Westinghouse

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Our ref: LTR-NRC-08-26
         May 21, 2008

Subject: "Westinghouse Presentation for the Axial Offset Validity Criteria Pre-Submittal Meeting"
            (Proprietary/Non-Proprietary)

Enclosed are copies of the Proprietary and Non-Proprietary versions of the "Westinghouse Presentation for the Axial Offset Validity Criteria Pre-Submittal Meeting" (Slide Presentation of May 28, 2008).

Also enclosed is:

1.   One (1) copy of the Application for Withholding, AW-08-2427 (Non-proprietary) with Proprietary Information 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 Section 2.390, as amended, of the Commission's 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 public disclosure by the Commission.

Correspondence with respect to the affidavit or Application for Withholding should reference AW-08-2427 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. A. Gresham, Manager
Regulatory Compliance and Plant Licensing

Enclosures
cc: A. Mendiola, NRR
       J. Thompson, NRR

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Our ref: AW-08-2427
May 21, 2008

APPLICATION FOR WITHHOLDING PROPRIETARY
INFORMATION FROM PUBLIC DISCLOSURE

Subject: LTR-NRC-08-26 P-Enclosure, "Westinghouse Presentation for the Axial Offset Validity Criteria Pre-Submittal Meeting" (Proprietary)

Reference: Letter from J. A. Gresham to Document Control Desk, LTR-NRC-08-26, dated May 21, 2008

The 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 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 2.390, Affidavit AW-08-2427 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-08-2427 and should be addressed to J. A. Gresham, Manager of Regulatory Compliance and Plant Licensing, Westinghouse Electric Company LLC, P. O. Box 355, Pittsburgh, Pennsylvania 15230-0355.

Very truly yours,

J. A. Gresham, Manager
Regulatory Compliance and Plant Licensing

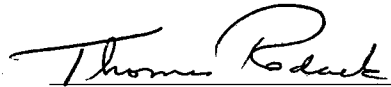Cc: A. Mendiola, NRR
        J. Thompson, NRR
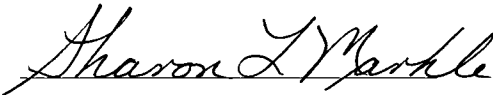
AFFIDAVIT

COMMONWEALTH OF PENNSYLVANIA:

ss

COUNTY OF ALLEGHENY:

Before me, the undersigned authority, personally appeared T. Rodack, 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:
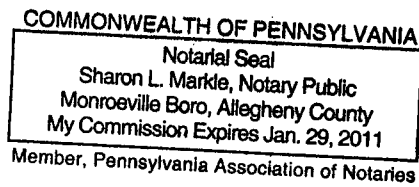
T. Rodack, Director

Quality and Licensing Programs

Sworn to and subscribed
before me this 21st day
of May , 2008.

Notary Public

COMMONWEALTH OF PENNSYLVANIA
Notarial Seal
Sharon L. Markle, Notary Public
Monroeville Boro, Allegheny County
My Commission Expires Jan. 29, 2011

Member, Pennsylvania Association of Notaries

(1)   I am Director, Quality and Licensing Programs, in Nuclear Fuel, Westinghouse Electric Company LLC (Westinghouse) 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 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 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 LTR-NRC-08-26 P-Enclosure, "Westinghouse Presentation for the Axial Offset Validity Criteria Pre-Submittal Meeting" (Proprietary), for submittal to the Commission, being transmitted by Westinghouse letter (LTR-NRC-08-26) and Application for Withholding Proprietary Information from Public Disclosure, to the Document Control Desk. The proprietary information as submitted by Westinghouse Electric Company is that associated with the pre-submittal meeting that will be held with the NRC on May 28, 2008.

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

(a)   Clarify the AO validity criteria guidance.
(b)   Assist customers in implementing an improved methodology.

Further this information has substantial commercial value as follows:

(a)   Westinghouse can use correlation to further enhance their licensing position over their competitors.

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 fuel design 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.

Further the deponent sayeth not.

PROPRIETARY INFORMATION NOTICE

Transmitted herewith are proprietary and/or 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

The reports transmitted herewith each bear a Westinghouse copyright notice. The NRC is permitted to make the number of copies of the information contained in these reports which are necessary for its internal use in connection with generic and plant-specific reviews and approvals as well as the issuance, denial, amendment, transfer, renewal, modification, suspension, revocation, or violation of a license, permit, order, or regulation subject to the requirements of 10 CFR 2.390 regarding restrictions on public disclosure to the extent such information has been identified as proprietary by Westinghouse, copyright protection notwithstanding. With respect to the non-proprietary versions of these reports, the NRC is permitted to make the number of copies beyond those necessary for its internal use which are necessary in order to have one copy available for public viewing in the appropriate docket files in the public document room in Washington, DC and in local public document rooms as may be required by NRC regulations if the number of copies submitted is insufficient for this purpose. Copies made by the NRC must include the copyright notice in all instances and the proprietary notice if the original was identified as proprietary.

"Westinghouse Presentation for the Axial Offset
Validity Criteria Pre-Submittal Meeting"
(Non-Proprietary)

Westinghouse Electric Company
P.O. Box 355
Pittsburgh, Pennsylvania 15230-0355

Resolution of F_Q Surveillance Issues Relating to Axial Offset Validity Guidance – Addendum to Topical Report WCAP-10216-P-A

Westinghouse/NRC Pre-Submittal Meeting
White Flint, Md.
## May 28, 2008

Westinghouse

Agenda

- Background & Perspective

- Purpose of WCAP-10216-P-A Addendum

- Contents of Addendum, Including Approach Taken on Key Issues

- Summary

- Next Steps

Westinghouse

F_Q Surveillance Activity – Background

- $F_Q(z)$ is a local peaking factor limit that is assumed in the plant safety analysis as a precondition to a severe accident (e.g., LOCA).

- Every Westinghouse core design is simulated in advance using extremely conservative NRC approved methods to confirm that the $F_Q(z)$ limit will be met under both steady state and normal allowed transient conditions.

- The monthly F_Q Surveillance activity provides confirmation that the limit is being met at the time of the measurement (steady state) and that the plant AFD & RIL Tech Specs will still protect against violating the limit during an allowed transient.

- "Measured" transient F_Q is approximated by combining measured steady state $F_Q(z)$ with predicted transient adjustment factors called W(z).

- If measured transient F_Q violates the limit, remedy is typically an operating AFD band restriction in proportion to the violation (within 4 hours)

Westinghouse

F_Q Surveillance Activity – At a Glance

FQ Surveillance Illustration
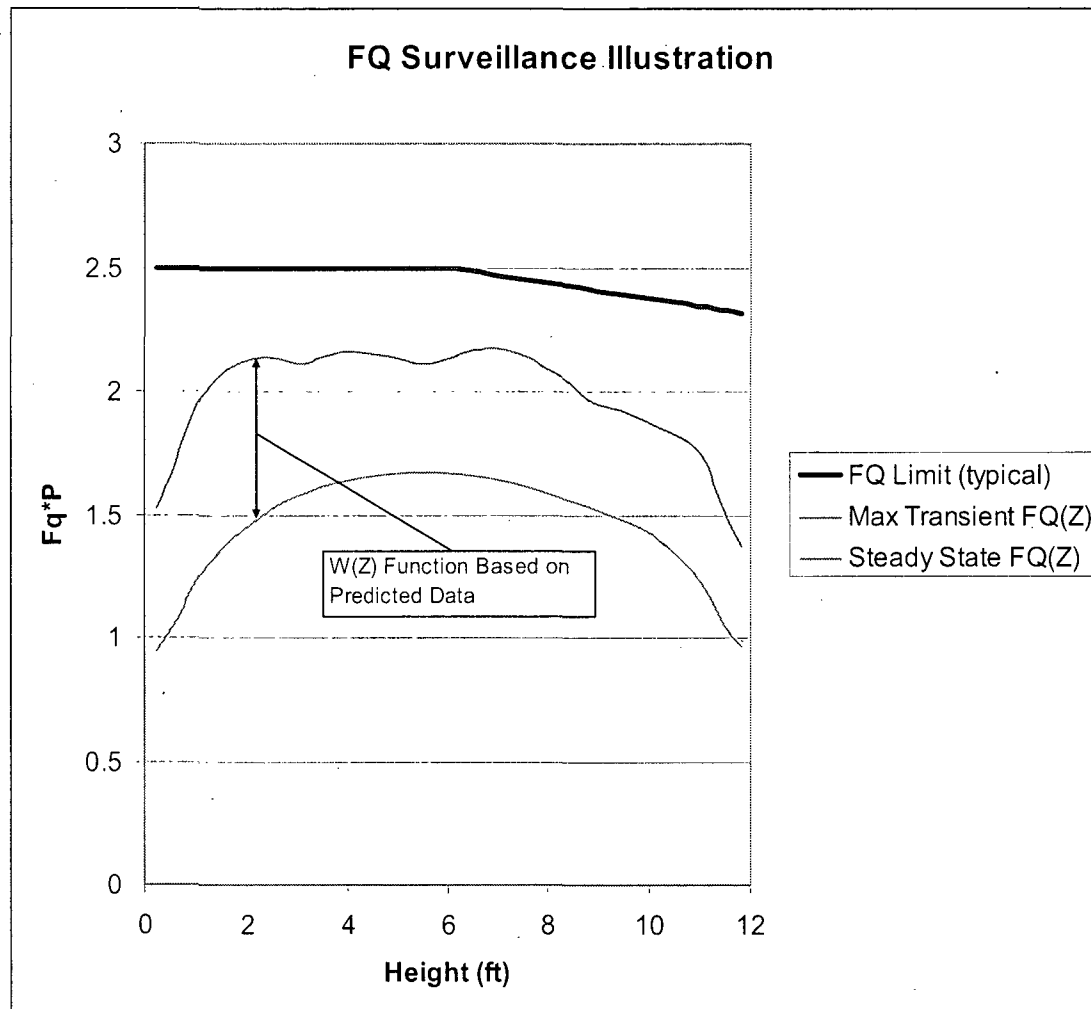
Note: Measured steady state $F_Q(z)$ is increased by 5% measurement uncertainty and 3% manufacturing tolerance uncertainty prior to application of the W(z) function. The uncertainties are not combined and the resulting multiplier for uncertainties applied is 1.0815 (i.e., 1.03*1.05).

Westinghouse

The Issue in a Nutshell

- W(z) functions are ratios, that have in their denominator a single predicted steady state power shape which is intended to be representative of the steady state plant conditions at the time of the surveillance. W(Z) is defined in WCAP-10216-P-A as:

$$W(Z) = \frac{\left(F_Q(Z) * P\right)^{\text{maximum, simulated transient}}}{\left(F_Q(Z) * P\right)^{\text{equilibrium}}}$$

- When the plant conditions for core average axial power shape (AO) and/or core power level are significantly different from that assumed in the W(z) denominator, the accuracy of the <u>transient</u> F_Q surveillance activity can be affected. In most cases, the resulting minimum surveillance margin will be overly-conservative, but there are some cases where the surveillance results may be non-conservative relative to the amount of transient F_Q margin available using re-calculated W(z)s.

- AO Validity Guidance provided by Westinghouse to the industry for adjusting W(z) has been determined by the NRC to be inconsistent with approved methods.

Westinghouse

Putting the Issue in Proper Perspective

- Maximum Transient $F_Q(z)$ is a <u>theoretical condition</u> that assumes the plant operates in an aggressive manner near the edge of the allowed Tech Spec envelope. It is very rare for domestic plants to ever operate in this manner, and natural feedback mechanisms would tend to make any such operation short lived if it occurred.

- In order for a <u>real</u> transient $F_Q(z)$ violation to occur, in addition to the aggressive operation described above, the radial power distribution in the actual core must simultaneously be different enough from predictions that all available margin to the F_Q limit is lost. Again, based on past history this is a very rare occurrence.

- In order for there to be any significant safety consequences from a <u>real</u> transient $F_Q(z)$ violation, the condition must go uncorrected, and then be followed by a very low probability severe accident scenario such as a LOCA.

- The issue with transient F_Q surveillance and W(z) adjustment is primarily a compliance issue, and will be resolved by submitting an addendum to WCAP-10216-P-A for NRC approval.

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History and Current Contents of WCAP-10216-P-A

- WCAP-10216-P-A Covers two topics:

  - Relaxed Axial Offset Control AFD Tech Spec and Supporting Analysis Methods (Part A)

  - F_Q Surveillance Tech Spec and Definition of W(z) Transient Adjustment Function (Part B)

- Originally Approved in 1983. Minor Revision Approved 1994

  (Burnup Dependent Penalty Factor Treatment Revised)

- F_Q Surveillance Technical Specification has since been updated and standardized
  (NUREG-1431 Rev. 3 defines two standardized versions of F_Q Surveillance Tech Spec – RAOC & CAOC)

- Specific surveillance requirements and action statements are changed by NUREG-1431, but the definition of W(z) function is unchanged.

Westinghouse

Purpose of WCAP-10216-P-A Addendum

- Submit the AO validity guidance for NRC review and approval.

- Clarify the intent behind W(z) functions, and discuss why W(z)s are sensitive to the conditions of the measurement.

- Discuss the implications of the F_Q surveillance Tech Spec issues, and how to ensure that the transient F_Q surveillance activity is performed in a conservative manner.

- Discuss the technical basis behind the AO validity guidance (including justification for allowing [   ]a, c AO validity deadband for W(z)s used at RAOC plants)

- Discuss F_Q margin assessment and W(z) adjustment methods that may be used.

- Discuss the application of full power W(z) functions to part power surveillances.

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Table of Contents for WCAP-10216-P-A Addendum

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Description of Standardized F_Q Surveillance Tech Specs

- NUREG 1431 establishes two standardized F_Q Surveillance Tech Specs that are different from the original single version in WCAP-10216

    - Measured surveillance of current steady state $F_Q(z)$ compliance and potential future compliance under allowed transient conditions (e.g., load follow).

    - Description of action statements and time requirements for being out of compliance (current vs. future severity level)

    - Clarifies that W(z) issues affect only the apparent F_Q margin available to accommodate future operational transients, and not the current F_Q compliance status.

    - Discusses the differences in potential allowed transient conditions between RAOC and CAOC plants, and how that affects F_Q surveillance.

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RAOC AFD Band Establishes Fixed Axial Operating Space, while CAOC AFD Band Varies with Measured Target AO
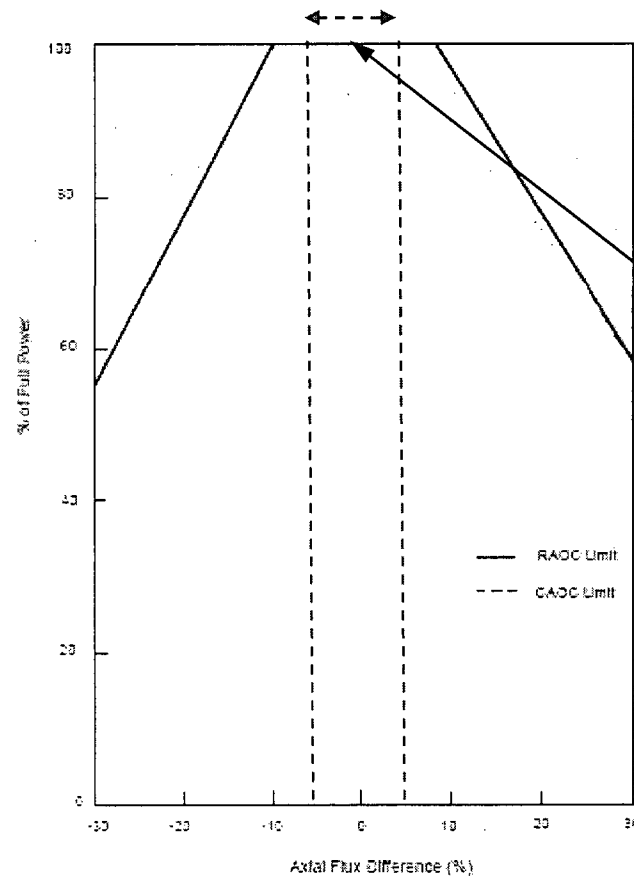
Top of CAOC Band is centered about the measured target axial offset and varies with the measurement

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RAOC Plants Max Transient P(z) is Fixed by AFD Band Limit – Insensitive to Measured Steady State P(z)

a, b, c

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W(Z) Function Sensitivity

- Describes W(z) functions and why they are sensitive to measured plant power distribution.

  - Clarifies that each W(z) function contains a <u>single</u> predicted power shape in the denominator which is intended to match plant surveillance conditions.

  - Breaks down $F_Q(z)$ into radial and axial component terms and describes how measurements contribute primarily the radial peaking component to the transient F_Q surveillance for RAOC plants. For CAOC plants, the measurements contribute both radial and axial components.

  - Discusses implications of W(z) sensitivity and potential consequences of underestimating the measured transient F_Q because of this sensitivity.

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W(z) and TF$_Q$ Surveillance in Radial and Axial Component Terms

W(z) expressed in radial and axial power distribution Component terms

$$W(Z) = \frac{\left(F_{XY}^{Pred,TR}(Z) * P^{Pred,TR}(Z) * P^{Pred,TR}\right)^{maximum,\,simulated\,transient}}{\left(F_{XY}^{Pred,BL}(Z) * P^{Pred,BL}(Z) * P^{Pred,BL}\right)^{equilibrium}}$$

Typical HFP Transient F$_Q$ Surveillance expressed in radial and axial component terms

$$\Delta AO$$
$$\downarrow$$

$$\text{Measured } TF_Q(Z) = \frac{\left(F_{XY}^{Pred,TR}(Z) * P^{Pred,TR}(Z) * P^{Pred,TR}\right)^{maximum,\,simulated\,transient}}{} * \frac{\left(F_{XY}^{Meas,BL}(Z) * P^{Meas,BL}(Z)\right)}{\left(F_{XY}^{Pred,BL}(Z) * P^{Pred,BL}(Z) * 1.0\right)}$$

In a RAOC plant, the axial P(z) terms ideally should cancel due to the fixed AFD band. Only the F$_{xy}$(z) ratio should adjust the predicted maximum transient F$_Q$(Z) to measured conditions.

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AO Validity Guidance in WCAP-10216-P-A Addendum

- Describes the AO Validity Guidance for initiating a review of core related safety analysis inputs and operations data, and for reviewing transient F_Q surveillance results in RAOC plants.

  - Normal steady state AO agreement and known causes of ΔAO are discussed.

  - Safety Analysis Inputs and Operations data reviewed if [

                                                                                      $]^{a,c}$

  - F_Q surveillance margin assessment for RAOC plants if [
              $]^{a,c}$ during the surveillance.

  - Technical basis provided for above ΔAO criteria.

Westinghouse

Technical Justification for Sustained ΔAO Criteria Used to Initiate Review of Safety Analysis Input and Ops Data

- Reload safety evaluation methods already cover operation within allowed AFD band on a snapshot basis

- Analyses that are sensitive to sustained ΔAO are performed off of core models that simulate a sustained ΔAO.

- The worst case allowed under the ΔAO criteria is well within the sustained ΔAO experience from CIPS and AOD cores that have been successfully re-evaluated in the past.

Westinghouse

Technical Justification for [   ]a, c Allowance on Current W(z) Functions for RAOC Plants

- Two sources of conservatism in analysis and measurement methods are identified as sufficient to cover [   ]a,c:

  - Conservatisms in the RAOC transient simulations and radial/axial synthesis methods

    - Extreme and rapid load follow sequences simulated that drive AO to edge of allowed band and position control rods at extremes of insertion limits. Plants don't operate this way in the real world.
    - Resulting axial power shapes are synthetically combined with extreme radial power shapes that assume worst case radial xenon effects at all times.
    - Radial and axial power shapes are not constrained to be consistent with one another
    - Many of the transient shapes included in the analysis are short lived, and may not be possible without first operating in unallowed AFD or RIL space.

  - Conservatism in measurement and manufacturing uncertainty terms as applied during the measurement is worth [   ]a, c when compared to a statistically combined measurement uncertainty factor.

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Effect of Realistic Operating Assumption on Transient F_Q

a, c

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Transient F_Q Surveillance Correction Procedures for RAOC Plants

- Describes transient F_Q surveillance corrective actions for RAOC plants when [   ]a, c

    - [   ]a, c penalty factor described and justified for measured transient F_Q margin assessment in underpowered half of core, when [   ]a, c Overpowered half of the core is not adjusted by penalty factor since surveillance results are already conservative.

    - Procedure described for adjusting W(z) function steady state axial power shape to match measured shape to restore best estimate measured F_Q margin in both halves of core. Cancels out the effect of the axial deviation, but leaves the radial power distribution and core thermal power effects.

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Justification for [

]a, c

* Addendum describes the standard RAOC analyses that were performed on perturbed core models to quantify this penalty, which is applied only to the underpowered half of the core in RAOC plants [   ]a, c

* Also includes simulated demonstrations of transient F_Q surveillances with the [ ]a, c penalty applied, which confirm that the resulting transient F_Q margin will be conservatively determined.

* Defines maximum ΔAO values of [   ]a, c as considered within the demonstrated performance envelope of the [   ]a, c penalty method. If ΔAO exceeds [   ]a, c the W(z) functions will be re-calculated using approved methods based on perturbed models that simulate the condition causing the deviation.
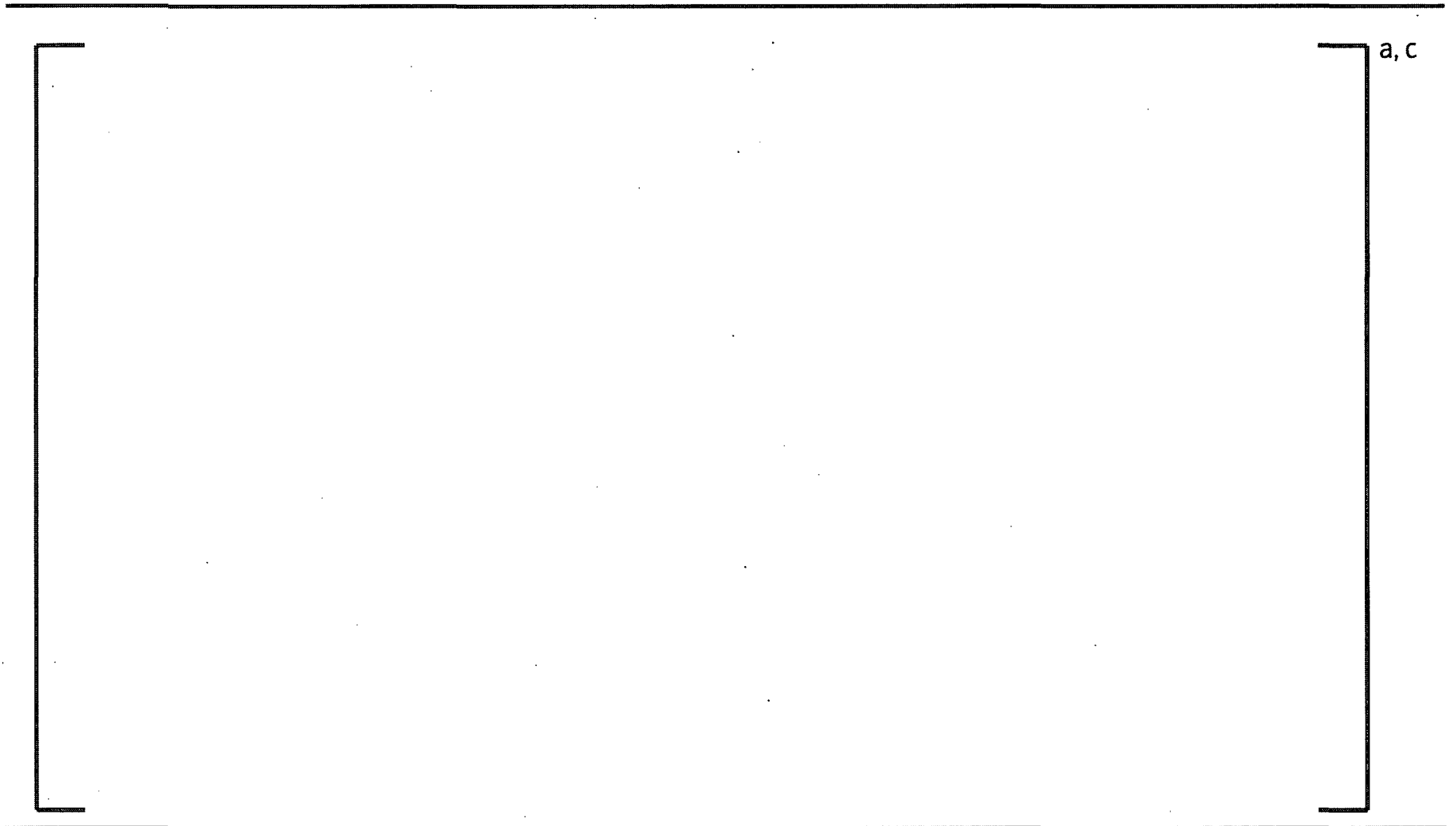
Westinghouse

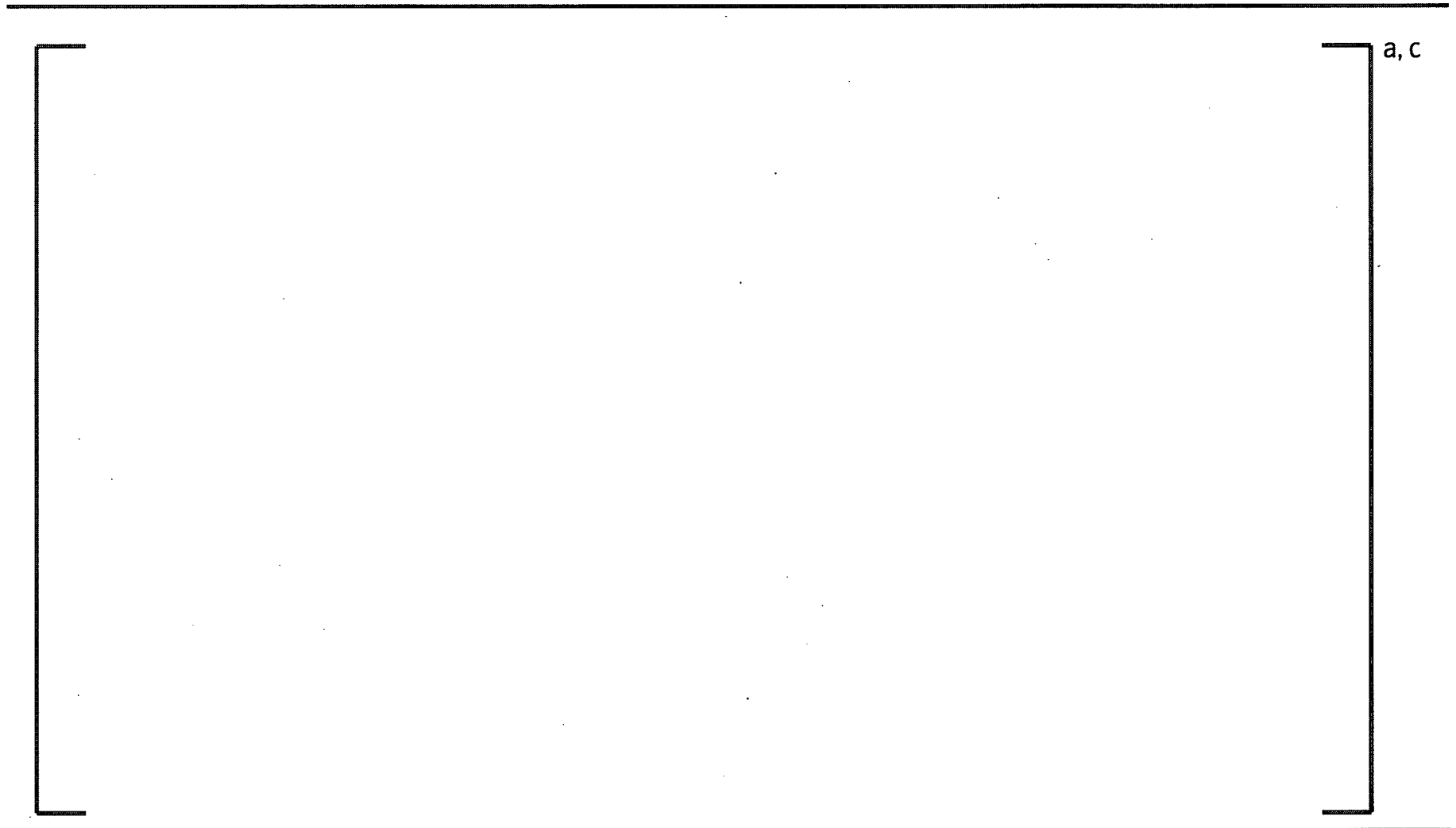# Illustration of Difference in Steady State $F_Q(z)$ when [

]a, c

a, c

Westinghouse

Illustration of [   ]a, c Penalty Application to a Transient $F_Q(z)$ Surveillance when [   ]a, c

a, c

Westinghouse

Illustration of Difference in Steady State $F_Q(z)$ when [

]a, c

a, c

Westinghouse

Illustration of [   ]$^{a, c}$ Penalty Application to a Transient $F_Q(z)$ Surveillance when [   ]$^{a, c}$

a, c

[   ]

Westinghouse

Minimum FQ Margin Summary Table

a, c

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Summary

- NRC has questioned licensing basis of guidance provided by Westinghouse to address effect of measured and predicted axial offset differences on transient F_Q surveillance.

  - Westinghouse provided conservative guidance based on approved methods
  - NRC feels that guidance and its basis should be submitted for review

    - Not safety significant, but a compliance issue

- Addendum to WCAP-10216-P-A Topical Report will be submitted to describe the guidance and its basis.

- Upon NRC approval, this Addendum will supersede previously provided guidance.

- NRC's timely review and approval of this material is requested to close this compliance issue and clearly establish the licensing basis for the transient F_Q surveillance guidance.

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Next Steps

- Schedule:

  - Topical Pre-meeting   May 28, 2008
  - Submit Topical Addendum to NRC   July 11, 2008
  - Requested Approval   ASAP

Westinghouse