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Our ref: LTR-NRC-04-58

October 6, 2004

Subject: Response to the NRC Proposed Draft SER for WCAP-16081-P/WCAP-16081-NP - "10x10 SVEA Fuel Critical Power Experiments and CPR Correlation: SVEA-96 Optima2"(Proprietary/Non-Proprietary)

References:
1. Fax, B. J. Benney (NRC) to R. B. Sisk (Westinghouse), "Request for Additional Information Relating to Response to the NRC proposed Draft SER for WCAP-16081-P - "10x10 SVEA Fuel Critical Power Experiments and CPR Correlation: SVEA-96 Optima2", January 13, 2004
2. WCAP-16081-P, Rev. 0, "10x10 SVEA Fuel Critical Power Experiments and CPR Correlation: SVEA-96 Optima2", May 2003
3. FAX , W Macon (NRC) to R.B. Sisk (Westinghouse), Preliminary Draft SER for WCAP-16081-P - "10x10 SVEA Fuel Critical Power Experiments and CPR Correlation: SVEA-96 Optima2", June 1, 2004

Enclosed are two attachments (Proprietary & Non-proprietary) providing information to support the NRC's review of Westinghouse Electric Company LLC (Westinghouse) WCAP-16081-P/NP- "10x10 SVEA Fuel Critical Power Experiments and CPR Correlation: SVEA-96 Optima2"," (Reference 2). The attachments provide Westinghouse's comments and clarifications regarding the draft of the WCAP-16081-P SER and the MONA-Film Flow Model Comparisons with FRIGG Data.

Also enclosed are:

1. One (1) copy of the Application for Withholding, AW-04-1903 with Proprietary Information Notice and Copyright Notice.
2. One (1) copy of Affidavit (Non-Proprietary.

This submittal contains proprietary information of Westinghouse Electric Company LLC. In conformance with the requirements of 10 CFR 2.390 as amended of the Commissions regulations, we are enclosing with this submittal an Application for Withholding from Public Disclosure and an affidavit. The affidavit sets forth the basis on which the information identified as proprietary may be withheld from the public disclosure by the Commission.

Correspondence with respect to this application for Withholding should reference AW-04-1903 and should be addressed to J. A. Gresham, Manager of Regulatory Compliance and Plant Licensing, Westinghouse Electric Company.

Very truly yours,

J. S. Galembush, Acting Manager
Regulatory Compliance and Plant Licensing

Enclosures

cc: F. M. Akstulewicz,/NRR
W. A. Macon/NRR
E. S. Peyton /NRR

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Project No.: 700
Our ref: AW-04-1903
October 6, 2004

APPLICATION FOR WITHHOLDING PROPRIETARY INFORMATION FROM PUBLIC DISCLOSURE

Subject: Response to the NRC Proposed Draft SER for WCAP-16081-P/WCAP-16081-NP - "10x10 SVEA Fuel Critical Power Experiments and CPR Correlation: SVEA-96 Optima2"(Proprietary)

Reference: Letter, J. A. Gresham (Westinghouse) to USNRC Document Control Desk, "Response to the NRC proposed Draft SER for WCAP-16081-P/WCAP-16081-NP - "10x10 SVEA Fuel Critical Power Experiments and CPR Correlation: SVEA-96 Optima2" (Proprietary/Non-Proprietary)," LTR-NRC-04-58, October 6, 2004

This Application for Withholding is submitted by Westinghouse Electric Company LLC (Westinghouse) pursuant to the provisions of paragraph (b)(1) of Section 2.390 of the Commission's regulations. It contains commercial strategic information proprietary to Westinghouse that is 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 2.390, Affidavit AW-04-1806 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 10 CFR Section 2.390 of the Commission's regulations.

Correspondence with respect to this Application for Withholding or the accompanying affidavit should reference AW-04-1903 and should be addressed to J. A. Gresham, Manager, Regulatory Compliance and Plant Licensing, Westinghouse Electric Company LLC, P.O. Box 355, Pittsburgh, Pennsylvania 15230-0355.

Very truly yours,

J. S. Galembush, Acting Manager
Regulatory Compliance and Plant Licensing

Enclosures

AW-04-1903

AFFIDAVIT

COMMONWEALTH OF PENNSYLVANIA:

ss

COUNTY OF ALLEGHENY:

Before me, the undersigned authority, personally appeared J. S. Galembush, 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 Company LLC ("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:

J. S. Galembush, Acting Manager
Regulatory Compliance and Plant Licensing

Sworn to and subscribed
before me this 6th day
of October, 2004

Sharon L. Fiori
Notary Public

My Commission expires: January 29, 2007

Notarial Seal
Sharon L. Fiori, Notary Public
Monroeville Boro, Allegheny County
My Commission Expires January 29, 2007
Member, Pennsylvania Association Of Notaries

(1) I am Acting Manager, Regulatory Compliance and Plant Licensing, in Nuclear Services, Westinghouse Electric Company LLC ("Westinghouse"), and 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 Westinghouse.

(2) I am making this Affidavit in conformance with the provisions of 10 CFR Section 2.390 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 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 2.390 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 advantage 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 10 CFR Section 2.390, 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 "Response to the NRC Proposed Draft SER for WCAP-16081-P/WCAP-16081-NP - "10x10 SVEA Fuel Critical Power Experiments and CPR Correlation: SVEA-96 Optima2" (Proprietary), for submittal to the Commission, transmitted by Westinghouse letter LTR-NRC-04-58, dated October 6, 2004 and Application for Withholding Proprietary Information from Public Disclosure to the NRC Document Control Desk. The proprietary information as submitted for use by Westinghouse is expected to be applicable in various licensee submittals in response to certain NRC requirements for justification for the use of WCAP-16081-P "10x10 SVEA Fuel Critical Power Experiments and CPR Correlation: SVEA-96 Optima2."

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

(a) Perform USFAR safety analyses employing the Westinghouse Critical Power Experiments and Critical Power Ratio Correlations for SVEA-96 Optima 2 fuel to ensure regulatory limits are met.

(b) Support licensees in regulatory actions in which demonstration of compliance with safety analysis acceptance criteria is required.

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 Critical Power Experiments and Critical Power Ratio Correlations for SVEA-96 Optima 2.

(c) The information requested to be withheld reveals the distinguishing aspects of a methodology which was developed by Westinghouse.

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 technical evaluation justifications 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 enclosed improved core thermal performance methodology.

Further the deponent sayeth not.

Proprietary Information Notice

Transmitted herewith are proprietary and non-proprietary versions of documents furnished to the NRC in connection with requests for generic and/or plant-specific review and approval.

In order to conform to the requirements of 10 CFR 2.390 of the Commission's regulations concerning the protection of proprietary information so submitted to the NRC, the information which is proprietary in the proprietary versions is contained within brackets, and where the proprietary information has been deleted in the non-proprietary versions, only the brackets remain (the information that was contained within the brackets in the proprietary versions having been deleted). The justification for claiming the information so designated as proprietary is indicated in both versions by means of lower case letters (a) through (f) located as a superscript immediately following the brackets enclosing each item of information being identified as proprietary or in the margin opposite such information. These lower case letters refer to the types of information Westinghouse customarily holds in confidence identified in Sections (4)(ii)(a) through (4)(ii)(f) of the affidavit accompanying this transmittal pursuant to 10 CFR 2.390(b)(1).

Copyright Notice

Response to the NRC Proposed Draft SER for WCAP-16081-P / WCAP-16081-NP - "10x10 SVEA Fuel Critical Power Experiments and CPR Correlation: SVEA-96 Optima2"

Telephone conversations were held on June 8 and August 2, 2004 to discuss the draft SER for WCAP-16081-P. During the 6/8/04 telephone conversation, Westinghouse agreed to address the following issues:

a, c

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Westinghouse comments on the SER provided in the 6/8/04 call, and additional information to support resolution of items discussed in the two phone calls, are provided below by SER section number.

SECTION 1.0

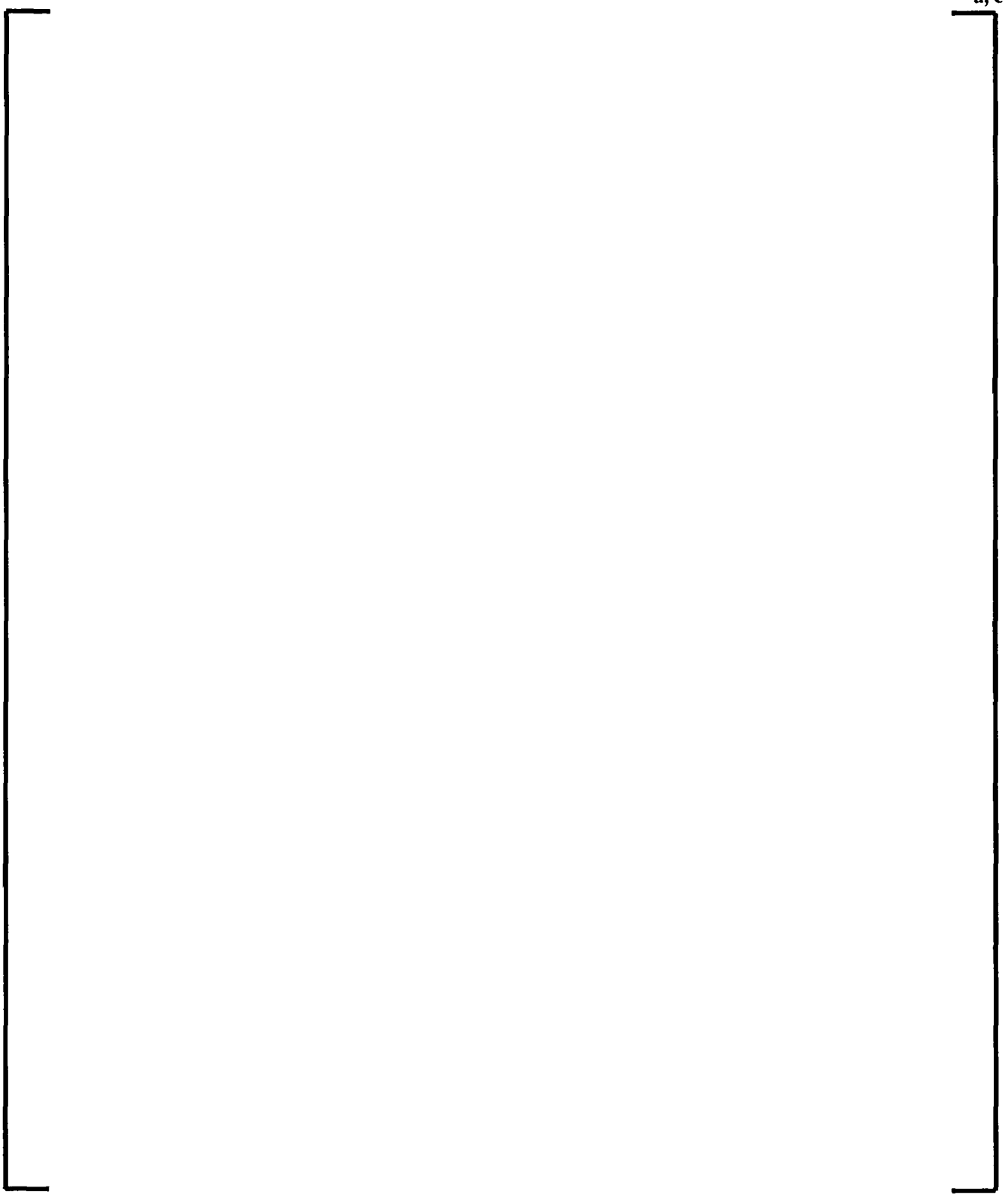
1. The text seems to imply that the SVEA-96 and SVEA-96+ assemblies contain part length rods (PLRs). The SVEA-96 and SVEA-96+ assemblies contain only full length rods (FLRs).

SECTION 3.0

2. The SER notes that the D4.1.1 mean and standard deviation were used as the basis for defining the 95/95 tolerance limit for thermal margin protection. Actually, the D4.1.1 mean and standard deviation are used in conjunction with the other uncertainties associated with establishing Critical Power Ratio (CPR) to derive the Safety Limit CPR in accordance with SRP 4.4, Section II.1.b. This issue is discussed further under Section 3.3.

SECTION 3.3

a, c



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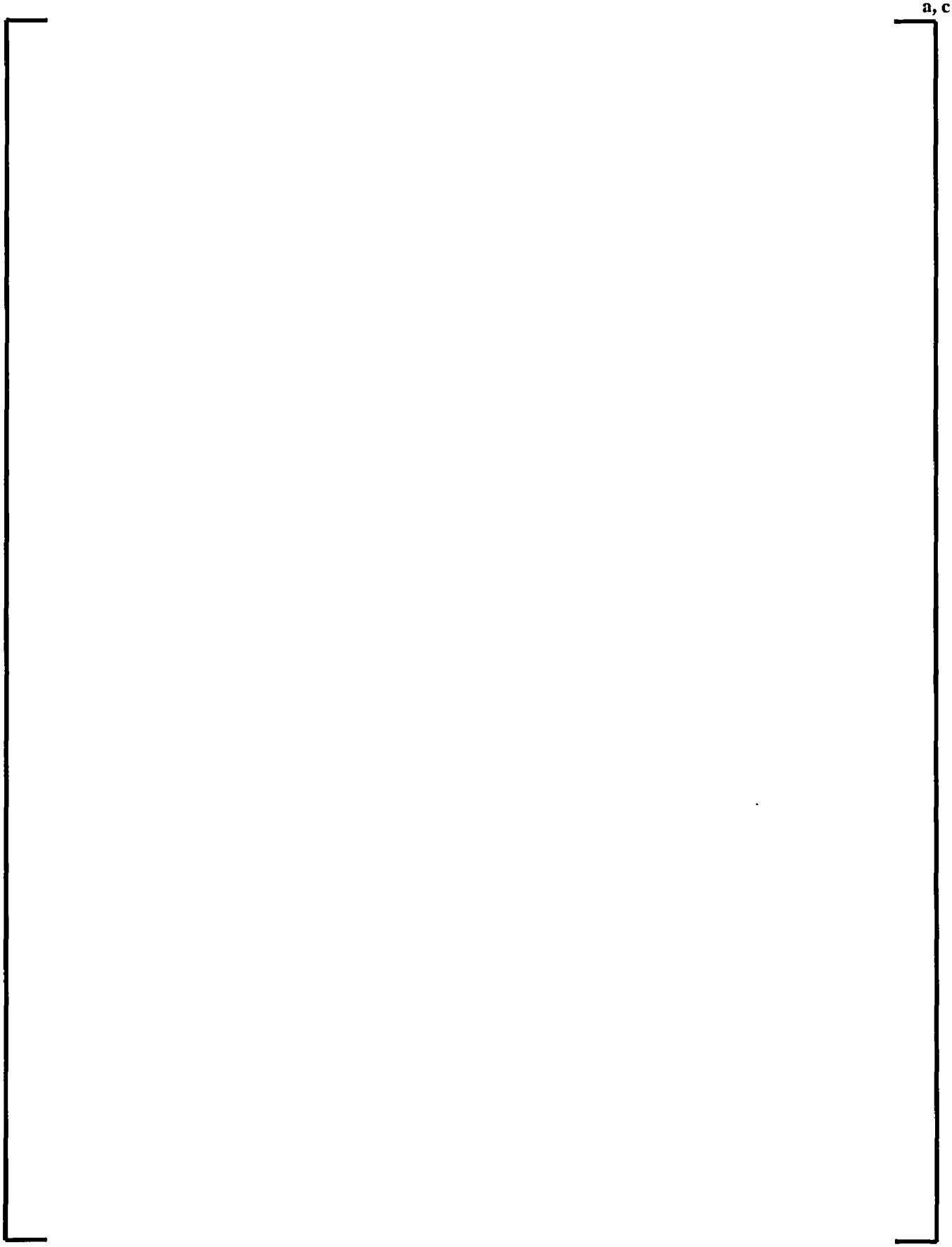

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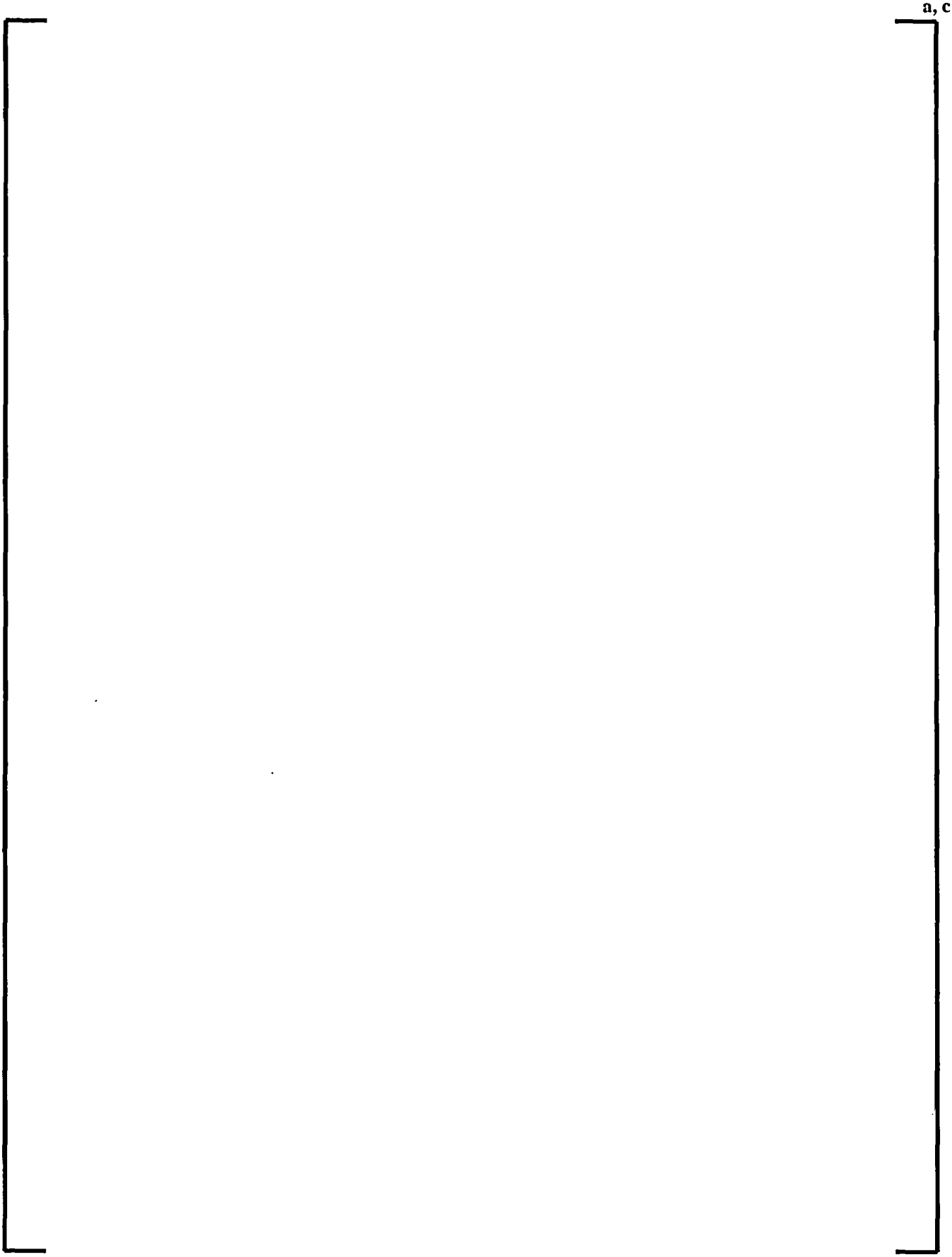

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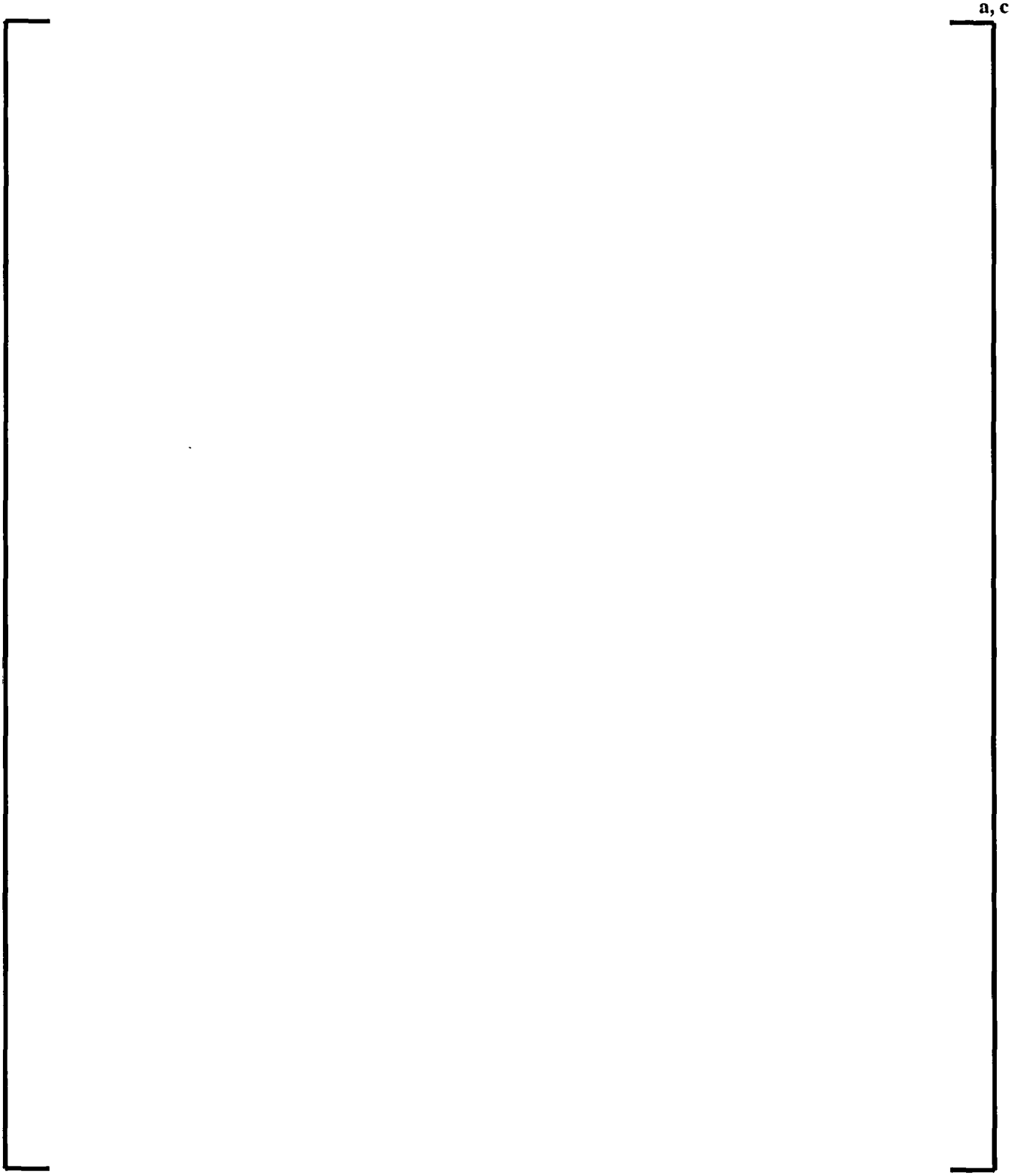

a, c

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REFERENCES

5. Second Japanese-European Two-Phase Flow Group Meeting "Loop Studies Simulating – in Annular Geometry – The Influence of The Axial Power Distribution and The number of spacers on Dryout in 8x8 BWR Assemblies," Jan Blomstrand et al., University of Tsukuba, Japan, 25-29 September 2000.

6. WCAP-16081-P, Fuel Critical Power Experiments and CPR Correlation: SVEA-96 Optima2, May 2003.

7. A.H. Govan, G.F. Hewitt, D.G. Owen and T.R. Bott, 1988, An Improved CHF Modeling Code, *2nd UK National Heat Transfer Conference*, Glasgow, UK

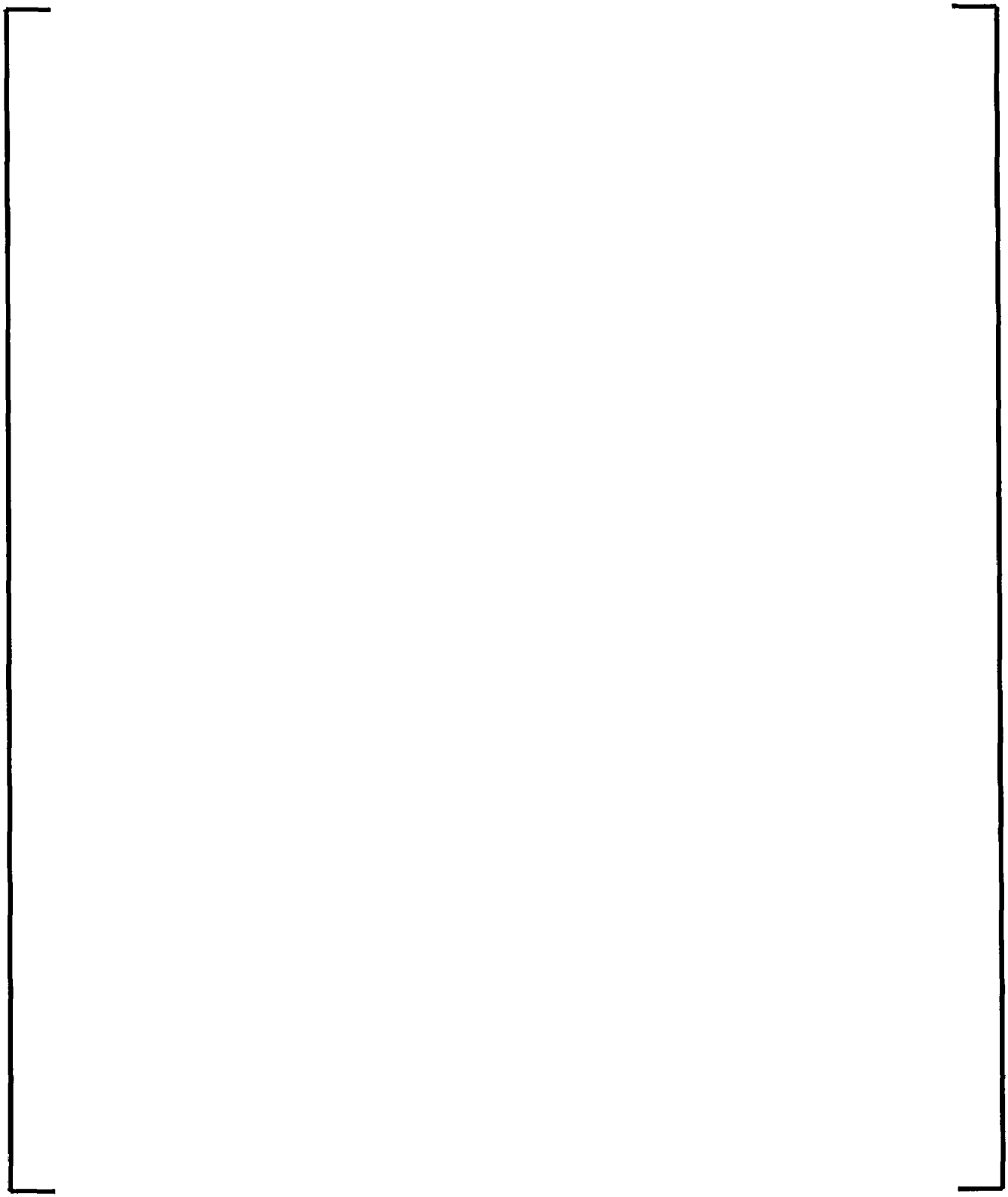
8. Anglart, H. and Adamsson, C., "Numerical study of the effect of the axial power distribution on dryout conditions in an annulus," presented on European Two-Phase Flow Group Meeting, Stockholm, June 10-13, 2002.

5. Nordsveen, M., Hoyer, N., Anglart, H. and Adamsson, C., The MONA Subchannel Analysis Code – Part A: Model Description, proc. 10th International Topical Meeting on Nuclear Reactor Thermal Hydraulics, NURETH10, Seoul, Korea, October 5-9, 2003.

   Adamsson, C., Anglart, H., Nordsveen, M. and Hoyer, N., The MONA Subchannel Analysis Code – Part B: Validation and Verification, proc. 10th International Topical Meeting on Nuclear Reactor Thermal Hydraulics, NURETH10, Seoul, Korea, October 5-9, 2003

6. NEDO-10958, General Electric BWR Thermal Analysis Basis (GETAB): Data, Correlation and Design Application, November 1973

a, b, c



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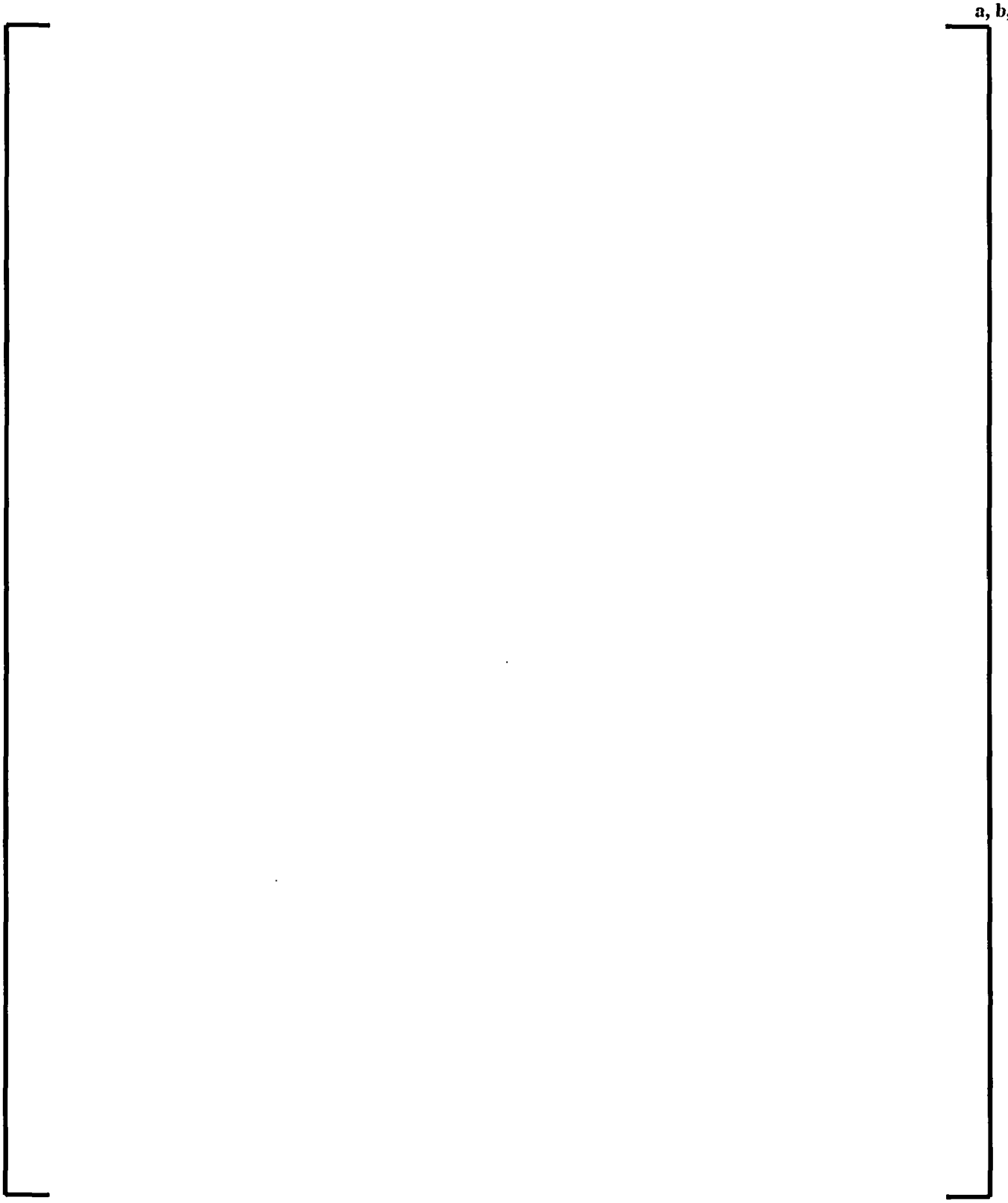

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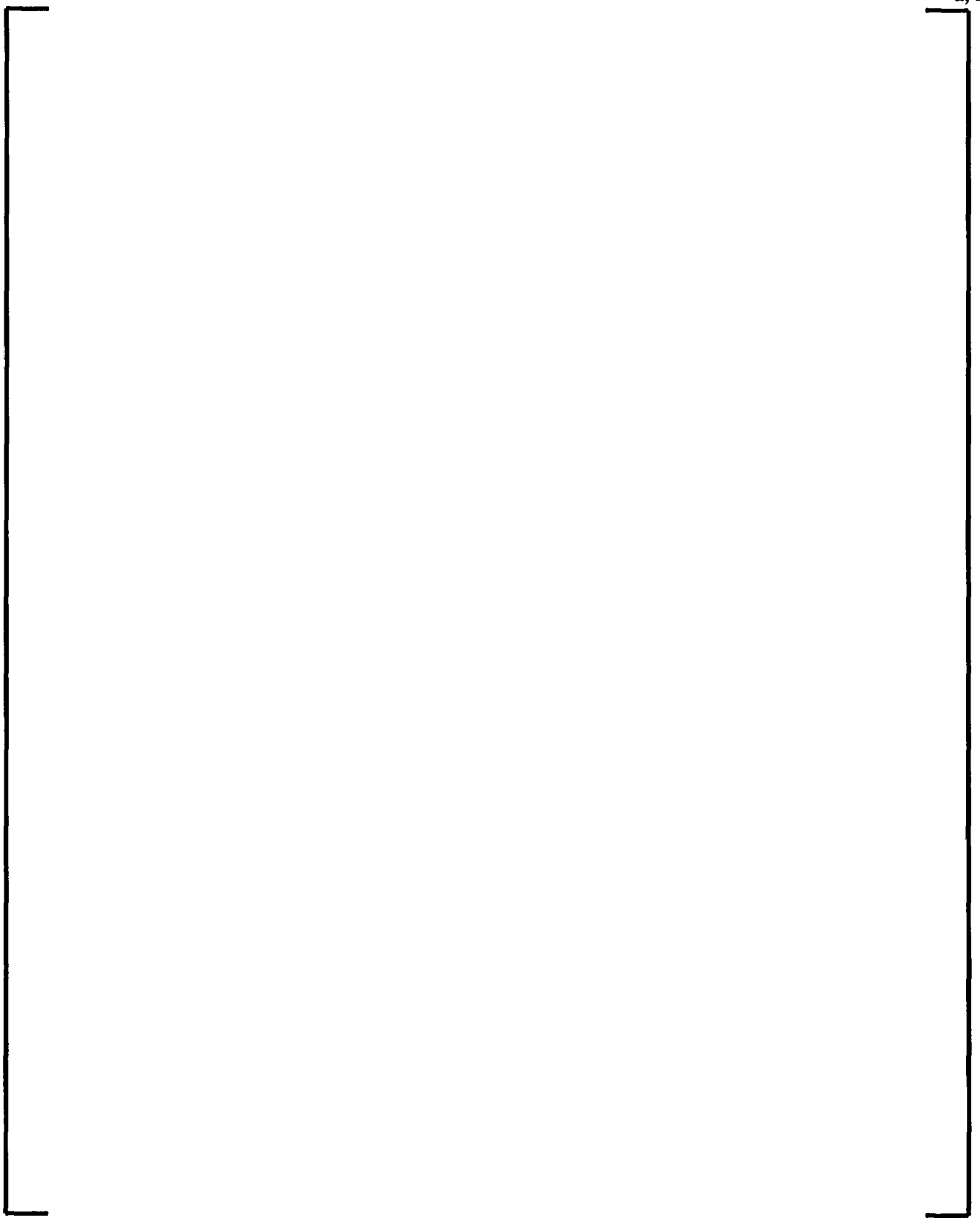

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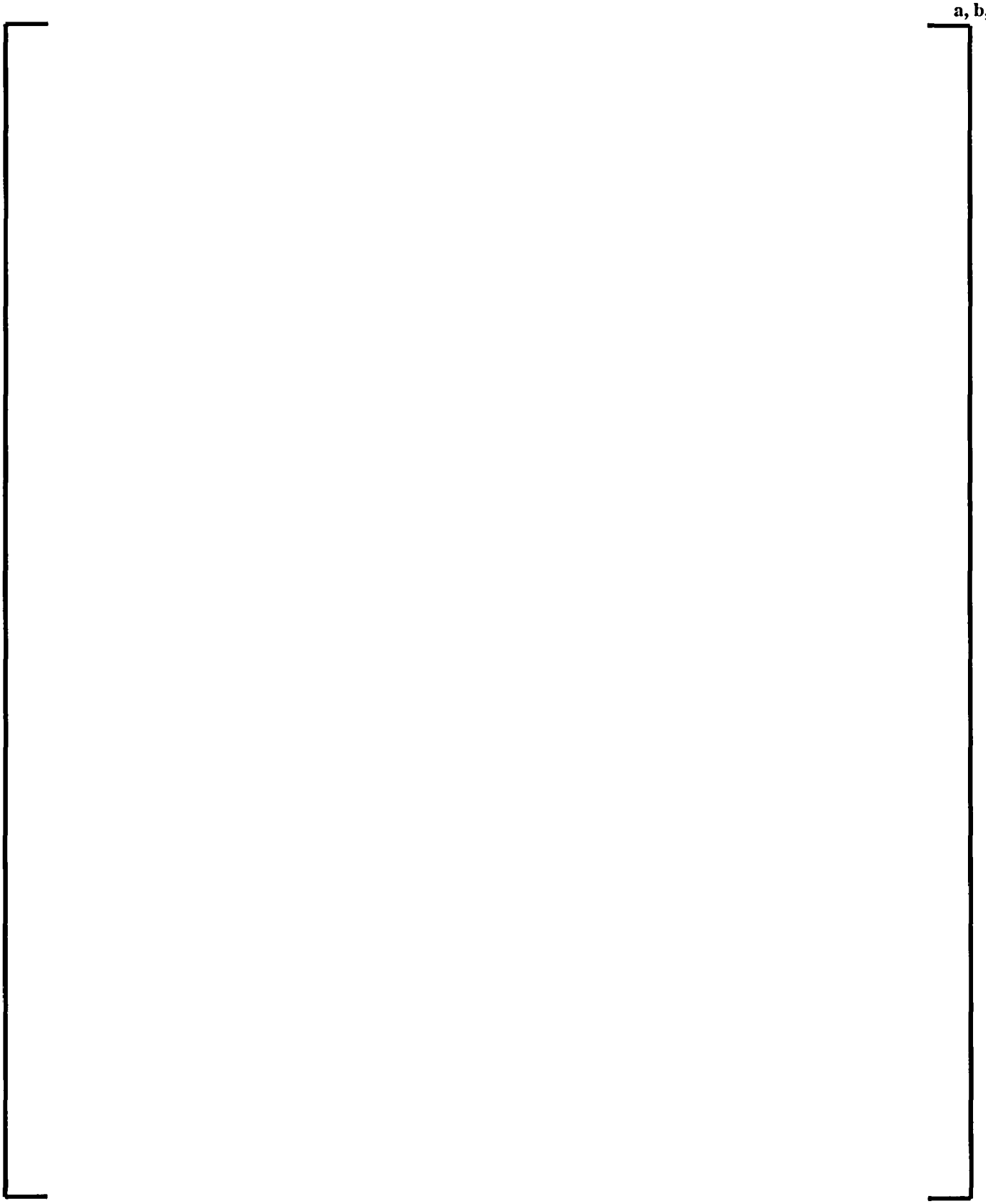

MONA-Film Flow Model Comparisons with FRIGG Data

1. Introduction

In a telephone conversation held on September 2, 2004 Westinghouse agreed to provide further justification that the MONA-3 film-flow model used in confirming the adequacy of the double-peaked axial power shape correction factor captures the effect of axial power shape on dryout sufficiently well to support this application. Westinghouse agreed to provide comparisons of the MONA-3 film flow model predictions of the relative impact on CPR of the [.]^{a,c} This information is provided in Section 2 and augments the information provided in Reference 1.

In assessing the comparisons between the MONA-3 film flow model predictions and the FRIGG Loop data, it is important to understand the manner in which these comparisons fit into the overall treatment of double-peaked (DH) axial power distributions by the D4.1.1 CPR correlation. In the discussion below, the phrase "bare D4.1.1" CPR correlation refers to [ ]^{a,c} The bare D4.1.1 CPR correlation is a critical quality correlation. The effect of axial power shape on assembly dryout power is captured in this correlation by the effect that the axial power distribution has on the axial quality distribution. Critical power testing and operating experience have demonstrated that this formulation effectively captures the impact on assembly critical power of [ ]^{a,c}

Dryout Critical Power testing in the annular geometry reported in Reference 2 indicated that a [ ]^{a,c} Comparisons of predictions of this type of correlation against the KTH data indicated that for double-peaked axial power distributions, [ ]^{a,c}

The DH axial power shape correction factor was established to correct the specific feature of double-peaked axial power shapes [ ] ^{a,c} This correction factor [ ]^{a,c} As discussed in Reference 3, the magnitude and form of this correction factor was established [ ]^{a,c} Since the bare CPR

correlation was established based on FRIGG Loop data, [ ]^{a,c} the appropriate dependence on inlet sub-cooling, exit pressure, and mass flux is preserved in the final D4.1.1 CPR correlation which includes the DH the correction. However, since the magnitude of the correction factor as a function of concavity was established based on the KTH annular geometry data, justification for using the correction factor to correct the CPR associated with an axial power distribution containing a concavity in an array of fuel rods such as the SVEA-96 Optima2 24-rod sub-was provided in Reference 1. This justification is defined in terms of the following three observations:

2. The bare D4.1.1 CPR correlation adequately represents single-peaked axial power shapes.

2. The double-peak axial power shape correction factor targets the specific feature of axial power shapes [

   ]^{a,c}

3. The double-peaked axial power shape correction factor is consistent with the trends in available Critical Power data [ ]^{a,c} given in References 2 and 4. The data in References 2 and 4 also show the same relative trends in critical power for [ ]^{a,c} as the data in References 5 and 6. These comparisons indicate that the relative trends in critical power with respect to axial power shape [

   ]^{a,c}

4. Figure 3 of Reference 1 demonstrated that the double-peaked axial power shape correction factor has a firm physical basis by virtue of the D4.1.1 correlation agreement with relative critical power trends for various axial power shapes, [ ]^{a,c} This model is referred to in Reference 1 as the MONA-3 film flow model. [

   ]^{a,c}

It was requested during the September 2, 2004 telephone conversation that Westinghouse provide further justification, in addition to that provided in Figure 1 of Reference 2, that the MONA-3 film flow model captures the relative trends in Critical Power for [ ]^{a,c} These comparisons are provided in Section 2.

2. Additional Comparisons of MONA-3 film flow model Predictions with FRIGG LOOP Data

Table 1 contains additional comparisons of MONA-3 film flow model predictions with SVEA-96 Optima2 FRIGG Loop Critical Power measurements. The Table 1 comparisons are provided at specific [

]^{a,c}

These comparisons are also plotted in Figures 1 through 8. As shown in Figures 1 through 8, the Mona film flow model captures [

]^{a,c} Consequently, it is concluded that the [

]^{a,c}

3 REFERENCES

1. Responses to draft WCAP-16081-P SER and revised draft SER, Email from Westinghouse (Sisk) to the NRC (Mason), 8/19/04.
7. Second Japanese-European Two-Phase Flow Group Meeting "Loop Studies Simulating – in Annular Geometry – The Influence of The Axial Power Distribution and The number of spacers on Dryout in 8x8 BWR Assemblies," Jan Blomstrand et al., University of Tsukuba, Japan, 25-29 September 2000.

8. WCAP-16081-P, Fuel Critical Power Experiments and CPR Correlation: SVEA-96 Optima2, May 2003.

9. NEDO-10958, General Electric BWR Thermal Analysis Basis (GETAB): Data, Correlation and Design Application, November 1973

10. CENPD-389-P-A, Fuel Critical Power Experiments and CPR Correlations: SVEA-96+, September 1999.

11. CENPD-392-P-A, Fuel Critical Power Experiments and CPR Correlations: SVEA-96, September 2000.

Table 1

Comparison of MONA-3 Film Flow Model Predictions with SVEA-96 Optima2 Frigg Loop Measurements

a, b, c

Table 2

Comparison of MONA-3 Film Flow Model Predictions with SVEA-96 Optima2 Frigg Loop Measurements

a, b, c

[

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Table 3

Comparison of MONA-3 Film Flow Model Predictions with SVEA-96 Optima2 Frigg Loop Measurements

a, b, c

[

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Table 4

Comparison of MONA-3 Film Flow Model Predictions with SVEA-96 Optima2 Frigg Loop Measurements

a, b, c

[

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Table 5

Comparison of MONA-3 Film Flow Model Predictions with SVEA-96 Optima2 Frigg Loop Measurements

a, b, c

Table 6

Comparison of MONA-3 Film Flow Model Predictions with SVEA-96 Optima2 Frigg Loop Measurements

a, b, c

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Table 7

Comparison of MONA-3 Film Flow Model Predictions with SVEA-96 Optima2 Frigg Loop Measurements

a, b, c

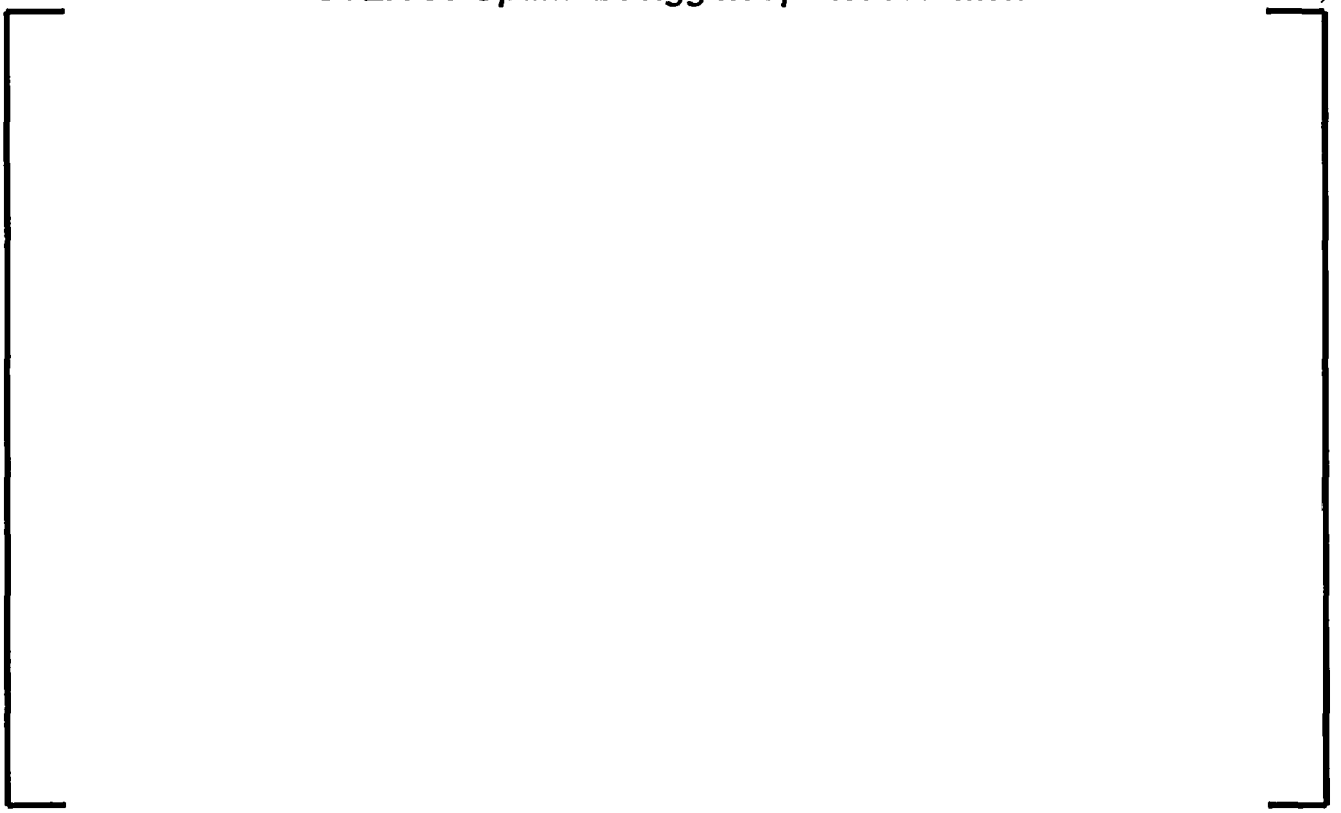
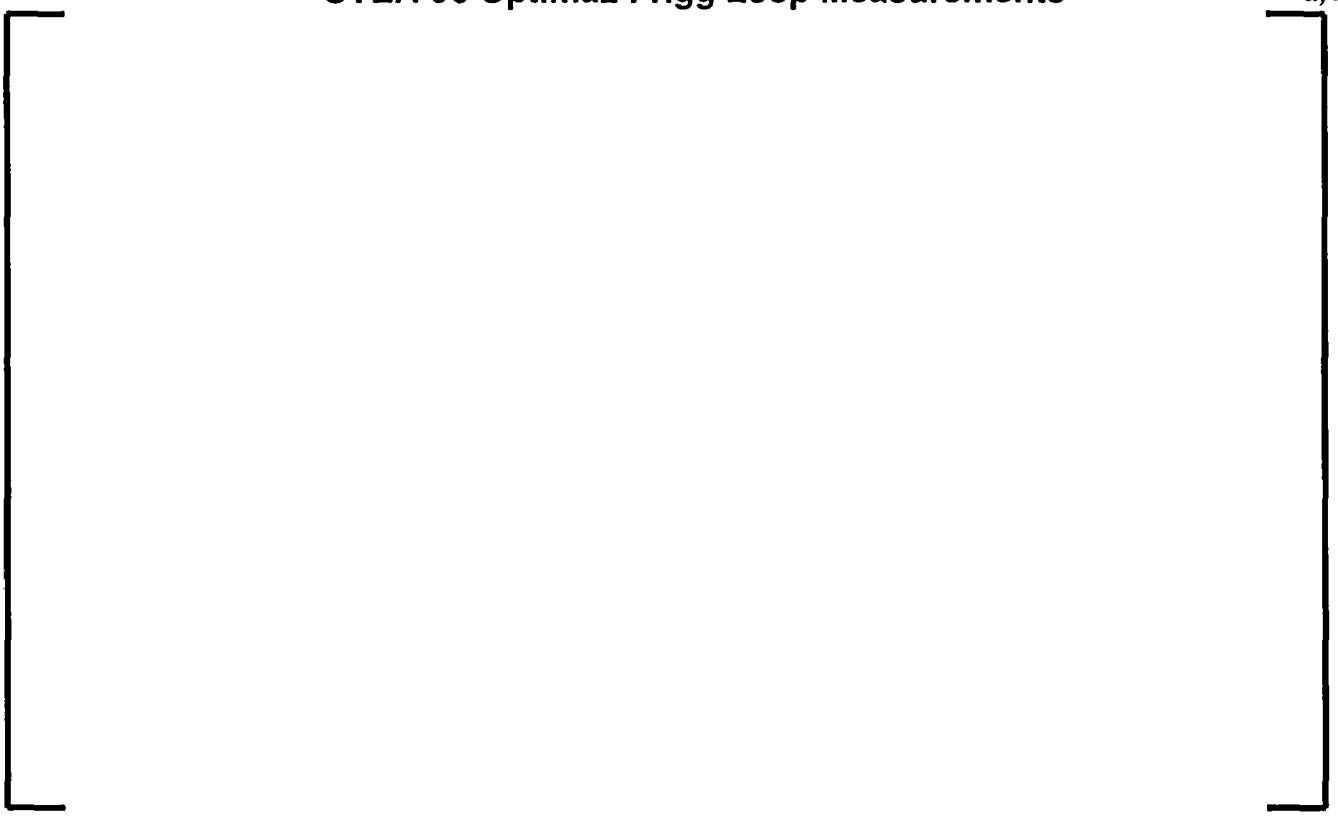


Table 8

Comparison of MONA-3 Film Flow Model Predictions with SVEA-96 Optima2 Frigg Loop Measurements

a, b, c



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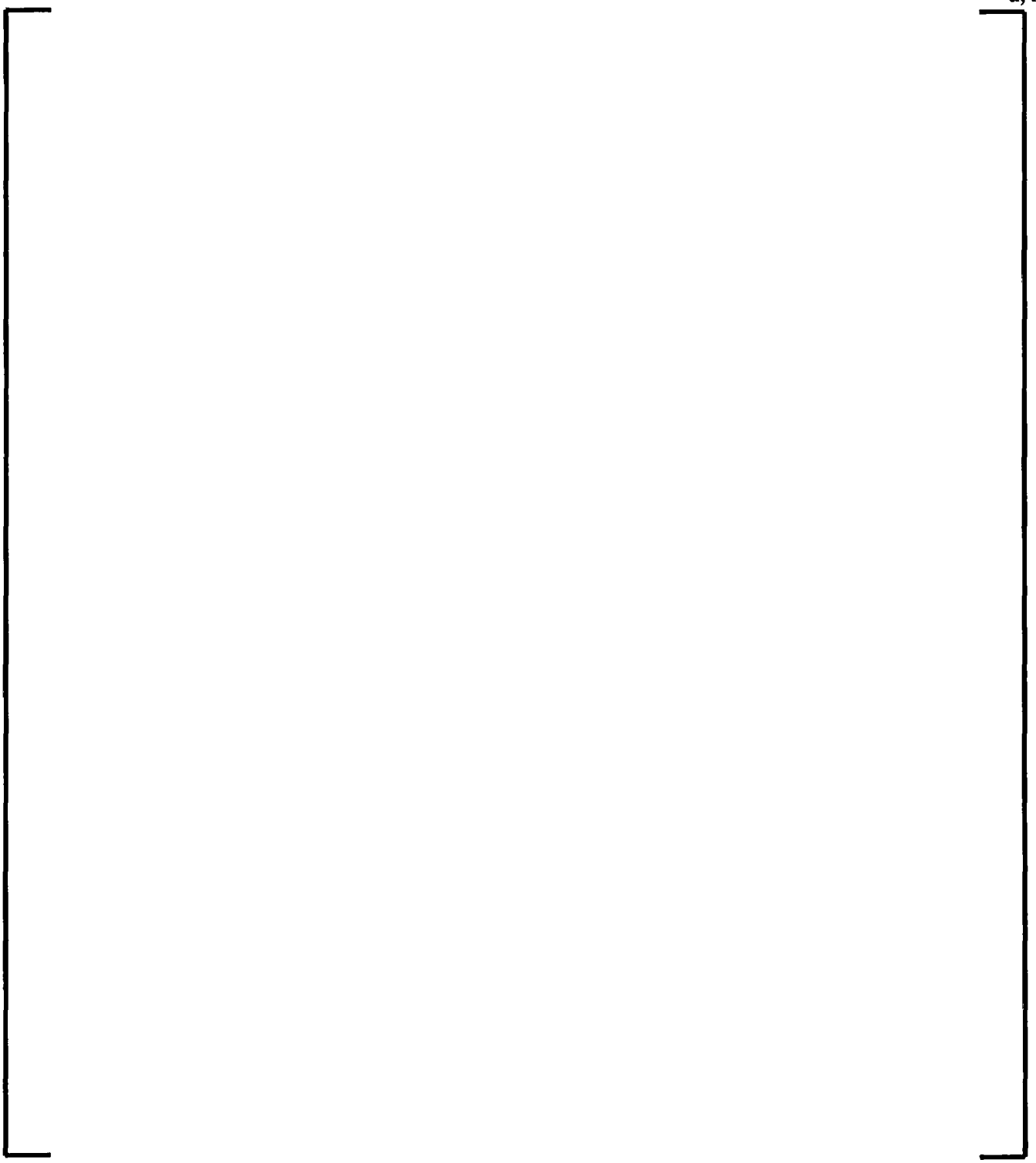
a, b, c



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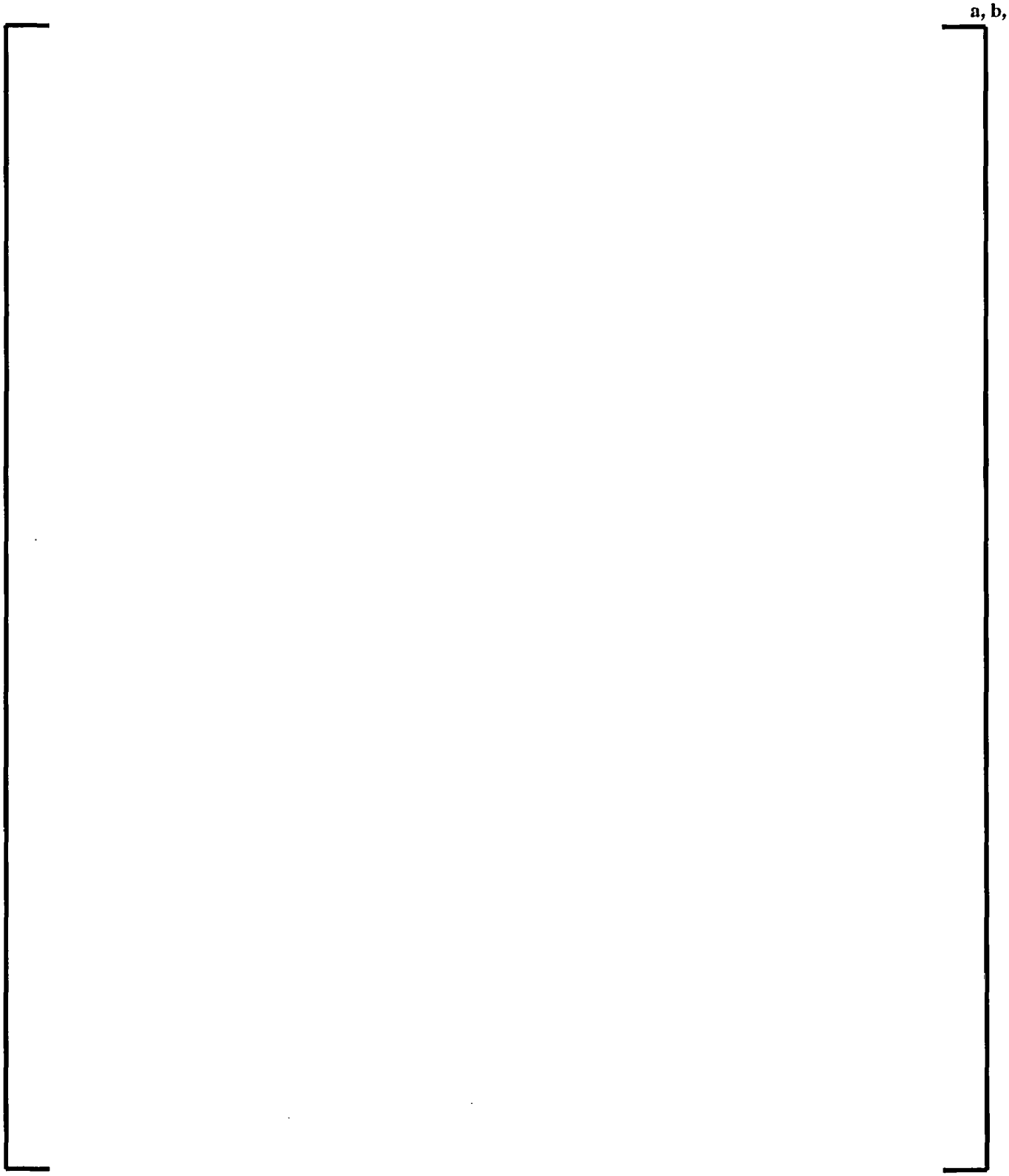

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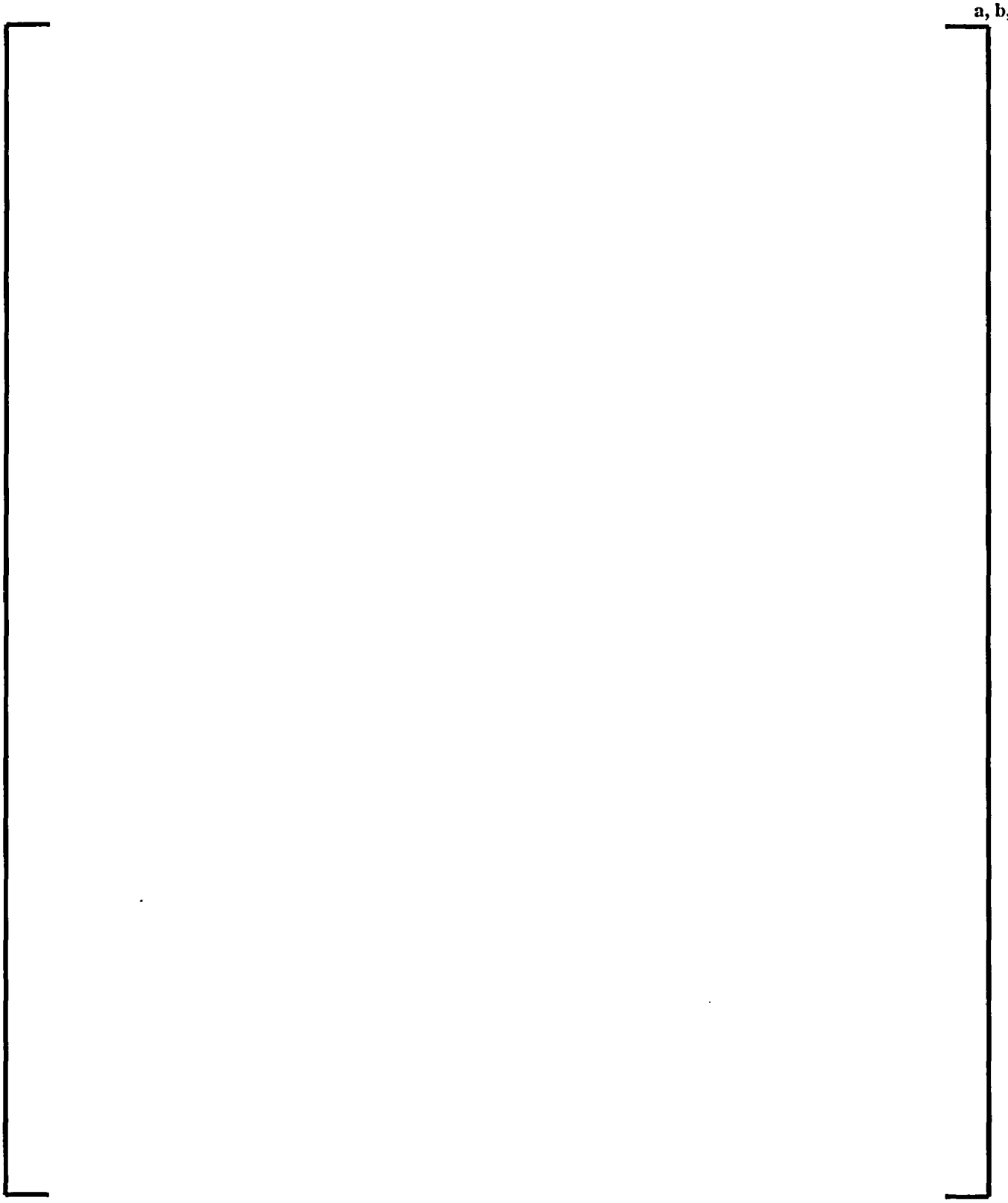

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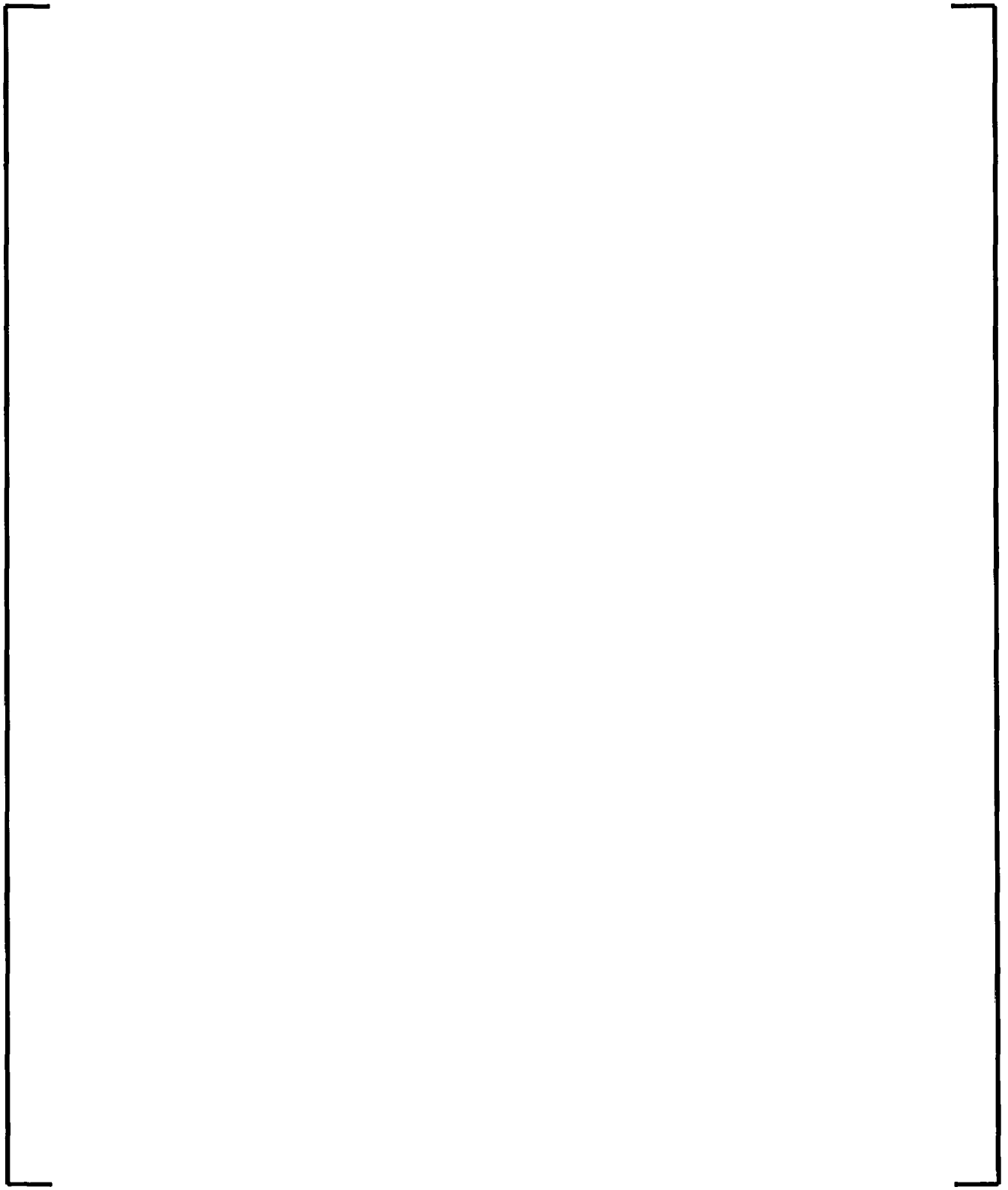
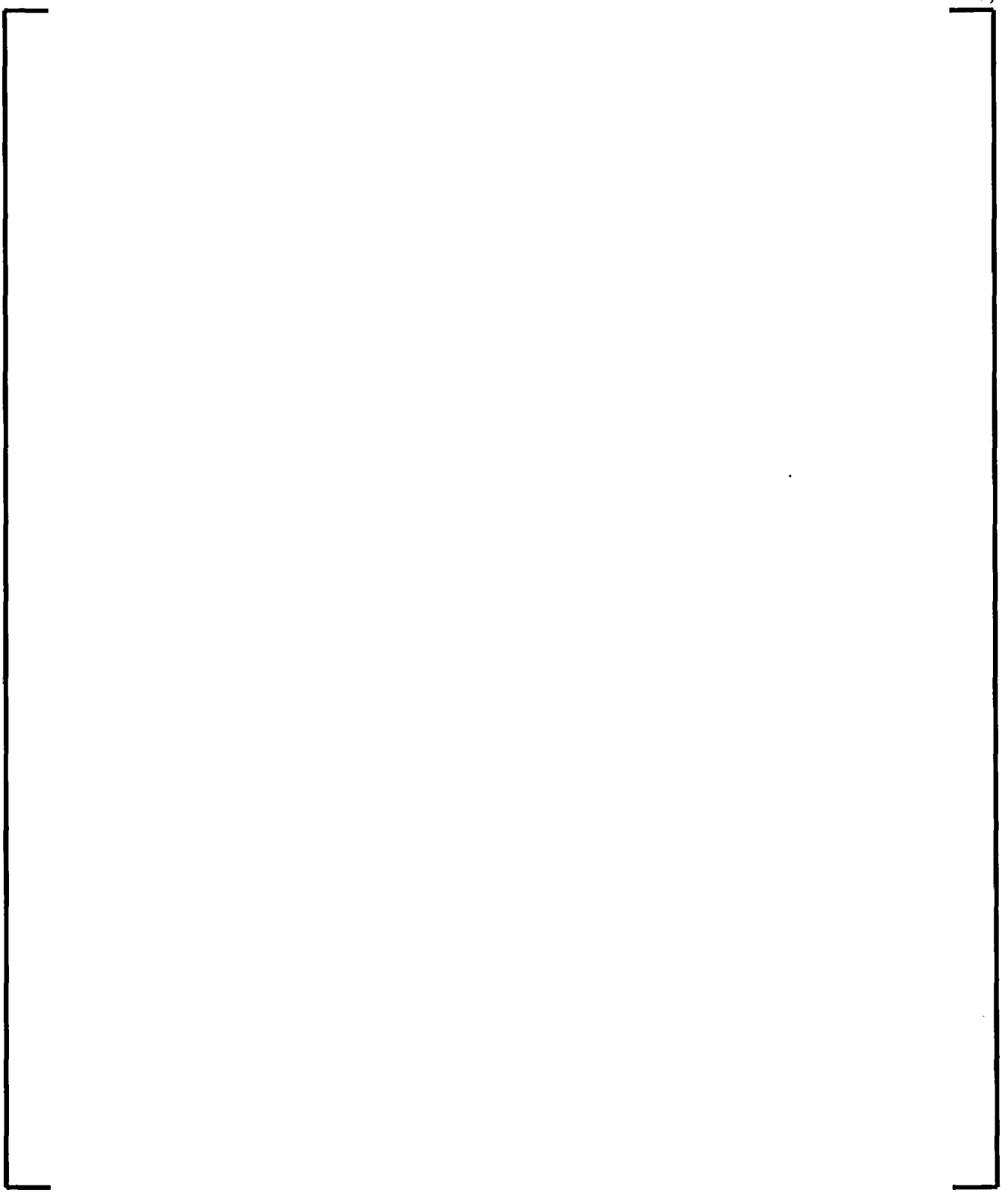


a, b, c



a, b, c

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a, b, c

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