Westinghouse Electric Corporation
Water Reactor Divisions

Nuclear Technology Division
Box 355
Pittsburgh Pennsylvania 15230

August 17, 1982
AW-82-48

Mr. James R. Miller, Chief
Special Projects Branch
Division of Project Management
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

APPLICATION FOR WITHHOLDING PROPRIETARY

INFORMATION FROM PUBLIC DISCLOSURE

SUBJECT: Supplement to WCAP-9500 and WCAP-9401/9402 NRC Safety Evaluation Report (SER) Mixed Core Compatibility Items

REF: Westinghouse Letter No. NS-EPR-2643, Rahe to Miller, dated August 17, 1982

Dear Mr. Miller:

The proprietary material transmitted by the reference letter is of the same technical type as material previously submitted concerning the Westinghouse optimized fuel assembly program (Reference: NS-TMA-2057, dated March 30, 1979). Further, the affidavits submitted to justify the material previously submitted, AW-78-23 and AW-78-61, are equally applicable to this material.

Accordingly, withholding the subject information from public disclosure is requested in accordance with the previously submitted affidavit and application for withholding, AW-78-23, dated March 21, 1978, a copy of which is attached.

Correspondence with respect to this application for withholding or the accompanying affidavit should reference AW-82-48 and should be addressed to the undersigned.

Very truly yours,

Robert A. Wiesemann

Robert A. Wiesemann, Manager
Regulatory & Legislative Affairs

/bek
Attachment

cc: E. C. Shomaker, Esq.
Office of the Executive Legal Director, NRC

AW-78-23

AFFIDAVIT

COMMONWEALTH OF PENNSYLVANIA:

ss

COUNTY OF ALLEGHENY:

Before me, the undersigned authority, personally appeared Robert A. Wiesemann, who, being by me duly sworn according to law, deposes and says that he is authorized to execute this Affidavit on behalf of Westinghouse Electric Corporation ("Westinghouse") and that the averments of fact set forth in this Affidavit are true and correct to the best of his knowledge, information, and belief:

Robert A. Wiesemann, Manager
Licensing Programs

Sworn to and subscribed
before me this 10 day
of March 1978.

Notary Public

(1) I am Manager, Licensing Programs, in the Pressurized Water Reactor Systems Division, of Westinghouse Electric Corporation and as such, I have been specifically delegated the function of reviewing the proprietary information sought to be withheld from public disclosure in connection with nuclear power plant licensing or rulemaking proceedings, and am authorized to apply for its withholding on behalf of the Westinghouse Water Reactor Divisions.

(2) I am making this affidavit in conformance with the provisions of 10 CFR Section 2.790 of the Commission's regulations and in conjunction with the Westinghouse application for withholding accompanying this Affidavit.

(3) I have personal knowledge of the criteria and procedures utilized by Westinghouse Nuclear Energy Systems in designating information as a trade secret, privileged or as confidential commercial or financial information.

(4) Pursuant to the provisions of paragraph (b)(4) of Section 2.790 of the Commission's regulations, the following is furnished for consideration by the Commission in determining whether the information sought to be withheld from public disclosure should be withheld.

(i) The information sought to be withheld from public disclosure is owned and has been held in confidence by Westinghouse.

(ii) The information is of a type customarily held in confidence by Westinghouse and not customarily disclosed to the public. Westinghouse has a rational basis for determining the types of information customarily held in confidence by it and, in that connection, utilizes a system to determine when and

whether to hold certain types of information in confidence. The application of that system and the substance of that system constitutes Westinghouse policy and provides the rational basis required.

Criteria and Standards Utilized

In determining whether information in a document or report is proprietary, the following criteria and standards are utilized by Westinghouse. Information is proprietary if any one of the following are met:

(a) The information reveals the distinguishing aspects of a process (or component, structure, tool, method, etc.) where prevention of its use by any of Westinghouse's competitors without license from Westinghouse constitutes a competitive economic advantage over other companies.

(b) It consists of supporting data, including test data, relative to a process (or component, structure, tool, method, etc.), the application of which data secures a competitive economic advantage, e.g., by optimization or improved marketability.

(c) Its use by a competitor would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing of a similar product.

(d) It reveals cost or price information, production capacities, budget levels, or commercial strategies of Westinghouse, its customers or suppliers.

(e) It reveals aspects of past, present, or future Westinghouse or customer funded development plans and programs of potential commercial value to Westinghouse.

(f) It contains patentable ideas, for which patent protection may be desirable.

(g) It is not the property of Westinghouse, but must be treated as proprietary by Westinghouse according to agreements with the owner.

(iii) The information is being transmitted to the Commission in confidence and, under the provisions of 10 CFR Section 2.790, it is to be received in confidence by the Commission.

(iv) The information is not available in public sources to the best of our knowledge and belief.

(v) The proprietary information sought to be withheld in this submittal are the copies of slides utilized by Westinghouse in its presentation to the NRC at the March 21, 1978 meeting concerning the Westinghouse optimized fuel assembly. The letter and the copies of slides are being submitted in preliminary form to the Commission for review and comment on the Westinghouse optimized fuel assembly in advance of a formal submittal for NRC approval.

Public disclosure of this information is likely to cause substantial harm to the competitive position of Westinghouse as it would reveal the description of the approved design, the comparison of the improved design with the standard design, the nature of the tests conducted, the test conditions, the test results and the conclusions of the testing program,

all of which is recognized by the Staff to be of competitive value and because of the large amount of effort and money expended by Westinghouse over a period of several years in carrying out this particular development program. Further, it would enable competitors to use the information for commercial purposes and also to meet NRC requirements for licensing documentation, each without purchasing the right from Westinghouse to use the information.

Information regarding its development programs is valuable to Westinghouse because:

(a) Information resulting from its development programs gives Westinghouse a competitive advantage over its competitors. It is, therefore, withheld from disclosure to protect the Westinghouse competitive position.

(b) It is information which is marketable in many ways. The extent to which such information is available to competitors diminishes the Westinghouse ability to sell products and services involving the use of the information.

(c) Use by our competitor would put Westinghouse at a competitive disadvantage by reducing his expenditure of resources at our expense.

(d) Each component of proprietary information pertinent to a particular competitive advantage is potentially as valuable as the total competitive advantage. If competitors acquire components of proprietary information, any one component may be the key to the entire puzzle, thereby depriving Westinghouse of a competitive advantage.

(e) The Westinghouse capacity to invest corporate assets in research and development depends upon the success in obtaining and maintaining a competitive advantage.

Being an innovative concept, this information might not be discovered by the competitors of Westinghouse independently. To duplicate this information, competitors would first have to be similarly inspired and would then have to expend an effort similar to that of Westinghouse to develop the design.

Further the deponent sayeth not.

This paper describes the 17x17 Standard Fuel Assembly (STD) to the 17x17 Optimized Fuel Assembly (OFA) Thermal-hydraulic transition core methods, the resulting transition core DNBR penalty relative to a 17x17 OFA full core analysis and Westinghouse's position of the application of this penalty.

The 17x17 OFA has an [ ]relative to the 17x17 STD due +(a,c)
to heat flux and equivalent diameter effects. [+(a,c)

]

[+(a,c)

]

The analysis which determined the transition core DNBR penalty used the THINC IV[1] code. The configurations used were [+(a,c)

]

[+(a,c

]

Investigation was also done on the effect of differing rod diameters on the lateral friction factor. [+(a,c)

]

[+(a,c)

]

It should be noted that the THINC IV code uses the Novendstern-Sandberg axial friction factor correlation[4] which, under two-phase conditions, employs the homogeneous flow model proposed by Owens[5]. Also under two-phase conditions, the THINC IV code implicitly corrects the pressure drop at grid locations by using the bulk density rather than the saturated liquid density. This is equivalent to the APD Simplification Homogeneous Model[4] and conservately over-predicts the pressure drop of expansion and contraction at two-phase conditions over the quality ranges of interest for PWR applications. Thus, the effect of localized hydraulic mismatches would be accentuated at two-phase conditions.

[+(a,c)

]

Also, for your information, the static pressure distributions of a full core of 17x17 STD and 17x17 OFA is presented in Figures 10 and 11. These figures were calculated isothermally. A respresentative best estimate flowrate was used. The static pressure distribution values for a transition core would be interpolated between the values on the two figures at each axial position as a function of the number of each assembly type in the core.

It is the position of Westinghouse to analyze 17x17 transition cores in the following manner: [+(a,c)

]

REFERENCES

1. H. Chelemer, et.al., "THINC IV-An Improved Program for Thermal-Hydraulic Analysis of Rod Bundle Cores," WCAP-7956, June 1973.

2. H. Chelemer, et.al., "Improved Thermal Design Procedure," WCAP-8567, July, 1975.

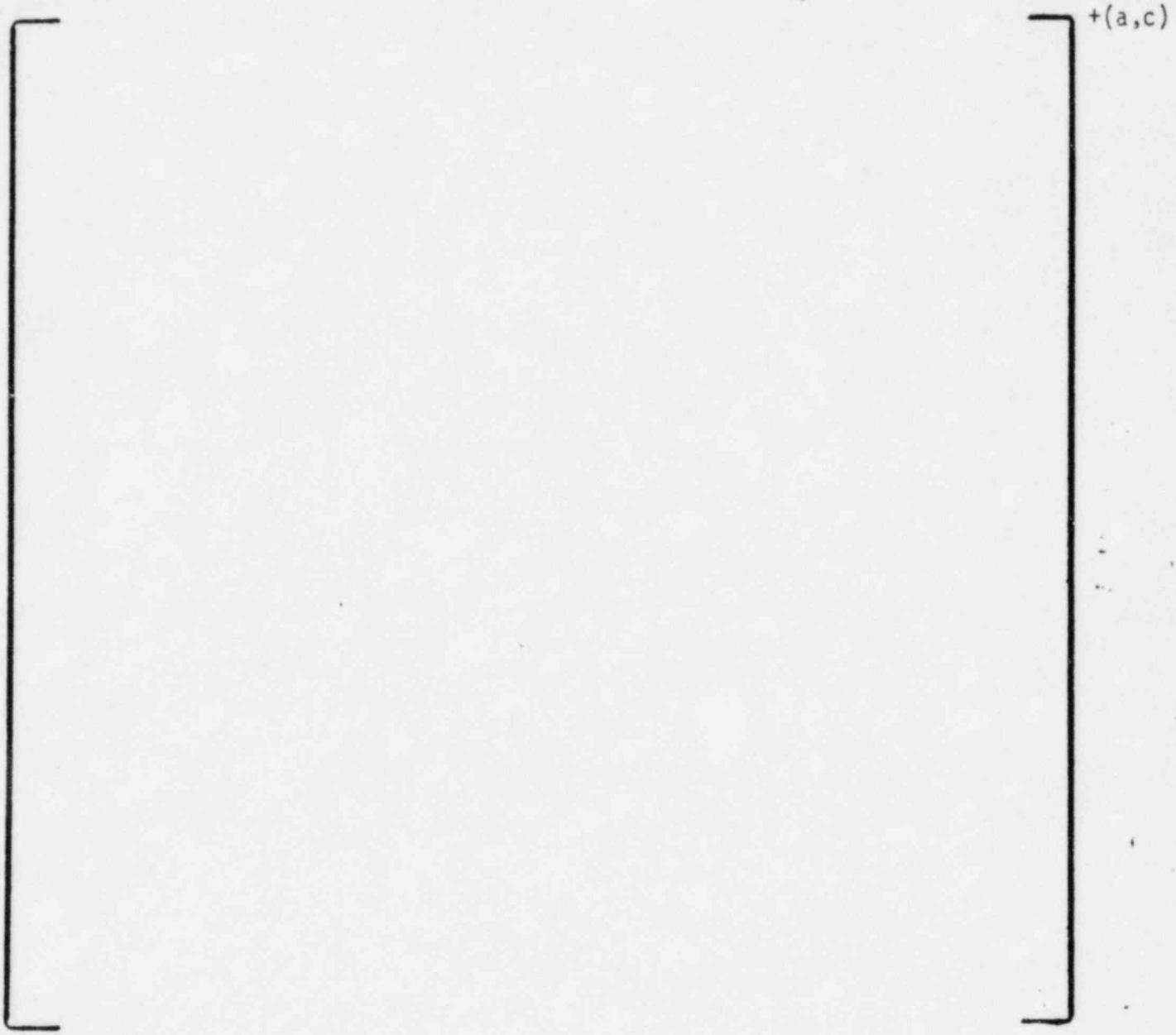
3. F. E. Motley, et.al., "New Westinghouse Correlation WRB-1 for Predicting Critical Heat Flux in Rod Bundles with Mixing Vane Grids," WCAP-8762, July 1976.

4. E. H. Novendstern, and R. O. Sandberg, "Single Phase, Local Boiling and Bulk Boiling Pressure Drop Correlations," WCAP-2850, April, 1966.

5. W. L. Owens, Jr., "Two-Phase Pressure Gradient," in "International Developments in Heat Transfer," Part II, pp. 363-8, American Society of Mechanical Engineers, New York, 1961.

FIGURE 1

TRANSITION PATTERN 1

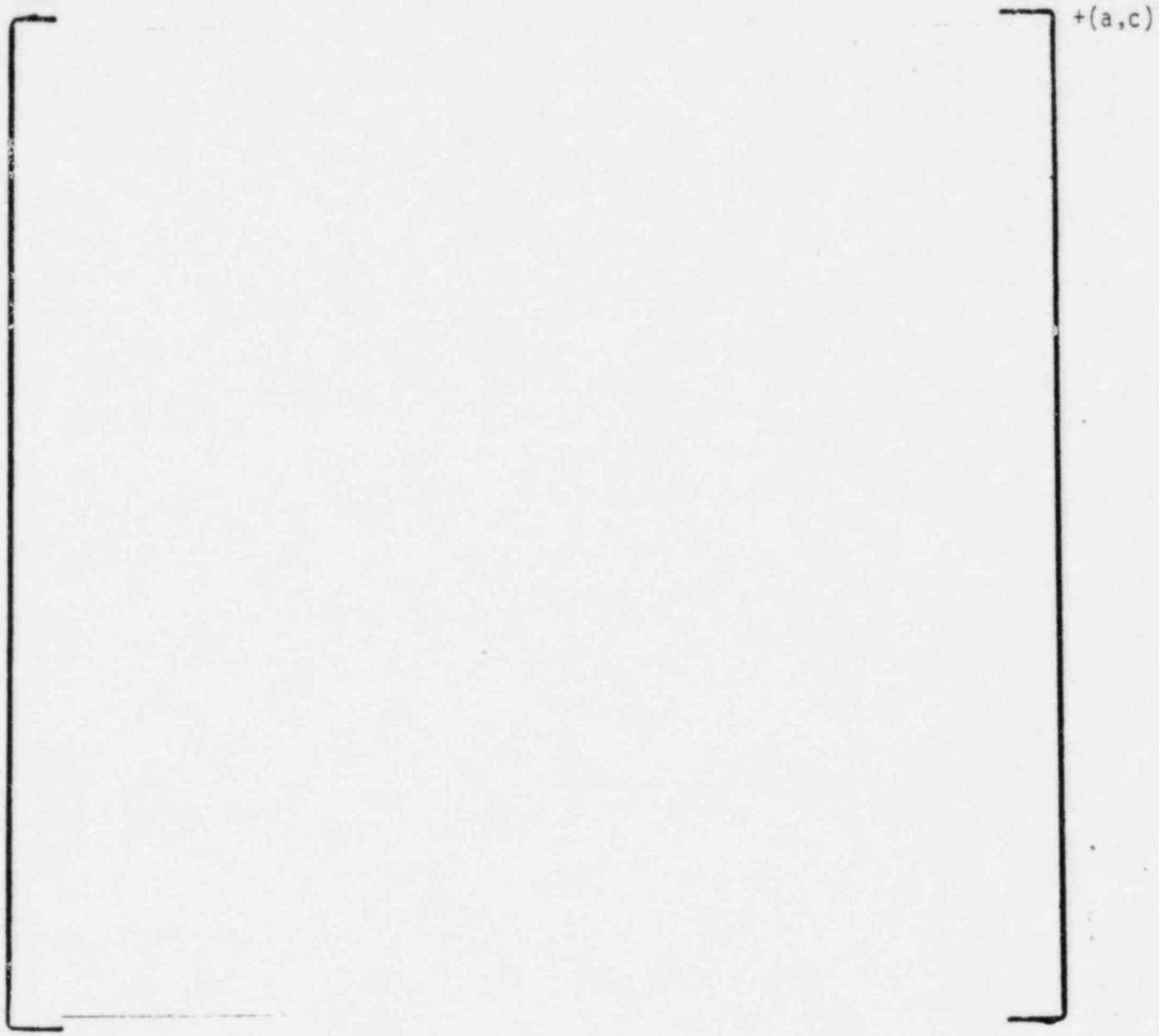


STD - STANDARD FUEL ASSEMBL

OFA - OPTIMIZED FUEL ASSEMBLY

FIGURE 2

TRANSITION PATTERN 2



STD - STANDARD FUEL ASSEMBLY

OFA - OPTIMIZED FUEL ASSEMBLY

FIGURE 3

REPRESENTATIVE AXIAL POWER
DISTRIBUTION

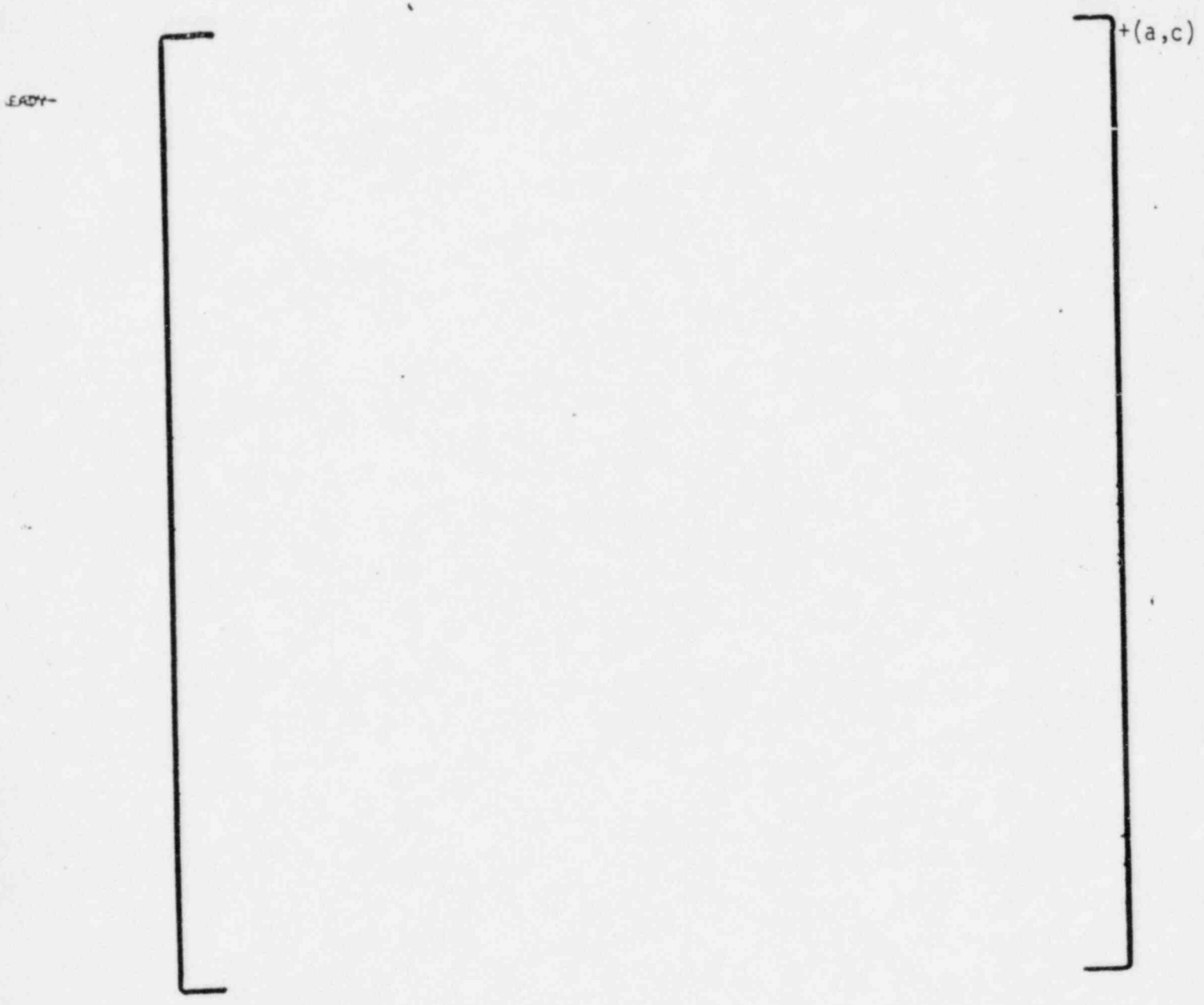


FIGURE 4
REPRESENTATIVE AXIAL POWER
DISTRIBUTION

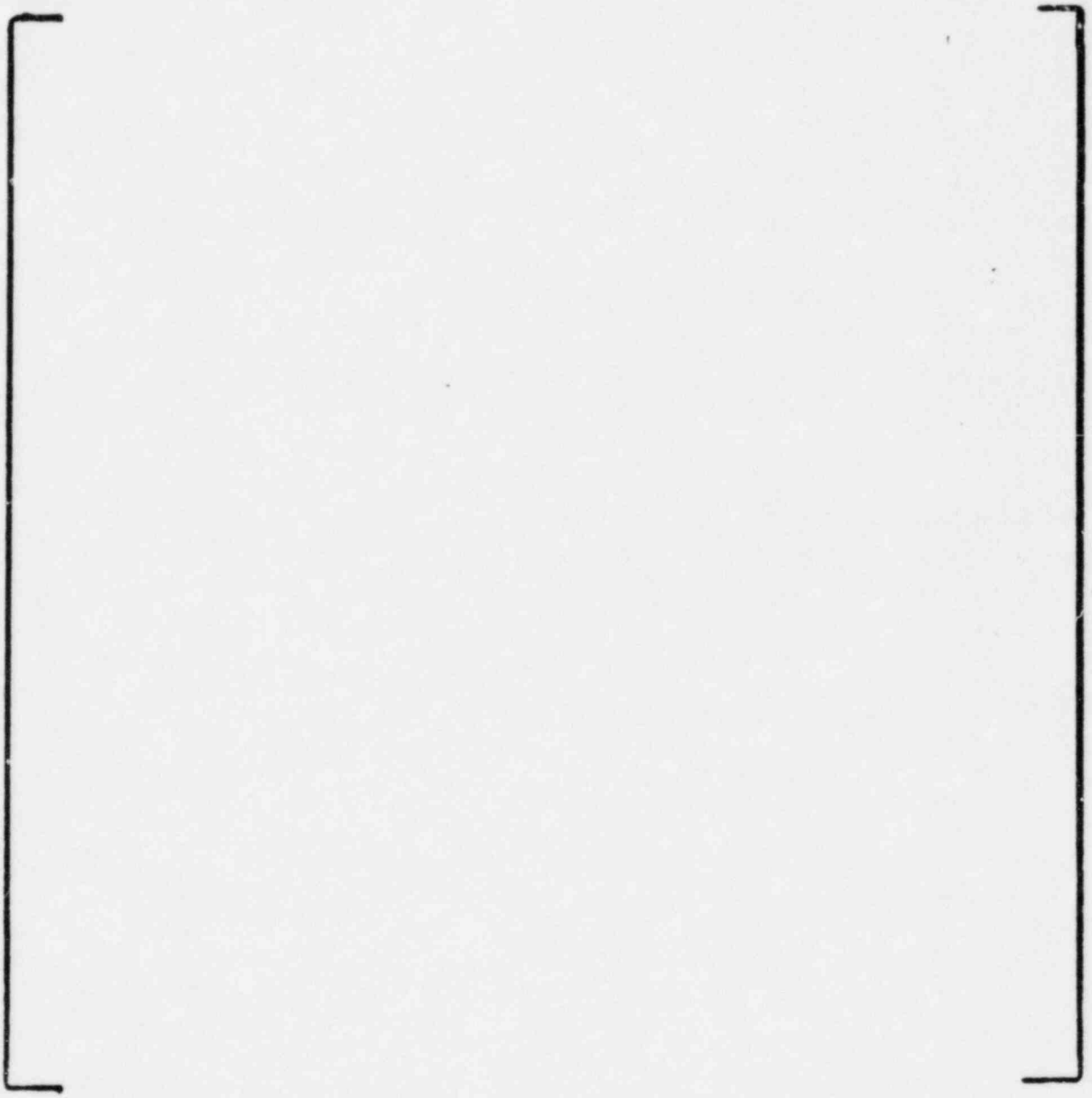


FIGURE 5

REPRESENTATIVE AXIAL POWER
DISTRIBUTION

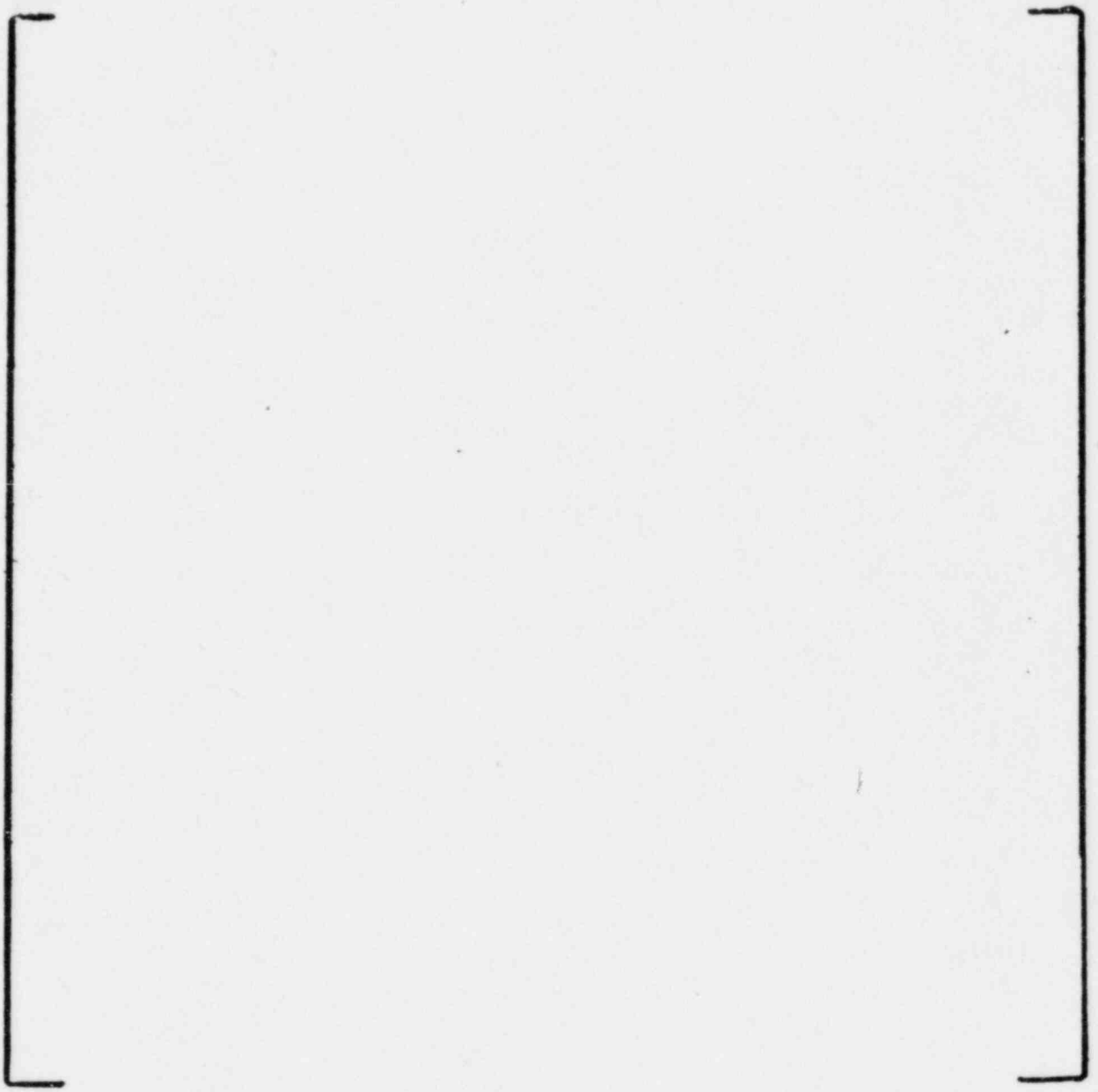


FIGURE 6
REPRESENTATIVE AXIAL POWER
DISTRIBUTION

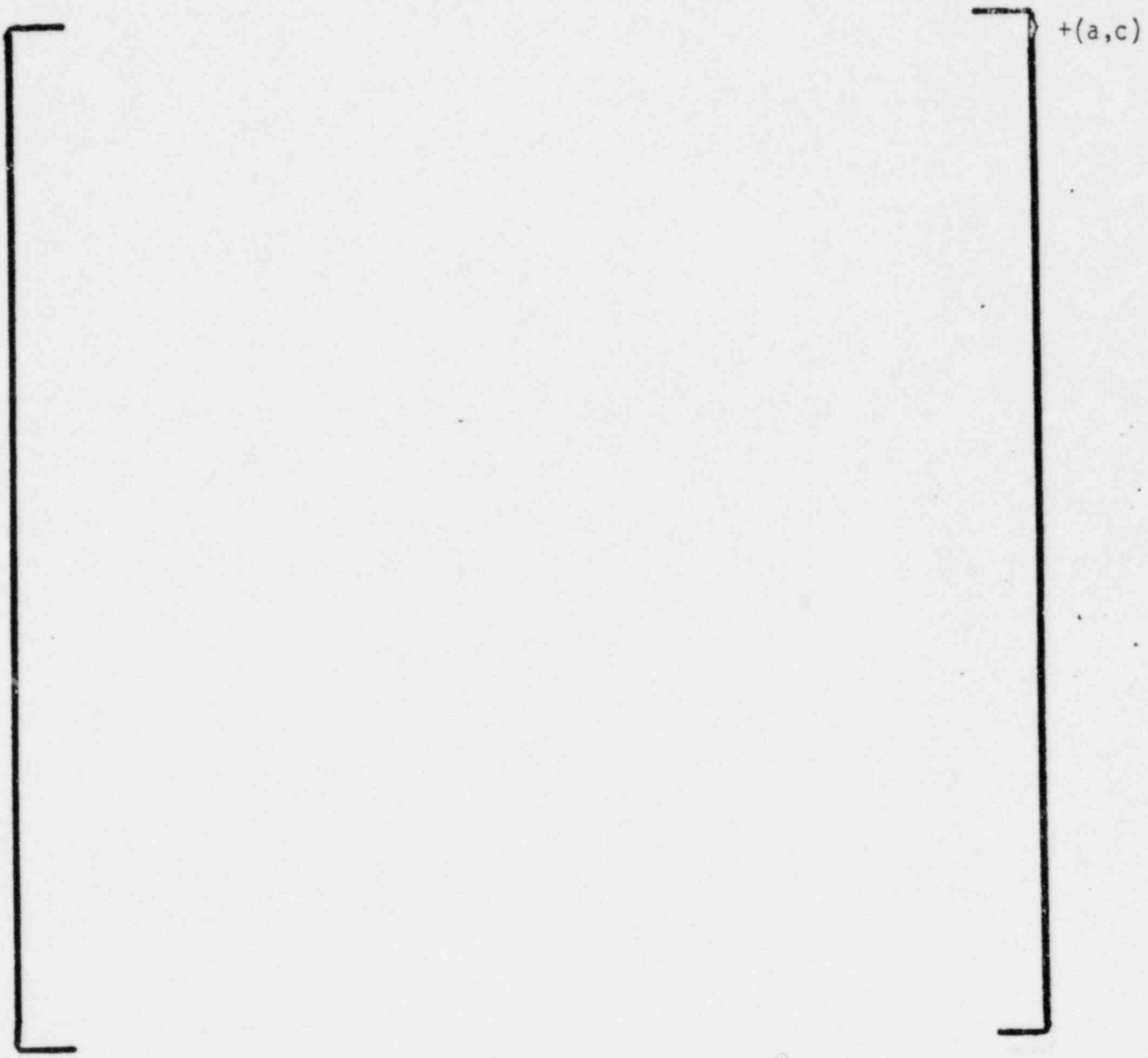


FIGURE 7 MASS VELOCITY VS. ELEVATION

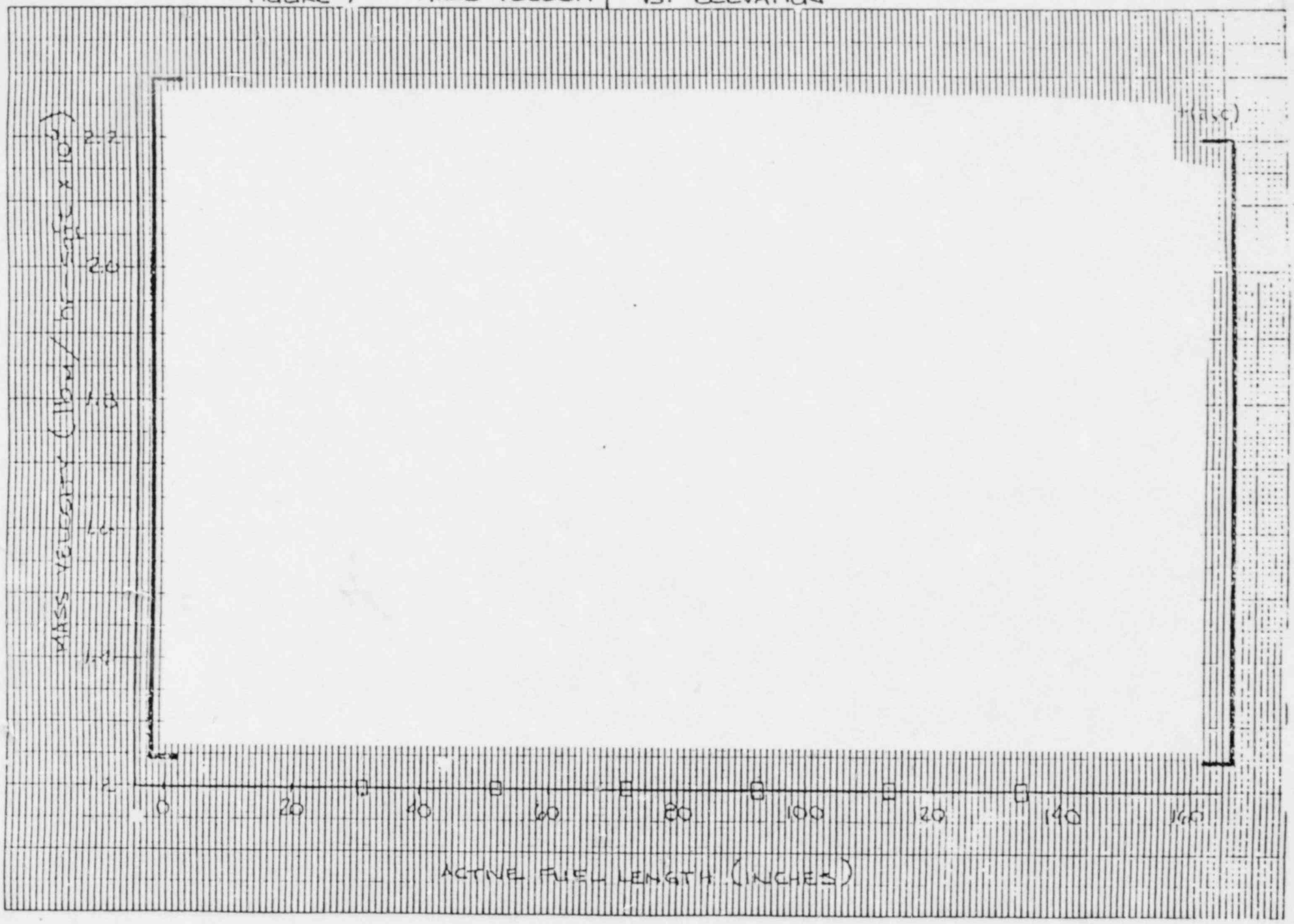


FIGURE 8 LOCAL QUALITY VS. ELEVATION

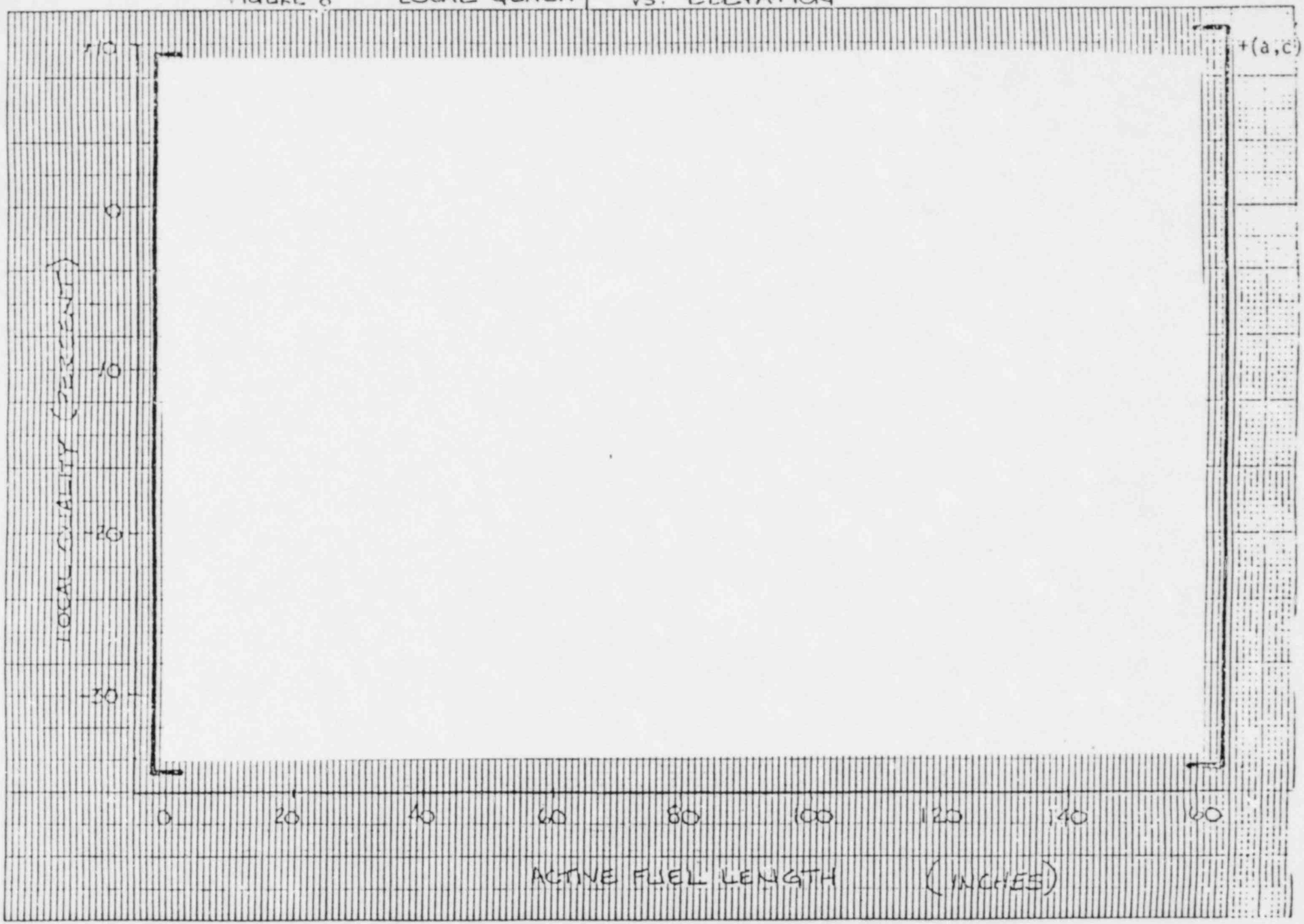


FIGURE 9 WRB-1 DNBR VS ELEVATION

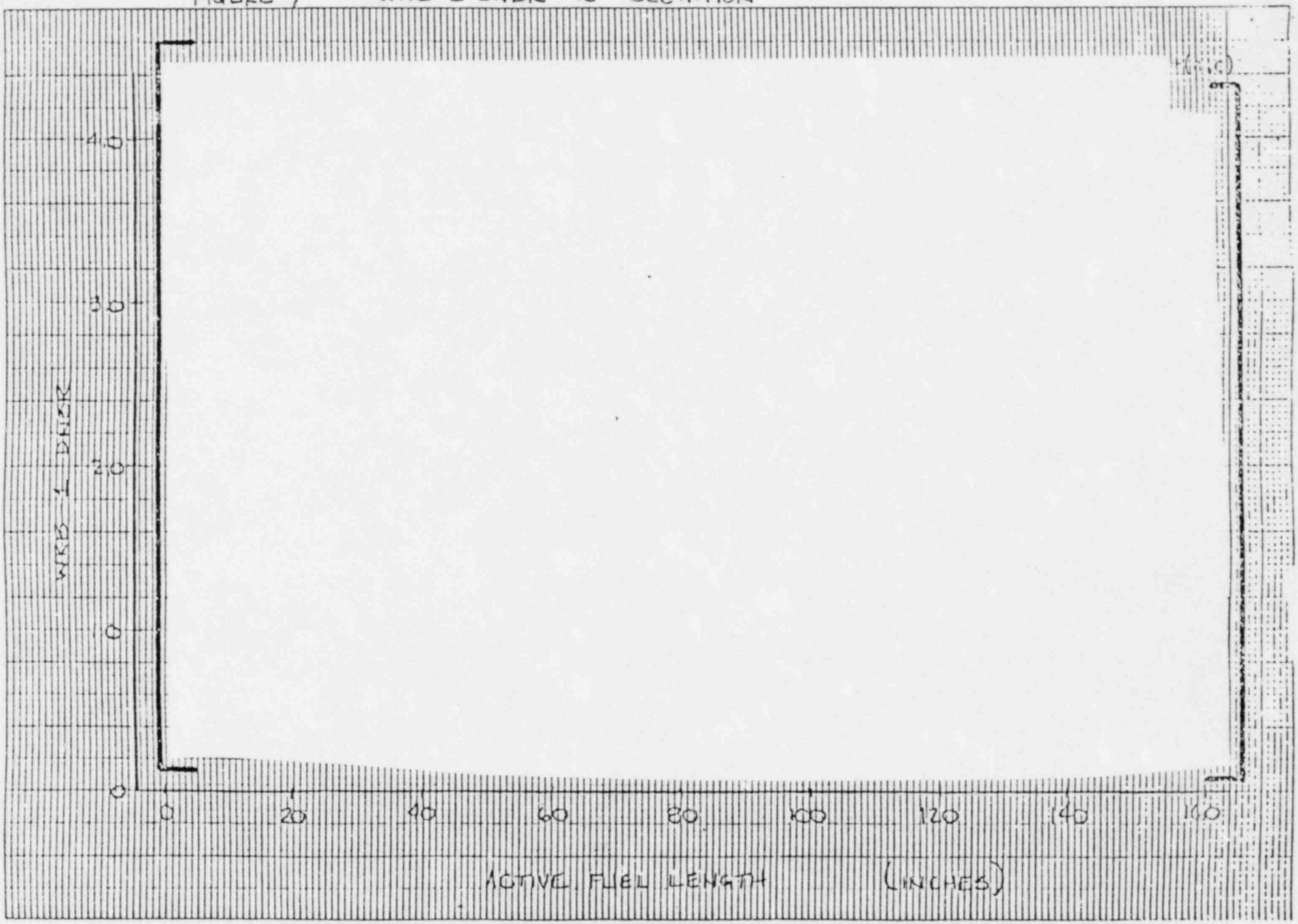


FIGURE 10

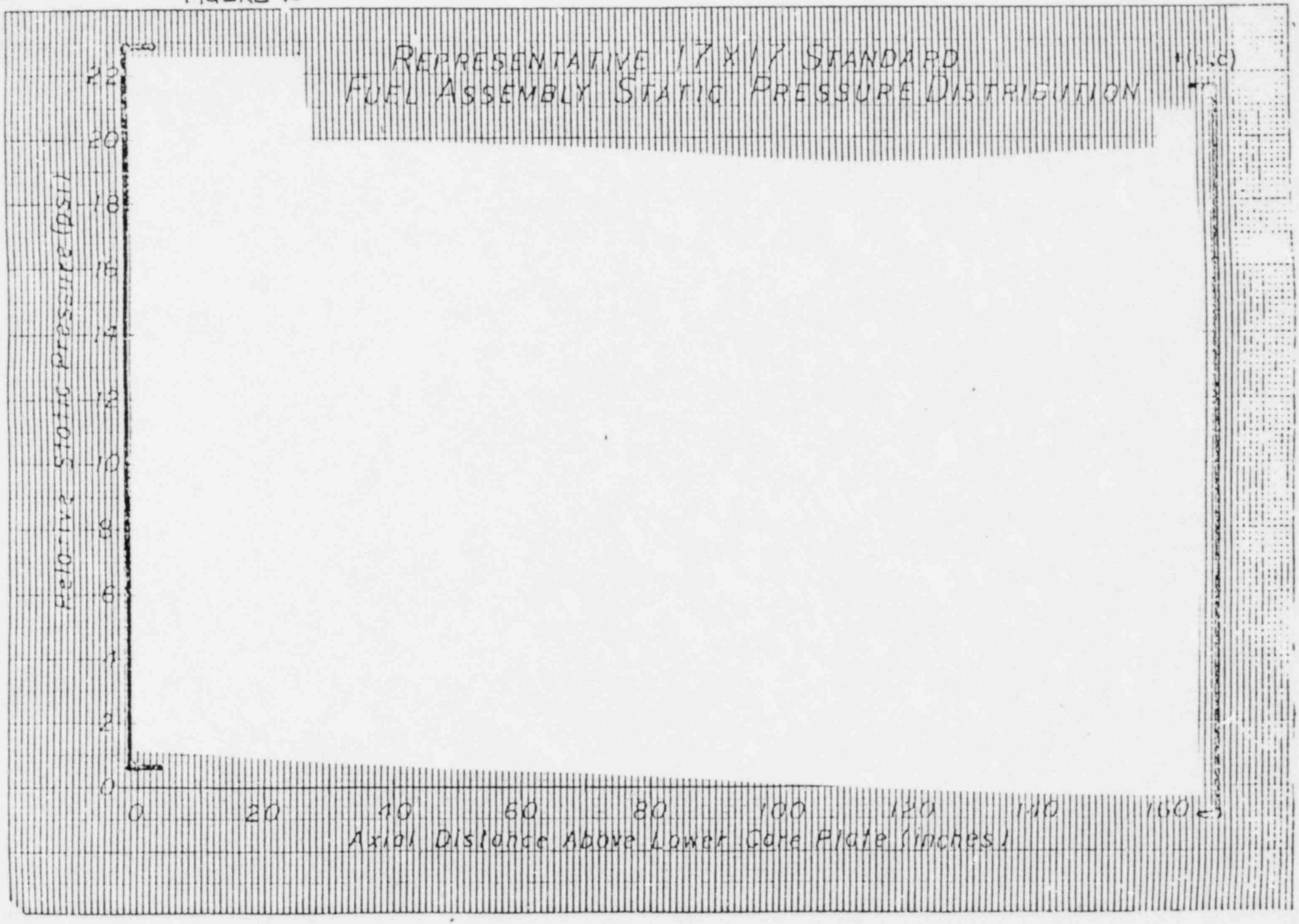

Representative 17 x 17 Standard
Fuel Assembly Static Pressure Distribution
Relative Static Pressure (psi)
0
2
4
6
8
10
12
14
16
18
20
22
0
20
40
60
80
100
120
140
160
Axial Distance Above Lower Core Plate (inches)

FIGURE 11

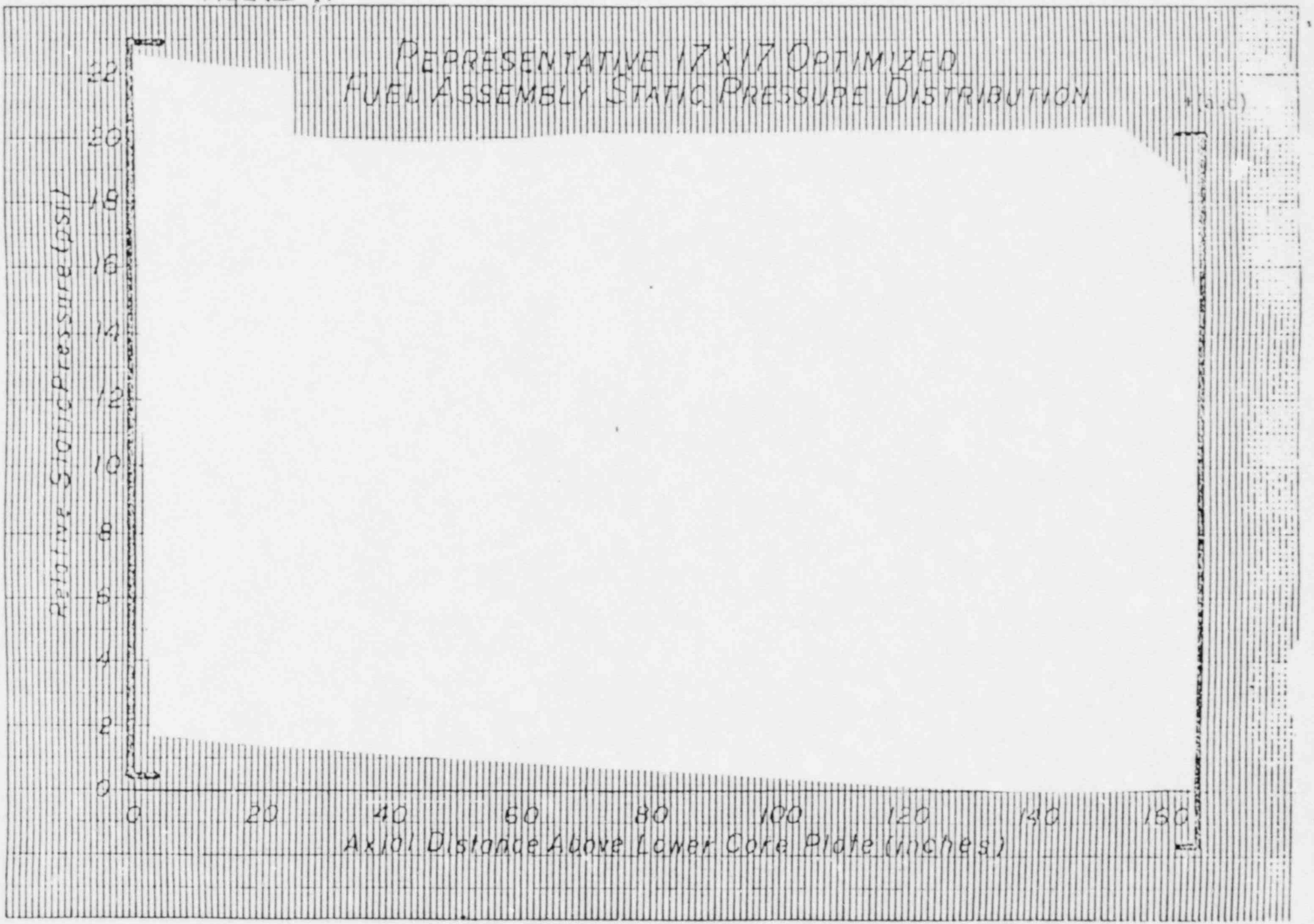

REPRESENTATIVE 17X17 OPTIMIZED
FUEL ASSEMBLY STATIC PRESSURE DISTRIBUTION
Relative Static Pressure (psi)
22
20
18
16
14
12
10
8
6
4
2
0
0
20
40
60
80
100
120
140
160
Axial Distance Above Lower Core Plate (inches)

TABLE 1

RUNS MADE TO JUSTIFY TRANSITION CORE METHODS

Run	Configuration (Figure No.)	Pressure (psia)	Inlet Temperature (°F)	POWER (% of 17.7 MWt/Assy)	FLOW (% of 1750 $\frac{gpm}{assy}$)	Axial Power Distribution (Figure No.)
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						

+(a,c)

TABLE 2 - COMPARISONS

Type	Runs	ΔDNBR (%)
[		+(a,c)]