Entergy

Entergy Nuclear South
Entergy Operations, Inc.
17265 River Road
Killona, LA 70057
Tel 504 464 3178

Kevin T. Walsh
General Manager, Plant Operations
Waterford 3

W3F1-2005-0074

October 25, 2005

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

SUBJECT: License Amendment Request NPF-38-265
To Allow the Use of Zirconium Diboride and
Modify Technical Specification 6.9.1.11, Core Operating Limits Report
Waterford Steam Electric Station, Unit 3
Docket No. 50-382
License No. NPF-38

Dear Sir or Madam:

Pursuant to 10 CFR 50.90, Entergy Operations, Inc. (Entergy) hereby requests an amendment to the Waterford Steam Electric Station, Unit 3 (Waterford 3) Technical Specifications (TS). The proposed change to TS 6.9.1.11, Core Operating Limits Report will result in the addition of a methodology that will allow the use of zirconium diboride (ZrB_2) burnable absorber coating on fuel pellets.

The proposed change has been evaluated in accordance with 10 CFR 50.91(a)(1) using criteria in 10 CFR 50.92(c) and it has been determined that this change involves no significant hazards consideration. The bases for these determinations are included in the attached submittal.

The proposed change includes new commitments as summarized in Attachment 3. The NRC has approved similar Technical Specification changes for other plants, including Arkansas Nuclear One, Unit 2.

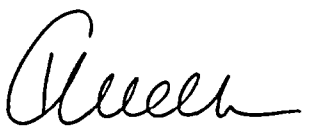
Entergy requests approval of the proposed amendment by September 18, 2006 in order to support the fall 2006 refueling outage. Once approved, the amendment shall be implemented within 30 days. Although this request is neither exigent nor emergency, your prompt review is requested.

If you have any questions or require additional information, please contact Dana Millar at 601-368-5445.

A001

I declare under penalty of perjury that the foregoing is true and correct. Executed on October 25, 2005.

Sincerely,



KTW/DM/cbh

Attachments:
1. Analysis of Proposed Technical Specification Change
2. Proposed Technical Specification Changes (mark-up)
3. List of Regulatory Commitments

cc: Dr. Bruce S. Mallett
U. S. Nuclear Regulatory Commission
Region IV
611 Ryan Plaza Drive, Suite 400
Arlington, TX 76011

NRC Senior Resident Inspector
Waterford 3
P.O. Box 822
Killona, LA 70066-0751

U.S. Nuclear Regulatory Commission
Attn: Mr. Nageswaran Kalyanam MS O-7D1
Washington, DC 20555-0001

Wise, Carter, Child & Caraway
Attn: J. Smith
P.O. Box 651
Jackson, MS 39205

Winston & Strawn
Attn: N.S. Reynolds
1700 K Street, NW
Washington, DC 20006-3817

Louisiana Department of Environmental Quality
Office of Environmental Compliance
Surveillance Division
P. O. Box 4312
Baton Rouge, LA 70821-4312

American Nuclear Insurers
Attn: Library
Town Center Suite 300S
29th S. Main Street
West Hartford, CT 06107-2445

Attachment 1

W3F1-2005-0074

Analysis of Proposed Technical Specification Change

1.0 DESCRIPTION

This letter is a request to amend Operating License NPF-38 for Waterford Steam Electric Station, Unit 3 (Waterford 3). The proposed change will revise the Operating License to supplement the list of the analytical methods referenced in Technical Specification (TS) 6.9.1.11.1 with a methodology that will allow the use of zirconium diboride (ZrB_2) burnable absorber coating on fuel pellets.

Approval of the proposed change is requested by September 18, 2006 in order to support the fall 2006 refueling outage.

2.0 PROPOSED CHANGE

The proposed change will add a reference to the topical report (WCAP-16072-P-A) that supports the use of ZrB_2 burnable absorber coating on fuel pellets to the list of NRC reviewed and approved analytical methods included in Waterford 3 TS 6.9.1.11.1.

3.0 BACKGROUND

A change in the burnable absorbers is planned for Waterford 3 Cycle 15 (fall 2006). The change reflects a transition from Erbia integral burnable absorber, which is mixed in the fuel, to a burnable absorber using ZrB_2 coating. Zirconium diboride burnable absorbers were introduced to Westinghouse cores in the mid-1980's as Integral Fuel Burnable Absorbers (IFBA). The description of IFBA was originally documented in WCAP-10444-P-A, "Reference Core Report Vantage 5 Assembly" September 1985. The use of ZrB_2 burnable absorbers in Combustion Engineering (CE) fuel assemblies is addressed separately in WCAP-16072-P-A, "Implementation of Zirconium Diboride Burnable Absorber Coatings in CE Nuclear Power Fuel Assembly Designs".

The topical report, WCAP-16072-P-A, includes a detailed description of the ZrB_2 burnable absorber and summarizes the evaluation of the effects of the ZrB_2 material characteristics on design and safety analyses, including loss of coolant accident (LOCA) analyses. The current reload methodologies can be used with the implementation of the ZrB_2 burnable absorber. Changes in the safety analyses or safety methods are addressed directly or via reference through WCAP-16072-P-A.

Waterford 3 TS 2.1.1.2 requires that the peak fuel centerline temperature be maintained less than 5080°F (decreasing by 58°F per 10,000 MWD/MTU for burnup and adjusting for burnable poisons per approved topical reports). Therefore, the impact of ZrB_2 was evaluated in relationship to the fuel centerline temperature. By design ZrB_2 is coated onto the outer surface of the uranium dioxide (UO_2) fuel pellets prior to loading into the fuel rod cladding tubes rather than being mixed with the UO_2 directly as is done with other integral fuel burnable absorber materials. Therefore, ZrB_2 does not impact the UO_2 melting point since it is coated onto the outer surface of the pellet and not mixed into the UO_2.

4.0 TECHNICAL ANALYSIS

The final NRC Safety Evaluation (SE) for WCAP-16072-P-A, "Implementation of Zirconium Diboride Burnable Absorber Coatings in CE Nuclear Power Fuel Assembly Designs" includes five conditions and limitations which require response. The conditions and Waterford 3's responses are below.

Condition 1

A license amendment is required to add this TR to the Core Operating Limits Report analytical methods listed in the licensee's TS.

Response 1

This license amendment request includes the TS change required by this condition.

Condition 2

Plant-specific core design guidelines or cycle-specific calculation shall be used to verify that required power margins in the axial cutback regions are maintained within safety analysis limitations.

Response 2

Cycle specific evaluations will be performed as part of the reload efforts to verify that required power margins in the axial cutback regions are maintained within the safety analysis limitations.

Condition 3

Plant TS SRs [surveillance requirement] on MTC [moderator temperature coefficient] validate the physics predictions and ensure that plant operations remain within allowable limits. In addition to current SRs, licensees shall confirm that the peak positive HFP [hot full power] MTC is within the TS limits at the highest RCS [reactor coolant system] soluble boron concentration predicted during full power operation. The peak positive HFP MTC shall be derived by adjusting the measured MTC at HFP BOC [beginning of cycle] conditions to the maximum HFP soluble boron concentration expected during the cycle. In order to ensure a conservative adjustment, a direct measurement of MTC is required at the highest RCS soluble boron concentration predicted during full power operation. This direct measurement is only required for the first application of ZrB_2 IFBA in a CE [Combustion Engineering] 14 x 14 or 16 x 16 fuel assembly design. During the first cycle implementation, Westinghouse shall provide the staff with a letter containing the following information:

i. Measured HFP BOC MTC (TS SR),
ii. Measured HFP MTC at highest RCS soluble boron concentration, and
iii. Calculated HFP MTC at highest RCS soluble boron concentration, and
iv. Demonstrated accuracy of the calculated HFP MTC within current analytical uncertainties.

In addition, plant procedures used to perform MTC surveillances shall be updated, where appropriate, to reflect the calculated peak positive HFP MTC along with ZrB_2 IFBA's distinctive trend in RCS critical boron concentration.

Response 3

An MTC test at the highest RCS soluble boron concentration predicted during full power operation to confirm that the MTC is within the TS limits at the peak boron concentration is not required since Arkansas Nuclear One, Unit 2 was the Combustion Engineering lead plant for the use of ZrB_2 as a burnable absorber coating on the fuel pellets and validated the methodology.

Plant procedures will be modified as needed to reflect the calculated peak HFP MTC along with ZrB_2 IFBAs distinctive trend in RCS critical boron concentration.

Condition 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 (in accordance with section 3.2 of this SE).

Response 4

In the event of a Condition III or IV event at Waterford 3, an evaluation of fuel structural integrity with respect to radial hydriding will be performed prior to power ascension. This commitment refers only to an actual Condition III or Condition IV occurrence at the plant that could potentially result in fuel damage, and would not allow for an immediate plant restart. The evaluation would likely be similar to the information provided in RAI [request for additional information] response in Items 6 of Appendix H of WCAP-16072-P-A, relying on the fact that the conditions necessary to allow radial hydriding would not have existed, and therefore the possibility of radial hydriding need not be considered further. Since this condition applies to an actual event and not to licensing calculations for this event, such evaluation would be based on best estimate assumptions and/or known plant conditions.

Condition 5

CEN-372-P-A constraints and limitations with regard to rod internal pressure and DNB propagation must continue to be met. In addition, licensees must ensure that the following two conditions are satisfied:

a. For Condition I (normal), Condition II (moderate frequency), and Condition III (infrequent) events, fuel cladding burst must be precluded for ZrB_2 IFBA fuel rods. Using models and methods approved for CE fuel designs, licensees must demonstrate that the total calculated stress remains below cladding burst stress at the cladding temperatures experienced during any potential Condition II or Condition III event. Within the confines of the plant's licensing basis, licensees

must evaluate all Condition II events in combination with any credible, single active failure to ensure that fuel rod burst is precluded.

b. 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.

Response 5

The constraints and limitations of CEN-372-P-A will continue to be met. Analyses as part of the Waterford 3 reload efforts will be performed in support of the generic implementation of ZrB_2 fuel.

5.0 REGULATORY ANALYSIS

5.1 Applicable Regulatory Requirements/Criteria

The proposed change has been evaluated to determine whether applicable regulations and requirements continue to be met. Entergy has determined that the proposed change does not require any exemptions or relief from regulatory requirements, other than the Technical Specification (TS), and does not affect conformance with any General Design Criterion (GDC) differently than described in the Updated Final Safety Analysis Report (UFSAR).

5.2 No Significant Hazards Consideration

The proposed change will modify Waterford Steam Electric Station, Unit 3 (Waterford 3) Technical Specifications (TS) 6.9.1.11, Core Operating Limits Report (COLR) to support the use of zirconium diboride (ZrB_2) burnable absorber coating on fuel pellets. Specifically WCAP-16072-P-A, "Implementation of Zirconium Diboride Burnable Absorber Coatings in CE Nuclear Power Fuel Assembly Designs" will be added to the list of NRC approved methodologies that can be utilized to determine the core operating limits.

Entergy Operations, Inc. has evaluated whether or not a significant hazards consideration is involved with the proposed amendment(s) by focusing on the three standards set forth in 10 CFR 50.92, "Issuance of amendment," as discussed below:

1. Does the proposed change involve a significant increase in the probability or consequences of an accident previously evaluated?

   Response: No.

   The proposed change will add topical report WCAP-16072-P-A to the NRC reviewed and approved analytical methods used to determine the core operating limits. The topical report has been previously approved by the NRC for use in Combustion Engineering core designs and as such, the proposed change is administrative in nature and has no impact on any plant configurations or on system performance that is relied upon to mitigate the consequences of an accident. In addition, prior to the use of the ZrB_2 burnable absorber coating, fuel design will be analyzed with applicable NRC staff approved codes and methods.

Therefore, the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. Does the proposed change create the possibility of a new or different kind of accident from any accident previously evaluated?

Response: No.

The proposed change adds a reference to the topical report that allows the use of ZrB_2 as a burnable absorber coating on the fuel pellet. The topical report has been previously approved by the NRC for use in Combustion Engineering core designs and as such, the proposed change is administrative in nature and has no impact on any plant configurations or on system performance that is relied upon to mitigate the consequences of an accident. In addition, prior to the use of the ZrB_2 burnable absorber coating, fuel design will be analyzed with applicable NRC staff approved codes and methods. This change is administrative in nature and does not create a new or different type of accident than previously evaluated because the design requirements for the facility remain the same.

Therefore, the proposed change does not create the possibility of a new or different kind of accident from any previously evaluated.

3. Does the proposed change involve a significant reduction in a margin of safety?

Response: No.

The proposed change will add WCAP-16072-P-A to the list of referenced topical reports. The topical report has been previously approved by the NRC for use in Combustion Engineering core designs and as such, the proposed change is administrative in nature and has no impact on any plant configurations or on system performance that is relied upon to mitigate the consequences of an accident. In addition, prior to the use of the ZrB_2 burnable absorber coating, fuel design will be analyzed with applicable NRC staff approved codes and methods.

Therefore, the proposed change does not involve a significant reduction in a margin of safety.

Based on the above, Entergy concludes that the proposed amendment(s) present no significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and, accordingly, a finding of "no significant hazards consideration" is justified.

5.3 Environmental Considerations

The proposed amendment does not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluent that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR

51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed amendment.

6.0 PRECEDENCE

NRC letter to Arkansas Nuclear One, Unit 2 (ANO-2) dated March 23, 2005 includes the NRC's Safety Evaluation (SE) for changes that were proposed for ANO-2 in support of core reload activities. One of the proposed changes was the addition of the Westinghouse topical report WCAP-16072-P-A. ANO-2 was the Combustion Engineering lead plant for implementing ZrB_2 as a burnable absorber coating on fuel pellets and therefore direct measurement of MTC at the highest boron concentration required by Condition 3 of the topical report is not required to be performed by Waterford 3. The NRC asked ANO-2 one additional question in regard to the use of ZrB_2. The response to the question is included in Waterford 3's response to Condition 4 of the topical report.

Attachment 2

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Proposed Technical Specification Changes (mark-up)

ADMINISTRATIVE CONTROLS

CORE OPERATING LIMITS REPORT COLR (Continued)

6) "CESEC - Digital Simulation for a Combustion Engineering Nuclear Steam Supply System," (CE letter LD-82-001 and NRC SE to CE dated April 3, 1984). (Methodology for Specification 3.1.1.1 and 3.1.1.2 for Shutdown Margins, 3.1.1.3 for MTC, 3.1.3.1 for Movable Control Assemblies - CEA Position, 3.1.3.6 for Regulating and group P CEA Insertion Limits, and 3.2.3 for Azimuthal Power Tilt).

7) "Qualification of Reactor Physics Methods for the Pressurized Water Reactors of the Entergy System," ENEAD-01-P. (Methodology for Specifications 3.1.1.1 and 3.1.1.2 for Shutdown Margins, 3.1.1.3 for MTC, 3.1.3.6 for Regulating and group P CEA Insertion Limits, 3.1.2.9 Boron Dilution (Calculation of CBC & IBW), and 3.9.1 Boron Concentration).

8) "Fuel Rod Maximum Allowable Gas Pressure," CEN-372-P-A. (Methodology for Specification 3.2.1, Linear Heat Rate).

9) "Technical Description Manual for the CENTS Code," WCAP-15996-P-A. (Methodology for Specification 3.1.1.1 and 3.1.1.2 for Shutdown Margins, 3.1.1.3 for MTC, 3.1.3.1 for Movable Control Assemblies - CEA Position, 3.1.3.6 for Regulating and group P CEA Insertion Limits, and 3.2.3 for Azimuthal Power Tilt).

10) "Calculative Methods for the CE Nuclear Power Large Break LOCA Evaluation Model," CENPD-132, Supplement 4-P-A. (Methodology for Specification 3.1.1.3 for MTC, 3.2.1 for Linear Heat Rate, 3.2.3 for Azimuthal Power Tilt and 3.2.7 for ASI).

11) "Implementation of ZIRLO Material Cladding in CE Nuclear Power Fuel Assembly Designs," CENPD-404-P-A (Methodology for Specification 3.1.1.3 for MTC, 3.2.1 for Linear Heat Rate, 3.2.3 for Azimuthal Power Tilt, and 3.2.7 for ASI).

12) "Qualification of the PHOENIX-P/ANC Nuclear Design System For Pressurized Water Reactor Cores," WCAP-11596-P-A; "ANC: A Westinghouse Advanced Nodal Computer Code," WCAP-10965-P-A; and "ANC: A Westinghouse Advanced Nodal Computer Code: Enhancements to ANC Rod Power Recovery," WCAP-10965-P-A Addendum 1. (Methodology for Specifications 3.1.1.1 and 3.1.1.2 for Shutdown Margins, 3.1.1.3 for MTC, 3.1.3.6 for Regulating and group P CEA Insertion Limits, 3.1.2.9 Boron Dilution (Calculation of CBC & IBW), and 3.9.1 Boron Concentration).

13) "Qualification of the Two-Dimensional Transport Code PARAGON," WCAP-16045-P-A (Methodology for Specifications 3.1.1.1 and 3.1.1.2 for Shutdown Margins, 3.1.1.3 for MTC, 3.1.3.6 for Regulating and group P CEA Insertion Limits, 3.1.2.9 Boron Dilution (Calculation of CBC & IBW), and 3.9.1 Boron Concentration).

6.9.1.11.2 The core operating limits shall be determined such that all applicable limits (e.g., fuel thermal limits, core thermal-hydraulic limits, ECCS limits, nuclear limits such as shutdown margin, and transient and accident analysis limits) of the safety analysis are met.

6.9.1.11.3 The CORE OPERATING LIMITS REPORT, including any mid-cycle revisions or supplements thereto, shall be provided upon issuance, for each reload cycle, to the NRC Document Control Desk with copies to the Regional Administrator and Resident Inspector.

INSERT

INSERT

(14) "Implementation of Zirconium Diboride Burnable Absorber Coatings in CE Nuclear Power Fuel Assembly Designs," WCAP-16072-P-A (Methodology for Specification 3.1.1.3 for MTC, 3.2.1 for Linear Heat Rate, 3.2.3 for Azimuthal Power Tilt, and 3.2.7 for ASI).

Attachment 3

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List of Regulatory Commitments

List of Regulatory Commitments

The following table identifies those actions committed to by Entergy in this document. Any other statements in this submittal are provided for information purposes and are not considered to be regulatory commitments.

COMMITMENT	TYPE (Check one)		SCHEDULED COMPLETION DATE (If Required)
	ONE-TIME ACTION	CONTINUING COMPLIANCE	
Prior to the use of ZrB_2 burnable absorber coatings, the fuel design will be analyzed with applicable NRC staff approved codes and methods.		X	
Plant procedures will be modified as needed to reflect the calculated peak HFP MTC along with ZrB_2 IFBAs distinctive trend in RCS critical boron concentration.		X	
In the event of a Condition III or IV event at Waterford 3, an evaluation of fuel structural integrity with respect to radial hydriding will be performed prior to power ascension.		X	
Analyses as part of the Waterford 3 reload efforts will be performed in support of the generic implementation of ZrB_2 fuel.		X	