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LTR-NRC-12-22

March 27, 2012

Subject: Response to the NRC's Draft Second Round of RAI's on Westinghouse Topical Report WCAP-16182-P-A, Revision 1, "Westinghouse BWR Control Rod CR 99 Licensing Report - Update to Mechanical Design Limits" (TAC No. ME2630) (Proprietary/Non-Proprietary)

Enclosed is Westinghouse's proprietary review of the NRC's Draft Second Round of RAI's on Westinghouse Topical Report WCAP-16182-P-A, Revision 1, "Westinghouse BWR Control Rod CR 99 Licensing Report - Update to Mechanical Design Limits" (TAC No. ME2630) (Proprietary/Non-Proprietary). There is proprietary information identified in the draft RAIs. Responses to these RAIs will be submitted to the NRC within 30 days of the receipt of the final questions.

Also enclosed are:

1. One (1) copy of the Application for Withholding Proprietary Information from Public Disclosure, AW-12-3422 (Non-Proprietary), with Proprietary Information Notice and Copyright Notice.

2. One (1) copy of Affidavit (Non-Proprietary).

The enclosure to this letter 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 letter an Application for Withholding Proprietary Information 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 proprietary aspects of the application for withholding or the Westinghouse affidavit should reference AW-12-3422 and should be addressed to J. A. Gresham, Manager, Regulatory Compliance, Westinghouse Electric Company, Suite 428, 1000 Westinghouse Drive, Cranberry Township, Pennsylvania 16066.

Very truly yours,

J. A. Gresham, Manager
Regulatory Compliance

Enclosures

cc: E. Lenning

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NRR

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AW-12-3422

March 27. 2012

APPLICATION FOR WITHHOLDING PROPRIETARY INFORMATION FROM PUBLIC DISCLOSURE

Subject: LTR-NRC-12-22 P-Enclosure, "Response to the NRC's Draft Second Round of RAI's on Westinghouse Topical Report WCAP-16182-P-A, Revision 1, 'Westinghouse BWR Control Rod CR 99 Licensing Report - Update to Mechanical Design Limits'" (TAC No. ME2630) (Proprietary)

Reference: Letter from J. A. Gresham to Document Control Desk, LTR-NRC-12-22, dated March 27, 2012

The Application for Withholding Proprietary Information from Public Disclosure 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 information for which withholding is being requested is that identified in the proprietary version of the subject document. In conformance with 10 CFR Section 2.390, Affidavit AW-12-3422 accompanies this Application for Withholding Proprietary Information from Public Disclosure, 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 the proprietary aspects of the application for withholding or the accompanying affidavit should reference AW-12-3422 and should be addressed to J. A. Gresham, Manager, Regulatory Compliance, Westinghouse Electric Company, Suite 428, 1000 Westinghouse Drive, Cranberry Township, Pennsylvania 16066.

Very truly yours,

J. A. Gresham, Manager
Regulatory Compliance

Enclosures

AW-12-3422

AFFIDAVIT

COMMONWEALTH OF PENNSYLVANIA:

ss

COUNTY OF BUTLER:

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

Sworn to and subscribed before me
this 27th day of March 2012

Notary Public

COMMONWEALTH OF PENNSYLVANIA
Notarial Seal
Cynthia Olesky, Notary Public
Manor Boro, Westmoreland County
My Commission Expires July 16, 2014
Member, Pennsylvania Association of Notaries

(1) I am Manager, Regulatory Compliance, 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 rule making 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 Proprietary Information from Public Disclosure 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 that 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 contained in LTR-NRC-12-22 P-Enclosure, "Response to the NRC's Draft Second Round of RAI's on Westinghouse Topical Report WCAP-16182-P-A, Revision 1, 'Westinghouse BWR Control Rod CR 99 Licensing Report - Update to Mechanical Design Limits'" (TAC No. ME2630) (Proprietary) for submittal to the Commission, being transmitted by Westinghouse letter LTR-NRC-12-22, and Application for Withholding Proprietary Information from Public Disclosure, to the Document Control Desk. The proprietary information as submitted by Westinghouse is that associated with the RAIs drafted for WCAP-16182-P-A, Revision 1.

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

(a) Obtain the NRC's approval for revised design criteria which will allow for extended component life of the Westinghouse CR 99 BWR control rods.

Further, this information has substantial commercial value as follows:

(a) Assist customers to obtain license changes.

(b) Westinghouse plans to sell the use of this information to its customers for the purpose of further enhancing their licensing position over their competitors.

(c) The information requested to be withheld reveals the distinguishing aspects of a product 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 gain knowledge of our commercial strategies.

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 the request for approval of revised design criteria for the Westinghouse CR 99 BWR control rods.

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's Draft Second Round of RAI's on Westinghouse Topical Report WCAP-16182-P-A, Revision 1, "Westinghouse BWR Control Rod CR 99 Licensing Report - Update to Mechanical Design Limits" (TAC No. ME2630) (Non-Proprietary)

Westinghouse Electric Company LLC
1000 Westinghouse Drive
Cranberry Township, Pennsylvania 16066

Second round of the Requests for Additional Information (RAIs) WCAP-16182-P-A, Revision 1, "Westinghouse Boiling Water Reactor Control Rod CR 99 Licensing Report – Update to Mechanical Design Limits."

1. Follow up to RAI-1a and RAI-11 on helium release and control rod pressure. [ ]^{a,c} release data points have been provided to justify the helium release fraction as defined by Equation 6.2 of the submittal. This equation has very little conservatism in relation to the small amount of release data provided. Traditionally the NRC has required the pressures in fuel rods to be calculated from a 95/95 upper bound tolerance. The helium release calculated from Equation 6.2 is approximately a factor of [ ]^{a,c} than the 95/95 bounding value from the [ ]^{a,c} (assumes [ ]^{a,c} degrees of freedom) data provided. Please justify (based on data comparisons) why the rod pressures calculated for the CR-99 design are conservative particularly given the response to RAI-11 that suggests that the ideal gas law [ ]^{a,c} and the use of [ ]^{a,c} for calculating initial void volume (response to RAI-2b). Also see RAI-17 below and RAI-18 that suggests the proposed B_4C [ ]^{a,c} swelling model is significantly lower than the traditional 95/95 upper bound that will not result in a 95/95 lower bound on void volume with ^{10}B depletion.

2. The recent paper by G. Ledberger, P. Seltborg and B. Rebensdorft "Mechanical Performance of the Westinghouse BWR CR 99 Control Rod at High Depletion Levels", presented at the 2011 Water Reactor Fuel Performance Meeting in Changdu, China notes that cracking has been observed in the Generation 2 CR 99 design. The subject topical report states that the Generation 3 CR 99 was a redesign of Generation 2 to provide additional volume to prevent contact between the B_4C [ ]^{a,c} and the blade wall. There are three concerns associated with the analyses presented in the current submittal for the Generation 3 CR 99 design:

1) The analysis of gap size appears to be based on the same upper bound B_4C [ ]^{a,c} swelling model used for Generation 2 design that resulted in gap closure and cracking,

2) See Item 3 below that suggests the upper bound swelling model does not meet the traditional 95/95 upper bound traditionally used for licensing analyses, and

3) The depletion limit for Generation 3 appears to be in terms of average ^{10}B depletion [ ]^{a,c} while the paper notes that peak local ^{10}B depletion can be considerably higher than the average resulting in peak swelling significantly higher than the average depletion level. This paper further notes that cracking first appeared in the locations of peak depletion. Please explain why a limit should not be established for a peak depletion level in the CR 99 Generation 3 control rod in addition to an average depletion. Did the peak depletion locations in Generation 2 [ ]^{a,c}?

Also, from this paper it appears that free (non-constrained) swelling has been measured in the [ ]^{a,c} but this swelling data has not been discussed in this submittal, please discuss this data in relation to the relevance to this submittal.

3. Follow up to RAI-1b. [ ]^{a,c} swelling data have been provided to justify the B_4C swelling as defined by Equation 6.12 of the submittal. A 95/95 upper bound based on the [ ]^{a,c} data points (assuming [ ]^{a,c} degrees of freedom) is over a factor of [ ]^{a,c} than the value applied in Equation 6.12. Therefore, the bounding Equation 6.12 provides [ ]^{a,c} bound than the traditional 95/95 bound of the data used in licensing analyses; please discuss why this is acceptable.

4. Follow up to RAI-7 of the first round of RAIs. This response was inadequate, a more detailed commitment is needed for a domestic inspection program other than the small amount of inspections oversees, particularly given the very small amount of helium release and swelling data provided and the cracking problems with the Generation 2 CR 99 design.

5. Follow up to RAI-8. Was the control blade evaluated for bending loads, such as a seismic channel bow load case? If evaluated please discuss, if not please provide justification why the bending loads were not considered.

6. Follow up to RAI-12. Mechanical Criterion 5 requires the control rod be insertable into the core without structural damage during a certain specified oscillatory fuel channel deflection. Does this analysis take into account possible creep strains in the control rods that could impact insertion? The proof of insertion appears to be that the CR-99 rod is more compliant than the CR-85 rod, and the CR-85 rod was found to be acceptably insertable during testing. How is the requirement of no structural damage addressed? The CR-99 appears to be generally operating at a higher stress state and insertion stresses could increase with rod compliance, leading to a more potentially damaging insertion scenario for the CR-99.

7. Follow up to RAI-15. What is the allowable design limit (Sm) value for stainless steel used in the CR-99 evaluation? Are the [ ]^{a,c} values of Sm identical? What are the sources of material data used to determine Sm? Also justify the reduced stress conversion factor for the fatigue calculation (Equation 6.7) from that provided in Reference 2.

8. Follow up to RAI-8. Do stresses in the structural finite element models exceed the elastic range? If so, is plastic material behavior modeled? If plastic is modeled please provide a description of the model.