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Our ref: LTR-NRC-08-8
February 7, 2008

Subject: Follow-Up Response to Question 6-9 of the NRC's Request for Additional Information by the Office of Nuclear Reactor Regulation for Topical Report (TR) WCAP-16747-P, "POLCA-T: System Analysis Code with Three-Dimensional Core Model" (TAC No. MD5258) (Proprietary/Non-proprietary)

Enclosed are copies of the Proprietary and Non-Proprietary follow-up response to question 6-9 of the NRC's Request for Additional Information by the Office of Nuclear Reactor Regulation for Topical Report (TR) WCAP-16747-P, "POLCA-T: System Analysis Code with Three-Dimensional Core Model."

Also enclosed is:

1. One (1) copy of the Application for Withholding, AW-08-2379 (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-08-2379 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 a printed name.

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

Enclosures

cc: A. Mendiola, NRR
P. Yarsky, NRR
J. Thompson, NRR

T007
NRR



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Our ref: AW-08-2379
February 7, 2008

APPLICATION FOR WITHHOLDING PROPRIETARY
INFORMATION FROM PUBLIC DISCLOSURE

Subject: LTR-NRC-08-8 P-Enclosure, "Follow-Up Response to Question 6-9 of the NRC's Request for Additional Information by the Office of Nuclear Reactor Regulation for Topical Report (TR) WCAP-16747-P, 'POLCA-T: System Analysis Code with Three-Dimensional Core Model' " (TAC No. MD5258) (Proprietary)

Reference: Letter from J. A. Gresham to Document Control Desk, LTR-NRC-08-8, dated February 7, 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-08-2379 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-08-2379 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
P. Yarsky, NRR
J. Thompson, NRR

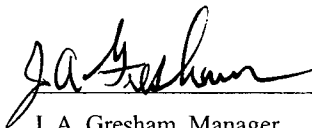
AFFIDAVIT

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 8th day
of February, 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-08-8 P-Enclosure, "Follow-Up Response to Question 6-9 of the NRC's Request for Additional Information by the Office of Nuclear Reactor Regulation for Topical Report (TR) WCAP-16747-P, 'POLCA-T: System Analysis Code with Three-Dimensional Core Model' (TAC No. MD5258) (Proprietary)," for submittal to the Commission, being transmitted by Westinghouse letter (LTR-NRC-08-8) 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 follow-up response to question 6-9 of the NRC's Request for Additional Information.

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

- (a) Obtain generic NRC licensed approval for use of the advanced dynamic system analysis code POLCA-T in performing BWR licensing analysis.
- (b) Specific applications using the POLCA-T computer code will include Control Rod Drop Accident (CRDA) analysis and BWR stability analysis.

Further this information has substantial commercial value as follows:

- (a) Future applications of the POLCA-T computer code will include BWR Transient Analysis and Anticipated Transient Without Scram (ATWS) analysis.
- (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).

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.

Follow-Up Response to Question 6-9 of the NRC's Request for Additional Information by the Office of Nuclear Reactor Regulation for Topical Report (TR) WCAP-16747-P, "POLCA-T: System Analysis Code with Three-Dimensional Core Model" (TAC No. MD5258) (Non-Proprietary)

February 2008

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RAI 6 Stability Evaluation

NRC RAI 6-9

Qualify the thermal hydraulic model for the stability evaluation separately by providing an analysis of type 1, type 2, and loop oscillations for a non-nuclear experiment such as FRIGG.

Westinghouse Response to RAI 6-9

The current stability validation database for POLCA-T includes reactor and loop measurements in a wide parameter range regarding reactor types and fuel designs as well as burnup, power, flow and subcooling.

Core stability is a coupled thermal hydraulic and neutronic phenomenon in the low-frequency range of the process dynamics. The loop and reactor signal measurement database covers the frequency range up to about 25 Hz at a maximum.

Stability measurements are performed during reactor start-up after refueling, or during periodic testing, i.e. they are integral tests, consisting of superimposed physical processes. Therefore, the stability validation is not a validation of separate effects but rather a validation of the combined physical processes within the frequency range. Due to the parameter variation, mentioned above, the separate effects of different physical processes are weighted differently within the superimposed process (actual reactor measurement), so that the validation inherently covers several thermal hydraulic processes, such as flow excursion, density wave oscillations and pressure drop oscillations. Since fluctuation in pressure is an important noise source, the dynamic properties of pressure propagation, within the frequency range, is also inherently validated.

Geysering and chugging are mainly containment phenomena outside the parameter range within which core stability and power oscillations are analyzed. Westinghouse does not have the intention to analyze geysering and chugging within the standard core stability analysis.

At rare occasions, pressure control system induced oscillations have occurred in reactor operation, due to wear in components or incorrectly tuned control parameters. This type of instability may occur anywhere in the operating domain, depending on the control system properties (mainly through the total gain). Even though the control system might be unstable, the power oscillations are limited (due to the damped core dynamic properties), unless the core dynamics are close to the instability limit. That is, if the core is close to the instability limit, the standard stability analysis will reveal this, and depending on the current methodology proper actions can be taken. Diverging oscillations are taken care of by the applied detect and suppress methodology, which does not consider the origin of the oscillations. Therefore, safety concerns regarding control system instabilities are taken into account by the current validation and applied methodology. Outside the dynamic range of the core (above 1 Hz), the spectral gain is very small, and control system induced power oscillations in that range will be strongly damped and have no safety impact.

Control system instability may induce limited power oscillations or reinforce inherent core power oscillations. The impact from control system instabilities might be analyzed as imposed oscillations. In operation, control system induced oscillations, if inducing high amplitude power oscillations, will be detected by the DSS.

Below is the validation of POLCA-T using FRIGG measurements for an Optima2 sub-channel. An instability limit in power and flow is fitted to the measurements results (linear fit), and the uncertainty band is estimated based on the flow measurement uncertainty (which is estimated to []^{a,b,c} at this flow) and the estimate of power oscillation threshold uncertainty (estimated from measurements to []^{a,c}).

The thermal hydraulic stability limit for two different axial power distributions is calculated adequately with POLCA-T. The results are shown in the Figure below.

