

ENCLOSURE 3

Non-Proprietary Version and Affidavit for Withholding

Tennessee Valley Authority - Watts Bar Nuclear Plant - Unit 2, Docket No. 50-391

RAIs for FSAR Sections 4, 5, 6, and 9 (from NRC letter dated September 16, 2010 (ADAMS Accession No. ML102530464))

4.4.1 – 1. Safety Evaluation Report (SER) 4.4.4, "Performance in Safety Criteria" (FSAR 4.4.1)

FSAR Table 4.4-1 provides the design limit from nucleate boiling ratio (DNBR) values. Provide:

- a. *The safety limit DNBR values for typical and thimble cells, for use with the Revised Thermal Design Procedure, and the Standard Thermal Design Procedure methods.*

Response: The design limit DNBR values listed in FSAR Table 4.4-1 are the values that meet the DNB design criterion based on the Revised Thermal Design Procedure (RTDP) methodology, (WCAP-11397-P-A (Proprietary) / WCAP-11397-A (Non-Proprietary), "Revised Thermal Design Procedure," April 1989). DNBR margin to offset known DNBR penalties (e.g., rod bow) and to provide operating and design flexibility is maintained in the RTDP analyses by performing the safety analyses to selected DNBR limits which are higher than the design limit DNBR values. For both the typical and thimble cells, a safety analysis limit DNBR of []^{a, c} is used compared to the design limit DNBR of 1.23 listed in FSAR Table 4.4-1.

For the Standard Thermal Design Procedure (STDP), the DNBR limit is the appropriate DNB correlation limit increased by sufficient margin to offset the applicable DNBR penalties and to provide operating and design flexibility. The DNBR limits used for the safety analyses based on STDP are shown in the following table. These limits are applicable for both the typical and thimble cells.

DNB Correlation	Correlation DNBR Limit (Typical and Thimble Cell)	STDP Safety Analysis DNBR Limit (Typical and Thimble Cell)
WRB-2M	1.14	[] ^{a, c}
W-3 (pressure ≥ 1000 psia)	1.30	[] ^{a, c}
W-3 (500 ≤ pressure < 1000 psia)	1.45	[] ^{a, c}

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- b. *The DNBR uncertainty allowances and margins.*

Response: With the RTDP methodology, uncertainties in plant operating parameters, nuclear and thermal parameters, fuel fabrication parameters, and computer codes are considered statistically with the DNB correlation statistics in the development of the RTDP design limit DNBR values. The parameter and code uncertainty values included in the RTDP design limit DNBR for WBN Unit 2 are shown in the following table. DNBR margins are addressed in the response to **RAI 4.4.1 – 1.c.** discussing the DNBR safety limits.

Parameter	Uncertainty ⁽¹⁾
Core Power	[] ^{a, c}
Reactor Coolant System (RCS) Flow	[] ^{a, c}
RCS Average Temperature	[] ^{a, c}
Pressurizer Pressure	[] ^{a, c}
Effective Flow Rate, (1-Bypass)	[] ^{a, c}
F _{ΔH}	[] ^{a, c}
Fuel Fabrication	[] ^{a, c}
Subchannel Analysis Code (VIPRE-W)	[] ^{a, c}
Transient Code	[] ^{a, c}

(1) The plant parameter uncertainties assumed in the calculation of the RTDP design limit DNBR conservatively bound the values for WBN Unit 2.

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- c. *A discussion about how the uncertainty allowances and margins are added to the design DNBR values to develop the DNBR safety limit values.*

Response: The RTDP safety analysis DNBR limit is determined from the following equation:

$$\text{RTDP Safety Analysis Limit DNBR} = \frac{\text{RTDP Design Limit DNBR}}{1.0 - \text{Margin}}$$

The uncertainties specified in the response to **RAI 4.4.1 – 1.b.** are combined statistically with the DNB correlation statistics to develop the RTDP design limit DNBR values. The margin retained in the RTDP safety analysis limit DNBR for WBN Unit 2 is shown in the following table.

DNB Correlation	WRB-2M	
Cell Type	Typical	Thimble
DNBR Correlation Limit	1.14	1.14
RTDP DNBR Design Limit	1.23	1.23
RTDP DNBR Safety Analysis Limit	[] ^{a, c}	[] ^{a, c}
DNBR Margin (between the Design Limit and the Safety Analysis Limit)	[] ^{a, c}	[] ^{a, c}

The margin retained in the safety analysis DNBR limit is used to offset the known DNBR penalties. The net remaining DNBR margin, after consideration of the DNBR penalties, is available for operating and design flexibility issues. The net DNBR margin can change on a reload-specific basis. Only the design limit DNBR values for the typical and thimble cells are listed in the FSAR since the design limit DNBR values are the values that have to be met to satisfy the DNB design criterion and will not change as a result of a reload cycle design.

The STDP safety analysis DNBR limit is determined from the following equation:

$$\text{STDP Safety Analysis Limit DNBR} = \frac{\text{Correlation DNBR Limit}}{1.0 - \text{Margin}}$$

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The margin retained in the STDP safety analysis DNBR limits for WBN Unit 2 is []^{a,c}. Only the correlation limit DNBR values are listed in the FSAR since these will not change as a result of a reload cycle design.

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RAIs for FSAR Chapter 15 (taken from NRC letter dated September 20, 2010
(ADAMS Accession No. ML102590244))

Safety Evaluation Report (SER) 15.0.0

15.2.0 – 2. FSAR 15.1.2, "Initial Power Conditions Assumed in Accident Analysis"

- a. Provide the safety limit values for the departure from nuclear boiling ratio (DNBR), for typical and thimble cells, used in Revised Thermal Design Procedure (RTDP) and Standard Thermal Design Procedure (STDP) analyses, and bases for their determination.

Response: For the Revised Thermal Design Procedure (RTDP), the safety analysis departure from nucleate boiling ratio (DNBR) limits are determined from the following equation:

$$\text{RTDP Safety Analysis Limit DNBR} = \frac{\text{RTDP Design Limit DNBR}}{1.0 - \text{Margin}}$$

The RTDP design limit DNBR values, which are listed in Unit 2 FSAR Table 4.4-1, are the values that meet the DNB design criterion based on the Revised Thermal Design Procedure (RTDP) methodology (WCAP-11397-P-A (Proprietary) / WCAP-11397-A (Non-Proprietary), "Revised Thermal Design Procedure," April 1989). DNBR margin to offset known DNBR penalties (e.g., rod bow) and to provide operating and design flexibility is maintained in the RTDP analyses by performing the safety analyses to selected DNBR limits which are higher than the design limit DNBR values. For both the typical and thimble cells, the RTDP safety analysis limit DNBR is []^{a, c}, which includes []^{a, c} margin above the RTDP design limit DNBR of 1.23 listed in Unit 2 FSAR Table 4.4-1.

For the Standard Thermal Design Procedure (STDP), the safety limit DNBR is the appropriate DNB correlation limit increased by sufficient margin to offset the applicable DNBR penalties and to provide operating and design flexibility. The STDP safety limit DNBR is determined from the following equation:

$$\text{STDP Safety Analysis Limit DNBR} = \frac{\text{Correlation DNBR Limit}}{1.0 - \text{Margin}}$$

For the DNB correlations used in the safety analyses based on STDP, the DNBR limits are shown in the following table. These limits are applicable for both the typical and thimble cells.

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DNB Correlation	Correlation DNBR Limit (Typical and Thimble Cell)	STDP Safety Analysis DNBR Limit (Typical and Thimble Cell)
WRB-2M	1.14	[] ^{a, c}
W-3 (pressure ≥ 1000 psia)	1.30	[] ^{a, c}
W-3 (500 ≤ pressure < 1000 psia)	1.45	[] ^{a, c}

The margin retained in the STDP safety analysis DNBR limits for WBN Unit 2 is []^{a, c}.

15.2.1 – 4. *FSAR 15.3.4, "Complete Loss of Forced Reactor Coolant Flow"*

- a. *What is the DNBR safety limit value and what is the thermal design procedure used?*

Response: The DNB analyses of the loss of flow events are based on the Revised Thermal Design Procedure (RTDP) (WCAP-11397-P-A (Proprietary) / WCAP-11397-A (Non-Proprietary), "Revised Thermal Design Procedure," April 1989.). For both the typical and thimble cells, the RTDP safety limit DNBR is []^{a, c}, which includes []^{a, c} margin above the RTDP design limit DNBR of 1.23 listed in Unit FSAR Table 4.4-1.

SER 15.2.2, "Change in Inventory Transients"

15.2.3 - 1. *FSAR 15.2.12, "Accidental Depressurization of the Reactor Coolant System"*

- c. *Specify the low limiting value for DNBR.*

Response: []

] ^{a, c}

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15.3.1 - 2. *Small-Break LOCA (SBLOCA)*

- c.** *Confirm that the hot leg nozzle gap and core barrel alignment key leakage paths were not credited in the SBLOCA analyses.*

Response: The nozzle gap and alignment key leakage paths []^{a,c} in the small break LOCA analyses.

- g.** *Identify the loop seal piping locations that clear of liquid for the breaks in the SBLOCA analyses.*

Response: The broken loop, loop seal is permitted to clear for all break sizes. For break sizes less than []^{a,c}, only the broken loop, loop seal is permitted to clear. For break sizes greater than or equal to []^{a,c}, the intact loop, loop seal is permitted to clear after the broken loop, loop seal clears.



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CAW-10-2996

October 27, 2010

APPLICATION FOR WITHHOLDING PROPRIETARY
INFORMATION FROM PUBLIC DISCLOSURE

Subject: WBT-D-2542 P-Attachment, "WBS 5.10 Revised Response to NRC RAIs" (Proprietary)

The proprietary information for which withholding is being requested in the above-referenced report is further identified in Affidavit CAW-10-2996 signed by the owner of the proprietary information, Westinghouse Electric Company LLC. The affidavit, which accompanies this letter, sets forth the basis on which the information may be withheld from public disclosure by the Commission and addresses with specificity the considerations listed in paragraph (b)(4) of 10 CFR Section 2.390 of the Commission's regulations.

Accordingly, this letter authorizes the utilization of the accompanying affidavit by Tennessee Valley Authority.

Correspondence with respect to the proprietary aspects of the application for withholding or the Westinghouse affidavit should reference this letter, CAW-10-2996, 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".

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

Enclosures

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 27th day of October 2010



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 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 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 appropriately marked in WBT-D-2542 P-Attachment, "WBS 5.10 Revised Response to NRC RAIs" (Proprietary) for submittal to the Commission, being transmitted by Tennessee Valley Authority letter and Application for Withholding Proprietary Information from Public Disclosure, to the Document Control Desk.

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

- (a) Support the licensing of Watts Bar Unit 2.

Further this information has substantial commercial value as follows:

- (a) The information requested to be withheld reveals the distinguishing aspects of a methodology which was 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 provide similar calculations 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.

Tennessee Valley Authority

Letter for Transmittal to the NRC

The following paragraphs should be included in your letter to the NRC:

Enclosed are:

1. 4 copies of WBT-D-2542 P-Attachment, "WBS 5.10 Revised Response to NRC RAIs" (Proprietary)
2. 2 copies of WBT-D-2542 NP-Attachment, "WBS 5.10 Revised Response to NRC RAIs" (Non-Proprietary)

Also enclosed is the Westinghouse Application for Withholding Proprietary Information from Public Disclosure CAW-10-2996, accompanying Affidavit, Proprietary Information Notice, and Copyright Notice.

As Item 1 contains information proprietary to Westinghouse Electric Company LLC, it is supported by an affidavit signed by Westinghouse, the owner of the information. The affidavit sets forth the basis on which the information may be withheld from public disclosure by the Commission and addresses with specificity the considerations listed in paragraph (b)(4) of Section 2.390 of the Commission's regulations.

Accordingly, it is respectfully requested that the 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 copyright or proprietary aspects of the items listed above or the supporting Westinghouse affidavit should reference CAW-10-2996 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.