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U.S. Nuclear Regulatory Commission  
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Our ref: LTR-NRC-08-23  
May 8, 2008

Subject: Representative Draft Slides for the Axial Offset Validity Criteria Pre-Submittal Meeting  
(Proprietary/Non-proprietary)

Enclosed are copies of the Proprietary and Non-Proprietary versions of the Draft Slides for the Axial Offset Validity Criteria Pre-Submittal Meeting. Westinghouse is requesting a meeting on May 28, 2008. The attached draft slides are provided for NRC proprietary determination assessment.

Also enclosed is:

1. One (1) copy of the Application for Withholding, AW-08-2421 (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-08-2421 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,

A handwritten signature in black ink, appearing to read 'J. A. Gresham', written over the typed name.

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

Enclosures

cc: J. Thompson, NRR

*T007  
Add: J Thompson  
NRR*



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Our ref: AW-08-2421  
May 8, 2008

APPLICATION FOR WITHHOLDING PROPRIETARY  
INFORMATION FROM PUBLIC DISCLOSURE

Subject: LTR-NRC-08-23 P-Enclosure, "Representative Draft Slides for the Axial Offset Validity Criteria Pre-Submittal Meeting" (Proprietary)

Reference: Letter from J. A. Gresham to Document Control Desk, LTR-NRC-08-23, dated May 8, 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-08-2421 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-08-2421 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,

A handwritten signature in black ink, appearing to read 'J. A. Gresham', written over the typed name.

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

Cc: J. Thompson, NRR

AFFIDAVIT

COMMONWEALTH OF PENNSYLVANIA:

ss

COUNTY OF ALLEGHENY:

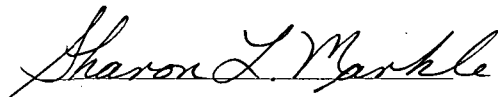
Before me, the undersigned authority, personally appeared J. A. Gresham, who, being by me duly sworn according to law, deposes and says that he is authorized to execute this Affidavit on behalf of Westinghouse Electric Company LLC (Westinghouse) and that the averments of fact set forth in this Affidavit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



J. A. Gresham, Manager

Regulatory Compliance and Plant Licensing

Sworn to and subscribed  
before me this 9<sup>th</sup> 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 Manager, Regulatory Compliance and Plant Licensing, in Nuclear Services, 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-08-23 P-Enclosure, "Representative Draft Slides for the Axial Offset Validity Criteria Pre-Submittal Meeting" (Proprietary), for submittal to the Commission, being transmitted by Westinghouse letter (LTR-NRC-08-23) 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 an NRC review for proprietary determination.

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.

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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

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Slide 1





# Agenda

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- Background
- Purpose of WCAP-10216-P-A Addendum
- Contents of Addendum, Including Approach Taken on Key Issues
- Summary
- Next Steps

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Slide 2



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

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- **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.**

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## Background on $F_Q$ Surveillance $W(Z)$ Sensitivity

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- $W(Z)$  Functions used to adjust measured steady state  $F_Q(Z)$  for potential transient effects are sensitive to the conditions of the measurement (axial power shape and power level).  $W(Z)$ s do not provide an accurate adjustment if steady state plant conditions do not match predictions reasonably well.
- Most  $F_Q$  surveillances are performed at or near HFP, consistent with the  $W(Z)$ s, so power level of surveillance is rarely an issue.
- Steady state measured Axial Offset (AO) can differ from predictions for a variety of reasons, and this can affect the  $F_Q$  surveillance results for RAOC plants.
- Westinghouse has provided industry with an AO Validity guidance document that defines the AO issue, and describes how and when to perform a transient  $F_Q$  margin assessment or  $W(Z)$  adjustment when predicted AO in the  $W(Z)$  function does not match measured.

## Purpose of WCAP-10216-P-A Addendum

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- 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 [ ]<sup>a, c</sup> 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.

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

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1.0 INTRODUCTION AND PURPOSE .....

2.0 SUMMARY OF THE STANDARD UPDATED FQ SURVEILLANCE TECHNICAL SPECIFICATION .....

3.0 SENSITIVITY OF THE W(Z) FUNCTION TO PLANT SURVEILLANCE CONDITIONS .....

    3.1 IMPLICATIONS OF W(Z) SENSITIVITY TO SURVEILLANCE POWER LEVEL .....

    3.2 IMPLICATIONS OF W(Z) SENSITIVITY TO STEADY STATE AXIAL POWER SHAPE FOR RAOC PLANTS .....

4.0 AXIAL OFFSET VALIDITY GUIDANCE .....

    4.1 KNOWN CAUSES OF DELTA-AO .....

    4.2 DELTA-AO CRITERIA AND RECOMMENDED ACTIONS .....

5.0 COMPENSATORY ACTIONS TAKEN FOR F<sub>Q</sub> SURVEILLANCE IN RAOC PLANTS WHEN [ ]<sup>ac</sup> .....

6.0 REFERENCES .....

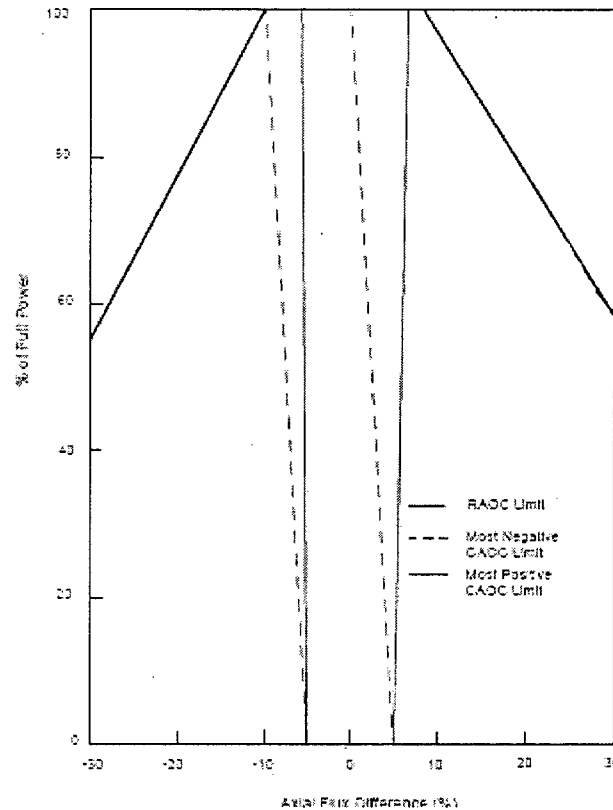
## Contents of WCAP-10216-P-A Addendum

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- Describes how the two standardized  $F_Q$  Surveillance Tech Specs in NUREG-1431 Differ 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.

# RAOC AFD Band Establishes Fixed Axial Operating Space, while CAOC AFD Band Varies with Measured Target AO

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

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a, b, c

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## Contents of WCAP-10216-P-A Addendum (cont)

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- Describes  $W(Z)$  functions and why they are sensitive to measured plant power distribution.
  - Clarifies that each  $W(Z)$  function contains a single 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.

## W(Z) Definition in WCAP-10216-P-A

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W(Z) as defined in topical

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

W(Z) expressed in radial and axial power distribution terms

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

## Contents of WCAP-10216-P-A Addendum (cont)

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- 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  $\Delta AO$  are discussed.
  - Safety Analysis Inputs and Operations data reviewed if [ ]<sup>a, c</sup>
  - $F_Q$  surveillance margin assessment for RAOC plants if [ ]<sup>a, c</sup> during the surveillance.
  - Technical basis provided for above  $\Delta AO$  criteria.

## Technical Justification for [ ]<sup>a, c</sup> Allowance on Current W(Z) Functions for RAOC Plants

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- Two sources of conservatism in analysis and measurement methods are identified as sufficient to cover [ ]<sup>a, c</sup>:
  - Conservatism in the RAOC transient simulations and radial/axial synthesis methods are described and quantified to be worth [ ]<sup>a, c</sup>
    - Extreme and rapid load follow sequences simulated that drive AO to edge of allowed band and position control rods at extremes of insertion limits
    - 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 [ ]<sup>a, c</sup> when compared to a statistically combined measurement uncertainty factor.

## Contents of WCAP-10216-P-A Addendum (cont)

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- Describes transient  $F_Q$  surveillance corrective actions for RAOC plants when [ ]<sup>a, c</sup>
  - [ ]<sup>a, c</sup> penalty factor described and justified for measured transient  $F_Q$  margin assessment in underpowered half of core, when [ ]<sup>a, c</sup>  
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.

## Justification for [ ]<sup>a, c</sup>

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- 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 [ ]<sup>a, c</sup>
- Also includes simulated demonstrations of transient FQ surveillances with the [ ]<sup>a, c</sup> penalty applied, which confirm that the resulting transient FQ margin will be conservatively determined.
- Defines maximum  $\Delta AO$  values of [ ]<sup>a, c</sup> as considered within the demonstrated performance envelope of the [ ]<sup>a, c</sup> penalty method. If DAO exceeds [ ]<sup>a, c</sup> the  $W(Z)$  functions will be re-calculated using approved methods based on perturbed models that simulate the condition causing the deviation.

# Illustration of [ ]<sup>a, c</sup> Penalty Application to a Surveillance when [ ]<sup>a, c</sup>

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# Minimum FQ Margin Summary Table

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	a, c
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## Summary

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- Addendum to WCAP-10216-P-A Topical Report Being Submitted to describe known generic issues with transient  $F_Q$  surveillance methodology, and compensatory actions that will be taken when necessary.
- Issues are not safety significant, but are being identified to ensure that future transient  $F_Q$  surveillances are performed in a conservative, and NRC approved manner.
- Submittal contains ~20 pages of actual content, and will replace AO Validity Guidance, once approved.
- NRC's timely review and approval of this material is requested so that generic issue can be closed out without further impact on Westinghouse customers

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## Next Steps

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