Westinghouse Electric Corporation Energy Systems

Nuclear Services Division
Box 355
Pittsburgh Pennsylvania 15230-0355

April 22, 1997

AW-97-1101

Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: Ms. Claudia M. Craig

APPLICATION FOR WITHHOLDING PROPRIETARY INFORMATION FROM PUBLIC DISCLOSURE

Subject: Westinghouse Presentation, "Incomplete RCCA Insertion Program Status", dated April 17, 1997 (Proprietary)

Dear Ms. Craig:

The application for withholding is submitted by Westinghouse Electric Corporation ("Westinghouse") pursuant to the provisions of paragraph (b)(1) of Section 2.790 of the Commission's regulations. It contains commercial strategic information proprietary to Westinghouse and customarily held in confidence.

The proprietary material for which withholding is being requested is identified in the proprietary version of the subject report. In conformance with 10 CFR Section 2.790, Affidavit AW-97-1101 accompanies this application for withholding, setting forth the basis on which the identified proprietary information may be withheld from public disclosure.

Accordingly, it is respectfully requested that the subject information which is proprietary to Westinghouse be withheld from public disclosure in accordance with 10CFR Section 2.790 of the Commission's regulations.

Correspondence with respect to this application for withholding or the accompanying affidavit should reference AW-97-1101 and should be addressed to the undersigned.

Very truly yours,

N. J. Liparulo, Manager
Equipment Design and Regulatory Engineering.

Enclosure

cc: Kevin Bohrer/NRC (12H5)

"The mission of NSD is to provide our customers with people, equipment and services that set the standards of excellence in the nuclear industry."

AW-97-1101

AFFIDAVIT

COMMONWEALTH OF PENNSYLVANIA:

ss

COUNTY OF ALLEGHENY:

Before me, the undersigned authority, personally appeared James M. Brennan, 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:

James M. Brennan, Manager
Design Basis Programs

Sworn to and subscribed
before me this 22 day
of April, 1997

Janet A. Schwab
Notary Public

Notarial Seal
Janet A. Schwab, Notary Public
Monroeville Boro, Allegheny County
My Commission Expires May 22, 2000
Member, Pennsylvania Association of Notaries

(1) I am Manager, Design Basis Programs, in the Nuclear Services Division, of the 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 and rulemaking proceedings, and am authorized to apply for its withholding on behalf of the Westinghouse Energy Systems Business Unit.

(2) I am making this Affidavit in conformance with the provisions of 10CFR 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 the Westinghouse Energy Systems Business Unit 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.

Under that system, information is held in confidence if it falls in one or more of several types, the release of which might result in the loss of an existing or potential competitive advantage, as follows:

(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 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.

There are sound policy reasons behind the Westinghouse system which include the following:

(a) The use of such information by Westinghouse 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) Unrestricted disclosure would jeopardize the position of prominence of Westinghouse in the world market, and thereby give a market ... age to the competition of those countries.

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

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

(iv) The information sought to be protected is not available in public sources or available information has not been previously employed in the same original manner or method to the best of our knowledge and belief.

(v) The proprietary information sought to be withheld in this submittal is that which is appropriately marked in presentation material entitled Westinghouse Presentation, "Incomplete RCCA Insertion Program Status", dated April 17, 1997 (Proprietary), being transmitted by Westinghouse Electric Corporation with Application for Withholding Proprietary Information from Public Disclosure, to the Document Control Desk, Attention Ms. Claudia M. Craig. The proprietary information has been requested by the Nuclear Regulatory Commission and is being voluntarily provided by Westinghouse for review relative to the incomplete RCCA insertion phenomenon.

This information is part of that which will enable Westinghouse to:

(a) Provide documentation of the methods for evaluating the implementation of fuel assembly and RCCA tests and inspections.

(b) Establish applicable analytical technologies relative to inspections.

(c) Establish the procedures and guidelines for the examination of fuel assemblies and RCCAs.

Further this information has substantial commercial value as follows:

(a) Westinghouse plans to sell the use of similar information to its customers for purposes of meeting NRC requirements for licensing documentation.

(b) Westinghouse can sell support and defense of this information to its customers in the licensing process.

Public disclosure of this proprietary information is likely to cause substantial harm to the competitive position of Westinghouse because it would enhance the ability of competitors to provide similar evaluation services and licensing defense services for commercial power reactors without commensurate expenses. Also, public disclosure of the information would enable others to use the information to meet NRC requirements for licensing documentation without purchasing the right to use the information.

The development of the technology described in part by the information is the result of applying the results of many years of experience in an intensive Westinghouse effort and the expenditure of a considerable sum of money.

In order for competitors of Westinghouse to duplicate this information, similar technical programs would have to be performed and a significant manpower effort,

having the requisite talent and experience, would have to be expended for developing the procedures, guidelines and analytical methods.

Further the deponent sayeth not.

Incomplete RCCA Insertion

Program Status

NRC Meeting

April 17, 1997

NRC Meeting
Incomplete Rod Insertion
4/17/97

Sensitivity Studies — **SPARROW**

[ ] a,b,c

Drag Methodology — **MENKE**

[ ] a,b,c

Predictive Methodology — **MENKE**

[ ] a,b,c

ZIRLO Data — **ROBERTS**

[ ] a,b,c

FA Design Changes — **ESPOSITO**

Near Term

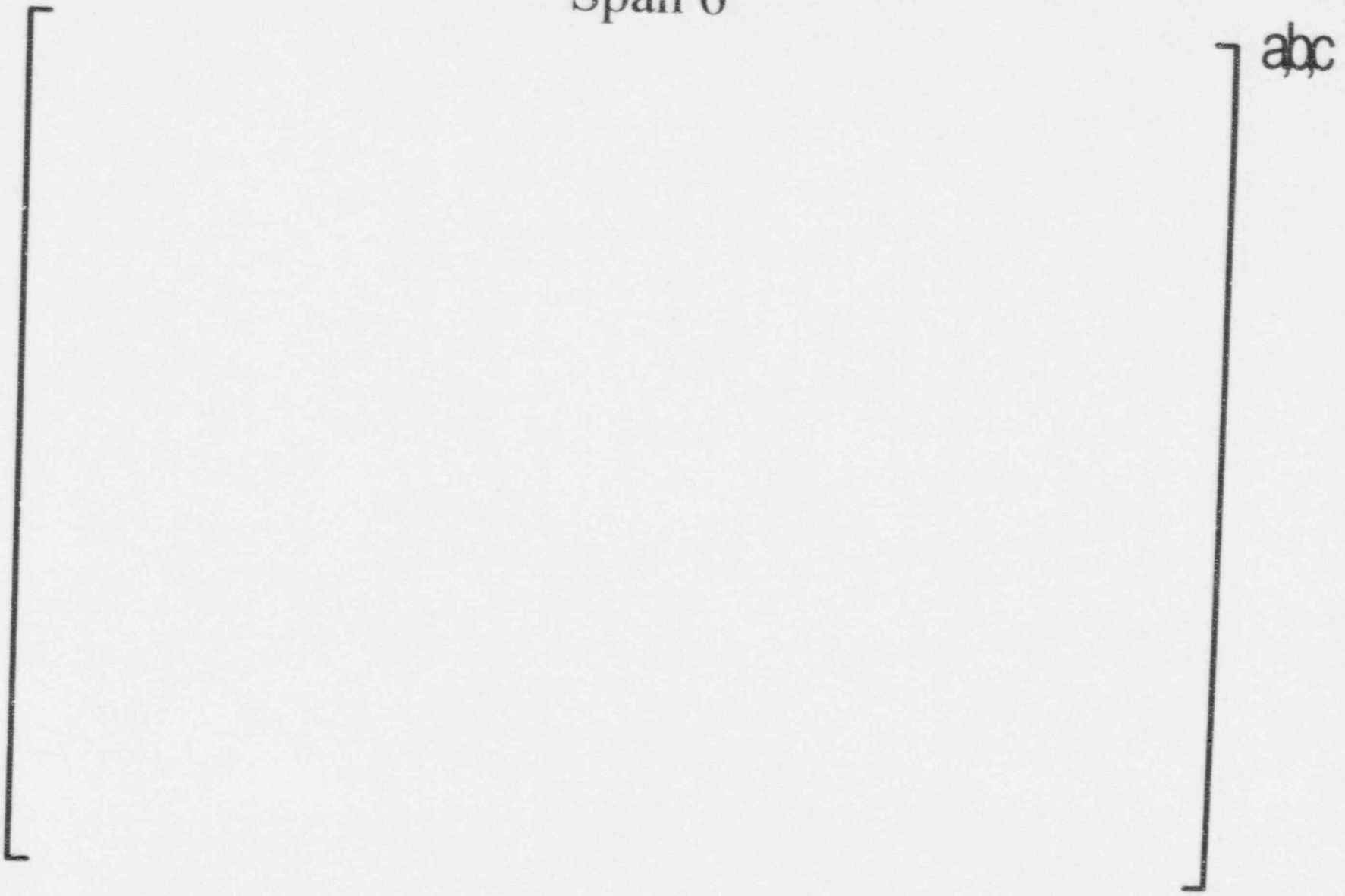
Longer Term

Sensitivity Studies

[ ] abc

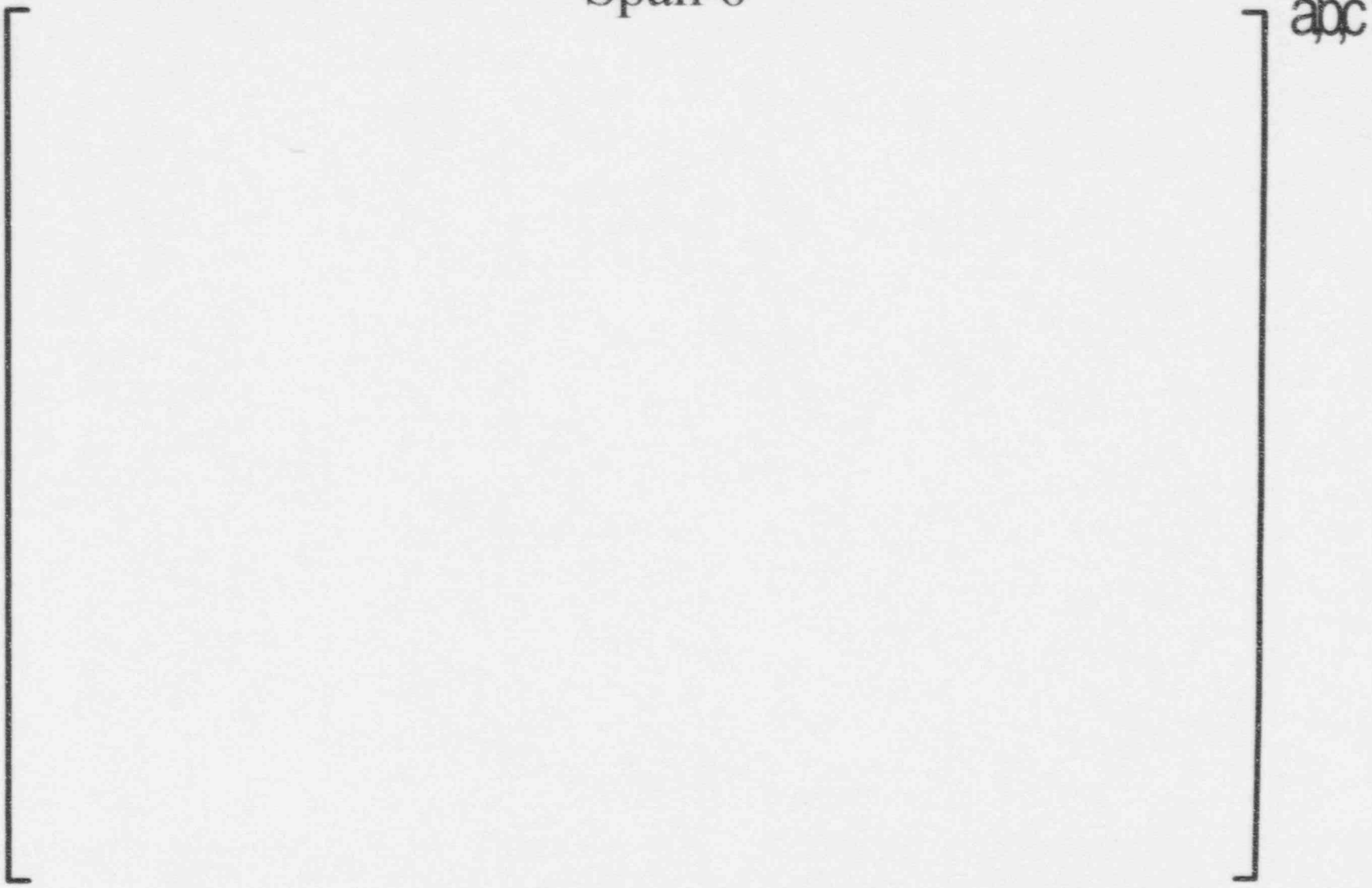
Bow Sensitivity - Hold Down Force

Span 6



Bow Sensitivity - Creep

Span 6



Bow Sensitivity - Fixity

Span 6

Bow Sensitivity - Temperature

Span 6

Growth Sensitivity - Hold Down Force

[ ] abc

Growth Sensitivity - Creep

[ ]

[ ] abc

Oxide Thickness Sensitivity - Temperature

[ ] abc

CONCLUSIONS FROM SENSITIVITY STUDIES

[ ] abc

Thimble & RCC Bow without Interference

Thimble & RCC Bow with Interference

Calculations

Guide Thimble Dashpot (Span 1)

Measured vs. Predicted Drag

abc

Upper Guide Thimble

Measured vs. Predicted Drag

[ ] abc

South Texas Guide Thimble Dashpot

Measured vs. Predicted Drag

abc

South Texas Guide Thimble Dashpot

Measured vs. Predicted Drag

[ ] abc

South Texas Upper Guide Thimble

Measured vs. Predicted Drag

[ ] abc

Wolf Creek H50 Individual Span Drag

Wolf Creek H50 Total Drag

Repeatability of Drag Data

a,b,c

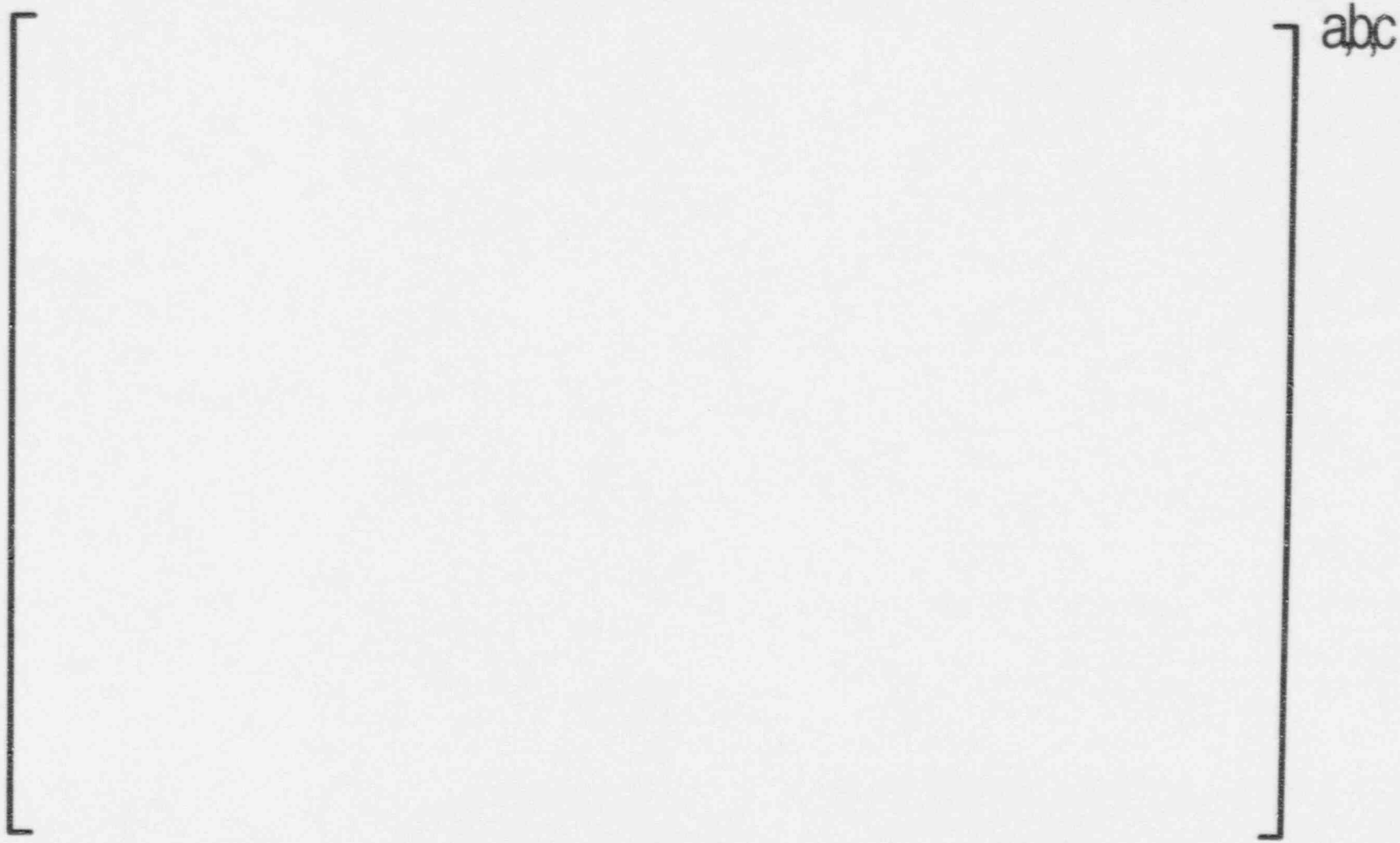
Drag Work vs. Insertion Distance

Measured Drag Work for RCCAs

Plant Names

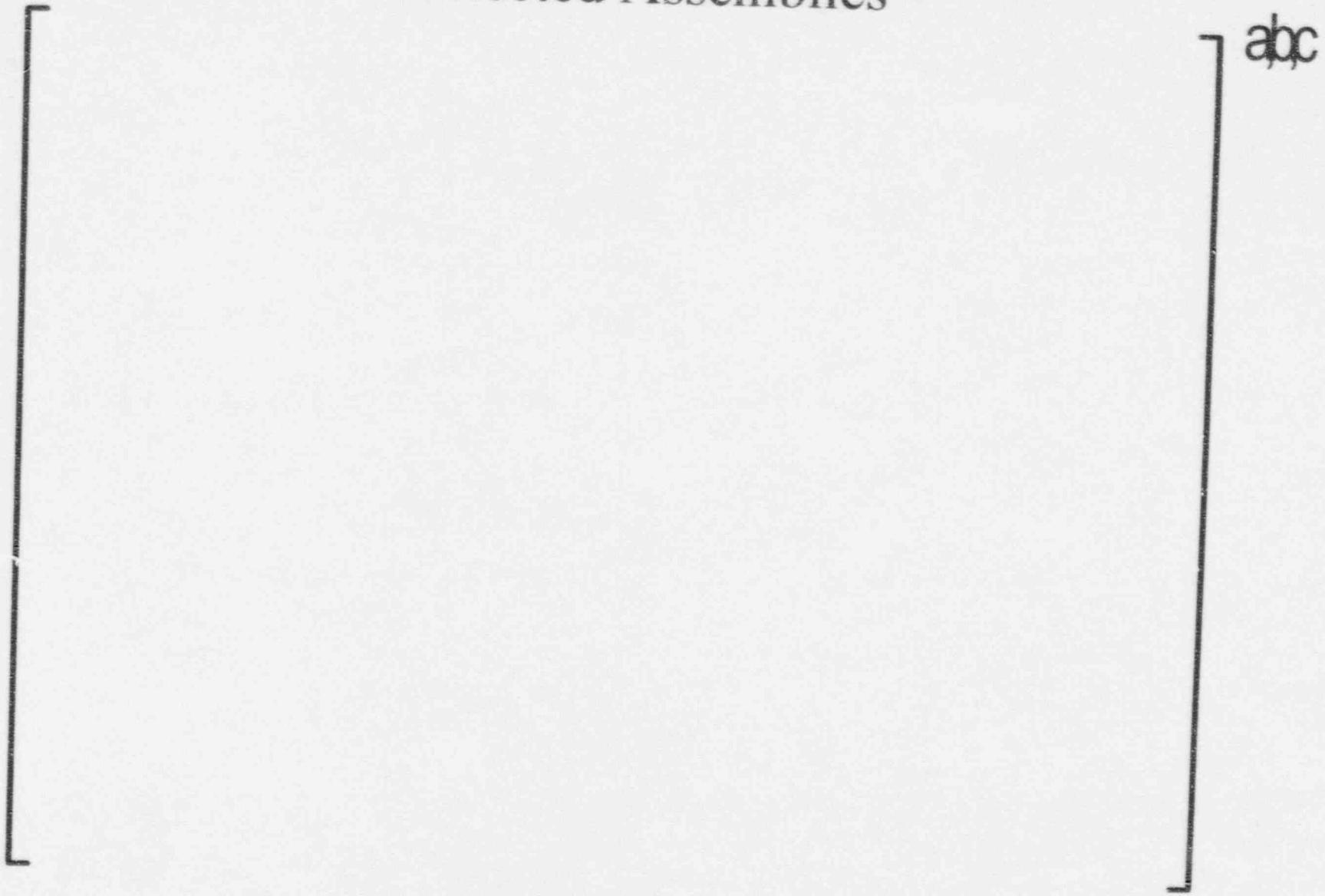
Measured Drag Work for RCCAs

Fuel Types



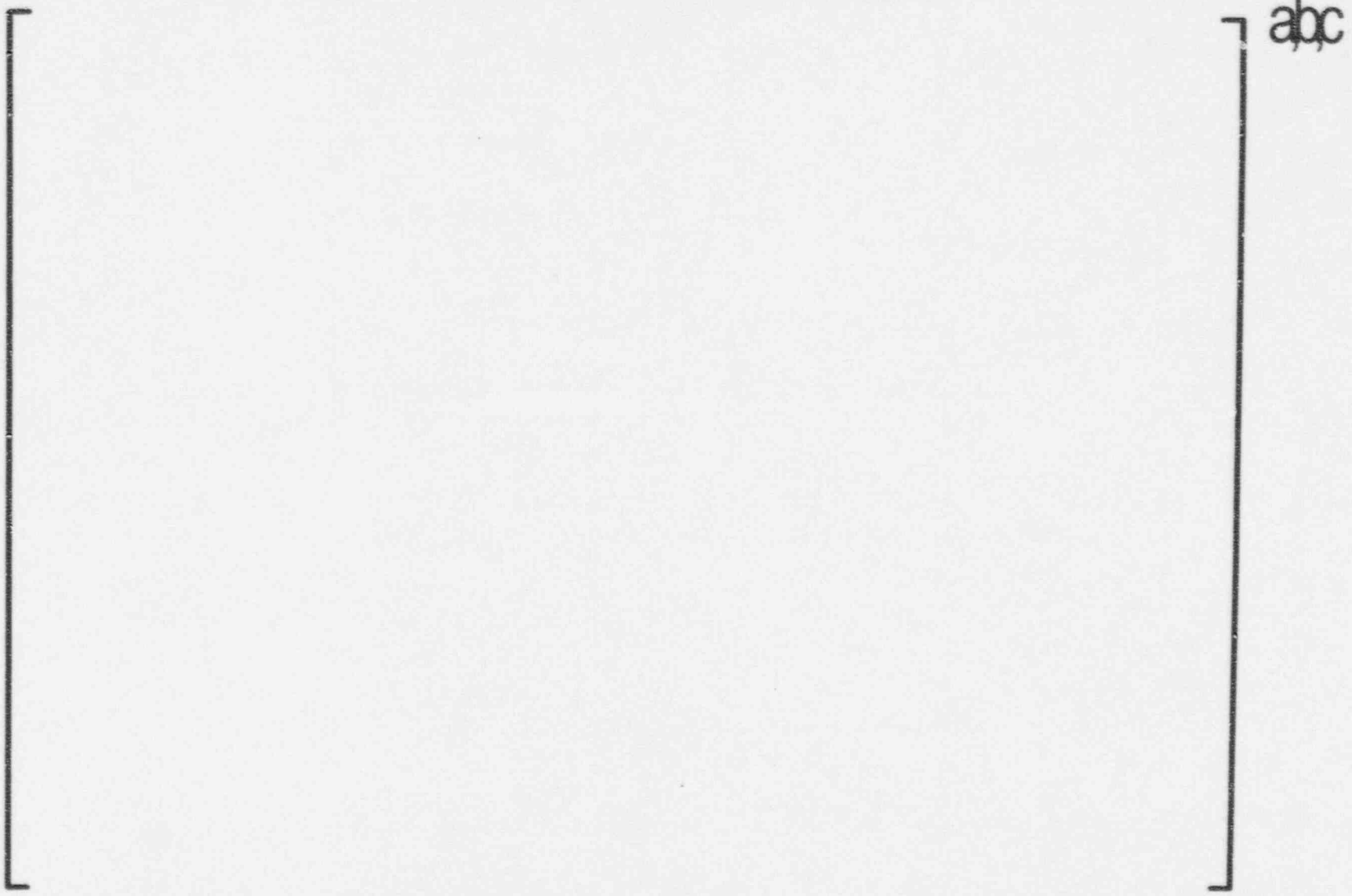
Measured Drag-Work Vs Fluence

Selected Assemblies



Predicted Drag-Work vs. Fluence

Selected Assemblies

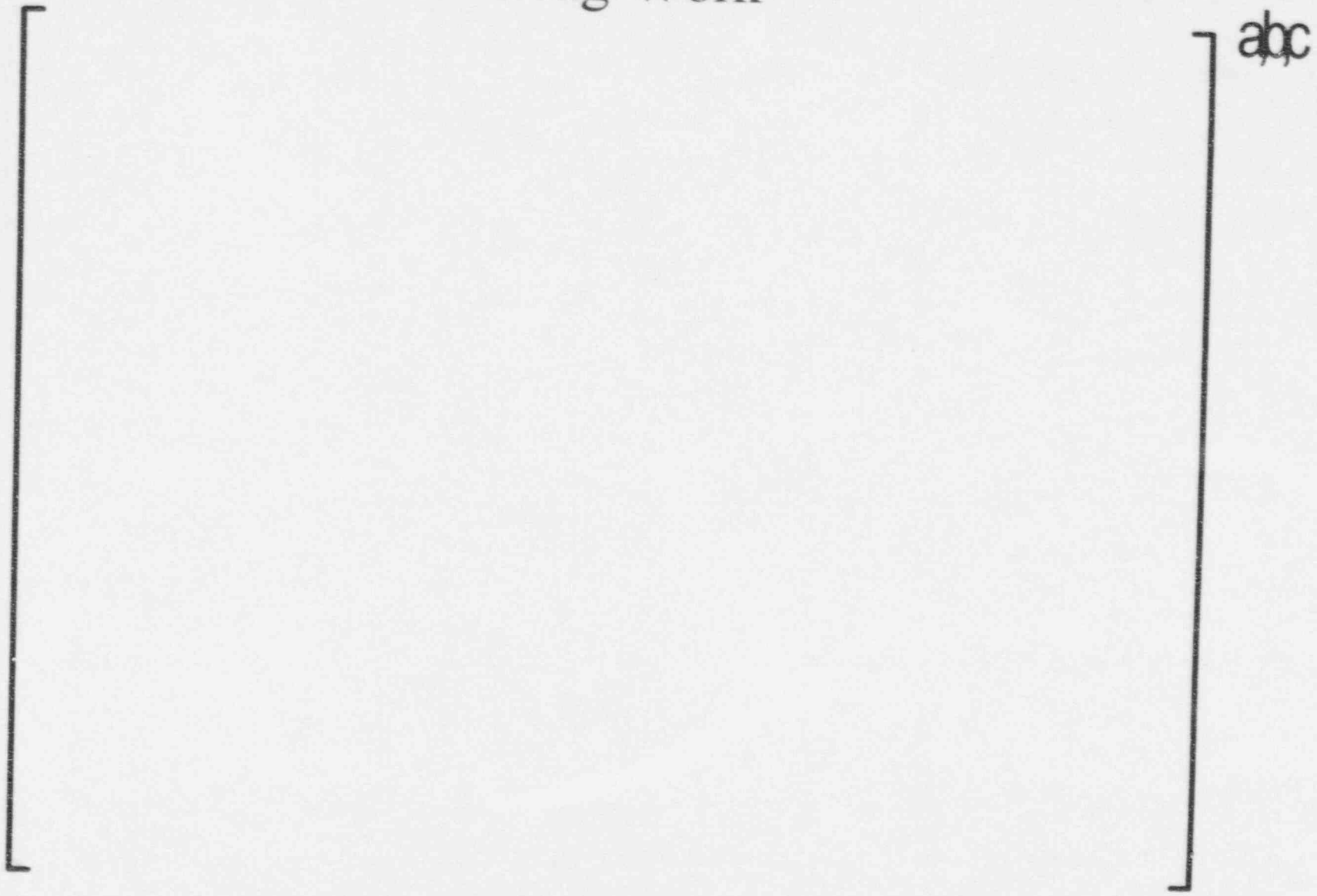


Measured vs. Predicted Drag-Work

Selected Assemblies

Comparison of Measured and Predicted

Drag-Work



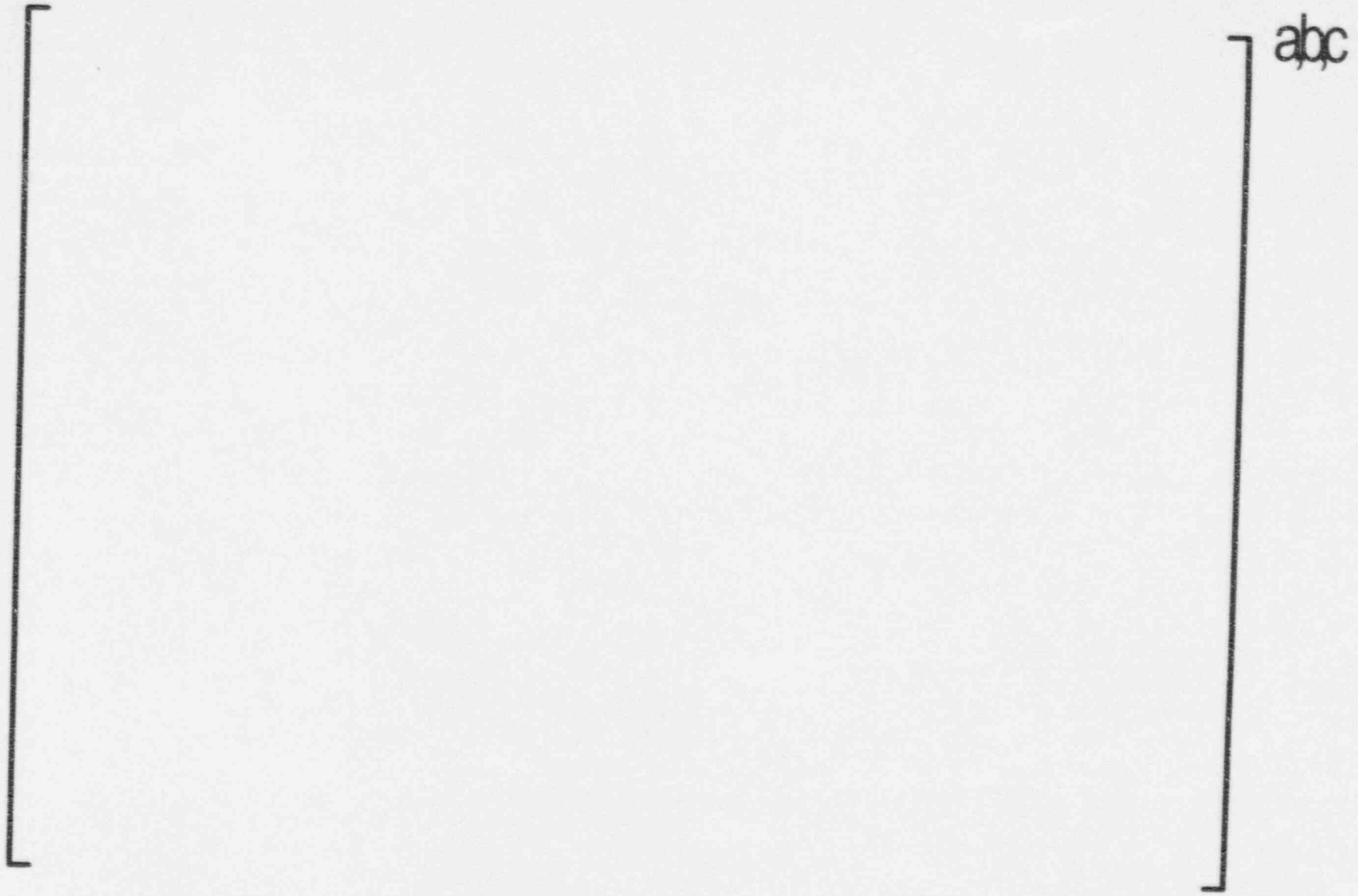
South Texas Measured Drag-Work for RCCAs

[redacted]

a,b,c

[redacted]

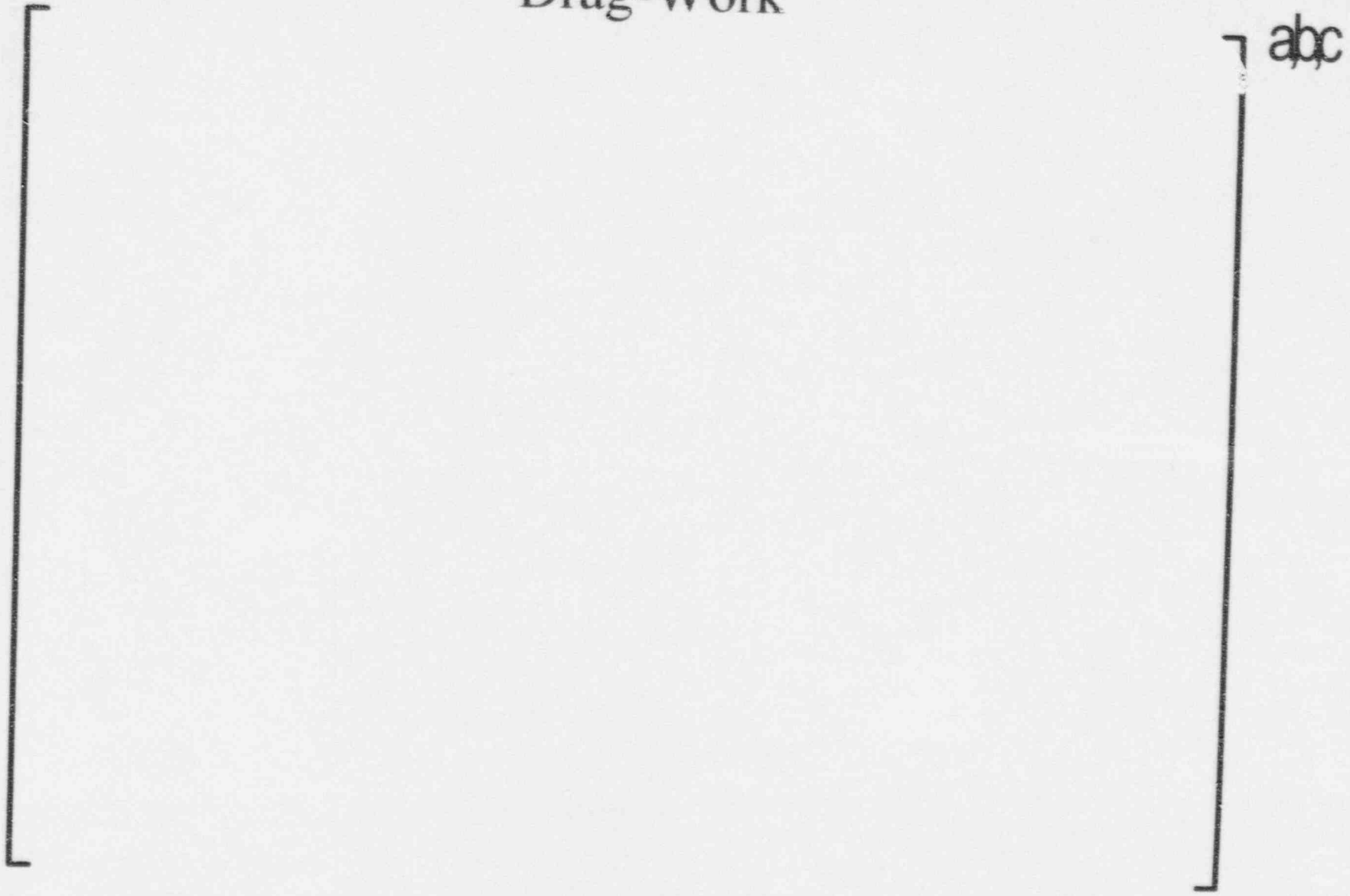
South Texas Measured Drag-Work vs. Fluence



South Texas Predicted Drag-Work vs. Fluence

South Texas Measured vs. Predicted

Drag-Work



ZIRLO STRUCTURES

- F/A Mechanical Design--key properties

MECHANICAL PROPERTIES

-Strength

-Creep

CORROSION

GROWTH

ZIRLO STRUCTURES

Thimble Yield Stress

[[a,b,c]

ZIRLO STRUCTURES

Cladding Creep

[ ]

[ ] a,b,c

ZIRLO STRUCTURES

RXA Thermal Creep

[ ] a,b,c

ZIRLO STRUCTURES

Cladding Corrosion

[ ]

a,b,c

ZIRLO STRUCTURES

Autoclave Corrosion

[ ]

[ ]a,b,c

ZIRLO STRUCTURES

ZIRLO Growth

ZIRLO STRUCTURES

ZIRLO Rod Growth

a,b,c

ZIRLO STRUCTURES

Growth from Corrosion

[ ] a,b,c

ZIRLO STRUCTURES

ZIRLO Assembly Growth

ZIRLO STRUCTURES

Summary: ZIRLO Growth

ZIRLO STRUCTURES
POST IRRADIATION PLANS

[ ] a,b,c

ZIRLO STRUCTURES

Summary

NRC 96-01 Drag Data

(Total and Upper Guide Thimble Drag Data)

[abc]

NRC 96-01 Drag Data

(Upper Guide Thimble Drag vs. Fluence)

[ ] abc

NRC 96-01 Drag Data

(Total Drag vs. Fluence)

Special W Fuel Assembly Features

- **ZIRLO**
  - **Basic material property differences between ZIRLO and Zirc-4 are significant relative to RCCAs**
    - Growth rate vs burnup
    - Fuel rod growth vs burnup

[•] a,b,c

    - Oxide data
  - **Comparison of Wolf Creek 50H FA with and w/o ZIRLO**

[•] a,b,c

Special W Fuel Assembly Features (continued)

- ZIRLO skeletons are significantly less susceptible than Zirc-4 skeletons due to material properties such as creep, corrosion, etc.

- Additional high burnup data will be available from demos

- ZIRLO skeletons require no burnup restrictions given current burnup license limit

Special W Fuel Assembly Features

- IFMs
  - IFM FAs are less susceptible than non-IFM FAs
    - Reduced drag in upper guide tube region due to increased stiffness
    - Reduced compressive loads due to increased ΔP from IFM grids

Special W Fuel Assembly Features

IFM Conclusions

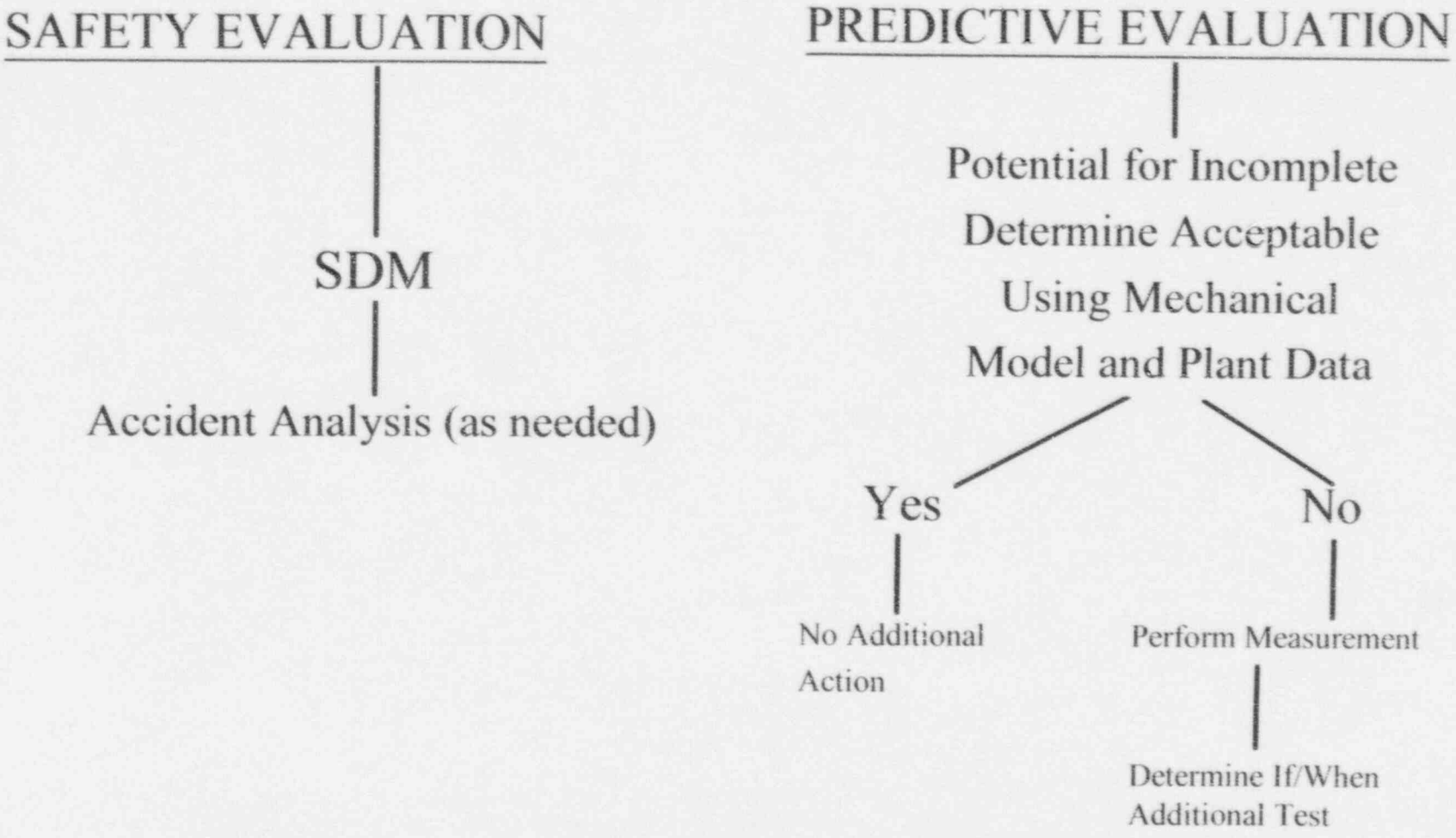
- No reported incomplete insertion for IFMs
- Drag tests with IFM do not exceed F-Spec
- Mechanical model predicts lower thimble tube bow for IFM FA than Wolf Creek H50

No Restrictions on IFMs up to Current Burnup Limit

Recommendation for Current Operating W Cores

- **No restriction for IFM or ZIRLO skeleton FAs**
- **No restriction for low temperature plant or 2 cycle FAs**
- **Temperature > 615°F and 3 cycle FA (18 months)**
  - 12 Foot - 40,000 MWD/MWT
  - 14 Foot - 30,000 MWD/MWT
- **Temperature < 615°F**
  - 12 Foot - no restrictions
- **Process to assess acceptability should the above values be exceeded**

Process to Address Acceptability for Operating Plant above W Recommended Values



Model Predictive Methodology

- Obtain necessary input of fuel assembly history

[
-] a,b,c

- If predicted burnup < EOC fluence by more than 2500 MWD/MTU
  (Additional test required)

Fuel Assembly Near/Longer Term Actions to Enhance Margin to Incomplete Rod Insertion

[ ] a,b,c

Fuel Assembly Near/Longer Term Actions to Enhance Margin to Incomplete Rod Insertion

[ ] a,b,c

Conclusions

- No restrictions required for IFM and /or ZIRLO based on current burnup licensing limit
- A mechanical model has been revised to predict span drag
- A methodology was developed to predict incomplete insertion