



November 19, 2021  
L-2021-213  
10 CFR 50.90

U. S. Nuclear Regulatory Commission  
Attn: Document Control Desk  
Washington DC 20555-0001

RE: Turkey Point Nuclear Plant, Unit 3 and 4  
Docket Nos. 50-250 and 50-251  
Renewed Facility Operating Licenses DPR-31 and DPR-41

Response to Request for Additional Information Regarding License Amendment Request 273, Update Listing of Approved LOCA Methodologies to Adopt FULL SPECTRUM™ LOCA Methodology

References:

- 1) Florida Power & Light Company Letter L-2021-071, License Amendment Request 273, Update Listing of Approved LOCA Methodologies to Adopt FULL SPECTRUM™ LOCA Methodology , April 15, 2021 (ADAMS Accession Nos. ML21105A848, ML21105A849)
- 2) NRR E-Mail Capture, Turkey Point Request for Additional Information Concerning Full Spectrum LOCA Methodology - EPID L-2021-LLA-0070, September 27, 2021 (ADAMS Accession No. ML21270A165)

In Reference 1, Florida Power & Light Company (FPL) submitted license amendment request (LAR) 273 for Turkey Point Units 3 and 4 (Turkey Point). The proposed license amendments would modify the Turkey Point Technical Specifications (TS) by revising the Loss-of-Coolant Accident (LOCA) methodology to reflect the adoption of WCAP-16996-P-A, Revision 1, Realistic LOCA Evaluation Methodology Applied to the Full Spectrum of Break Sizes (FULL SPECTRUM™ LOCA Methodology) (ADAMS Accession No. ML17277A130).

In Reference 2, the NRC requested additional information determined necessary to complete its review.

The enclosure to this letter provides FPL's response to the request for additional information (RAI) provided in Reference 2. Attachment 1 to the enclosure contains information proprietary to Westinghouse Electric Company, LLC (Westinghouse), which is supported by an Affidavit signed by Westinghouse, the owner of the information. Pursuant to 10 CFR 2.390(a)(4), FPL requests the proprietary information be withheld from public disclosure. Attachment 2 provides a redacted, non-proprietary version of the RAI response provided in Attachment 1. Attachment 3 provides Westinghouse Affidavit, CAW-21-5243. The affidavit sets forth the basis on which the information in Attachment 1 may be withheld from public disclosure by the Nuclear Regulatory Commission ("Commission") and addresses with specificity the considerations listed in paragraph (b)(4) of Section 2.390 of the Commission's regulations. Accordingly, it is respectfully requested that the information

Florida Power & Light Company

9760 SW 344th Street, Homestead, FL 33035

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 the copyright or proprietary aspects of the items listed above or the supporting Westinghouse affidavit should reference CAW-21-5243 and should be addressed to Camille T. Zozula, Manager, Regulatory Compliance & Corporate Licensing, Westinghouse Electric Company, 1000 Westinghouse Drive, Suite 165, Cranberry Township, Pennsylvania 16066.

The supplements included in this RAI response provide additional information that clarifies the application, do not expand the scope of the application as originally noticed, and should not change the NRC staff's original proposed no significant hazards consideration determination as published in the *Federal Register*.

This letter contains no regulatory commitments.

Should you have any questions regarding this submission, please contact Mr. Robert Hess, Turkey Point Licensing Manager, at 305-246-4112.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on the 19<sup>th</sup> day of November 2021.

Sincerely,



Michael Pearce  
Site Vice President, Turkey Point Nuclear Plant

Enclosure  
Attachments

cc: USNRC Regional Administrator, Region II  
USNRC Project Manager, Turkey Point Nuclear Plant  
USNRC Senior Resident Inspector, Turkey Point Nuclear Plant  
Ms. Cindy Becker, Florida Department of Health

Attachment 2:  
Responses to NRC RAIs on the Turkey Point Units 3 and 4 Analysis with the  
FULL SPECTRUM LOCA (FSLOCA) Methodology  
(Non-Proprietary)

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## Background

The Nuclear Regulatory Commission (NRC) has provided the following background:

By letter dated April 15, 2021 (the submittal) (Agencywide Document Access and Management System (ADAMS) Accession No. ML20310A324), Florida Power & Light Company (FPL, the licensee) submitted a license amendment request for Turkey Point Nuclear Plant, Units 3 and 4 (Turkey Point). The proposed amendment would revise the Turkey Point Technical Specification (TS) 6.9.1.7 to reflect the adoption of topical report (TR) WCAP-16996-P-A, Revision 1, "Realistic LOCA Evaluation Methodology Applied to the Full Spectrum of Break Sizes (Full Spectrum LOCA Methodology)," (ADAMS Accession No. ML17277A130) as a reference in the Core Operating Limits Report (COLR). The added reference identifies the analytical method used to determine the core operating limits for the large break loss-of-coolant accidents (LOCA) (LBLOCA) and the small break LOCA (SBLOCA) events described in the Turkey Point Updated Final Safety Analysis Report (UFSAR) (ADAMS Accession No. ML21145A288) Sections 14.3.2.1 and 14.3.2.2 respectively. The amendment also proposes to delete references 1 through 6 in the TS 6.9.1.7 COLR list of analytical methods.

The regulations in Paragraph 50.46(b) Title 10 to the *Code of Federal Regulations* (10 CFR) 50.46(b) require that during LOCA events, the following criteria are met:

- 1) *Peak cladding temperature (PCT)*. The calculated maximum fuel element cladding temperature shall not exceed 2200° Fahrenheit.
- 2) *Maximum cladding oxidation*. The calculated total oxidation of the cladding shall nowhere exceed 0.17 times the total cladding thickness before oxidation.
- 3) *Maximum hydrogen generation*. The calculated total amount of hydrogen generated from the chemical reaction of the cladding with water or steam shall not exceed 0.01 times the hypothetical amount that would be generated if all of the metal in the cladding cylinders surrounding the fuel, excluding the cladding surrounding the plenum volume, were to react.
- 4) *Coolable geometry*. Calculated changes in core geometry shall be such that the core remains amenable to cooling.

The following pages contain the specific requests for additional information (RAIs) and responses.

1. In Attachment 1 to the submittal, Limitation and Condition 2, under "Compliance", the licensee refers to Westinghouse letters LTR-NRC-18-30, "U.S. Nuclear Regulatory Commission 10 CFR 50.46 Annual Notification and Reporting for 2017" and LTR-NRC-19-6, "U.S. Nuclear Regulatory Commission 10 CFR 50.46 Annual Notification and Reporting for 2018," (ADAMS Accession Nos. ML19288A174 and ML19042A378, respectively), which report "impact of changes or errors" in the emergency core cooling system (ECCS) evaluation models. These letters LTR-NRC-18-30 and LTR-NRC-19-6 report an "Estimated Effect" on the PCT due to the changes and errors noted in years 2017 and 2018 respectively.

- a. Discuss whether the FSLOCA EM code was revised by incorporating the changes or correction of errors reported in LTR-NRC-18-30 and LTR-NRC-19-6, and the SBLOCA and LBLOCA results reported in Table 8 of Attachment 1 to the submittal were quantitatively determined using the revised code instead of a qualitatively estimated effect.

**Response**

The Turkey Point Nuclear Plant, Units 3 and 4 (Turkey Point) analysis with the **FULL SPECTRUM™** Loss-of-Coolant Accident (**FSLOCA™**) Evaluation Model (EM) utilized a version of the WCOBRA/TRAC-TF2 code which incorporated the changes and error corrections described in LTR-NRC-18-30 and LTR-NRC-19-6. It is confirmed that the analysis was performed with the updated code which removed the errors applicable to the FSLOCA EM, as reported in LTR-NRC-18-30 and LTR-NRC-19-6.

- b. Discuss whether the error that impacts the gamma energy redistribution reported in an August 31, 2020 Virginia Electric and Power Company letter to NRC (ADAMS Accession No. ML20244A336) occurred during the implementation of the FSLOCA evaluation model for the Turkey Point FSLOCA analysis.

**Response**

The error related to gamma energy redistribution discussed therein was not an error in the FSLOCA EM or the WCOBRA/TRAC-TF2 code, but rather an error in the plant-specific implementation of the methodology for North Anna Units 1 and 2. As such, the error was not reported in the Westinghouse communications as a methodology error for the FSLOCA EM. The implementation error did not occur in the execution of the Turkey Point analysis using the FSLOCA EM, and as a result the as-approved methodology related to gamma energy redistribution was correctly applied. Therefore, the error is not applicable to the Turkey Point FSLOCA EM analysis.

2. In Section 3.0 of Attachment 1 to the submittal, the description of Region II analysis does not provide the LBLOCA break spectrum scenarios that were analyzed. Provide the break spectrum, i.e., the PCTs versus break areas, maximum local oxidation and core-wide oxidation versus PCT, that were analyzed from which the limiting results reported in Table 8 were obtained.

**Response**

Section 3.0 of Attachment 1 to the submittal describes the Region I (SBLOCA analysis). However, Section 4.0 of Attachment 1 to the submittal describes the Region II (LBLOCA) results, which are provided here as requested. The PCT versus effective break area is provided for the offsite power available (OPA) and the loss-of-offsite power (LOOP) configurations in Figures 1a and 1b, respectively, and reflect the combined effect of the break size and break flow model uncertainties.

The transient maximum local oxidation (or transient equivalent cladding reacted (ECR)) versus PCT is provided for the offsite power available (OPA) and the loss-of-offsite power (LOOP)

configurations in Figures 2a and 2b, respectively. A strong trend of increasing MLO with increasing PCT occurs due to the temperature dependence of the oxidation kinetics.

The core-wide oxidation versus PCT is provided for the offsite power available (OPA) and the loss-of-offsite power (LOOP) configurations in Figures 3a and 3b, respectively. A strong trend of increasing CWO with increasing PCT occurs due to the temperature dependence of the oxidation kinetics.

The uncertainty analysis methodology used in the FSLOCA EM is described in Section 30 of WCAP-16996-P-A, Revision 1/WCAP-16996-NP-A, Revision 1. A Monte Carlo sampling of all uncertainty contributors leads to the generation of a sample of simulated results from which upper tolerance limits are derived for the analysis figures of merit (PCT, MLO, CWO). [

] <sup>a,c</sup>

3. Define the SBLOCA (Region I) range of breaks that were analyzed. Identify the break size for which the time sequence of events and results given in Tables 9 and 8 respectively of Attachment 1 to the submittal represents.

#### **Response**

As noted in Section 3.2 of Attachment 1 to the submittal, the Turkey Point Units 3 and 4 Region I analysis was performed in accordance with the NRC-approved methodology. The FSLOCA EM analysis approach was demonstrated for a Westinghouse 3-loop PWR as described in Section 31.2 of WCAP-16996-P-A/WCAP-16996-NP-A, Revision 1. [

] <sup>a,c</sup>

It is further noted in Section 3.2 of Attachment 1 to the submittal that the transient that produced the analysis PCT result is a cold leg break with a break diameter of 2.1-inches. As such, the Region I analysis results provided in Table 8 and the time sequence of events in Table 9 of Attachment 1 to the submittal are from a transient simulation that modeled a break diameter of 2.1-inches.

4. Considering both the current and the proposed LOCA analyses are best-estimate, differences were noted in some of the input parameters in the current analysis documented in the UFSAR and the proposed analysis as shown in the table below. Address the differences between the submittal and the UFSAR parameter values in the table below and list any other parameters in the proposed analyses which are different from the current analysis. Provide justification for the differences.



**Response**

The FSLOCA EM is a new best-estimate method that incorporates new conservatisms requiring a host of new inputs. As the question suggests, inputs were changed from the ASTRUM analysis. For example, the FSLOCA EM explicitly considers the effects of fuel pellet thermal conductivity degradation, incorporates updated fuel performance models and accounts for other burnup-related effects. Additionally, some inputs were modified from the values assumed in the ASTRUM analysis to improve operating margins or recover safety analysis margin. Other inputs were defined to maintain compliance with the new approved methodology. In short, even though they are both best-estimate methods, there are many differences between the ASTRUM and FSLOCA methodologies. To accommodate these differences, the values were defined in accordance with the new FSLOCA methodology to ensure the analysis met the § 50.46(b) acceptance criteria.

The table provided comparing some of the input differences illustrates these different categories. For instance, LOCA analysis is relatively insensitive to the steam generator tube plugging input so it was increased to improve operating margins. The minimum initial containment pressure and temperature changes are an example of selecting inputs consistent with the approved FSLOCA methodology. Limitation and Condition 3 on the FSLOCA methodology states that for the purpose of calculating “a conservatively low, although not explicitly bounded, containment pressure, the input to the COCO model will be based on appropriate plant-specific containment design parameters and initial conditions.” As such, an acceptable plant-specific initial containment temperature and pressure were provided to Westinghouse for the purpose of modeling the containment pressure response, consistent with the Limitation and Condition. A minimum value based on plant operating data was applied in the FSLOCA EM analysis. In a similar manner, a plant-specific minimum initial containment temperature was established based on plant operating data. Lastly, the other temperatures (accumulator, initial spray, and RWST) were modified to account for instrument uncertainties, and to add conservatism to safety analysis margin.

5. Paragraph 50.46(b)(4) to 10 CFR on Coolable Geometry states that:

[c]alculated changes in core geometry shall be such that the core remains amenable to cooling.

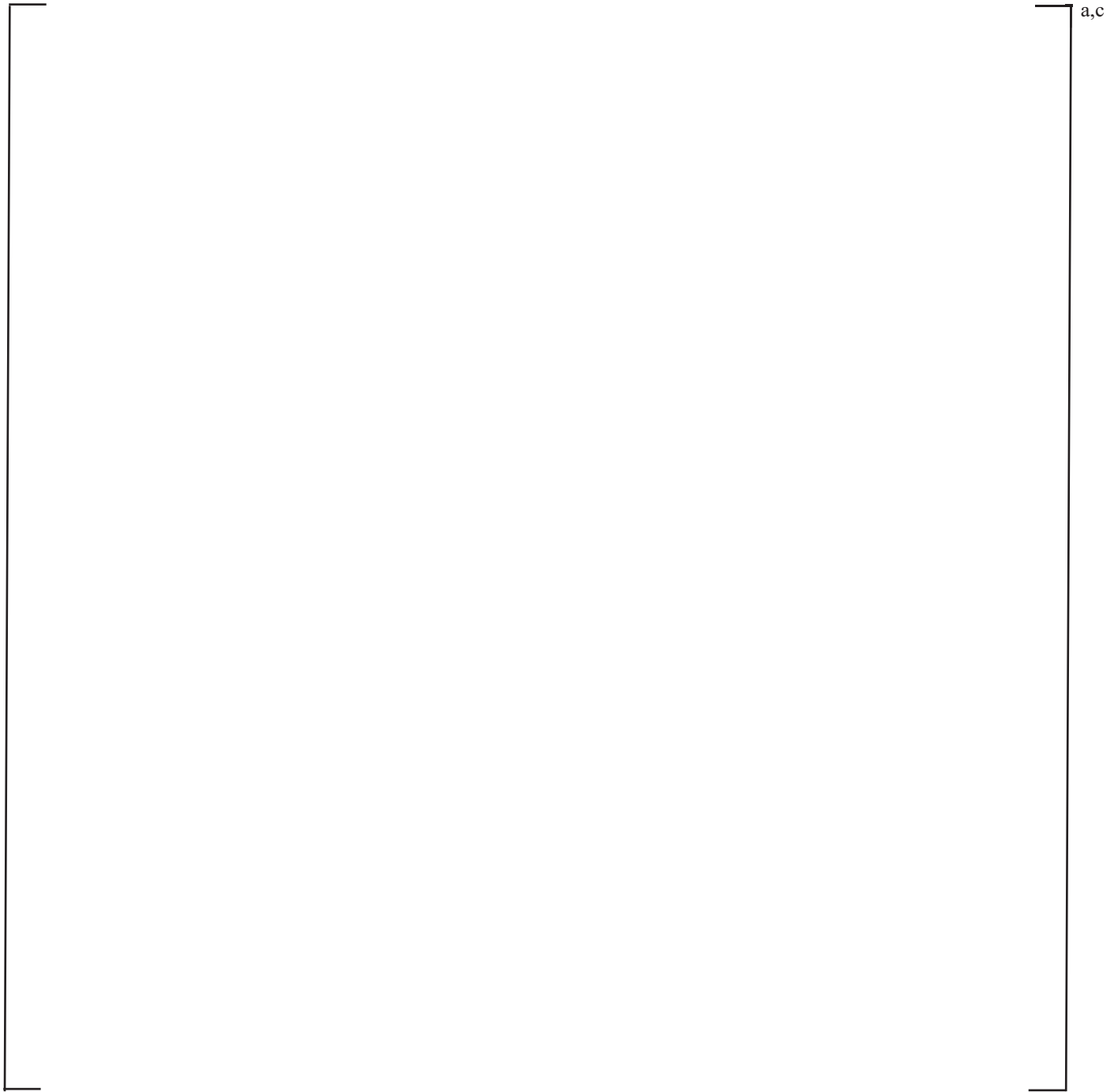
Section 4.0 of Attachment 3 of the submittal states:

Inboard grid deformation due to combined LOCA and seismic loads is not calculated to occur for Turkey Point Units 3 and 4.

Discuss why inboard grid deformation due to combined LOCA and seismic loads is not expected.

**Response**

The FSLOCA EM analysis does not affect the existing calculations that support the analysis of record related to combined LOCA and seismic loads, and the conclusion is retained from prior calculations and is credited in the current LOCA design basis analyses. That is, the previous calculations on grid deformation due to combined LOCA and seismic loads remain valid. As described in Section 3.2.3 of the Updated Final Safety Analysis Report (UFSAR) regarding the combined LOCA and seismic loads, “Some ZIRLO grid designs experience grid crush during the most severe load conditions of a combined seismic/LOCA event. However, crushed grid locations are limited to the periphery of the core and coolable geometry is maintained. Control rod insertability and fuel cladding integrity are also maintained.”

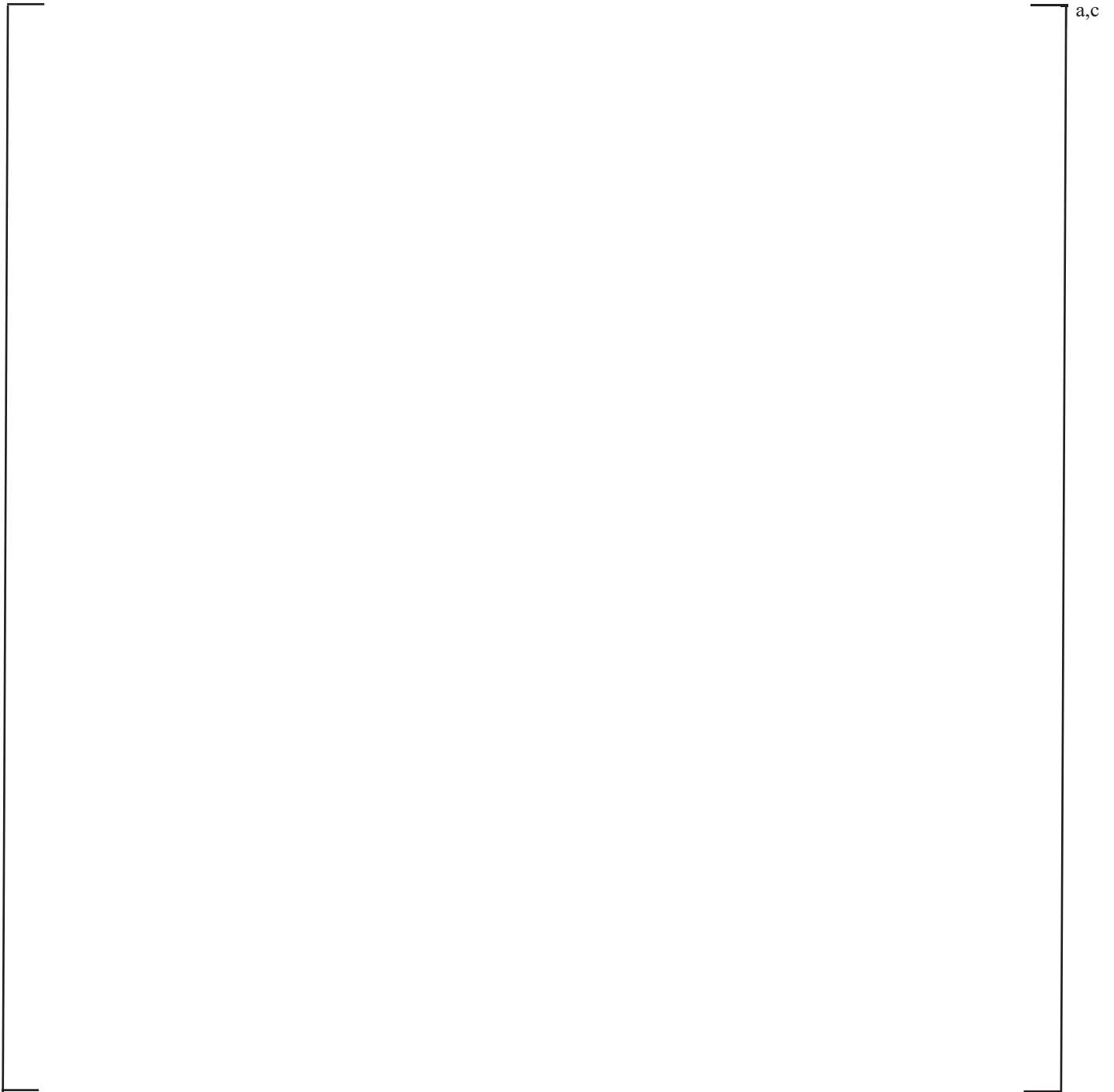


a,c

Figure 1a: [

]a,c





a,c

Figure 1b: [

]a,c

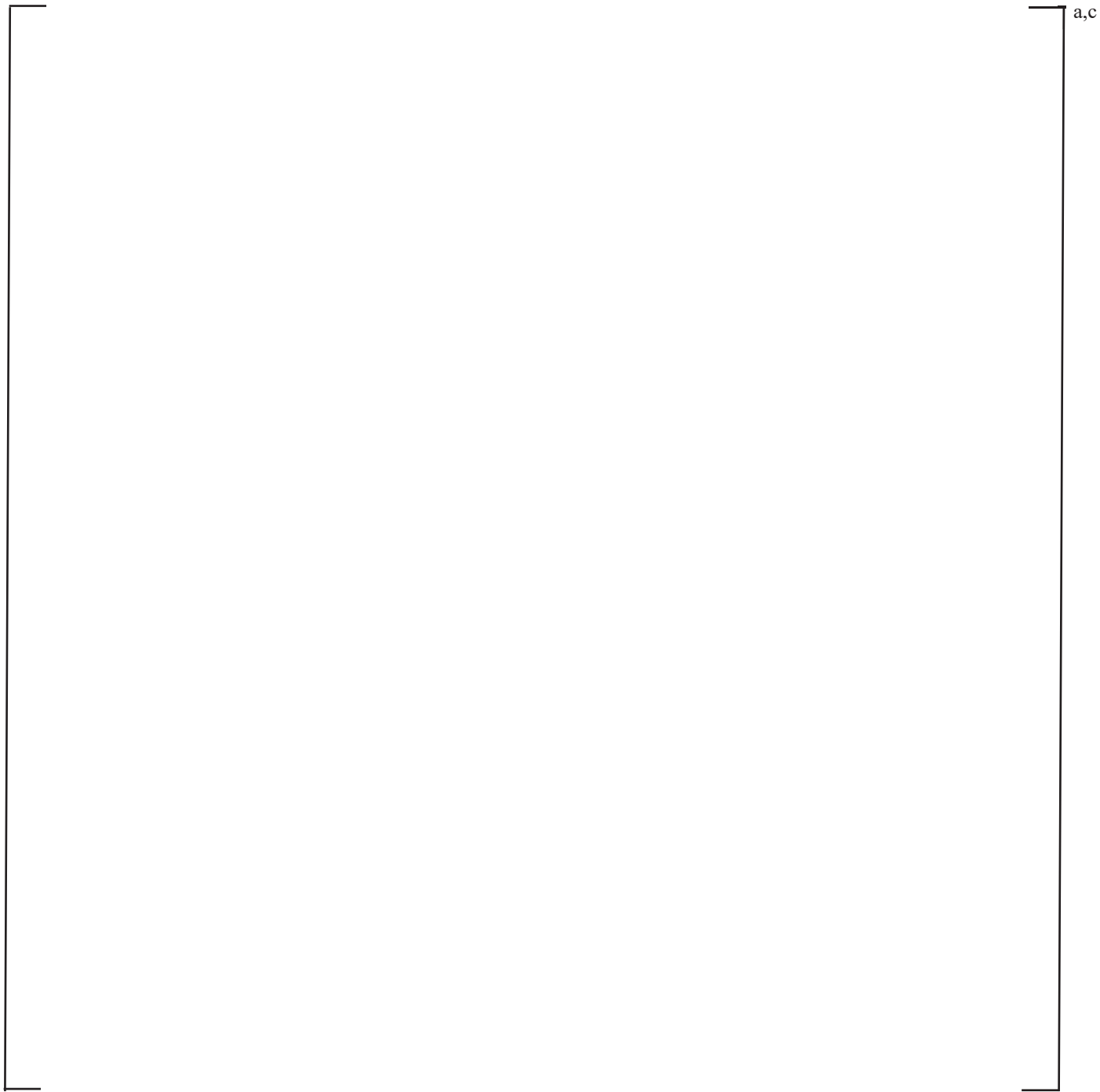
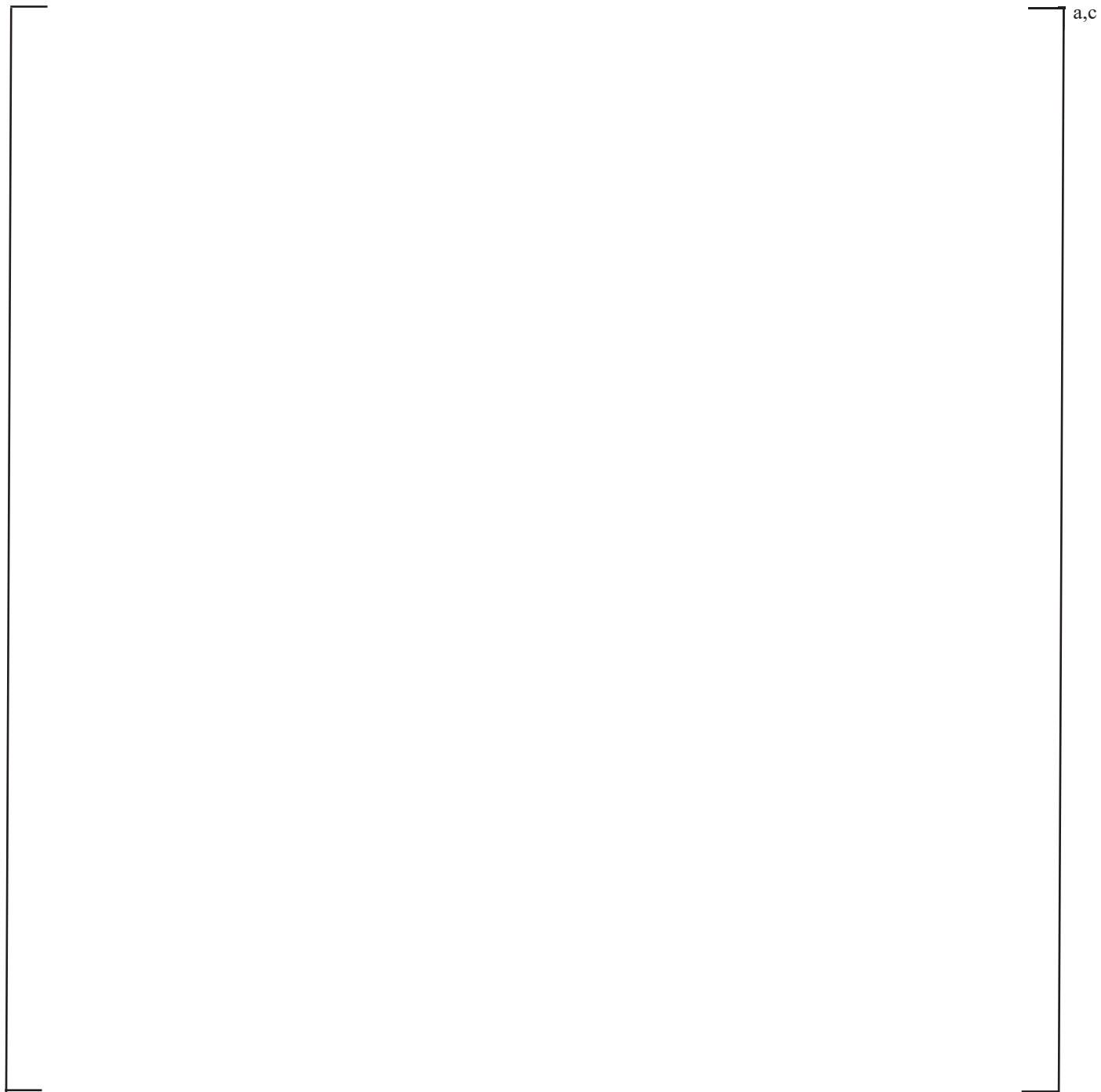


Figure 2a: [

]a,c



a,c

Figure 2b: [

]a,c

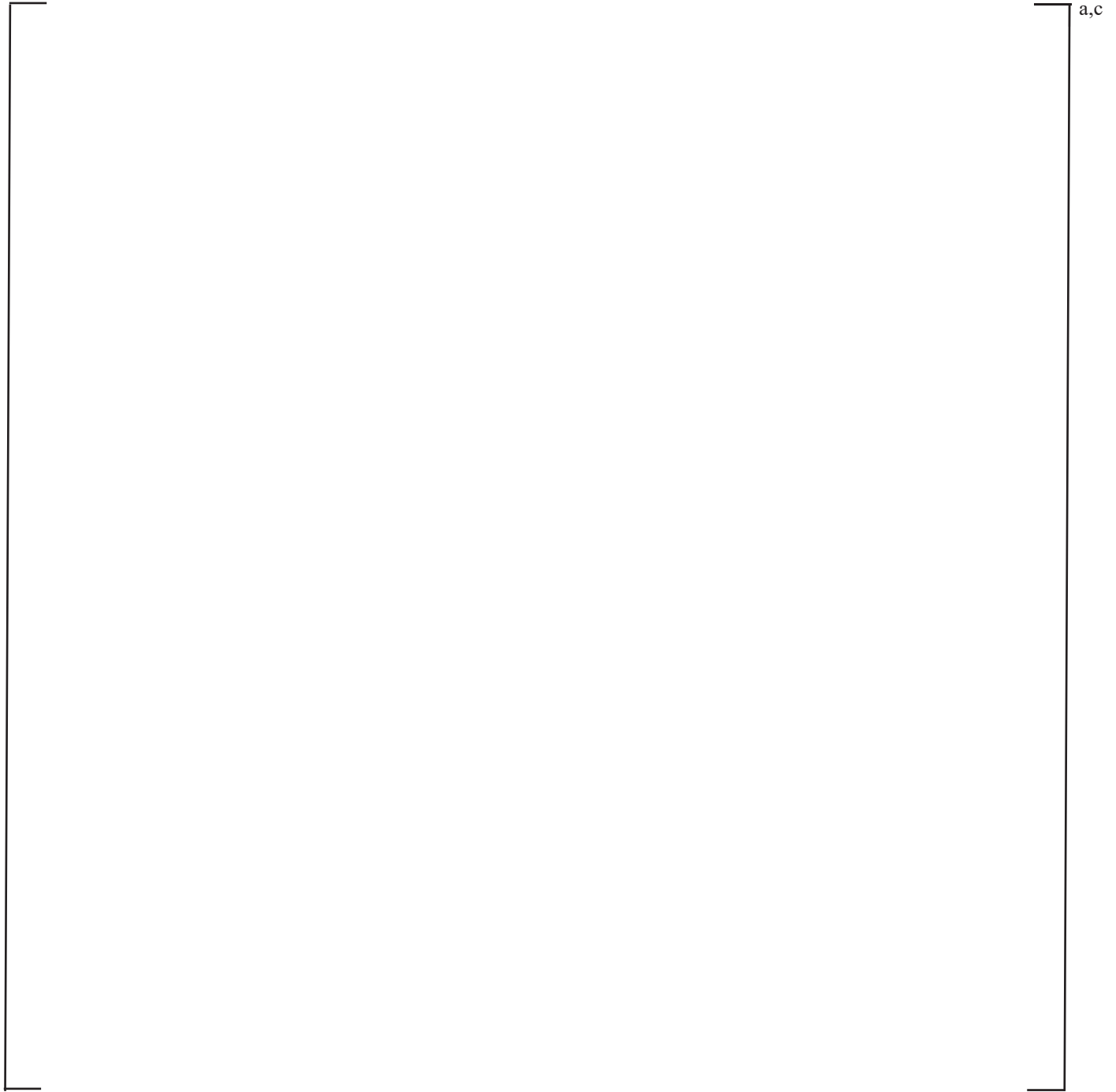


Figure 3a: [

]a,c

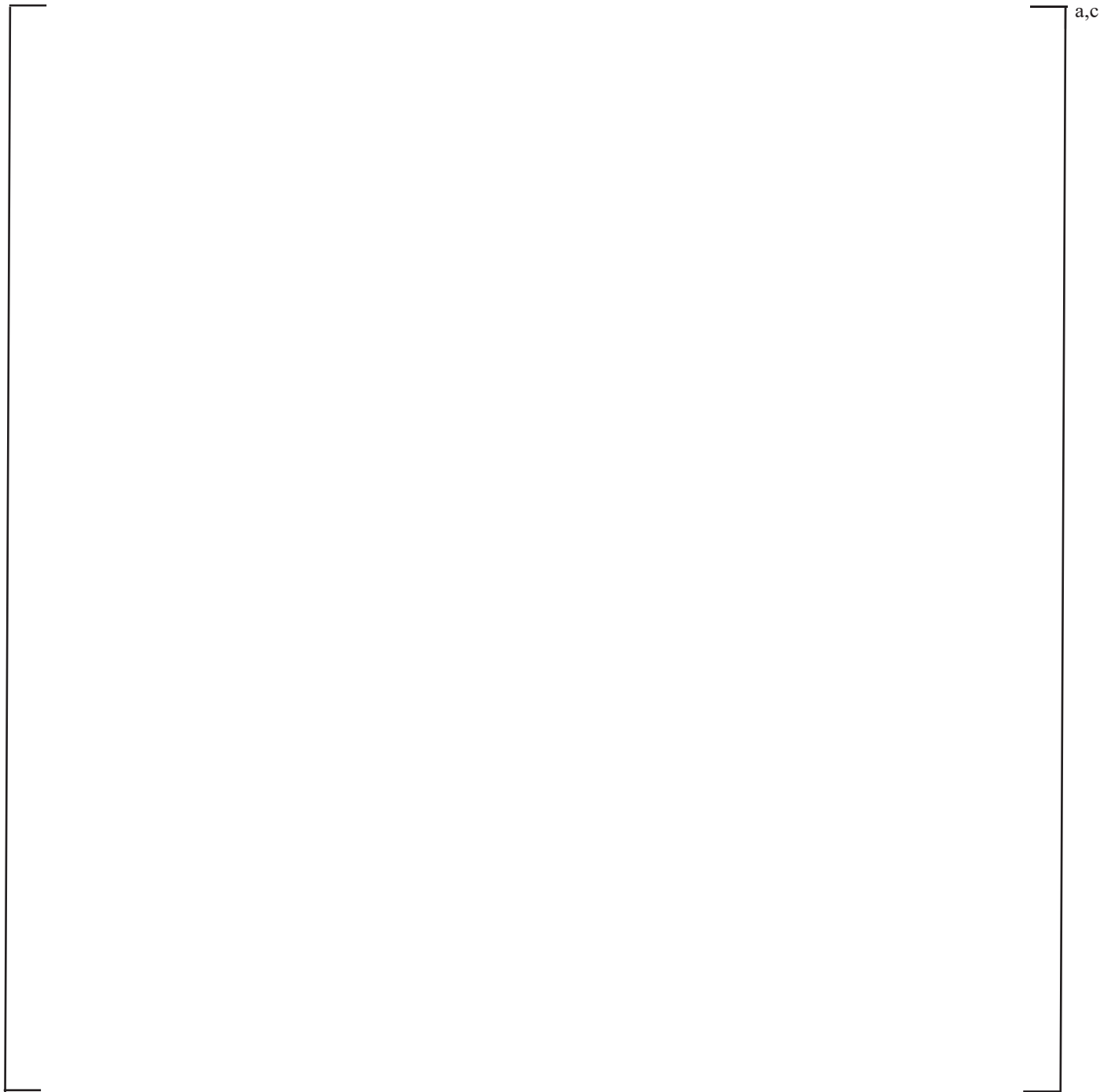


Figure 3b: [

]a,c

Attachment 3:  
Affidavit CAW 21-5243, November 17, 2021  
Supporting Application for Withholding Proprietary  
Information From Public Disclosure

(3 pages follow)

ZIRLO, FULL SPECTRUM, and FSLOCA are trademarks or registered trademarks of Westinghouse Electric Company LLC, its affiliates and/or its subsidiaries in the United States of America and may be registered in other countries throughout the world. All rights reserved. Unauthorized use is strictly prohibited. Other names may be trademarks of their respective owners.

COMMONWEALTH OF PENNSYLVANIA:

COUNTY OF BUTLER:

- (1) I, Camille T. Zozula, have been specifically delegated and authorized to apply for withholding and execute this Affidavit on behalf of Westinghouse Electric Company LLC (Westinghouse).
- (2) I am requesting the proprietary portions of L-2021-213 be withheld from public disclosure under 10 CFR 2.390.
- (3) I have personal knowledge of the criteria and procedures utilized by Westinghouse in designating information as a trade secret, privileged, or as confidential commercial or financial information.
- (4) Pursuant to 10 CFR 2.390, 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 and is not customarily disclosed to the public.
  - (ii) The information sought to be withheld is being transmitted to the Commission in confidence and, to Westinghouse's knowledge, is not available in public sources.
  - (iii) Westinghouse notes that a showing of substantial harm is no longer an applicable criterion for analyzing whether a document should be withheld from public disclosure. Nevertheless, 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.

- (5) Westinghouse has policies in place to identify proprietary information. 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.

- (6) The attached documents are bracketed and marked to indicate the bases for withholding. The justification for withholding 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 (5)(a) through (f) of this Affidavit.

I declare that the averments of fact set forth in this Affidavit are true and correct to the best of my knowledge, information, and belief.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on: 17 Nov 2021



Camille T. Zozula, Manager

Regulatory Compliance & Corporate

Licensing