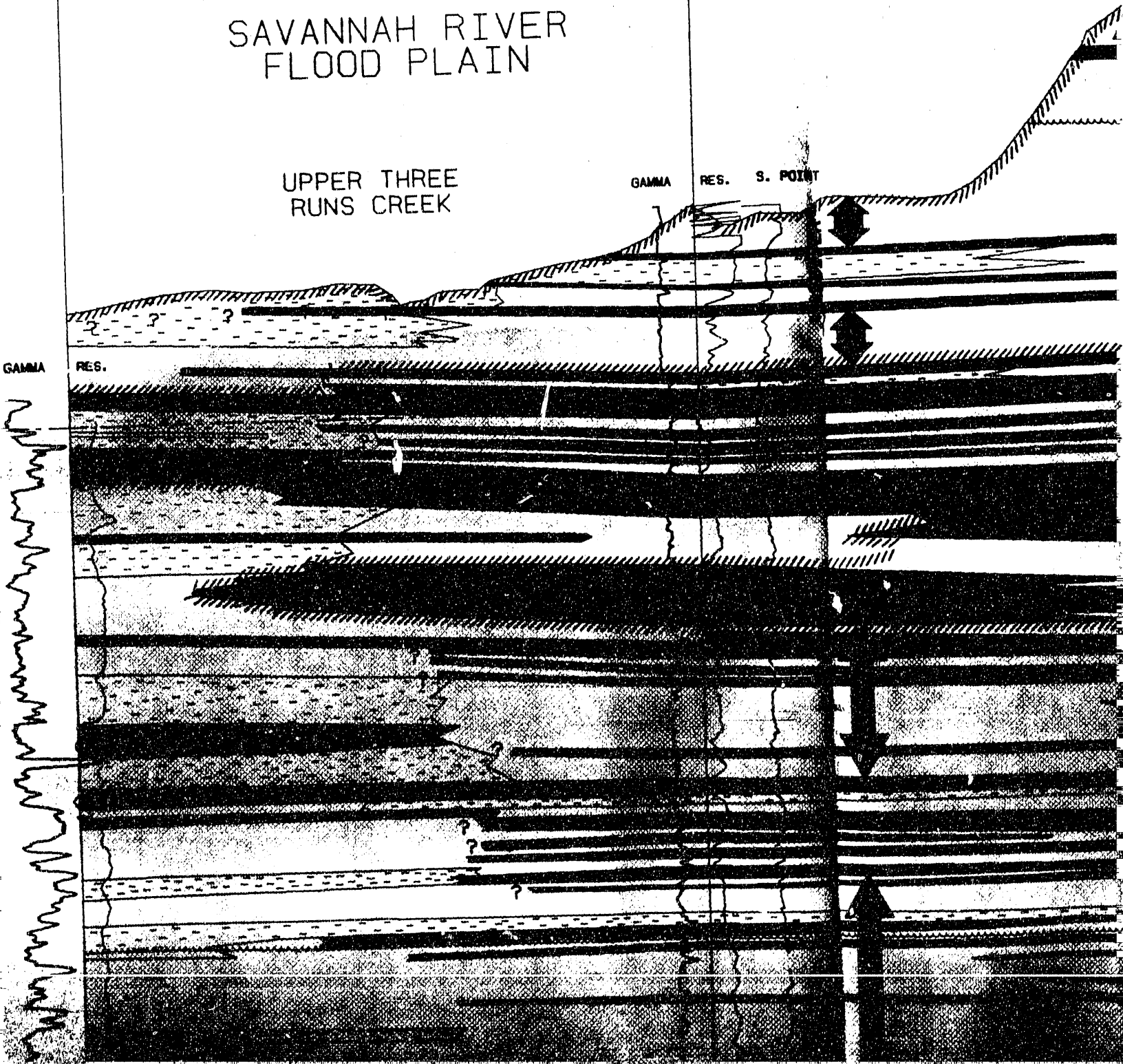
3.5 MILES

# SAVANNAH RIVER FLOOD PLAIN

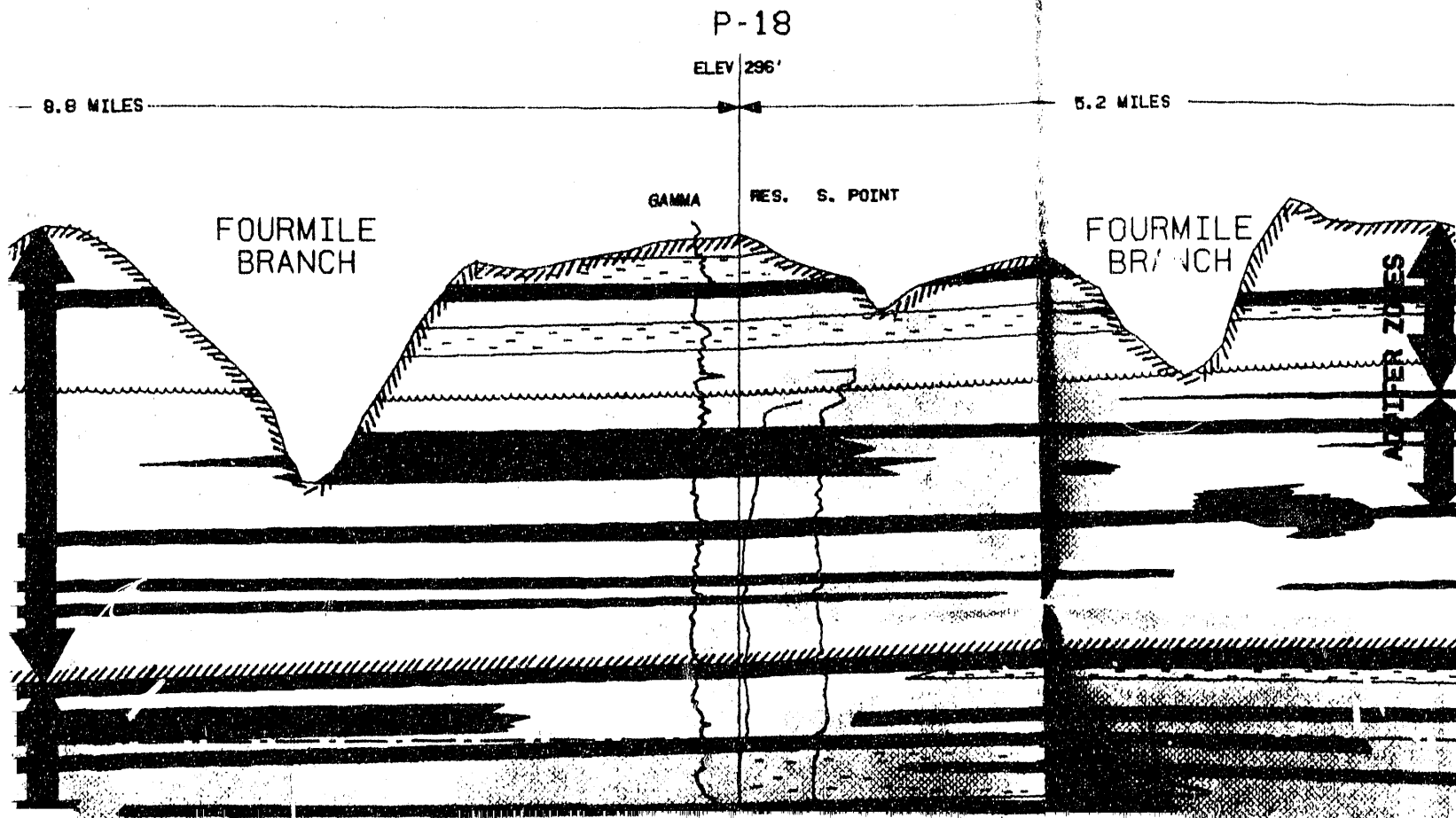
UPPER THREE  
RUNS CREEK

GAMMA RES. S. POINT

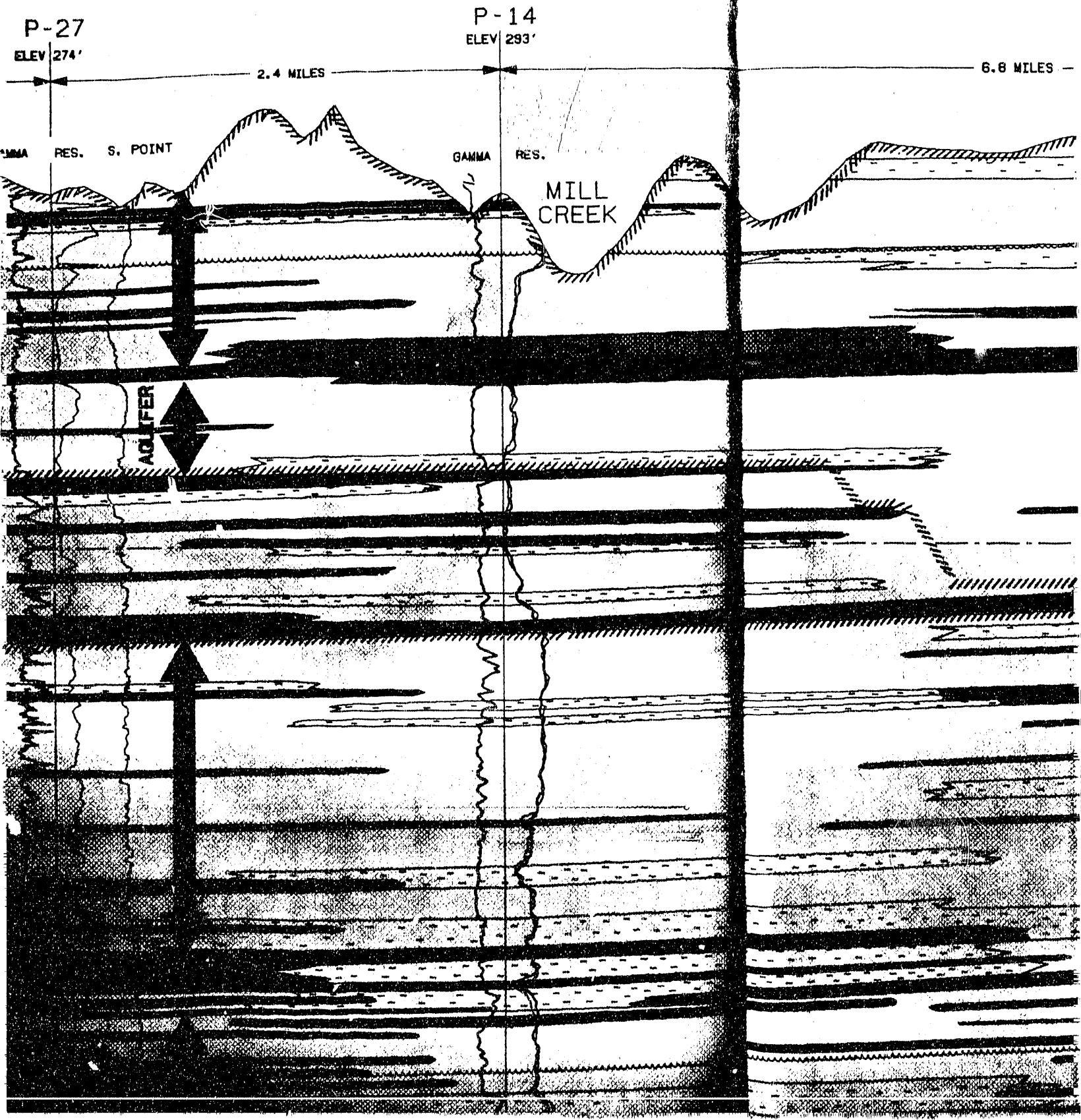
GAMMA RES.



# WEST-EAST REGI

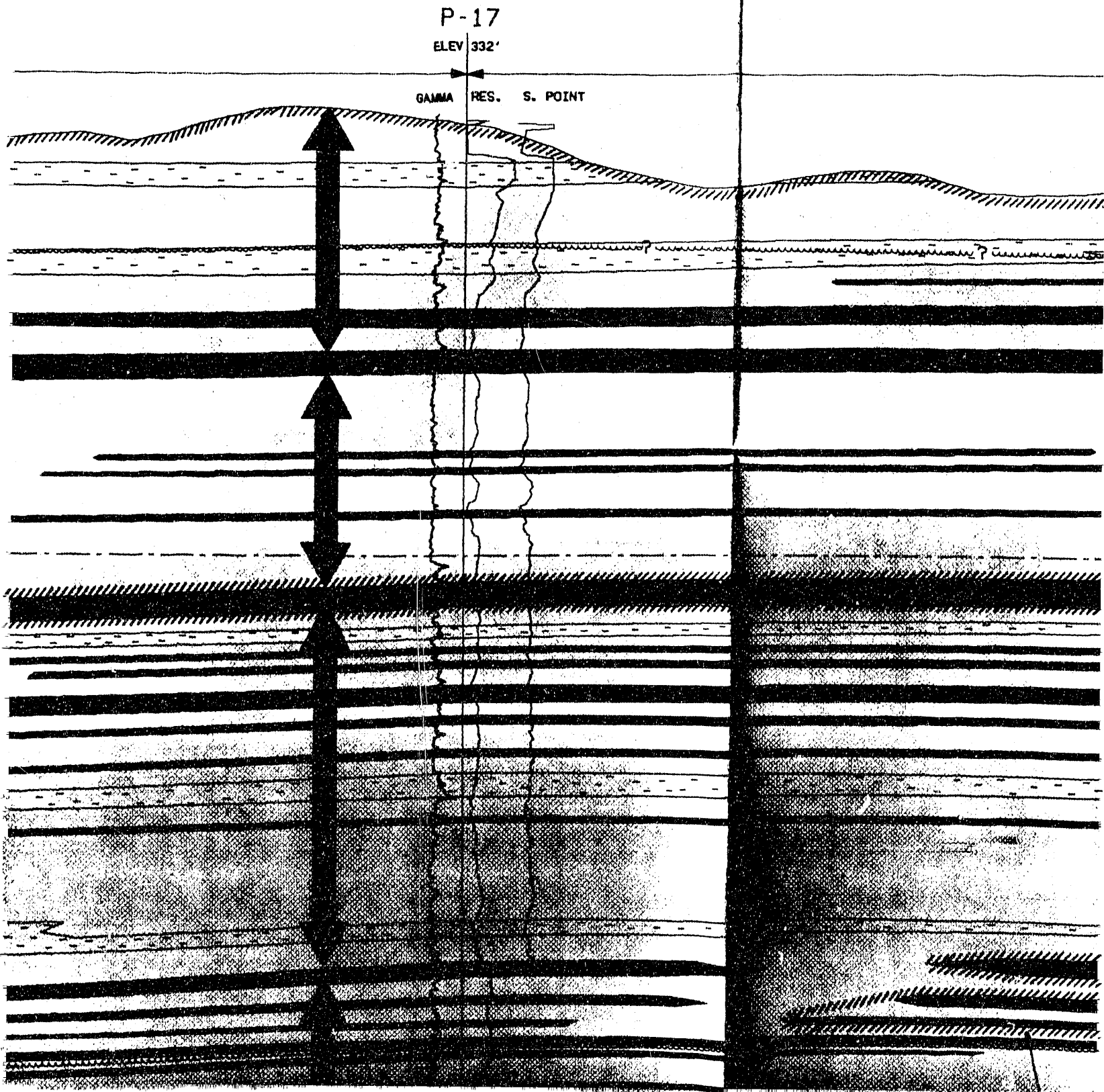


# ANAL HYDROSTRATIGRAPHIC C





# CROSS-SECTION C-C'

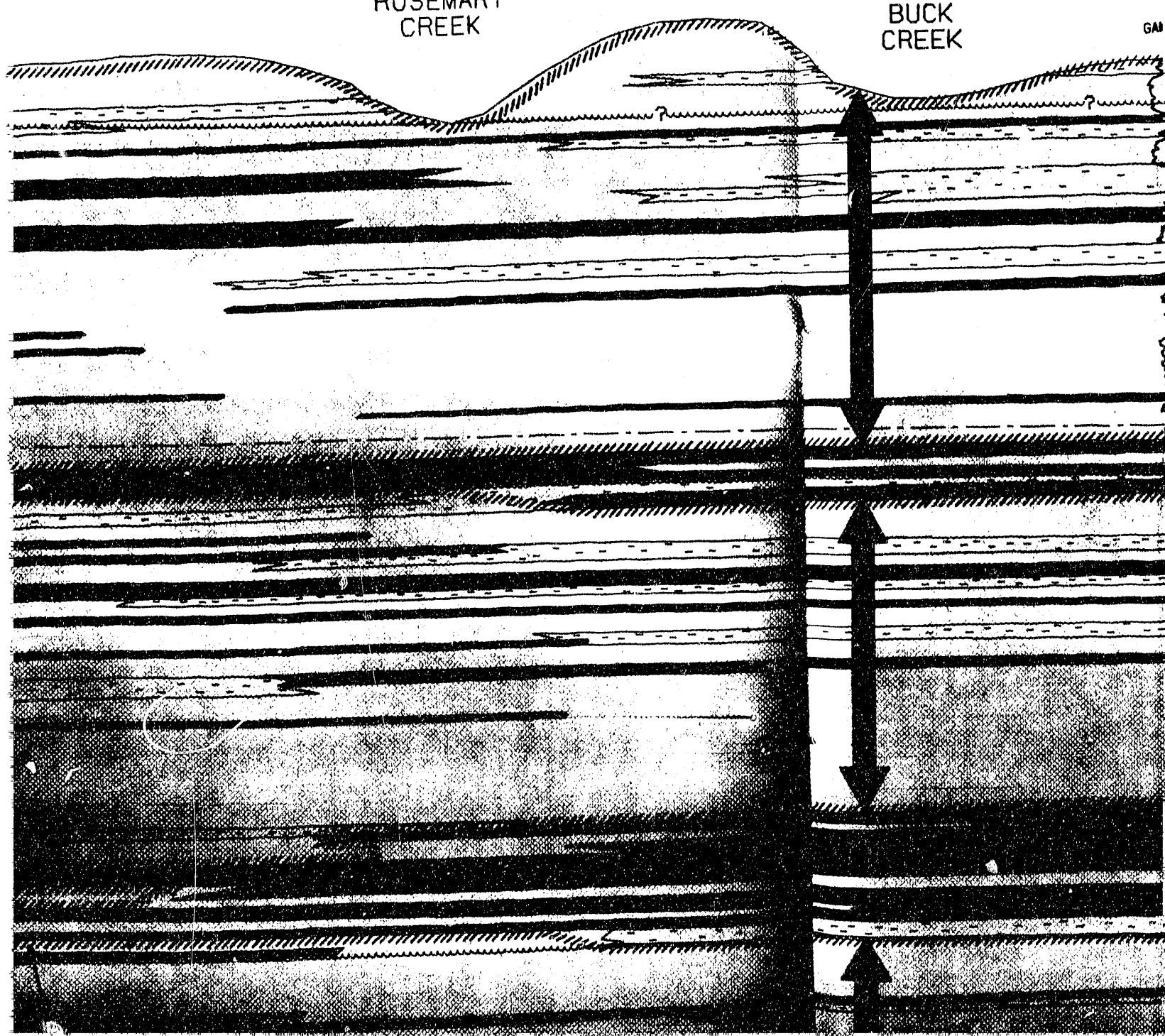


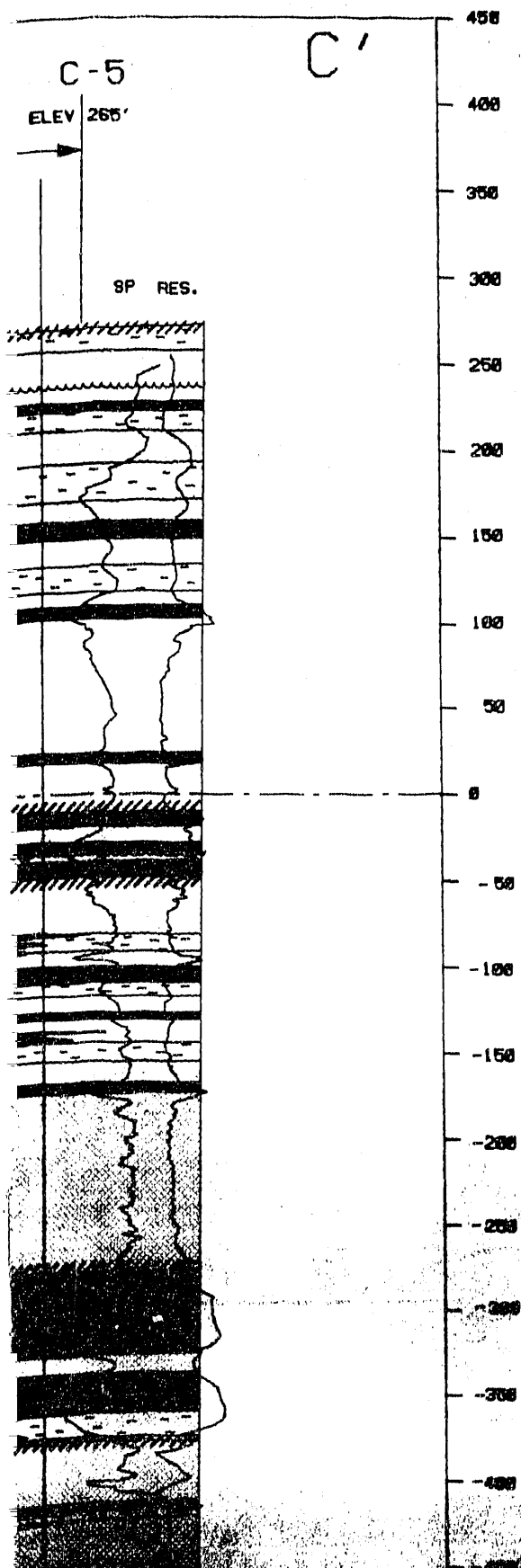
9.2 MILES

ROSEMARY  
CREEK

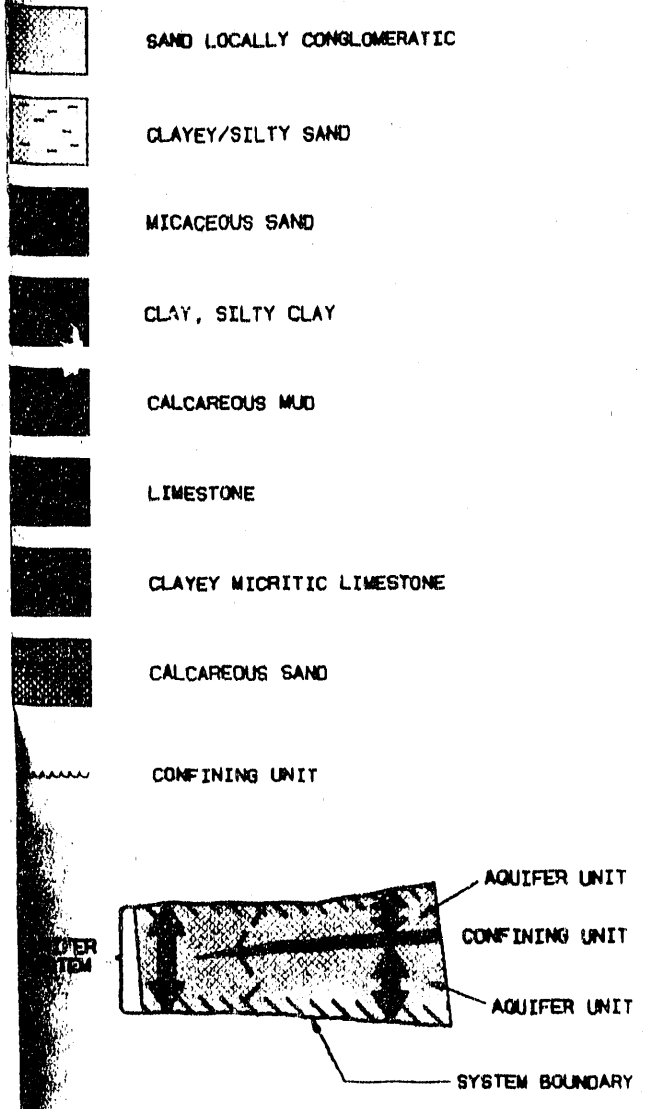
BUCK  
CREEK

GAI

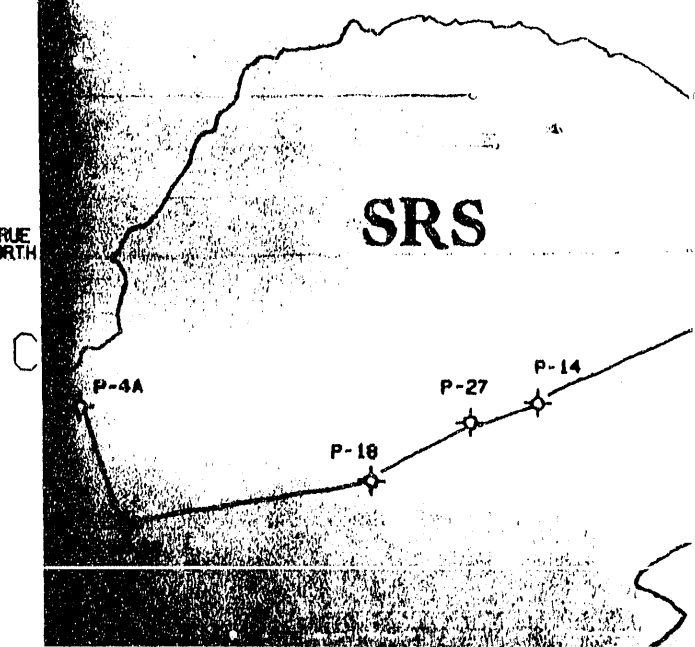













**LEGEND:**

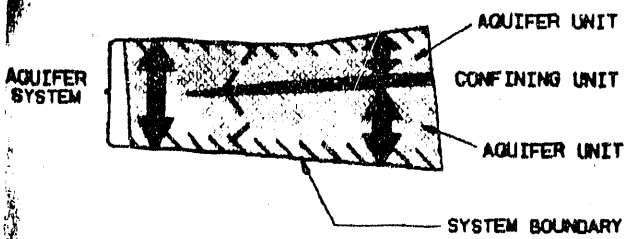


PLANT NORTH  
TRUE NORTH

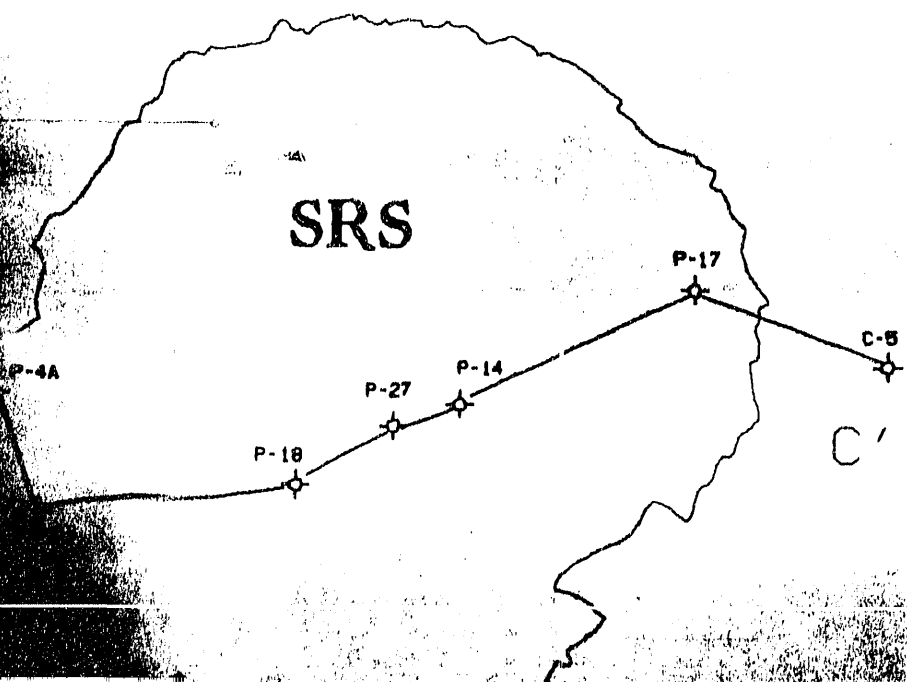


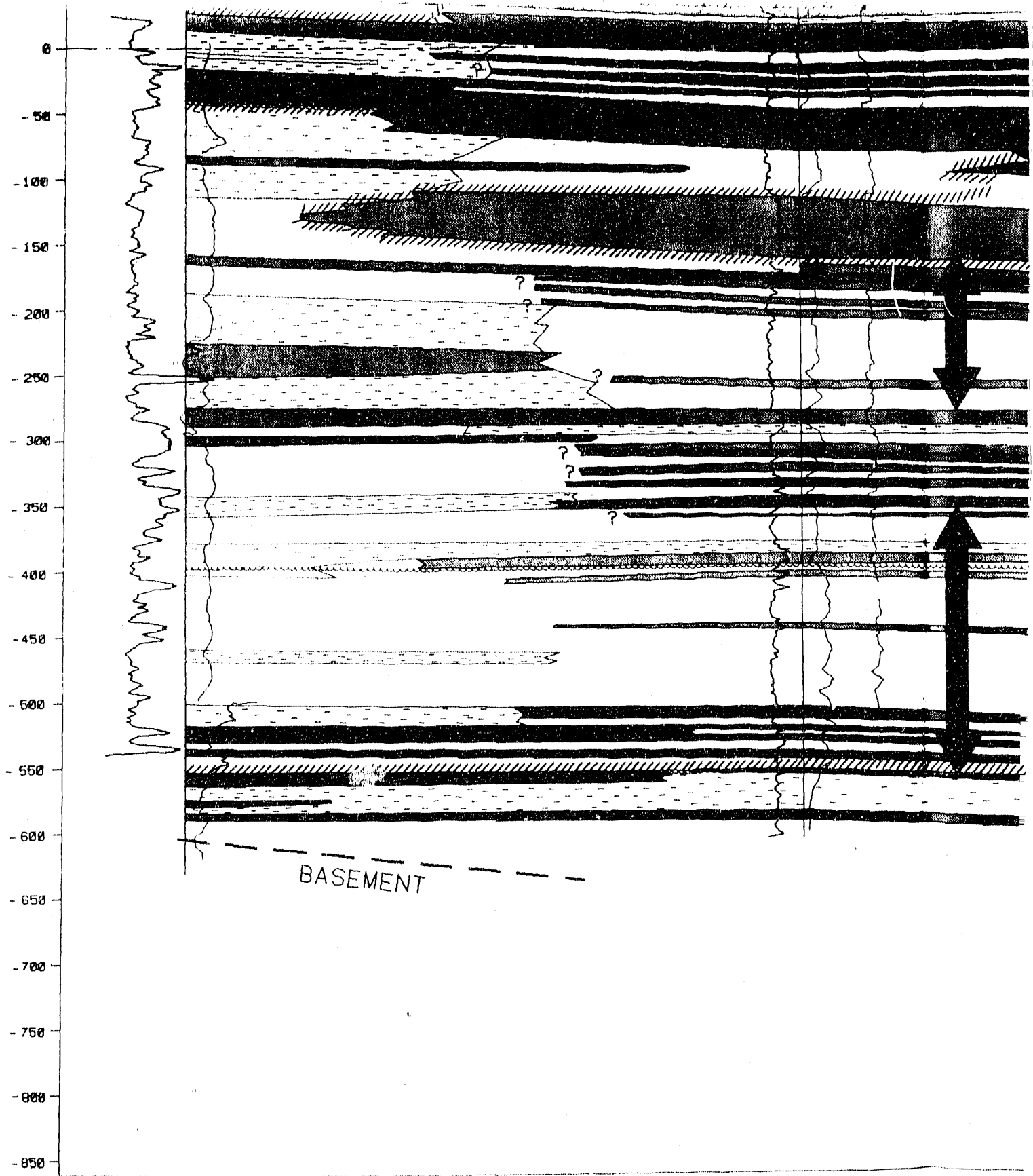
**LEGEND:**

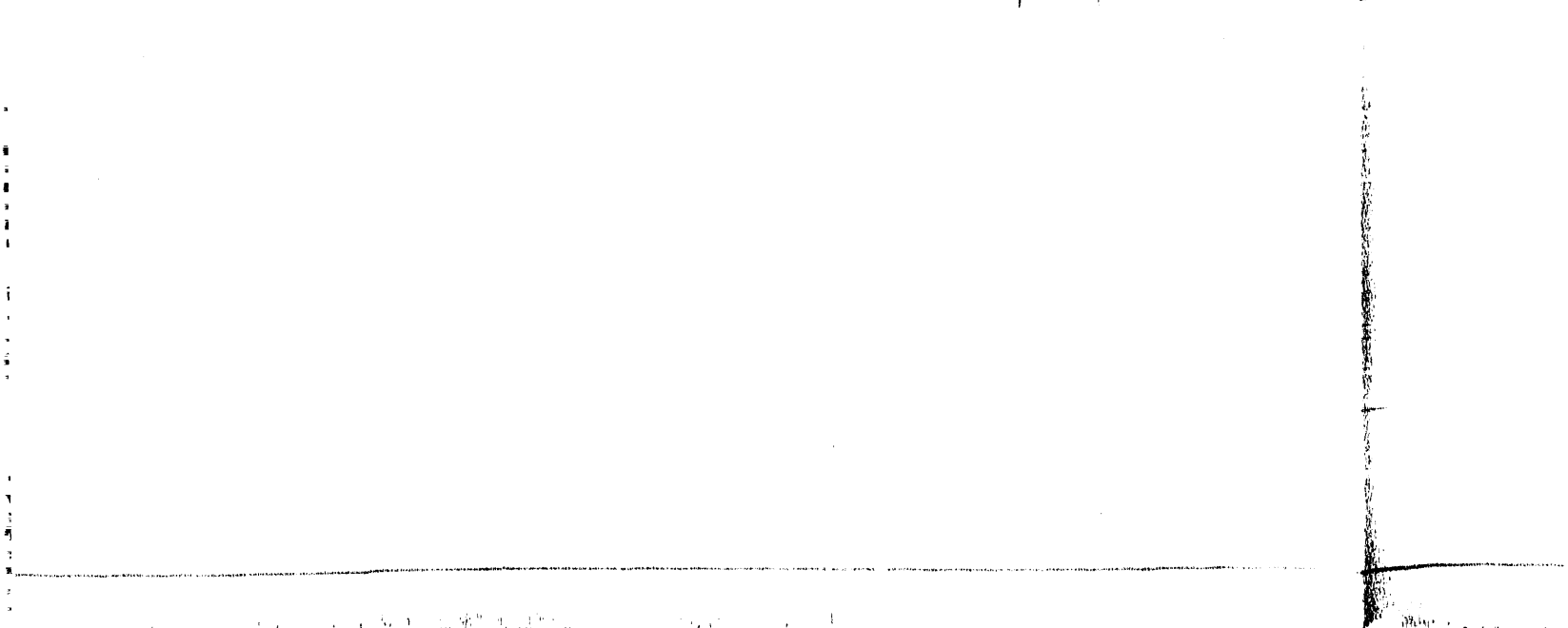
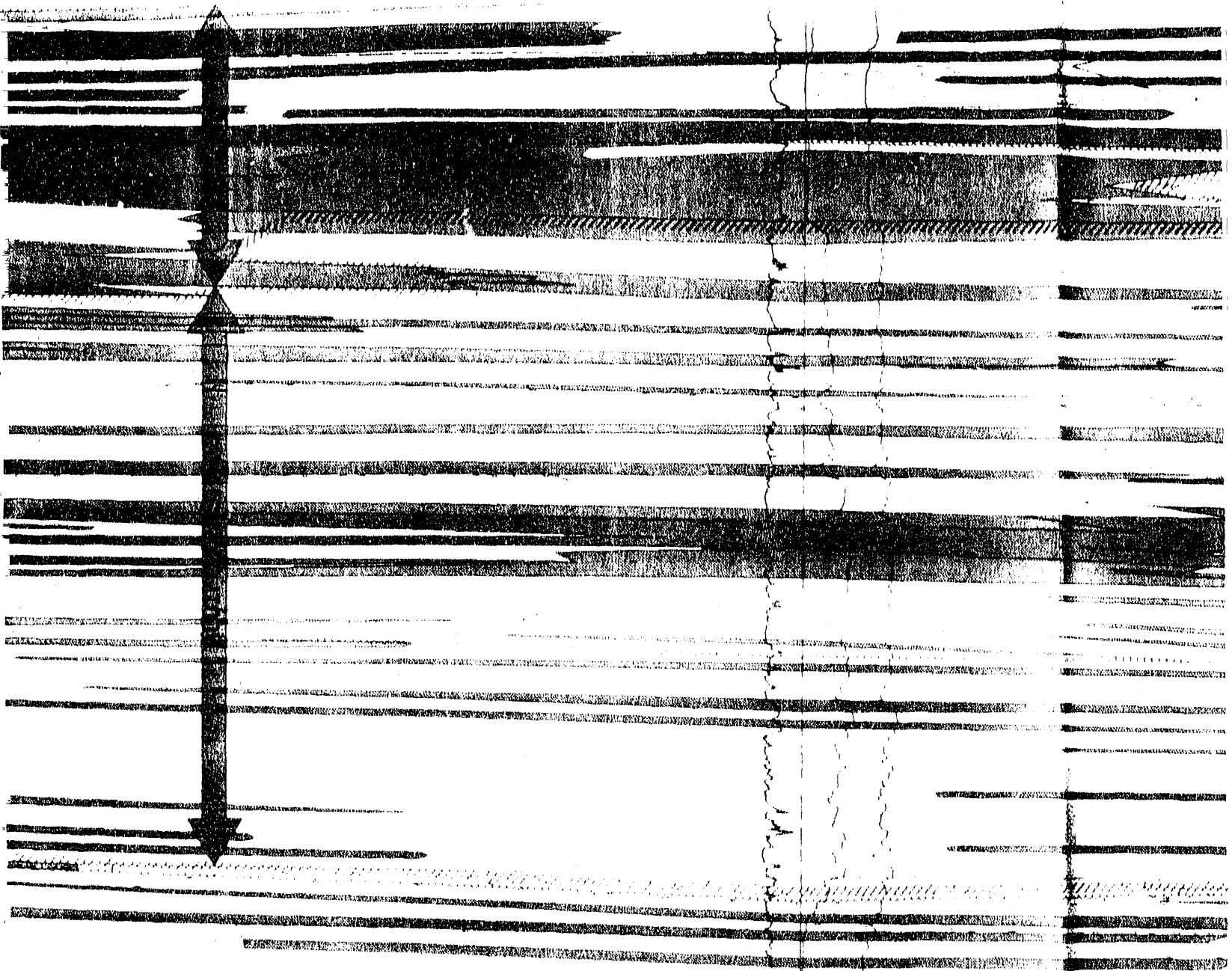
-  SAND LOCALLY CONGLOMERATIC
-  CLAYEY/SILTY SAND
-  MICACEOUS SAND
-  CLAY, SILTY CLAY
-  CALCAREOUS MUD
-  LIMESTONE
-  CLAYEY MICRITIC LIMESTONE
-  CALCAREOUS SAND
-  CONFINING UNIT

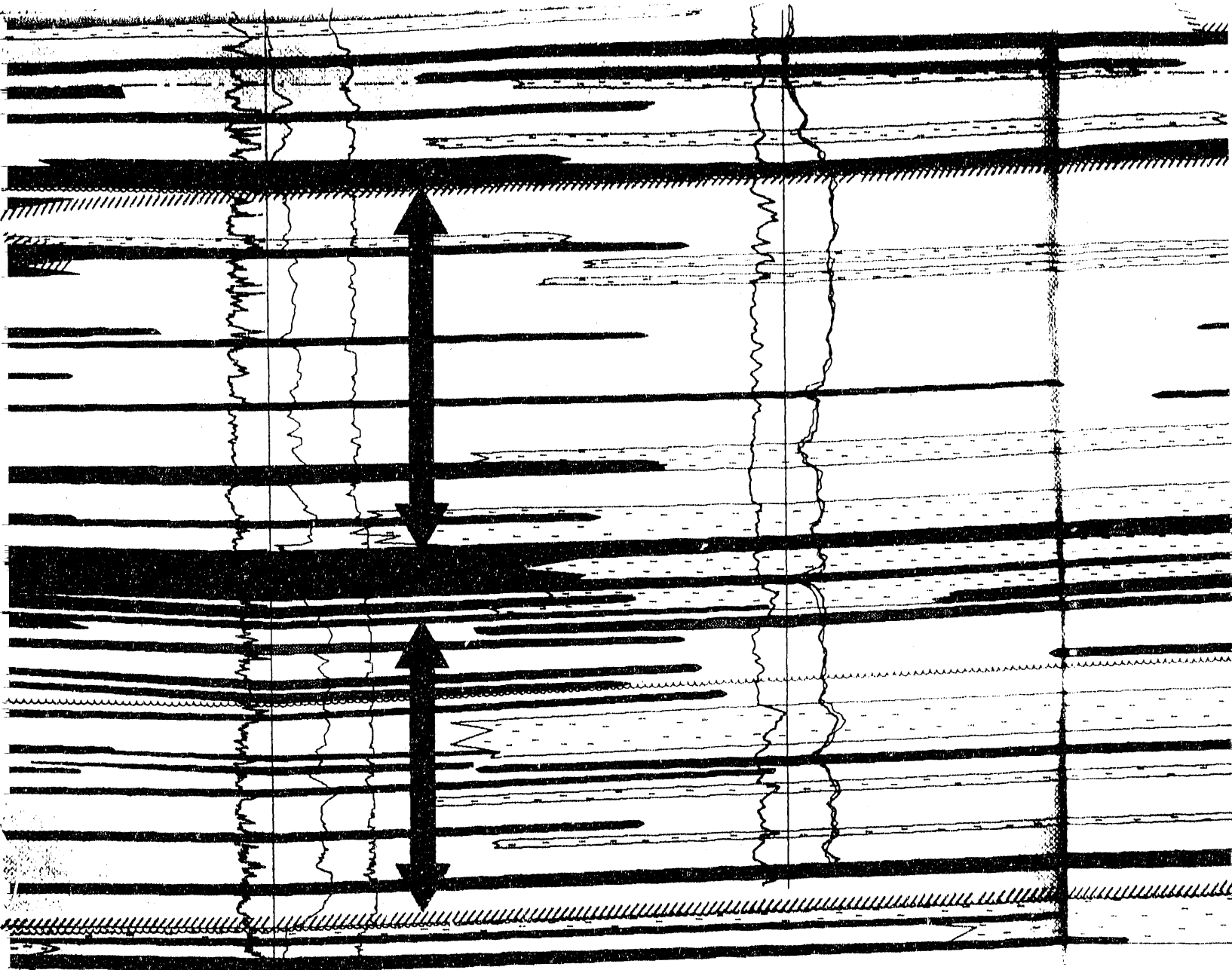


NT TRUE  
TH NORTH



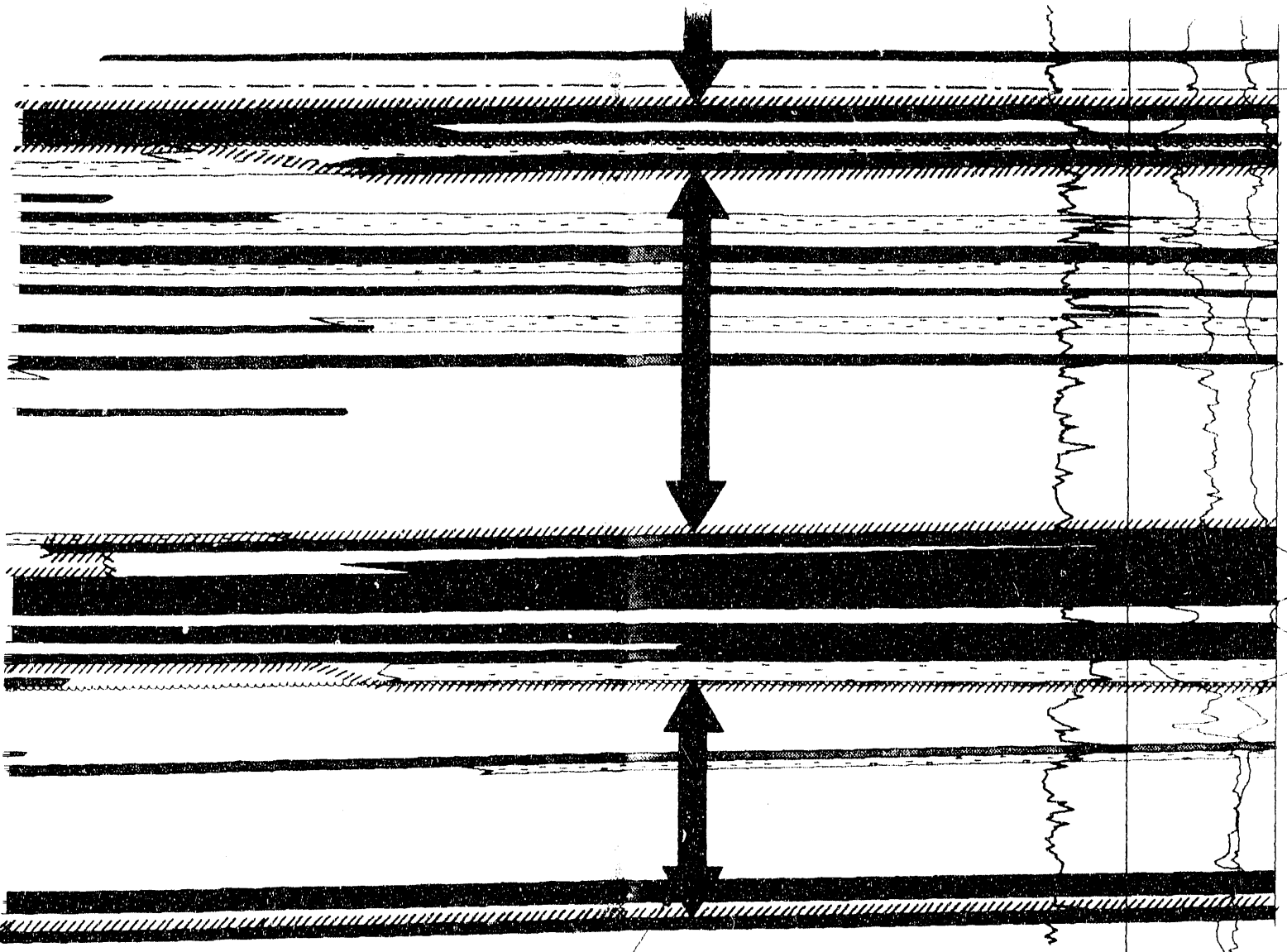




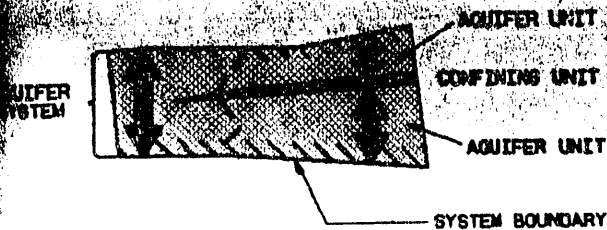


THE UPDIP LIMIT OF THE CONFINING SYSTEM  
SEPARATING THE TWO LOWER AQUIFER  
SYSTEMS OF CLARKE BROOKS AND FAYE,  
1988.



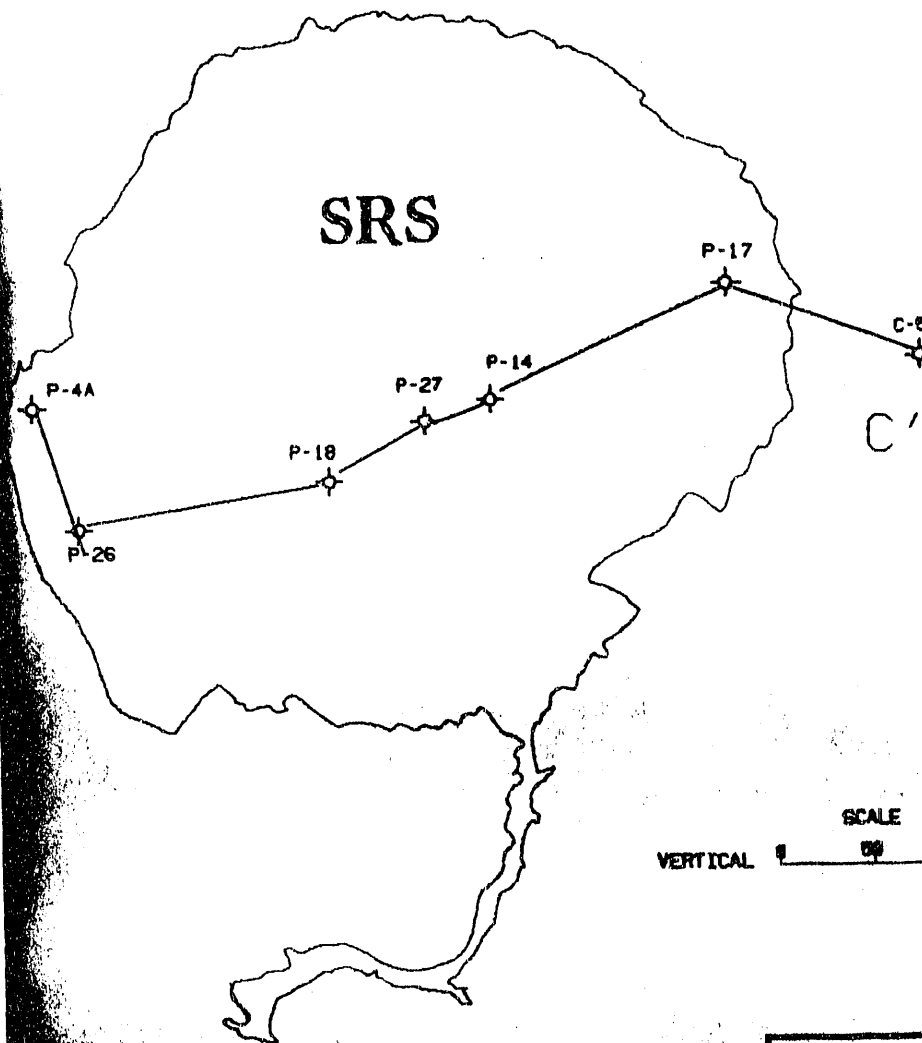


THE THREE REGIONAL  
AQUIFER SYSTEMS  
PROPOSED BY CLARKE,  
BROOKS AND FAYE, 1988.



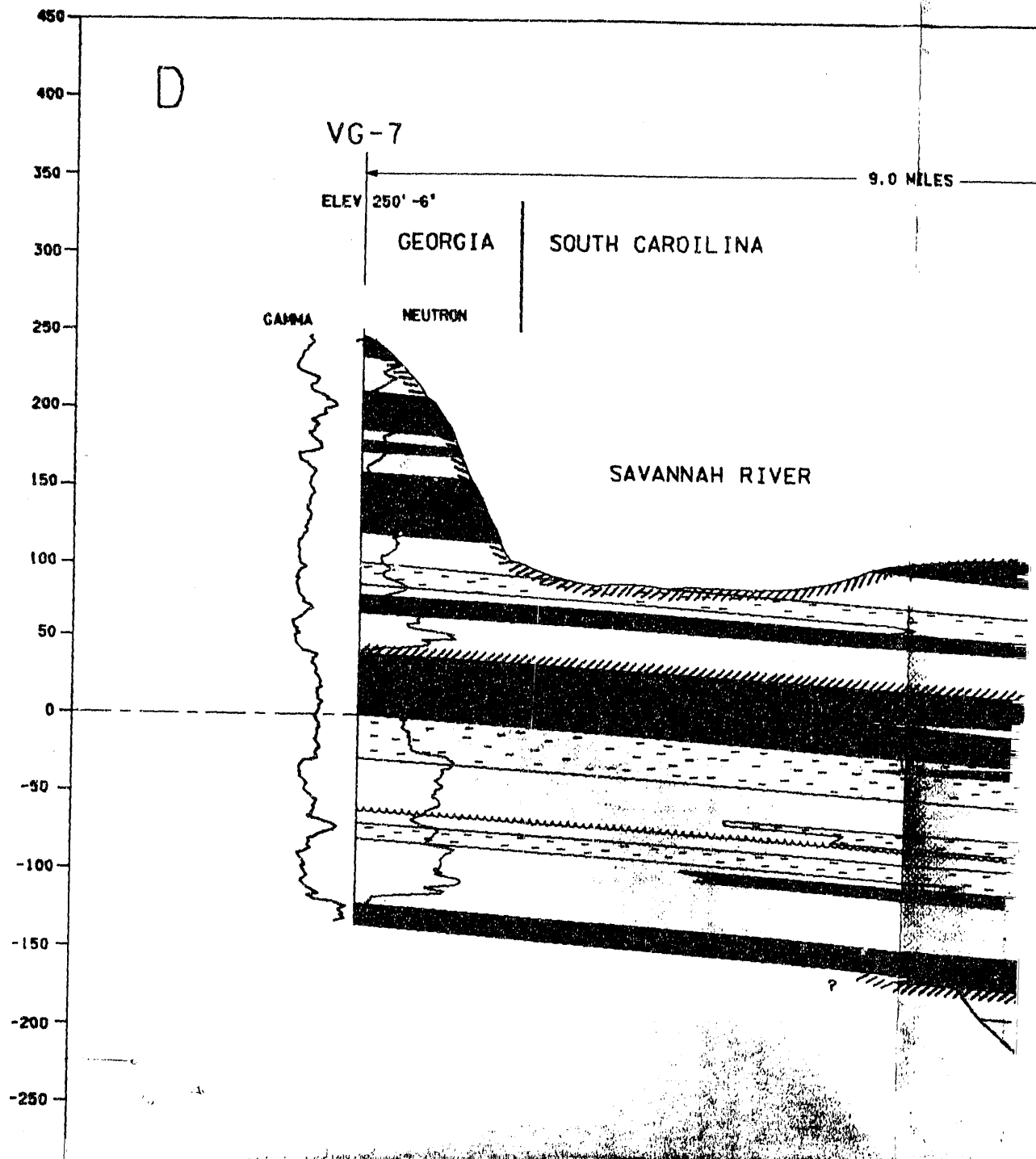
PLANT NORTH  
TRUE NORTH

Y C

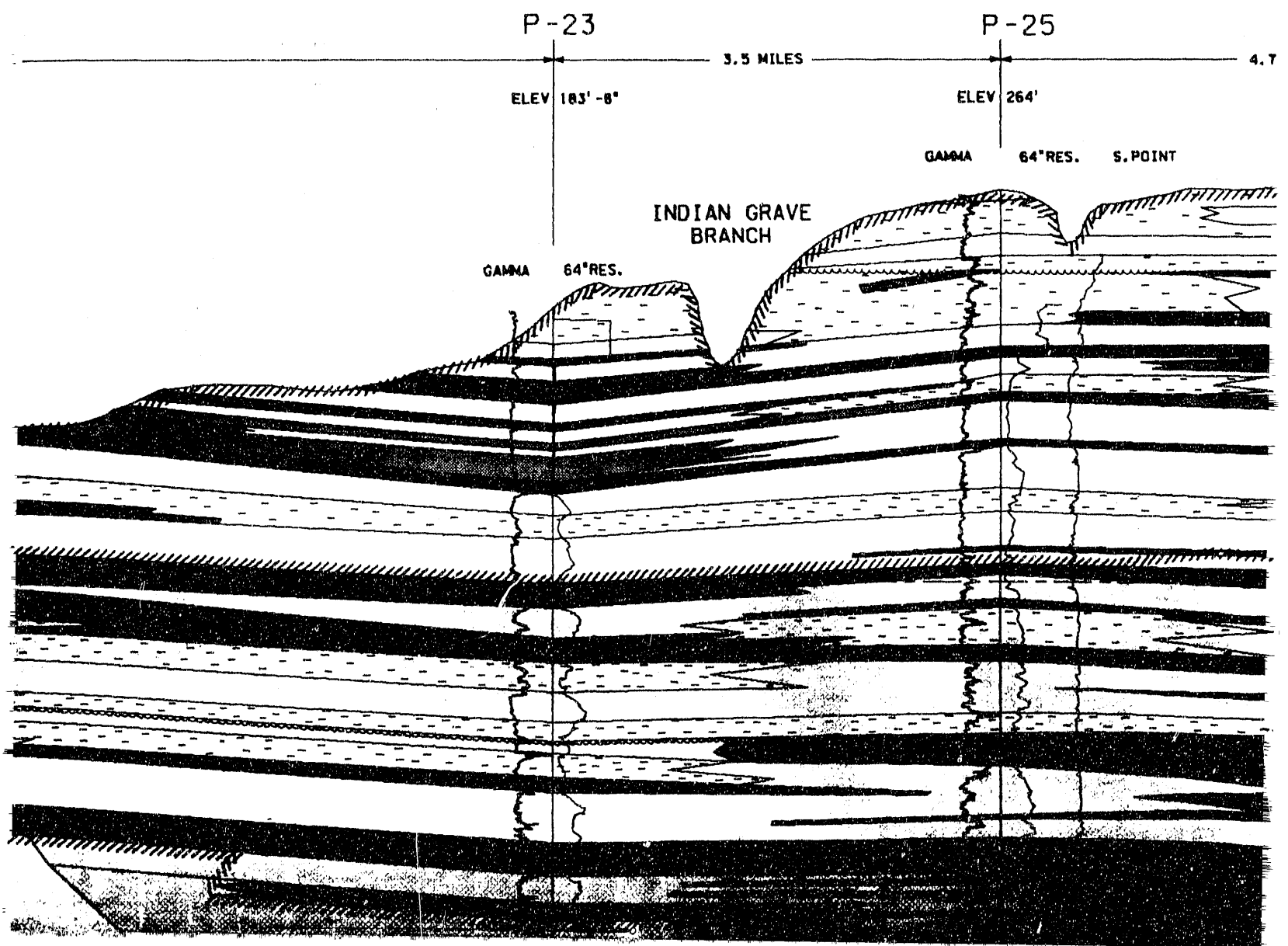


SCALE  
VERTICAL 0 50 100 FEET

SRS. NO.		R00011	
<b>UNITED STATES DEPARTMENT OF ENERGY</b>			
<b>SAVANNAH RIVER SITE</b>			
AREA	MAP NO.	PROJECT NO.	SRS REGIONAL
SRS REGION	866467		HYDROSTRATIGRAPHIC CROSS SECTION
TITLE		DESIGNED BY	DATE
		T. NICKLEY	
REGIONAL HYDROSTRATIGRAPHIC CROSS SECTION		PREPARED BY	DATE
		R. ANGLAND	



# SOUTHWEST



# NORTHEAST REGIONAL HYDRO

BARNWELL CO.

AIKEN CO.

CPC-1

P-27

4.2 MILES

ELEV 294' -6"  
GAMMA 64° RES.

ELEV 273' -7"

GAMMA 16° RES. S. POINT

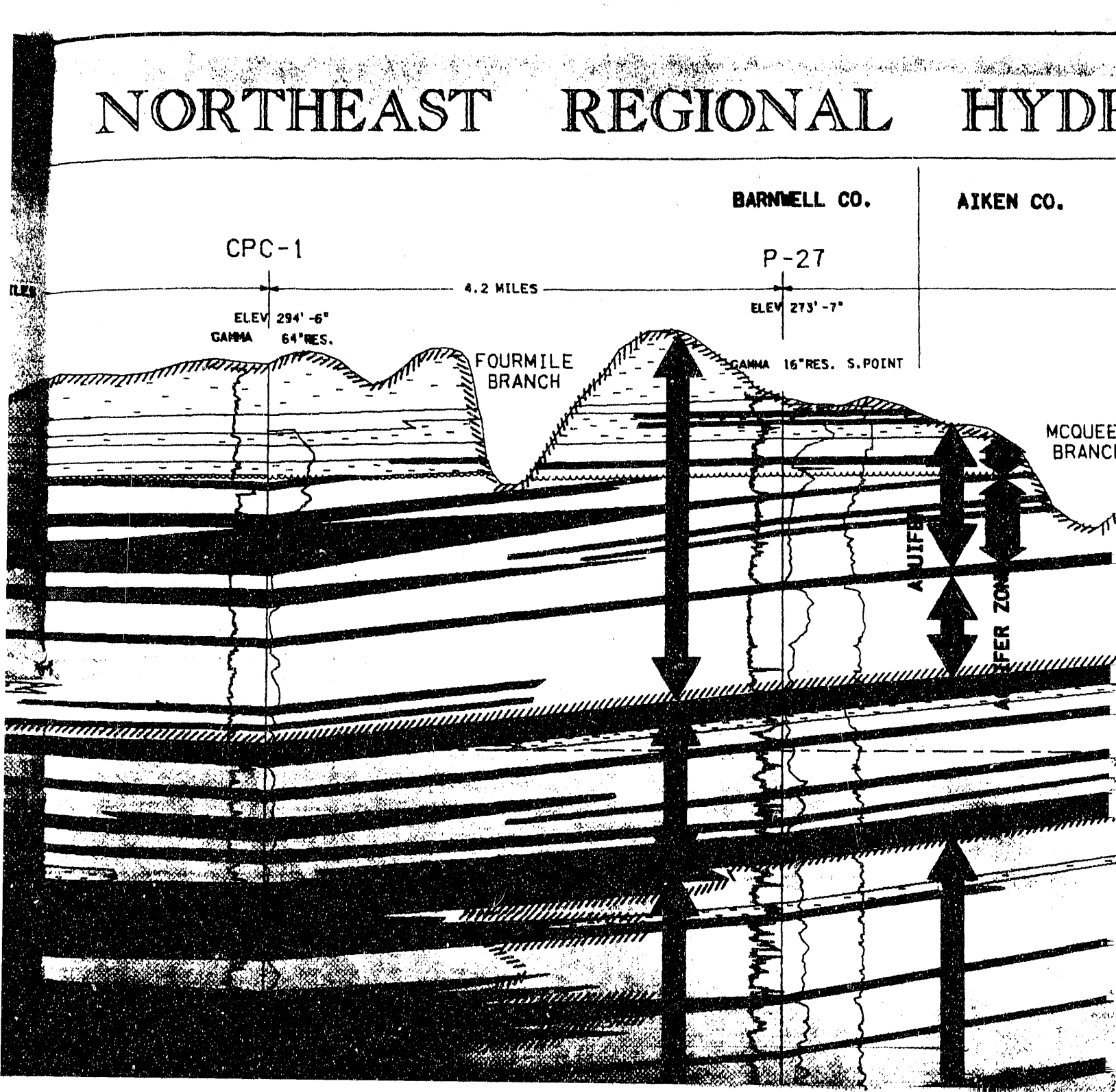
FOURMILE  
BRANCH

MCOQUEE  
BRANCH

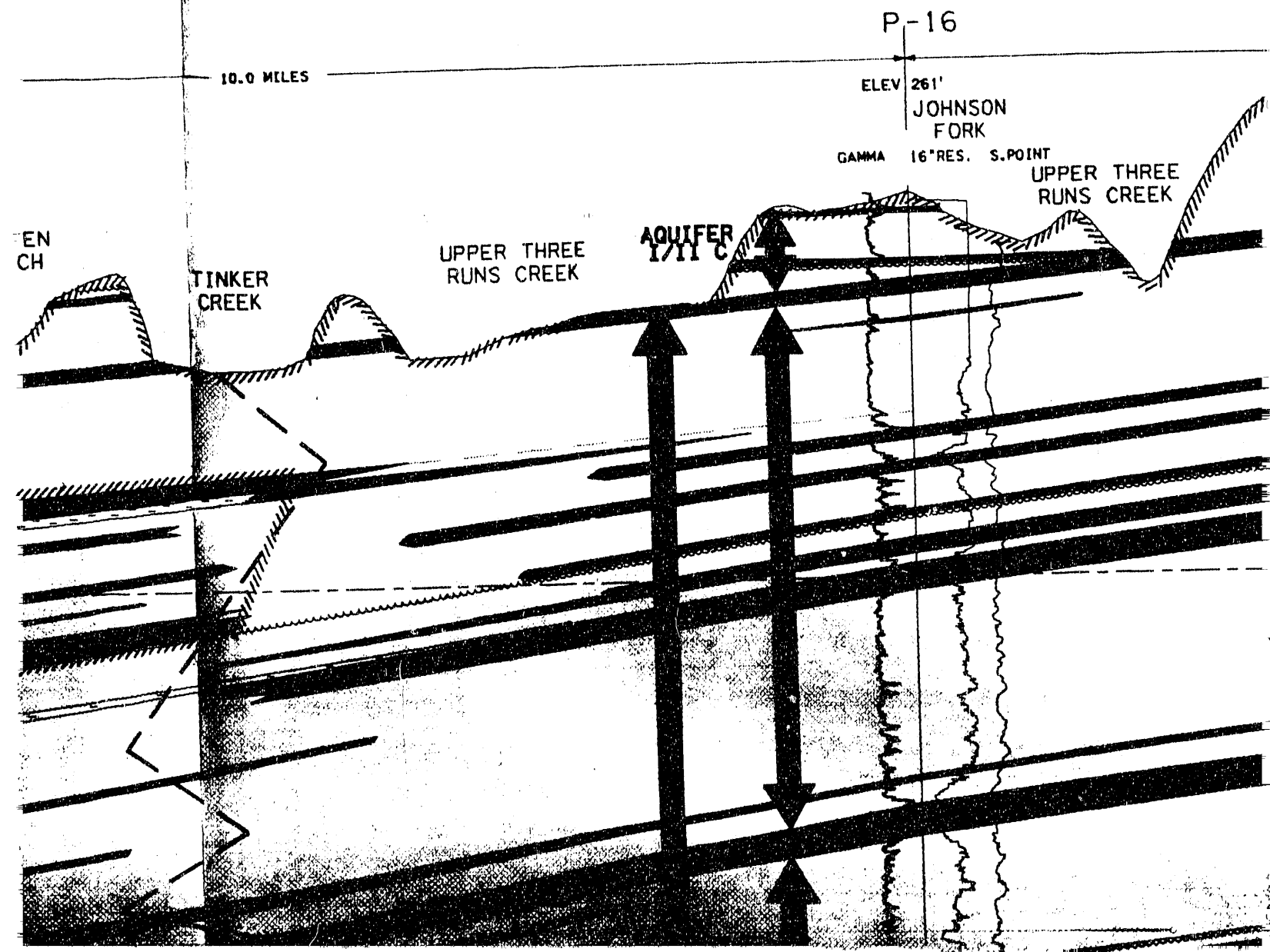
AQUIFER

CONFINER ZONE

ILES



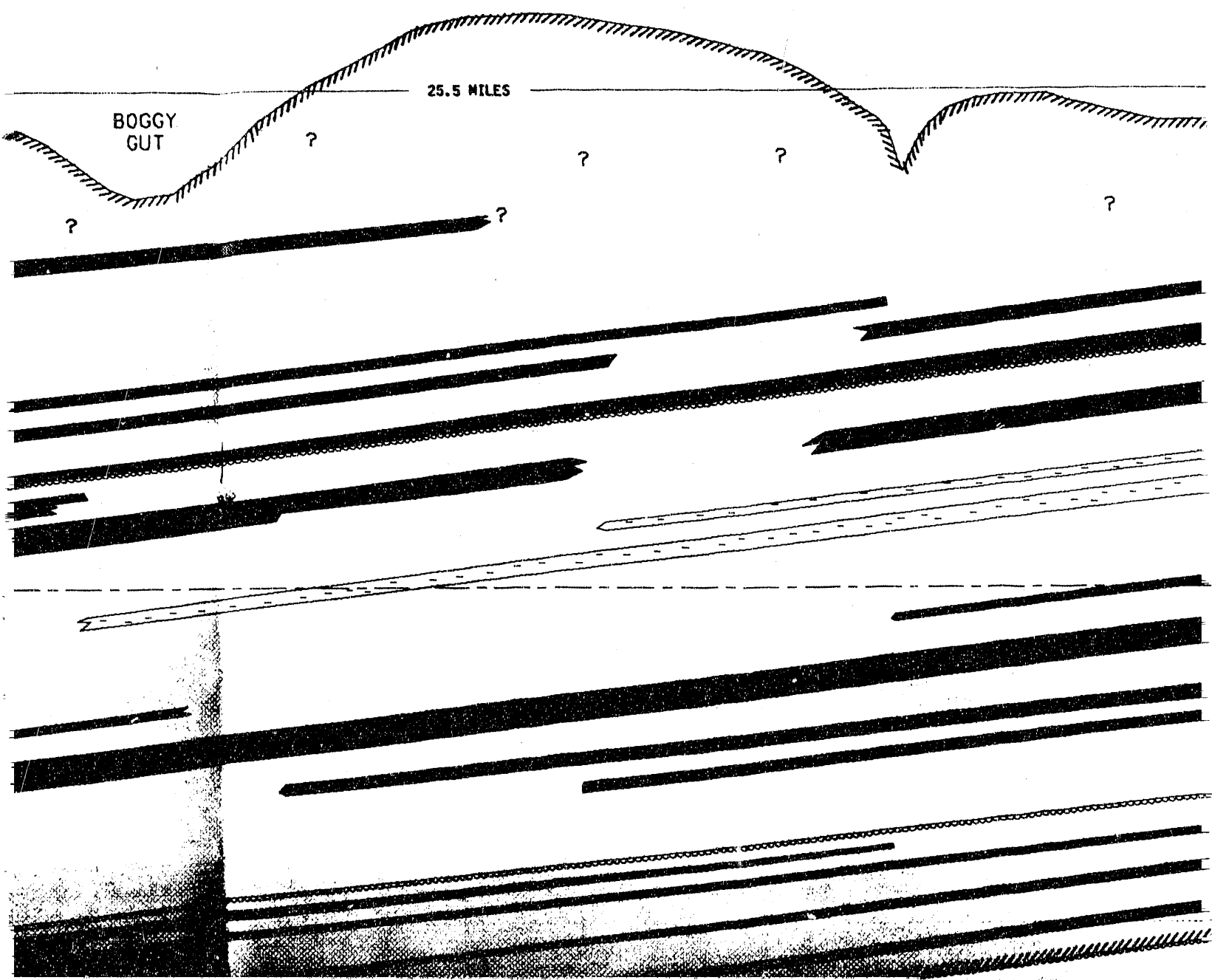
# ROSTRATIGRAPHIC CROSS-SECTION

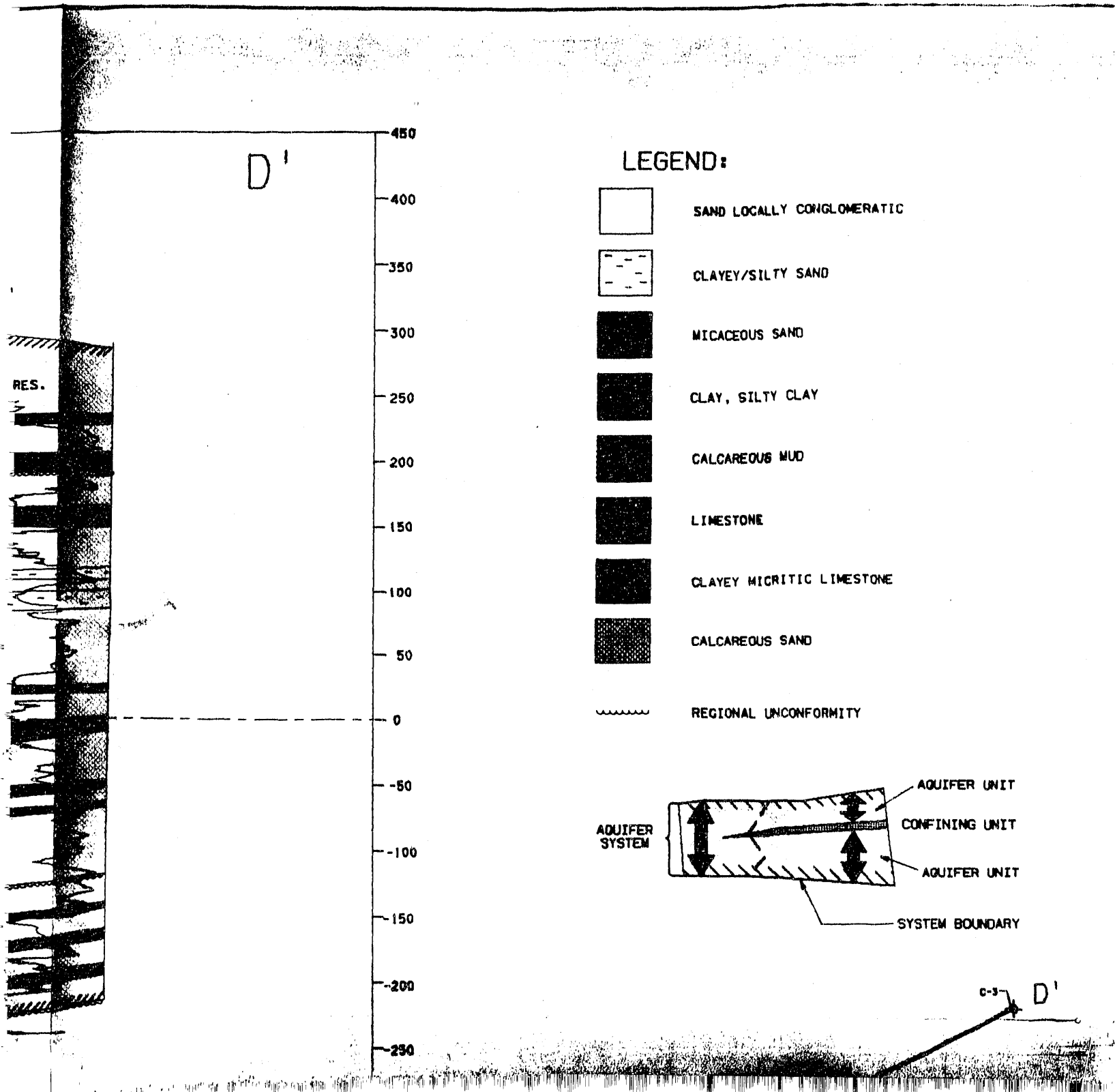


D-D'

BOGGY  
GUT

25.5 MILES







-300

-400

-450

-500

-550

-600

-650

-700

-750

-800

-850

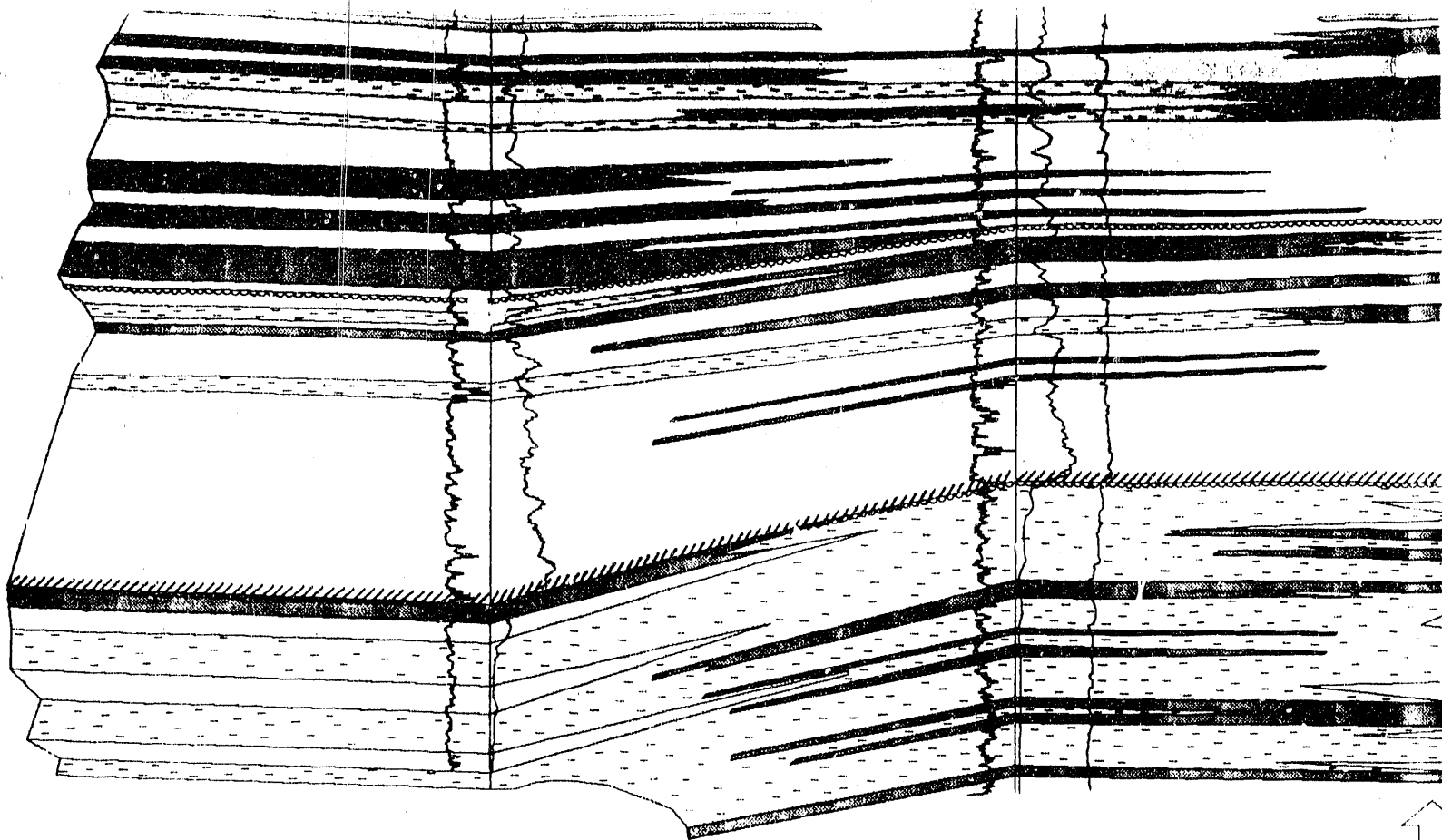
-900

-950

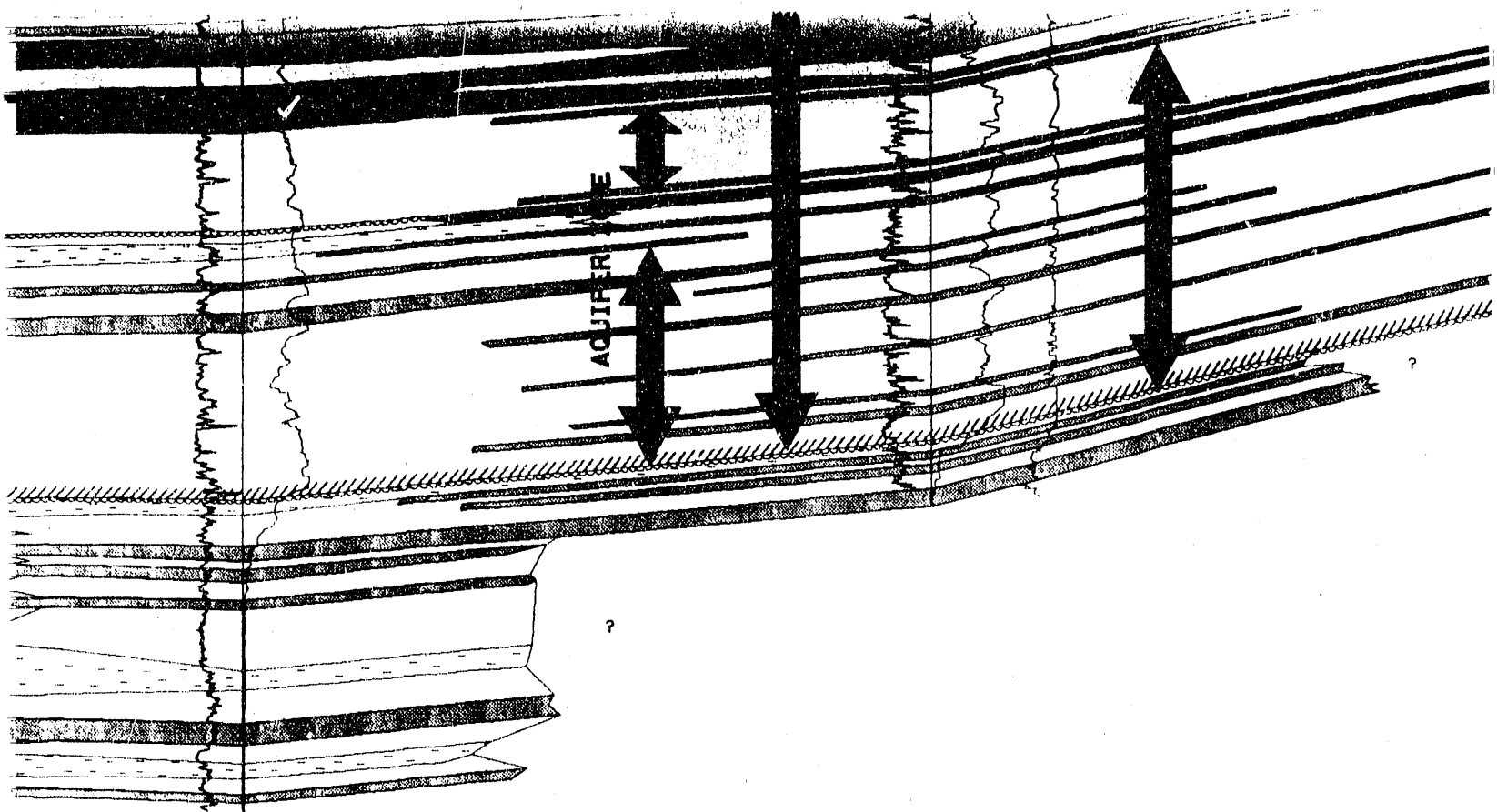
-1000

-1050

-1100



LOCATION OF THE F



IN BRANCH FAULT

**AQUIFER SYSTEMS  
BOUNDARY**

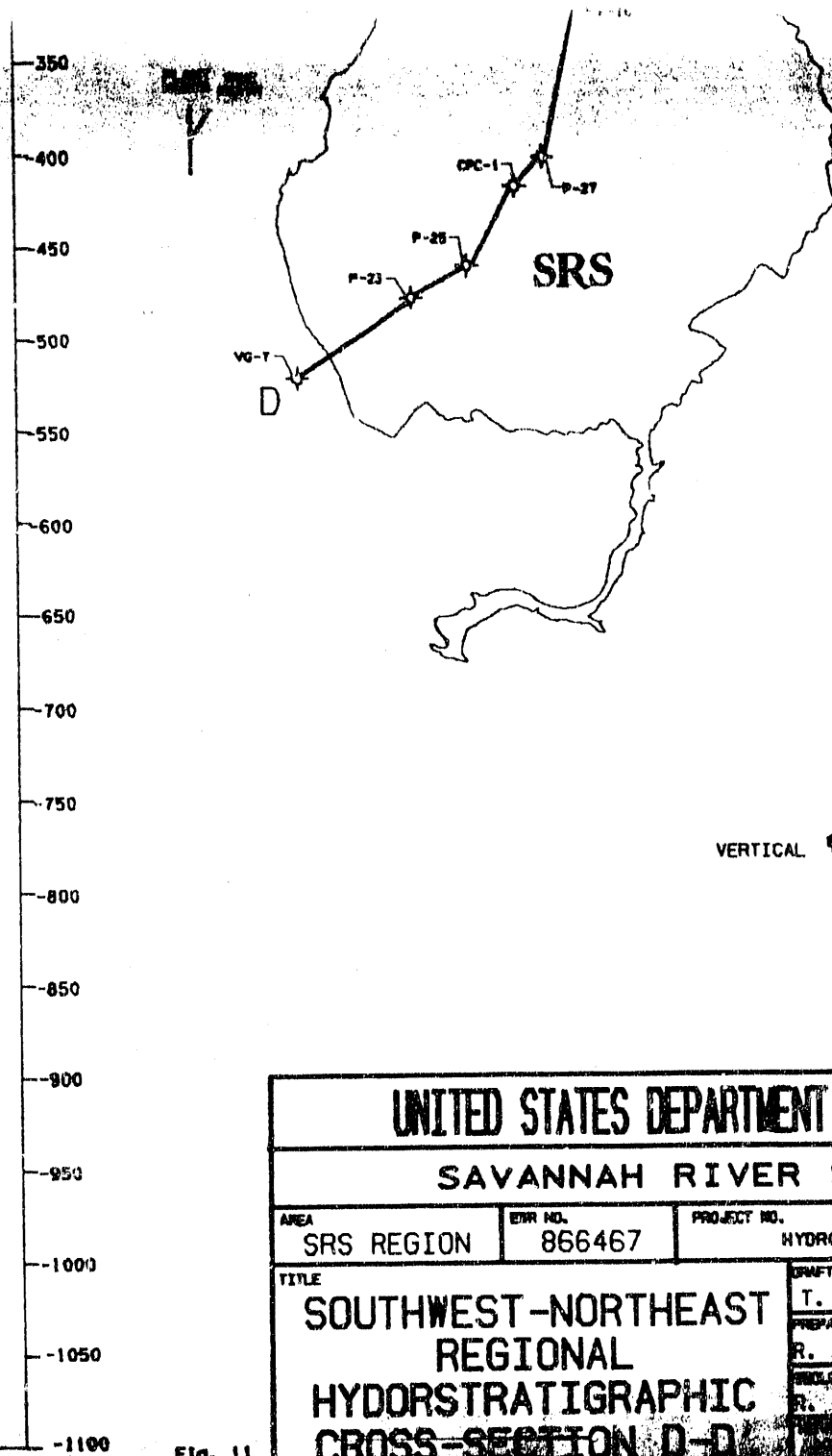
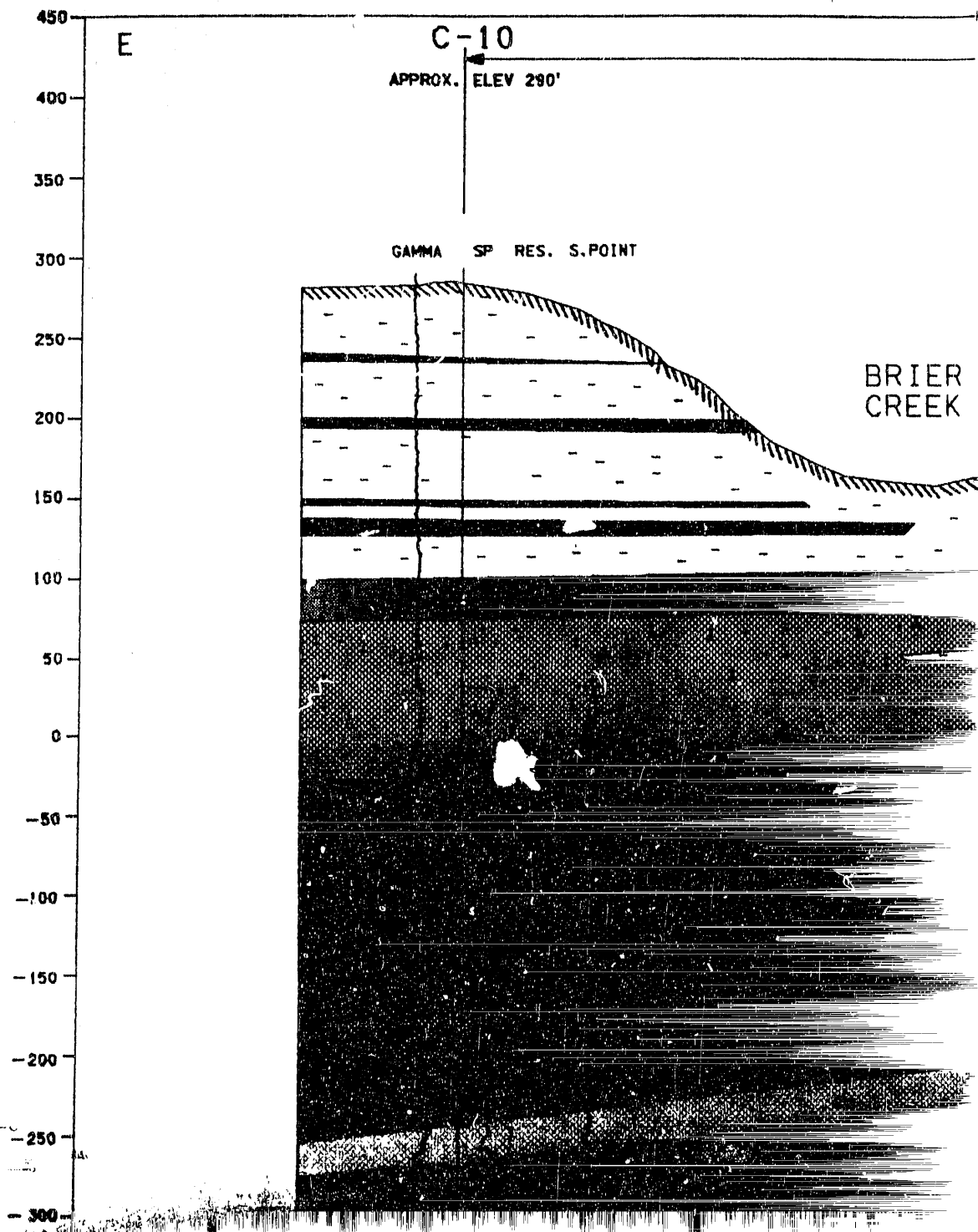


Fig. 11

18

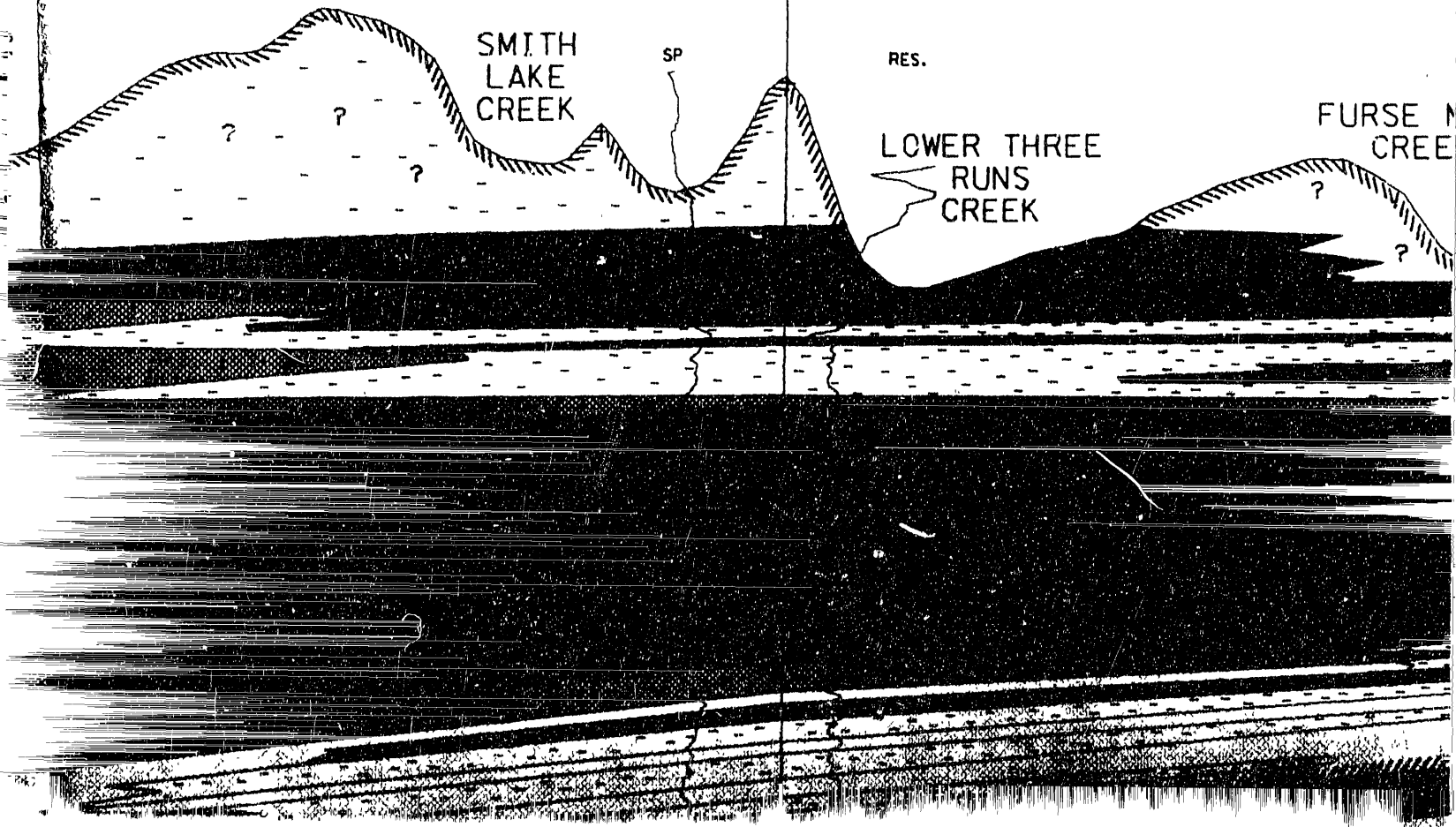


6.1 MILES

AL-27

6.8 MILES

APPROX. ELEV 175'



# SOUTH-NORTH REGIO

AL-324

MILES

4.1 MILES

APPROX. ELEV 220'

FURSE MILL  
CREEK

FURSE MILL  
CREEK

FURSE  
CREEK

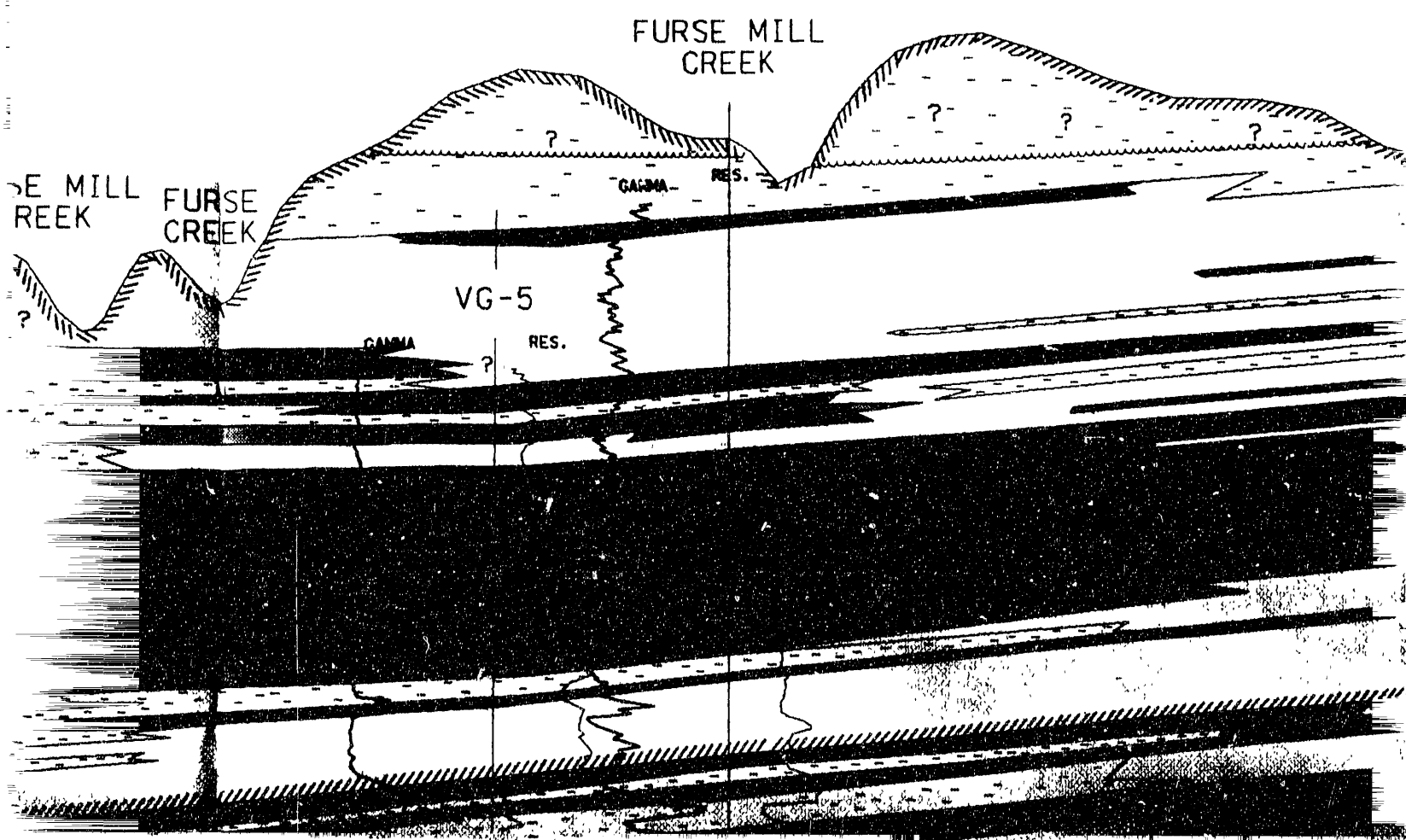
VG-5

GAMMA

RES.

GAMMA

RES.





# NAL HYDROSTRATIGRAPHIC CRO

P-21

5.1 MILES

P-25

ELEV 206~6'

ELEV 264'

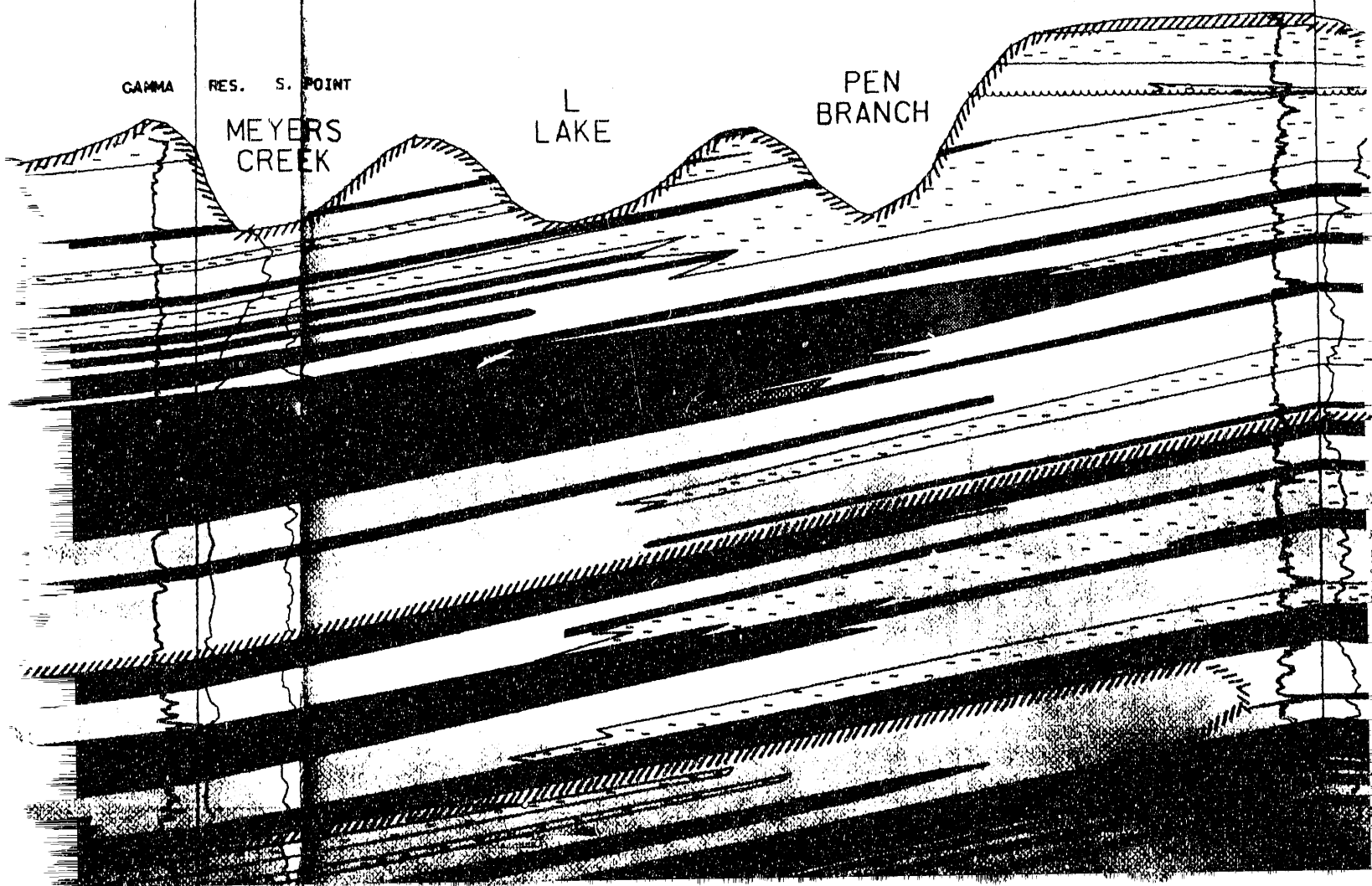
GAMMA RES. S. POINT

MEYERS  
CREEK

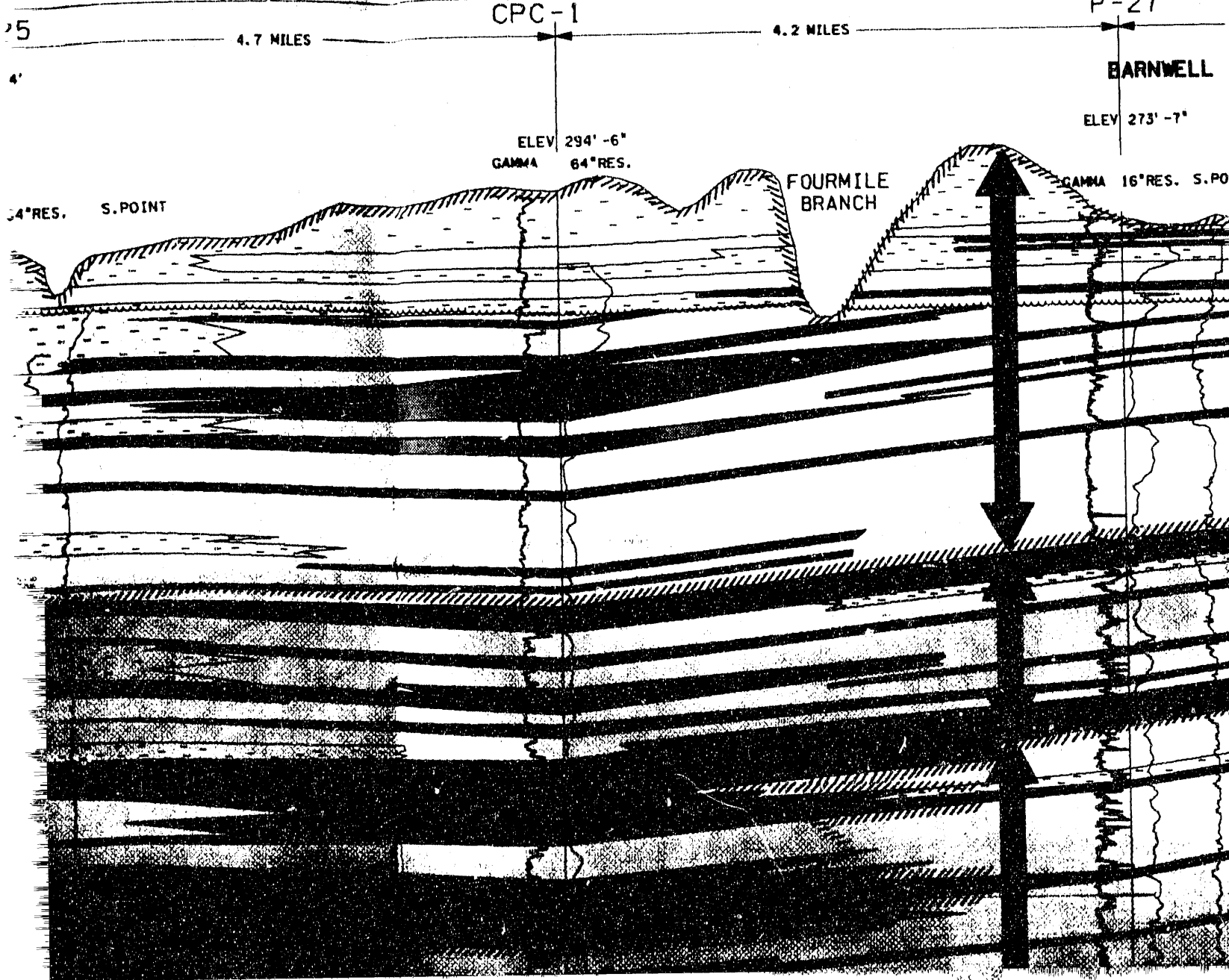
L  
LAKE

PEN  
BRANCH

GAMMA 64'



# CROSS-SECTION E-E'



AIKEN CO.

10.0 MILES

P-16

ELEV 261'

JOHNSON  
FORK

GAMMA 16° RES. S. POINT

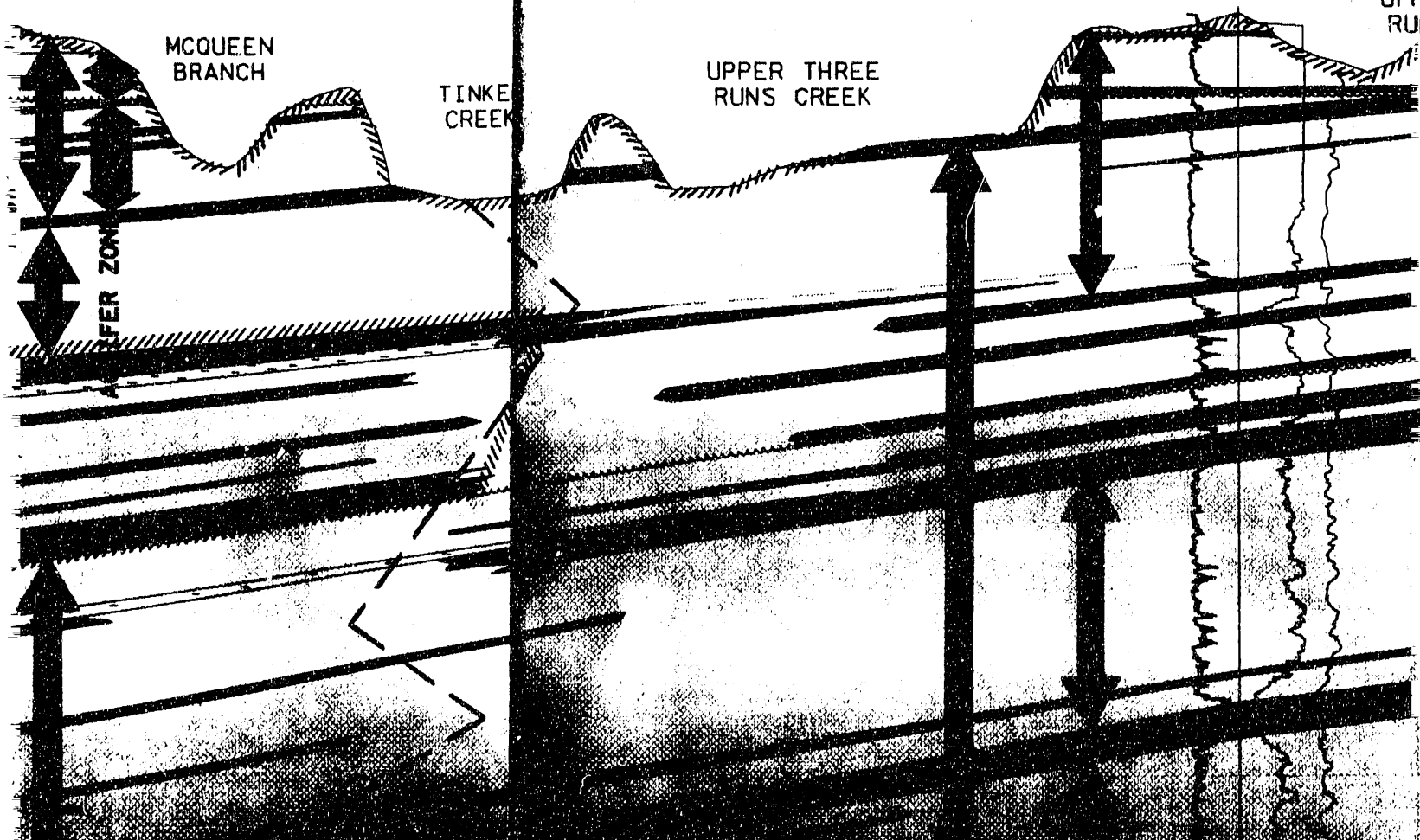
UPI  
RU

MCQUEEN  
BRANCH

TINKE  
CREEK

UPPER THREE  
RUNS CREEK

UPPER ZONE



25.5 MILES

INSON  
ORK

S. S. POINT

UPPER THREE  
RUNS CREEK

BOGGY  
GUT

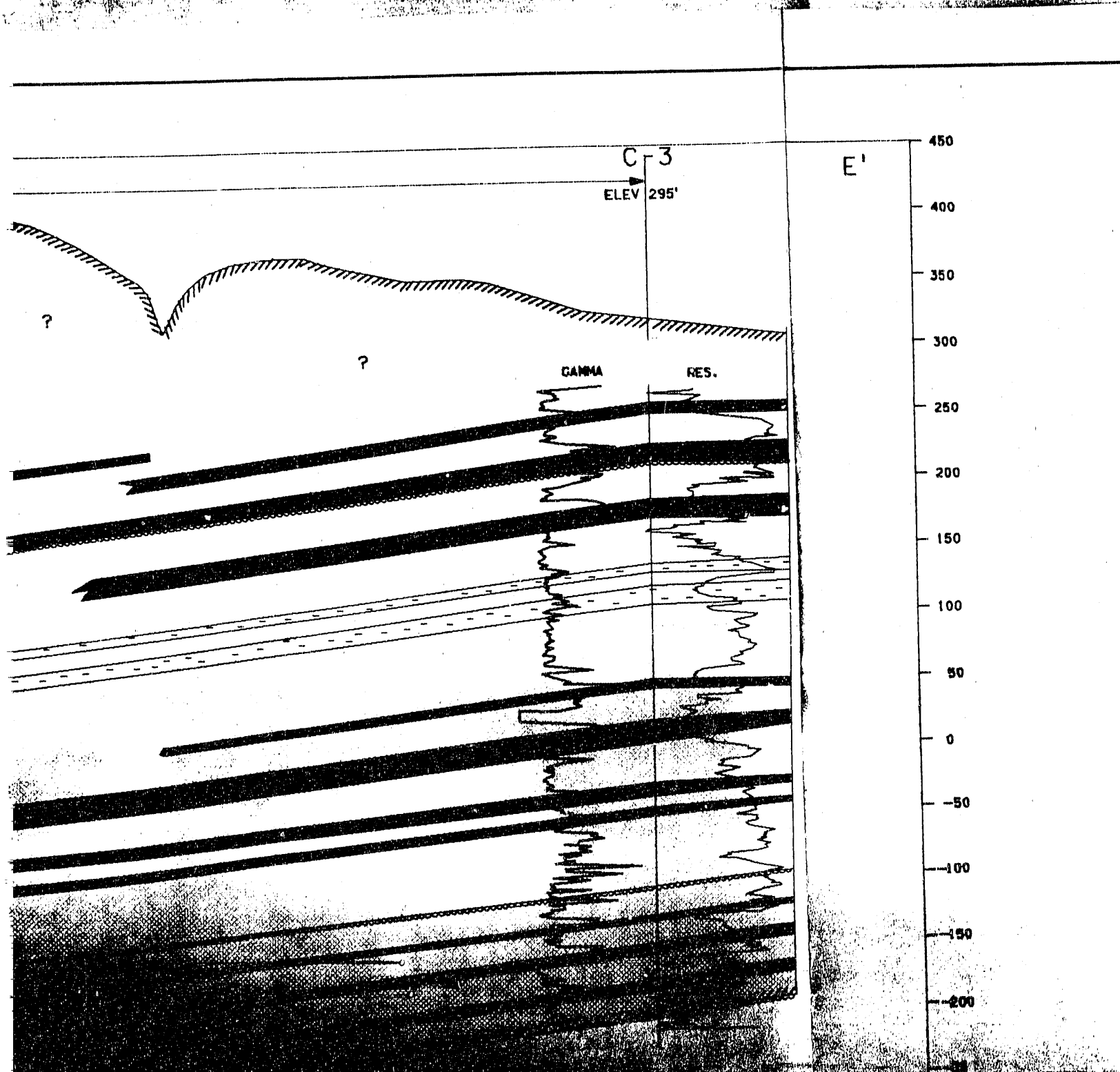
?

?

?

?

?



C-3

ELEV 295'

E'

450

400

350

300

250

200

150

100

50

0

-50

-100

-150

-200

GAMMA

RES.

E'

450

400

350

300

250

200

150

100

50

0

-50

-100

-150

-200

-250

### LEGEND



SAND LOCALLY CONGLOMERATIC



CLAYEY/SILTY SAND



MICACEOUS SAND



CLAY, SILTY CLAY



CALCAREOUS MUD



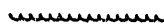
LIMESTONE



CLAYEY MICRITIC LIMESTONE

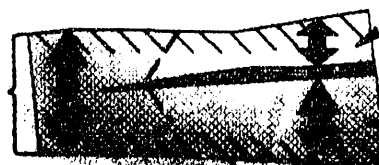


CALCAREOUS SAND



REGIONAL UNCONFORMITY

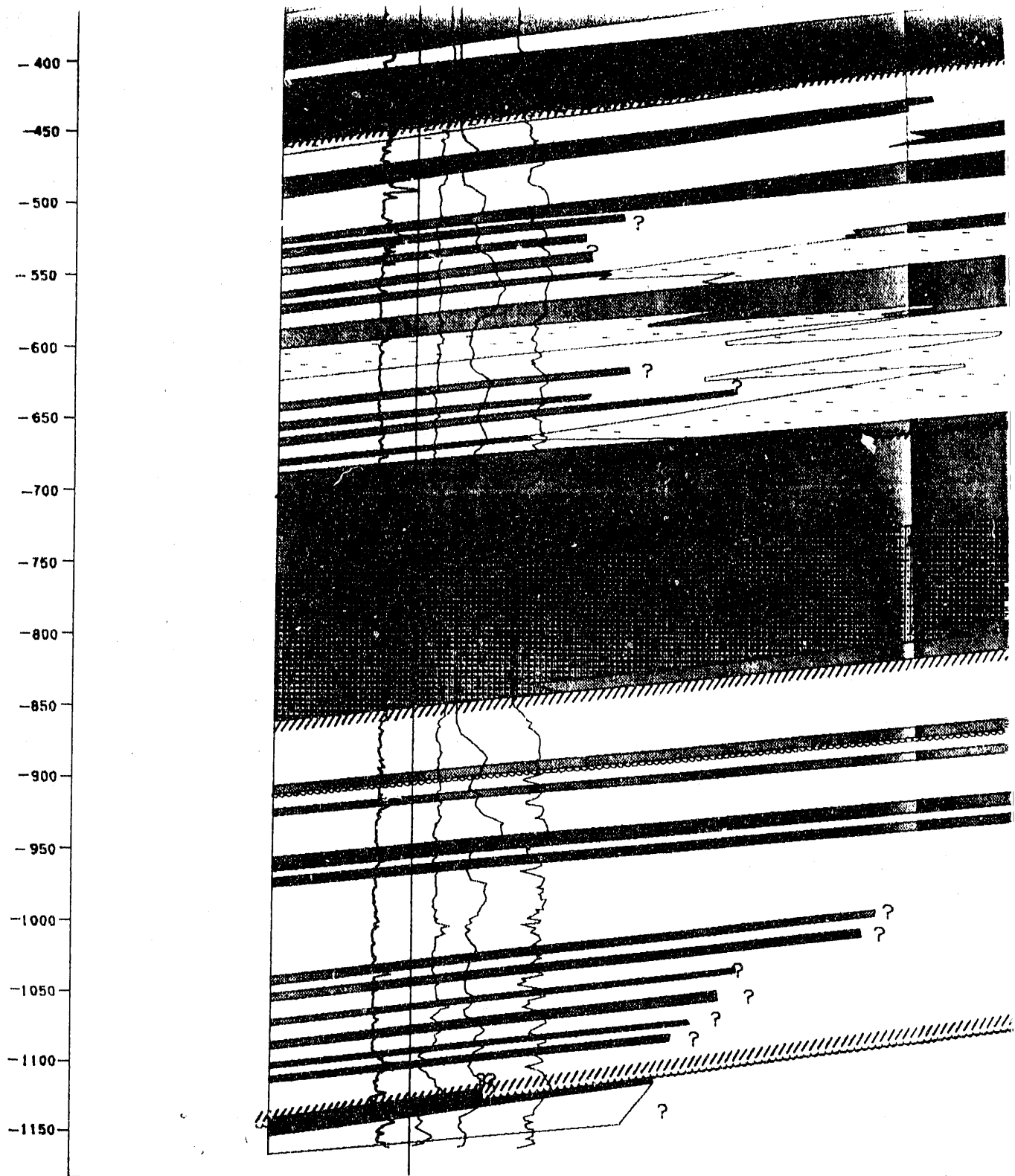
AQUIFER  
SYSTEM

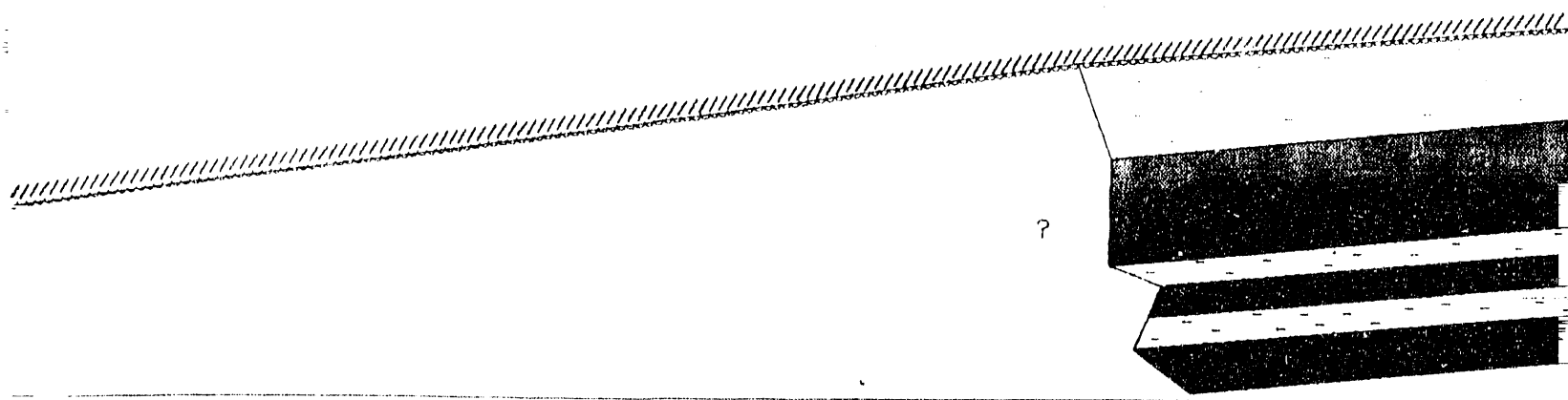


AQUIFER UNIT

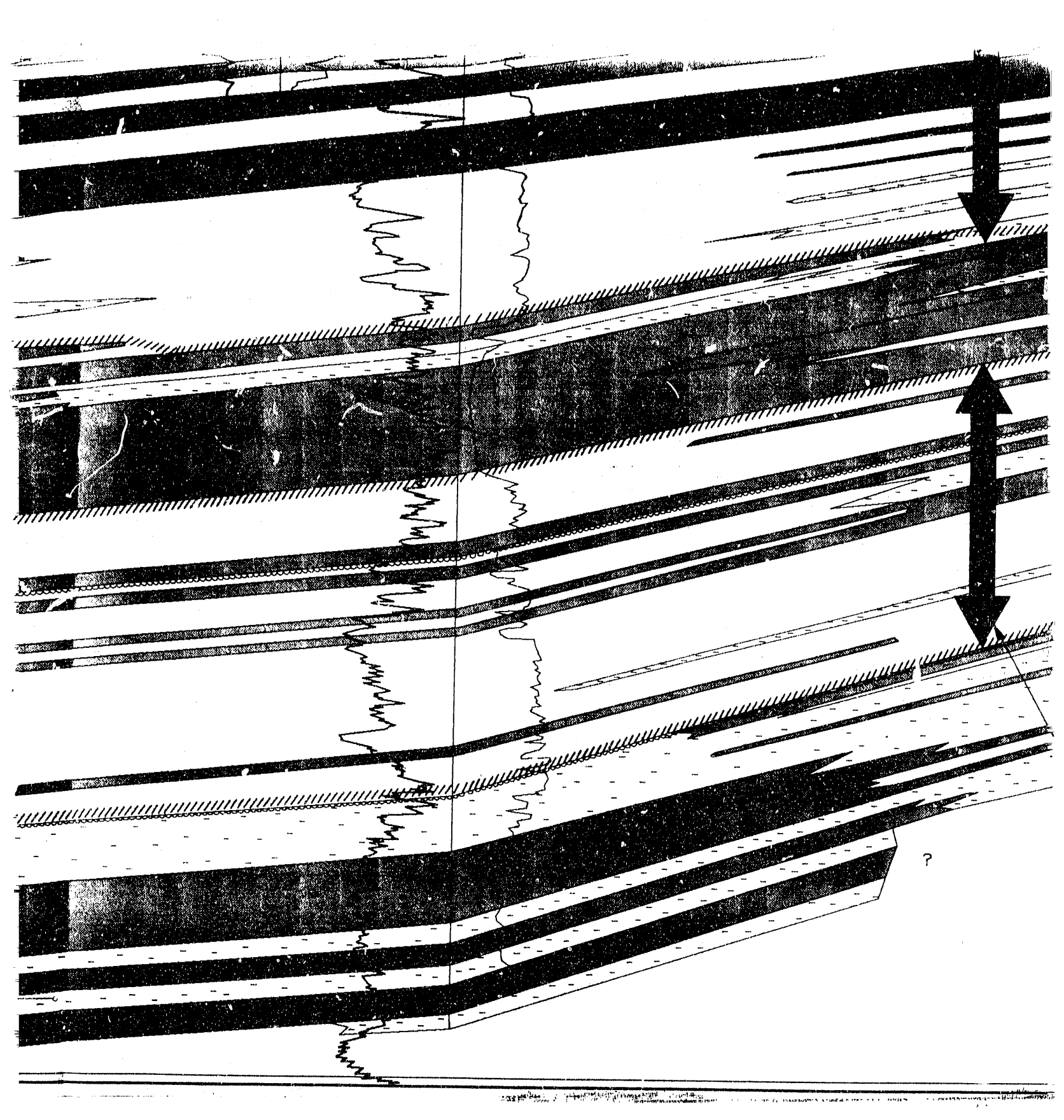
CONFINING UNIT

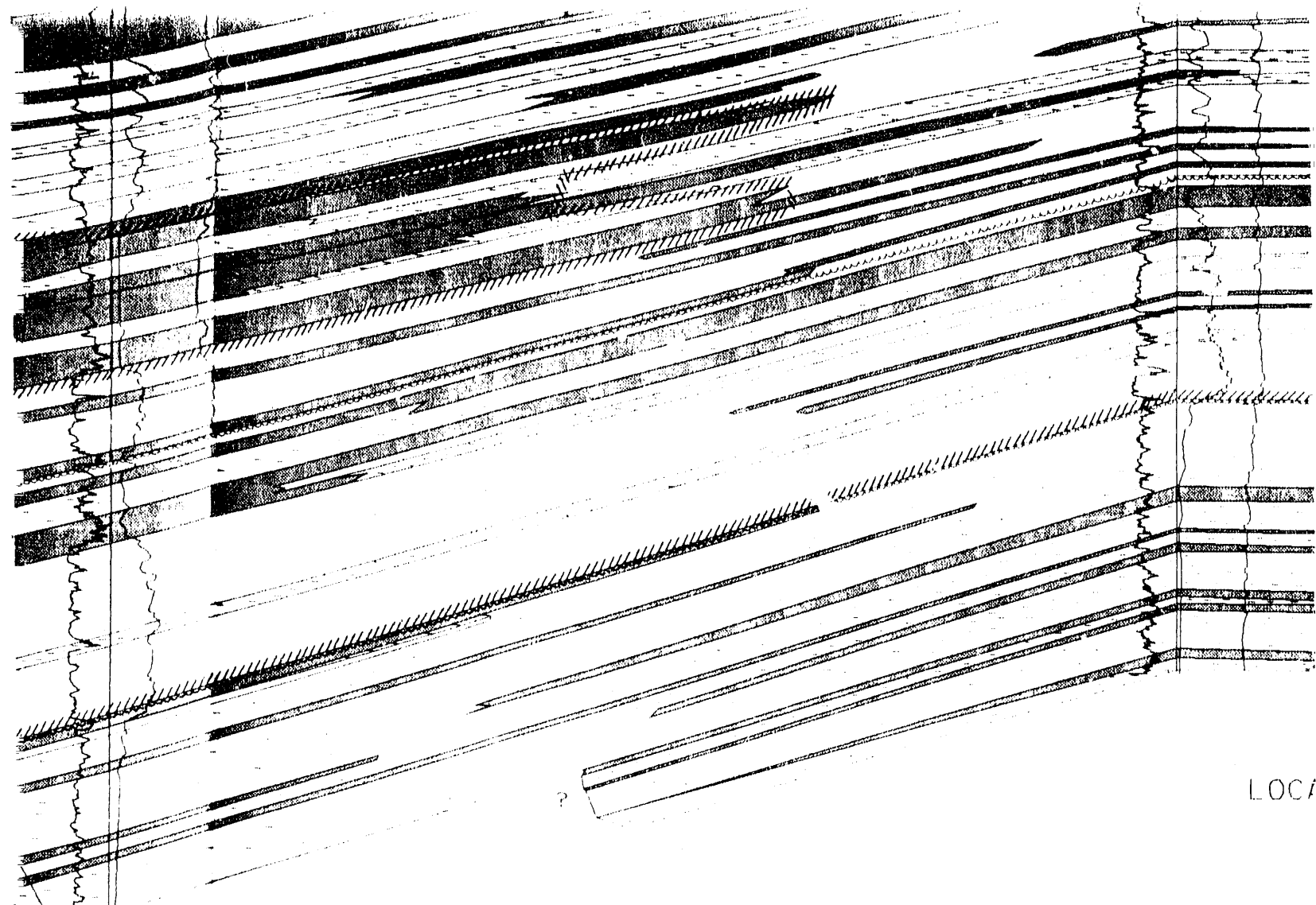
AQUIFER UNIT





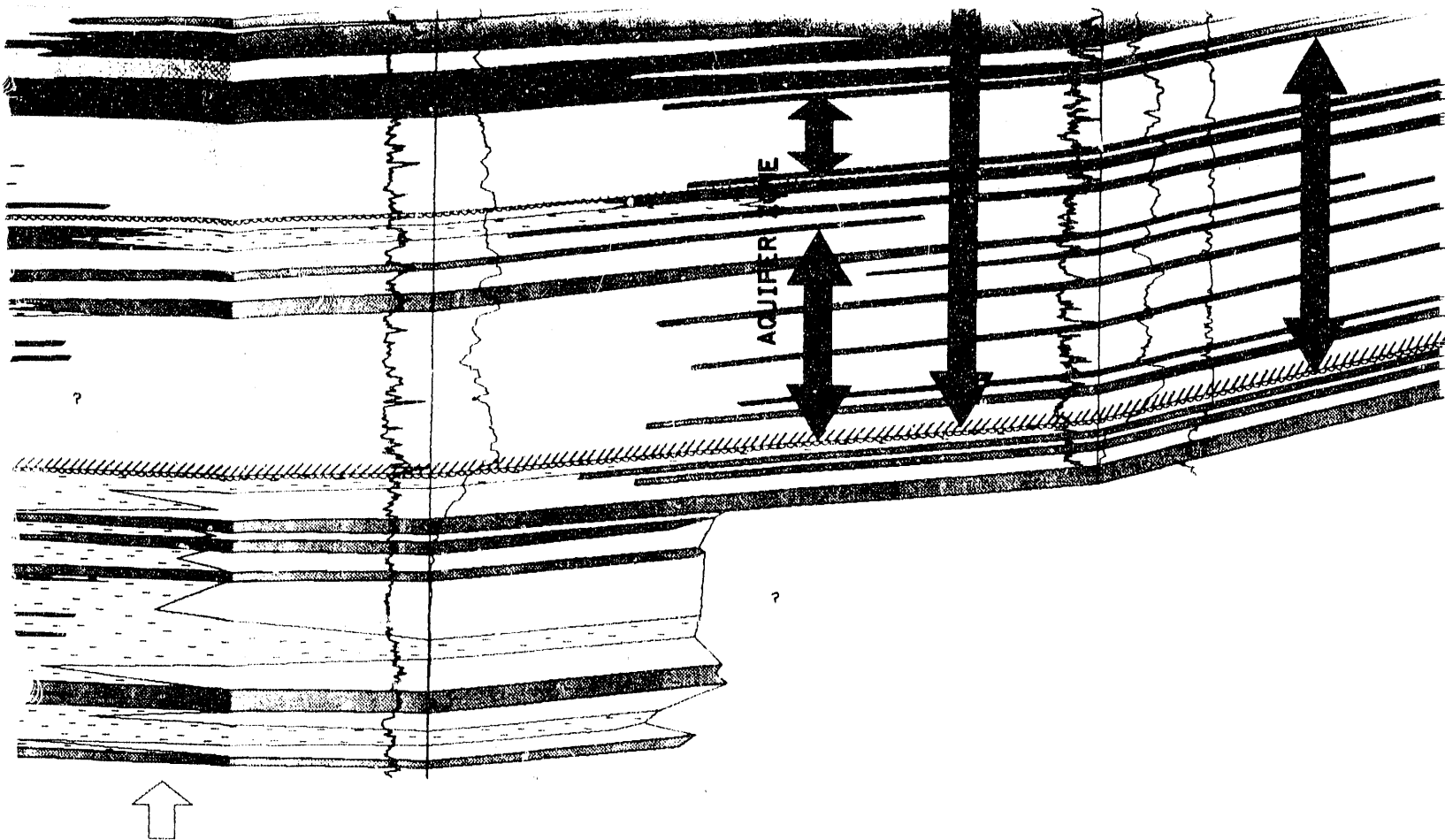






LOCAL

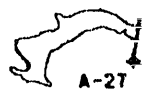
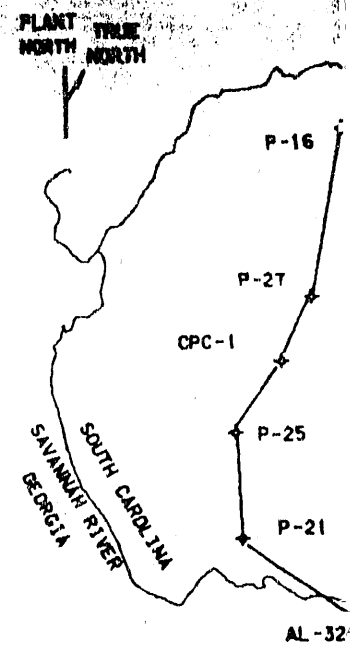
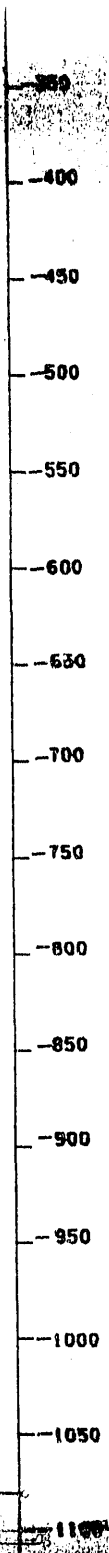
THE THREE REGIONAL AQUIFER  
SYSTEMS PROPOSED BY  
CLARK, BROOKS & FAYE, 1988  
IN EASTERN GEORGIA



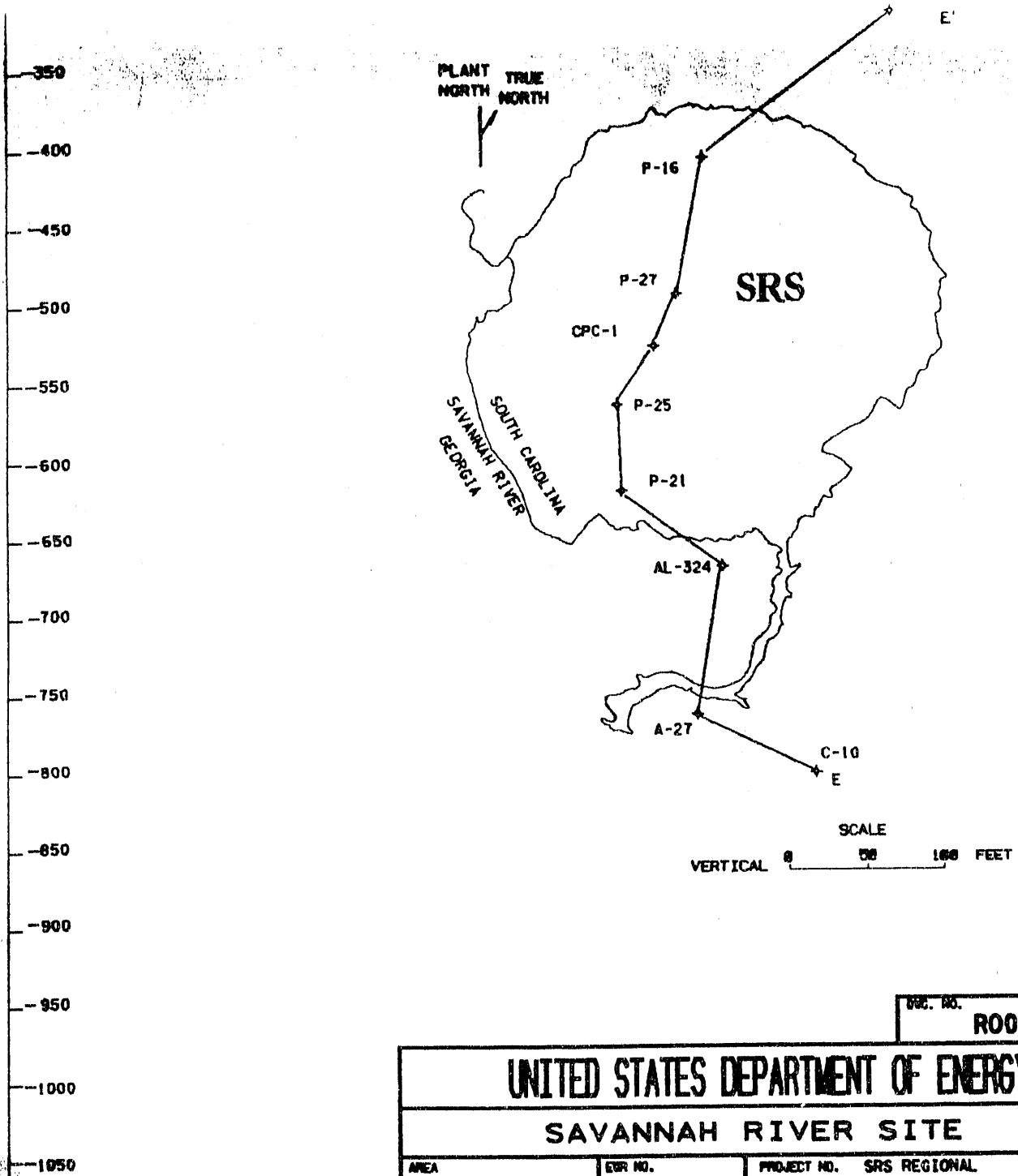
OF THE PEN BRANCH FAULT



AQUIFER SYSTEMS  
BOUNDARY



UNITED STATES	
SAVANNAH	
AREA SRS REGIONAL	CONT. NO. 86648
TITLE SOUTH CAROLINA	



DOC. NO.  
**R00013**

<b>UNITED STATES DEPARTMENT OF ENERGY</b>		
<b>SAVANNAH RIVER SITE</b>		
AREA <b>SRS REGIONAL</b>	EOR NO. <b>866467</b>	PROJECT NO. <b>SRS REGIONAL</b> HYDROSTRATIGRAPHIC CLASSIFICATION
TITLE <b>SOUTH-NORTH REGIONAL</b>		DRAFTED BY <b>T. WICKLEY</b>
		DATE <b>1/78</b>

P-28

368

298

268

278

288

258

248

238

228

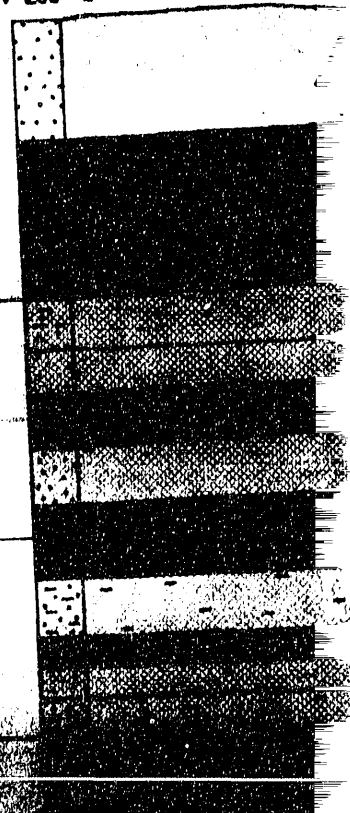
UPLAND UNIT

TOBACCO RD. FM.

UPPER

DRY BRANCH FM.

ELEV 285' - 8"



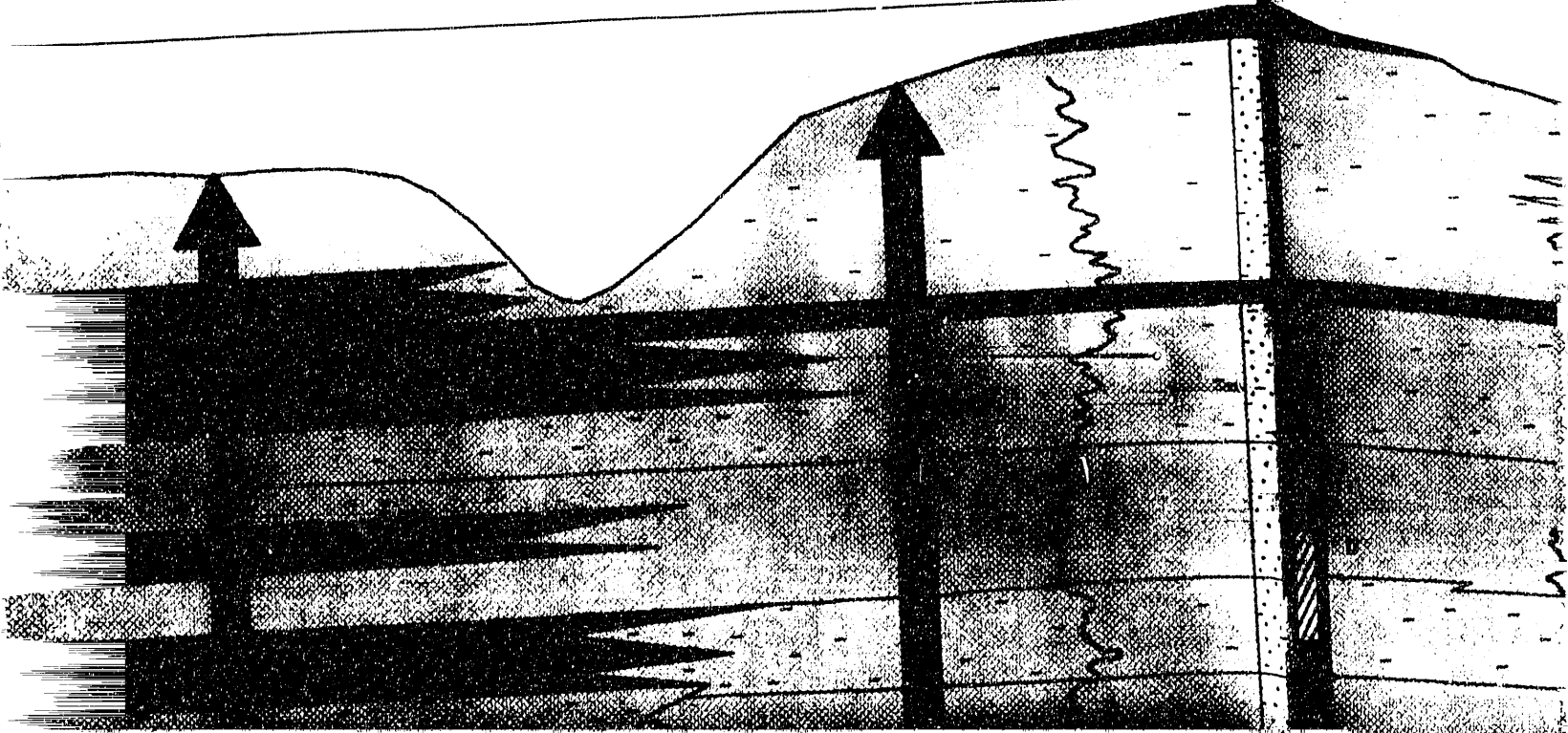
2858'-0"

680'-0"

THE SCALE IN  
AREA IS EXAGGERATED

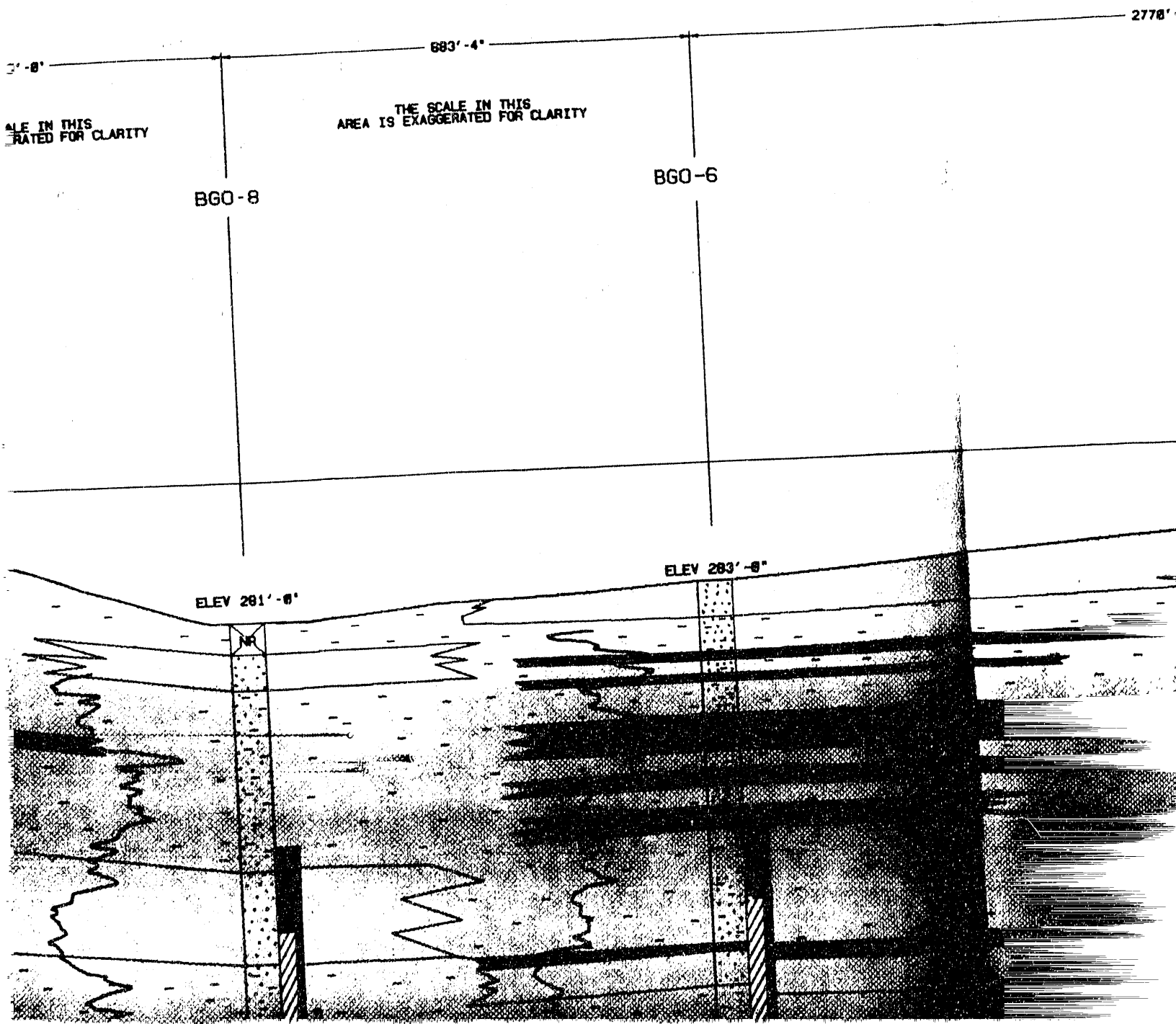
BGO 10

ELEV 28'-0"





# GENERAL SEPARATION



# ONS AREA REGIONAL HYDROST CROSS-SECTION

— 2778' - 8"

485' - 8"

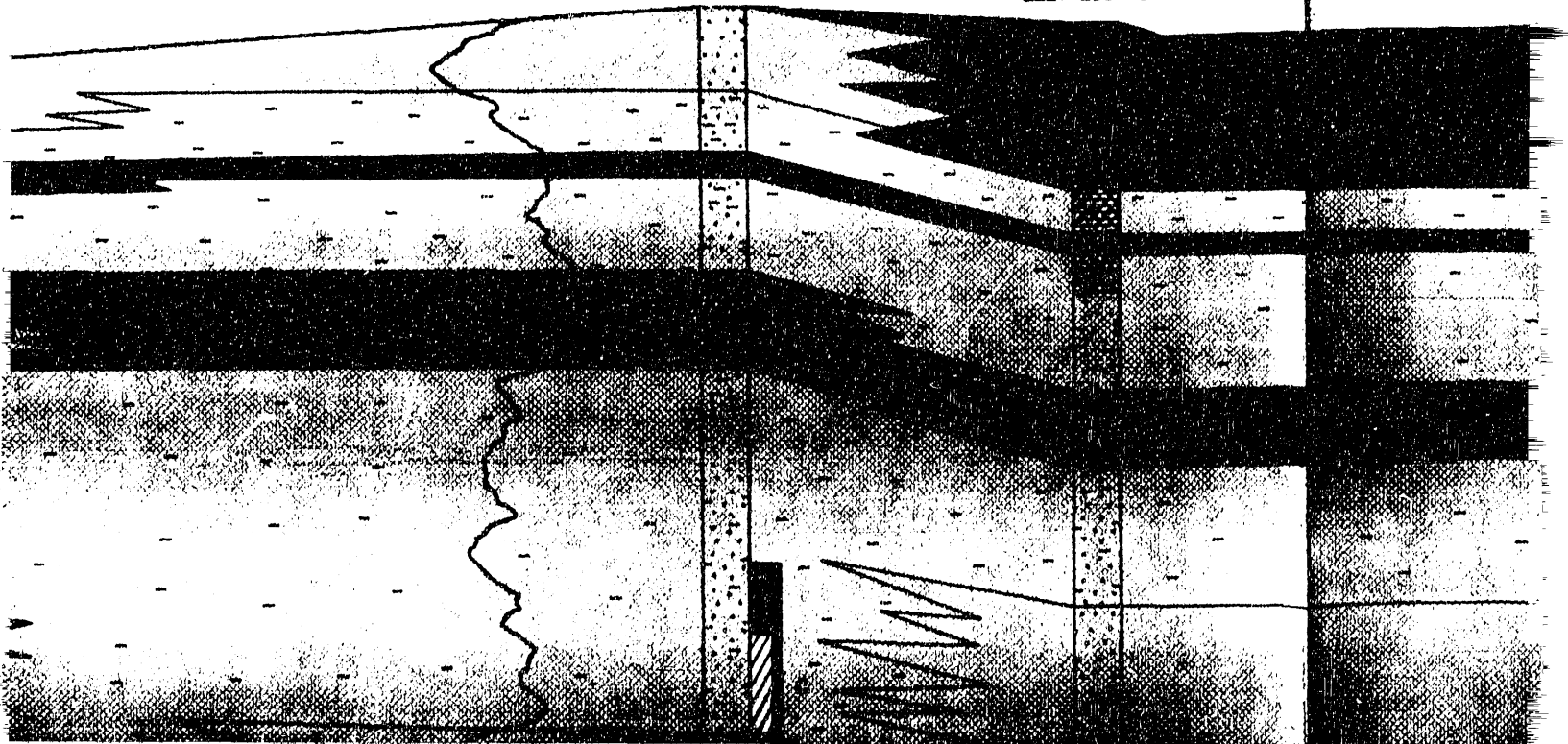
THE SCALE IN THIS  
AREA IS EXAGGERATED FOR CLARITY

HSB-85

HC-12

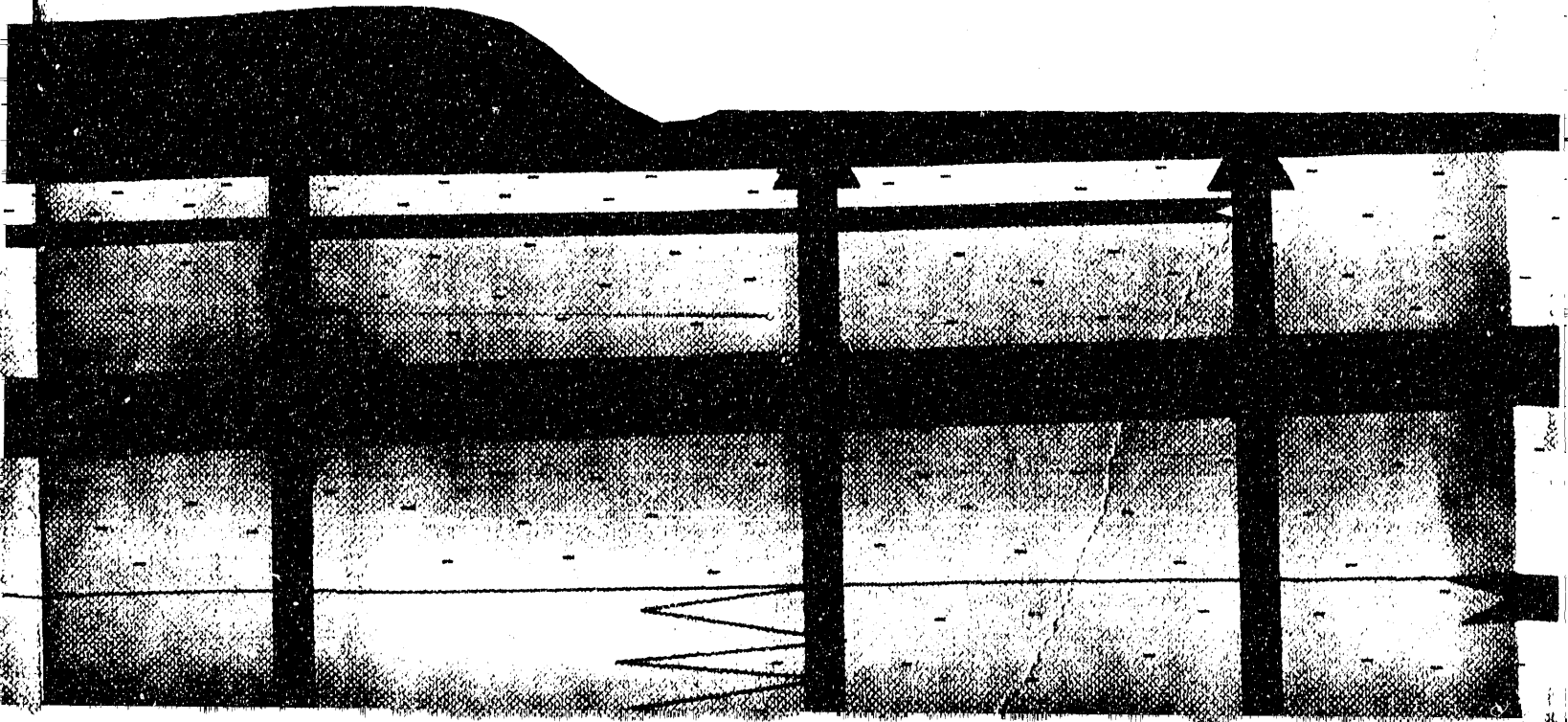
ELEV 282' - 8"

ELEV 288' - 8"



# PROSTRATIGRAPHIC

5236' - 6'
















P-27

ELEV 274' - 0"

UPLAND UNIT

TOBACCO RD. FM.

# LEGEND

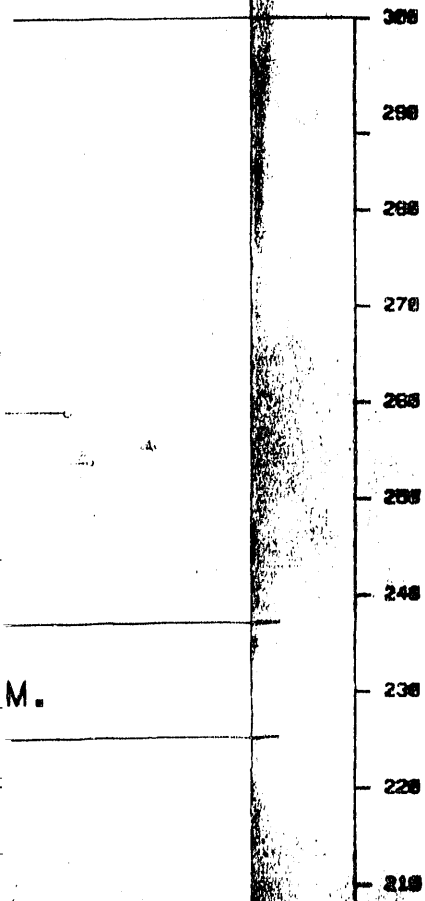
-  CALCAREOUS SAND
-  CALCAREOUS MUD
-  CLAYEY SAND
-  SAND
-  GRAVEL/PEBBLES
-  SILT/CLAY
-  SANDY LIMESTONE
-  LIMESTONE
-  SANDY MUDDY LIMESTONE
-  MUDDY LIMESTONE
-  SANDY CLAY
-  SAND PACK INTERVAL
-  SCREENED INTERVAL

TD - TOTAL DEPTH

SSA - GENERAL SEPARATIONS AREA

NR - NO RECOVERY

GEOPHYSICAL CURVE - NATURAL GAMMA



AQUIFER UNIT

220  
210  
200  
190  
180  
170  
160  
150  
140  
130  
120  
110  
100  
90  
80  
70  
60  
50  
40  
30  
20

DRY BRANCH FM.

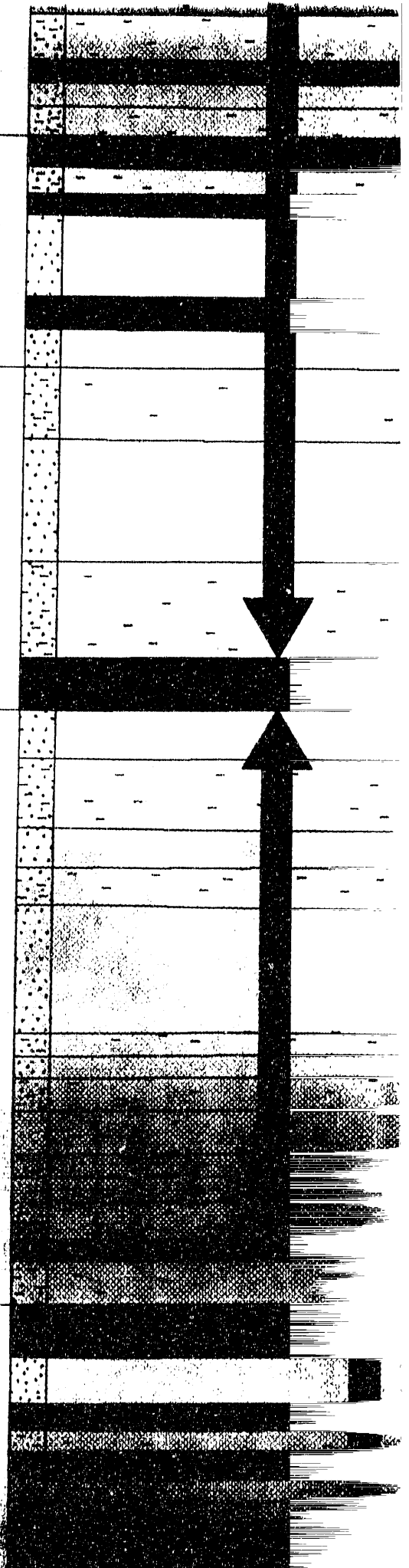
UPPER

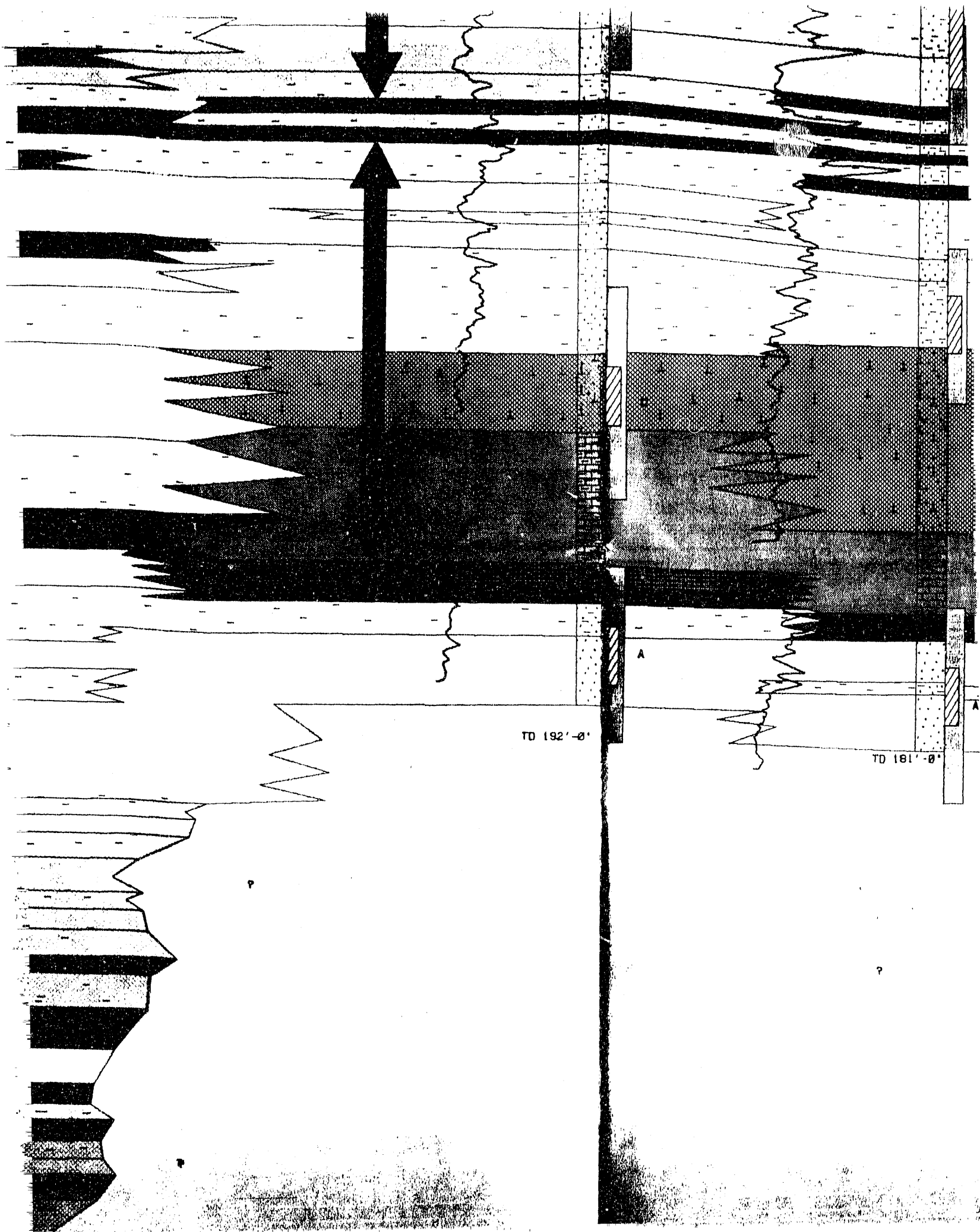
LOWER

SANTEE FM.

CONGAREE FM.

BLACK MOUNTAIN



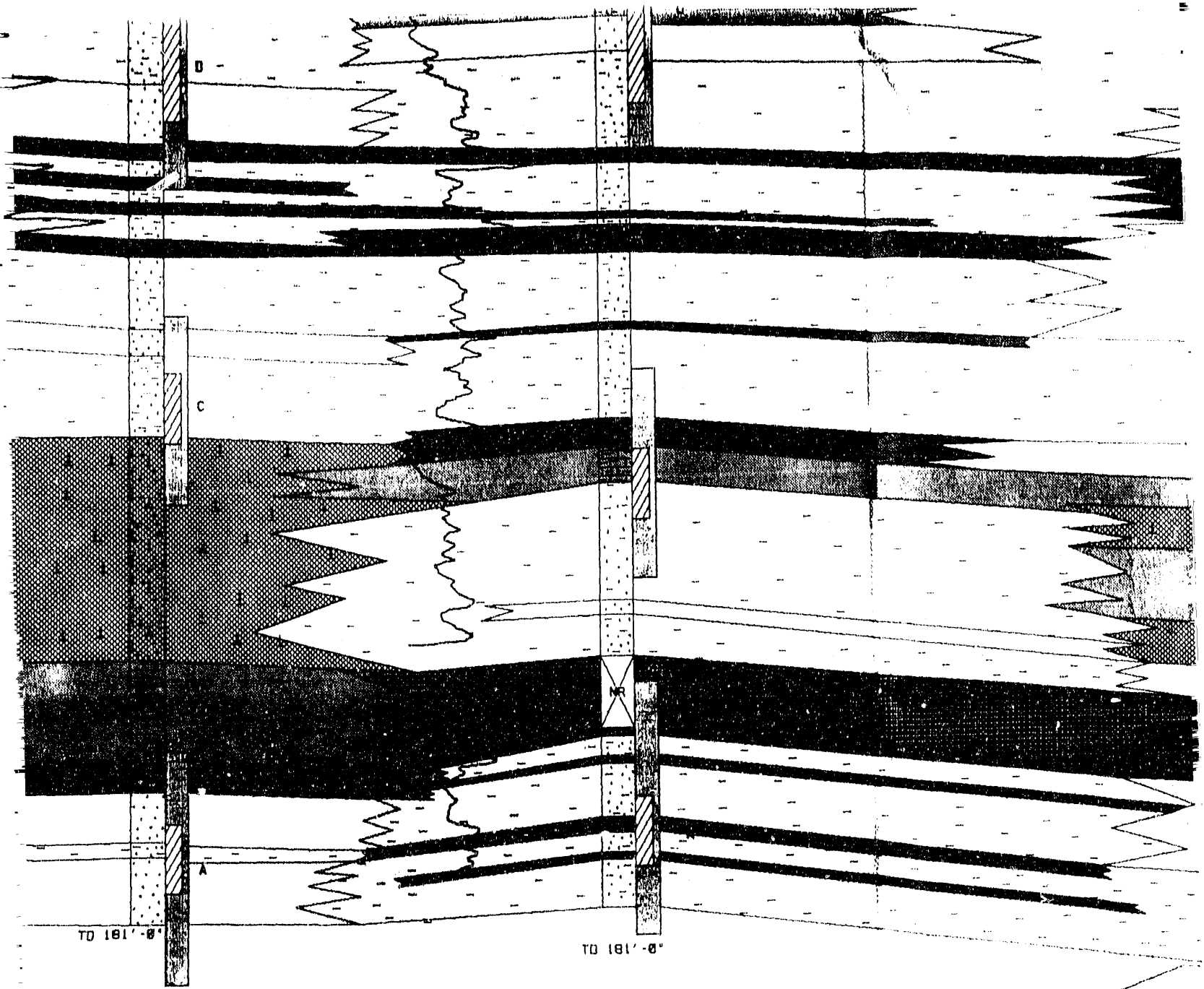


TD 192'-0"

TD 181'-0"

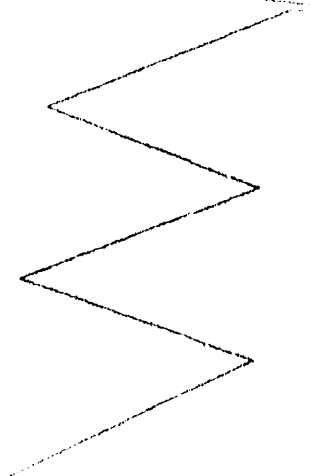
A

A



TD 181'-8''

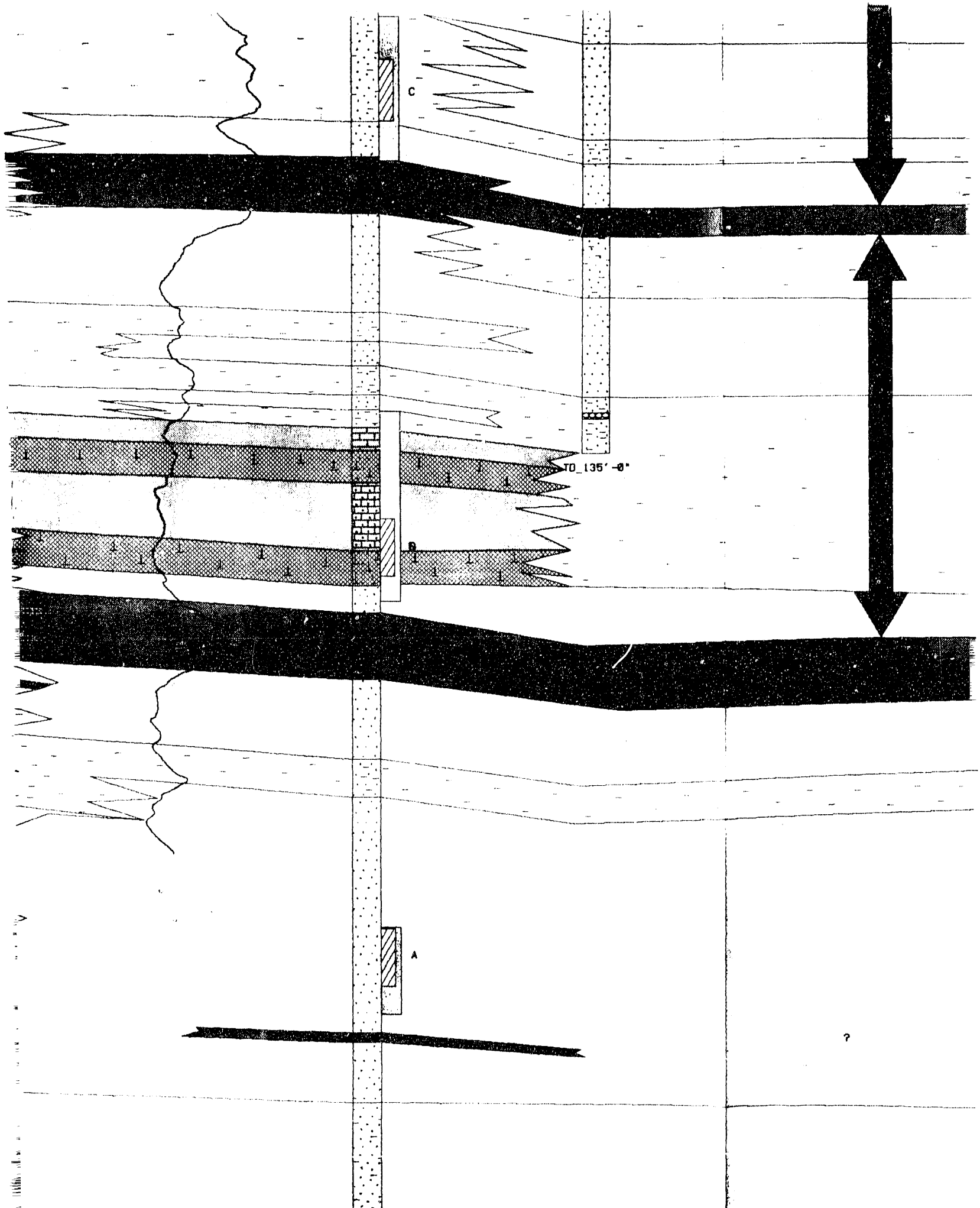
TD 181'-8''

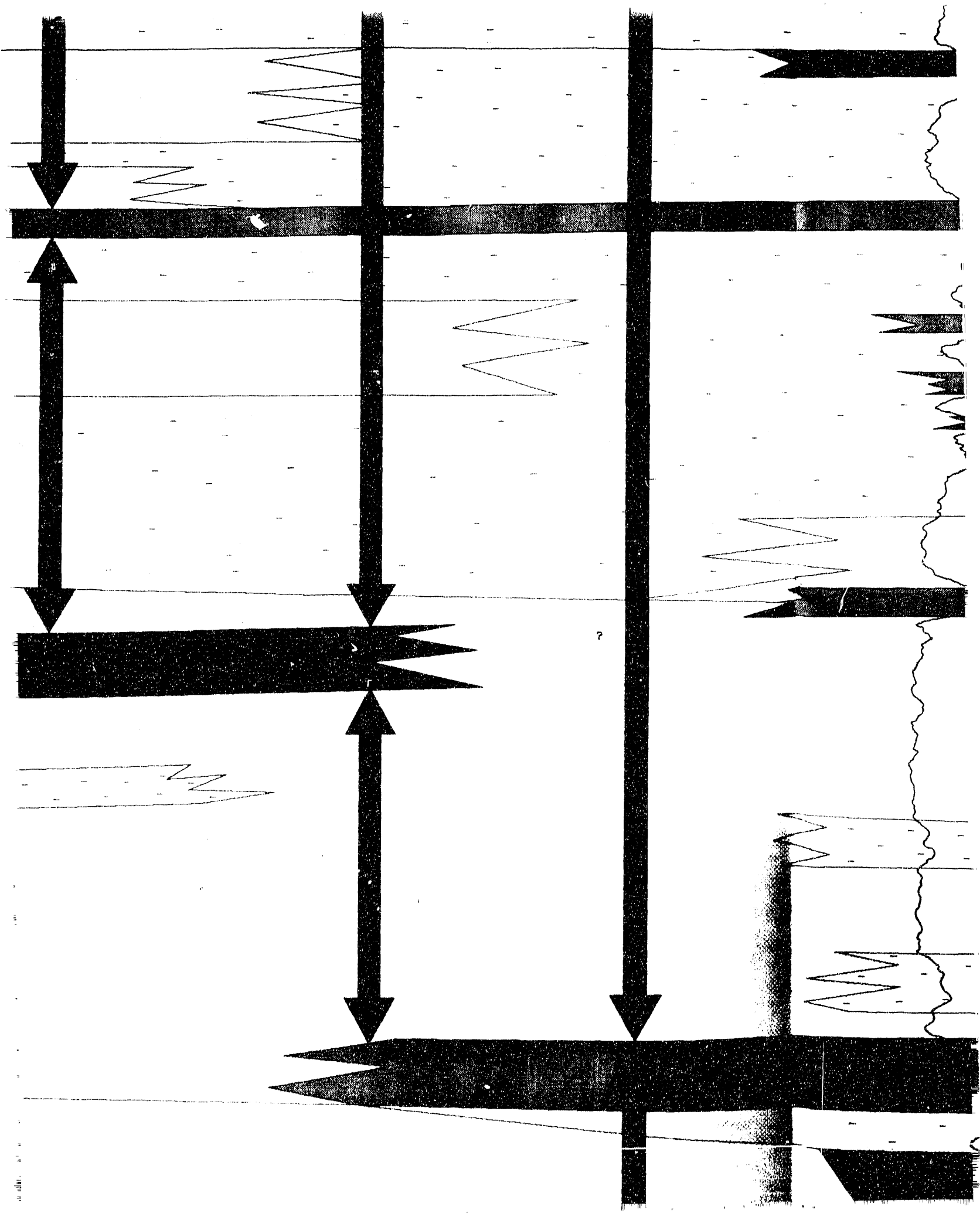


?

?







TOBACCO RD. FM.

230  
220  
210  
200  
190  
180  
170  
160  
150  
140  
120  
110  
100  
90  
80  
70

D

UPPER

DRY BRANCH FM.

LOWER

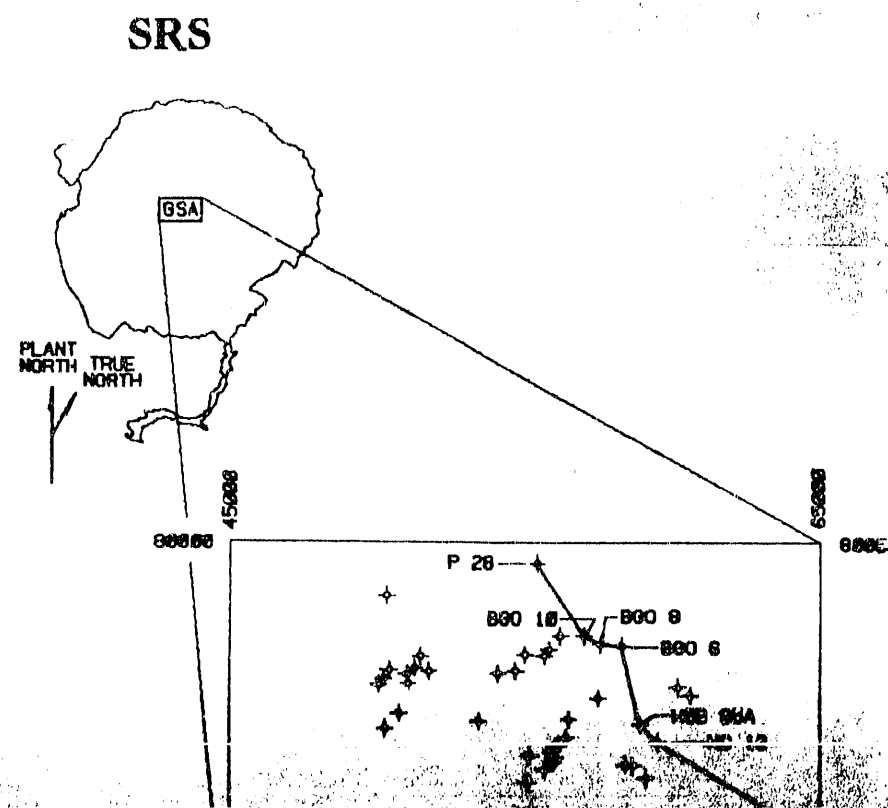
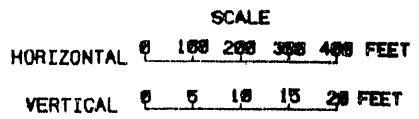
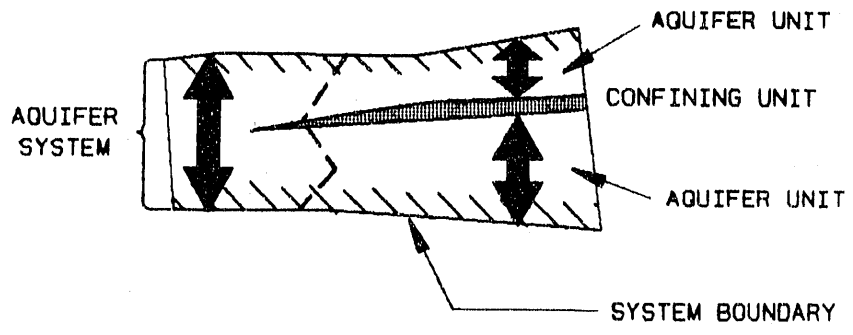
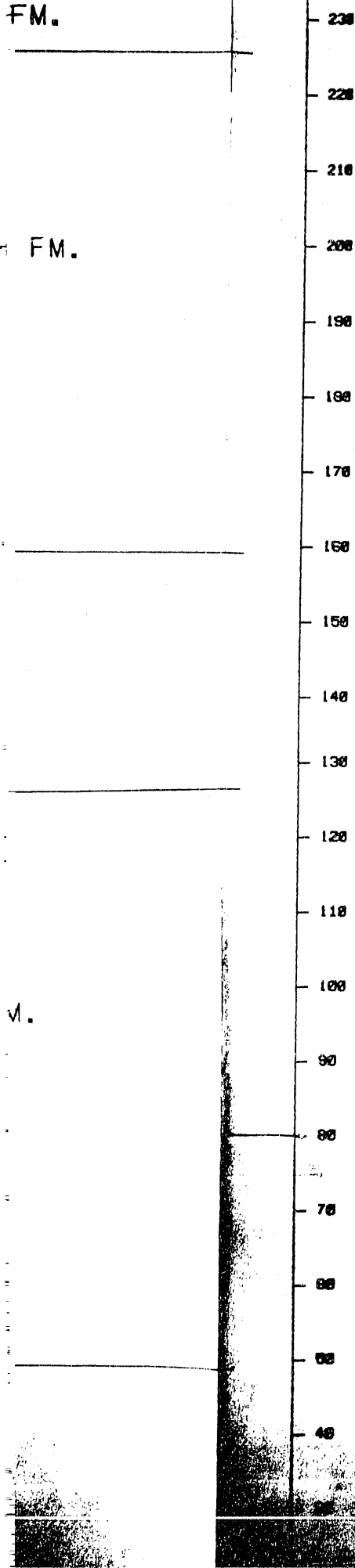
AQU  
SYE

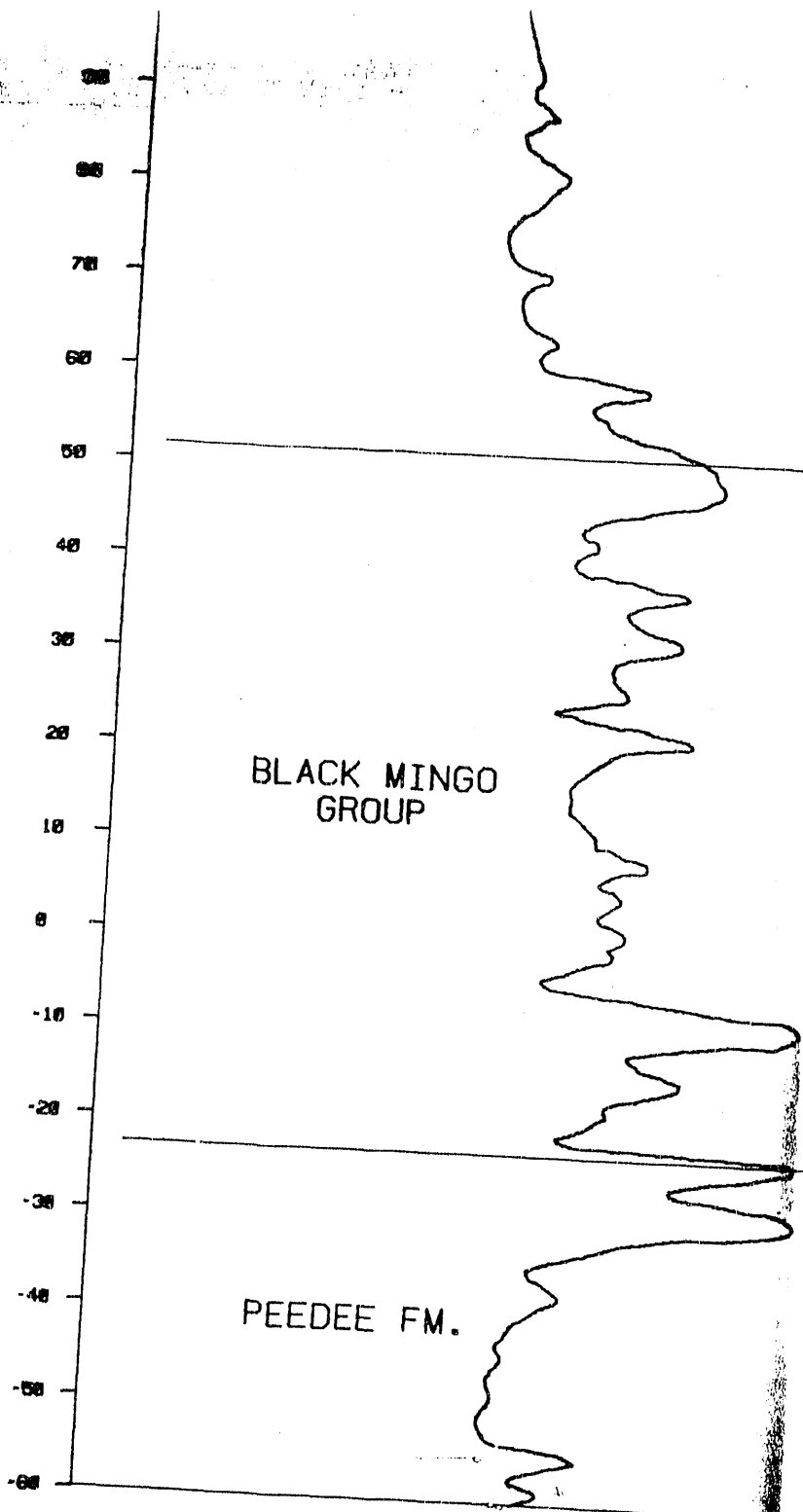
C

SANTEE FM.

CONGAREE FM.

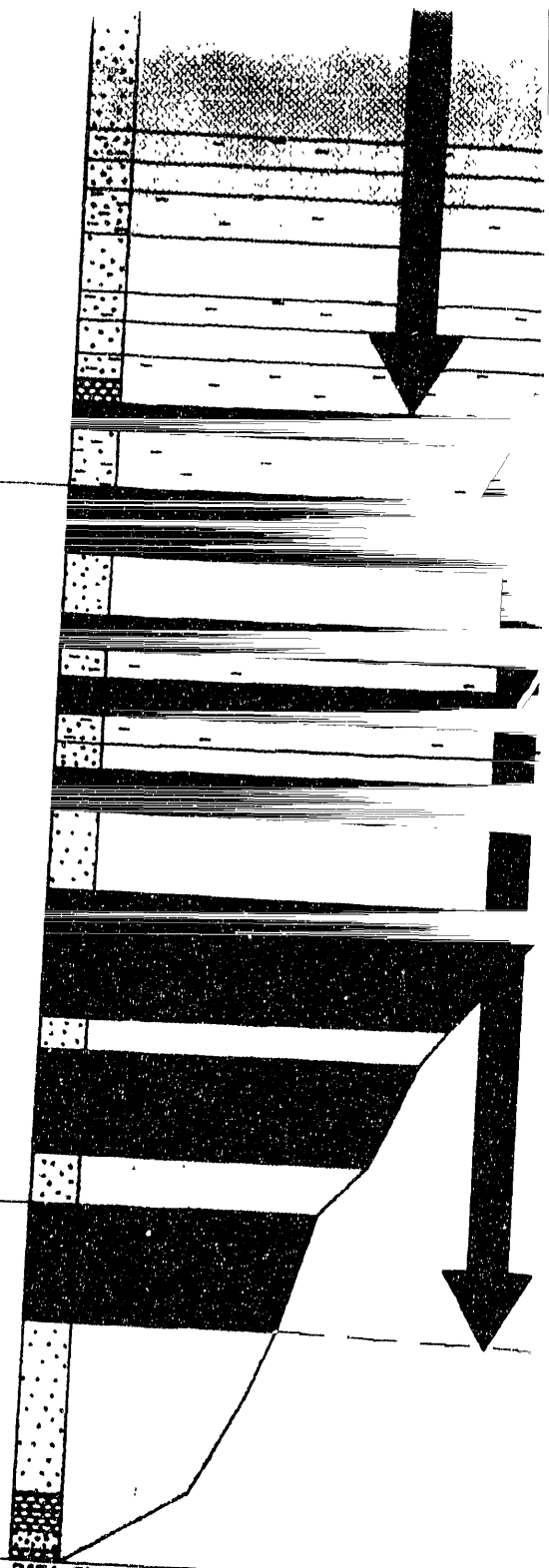
GEOPHYSICAL CURVE - NATURAL GAMMA





BLACK MINGO  
GROUP

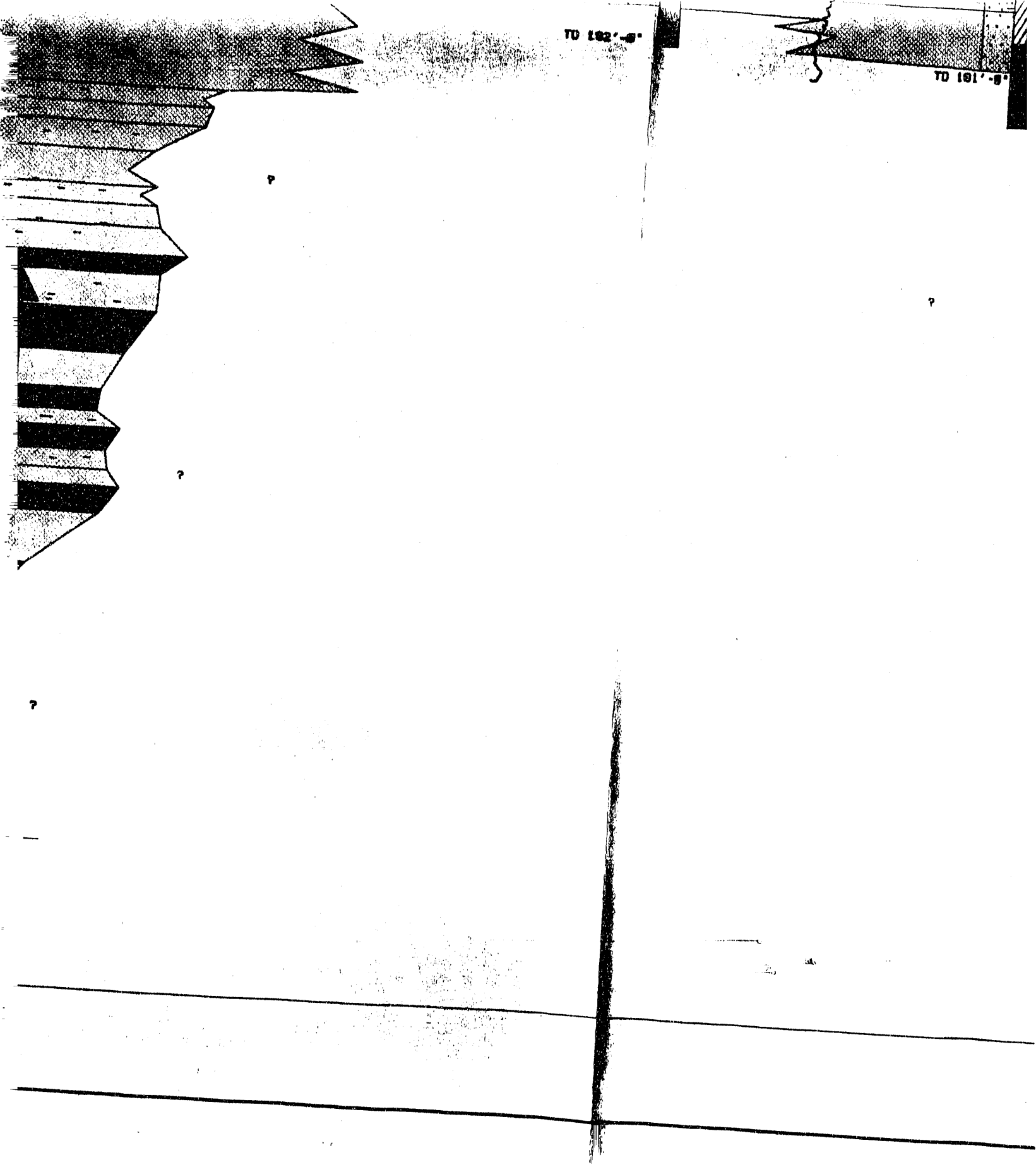
PEEDEE FM.



DUI 346' - 0" ±  
TD 428' - 8"

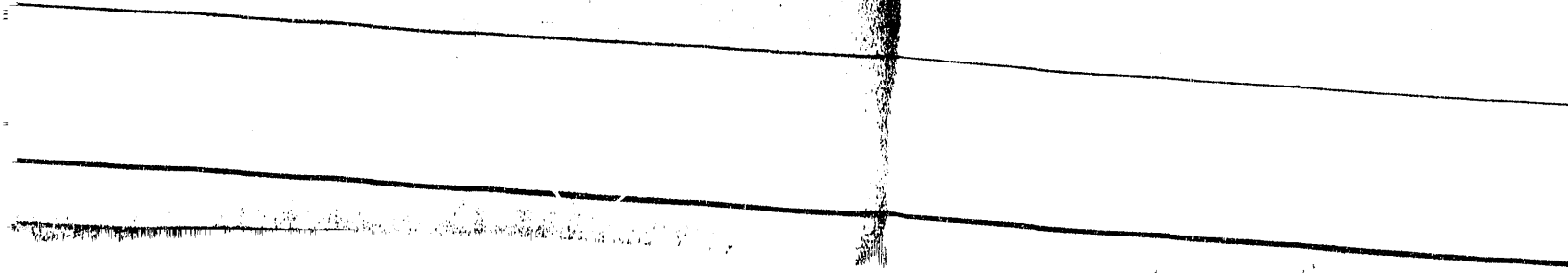
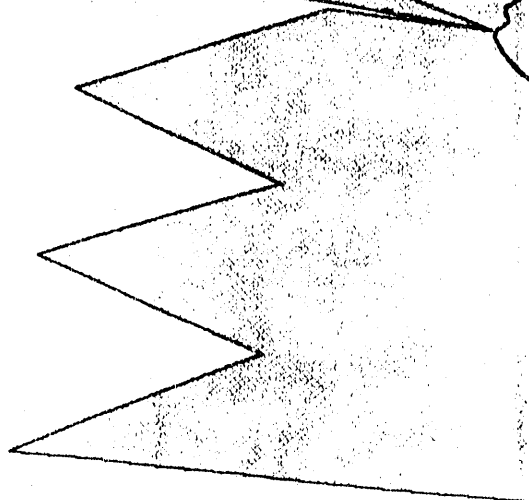
TO 192'-9"

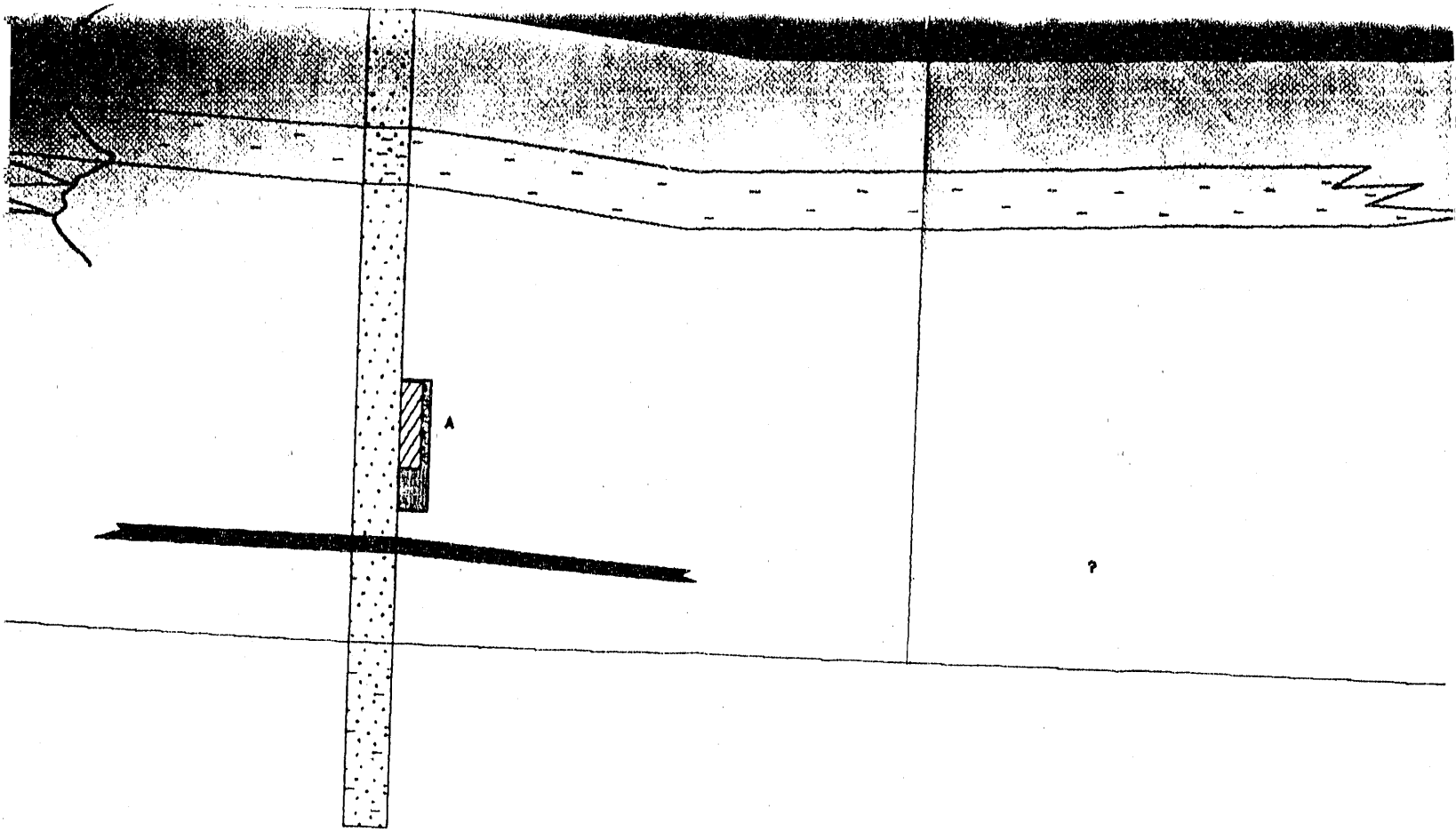
TO 191'-9"



TD 181'-8"

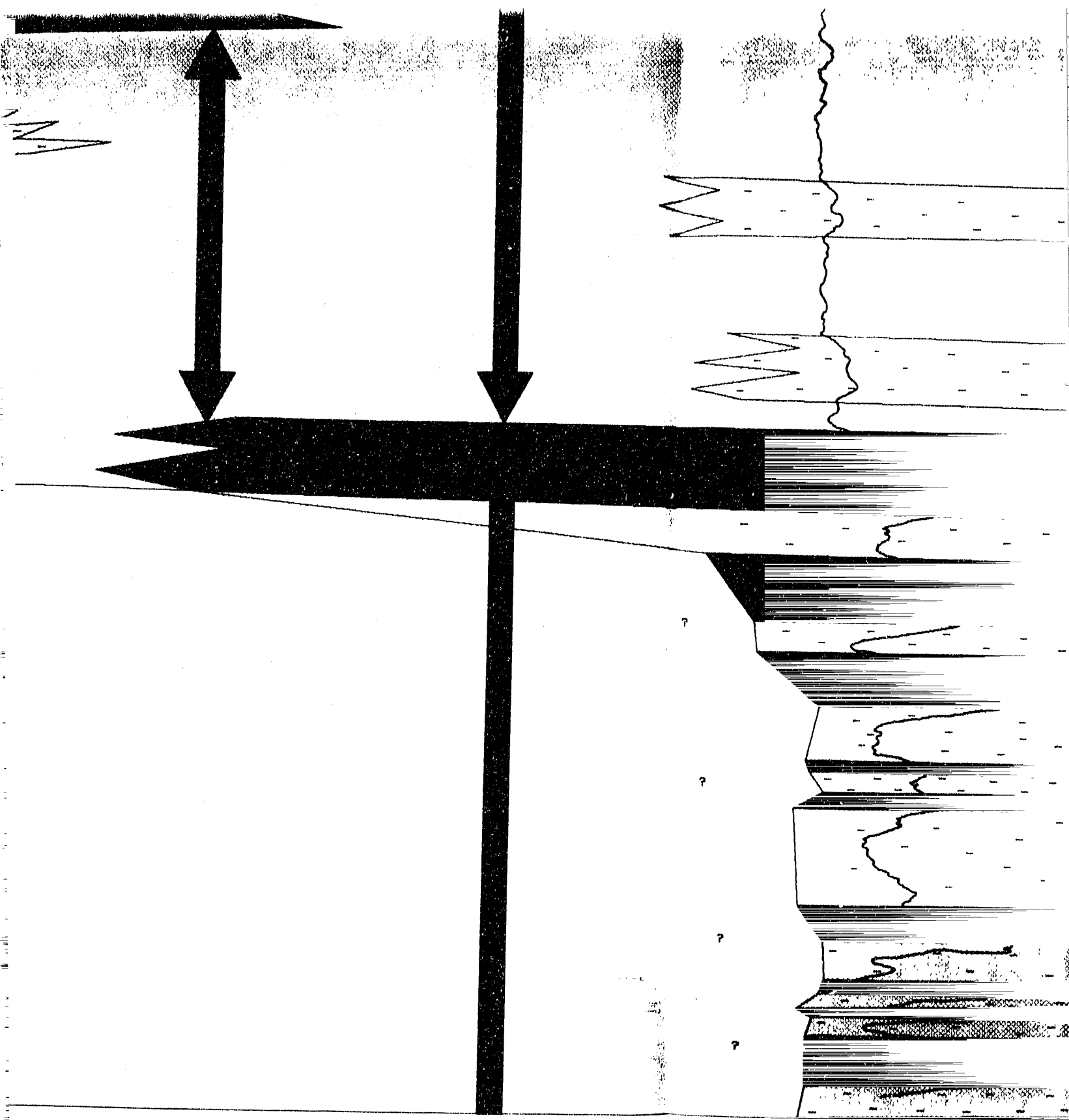
?

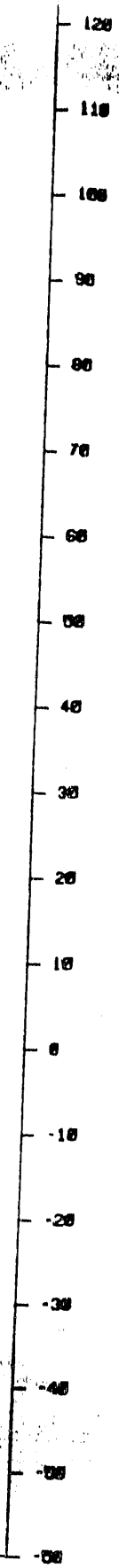
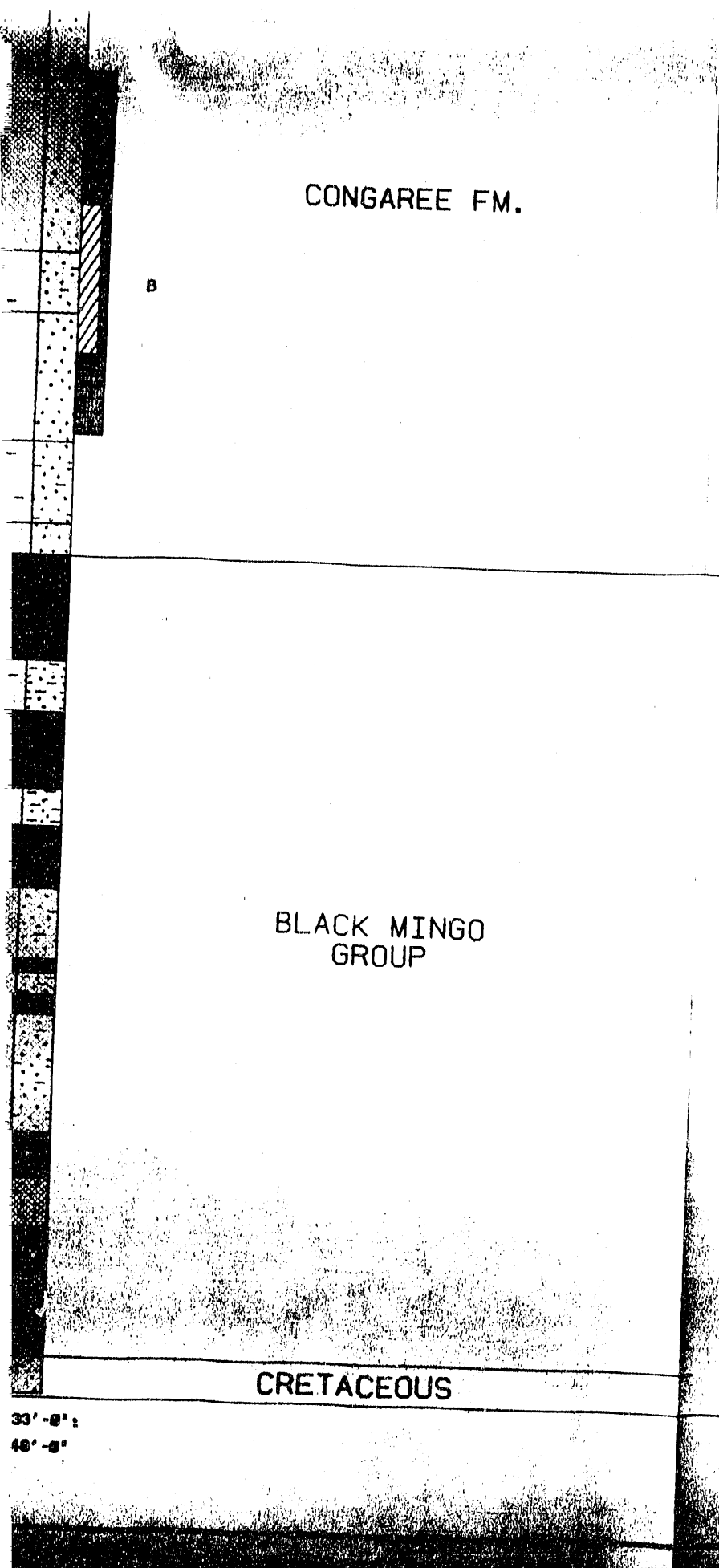




TD 273'-8"

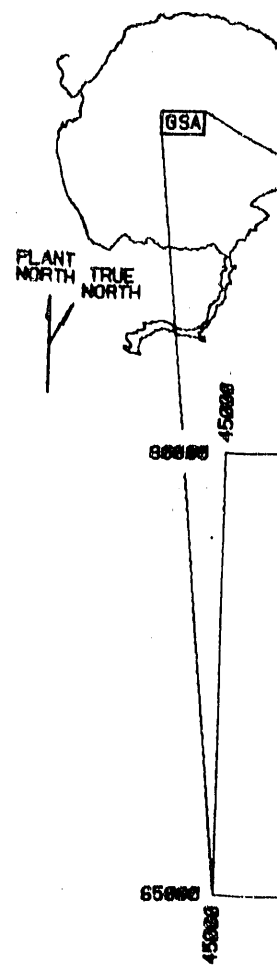






HORIZONTAL 1:100,000  
VERTICAL 1:50,000

SRS



33' - 0" :  
48' - 0"

UNITED STATES	
SAVANNAH	
AREA GSA	FORM NO. 866
TITLE GENERAL SEPARATE HYDROSTRATIGRAPHIC CROSS - SECTION	

Fig. 13

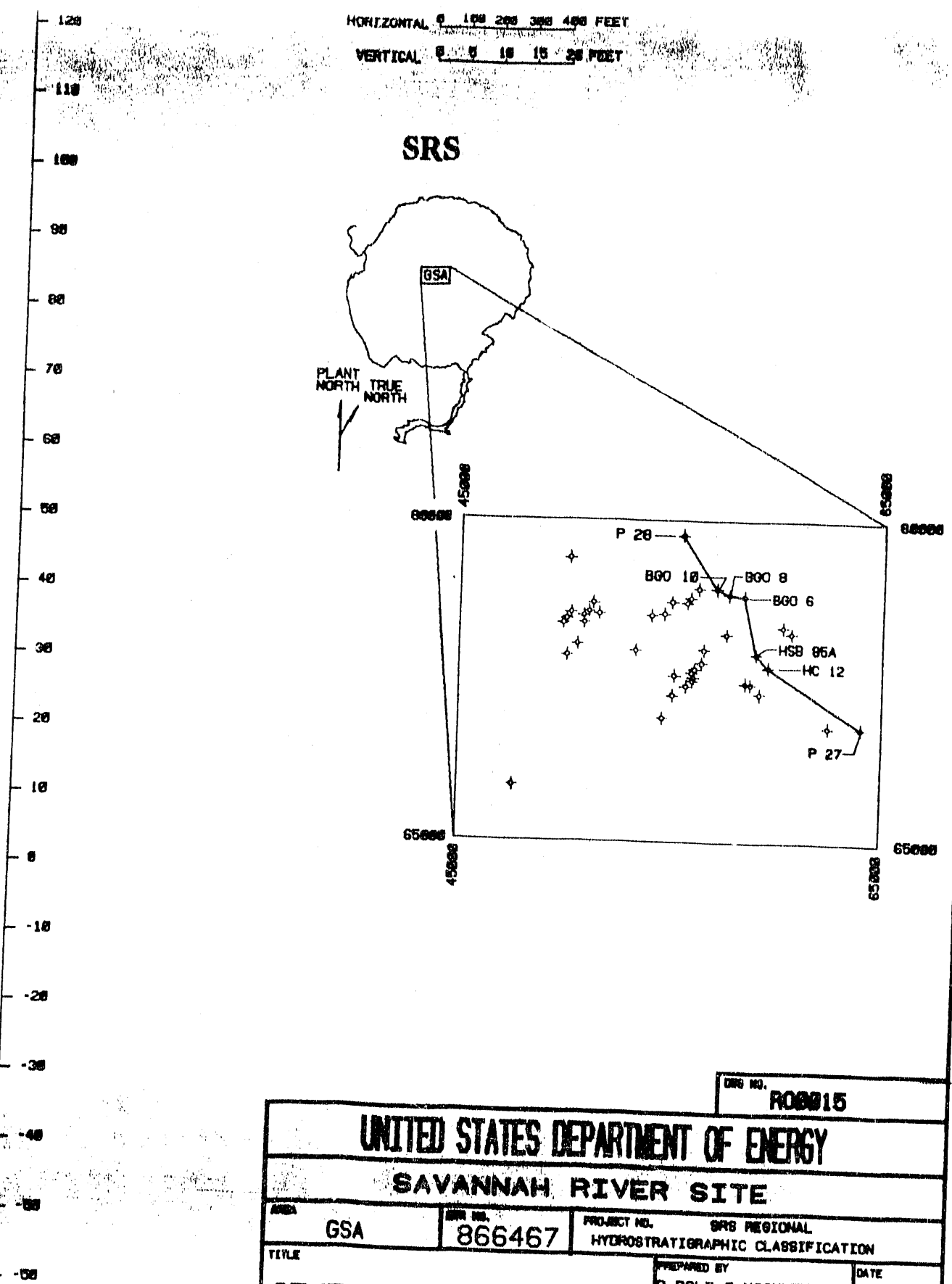


Fig. 13

		ORG. NO. RO0015	
<b>UNITED STATES DEPARTMENT OF ENERGY</b>			
<b>SAVANNAH RIVER SITE</b>			
AREA GSA	SWR NO. 866467	PROJECT NO. SRS REGIONAL HYDROSTRATIGRAPHIC CLASSIFICATION	
TITLE <b>GENERAL SEPARATIONS HYDROSTRATIGRAPHIC CROSS SECTION</b>		PREPARED BY R. BOLT, T. MICKLEY	DATE
		REVIEWED BY R. AADLAND, M. HARRIS	DATE
		BY T. M. WESTBROOK	DATE

**END**

**DATE  
FILMED**

**5 / 7 / 92**

