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LTR-NRC-12-46

June 13, 2012

Subject: Supplemental Information to WCAP-17524, "AP1000 Core Reference Report" to Address Thermal Conductivity Degradation (Proprietary/Non-Proprietary)

References: 1) LTR-NRC-12-32, "Westinghouse Transmittal of Schedule to Address Thermal Conductivity Degradation (TCD) for the AP1000 Core Reference Report (Project #0793)" dated April 5, 2012.

2) WCAP-17524-P, Revision 0, "AP1000 Core Reference Report," March 2012.

Attached are the proprietary and non-proprietary versions of, "Supplemental Information to WCAP-17524, 'AP1000 Core Reference Report' to Address Thermal Conductivity Degradation." As communicated in the Westinghouse transmittal letter, LTR-NRC-12-32 (Reference 1), Westinghouse is herein providing the impacts of thermal conductivity degradation (TCD) on the Large Break Loss of Coolant Accident (LBLOCA) peak clad temperature (PCT) with respect to the Advanced First Core as described in the Core Reference Report (Reference 2) for the AP1000<sup>®1</sup> plant.

Also enclosed is:

1. One (1) copy of the Application for Withholding Proprietary Information from Public Disclosure, AW-12-3494 (Non-Proprietary), with Proprietary Information Notice and Copyright 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 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.

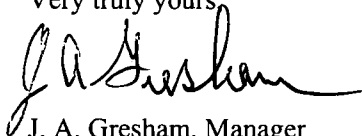
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HRO

Correspondence with respect to the proprietary aspects of the application for withholding or the Westinghouse affidavit should reference AW-12-3494, 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,

A handwritten signature in black ink, appearing to read "J. A. Gresham". The signature is fluid and cursive, with a long horizontal stroke at the end.

J. A. Gresham, Manager  
Regulatory Compliance

Enclosures



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AW-12-3494

June 13, 2012

APPLICATION FOR WITHHOLDING PROPRIETARY  
INFORMATION FROM PUBLIC DISCLOSURE

Subject: LTR-NRC-12-46 P-Attachment, "Supplemental Information to WCAP-17524, 'AP1000 Core Reference Report' to Address Thermal Conductivity Degradation" (Proprietary)

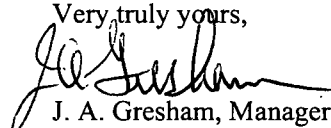
Reference: Letter from J. A. Gresham to Document Control Desk, LTR-NRC-12-46, dated June 13, 2012

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 identified in the proprietary version of the subject report. In conformance with 10 CFR Section 2.390, Affidavit AW-12-3494 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-12-3494, 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

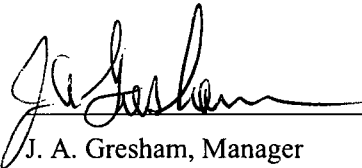
AFFIDAVIT

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 13<sup>th</sup> day of June 2012



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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 appropriately marked in LTR-NRC-12-46 P-Attachment, "Supplemental Information to WCAP-17524, 'AP1000 Core Reference Report' to Address Thermal Conductivity Degradation" (Proprietary), for submittal to the Commission, being transmitted by Westinghouse letter, LTR-NRC-12-46, 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 Westinghouse's request for NRC approval of WCAP-17524, and may be used only for that purpose.

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

- (a) Obtain NRC approval of the Advanced First Core for the AP1000 plant, as documented in WCAP-17524-P, "AP1000 Core Reference Report."

Further this information has substantial commercial value as follows:

- (a) Westinghouse plans to sell the use of this information to its customers for the purpose of assisting customers in obtaining license changes for the AP1000 pressurized water reactor (PWR).
- (b) This document established a portion of the licensing basis for the AP1000 PWR.
- (c) 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 technical evaluation justifications 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.



Westinghouse Non-Proprietary Class 3

LTR-NRC-12-46 NP-Attachment

**Supplemental Information to WCAP-17524, "AP1000 Core Reference Report" to Address Thermal  
Conductivity Degradation**

**June 2012**

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1000 Westinghouse Drive  
Cranberry Township, PA 16066

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## 1.0 Background

Thermal Conductivity Degradation (TCD) is a physical phenomenon in which the material properties of the fuel (pellets) are affected over the course of in-pile operation (burnup) resulting in a reduced ability to transfer energy from the pellet to the coolant. Consequently, stored energy in the pellets will be higher at burnup when TCD is considered than when TCD is not considered (other effects, such as power fall-off with burnup must be considered to account for the overall impact of TCD). Current Westinghouse Evaluation Models for fuel performance and safety analysis do not explicitly model this effect, although these models do contain conservatism which offset the effects of TCD based on comparisons with test data. These trade-offs are known and documented, and provide an acceptable basis to conclude that TCD does not represent a safety issue. However, the NRC has recently indicated their concern that these effects may pose a compliance question for which they believe the application of generic Evaluation Model conservatism may not be appropriate.

After the submittal of the Core Reference Report Westinghouse transmitted LTR-NRC-12-32, "Westinghouse Transmittal of Schedule to Address Thermal Conductivity Degradation (TCD) for the AP1000 Core Reference Report" (Reference 1). In this transmittal Westinghouse committed to providing an estimate of the effect of TCD on the Peak Clad Temperature (PCT) calculated for the Large Break Loss of Coolant Accident (LBLOCA) analysis presented in WCAP-17524, "AP1000 Core Reference Report" (Reference 2).

The supplemental information provided herein includes a description of the methods used to evaluate the impact of TCD on the LBLOCA analysis presented in the Core Reference Report and an estimate of the impact on the reported LBLOCA PCT results presented in Appendix F of the Core Reference Report.

## 2.0 Description of the Issue

Fuel pellet TCD and peaking factor burndown were not explicitly considered in the AP1000<sup>®1</sup> plant LBLOCA analysis presented in the Core Reference Report (Reference 2). NRC Information Notice 2011-21 (Reference 3) notified addressees of recent information obtained concerning the impact of irradiation on fuel thermal conductivity and its potential to cause significantly higher predicted PCT results in realistic emergency core cooling system (ECCS) evaluation models. This evaluation provides an estimated effect of TCD on PCT for the Emergency Core Cooling System (ECCS) in the AP1000 plant design.

Fuel performance data that accounts for fuel pellet TCD (using an unlicensed model) was used as input to the AP1000 plant evaluation. The new PAD fuel performance data was generated with a representative model that includes explicit modeling of fuel pellet TCD. Therefore the evaluations performed consider the fuel pellet TCD effects cited in NRC Information Notice 2011-21 (Reference 3).

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1 AP1000 is a registered trademark of Westinghouse Electric Company LLC, its affiliates and/or its subsidiaries in the United States of America and may be registered in other countries throughout the world. All rights reserved. Unauthorized use is strictly prohibited. Other names may be trademarks of their respective owners.

### 3.0 Fuel Performance Methodology and Assumptions for Thermal Conductivity Degradation Evaluation

The Nuclear Regulatory Commission (NRC) approved Performance Analysis and Design (PAD) 4.0 code, with NRC-approved models (Reference 4) for in-reactor behavior, is used as the basis for the assessment of the impact of TCD on fuel performance inputs to safety analyses. PAD 4.0 is a best-estimate fuel rod performance model, with established uncertainties for each of the major fuel and cladding performance models.

The licensed PAD 4.0 fuel performance models do not explicitly address the impact of TCD. The fuel thermal conductivity model in PAD 4.0 is:

$$\left[ \begin{array}{c} \\ \\ \\ \\ \end{array} \right]^{a,c} \left[ \begin{array}{c} \\ \\ \\ \end{array} \right]^{a,c} \left[ \begin{array}{c} \\ \\ \end{array} \right]^{a,c}$$

[

] <sup>a,c</sup>

] <sup>a,c</sup>



**Figure 1: Comparison of Measured Minus Predicted Fuel Temperature as a Function of Burnup for PAD 4.0 and PAD 4.0 TCD**

**4.0 Large Break Loss of Coolant Accident Methodology for Thermal Conductivity Degradation Evaluation**

Westinghouse currently employs the ASTRUM best estimate Evaluation Model (EM) methodology for analysis of the AP1000 pressurized water reactor (PWR) large break loss-of-coolant accident:

- 2004 Westinghouse Realistic LBLOCA Evaluation Model Using ASTRUM (Automated Statistical Treatment of Uncertainty Method) (ASTRUM EM, Reference 6)

The ASTRUM EM is executed assuming a LBLOCA to be [

]<sup>a,c</sup> The basis for the modeling approach and supporting sensitivity studies are discussed in Section 11-2-2 of Reference 6.

The ASTRUM EM was licensed using PAD 4.0. PAD 4.0 fuel temperature calculations indicate that [

]<sup>a,c</sup>

The ASTRUM EMs uses WCOBRA/TRAC and HOTSPOT for calculation of the thermal-hydraulic and PCT response to a LBLOCA. The WCOBRA/TRAC and HOTSPOT versions used in ASTRUM analysis include options to use a fuel thermal conductivity model that accounts for TCD; these options were not used in the ASTRUM analysis. HOTSPOT also includes the ability to use pellet radial power profiles from WCOBRA/TRAC which are appropriate to the burnup modeled for a given rod. The ability for HOTSPOT to use pellet radial power profiles from WCOBRA/TRAC which are appropriate to the burnup modeled for a given rod was previously reported to the NRC per Reference 7 as a discretionary change; this feature was used in ASTRUM analysis.

Calculations for TCD evaluations will use code versions with these thermal conductivity and pellet radial profile features in order to appropriately initialize the WCOBRA/TRAC and HOTSPOT fuel rod to the input fuel temperatures and pressures from the fuel performance code and determine the impact of TCD with peaking factor burndown on PCT.

[

[

a,c

]

]<sup>a,c</sup>

Where:

$$\left[ \begin{array}{c} \\ \\ \\ \\ \end{array} \right]^{a,c}$$

$$[ \quad ]^{a,c}$$

$$\left[ \quad \right]^{a,c}$$

Where:

$$\left[ \quad \right]^{a,c}$$

$$[ \quad ]^{a,c}$$

Physically accounting for TCD leads to an increase in fuel temperature as the fuel is burned, while accounting for peaking factor burndown leads to a reduction in fuel temperature as the fuel is burned. As inferred from the decrease in fuel temperatures and stored energy in Figures 3 and 4 of Reference 9, TCD and peaking factor burndown are inter-related and should be coupled for the purposes of the evaluation. Therefore, the effect of TCD including peaking factor burndown is estimated to be the difference between a compliance PCT and a margin PCT.

The evaluation is based on running [

$$]^{a,c}$$

## 5.0 Large Break Loss of Coolant Accident Peak Clad Temperature Estimate

### 5.1 Input Parameters and Assumptions

Determining an estimated PCT effect due to TCD and peaking factor burndown at higher PCTs may result in an exaggerated estimated PCT effect because of a calculated run-away zirconium–water reaction which could occur if the analysis contains excessive conservatism. Therefore, in order to evaluate the estimated effect of TCD, conservatisms in the ASTRUM analysis presented in the Core Reference Report (Reference 2) were evaluated. Specifically, the following analysis input change in the LBLOCA analysis presented in the Core Reference Report was evaluated in order to more accurately estimate the impact of TCD:

- Reduction in the as-analyzed  $F_Q$  to a value closer to the desired  $F_Q$  as defined by the ASTRUM evaluation method for the top two most limiting PCT cases from analysis presented in Reference 2 (see Table 5-1). This reduction removed analysis conservatism associated with using values of  $F_Q$  in code executions that significantly exceeded target values.

The evaluation of fuel TCD and peaking factor burndown considered the following additional input parameter changes to the LBLOCA analysis:

- Fuel rod design data with PAD 4.0 + TCD
- Peaking factor burndown shown in Table 5-2

Westinghouse Electric Company utilizes processes which ensure that the LOCA analysis input values conservatively bound the as-designed plant values for those parameters.

### 5.2 Evaluation Basis

The evaluation method discussed in Section 3.0 and Section 4.0 was used to determine the estimated effect of fuel pellet TCD and peaking factor burndown. First, the integrated PCT was calculated to demonstrate compliance with the 10 CFR 50.46(b)(1) criterion when the analysis input changes and TCD and burndown were considered. Then, the margin PCT was calculated, including only the analysis input changes.

For the integrated PCT calculation, a total of 31 WCOBRA/TRAC executions were performed. The uncertainty attributes of these executions were taken from among the most limiting cases from the original 124-run ASTRUM analysis discussed in the Core Reference Report (Reference 2). The evaluation considered an adequate range of burnup such that the effects of TCD and related burnup effects were captured. HOTSPOT executions were performed for each WCOBRA/TRAC case to consider the effect of local uncertainties for both IFBA (Integral Fuel Burnable Absorber) and non-IFBA fuel.

For the margin PCT calculation, WCOBRA/TRAC executions were performed for the top two PCT cases from the Reference 6 ASTRUM analysis with the reduced conservatism in  $F_Q$  described in Table 5-1. The margin PCT result was then determined as the limiting PCT from these two margin cases and the PCT results of the rank 3 through 124 cases from the Reference 6 ASTRUM analysis. The margin PCT

calculation does not include effects of peaking factor burndown, consistent with the as-approved ASTRUM evaluation model (Reference 6).

The estimated effect of TCD was then taken as the difference between the integrated PCT and the margin PCT for the Core Reference Report analysis results.

The same WCOBRA/TRAC and HOTSPOT code versions used in the analysis presented in the Core Reference Report (Reference 2) were used in the calculations for evaluation of TCD and analysis input conservatism.

### **5.3 Impact on the Large Break Loss of Coolant Accident Analysis Presented in the Core Reference Report**

The quantitative evaluation as described above was performed to assess the PCT effect of TCD and peaking factor burndown with other considerations of burnup on the LBLOCA analysis presented in the Core Reference Report (Reference 2). The results of the evaluation have been summarized in Table 5-3. As can be seen in the table there is sufficient margin to address TCD impacts on PCT.

Consistent with the ASTRUM methodology, the most limiting PCT from each evaluation was taken as the representative PCT impact. The limiting integrated PCT case, considering all analysis input changes and TCD and burndown, was 1936°F, less than the 2200°F acceptance criterion.

### **6.0 Conclusions**

With the inclusion of an adjusted degree of conservatism in the  $F_Q$  and inclusion of the effects of TCD continued compliance with the requirement of 2200°F of 10 CFR 50.46(b)(1) can be demonstrated. Westinghouse is requesting approval of the revised PCT value as part of the review of WCAP-17524, "AP1000 Core Reference Report." The impact of TCD will be reflected in the Chapter 15 analysis as part of the creation of the approved version.



## 7.0 References

- 1.0 LTR-NRC-12-32, "Westinghouse Transmittal of Schedule to Address Thermal Conductivity Degradation (TCD) for the AP1000 Core Reference Report (Project #0793)," April 5, 2012.
- 2.0 WCAP-17524, "AP1000 Core Reference Report" March 2012.
- 3.0 NRC Information Notice 2011-21, McGinty, T.J., and Dudes, L. A., "Realistic Emergency Core Cooling System Evaluation Model Effects Resulting From Nuclear Fuel Thermal Conductivity Degradation," December 13, 2011. (NRC ADAMS #ML 113430785).
- 4.0 WCAP-15063-P-A, Revision 1 with Errata (Proprietary), Foster J. P., et al., "Westinghouse Improved Performance Analysis and Design Model (PAD 4.0)," July 2000.
- 5.0 WCAP-15836-P-A (Proprietary), Harris, W. R., et al., "Fuel Rod Design Methods for Boiling Water Reactors – Supplement 1," April 2006.
- 6.0 WCAP-16009-P-A (Proprietary), Frepoli, C., et al., "Realistic Large-Break LOCA Evaluation Methodology Using the Automated Statistical Treatment of Uncertainty Method (ASTRUM)," January 2005.
- 7.0 LTR-NRC-07-23, Maurer, B. F., "U. S. Nuclear Regulatory Commission, 10 CFR 50.46 Annual Notification and Reporting for 2006," May 15, 2007.
- 8.0 NUREG/CR-6534, Volume 4, Lanning, D.D., et al., "FRAPCON-3 Updates, Including Mixed-Oxide Fuel Properties," May 2005.
- 9.0 McGinty, T. J. (NRC) to Gresham, J. A. (Westinghouse), "Nuclear Fuel Thermal Conductivity Degradation Evaluation for Light Water Reactors Using Westinghouse Codes and Methods (TAC NO. ME5186)," December 16, 2011.

**Table 5-1: Reduced Conservatism in Reference 2 Analysis FQ Considered in the Evaluation of TCD**

<b>Case</b>	<b>FQ Conservatism<sup>(1),(2)</sup> [%]</b>	<b>Adjusted FQ Conservatism<sup>(1),(3)</sup> [%]</b>
A	15	0.4
B	12	0.2

- (1) Numbers reflect the percentage by which the as-analyzed FQ in the run exceeded the desired FQ as defined by the ASTRUM evaluation method.
- (2) FQ conservatism in runs executed for Reference 5 ASTRUM analysis.
- (3) FQ conservatism in the runs executed for evaluation of analysis input changes, and in runs executed for evaluation of fuel TCD and peaking factor burndown with the same analysis input changes.

**Table 5-2: Peaking Factors Assumed in the Evaluation of TCD**

<b>Rod Burnup (MWD/MTU)</b>	<b>FDH<sup>(1)(2)</sup></b>	<b>FQ Transient<sup>(1)</sup></b>	<b>FQ Steady-State</b>
0	1.72	2.60	2.10
30,000	1.72	2.60	2.10
49,000	1.55	2.30	1.85
65,000	1.55	2.30	1.85

- (1) Includes uncertainties.
- (2) Hot assembly average power follows the same burndown, since it is a function of FdH .

**Table 5-3: Summary of PCT Results for Various Evaluations<sup>(1)</sup>**

<b>Core Reference Report PCT  [°F]</b>	<b>Core Reference Report Margin PCT<sup>(2)</sup>  [°F]</b>	<b>Core Reference Report PCT with reduction in input conservatisms and including TCD effects  [°F]</b>
1867	1797	1936

- (1) All values contain a 2°F bias for sensitivity to passive residual heat removal heat exchanger (PRHR) operation.
- (2) Reflects reduction in input conservatism described in Table 5-1.

## **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.