

March 5, 2002

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

SUBJECT: WATERFORD STEAM ELECTRIC STATION, UNIT 3 - ISSUANCE OF  
AMENDMENT RE: REVISION TO PEAK LINEAR HEAT RATE SAFETY LIMIT  
(TAC NO. MB3926)

Dear Mr. Venable:

The Commission has issued the enclosed Amendment No. 181 to Facility Operating License No. NPF-38 for the Waterford Steam Electric Station, Unit 3. The amendment consists of changes to the Technical Specifications (TSs) in response to your application dated January 31, 2002.

The amendment replaces the TS Safety Limit 2.1.1.2, "Peak Linear Heat Rate" with a Peak Fuel Centerline Temperature Safety Limit and updates the Index accordingly. Changes have also been made to the associated TS Bases to appropriately reflect the new Safety Limit.

A copy of our related Safety Evaluation is also enclosed. The Notice of Issuance will be included in the Commission's next biweekly *Federal Register* notice.

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

Enclosures: 1. Amendment No. 181 to NPF-38  
2. Safety Evaluation

cc w/encls: See next page

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\*Staff SE dated 2/11/02. Used with minor editorial changes

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ENTERGY OPERATIONS, INC.

DOCKET NO. 50-382

WATERFORD STEAM ELECTRIC STATION, UNIT 3

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 181  
License No. NPF-38

1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by Entergy Operations, Inc. (EOI) dated January 31, 2002, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;
  - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
  - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
  - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
  - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.2. of Facility Operating License No. NPF-38 is hereby amended to read as follows:

2. Technical Specifications and Environmental Protection Plan

- The Technical Specifications contained in Appendix A, as revised through Amendment No. 181 , and the Environmental Protection Plan contained in Appendix B, are hereby incorporated in the license. EOI shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective as of its date of issuance and shall be implemented within 30 days from the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

*/RA/*

Robert A. Gramm, Chief, Section 1  
Project Directorate IV  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical  
Specifications

Date of Issuance: March 5, 2002

ATTACHMENT TO LICENSE AMENDMENT NO. 181

TO FACILITY OPERATING LICENSE NO. NPF-38

DOCKET NO. 50-382

Replace the following pages of the Appendix A Technical Specifications with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

Remove

III

2-1

Insert

III

2-1

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 181 TO

FACILITY OPERATING LICENSE NO. NPF-38

ENTERGY OPERATIONS, INC.

WATERFORD STEAM ELECTRIC STATION, UNIT 3

DOCKET NO. 50-382

1.0 INTRODUCTION

By application dated January 31, 2002, (Reference 1), Entergy Operations, Inc. (Entergy, the licensee), requested a change to Waterford Steam Electric Station, Unit 3 (Waterford 3) Technical Specifications (TS). The proposed change will replace the Peak Linear Heat Rate (PLHR) Safety Limit, TS 2.1.1.2, with a Peak Fuel Centerline Temperature Safety Limit. This change is necessary to comply with 10 CFR 50.36(c)(1)(ii)(A), which requires that Limiting Safety System Settings (LSSSs) prevent a Safety Limit from being exceeded during normal operations and Anticipated Operational Occurrences (AOO).

The proposed change will replace the current PLHR TS 2.1.1.2 Safety Limit of 21 kiloWatt/foot (kW/ft) with a Peak Fuel Centerline Temperature value, and a statement that this temperature will be adjusted for effects of fuel burnup and burnable absorbers. Because the adjustment for burnable absorbers is considered proprietary, a reference to the Nuclear Regulatory Commission (NRC) approved Topical Report (TR), which provides the methodology for that adjustment, will be included as part of the TS Safety Limit. Additionally, the proposed change updates the Index accordingly. Changes have also been made to the associated TS Bases to appropriately reflect the new Safety Limit.

2.0 BACKGROUND

In preparation for the spring 2002 refueling outage, Entergy submitted a License Amendment Request (LAR) for a 1.5 % Appendix K margin recovery power uprate (Reference 2) and to replace the part-length control element assemblies (CEAs) with full length CEAs (Reference 3). During review of the Waterford 3 Appendix K margin recovery power uprate request, the NRC staff identified that the PLHR Safety Limit of 21 kW/ft would be exceeded for two AOOs. This does not comply with 10 CFR 50.36(c)(1)(ii)(A), that requires that LSSS be in place such that automatic action will prevent Safety Limits from being exceeded during normal operations and AOOs.

The two AOOs for which the PLHR Safety Limit is exceeded are the CEA Withdrawal events from Subcritical and Low Power conditions. These events and their acceptance criteria are discussed in Standard Review Plan (SRP) Section 15.4.1 (Reference 4). While the current

Safety Limit of 21 kW/ft is exceeded during two AOOs, the peak fuel centerline temperature does not exceed the melting point, which is the true acceptance criteria for the event. The analysis results, including the linear heat rate greater than 21 kW/ft, for these events had been previously reviewed and found to be acceptable by the NRC staff. This review and acceptance by the staff is documented in the original Waterford 3 Safety Evaluation Report (SER) (Reference 5), and the SER for the Waterford 3 Cycle 2 Reload Analysis Report (Reference 6). However, based on the recent review initiated by the power uprate LAR, the staff has determined that the exceeding PLHR Safety Limit is not acceptable.

### 3.0 EVALUATION

The Uncontrolled CEA Withdrawal from Subcritical and Low Power transients are classified as moderate frequency events (AOO, as defined in 10 CFR Part 50, Appendix A) and the acceptance criteria are discussed in Reference 4 and General Design Criteria (GDC)-10, "Reactor design," and GDC-20, "Protection system functions." These GDC's ensure that acceptable fuel design limits are not exceeded during the transient. The acceptable fuel design limits for this transient are: 1) no fuel pins experience departure from nucleate boiling limit, and 2) fuel centerline temperature does not exceed the melting point. Most Combustion Engineering (CE) plants and the CE Standard TS (STS) define the fuel centerline melt specified acceptable fuel design limit (SAFDL) in terms of a PLHR safety limit.

The intent of the PLHR Safety Limit is to prevent the fuel centerline temperature from reaching the melting point, which conservatively assures that there will be no breach in cladding integrity. The current 21 kW/ft limit was chosen because it is the highest steady state linear heat rate at which the fuel can operate without causing the centerline temperature to reach the melting point. This limit adequately addresses steady state operation (normal operation). For the two transients of interest, the PLHR exceeds 21 kW/ft. However, due to the short duration of these AOOs, deposited energy calculations demonstrate that the true acceptance criteria, namely the peak fuel centerline temperature, is not exceeded.

In accordance with Appendix A to 10 CFR Part 50, GDC-10, and GDC-20, the acceptance criteria for normal operation and AOOs is that the SAFDLs will not be exceeded. The SAFDL of interest in this case is the Peak Fuel Centerline Temperature limit. This SAFDL is discussed in detail in SRP Section 4.2, which states:

(II)(A)(2)(e) "Overheating of Fuel Pellets: It has also been traditional practice to assume that failure will occur if centerline melting takes place...For normal operation and anticipated operational occurrences, centerline melting is not permitted...The centerline melting criterion was established to assure that axial or radial relocation of molten fuel would neither allow molten fuel to come into contact with the cladding nor produce local hot spots. The assumption that centerline melting results in fuel failure is conservative."

The licensee stated in Reference 1 that Waterford 3 complies with GDC-10 and GDC-20 as discussed in Final Safety Analysis Report (FSAR), Sections 3.1.6 and 3.1.16. Additionally, FSAR Section 4.4.1 lists the SAFDLs utilized for the design of the Waterford 3 reactor. FSAR Section 4.4.1.3 states:

“The peak temperature of the fuel shall be less than the melting point...during steady-state operation and anticipated operation and anticipated operational occurrences.”

Therefore, a more appropriate Safety Limit would be one that is based upon the peak fuel centerline temperature. A Peak Fuel Centerline Temperature Safety Limit would address both normal operation and AOOs, and would be consistent with Appendix A to 10 CFR Part 50, the SRP, the Waterford 3 licensing basis, and 10 CFR 50.36. Maine Yankee Atomic Power Station, a CE plant, previously requested and received NRC approval to change the PLHR Safety Limit to a Peak Fuel Centerline Safety Limit (Amendment No. 124, November 18, 1991).

For Waterford 3, the melting point of the fuel is dependent on fuel burnup and the amount and type of burnable poison used in the fuel. The design melting point of new fuel with no burnable poison is 5080 °F. The melting point is adjusted downward from this temperature based on the amount of burnup and amount and type of burnable poison in the fuel. The adjustment for burnup is 58 °F per 10,000 MWD/MTU, which was accepted by the NRC staff in TR CEN-386-P-A (Reference 7). The burnable poison adjustments are determined in accordance with the NRC staff-approved methodology in TR CENPD-382-P-A (Reference 8). Waterford 3 considers the adjustment for burnable poison (erbium) to be proprietary information and, therefore, will reference this TR in the TS Safety Limit. The mode of applicability and Actions required if the Safety Limit is exceeded would be the same as they are for the current PLHR Safety Limit. These changes will be incorporated into TS 2.1.1.2.

Additionally, the Peak Fuel Centerline Temperature Safety Limit proposed for Waterford 3 is consistent with the Peak Fuel Centerline Temperature and Maximum Local Fuel Pin Centerline Temperature Safety Limits contained in the STS for Westinghouse Electric Company (Westinghouse) (NUREG-1431) and Babcock & Wilcox (B&W) (NUREG-1430) plants. The STS for Westinghouse and B&W contain an equation for decreasing the melting point based on the fuel burnup. The proposed Safety Limit for Waterford 3 does not contain the same formula, but instead states that the limit is “decreasing by 58 °F per 10,000 MWD/MTU for burnup and adjusting for burnable poisons per CENPD-382-P-A.” As stated above, this is acceptable because NRC-approved methods are used, and the portion of the adjustment formula accounting for burnable poison is proprietary and can not be placed in the TS. This NRC approved methodology will be referenced in TS 2.1.1.2 itself.

The NRC staff maintained regular communications with the Waterford 3 staff during preparation of this TS change, has reviewed this amendment request, and finds it to be acceptable. A Peak Fuel Centerline Temperature Safety Limit of less than 5080 °F (decreasing by 58 °F per 10,000 MWD/MTU for burnup and adjusting for burnable poisons per CENPD-382-P-A) is more appropriate than the current PLHR Safety Limit for the following reasons:

- addresses both normal operation and AOOs,
- is consistent with 10 CFR Part 50 Appendix A criteria,
- is consistent with SAFDLs,
- is consistent with SRP acceptance criteria,
- is consistent with the Waterford 3 licensing basis,
- is determined using NRC approved methodologies, and
- clearly conforms to 10 CFR 50.36(c)(1)(ii)(A).



The TS Bases for Sections 2.1.1, 2.2.1 and 3/4.2.7 would also be revised to reflect the change to a Peak Fuel Centerline Temperature Safety Limit and provide a reference to the methods for calculating the Safety Limit.

#### 4.0 STATEMENT OF EXIGENT CIRCUMSTANCES

The Commission's regulation, as stated in 10 CFR 50.91, provides special exceptions for the issuance of amendments when the usual 30-day public notice cannot be met. One type of special exception is an exigency. An exigency exists when the staff and the licensee need to act quickly and time does not permit the staff to publish a *Federal Register* notice allowing 30 days for prior public comment, and the staff also determines that the amendment involves no significant hazards consideration. In accordance with 10 CFR 50.91(a)(6)(i)(A), the staff issued a *Federal Register* notice providing an opportunity for hearing and allowing at least two weeks from the date of the notice for prior public comment on February 11, 2002 (67 FR 6281). No comments were received.

In its submittal, the licensee discussed the need for an exigent review of the proposed license amendment. This LAR was submitted on an exigent basis since this change is required to support LARs for "Replacement of Part-Length Control Element Assemblies," dated July 9, 2001 (66 FR 41617, published August 8, 2001), and "Appendix K Margin Recovery - Power Uprate Request," dated September 21, 2001 (66 FR 55017, published October 31, 2001), which have been requested to support the March 2002 refueling outage. The need to conform with 10 CFR 50.36 was recently identified. Therefore, the licensee requested NRC review and approval of this License Amendment on an exigent basis.

On the basis of the above discussion, the staff has determined that exigent circumstances exist and that the licensee used its best efforts to make a timely application and did not cause the exigent situation.

#### 4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Louisiana State official was notified of the proposed issuance of the amendment. The State official had no comments.

#### 5.0 FINAL NO SIGNIFICANT HAZARDS CONSIDERATION DETERMINATION

The Commission's regulations in 10 CFR 50.92 state that the Commission may make a final determination that a license amendment involves no significant hazards consideration if operation of the facility, in accordance with the amendment, would not (1) involve a significant increase in the probability or consequences of an accident previously evaluated, or (2) create the possibility of a new or different kind of accident from any accident previously evaluated, or (3) involve a significant reduction in a margin of safety. As required by 10 CFR 50.91(a), the licensee has provided its analysis of the issue. The staff's analysis is set forth below.

(1) The proposed amendment would revise the TSs by replacing the PLHR safety limit with a peak fuel centerline temperature safety limit. The accidents analyzed in Chapter 15 of the Waterford 3 Safety Analysis Report where the PLHR may exceed the limiting safety system setpoint of 21 kW/ft are the CEA withdrawals at subcritical conditions.

This change does not increase the probability of an accident previously evaluated because the proposed change does not require any change to plant systems, structures, or components, nor does it require any change in plant operations. The change does not increase the consequences of an accident because the change to establish the peak fuel centerline temperature as the TS safety limit is consistent with the current licensing basis of Waterford 3 for protecting the fuel.

(2) The change does not establish a new accident precursor, nor does it affect the method or manner in which the plant is operated. Therefore, the change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

(3) The proposed change does not change any safety analysis methods or results. In addition, changing the TS safety limit from PLHR to peak fuel centerline temperature establishes a margin in the TSs that is consistent with the current licensing basis of Waterford 3 for protecting the fuel. Therefore, the change does not involve a significant reduction in a margin of safety.

Based on the above considerations, the NRC staff concludes that the amendment meets the three criteria of 10 CFR 50.92. Therefore, the staff has made a final determination that the proposed amendment does not involve a significant hazards consideration.

## 5.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration and there has been no public comment on such finding (67 FR 6281 published February 11, 2002). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

## 6.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

## 7.0 REFERENCES

1. Letter from B. S. Allen, Entergy Operations, Inc., to USNRC, "Waterford Steam Electric Station, Unit 3, Docket No. 50-382, License Amendment Request TSCR NPF-38-241, Revision to Peak Linear Heat Rate Safety Limit Technical Specification 2.1.1.2," Letter No. W3F1-2002-0012, dated January 31, 2002.

2. Letter from J. T. Herron, Entergy Nuclear Southwest, to USNRC, "Waterford Steam Electric Station, Unit 3, Docket No. 50-382, License Amendment Request TSCR NPF-38-238, "Appendix K Margin Recovery - Power Uprate Request," Letter No. W3F1-2001-0091, dated September 21, 2001.
3. Letter from J. T. Herron, Entergy Nuclear Southwest, to USNRC, "Waterford Steam Electric Station, Unit 3, Docket No. 50-382, License Amendment Request TSCR NPF-38-234, "Replacement of Part-Length Control Element Assemblies," Letter No. W3F1-2001-0063, dated July 9, 2001.
4. NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants," Section 15.4.1, Uncontrolled Control Rod Assembly Withdrawal From a Subcritical or Low Power Startup Condition
5. NUREG-0787, "Safety Evaluation Report Related to the Operation of Waterford Steam Electric Station, Unit No. 3," July, 1981
6. NRC Letter dated January 16, 1987, "Reload Analysis Report for Cycle 2 at Waterford 3."
7. Topical Report CEN-386-P-A, "Verification of the Acceptability of a 1-Pin Burnup Limit of 60 MWD/kdU for Combustion Engineering 16x16 PWR Fuel," August, 1992.
8. Topical Report CENPD-382-P-A, "Methodology for Core Designs Containing Erbium Burnable Absorbers," Revision 0, August, 1993.

Principal Contributor: M. Kowal

Date: March 5, 2002

Waterford Generating Station 3

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