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W3F1-2005-0072

October 25, 2005

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

**SUBJECT:** License Amendment Request NPF-38-264  
To Modify Technical Specification 3.1.1.4, Minimum Temperature for  
Criticality  
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 the following amendment to the Waterford Steam Electric Station, Unit 3 (Waterford 3) Technical Specifications (TSs). The proposed change will modify the Waterford 3 TS 3.1.1.4, Minimum Temperature for Criticality. Specifically, the proposed change will raise the minimum temperature for criticality from the current value of  $\geq 520^{\circ}\text{F}$  to  $\geq 533^{\circ}\text{F}$ . Changes are also proposed to the Action statement and Surveillance Requirements to support the increase in temperature. The change is needed to support core design.

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 does not include any new commitments.

Entergy requests approval of the proposed amendment by September 18, 2006. 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,

A handwritten signature in black ink, appearing to read 'KTW/DM/cbh', written in a cursive style.

KTW/DM/cbh

Attachments:

1. Analysis of Proposed Technical Specification Change
2. Proposed Technical Specification Changes (mark-up)

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**Attachment 1**

**W3F1-2005-0072**

**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 modify the Waterford 3 Technical Specification (TS) 3.1.1.4, Minimum Temperature for Criticality. Specifically, the proposed change will increase the current minimum Reactor Coolant System (RCS) lowest operating loop temperature ( $T_{cold}$ ) from greater than or equal to 520°F to greater than or equal to 533°F. In addition, changes are proposed to the Action statement and Surveillance Requirements to support the increase in minimum temperature for criticality. The change is needed to support Cycle 15 core design.

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

## 2.0 PROPOSED CHANGE

The proposed change revises Waterford 3 TS 3.1.1.4 to increase the RCS lowest operating loop temperature. The current Limiting Condition for Operation (LCO) for TS 3.1.1.4 states:

“The Reactor Coolant System lowest operating loop temperature ( $T_{cold}$ ) shall be greater than or equal to 520°F.”

The proposed change to the LCO is as follows:

“The Reactor Coolant System lowest operating loop temperature ( $T_{cold}$ ) shall be greater than or equal to 533°F.”

The current Action statement for LCO 3.1.1.4 is:

“With a Reactor Coolant System operating loop temperature ( $T_{cold}$ ) less than 520°F, restore  $T_{cold}$  to within its limit within 15 minutes or be in HOT STANDBY within the next 15 minutes.”

The proposed change to the Action statement is as follows:

“With a Reactor Coolant System operating loop temperature ( $T_{cold}$ ) less than 533°F, restore  $T_{cold}$  to within its limit within 15 minutes or be in HOT STANDBY within the next 15 minutes.”

Surveillance Requirement (SR) 4.1.1.4 currently states the following:

“The Reactor Coolant System cold leg temperature ( $T_{cold}$ ) shall be determined to be greater than or equal to 520°F:

- a. Within 15 minutes prior to achieving reactor criticality, and
- b. At least once per 30 minutes when the reactor is critical and the Reactor Coolant System  $T_{cold}$  is less than 530°F.”

The proposed SR will entirely replace the current SR. The proposed wording, which is consistent with the wording in NUREG-1432, *Standard Technical Specifications Combustion Engineering Plants*, is:

“The Reactor Coolant System temperature ( $T_{\text{cold}}$ ) shall be determined to be greater than or equal to 533°F at least once per 12 hours.”

Changes will be made to the Waterford 3 TS Bases in accordance with the Technical Specifications (TS) Bases Control Program (Waterford 3 TS 6.16).

### 3.0 BACKGROUND

The moderator temperature coefficient (MTC) relates changes in reactivity to uniform changes in moderator temperature, including the effects of moderator density changes with changes in moderator temperature. Typically, an increase in the moderator temperature causes a decrease in the core moderator density and therefore a reduction in the number of neutrons that are slowed to thermal energy and a reduction in the core reactivity.

The following Waterford 3 TSs are associated, but require no change to support the proposed change to the minimum temperature for criticality:

- TS LCO 3.1.1.3 - The moderator temperature coefficient (MTC) shall be within the limits specified in the Core Operating Limits Report (COLR). The maximum upper design limit shall be: (Applicability: Modes 1 and 2 with  $K_{\text{eff}} \geq 1.0$ )
  - a. Less positive than  $0.5 \times 10^{-4}$  delta k/k/°F whenever THERMAL POWER is  $\leq 70\%$  RATED THERMAL POWER, and
  - b. Less positive than  $0.0 \times 10^{-4}$  delta k/k/°F whenever THERMAL POWER is  $> 70\%$  RATED THERMAL POWER
- TS LCO 3.2.6 - The reactor coolant cold leg temperature ( $T_c$ ) shall be maintained between 536°F and 549°F (Applicability: Mode 1 above 30% RATED THERMAL POWER).

Currently, the Waterford 3 TS requirement on most positive MTC is confirmed for a given core design at the minimum temperature for criticality of 517°F (520°F minus 3°F uncertainty) (TS LCO 3.1.1.4). This temperature is 23°F below the nominal temperature for approaching critical (543°F) and 16°F below the low  $T_{\text{cold}}$  of 536°F (TS 3.2.6). Following approval of this change the analytical value used for determining MTC will be 530°F.

MTC becomes less positive at higher RCS temperatures and lower soluble boron concentrations. Therefore, it is easier for a given core design to meet the requirement on most positive MTC at higher RCS temperatures. For the upcoming Waterford 3 core designs, the most positive MTC occurs at the cycle's peak boron concentration, at hot zero power (HZP) and the minimum temperature for criticality. The basic approach to reduce the positive MTC is to increase the amount of burnable absorber material in the core. The amount of burnable absorber material that would need to be added to a given core design could be reduced if the minimum temperature for criticality is increased to a higher value.

#### 4.0 TECHNICAL ANALYSIS

The minimum temperature for criticality is used in the reload analyses as the limiting HZP temperature at which the core design is verified to satisfy the limit on most positive MTC specified in the TS/COLR. The minimum temperature for criticality is one of many input parameters used in the reload design analytical calculation that confirms the core design satisfies the MTC specification. Sufficient burnable absorber material will be incorporated into the core design to ensure that the current TS/COLR limit on most positive MTC will continue to be satisfied at the specified minimum temperature for criticality.

The proposed TS change on minimum temperature for criticality does not impact the NRC approved analytical methods used to determine core operating limits.

The proposed change increases the minimum temperature for criticality. The MTC will continue to be verified over the appropriate temperature range. The reactor protective instrumentation will continue to function within its normal operating range and the reactor pressure vessel will remain above the minimum  $RT_{NDT}$  limits. Operation of the pressurizer will also continue to be within its normal range.

The current SR does not require that the minimum temperature for criticality be monitored after criticality is achieved unless the temperature drops below 530°F. The proposed addition of a frequency to monitor the temperature after the reactor is critical is consistent with the frequency in SR 4.2.6, which requires RCS cold leg temperature to be monitored at least once per 12 hours. The 12 hour frequency takes into account the indications and alarms that are continuously available in the Control Room to the Operator. This change is consistent with the Revised Standard TSs for CE Plants contained in NUREG-1432.

The elimination of the requirement to monitor temperature within 15 minutes prior to achieving criticality is acceptable because it is standard operating practice to verify TSs are satisfied prior to entering the Mode of applicability. The current Mode of applicability is Mode 1 and 2 with  $K_{eff}$  greater than or equal to 1.0 (i.e., the reactor is critical). Therefore, prior to entering Mode 2 and becoming critical, the minimum temperature for criticality limit (533°F) has to be met. In addition, administrative controls are currently in place to verify the temperature prior to achieving criticality. The approach to criticality is a very focused, methodical, and deliberate activity. Reactivity changes and overall plant response are closely monitored by the Operations staff.

The elimination of the requirement to check temperature at least once per 30 minutes when the reactor is critical and the RCS  $T_{cold}$  is less than 530°F is no longer applicable with the proposed change. If RCS  $T_{cold}$  were to fall below the TS limit of 533°F, the Action statement would require restoration of the temperature to within its limit or a shutdown of the reactor.

#### 5.0 REGULATORY ANALYSIS

##### 5.1 Applicable Regulatory Requirements/Criteria

A change is proposed to the Waterford Steam Electric Station, Unit 3 (Waterford 3) Technical Specifications (TSs) to increase the minimum temperature for criticality from the current value of 520°F to 533°F. There are also changes to the Action statement and to the Surveillance

Requirements (SRs) associated with the TS Limiting Condition for Operation (LCO). The current SR that requires the temperature be verified to be within the limits of the LCO within 15 minutes prior to reaching criticality and monitoring at least once per 30 minutes when the reactor is critical if the temperature drops below 530°F will be eliminated. The SR is being modified to ensure Reactor Coolant System (RCS) temperature is  $\geq 533^{\circ}\text{F}$  at least once per 12 hours.

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 TS, and does not affect conformance with any General Design Criterion (GDC) differently than described in the Final Safety Analysis Report (FSAR).

## 5.2 No Significant Hazards Consideration

Entergy Operations, Inc. has evaluated whether or not a significant hazards consideration is involved with the proposed amendment 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 minimum temperature for criticality is not an accident initiator. It is used in the reload analyses as a limiting temperature at which the core design is verified to satisfy the limit of the positive moderator temperature coefficient (MTC) specified in the Waterford 3 TS and Core Operating Limits Report (COLR). The minimum temperature for criticality is one of many input parameters used in the reload design analytical calculation that confirms the core design satisfies the MTC TS and COLR.

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 to increase the minimum temperature for criticality does not result in any plant design changes. In addition the minimum temperature at which the reactor is taken critical is not an accident initiator. The nominal average reactor coolant system temperature during an approach to criticality is several degrees higher than the limit proposed for the minimum temperature for criticality.

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 increase of the minimum temperature for criticality in conjunction with the appropriate core designs will ensure the current TS limits, as reflected in the COLR, for the most positive MTC will continue to be satisfied.

The current transient analysis results are bounding and remain applicable.

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 presents 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.

**Attachment 2**

**W3F1-2005-0072**

**Proposed Technical Specification Changes (mark-up)**

REACTIVITY CONTROL SYSTEMS

MINIMUM TEMPERATURE FOR CRITICALITY

LIMITING CONDITION FOR OPERATION

3.1.1.4 The Reactor Coolant System lowest operating loop temperature ( $T_{cold}$ ) shall be greater than or equal to ~~520~~<sup>533</sup>°F.

APPLICABILITY: MODES 1 and 2#.

ACTION:

<sup>533</sup> With a Reactor Coolant System operating loop temperature ( $T_{cold}$ ) less than ~~520~~<sup>533</sup>°F, restore  $T_{cold}$  to within its limit within 15 minutes or be in HOT STANDBY within the next 15 minutes.

SURVEILLANCE REQUIREMENTS

4.1.1.4 The Reactor Coolant System ~~temperature~~<sup>cold leg</sup> temperature ( $T_{cold}$ ) shall be determined to be greater than or equal to ~~520~~<sup>533</sup>°F <sup>at least once per 12 hours.</sup>

- a. Within 15 minutes prior to achieving reactor criticality, and
- b. At least once per 30 minutes when the reactor is critical and the Reactor Coolant System  $T_{cold}$  is less than 530°F.

#With  $K_{eff}$  greater than or equal to 1.0.