PROPRIETARY

NINA

Nuclear Innovation
North America LLC
4000 Avenue F, Suite A
Bay City, Texas 77414

December 28, 2011
U7-C-NINA-NRC-110125
10 CFR 2.390

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
One White Flint North
11555 Rockville Pike
Rockville, MD 20852-2738

South Texas Project
Units 3 and 4
Docket No. PROJ0772
Response to Request for Additional Information

Reference: Letter from Tekia Govan to Mark McBurnett, "Request for Additional Information Re: South Texas Project Nuclear Operating Company Topical Report (TR) WCAP-17203-P, Fast Transient and ATWS Methodology (TAC No. ME4505)," May 24, 2011 (ML111440329)

Attached are the responses to the following NRC staff questions included in the reference:

NRR RAI-6	
NRR RAI-7	NRR RAI-28
NRR RAI-8	NRR RAI-29
NRR RAI-9	NRR RAI-30
NRR RAI-23	NRR RAI-32
NRR RAI-26	NRR RAI-36
NRR RAI-27	NRR RAI-37

The responses to some of these RAI questions contain information proprietary to Westinghouse Electric Corporation. Since this letter 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.

DO91
NRD

STI 33000234

Attachments 1 through 13 contain the responses to the RAI questions. Attachments 14 through 23 contain the non-proprietary versions of the proprietary responses. Attachment 24 contains the request for withholding of proprietary information, the affidavit, the proprietary information notice, and the copyright notice.

Correspondence with respect to the copyright or proprietary aspects of this information or the supporting Westinghouse Affidavit should reference CAW-11-3338 and should be addressed to: J. A. Gresham, Manager, Regulatory Compliance and Plant Licensing, Westinghouse Electric Company LLC, Suite 428, 1000 Westinghouse Drive, Cranberry Township, Pennsylvania, 16066.

If this letter becomes separated from the proprietary material it is no longer proprietary.

There are no commitments in this letter.

If you have any questions, please contact me at (361) 972-7136, or Bill Mookhoek at (361) 972-7274.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on 12/28/11

Scott Head
Manager, Regulatory Affairs
Nuclear Innovation North America LLC

jet

Attachments:

1. NRR RAI-6
2. NRR RAI-7 (Proprietary)
3. NRR RAI-8 (Proprietary)
4. NRR RAI-9 (Proprietary)
5. NRR RAI-23 (Proprietary)
6. NRR RAI-26 (Proprietary)
7. NRR RAI-27 (Proprietary)
8. NRR RAI-28 (Proprietary)
9. NRR RAI-29
10. NRR RAI-30 (Proprietary)
11. NRR RAI-32 (Proprietary)
12. NRR RAI-36 (Proprietary)
13. NRR RAI-37
14. NRR RAI-7 (Non-Proprietary)
15. NRR RAI-8 (Non-Proprietary)
16. NRR RAI-9 (Non-Proprietary)
17. NRR RAI-23 (Non-Proprietary)
18. NRR RAI-26 (Non-Proprietary)
19. NRR RAI-27 (Non-Proprietary)
20. NRR RAI-28 (Non-Proprietary)
21. NRR RAI-30 (Non-Proprietary)
22. NRR RAI-32 (Non-Proprietary)
23. NRR RAI-36 (Non-Proprietary)
24. Request for Withholding Proprietary Information

cc: w/o attachment except*
(paper copy)

Director, Office of New Reactors
U. S. Nuclear Regulatory Commission
One White Flint North
11555 Rockville Pike
Rockville, MD 20852-2738

Regional Administrator, Region IV
U. S. Nuclear Regulatory Commission
1600 E. Lamar Blvd.
Arlington, TX 76011-4511

Kathy C. Perkins, RN, MBA
Assistant Commissioner
Division for Regulatory Services
Texas Department of State Health Services
P. O. Box 149347
Austin, Texas 78714-9347

Alice Hamilton Rogers, P.E.
Inspection Unit Manager
Texas Department of State Health Services
P. O. Box 149347
Austin, Texas 78714-9347

*Steven P. Frantz, Esquire
A. H. Gutterman, Esquire
Morgan, Lewis & Bockius LLP
1111 Pennsylvania Ave. NW
Washington D.C. 20004

*Michael Eudy
*Ekaterina Lenning
Two White Flint North
11545 Rockville Pike
Rockville, MD 20852

(electronic copy)

*George F. Wunder
*Michael Eudy
*Ekaterina Lenning
Charles Casto
U. S. Nuclear Regulatory Commission

Jamey Seely
Nuclear Innovation North America

Peter G. Nemeth
Crain, Caton & James, P.C.

Richard Peña
Kevin Pollo
L. D. Blaylock
CPS Energy

NRR RAI-6

Table 2-1 of the topical report groups accidents defined in the SRP (NUREG-0800) into 4 event categories. These categories are used throughout the description of the PIRT development. We note that in CENPD-300-P-A a more comprehensive list of transients is similarly binned but only the "potentially limiting" fast transients are listed. In neither of these documents is there a clear, comprehensive list of all fast transients. The reviewers believe that the transients in Table 2-1 are this list. Please provide a clear and comprehensive list of all the transients which are classified as "fast" and thus will be analyzed using the methodology outlined in the topical report for both the ABWR and BWR/2 through BWR/6.

Response to NRR RAI-6

In WCAP-17203-P, Westinghouse seeks the approval for the evaluation of transient events listed in Table 2-1 employing the methodology described in the subject LTR. The evaluation model applies for the transient codes (codes with explicit time derivatives) such as BISON and POLCA-T. Therefore from the perspective of WCAP-17203-P, Table 2-1 is the comprehensive list of transients for which the methodology applies.

<u>NRR RAI-29</u>

Please clarify the specific reactor coolant temperature decrease transients for which a significant pressure buildup in the primary system is expected (second bullet under Section 6.4.4.2.1) and the assumptions made regarding control system behavior that lead to this pressure buildup. For typical events grouped in this category, such as the loss of a feedwater heater or the inadvertent injection of ECCS, it is not clear to the staff that more than a slight pressure increase would occur.

<u>Response to NRR RAI-29</u>

The transients grouped in the category reactor coolant temperature decrease transients are "Decrease in the feedwater temperature" (e.g. the loss of feedwater heating) and "Inadvertent startup of ECCS" (e.g. Inadvertent HPCI initiation).

Westinghouse experience regarding the reactor coolant temperature decrease transients is that only a slight pressure increase would occur. These transients are usually analyzed as slow transients with the approved methodology described in CENPD-300-P-A using a steady-state code.

The Inadvertent HPCI initiation will also cause an increase in the water level, which would normally be compensated by an equivalent decrease in the feedwater flow. If the feedwater control fails, the water level might increase until the turbine trip is initiated. In this case a pressure increase would follow the isolation of the steamlines. In some of the older plants designs (BWR/3) the Inadvertent HPCI initiation combined with a feedwater controller failure is included in the plant's licensing basis as an AOO. For those cases the methodology described in WCAP-17203-P will be applied using a dynamic code such as BISON or POLCA-T.

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 20th day of December 2011

Notary Public

COMMONWEALTH OF PENNSYLVANIA
Notarial Seal
Joyce A. Szepessy, Notary Public
Parks Twp., Armstrong County
My Commission Expires April 16, 2013
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 WEC-NINA-2011-0039 P-Enclosure, "Transmittal of Responses to NRR RAI 6, 7, 8, 9, 23, 26, 27, 28, 29, 30, 32, 36, and 37 for WCAP-17203" (Proprietary) for submittal to the Commission, being transmitted by Nuclear Innovation North America (NINA) letter 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 NRC review of WCAP-17203.

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

(a) Assist customers in obtaining NRC review of the Westinghouse Fast Transient and ATWS Methodology topical as applied to current BWR and ABWR plant designs.

Further this information has substantial commercial value as follows:

(a) Assist customer to obtain license changes.

(b) 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 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.

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.

NRR RAI-37

Please clarify what part of the topical report provides the methodology for determining the parameters selected in Table 8-4, and clarify whether sensitivity studies have been or would be performed to ensure that the conservative direction for a given parameter is chosen during plant-specific analyses. In the staff's experience, the conservative direction for input parameters for a given transient may not be obvious. If sensitivity studies have not been or will not be performed, please provide adequate justification to support the assumed conservative directions for the analytical values that will be used for plant-specific analysis. Please further clarify the approach that would be used to determine the margin between the nominal and analytical values used for plant-specific analysis. Please address whether the initial conditions used in plant analyses for parameters with associated technical specification limiting safety system settings and limiting conditions for operation would be limiting values with allowance for uncertainty, consistent with 10 CFR 50.36.

Response to RAI-37

As described in the response to NRR RAI-23, the conservatisms in plant operating conditions – such as initial power level, recirculation flow, fuel burn-up, steam dome pressure and feed-water temperature are applied unconditionally in the analysis to assure the compliance with Chapter 15 of the SRP. This is captured in Section 6.1 of the LTR which requires that each potentially limiting event is evaluated for the limiting plant conditions throughout the plant operating domain. Table 8-4 in the LTR is a direct implementation of this criterion and the "Analysis Value" column contains the limiting values of the plant operating conditions. Here, for example the reactor power is 4005 MWth, which corresponds to the 102% of rated power.

Parameters selected in Table 8-4 are justified on a plant specific basis to ensure that the limiting plant operating condition is analyzed for the potentially limiting transients.

1. **Initial power level**: Nominal reactor power plus 2% power measurement uncertainties, resulting in 102% power level is used in the analysis in conformance with the SRP. See response to NRR RAI-23 for further details on this issue.
2. **Feed water temperature and steam dome pressure**: As stated by the NRC, the conservative direction for these parameters may not be obvious. Therefore this direction will be confirmed by sensitivity studies, engineering judgment or analytical solutions on a plant specific basis to ensure that the most limiting plant condition is analyzed for the potentially limiting transients.
3. **Core flow window:** The limiting value of recirculation flow throughout the plant allowable operating domain is used in the analysis.

The issue of conformance with SRP guidance and 10 CFR 50.36, when selecting plant operating conditions and setpoints for mitigating systems is addressed in the response to NRR RAI-23.

NRR RAI-7

Section 1.4 requests NRC staff approval of the phenomenon identification and ranking table (PIRT) included in Section 5.3. To support the staff's review of the PIRT, please provide the following information:

a. Clarification as to how differences in BWR designs have been factored into the PIRT rankings (e.g., rankings were averaged across all designs, the highest ranking among all designs was chosen, etc.).

b. A discussion of the extent to which the scope and rankings of the PIRT in Section 5.3 have been benchmarked against previously conducted PIRTs for non-loss-of-coolant accident (LOCA) transient events. For example, the staff's review of several previous PIRTs for BWR transients (e.g., NUREG/CR-6720 and cited references) shows differences in the phenomenon rankings relative to the Westinghouse PIRT in areas such as boiling heat transfer, core pressure drop, and steam separators. Please address the concern that significant uncertainty and subjectivity exists regarding the ranking of some phenomena.

c. More detailed description of any peer reviews, sensitivity studies, or other activities undertaken to validate the PIRT panelists' rankings than the limited, non-specific information provided in response to NRO RAI-13.

Response to NRR RAI-7

a) The PIRT in Section 5.3 of the LTR has been developed for both ABWR and BWR/2-6 reactors. Design differences have been factored into the ranking and the highest ranking for all designs is chosen.

b) The PIRT has been benchmarked against various open-literature BWR and PWR reference PIRTs. The primary PIRT reference used is NUREG/CR-6744 (Reference 1). This LOCA PIRT was used both to identify relevant phenomena and then to benchmark the rankings prepared by the expert panel. Related PIRTs (References 2 and 3) were considered for phenomena and ranking related to rod ejection accidents and instability events in BWRs. Additional benchmarking was performed against References 4 and 5 for important phenomena for ATWS events. Also the PIRT in Reference 6 was used to identify any additional phenomena not previously recognized and to compare rankings. Overview information describing the PIRT process and ranking procedure for loss-of-coolant accidents was provided from Reference 7. Westinghouse has not considered NUREG/CR-6720 specifically since References 1 through 7 provided adequate information for benchmarking.

The ranking of a certain phenomenon can be different depending on the PIRT application area and purpose. The boiling heat transfer phenomenon (C2) is such an example. [

]^{a,c} The boiling heat transfer coefficient is much reduced in LOCA and changes to this heat transfer coefficient have a large impact on core cooling conditions which explains the high ranking in

NUREG/CR-6744. It should be noted that the effect of subcooled voiding (D9) is ranked as High, however, due to its importance for reactivity feedback and axial power profile. The ranking of steam separators (H2) was verified by the sensitivity study in the response to RAI-9d from the Office of New Reactors.

Westinghouse acknowledges that the initial phase of the PIRT process reflects the qualitative engineering judgment of a group of experts as to the importance of a particular phenomenon. Engineering judgment, which can be subjective, is an intrinsic part of the PIRT. Nevertheless, the PIRT method is being broadly used by the nuclear industry and it is considered as an acceptable method by the NRC as evidenced by its inclusion in RG 1.203. To address the concern of uncertainty and subjectivity, while at the same time making the PIRT development manageable, Westinghouse applies [ ]a,c as described in the response to RAI-20 S02 from the Office of New Reactors. [

]a,c

c) The PIRT panel started with the original LOCA PIRT (Reference 1). This initial PIRT was reviewed by a panel of Westinghouse BWR Engineering experts, who provided recommendations for the addition or deletion of phenomena and established the initial ranking of the phenomena. This initial ranking process was accomplished primarily through structured discussions among the experts. Benchmarking was performed against past PIRT reports as noted above.

The ranking also was enhanced by sensitivity analysis of key parameters performed within Westinghouse methodology for evaluation of transient events at Nordic BWRs. [

]a,c These sensitivity studies serve to validate the engineering judgment statements. Following this review, an independent peer review was performed according to Westinghouse QA practice by additional Westinghouse BWR Engineering qualified personnel to derive a first PIRT version that incorporated the input from all participants.

In total, over 30 PIRT-specific requests for additional information have been issued by the Office of New Reactors and the Office of Nuclear Reactor Regulation during the NRC review process of the subject LTR and nearly [ ]a,c additional sensitivity studies were performed to address those RAIs. The outcome of those studies served to update the PIRT report and further validate the PIRT rankings.

References:

[1] NUREG/CR-6744, "Phenomenon Identification and Ranking Tables (PIRTs) for Loss-of-Coolant Accidents in Pressurized and Boiling Water Reactors Containing High Burnup Fuel", USNRC, September 2001.

[2] NUREG/CR-6742, "Phenomenon Identification and Ranking Tables (PIRTs) for Rod Ejection Accidents in Pressurized Water Reactors Containing High Burnup Fuel", USNRC, September 2001.

[3] NUREG/CR-6743, "Phenomenon Identification and Ranking Tables (PIRTs) for Power Ocsillations Without Scram in Boiling Water Reactors Containing High Burnup Fuel", USNRC, September 2001.

[4] W. Wulff, et al., "Uncertainty Analysis of Suppression Pool Heating During an ATWS in a BWR-5 Plant: An Application of the CSAU Methodology Using the BNL Engineering Plant Analyzer," NUREG/CR-6200, USNRC, March 1994.

[5] Licensing Topical Report NEDO-33083, TRACG Application For ESBWR Anticipated Transient Without Scram Analyses, Supplement 2, Revision 2, September 2009 (Non-Proprietary Version)

[6] C.D. Fletcher et al., "Adequacy Evaluation of RELAP5/MOD3, Version 3.2.1.2 for Simulating AP600 Small Break Loss-of-Coolant Accidents," INEL-96/0400 (Non-Proprietary Version), April 1997.

[7] B.E. Boyak, et al., "Quantifying Reactor Safety Margins: Application of Code Scaling, Applicability, and Uncertainty Evaluation Methodology to a Large-Break Loss-of-Coolant Accident," NUREG/CR-5249, USNRC, December 1989.

NRR RAI-8

More detailed rationale is generally necessary in support of the PIRT rankings assigned by Westinghouse. In reality, Table 5-2 represents 5 individual PIRTs for 9 different types of transient, and in a large number of cases, insufficient information is provided to justify adequately the assigned ranking. Therefore, the staff requests that Westinghouse review and strengthen the rationale for the assigned PIRT rankings, with emphasis on the following areas:

a. In many cases different rankings are assigned across the various classes of transient without adequate basis (e.g., entries A1, A8, and A11, etc., do not provide adequate rationale, whereas B5 does).

b. In many cases the rationale offered does not seem to provide meaningful basis for the ranking (e.g., entries A4, B2, C1, etc.).

Response to NRR RAI-8

The rationales in Table 5-2 of the LTR are condensed from the discussions during the PIRT development. The level of detail in the rationale of the Table 5-2 was considered adequate for inclusion in a table. A similar level of detail is used for example in the work documented in Reference 1. However, the rationales in Table 5-2 will be improved as requested.

a. The rationale of Phenomena A1, A8 and A11 in Table 5-2 of the LTR will be updated as follows:

Phenomenon A1, [ ]a,c:

[

]a,c

The rationale of the Phenomenon A1 in Table 5-2 of the LTR will be updated as follows:

Existing Rationale:

[ ]a,c

Updated Rationale:

[

]a,c

Phenomenon A8, [ ]a,c:

[

]a,c

Existing Rationale:

[ ]a,c

Updated Rationale:

[
]a,c

Phenomenon A11, [ ]a,c

[

]a,c

The ranking of the Phenomena A11 for the ATWS events and the rationale in Table 5-2 of the LTR will be updated according to response to RAI-9b.

b. The rationale of Phenomena A4, B2 and C1 in Table 5-2 of the LTR will be updated as follows:

Phenomenon A4, [ ]a,c

[

]a,c The rationale of Phenomenon A4 will be updated as follows:

Existing Rationale:

[

]a,c

Updated Rationale:

[

]a,c

Phenomenon B2, [ ]a,c

[

]a,c The rationale of Phenomenon B2 will be updated as follows:

Existing Rationale:

[

]a,c

Updated Rationale:

[

]a,c

Phenomenon C1, [ ]a,c:

[

]a,c

The rationale of the Phenomenon C1 in the Table 5-2 of the LTR will be updated as follows:

Existing Rationale:

[ ]a,c

Updated Rationale:

[

]a,c

Reference

1. NUREG/CR-6744, "Phenomenon Identification and Ranking Tables (PIRTs) for Loss-of-Coolant Accidents in Pressurized and Boiling Water Reactors Containing High Burnup Fuel", USNRC, September 2001

NRR RAI-9:

Please address the following specific issues regarding the PIRT rankings that are inconsistent with other PIRTs reviewed by the staff and/or the staff's expectations:

a. Adequate basis was not provided for [

]a,c

Response to NRR RAI-9a:

[

]a,c, which is a figure-of-merit for Anticipated Transients Without Scram (ATWS), but not for Anticipated Operational Occurrences (AOO).

During an AOO and until a reactor scram occurs, the AOO figures-of-merit [ ]a,c are mainly influenced [ ]a,c

When the reactor scram has occurred and [ ]a,c

No changes will be made to the LTR.

b. Adequate basis was not provided to support the [ ]a,c Also, please address the existing conflict between the ranking for [

]a,c

Response to NRR RAI-9b:

Phenomenon [ ]a,c is a minor contributor to the long term energy release to containment. The influence of [ ]a,c.

The relative influence of [

]a,c

[ ]a,c were studied, see Table 1.

Table 1 The sensitivity study of AOO and ATWS figures-of-merit on [ ]a,c

a,c

[ ]

The results of the sensitivity study are shown in Table 2 through Table 6.

Table 2 Sensitivity of [ ]a,c

a,c

[ ]

[ ]a,c Based on the results, the overall influence of [ ]a,c for Pressure Increase/Decrease events.

Table 3	Sensitivity of [ ]a,c

a,c

[ ]

[ ]a,c Based on the results, the overall influence of [ ]a,c for Reactor coolant flow Increase/Decrease events.

Table 4	Sensitivity of [ ]a,c

a,c

[ ]

[ ]a,c for Feedwater flow Increase/Decrease events.

Table 5 Sensitivity of [ ]a,c

a,c

[ ]a,c Based on the results, the overall influence of [ ]a,c for reactor coolant Temperature Increase/Decrease events.

Table 6 Sensitivity of [ ]a,c

a,c

[ ]a,c Based on the results, the overall influence of [ ]a,c for ATWS events.

The conclusion from this sensitivity study is that the [ ]a,c overall has low impact on all types of AOO events. The overall ranking of [ ]a,c should be High for the ATWS events.

The relative importance and the rationale of the [ ]a,c in Table 5-2 of the LTR will be updated as follows:

Existing ranking and rationale:

[ ]a,c

Updated ranking and rationale:

[ ]a,c

c. A [ ]a,c Does this imply that any feedwater transients involving these phenomena may only be treated as pressure increase/decrease transients?

Response to NRR RAI-9c:

The ranking does not imply that a feedwater transient [ ]a,c is only treated as a pressure increase or decrease transient.

Each transient event is categorized based on the plant DCD or FSAR classification. For those limiting transient events that evolve from one transient category into another, confirmatory analyses are performed to ensure that the transient is adequately classified.

The methodology steps used for the confirmatory analysis for evolving transients are presented in response to RAI-29 and RAI-29 S01 from the Office of New Reactors.

d. Please provide adequate basis for ranking the steam separators [ ]a,c Due to the significance of carryunder in determining the thermodynamic state of the fluid entering the core, it is not clear to the staff that [ ]a,c

Response to NRR RAI-9d:

The ranking of component [

]a,c were studied, see Table 7.

Table 7 The sensitivity study of AOO and ATWS figures-of-merit on [ ]a,c

a,c

The results of the sensitivity study are shown in Table 8 through Table 12.

Table 8	Sensitivity of [ ]a,c

a,c

[

]a,c Based on the results, the influence of [ ]a,c on the Pressure Increase/Decrease events. The most conservative grade was chosen.

Table 9	Sensitivity of [ ]a,c

a,c

[

]a,c Based on the results, the influence of [

]a,c on the Reactor coolant flow Increase/Decrease events.

Table 10 Sensitivity of [ ]a,c

a,c

[ ]

[ ]a,c Based on the results, the influence of [ ]a,c on the Feedwater flow Increase/Decrease events.

Table 11 Sensitivity of [ ]a,c

a,c

[ ]

[ ]a,c Based on the results, the influence of [ ]a,c on the reactor coolant Temperature Increase/Decrease events.

Table 12 Sensitivity of [ ]a,c	a,c

[

]a,c Based on the results, the influence of [

]a,c

The conclusion from this sensitivity study was that the [

]a,c

No changes will be made to the LTR.

e. Please provide adequate basis for ranking [

]a,c effect during an inadvertent ECCS injection transient.

Response to NRR RAI-9e:

An inadvertent ECCS injection transient is classified as reactor coolant Temperature Decrease event.

[

]a,c

No changes will be made to the LTR.

NRR RAI-23:

Please expand on the discussion in Section 6.1 and the response to RAI-31(b) from the Office of New Reactors, addressing the following points to provide assurance that adequate conservatism is included in the methodology, consistent with SRP guidance and the requirements of 10 CFR 50.36:

a) **Please explicitly identify and justify any deviations in the proposed analytical model relative to the acceptance criteria outlined in the SRP. For instance, many SRP sections in Chapter 15 stipulate that transients should be modeled assuming a conservative initial power level, conservative scram characteristics, limiting core parameters as a function of burnup, allowance for instrument uncertainty, and a limiting single failure. Although Section 6.2.1 addresses some aspects of the SRP guidance, the intent of the topical report remains in some respects unclear and potentially contradictory to the SRP guidance and/or 10 CFR 50.36. For example, the first bullet under Section 7.3.3 indicates that parameters describing the condition of the plant, including initial power level and peaking factors, should have their uncertainties determined from operating experience. Likewise, the significant reduction in conservatism associated with the topical report revision proposed in response to NRO RAI-31(b) appears in conflict with aspects of SRP Chapter 15 and 10 CFR 50.36.**

b) **Please justify the conformance of the topical report guidance regarding the selection of parameters representing the plant initial condition and equipment behavior with the requirement derived from 10 CFR 50.36 that analysis inputs for equipment associated with technical specification limiting safety system settings and limiting conditions for operation consider the limiting values across the entire permissible range of operation, with allowance for applicable uncertainties.**

c) **Based on the existing wording of the topical report, the staff expected that the conservative assumptions summarized in Tables 6-1 through 6-8 were intended to be applied for the analysis of transients, as applicable based on event scenario, regardless of the PIRT phenomena rankings and code capability assessments. However, the response to NRO RAI-31(b) proposes to revise the topical report such that these conservatisms only apply under narrow conditions when a phenomenon is ranked highly and the code capability is low. Please address the inconsistencies that would be created between this proposed revision to the topical report and existing topical report text introducing a number of the Tables 6-1 through 6-8 that the response to NRO RAI-31(b) did not propose to revise.**

d) **Please confirm or correct the staff's understanding that the magnitude of the conservative biases to be applied as specified in Tables 6-1 through 6-8 would be based on an appropriate data uncertainty assessment. Also, additional discussion is necessary in the topical report regarding the details of how the magnitude of the biases would be determined from the available data (e.g., minimum/maximum values, some multiple of a standard deviation, etc.) and the basis for acceptability of the chosen method.**

Response to NRR RAI-23

a) According to SRP Chapter 15, the following values provide an acceptable level of conservatism of an evaluation model:

1. The initial power level is taken as the licensed core thermal power for the number of loops initially assumed to be operating plus an allowance of 2% to account for power measurement uncertainties, unless a lower power level can be justified by the applicant. The number of loops operating at the initiation of the event should correspond to the operating condition which maximizes the consequences of the event.

2. Conservative scram characteristics are assumed. For a BWR –a design conservatism factor of 0.8 times the calculated negative reactivity insertion rate, unless (a) a different conservatism factor can be justified through the uncertainty methodology and evaluation, or (b) the uncertainty has otherwise been accounted for (see SAR or DCD) Section 4.4.

3. The core burn-up is selected to yield the most limiting combination of moderator temperature coefficient, void coefficient, Doppler coefficient, axial power profile, and radial power distribution.

4. Mitigating systems should be assumed to be actuated in the analyses at setpoints with allowance for instrument inaccuracy in accordance with Regulatory Guide 1.105. Compliance with Regulatory Guide 1.105 is determined by the Instrumentation and Control Systems.

5. The most limiting plant system single failure, as defined in the "Definitions and Explanations" of Appendix A to 10 CFR Part 50, shall be identified and assumed in the analysis and shall satisfy the positions of Regulatory Guide 1.53.

The limiting plant conditions are used in the evaluation model. This is captured in Section 6.1 in the LTR which states that each potentially limiting transient event is evaluated for the limiting plant condition(s) throughout the plant operating domain. These limiting conditions are defined by initial power level, recirculation flow, system pressure and feed water temperature. Each of these limiting conditions includes allowance of plant measurement system uncertainties. The nominal reactor power plus 2% power measurement uncertainties is used in the analysis in conformance with the SRP requirement. A lower power level may be used in the analysis, when its use is justified.

Conservative scram speed tables are used in the evaluation model if the simple scram model is used. Conservative scram speed is used also with the Westinghouse advanced scram model [

]^{a,c} This approach is in compliance with the SRP as it fulfills part a) or b) of the scram characteristics requirement (see 2. above).

The limiting core exposure is included in the Westinghouse transient evaluation methodology. The limiting core exposure is evaluated using the limiting operating conditions including the allowance for the measurement system uncertainties for these conditions.

The treatment of actuation for mitigating safety systems in the analysis methodology is described in Figure 1 below.

a,c

[ ]

Figure 1 – [ ]a,c

[ ]a,c Either of these approaches assures that the mitigating system accounts for the allowance for instrument inaccuracy in accordance with Regulatory Guide 1.105.

The most limiting plant system single failure (SRP requirement 5 from the list above) will be accounted for in the analysis methodology, as stated in the response to RAI-30 from the Office of New Reactors.

The above conservatisms are applied unconditionally in the analysis. This assures the compliance with the level of conservatism required by the SRP. [ ]a,c Tables 6-1 to 6-8 in the LTR describe the direction of the conservatism in such cases for various types of models. [ ]a,c

It was the original intention of Section 6.1 to assure the inclusion of these unconditional conservatisms in the methodology. Westinghouse agrees that the text in Section 6.1 is rather condensed and will therefore update it with the more descriptive formulation shown below:

Section 6.1 Original Formulation:

"Each potentially limiting transient and ATWS event is evaluated for the limiting plant condition(s) throughout the plant operating domain. A single operating state or operating condition can conservatively bound all other possible states. Verification that this condition is bounding allows for the use of a bounding analysis during first core and reload safety analyses since performing an event analysis for limiting operating states and conditions conservatively bounds all other operating states and conditions."

Section 6.1 Updated Formulation:

"Each potentially limiting transient event is evaluated for the limiting plant condition(s) throughout the plant operating domain.

These limiting conditions are defined by initial power level, recirculation flow, system pressure and feed water temperature. Each of these limiting conditions includes allowance of plant measurement system uncertainties. The nominal reactor power plus 2% power measurement uncertainties shall be used in the analysis in conformance with the SRP requirement. A lower power level may be used in the analysis, when its use is justified on a plant specific basis.

The treatment of actuation for mitigating safety systems in the analysis methodology is described in Figure 1 below.

a,c

Figure 1 – [ ]a,c

[

)]a,c. Either of these approaches assures that the mitigating system accounts for the allowance for instrument inaccuracy in accordance with Regulatory Guide 1.105.

The most limiting plant system single failure shall be accounted for in the analysis methodology.

A single operating state or operating condition can conservatively bound all other possible states. Verification that this condition is bounding allows for the use of a bounding analysis during first core and reload safety analyses since performing an event analysis for limiting operating states and conditions conservatively bounds all other operating states and conditions."

b) The issue of the allowance for instrument uncertainties and limiting values of operating parameters is addressed in part a) of this response. The unconditional overall conservatisms in plant conditions together with the selection process of mitigating system setpoints, described above justifies the conformance with the requirement derived from 10 CFR 50.36.

c) As stated in the Response to RAI-31(b) from the Office of New Reactors, the purpose of Table 6-1 to Table 6-8 in the LTR is not to unconditionally apply stated conservatisms. [

]a,c

Westinghouse recognizes that the phenomena listed in Table 6-1, 6-3, 6-4, 6-5, 6-6 and 6-7 cover only a fraction of phenomena from the PIRT table (Table 5-2). [

]a,c

As pointed out by the NRC, the text introducing a number of Tables 6-1 through 6-8 is inconsistent among the different sections of the analysis methodology and in some cases contradictory to the statement in NRO RAI-31(b). The correct formulation of this text is the one introducing Table 6-6 stating *"Table 6-6 summarizes these conservatisms".*

The text introducing Table 6-1, 6-3, 6-4, 6-5 and 6-7 will be updated in the approved version of the LTR as follows:

Text introducing Table 6-1:

Original formulation:

"Table 6-1 summarizes the conservatisms that should be included in computer based evaluation models."

Updated formulation:

"Table 6-1 summarizes these conservatisms."

Text introducing Table 6-3:

Original formulation:

"Table 6-3 summarizes the conservative assumptions for pressure decrease transients."

Updated formulation:

"Table 6-3 summarizes these conservatisms."

Text introducing Table 6-4:

Original formulation:

"Table 6-4 summarizes the conservative assumptions for modeling this group of transients."

Updated formulation:

"Table 6-4 summarizes these conservatisms."

Text introducing Table 6-5:

Original formulation:

"Table 6-5 summarizes the conservative assumptions used to accurately model Reactor Coolant Flow Decrease Transients."

Updated formulation:

"Table 6-5 summarizes these conservatisms."

Text introducing Table 6-7:

Original formulation:

"Table 6-7 summarizes the conservatisms used during Feedwater Flow Decrease transients."

Updated formulation:

"Table 6-7 summarizes these conservatisms."

d) Westinghouse confirms that the magnitude of the conservative biases to be applied, as specified in Tables 6-1 through 6-8 are based on an appropriate data uncertainty assessment. The process of how the biases are determined depends on the sample size of the available data. As described in the response to RAI-19S02 from the Office of New Reactors, for the sample size of less than 20 samples [

.]a,c

To include this discussion in the LTR, the last part of Section 7.4.1 will be updated as follows (additional text is marked **bold**):

Original formulation:

"Conservative – [

]a,c "

Updated formulation:

"Conservative – [

]a,c

[

]a,c"

In conclusion, the methodology presented in the LTR is conservative overall by meeting requirements 1-5 in the SRP cited above and [

]a,c

NRR-RAI-26

Section 6.4.1.3.1 suggests that the limiting pressure decrease transient would be one which initiates MSIV closure, thereby ultimately resulting in a primary system pressure increase. Please clarify whether this is a correct interpretation of Westinghouse's intent, and further, address the following requests:

a. Identify any conditions under which a pressure increase initiated by a pressure decrease transient could have more limiting results than one initiated directly by a pressure increase transient.

b. Provide a basis for considering [

]a,c, given that these biases would presumably have an

[ ]a,c

Reference available data from sensitivity studies demonstrating that the chosen biases are correct and lead to overall conservative results.

c. Provide a basis for the conclusion that it is [

]a,c Reference available data from sensitivity studies demonstrating that the chosen biases are correct and lead to overall conservative results.

Response to NRR-RAI-26

Westinghouse confirms that it is a correct interpretation that the limiting pressure decrease transient would be one which initiates MSIV closure, thereby ultimately resulting in a primary system pressure increase.

a. Westinghouse experience with BWR designs regarding pressure decrease transients is that the pressure decrease transients are non limiting transients for OLMCPR determination.

[

]a,c

b/c. Table 1 summarizes the valve opening times assumed in the analysis for pressure decrease and pressure increase transients. Note that the valve opening times shown in the table for pressure decrease transients are the opening times assumed as the initiating event. [

][a,c]

Table 1 Summary of valve opening times assumptions for pressure decrease and pressure increase transients.

a,c

[ ]

With regard to question c, Westinghouse agrees there is an inconsistency regarding fuel time constant and reactivity impacts of the moderator density coefficient, control rods and recirculation pumps. Therefore, Westinghouse will revise Table 6-3 for the fuel model, kinetics model and recirculation pump inertia in the approved version of the topical report according to Table 2.

Table 2 Revised assumptions for the fuel model, the kinetics model and the recirculation pump inertia for pressure decrease transients.

a,c

[ ]

The basis for the chosen biases is to have consistent conservative assumptions with pressure increase transients for the fuel model, the kinetics model and the recirculation pumps model as the limiting pressure decrease transients are those that evolve into a pressure increase through MSIV closure. The chosen biases, according to Table 2, are justified by the sensitivity study shown in Figure 1 below for the Opening of all turbine control and bypass valves transient.

The transient is initiated by opening of all turbine control and bypass valves, which causes the pressure to decrease. MSIV closure is initiated on low steamline pressure and scram is activated on MSIV position. The conservative case predicts a higher APRM peak after the MSIV closure and an overall higher peak pressure. Hence, the chosen biases according to Table 2 are appropriate.

[ ]a,c

Figure 1 APRM and steam dome pressure as a function of time for nominal case and conservative case for Opening of all turbine control and bypass valves.

[ ]a,c

Westinghouse's general approach for transients that evolve into another transient group is to confirm the assumed conservatisms in the analysis yield overall conservative results. However, [ ]a,c

NRR RAI-27

Section 6.4.2.2.2 states that the assumption of "an as low as possible recirculation flow increase rate" is conservative. Please clarify the following:

a. Clarify the intent of the quoted phrase in practical terms. Is the topical report suggesting that this transient could be or will be modeled using a steady-state analysis with the recirculation pump speed just below the pump trip setpoint or a reactor scram setpoint Please include adequate justification for the positions taken in the response, and discuss the results of any sensitivity studies that have been undertaken in support of it.

b. Clarify the circumstances under which modeling assumptions can result in the prediction that a reactor scram will precede reaching the maximum pump speed and further clarify and provide justification for the modeling approaches that will be taken based on the topical report methodology. Include discussion of the method to determine the limiting initial power level and flow for this event.

Response to NRR RAI-27

a. The methodology described in WCAP-17203-P Section 6.4.2.2.2 applies to transient codes where the governing equations include the explicit time derivatives, for example POLCA-T or BISON. Therefore, when recirculation flow increase transients are analyzed employing the methodology in the subject LTR, the analysis will not be performed by using a steady state analysis.

[

]a,c

a,c

Figure 1 – [

]a,c

a,c

Figure 2 – [

]a,c

b. A general assumption on reactor scram preceding the point of maximum pump speed cannot be made. [ ]a,c

[

]a,c

Whether the reactor scram precedes the point of maximum pump speed depends also on the type of event under evaluation. For Fast Runout of One Recirculation pump the maximum pump speed is more likely to precede scram on high APRM than for the Fast Runout of All Recirculation pumps.

[

]a,c

NRR RAI-28

Please provide qualitative and quantitative technical justification for the statement in Section 6.4.2.2.2 that it is conservative to model a reactor coolant flow increase transient with [

][a,c]

Response to NRR RAI-28

The statement that it is conservative to model a reactor coolant flow increase transients with [

][a,c]

This statement is supported by the sensitivity study where the Fast Runout of All Feewater Pumps (FROARP) event is evaluated against CPR for ABWR at limiting conditions [ ][a,c]. This event is selected because the transient change in CPR is relatively large in this transient.. Two cases are run for this event. In the first case [ ][a,c]. Figure 1 and Figure 2 below show the results supporting the argument that [

][a,c]

The statement in Section 6.4.2.2.2 in the LTR will be updated as shown below.

[

][a,c]

a,c

Figure 1 – [ ]a,c

a,c

Figure 2 – [ ]a,c

NRR RAI-30

It appears that the intent of Sections 6.5.1.1 and 6.5.1.2 is to state that no uncertainty analysis will be performed for the ATWS event. Please confirm this understanding is correct, and if so, address the following items:

a. Consider revising Table 7-1 to include separate Analysis Treatment columns for AOO (presumably including infrequent events and accidents within the scope of the topical report as well) and ATWS events. Further consider revising other discussion in Chapter 7 to clarify where applicability is intended solely for AOOs (and presumably other non-ATWS events within scope), and where applicability is for both AOO and ATWS events.

b. Provide qualitative and quantitative technical justification for the position that no uncertainty analysis is necessary for the ATWS event. It is not clear to the staff that a statistical analysis methodology that completely discounts the impacts of uncertainty can be considered acceptable, even in the case of a beyond-design basis event.

c. The response to RAI-18 from the Office of New Reactors states that, for the ATWS event, [ ]^{a,c} Please discuss whether the magnitude of these model uncertainties would be generic or plant-specific, thereby clarifying the intent of performing a statistical analysis of the ATWS event [ ]^{a,c} If this will no longer be the approach for ATWS events, please revise the topical report appropriately.

Response to NRR RAI-30

The original statement used in Section 6.5.1.1 and 6.5.1.2 "...according to the PIRT, CCA and DUA, best estimate values will be used for different parameters (Table 7-1) and no uncertainty evaluation is performed. " is not correct. Uncertainty analysis will be performed for the ATWS event. This was stated in the response to RAI-18 from the Office of New Reactors as: "Methodology similar to the corresponding AOO event (previously evaluated with a scram) is used. [ ]^{a,c} For completeness, questions a-c have been responded to (even though it is pointed out that uncertainty evaluation will be performed for ATWS):

a) Chapter 7 applies to AOO, accidents, infrequent events and ATWS analysis.
b) Uncertainty analysis is performed for ATWS to evaluate model uncertainties, as stated in the response to RAI-18 from the Office of New Reactors.
c) As the magnitude of model uncertainties varies among different plant designs, these uncertainties are evaluated [ ]^{a,c}

NRR RAI-32

The basis for treating phenomena with medium PIRT ranking using the nominal without uncertainty analysis approach has not been adequately justified. Please address the following concerns:

a. It is not clear to the staff that this approach can be considered acceptable for phenomena for which the code capability assessment is low (i.e., high bias and deviation, or the phenomenon is not even modeled in the code). Furthermore, a cumulative effect can occur if multiple phenomena happen to fall into this situation for a given analysis.

b. The perception of potential limitations in the validation for the PIRT rankings in Section 5.3 causes staff concerns regarding the lack of uncertainty analysis for medium-ranked parameters (the influence of which may have been inadvertently underestimated) for which code capabilities are rated medium or high.

c. In response to NRO RAI-33(a), Westinghouse advocates that the nominal without uncertainty analysis approach should apply to phenomena with a medium PIRT ranking based on the assertion that these parameters would have "minimal impact" on figures of merit; however, this rationale appears to contradict Section 5.3 of the topical report, which indicates that rankings of medium are assigned when a phenomenon has a moderate impact on figures of merit.

Response to NRR RAI-32

a) Subsequent to this RAI, we answered RAI-20 S02 from the Office of New Reactors and believe that it addresses this question as summarized below. Please review that RAI response. [

]a,c

b) The uncertainty analysis performed in the response to RAI-20 S02 from the Office of New Reactors confirms that [

]a,c

c) As described in the response to RAI-20 S02 from the Office of New Reactors, Westinghouse adopted the same screening criteria to determine the impact on the figures-of-merit as were used in the LOCA PIRT reported in NUREG/CR-6744 (Reference 1) and this PIRT defined a "Medium" ranked phenomenon as a "...phenomenon or process that has moderate influence on the figures-of-merit". [

]a,c

NRR RAI-36

In Section 8.6.1 of the demonstration analysis, it is unclear how the parameters to be treated conservatively were selected. First, the staff expected that the parameters treated conservatively would have included all of the parameters listed in Table 6-1, since Section 6.4.1.2.1 appears to state unconditionally that these conservatisms should be included in the evaluation model. The staff further expected that other parameters would also have been included, according to the matrix in Table 7-1 (i.e., parameters ranked highly in the PIRT and lowly in the CCA). However, the staff noted that a number of the parameters listed in Table 6-1 were not included in Section 8.6.1. Please clarify the basis for the parameters treated conservatively in Section 8.6.1 and further confirm or correct the staff's understanding that the selection of conservative parameters for the demonstration analysis should be based on Table 6-1 and the criteria of Table 7-1.

Response to NRR RAI-36

A general discussion on how the parameters treated conservatively are selected in the analysis is provided in the response to NRR RAI-23.

Based on the response to NRR RAI-23 and the methodology described in the LTR, the final list of parameters set conservatively in Section 8.6.1 in the LTR arises from three different groups:

1. [

]a,c

2. [

]a,c

3. [

]a,c

Once the choice of whether the parameter is treated conservatively is made, based on item 2 or 3 from the list above, the direction of the conservatism (lower or upper bound) is selected based on Tables 6-1 to 6-8 for the phenomena listed in these tables. For the conservative treatment of a phenomenon not explicitly mentioned in Section 6, the conservative direction is selected based on the sensitivity study or other justification (see NRR RAI-23 for a general discussion of this issue).

Based on the motivation above, not all of the parameters listed in Table 6-1 are included in Section 8.6.1. Following is the detailed clarification of the basis for the parameters treated conservatively in Section 8.6.1:

[

]a,c

[

]a,c