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Our ref: LTR-NRC-06-53

September 18, 2006

Subject: Response to NRC's Request for Additional Information By the Office Of Nuclear Reactor Regulation Topical Report WCAP-16523-P, "Westinghouse Correlations WSSV and WSSV-T for Predicting Critical Heat Flux in Rod Bundles with Side-Supported Mixing Vanes" (TAC No. MD0561) (Proprietary/Non-Proprietary)

Enclosed are copies of the Proprietary and Non-Proprietary responses for NRC's Request for Additional Information for WCAP-16523-P/WCAP-16523-NP "Westinghouse Correlations WSSV and WSSV-T for Predicting Critical Heat Flux in Rod Bundles with Side-Supported Mixing Vanes".

Also enclosed is:

1. One (1) copy of the Application for Withholding, AW-06-2200 (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 this affidavit or Application for Withholding should reference AW-06-2200 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: F. M. Akstulewicz, NRR
E. Throm, NRR
J. H. Thompson, NRR

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Our ref: AW-06-2200

September 18, 2006

APPLICATION FOR WITHHOLDING PROPRIETARY INFORMATION FROM PUBLIC DISCLOSURE

Subject: Response to NRC's Request for Additional Information By the Office Of Nuclear Reactor Regulation Topical Report WCAP-16523-P, "Westinghouse Correlations WSSV and WSSV-T for Predicting Critical Heat Flux in Rod Bundles with Side-Supported Mixing Vanes" (TAC No. MD0561) (Proprietary)

Reference: Letter from J. A. Gresham to NRC, LTR-NRC-06-53, dated September 18, 2006

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-06-2200 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-06-2200 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

AW-06-2200

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 18th day
of September, 2006.

Notary Public

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

(1) I am 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 in LTR-NRC-06-53 P-Attachment, Response to NRC's Request for Additional Information By the Office Of Nuclear Reactor Regulation Topical Report WCAP-16523-P, "Westinghouse Correlations WSSV and WSSV-T for Predicting Critical Heat Flux in Rod Bundles with Side-Supported Mixing Vanes" (TAC No. MD0561) (Proprietary), for submittal to the Commission, being transmitted by Westinghouse letter (LTR-NRC-06-53) and Application for Withholding Proprietary Information from Public Disclosure, to the Document Control Desk. The proprietary information as submitted by Westinghouse Electric Company is responses to NRC's Request for Additional Information.

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

(a) Demonstrate the acceptability of the CE 16x16 Next Generation Fuel and corresponding correlation.

(b) Assist customers in implementing an improved fuel product.

Further this information has substantial commercial value as follows:

(a) Westinghouse can use this fuel design with its associated correlation to further enhance their licensing position over their competitors.

(b) Assist customers to obtain license changes.

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 for developing the enclosed improved core thermal performance methodology.

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).

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LTR-NRC-06-53 NP-Attachment
TAC No. MD0561

Response to NRC's Request for Additional Information By the Office Of Nuclear Reactor Regulation Topical Report WCAP-16523-P, "Westinghouse Correlations WSSV and WSSV-T for Predicting Critical Heat Flux in Rod Bundles with Side-Supported Mixing Vanes" (TAC No. MD0561) (Non-Proprietary)

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

Response to NRC's Request for Additional Information
By the Office Of Nuclear Reactor Regulation
Topical Report WCAP-16523-P, "Westinghouse Correlations WSSV and WSSV-T for Predicting Critical Heat Flux in Rod Bundles with Side-Supported Mixing Vanes" (TAC No. MD0561) (Non-Proprietary)

Question 1: **On page 23 of 124, the B-array index shown in the top equation is not consistent with the index value for the same equation elsewhere in the report. Correct as appropriate.**

Response 1: *The B-array indices shown on page 23 will be corrected to be consistent with the final equation form shown on page 24 of 124 in the final approved report.*

Question 2: **On page 24 of 124, define the following terms in the equation for F_C:**
$q''_{CHF,NU}$ (not defined until page 36 of 124)
l_{crit}
z

Response 2: *The terms in the equation for F_C will be defined following the equation given on page 24 of 124 in the final approved report.*

Question 3: **On page 24 of 124, the only parts of the last equation previously considered proprietary are the leading coefficient and the exponents, see for example page 5-5 in CENPD-387-NP-A, Rev. 000, "ABB Critical Heat Flux Correlations for PWR Fuel." Correct as appropriate, and define any new terms.**

Response 3: *The proprietary brackets will be moved to cover just the leading coefficient and the exponents, consistent with CENPD-387-P-A in the final approved report. Terms are defined following the equation for F_C.*

Question 4: **The term F_C, to correct for non-uniform shapes, includes an empirical term "C" taken from CENPD-387-P-A, "ABB Critical Heat Flux Correlations for PWR Fuel." The parameter ranges have been expanded in the current proposal as compared to the previous study, most notably in the local coolant quality. Provide an explanation, or re-evaluate the empirical term "C" to cover the new parameter range, justifying the use of this term for cases outside the original parameter ranges used to develop "C."**

Response 4: *As described in Section 5 of CENPD-387-P-A, the non-uniform shape factor was optimized based upon the application of the correlation form and coefficients from uniform axial power data to the available non-uniform data. The non-uniform tests used*

to evaluate the empirical term "C" in CENPD-387-P-A had quality ranges from [ ] [a, b, c] from the beginning of subcooled boiling to the end of heated length. Therefore, in the region where minimum DNBR could have occurred, the quality range in the non-uniform data was larger than the quality range for the final correlation. In CENPD-387-P-A, the coefficients were determined with the data from five tests with five non-uniform shapes and were validated with the data from three additional tests. As shown in Figure 5-7 of CENPD-387-P-A, the results [ ] [a, c] for the entire range of quality at the MDNBR locations. For the WSSV and WSSVT correlations, the data from Test 114 is used to validate the use of the coefficients determined in CENPD-387-P-A for the current correlation. Test 114 has a large quality range from [ ] [a, b, c] from the beginning of subcooled boiling to end of heated length. As stated in Section 5, the mean for Test 114 is [ ] [a, b, c] with VIPRE for WSSV and [ ] [a, b, c] with TORC for WSSV-T with standard deviations less than [ ] [a, b, c]. The scatter plots in Section 5 show no trend with quality or the value of F_C. Therefore, the results for Test 114, along with Test 93, validate and justify the use of the empirical term "C", determined in CENPD-387-P-A for the new correlations with the increased local coolant quality range.

Question 5: **The base ABB-NV and ABB-TV correlations (CENPD-387) did not include a factor to extend the correlation to higher qualities. The break point selected overlaps the previous data. Provide a discussion for how the break point was selected.**

Response 5: *Visual observations of the data when the higher quality data are included indicated the [ ] [a, c] value provided the lowest standard deviation and smoothest scatter plot for the values evaluated for the WSSV and WSSV-T correlations. As a further check, the statistical tests described in Section 5 were applied to confirm the [ ] [a, c].*

Question 6: **On page 38 of 124, it is stated "After the initial runs, the code could {emphasis added} have been used to separate out outliers, following the procedure described in Section 5. No points in the correlation database were rejected by this procedure as outliers." In Section 5, page 56 of 124, it is stated "As stated in Section 4, no points from the correlation or validation databases were eliminated." Clarify the actual procedure used to determine that no points in the data base were identified as outliers.**

Response 6: *The procedure used was the application of the outlier test given in Chapter 17 of Reference 7 that is described in Section 5.1.1. The test was applied to the correlation database and the combined correlation and validation database, after poolability was demonstrated. The test showed there were no outliers in either database. This*

description of the procedure will be added to Section 5.1.1 in the final approved report. Also, the words, "As stated in Section 4", will be removed from page 55 to eliminate the cross-reference.

Question 7: **On page 56 of 124, should the equation for W be b^2/S^2 (b-squared divided by S-squared)?**

Response 7: *The expression W = b2/S2 will be corrected to $W = b^2/S^2$ in the final approved report.*