

August 27, 2004

Mr. Joseph E. Venable  
Vice President Operations  
Entergy Operations, Inc.  
17265 River Road  
Killona, LA 70066-0751

SUBJECT: WATERFORD STEAM ELECTRIC STATION, UNIT 3 (WATERFORD 3) -  
REQUEST FOR ADDITIONAL INFORMATION RELATED MODIFICATION OF  
TECHNICAL SPECIFICATIONS (TS) 5.3.1, FUEL ASSEMBLIES, TS 6.9.1.11.1  
CORE OPERATING LIMITS REPORT (TAC NO. MC3584)

Dear Mr. Venable:

By letter dated June 17, 2004, Entergy Operations, Inc. proposed an amendment to the Waterford 3 Technical Specifications to allow a limited number of lead test assemblies (LTAs) and limited substitutions of zirconium alloy or stainless steel filler rods for fuel rods, include ZIRLO™ as an acceptable fuel rod cladding, and allow the use of the Westinghouse Nuclear Physics code package and to incorporate the methodology used to support ZIRLO™ cladding material.

After reviewing your request, the Nuclear Regulatory Commission staff has determined that additional information is required to complete the review. We discussed this information with your staff by telephone and they agreed to provide the additional information requested in the enclosure within 30 days of receipt of this letter.

If you have any questions, please call me at (301) 415-1480.

Sincerely,

*/RA/*

N. Kalyanam, Project Manager, Section 1  
Project Directorate IV  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Docket No. 50-382

Enclosure: Request for Additional Information

cc w/encl: See next page

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\* RAI input from the staff without any major change

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\*\* Per T. Marsh's deferral memo

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REQUEST FOR ADDITIONAL INFORMATION

ENTERGY OPERATIONS, INC.

WATERFORD STEAM ELECTRIC STATION, UNIT 3 (WATERFORD 3)

DOCKET NO. 50-382

1. Enclosure 1 to Entergy Operations, Inc. letter dated June 17, 2004, (Reference 1) provided supplemental information to demonstrate the applicability of the Westinghouse nuclear physics code package to Waterford 3. Figures 2.3-9 through 2.3-20 provide comparisons between plant measurements and the ANC code predictions of Waterford 3 Cycles 11 and 12 radial assembly average power and radial peaking factor (Fr) distributions. These comparisons, however, show large differences between the measured and predicted values for some assemblies. For example, in Figure 2.3-9, assembly T-20 for cycle 11 has a difference of 8.046% in the measured and predicted radial assembly average power; and in Figure 2.3-15, the difference in the Fr for assembly S-20 is 8.97%. Provide justification for concluding the applicability the Westinghouse nuclear physics package to Waterford 3 in light of these large differences between the measured and the predicted values.
2. The staff included several conditions in its acceptance of CENPD-404-P-A for licensing application. Condition 4 stated that until data are available demonstrating the performance of ZIRLO cladding in CENP designed plants, the fuel duty will be limited for each CENP designed plant with some provision for adequate margin to account for variations in core design (e.g., cycle length, plant operating conditions, etc.). The licensee's response to Condition 4 (on page 8 of Attachment 1 to Reference 1) indicated that the maximum modified fuel duty index (mFDI) calculated based on actual 16x16 Combustion Engineering (CE)-designed fuel is approximately 590; and the mFDI values of 652 and 712, which are 110% (for the majority of ZIRLO clad fuel pins) and 120% (for a fraction of ZIRLO clad fuel pins in a limited number of assemblies) of 590, respectively, will be used as upper design limits for the Waterford 3 fuel to provide margin to account for core design variations. The response further states that if the mFDI and measured oxide thickness from the CE lead plant utilizing ZIRLO™ correlate as expected or is conservative relative to predictions, Waterford 3 will no longer restrict the mFDI except as required to meet the 100 micron oxide limit.
  - (a) Explain how the maximum mFDI value of 590 is calculated and why this is the adequate nominal fuel duty limit. The response should include: (1) the values and the source of data regarding the time averaged oxide layer surface temperature ( $T_{avg}$ ), total irradiation time (hours), and total mass evaporation (Mt) used to calculate the maximum mFDI value (see the mFDI formula described in Equation 3-2 of CENPD-404) of 590; and (2) ZIRLO oxide measurements as a function of mFDI from CE fuel designs (e.g., lead test assemblies, fuel batches, etc.) to demonstrate the relative corrosion rate of ZIRLO in a CE fuel design and adequacy of the mFDI limit of 590.
  - (b) Explain how the 110% and 120% mFDI multipliers are obtained to provide adequate margin for variations in core design, and how they will be applied to the Waterford 3 fuel, i.e., which fuel pins are subject to which mFDI limit values.
  - (c) The margin provision stated in Condition 4 is intended to account for core design variations to further restrict the fuel duty limit until data are available

ENCLOSURE

demonstrating the performance of ZIRLO cladding. Explain why increasing, rather than reducing, the fuel duty limit with the 110% and 120% multipliers, respectively, is not contrary to the intent of Condition 4.

- (d) Explain what is meant by the “as expected” correlation between mFDI and measured oxide thickness. Provide the correlation, with basis, used to judge if the measured oxide thickness is as expected or conservative.
  - (e) The licensee indicated that if the mFDI and measured oxide thickness from the CE lead plant utilizing ZIRLO™ correlate as expected, then Waterford 3 will no longer restrict the mFDI except as required to meet the 100 oxide limit. Please clarify whether the licensee intends to lift the restriction on fuel duty without the Nuclear Regulatory Commission (NRC) staff's evaluation of the licensee submittal of the appropriate ZIRLO corrosion data from CE fuel design.
3. The licensee proposed to revise Technical Specification (TS) 5.3.1. The existing TS 5.3.1 specified that the reactor core shall contain 217 fuel assemblies with each fuel assembly containing a maximum of 236 fuel rods clad with Zircaloy-4. The specification of the maximum of 236 fuel rods per fuel assembly is deleted in the revised TS 5.3.1. Provide the basis and justification for the deletion of the maximum of 236 fuel rods per assembly.

Waterford Steam Electric Station, Unit 3

cc:

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