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Attention: J. S. Wermiel, Chief
Reactor Systems Branch
Division of Systems Safety and Analysis

Our ref: LTR-NRC-04-19

and

Stephen Dembek, Chief, Section 2
Project Directorate IV
Division of Licensing Project Management

April 8, 2004

Subject: Westinghouse Comments on the NRC's Draft Safety Evaluation for WCAP-16072-P, Revision 00 "Implementation of Zirconium Diboride Burnable Absorber Coatings in CE Nuclear Power Fuel Assembly Designs" (Proprietary/Non-Proprietary)

Reference: 1. Letter from Stephen Dembek (NRC) to James A. Gresham (Westinghouse), "Draft Safety Evaluation for WCAP-16072-P, Revision 00 'Implementation of Zirconium Diboride Burnable Absorber Coatings in CE Nuclear Power Fuel Assembly Designs'," (TAC NO. MB8721), dated March 31, 2004

Dear Mr. Wermiel and Mr. Dembek:

Enclosed are copies of the Proprietary and Non-Proprietary versions of the Westinghouse Comments on the NRC's Draft Safety Evaluation for WCAP-16072-P, Revision 00 "Implementation of Zirconium Diboride Burnable Absorber Coatings in CE Nuclear Power Fuel Assembly Designs" (Proprietary/Non-Proprietary). This submittal serves as Westinghouse's comments to the NRC, as requested by Reference 1.

Also enclosed is a copy of the Draft SE with line numbers sequentially numbered as directed by Reference 1. Since Westinghouse has identified proprietary information in this Draft SE, it is requested that the Draft SE be withheld from public disclosure until the proprietary information has been removed pursuant to the provisions of 10 CFR Section 2.390.

Also enclosed is:

1. One (1) copy of the Application for Withholding, AW-04-1809 with Proprietary Information Notice and Copyright Notice.
2. One (1) copy of Affidavit, AW-04-1809.

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This submittal contains proprietary information of Westinghouse Electric Company LLC. In conformance with the requirements of 10 CFR Section 2.390, as amended, of the Commission's regulations, we are enclosing with this submittal an Application for Withholding from Public Disclosure and an affidavit. The affidavit sets forth the basis on which the information identified as proprietary may be withheld from public disclosure by the Commission.

Correspondence with respect to any Application for Withholding should reference AW-04-1809 and should be addressed to James A. Gresham, Manager of Regulatory Compliance and Plant Licensing, Westinghouse Electric Company, P. O. Box 355, Pittsburgh, Pennsylvania 15230-0355.

Very truly yours,



James A. Gresham, Manager
Regulatory Compliance and Plant Licensing

Enclosures

cc: F. M. Akstulewicz, NRR
P. Clifford, NRR
B. J. Benney, NRR
E. S. Peyton, NRR



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Attention: J. S. Wermiel, Chief
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Our ref: AW-04-1809

and

April 8, 2004

Stephen Dembek, Chief, Section 2
Project Directorate IV
Division of Licensing Project Management

**APPLICATION FOR WITHHOLDING PROPRIETARY
INFORMATION FROM PUBLIC DISCLOSURE**

Subject: Westinghouse Comments on the NRC's Draft Safety Evaluation for WCAP-16072-P, Revision 00
"Implementation of Zirconium Diboride Burnable Absorber Coatings in CE Nuclear Power Fuel
Assembly Designs" (Proprietary)

Reference: Letter from James A. Gresham to J. S. Wermiel and S. Dembek, LTR-NRC-04-19, dated
April 8, 2004

Dear Mr. Wermiel and Mr. Dembek:

The Application for Withholding is submitted by Westinghouse Electric Company LLC, a Delaware limited liability company (Westinghouse), pursuant to the provisions of paragraph (b)(1) of Section 2.390 of the Commission's regulations. It contains commercial strategic information proprietary to Westinghouse and customarily held in confidence.

The proprietary material for which withholding is being requested is identified in the proprietary version of the subject report. In conformance with 10 CFR Section 2.390, Affidavit AW-04-1809 accompanies this application for withholding, setting forth the basis on which the identified proprietary information may be withheld from public disclosure.

Accordingly, it is respectfully requested that the subject information which is proprietary to Westinghouse be withheld from public disclosure in accordance with 10 CFR Section 2.390 of the Commission's regulations.

Correspondence with respect to this application for withholding or the accompanying affidavit should reference AW-04-1809 and should be addressed to James A. Gresham, Manager of Regulatory Compliance and Plant Licensing, Westinghouse Electric Company, P. O. Box 355, Pittsburgh, Pennsylvania 15230-0355.

Very truly yours,

A handwritten signature in black ink, appearing to read "James A. Gresham".

James A. Gresham, Manager
Regulatory Compliance and Plant Licensing

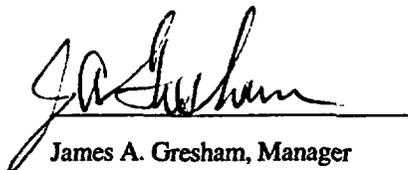
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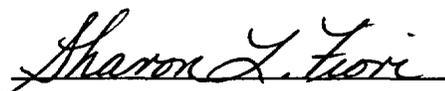
COUNTY OF ALLEGHENY:

Before me, the undersigned authority, personally appeared James 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:



James A. Gresham, Manager
Regulatory Compliance and Plant Licensing

Sworn to and subscribed
before me this 8th day
of April, 2004.



Notary Public

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

- (1) I am Manager, Regulatory Compliance and Plant Licensing, in Nuclear Services, Westinghouse Electric Company LLC (Westinghouse) and as such, I have been specifically delegated the function of reviewing the proprietary information sought to be withheld from public disclosure in connection with nuclear power plant licensing and rulemaking proceedings, and am authorized to apply for its withholding on behalf of the Westinghouse.
- (2) I am making this Affidavit in conformance with the provisions of 10 CFR Section 2.390 of the Commission's regulations and in conjunction with the Westinghouse "Application for Withholding" accompanying this Affidavit.
- (3) I have personal knowledge of the criteria and procedures utilized by Westinghouse in designating information as a trade secret, privileged or as confidential commercial or financial information.
- (4) Pursuant to the provisions of paragraph (b)(4) of Section 2.390 of the Commission's regulations, the following is furnished for consideration by the Commission in determining whether the information sought to be withheld from public disclosure should be withheld.
 - (i) The information sought to be withheld from public disclosure is owned and has been held in confidence by Westinghouse.
 - (ii) The information is of a type customarily held in confidence by Westinghouse and not customarily disclosed to the public. Westinghouse has a rational basis for determining the types of information customarily held in confidence by it and, in that connection, utilizes a system to determine when and whether to hold certain types of information in confidence. The application of that system and the substance of that system constitutes Westinghouse policy and provides the rational basis required.

Under that system, information is held in confidence if it falls in one or more of several types, the release of which might result in the loss of an existing or potential competitive advantage, as follows:

- (a) The information reveals the distinguishing aspects of a process (or component, structure, tool, method, etc.) where prevention of its use by any of Westinghouse's competitors without license from Westinghouse constitutes a competitive economic advantage over other companies.
- (b) It consists of supporting data, including test data, relative to a process (or component, structure, tool, method, etc.), the application of which data secures a competitive economic advantage, e.g., by optimization or improved marketability.
- (c) Its use by a competitor would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing a similar product.

- (d) It reveals cost or price information, production capacities, budget levels, or commercial strategies of Westinghouse, its customers or suppliers.
- (e) It reveals aspects of past, present, or future Westinghouse or customer funded development plans and programs of potential commercial value to Westinghouse.
- (f) It contains patentable ideas, for which patent protection may be desirable.

There are sound policy reasons behind the Westinghouse system which include the following:

- (a) The use of such information by Westinghouse gives Westinghouse a competitive advantage over its competitors. It is, therefore, withheld from disclosure to protect the Westinghouse competitive position.
 - b) It is information which is marketable in many ways. The extent to which such information is available to competitors diminishes the Westinghouse ability to sell products and services involving the use of the information.
 - c) Use by our competitor would put Westinghouse at a competitive disadvantage by reducing his expenditure of resources at our expense.
 - (d) Each component of proprietary information pertinent to a particular competitive advantage is potentially as valuable as the total competitive advantage. If competitors acquire components of proprietary information, any one component may be the key to the entire puzzle, thereby depriving Westinghouse of a competitive advantage.
 - (e) Unrestricted disclosure would jeopardize the position of prominence of Westinghouse in the world market, and thereby give a market advantage to the competition of those countries.
 - (f) The Westinghouse capacity to invest corporate assets in research and development depends upon the success in obtaining and maintaining a competitive advantage.
- (iii) The information is being transmitted to the Commission in confidence and, under the provisions of 10 CFR Section 2.390, it is to be received in confidence by the Commission.
 - (iv) The information sought to be protected is not available in public sources or available information has not been previously employed in the same original manner or method to the best of our knowledge and belief.

- (v) The proprietary information sought to be withheld in this submittal is that which is appropriately marked "Westinghouse Comments on the NRC's Draft Safety Evaluation for WCAP-16072-P, Revision 00 'Implementation of Zirconium Diboride Burnable Absorber Coatings in CE Nuclear Power Fuel Assembly Designs' (Proprietary/Non-Proprietary)," April 8, 2004, for submittal to the Commission, being transmitted by Westinghouse letter (LTR-NRC-04-19) and Application for Withholding Proprietary Information from Public Disclosure, to the Document Control Desk. The proprietary information as submitted by Westinghouse is to provide comments to the NRC staff on potentially proprietary information included in the Draft Safety Evaluation.

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

- (a) Assist customers in improving their fuel performance with a different burnable absorber.

Further this information has substantial commercial value as follows:

- (a) Westinghouse plans to implement processes and products that benefit the Westinghouse fleet of customer by ensuring the highest quality of fuel in order to meet the customer needs.

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 for developing the enclosed improved core thermal performance methodology.

Further the deponent sayeth not.

Proprietary Information Notice

Transmitted herewith are proprietary and non-proprietary versions of documents furnished to the NRC. 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 documents transmitted herewith each bear a Westinghouse copyright notice. The NRC is permitted to make the number of copies for 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 these 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.

Westinghouse Non-Proprietary Class 3

**Westinghouse Comments on the NRC's Draft Safety Evaluation
for WCAP-16072-P, Revision 00
"Implementation of Zirconium Diboride Burnable Absorber Coatings
in CE Nuclear Power Fuel Assembly Designs"**

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Westinghouse Non-Proprietary Class 3
Westinghouse Comments on the NRC's Draft Safety Evaluation
for WCAP-16072-P, Revision 00
"Implementation of Zirconium Diboride Burnable Absorber Coatings
in CE Nuclear Power Fuel Assembly Designs"

Line 111, Page 3, Section 3.1, 1st paragraph, last sentence:

Wording: "Westinghouse claims that no . . ."
Recommendation: "Westinghouse stated that no . . ."
Basis: The information provided by Westinghouse is factual and is based on hundreds of fuel examinations and root cause analyses. No fuel failures have been attributed to ZrB₂ IFBA fuel rod designs.

Line 133-134, Page 3, Section 3.2, Fuel Mechanical Design, 1st paragraph, last sentence:

Wording []^{a,c}
Recommendation: ". . . fuel design may employ annular fuel pellets (to provide additional void volume)."
Basis: []^{a,c}

Line 147, Page 4, Section 3.2, Fuel Rod Internal Pressure, last sentence:

Wording: []^{a,c}
Recommendation: []^{a,c}
Basis: []^{a,c}

Lines 155-156, Page 4, Section 3.2, Clad Stress, last sentence:

Wording: []^{a,c}
Recommendation: "Impacts of a fill gas pressure on compressive cladding stresses are discussed below under cladding collapse."
Basis: []^{a,c}

Line 168, Page 4, Section 3.2, Clad Fatigue, first sentence:

Wording: [

] ^{a,c}

Recommendation: "Westinghouse has evaluated the impact of rod internal pressure and the increased fuel pellet diameter for both the 14x14 and 16x16 CE fuel designs with ZrB₂ IFBA fuel design."

Basis: [

] ^{a,c}

Line 177, Section 3.2, Clad Collapse, first sentence:

Wording: [

] ^{a,c}

Recommendation: ". . . Westinghouse has evaluated the impact of rod internal pressure and the increased fuel pellet diameter for both . . ."

Basis: [

] ^{a,c}

Lines 208-210, Page 5, Section 3.2, Clad Oxidation and Hydriding, last sentence:

Wording: "Since clad hydride reorientation was not addressed for these events, the staff has instituted a condition requiring that this issue be evaluated prior to restart following a Condition III or IV event."

Recommendation: Delete this sentence.

Basis: This has nothing to do with ZrB₂ IFBA. It is a delta-pressure concern with operating above system pressure and high stresses. [

] ^{a,c} If

this is a concern, then the NRC should consider a new requirement on the industry. Such a new requirement should be handled through appropriate design criteria processes and not in a topical report review.

[

] ^{a,c}

Lines 227-263, Page 6, Section 3.2, Fuel Rod Ballooning and Bursting, 2nd, 3rd, 4th, 5th, and 6th paragraphs:

Wording: Refer to the 2nd, 3rd, 4th, 5th, and 6th paragraphs in this section.

Recommendation: Replace these paragraphs with the following wording:

“During AOOs and postulated transients, fuel rods with elevated clad temperatures due to DNB may experience outward clad creep. As described in CEN-372-P-A, analysis must show that DNB propagation to adjacent fuel rods is precluded or the consequences of DNB propagation must be appropriately accounted for.

The staff is concerned with potentially higher rod internal pressures exhibited by the ZrB₂ fuel rods during the first operating cycle (depicted in Figures 4.2-3 and 4.2-4 of the TR), with the commensurate increased likelihood of fuel rod internal pressures exceeding system pressure during the first operating cycle. With potentially higher predicted rod internal pressure in the first cycle associated with ZrB₂, the likelihood of a single fuel rod exhibiting rod internal pressure in excess of system pressure concurrent with a rod power close to the peak pin is increased. As a result, the probability of a fuel rod with rod internal pressure in excess of system pressure experiencing DNB-induced elevated clad temperatures (during Condition III or IV Non-LOCA events) is increased. The staff is concerned that the implementation of ZrB₂ will have a higher propensity for fuel rod ballooning and rod burst during these conditions.

In its September 10 and November 3, 2003, and February 3, 2004, letters, Westinghouse stated that clad burst was an acceptable mechanism and would be credited for terminating rod ballooning during DNB propagation analysis for ZrB₂ applications. In addition, Westinghouse also stated that rod burst is an acceptable mechanism for terminating rod ballooning during DNB propagation analysis was implicit in the strain evaluation expressions in CEN-372-P-A. The staff does not fully concur. Although fuel rod bursting is an acceptable phenomena explicitly recognized during lower probability loss-of-coolant accidents (LOCA) and implicitly recognized during lower probability Condition IV non-LOCA events (e.g., control element assembly ejection), the staff has concerns with extending fuel rod burst as an acceptable mechanism to Condition II and III events that might experience elevated clad temperatures.

To clearly define the extent to which the clad burst mechanism may be credited in DNB propagation analyses, the staff has instituted a condition to preclude fuel clad burst during Condition I, II, and III events. For Condition IV non-LOCA events which predict clad burst during DNB propagation events, the potential impacts of fuel rod ballooning and bursting need to be specifically addressed with regard to radiological source term.”

Basis: Clarification.

Line 274, Page 7, Section 3.3, Safety Analysis Models and Methods, Item 4:

Wording: []^{a,c}

Recommendation: “. . . (4) initial helium fill gas pressure.”

Basis: []

] ^{a,c}

Lines 297-301, Page 7, Section 3.3, Safety Analysis Models and Methods, Core Physics, 2nd paragraph, last two sentences:

Wording: “Further, until licensees have experienced several cycles of an increasing trend in RCS soluble boron concentration, a direct measurement of MTC is prudent. As a result, the staff has instituted a condition requiring that licensees confirm by direct measurement that the peak positive MTC is within the TS limits at the highest RCS soluble boron concentration predicted during Mode 1 operation.”

Recommendation: Delete these two sentences or change the wording to the following:

“Plant Technical Specification (TS) Surveillance Requirements on MTC validate the physics predictions and ensure that plant operations remain within allowable limits. In addition to current Surveillance Requirements, licensees shall confirm by extrapolation of the BOC measured MTC value that the peak positive MTC is within the TS limits at the highest RCS soluble boron concentration predicted during Mode 1 operation.”

Basis: In most (but not all) previous cycles of CE plants the most positive MTC usually occurred at the beginning of cycle and thus confirmation of compliance to the most positive Tech Spec MTC limit was accomplished by the HZP and HFP MTC startup tests required by Technical Specifications. However in some cycles (particularly those containing Gadolinia as well as ZrB₂ IFBA burnable absorbers) the most positive MTC may occur a few months after beginning of cycle. In this case confirmation of compliance to the Technical Specification limit has been accomplished according to design procedures involving analytical calculations rather than explicit measurement.

The requirement of an additional MTC measurement would have a significant impact on operation. An explicit test at the highest soluble boron concentration predicted during Mode 1 would require that the reactor power be reduced to 5% power for an extended period of time. A HZP measurement later in cycle would be much worse from both a risk and an operational standpoint. Even if the test were to be performed at near full power conditions, the test usually requires that power be reduced 5-10% for a sufficiently long time to establish equilibrium conditions during the test. (This is one of the reasons why there was a lot of interest in eliminating the two thirds cycle MTC test in both the CE and Westinghouse plants.)

An alternate method of comparable accuracy of verifying compliance to the MTC Technical Specification limit would be to adjust (using analytically determined derivatives) the MTC obtained via measurement at HFP BOC conditions to the maximum HFP RCS critical boron concentration expected during the cycle. This is a sound alternate approach to confirming the compliance to the Technical Specification limit since: (a) for a given cycle, the RCS boron concentration is the primary parameter that determines the MTC; (b) analytical derivatives of MTC with boron concentration are currently used in the Startup Physics Tests to adjust the predicted MTC to measured boron conditions

for determining compliance to startup test acceptance criteria; (c) the expected increase in boron concentration from BOC to cycle maximum is relatively small and therefore the correction on the MTC would be relatively small; (d) RCS boron concentration is a parameter that is continually measured and thus the adjustment should be highly accurate, and (e) there is precedence for this approach since a similar adjustment of the two thirds cycle measured MTC to EOC boron conditions has long been used to verify compliance with the most negative MTC Tech Spec.

Lines 322-324, Page 8, Section 3.3, Safety Analysis Models and Methods, Fuel Performance, 3rd

paragraph:

Wording:

[

] ^{a,c}

Recommendation: Delete this paragraph.

Basis:

[

] ^{a,c}

Lines 326-330, Page 8, Section 3.3, Safety Analysis Models and Methods, Fuel Performance, 4th

paragraph:

Wording:

[

] ^{a,c}

Recommendation: Delete this paragraph.

Basis:

[

] ^{a,c}

Lines 472-475, Page 11, Section 4.0, Conditions and Limitations, 3rd bullet:

Wording:

“3. Plant TSs SRs on MTC validate the physics predictions and ensure that plant operations remain within allowable limits. In addition to current SRs, licensees shall confirm by direct measurement that the peak positive MTC is within the TS limits at the highest RCS soluble boron concentration predicted during Mode 1 operations.”

Recommendation: Delete this item or change the wording to the following:

“Plant Technical Specification (TS) Surveillance Requirements on MTC validate the physics predictions and ensure that plant operations remain within allowable limits. In addition to current Surveillance Requirements, licensees shall confirm by extrapolation of the BOC measured MTC value that the peak positive MTC is

within the TS limits at the highest RCS soluble boron concentration predicted during Mode 1 operation.”

Basis: Same as before as noted on page 4 of this comment response.

Lines 477-478, Page 11, Section 4.0, Conditions and Limitations, 4th bullet:

Wording: “4. Prior to startup following a Condition III or IV event, licensees must evaluate clad hydriding to ensure that hydrides have not precipitated in the radial direction.”

Recommendation: Delete this item.

Basis: This has nothing to do with ZrB₂ IFBA. It is a delta-pressure concern with operating above system pressure and high stresses. Refer to response to Lines 208-210 on Page 2 of this response.

Lines 480-481, Page 11, Section 4.0, Conditions and Limitations, 5th bullet:

Wording: “5. CEN-372-P-A constraints and limitations with regard to rod internal pressure, hydride reorientation, and DNB propagation must continue to be met.”

Recommendation: “5. CEN-372-P-A constraints and limitations with regard to rod internal pressure and DNB propagation must continue to be met.”

Basis: Refer to previous discussion on hydride reorientation. Delete reference to this statement.

Lines 481-482, Page 11, Section 4.0, Conditions and Limitations, 5th bullet:

Wording: “In addition, licensees must ensure that the following two conditions are satisfied:”

Recommendation: “In addition, when addressing DNB propagation, licensees must ensure that the following condition is satisfied:”

Basis: Self explanatory.

Lines 484-494, Page 11, Section 4.0, Conditions and Limitations, 5th bullet, Item a:

Wording: “a. For Condition I (normal), Condition II (moderate frequency), and Condition III (infrequent) events, fuel cladding burst must be precluded for all fuel types. Using current models and methods approved for CE fuel designs, it must be demonstrated that the total calculated stress remains below cladding burst stress at the cladding temperatures experienced during any potential Condition II or Condition III event. To ensure that fuel rod burst is precluded, licensees must evaluate all Condition II events in combination with any credible, single active failure. The selection of limiting single failure shall include a loss of offsite power (LOAC). Unless the staff has previously approved a time delay for a LOAC following turbine trip for this category of event, the timing of the LOAC shall be coincident with reactor trip breakers open.”

Recommendation: “a. For Condition I (normal), Condition II (moderate frequency), and Condition III (infrequent) events, fuel cladding burst must be precluded for CE ZrB₂ rods using currently approved creep and rupture models approved for CE fuel designs.”

Basis: The discussion on selection of limiting single failure including a loss of offsite power (LOAC) is a requirement associated with GDC 23 which is not part of this TR review. This discussion is a generic industry issue and should not be part of this TR review or Safety Evaluation.

Lines 496-498, Page 11, Section 4.0, Conditions and Limitations, 5th bullet, Item b:

Wording: “For Condition IV non-LOCA events which predict clad burst, the potential impacts of fuel rod ballooning and bursting need to be specifically addressed with regard to coolable geometry, RCS pressure, and radiological source term.”

Recommendation: Delete this statement.

Basis: Lines 260-263, the NRC staff has already acknowledged burst for Condition IV events. Appropriate analyses are performed and no additional requirement or limitation needs to be specified for this TR.