UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

September 30, 2009

Vice President, Operations
Entergy Operations, Inc.
Waterford Steam Electric Station, Unit 3
17265 River Road
Killona, LA 70057-3093

SUBJECT: WATERFORD STEAM ELECTRIC STATION, UNIT 3 - ISSUANCE OF AMENDMENT RE: MODIFY TS 5.6, "FUEL STORAGE"; ADD NEW TS 3/4.9.12, "SPENT FUEL POOL BORON CONCENTRATION," AND TS 3/4.9.13, "SPENT FUEL STORAGE" (TAC NO. MD9685)

Dear Sir or Madam:

The Commission has issued the enclosed Amendment No. 223 to Facility Operating License No. NPF-38 for the Waterford Steam Electric Station, Unit 3 (Waterford 3). This amendment consists of changes to the Technical Specifications (TSs) in response to your application dated September 17, 2008, as supplemented by letters dated February 26, June 30, and September 24, 2009.

The amendment revises the Waterford 3 TS 5.6, "FUEL STORAGE," to take credit for soluble boron in Region 1 (cask storage pit) and Region 2 (spent fuel pool and refueling canal) fuel storage racks for the storage of both Standard and Next Generation Fuel (NGF) assemblies. The amendment also adds new TS 3/4.9.12, "SPENT FUEL POOL (SFP) BORON CONCENTRATION," which includes a surveillance that ensures the required boron concentration is maintained in the spent fuel storage racks, and new TS 3/4.9.13, "SPENT FUEL STORAGE," to reflect the results of the new criticality analysis.

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,

N. Kalyanam, Senior Project Manager
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-382

Enclosures:
1. Amendment No. 223 to NPF-38
2. Safety Evaluation

cc w/encl.: Distribution via ListServ

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

ENTERGY OPERATIONS, INC.

DOCKET NO. 50-382

WATERFORD STEAM ELECTRIC STATION, UNIT 3

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 223
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 September 17, 2008, as supplemented by letters dated February 26, June 30, and September 24, 2009, 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. 223, 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 60 days from the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Michael T. Markley

Michael T. Markley, Chief
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Facility Operating License No. NPF-38 and Technical Specifications

Date of Issuance: September 30, 2009

ATTACHMENT TO LICENSE AMENDMENT NO. 223

TO FACILITY OPERATING LICENSE NO. NPF-38

DOCKET NO. 50-382

Replace the following pages of the Facility Operating License and 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.

Facility Operating License

REMOVE	INSERT
-4-	-4-

Technical Specifications

REMOVE	INSERT
-------	3/4 9-13a
-------	3/4 9-13b
5-6	5-6
5-6a	5-6a
5-6b	5-6b
5-6c	5-6c
-------	5-6d

or indirectly any control over (i) the facility, (ii) power or energy produced by the facility, or (iii) the licensees of the facility. Further, any rights acquired under this authorization may be exercised only in compliance with and subject to the requirements and restrictions of this operating license, the Atomic Energy Act of 1954, as amended, and the NRC's regulations. For purposes of this condition, the limitations of 10 CFR 50.81, as now in effect and as they may be subsequently amended, are fully applicable to the equity investors and any successors in interest to the equity investors, as long as the license for the facility remains in effect.

(b) Entergy Louisiana, LLC (or its designee) to notify the NRC in writing prior to any change in (i) the terms or conditions of any lease agreements executed as part of the above authorized financial transactions, (ii) any facility operating agreement involving a licensee that is in effect now or will be in effect in the future, or (iii) the existing property insurance coverages for the facility, that would materially alter the representations and conditions, set forth in the staff's Safety Evaluation enclosed to the NRC letter dated September 18, 1989. In addition, Entergy Louisiana, LLC or its designee is required to notify the NRC of any action by equity investors or successors in interest to Entergy Louisiana, LLC that may have an effect on the operation of the facility.

C. This license shall be deemed to contain and is subject to the conditions specified in the Commission's regulations set forth in 10 CFR Chapter I and is subject to all applicable provisions of the Act and to the rules, regulations and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified or incorporated below:

1. Maximum Power Level

EOI is authorized to operate the facility at reactor core power levels not in excess of 3716 megawatts thermal (100% power) in accordance with the conditions specified herein.

2. Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A, as revised through Amendment No. 223, 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.

3/4.9.12 SPENT FUEL POOL (SFP) BORON CONCENTRATION

LIMITING CONDITION FOR OPERATION

3.9.12 The spent fuel pool boron concentration shall be ≥ 1900 ppm.

APPLICABILITY: When fuel assemblies are stored in the SFP.

ACTION:

a. With the spent fuel pool boron concentration not within limits immediately suspend movement of fuel in the SFP and immediately initiate actions to restore boron concentration to within limits.

b. The provisions of Specification 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.9.12 Verify the spent fuel pool concentration is within limits once per 7 days.

3/4.9.13 SPENT FUEL STORAGE

LIMITING CONDITION FOR OPERATION

3.9.13 Storage of fuel assemblies in the spent fuel storage racks of Region 1 (cask storage pit) and Region 2 (spent fuel pool and refueling canal) shall be stored within the limitations of Specification 5.6.1.

APPLICABILITY: Whenever a fuel assembly is stored in a spent fuel storage rack.

ACTION:

a. With the requirements of the LCO not met, immediately initiate action to restore the non-complying fuel assembly within requirements.

b. The provisions of Specification 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.9.13 Verify by administrative means that each fuel assembly meets fuel storage requirements contained in Specification 5.6.1 prior to storing the fuel assembly in a spent fuel storage rack.

5.6 FUEL STORAGE

CRITICALITY

5.6.1 The spent fuel storage racks are designed and shall be maintained with:

a. For Region I (cask storage pit) and Region 2 (spent fuel pool and refueling canal) racks, a maximum k_{eff} of less than 1.00 when flooded with unborated water, and less than, or equal to, 0.95 when flooded with water having a boron concentration of 524 ppm.

b. A nominal 10.185 inch center-to-center distance between fuel assemblies placed in Region 1 (cask storage pit) spent fuel storage racks.

c. A nominal 8.692 inch center-to-center distance between fuel assemblies in the Region 2 (spent fuel pool and refuelling canal) racks, except for the four southern-most racks in the spent fuel pool which have an increased N-S center-to-center nominal distance of 8.892 inches.

d. Fresh and irradiated fuel assemblies may be allowed unrestricted storage in Region 1 racks.

e. Fresh fuel assemblies may be stored in the Region 2 racks provided that they are stored in a "checkerboard pattern" with empty cells as illustrated in Figure 5.6-1, Pattern 1. Irradiated fuel assemblies with any burnup may also be stored with empty cells in the checkerboard configuration of Figure 5.6-1, Pattern 1.

f. Irradiated fuel assemblies with a burnup in the "accceptable range" of Figure 5.6-2 may be allowed unrestricted storage in the Region 2 racks.

g. Irradiated fuel assemblies with a burnup of $\geq$27 GWd/MTU in the "unacceptable range" of Figure 5.6-2 may be stored in the Region 2 racks in a "checkerboard pattern", as illustrated in Figure 5.6-1, Pattern 2 with irradiated fuel in the "acceptable range" of Figure 5.6-3.

h. Fuel assemblies having a maximum U-235 enrichment of 5.0 weight percent.

5.6.2 The k_{eff} for fresh fuel stored in the new fuel storage racks shall be less than or equal to 0.95 when flooded with unborated water and shall not exceed 0.98 when aqueous foam moderation is assumed.

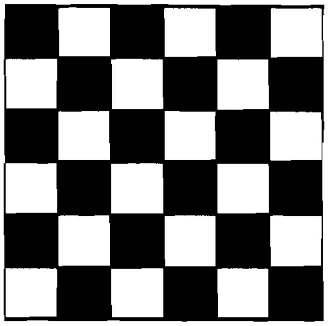
DRAINAGE

5.6.3 The spent fuel pool is designed and shall be maintained to prevent inadvertent draining of the pool below elevation +40.0 MSL. When fuel is being stored in the cask storage pit and/or the refueling canal, these areas will also be maintained at +40.0 MSL.

CAPACITY

5.6.4 The spent fuel pool is designed and shall be maintained with a storage capacity limited to no more than 1849 fuel assemblies in the main pool, 255 fuel assemblies in the cask storage pit and after permanent plant shutdown 294 fuel assemblies in the refueling canal. The heat load from spent fuel stored in the refueling canal racks shall not exceed 1.72x10E6 BTU/Hr. Fuel shall not be stored in the spent fuel racks in the cask storage pit or the refueling canal unless all of the racks are installed in each respective area per the design.

5.7 NOT USED

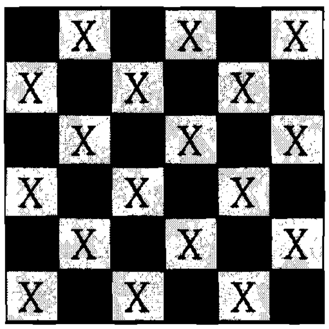


■ Cells loaded with fresh or irradiated fuel of less than, or equal to, 5 wt% initial U-235 enrichment

□ Water-filled, empty cells

Pattern 1

Checkerboard of Fresh or Irradiated Fuel Assemblies and Empty Storage Cells



■ Cells loaded with irradiated fuel of 27 GWd/MTU burnup, or higher

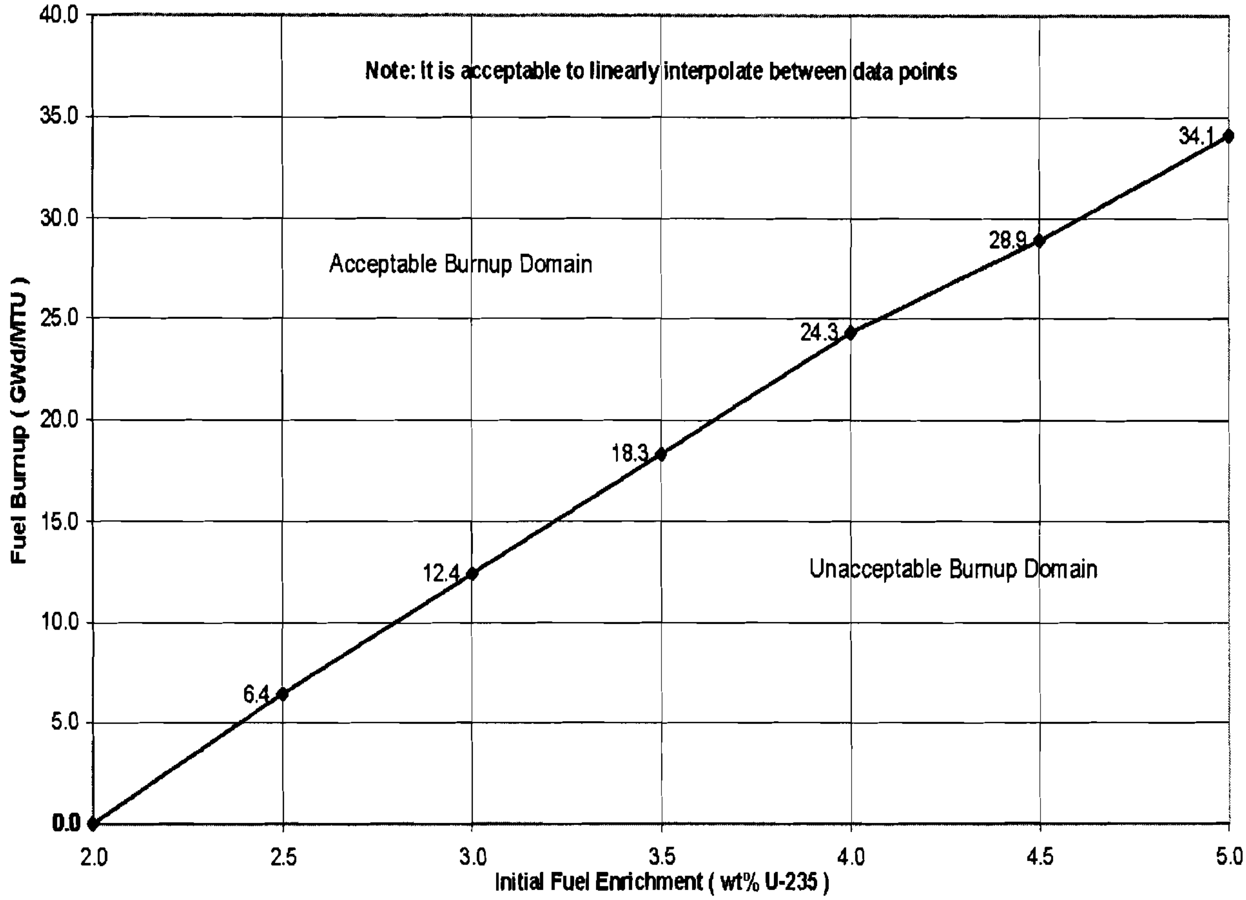
[X] Cells loaded with fuel having the enrichment-burnup combinations specified in Figure 5.6-3

Pattern 2

Checkerboard of Fuel Assemblies with Burnups of 27 GWd/MTU, or higher, and Fuel Assemblies of Specified Enrichment-Burnup Combinations

Note: <u>Either</u> of these checkerboard arrangements may be used in areas contiguous to areas of unrestricted storage in Region 2 (Figure 5.6-2). For interfaces between a Pattern 1 checkerboard and a Pattern 2 checkerboard, each high-reactivity irradiated assembly (e.g., 27 GWd/MTU) in a Pattern 2 configuration may be face-adjacent to no more than <u>one</u> fresh (or irradiated) fuel assembly; each fresh (or irradiated) fuel assembly in a Pattern 1 configuration may be face-adjacent with up to <u>two</u> high-reactivity irradiated fuel assemblies. See Figure 5.6-4 for examples of contiguous Pattern 1 and Pattern 2 fuel checkerboards which meet these requirements.

Figure 5.6-1 Alternative Checkerboard Storage Arrangements



Note: For enrichments lower than 2 wt%, apply the burnup value at 2 wt%.

Figure 5.6-2 Acceptable Burnup Domain for Unrestricted Storage of Irradiated Fuel in Region 2 of the Spent Fuel Pool

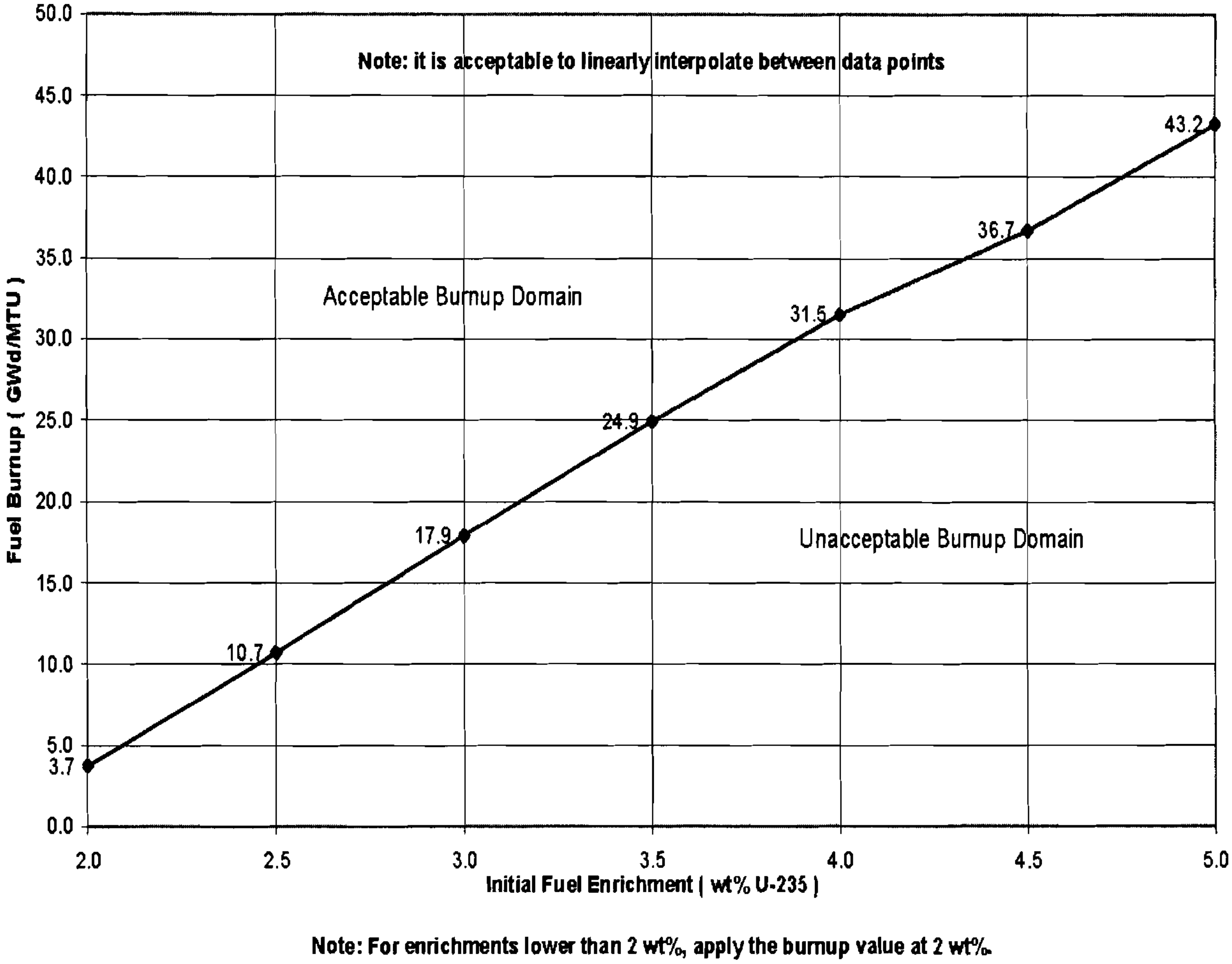


Figure 5.6-3 Acceptable Burnup Domain for Irradiated Fuel in a Checkerboard Arrangement with Fuel of 5 wt% Enrichment, or Less, at 27 GWd/MTU Burnup, or Higher, in Region 2 of the Spent Fuel Pool

A	■	A	■	A	■	A
■	A	■	A	■	A	■
A	■	B	C	B	■	A
■	A	C	B	C	A	■
A	■	B	C	B	■	A
■	A	■	A	■	A	■
A	■	A	■	A	■	A

■	≤ 5 wt% U-235, ≥ 27 GWd/MTU irradiated fuel
A	Irradiated fuel at, or above, the curve in Figure 5.6-3
B	≤ 5 wt% U-235 fresh or irradiated fuel at any burnup
C	Empty storage cell

■	A	■	B	C	B	C
A	■	A	C	B	C	B
■	A	■	B	C	B	C
A	■	A	C	B	C	B
■	A	■	B	C	B	C
A	■	A	C	B	C	B
■	A	■	B	C	B	C

■	≤ 5 wt% U-235, ≥ 27 GWd/MTU irradiated fuel
A	Irradiated fuel at, or above, the curve in Figure 5.6-3
B	≤ 5 wt% U-235 fresh or irradiated fuel at any burnup
C	Empty storage cell

Figure 5.6-4 Examples of Contiguous Checkerboard Configurations Which Meet Interface Requirements

UNITED STATES
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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 223 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 September 17, 2008 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML082660649) (Reference 1), as supplemented by letters dated February 26, June 30, and September 24, 2009 (ADAMS Accession Nos. ML090610134, ML091831258, and ML092720697, respectively) (References 2, 3, and 10), Entergy Operations, Inc. (the licensee), requested changes to the Technical Specifications (TSs) for Waterford Steam Electric Station, Unit 3.

The application dated September 17, 2008, contained an evaluation of the TS change in accordance with paragraph 50.91(a)(1) of Title 10 of the *Code of Federal Regulations* (10 CFR), using criteria in 10 CFR 50.92(c), and the licensee determined that the change involved no significant hazards consideration (NSHC). However, based on the discussions with the U.S. Nuclear Regulatory Commission (NRC) staff, the licensee revised its original NSHC in its revised submittal dated February 26, 2009. The NRC staff reviewed the licensee's analysis and determined that the amendment request involved NSHC and published the basis for NSHC in the *Federal Register* on April 14, 2009 (74 FR 17228). The supplemental letters dated June 30 and September 24, 2009, provided additional information that clarified the application, did not expand the scope of the application as noticed, and did not change the staff's proposed no significant hazards consideration determination as published in the *Federal Register*.

The revised spent fuel pool (SFP) criticality analysis credits 524 parts per million (ppm) of soluble boron during normal conditions to meet the regulatory requirements. The proposed license amendment request (LAR) re-qualifies three storage configurations: 1) uniform loading of assemblies, 2) checkerboard loading of high and low reactivity assemblies, and 3) checkerboard loading of fresh assemblies and empty cells. Each storage configuration has a geometric arrangement which must be maintained so that the SFP criticality analysis remains valid. The storage configurations may be interspersed with each other throughout the SFP, provided that the geometric interface requirements are met. Two storage configurations, the uniform loading of assemblies and the checkerboard loading of high and low reactivity assemblies, have an associated burnup versus enrichment requirement that must be met for a fuel assembly to be stored in that configuration. The licensee proposed to add new TS 3/4.9.12, "SPENT FUEL POOL BORON (SFP) CONCENTRATION," and TS 3/4.9.13, "SPENT FUEL STORAGE," and to modify TS 5.6, "FUEL STORAGE," to reflect the results of the new criticality analysis. Approval of this LAR will allow more flexibility in storing the more reactive Next Generation Fuel (NGF) assemblies in the spent fuel storage racks.

2.0 REGULATORY EVALUATION

In Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.36, "Technical specifications," the Commission established its regulatory requirements related to the content of TSs. Pursuant to 10 CFR 50.36, TSs are required to include items in the following five specific categories related to station operation: (1) safety limits, limiting safety system settings, and limiting control settings; (2) limiting conditions for operation (LCOs); (3) surveillance requirements (SRs); (4) design features; and (5) administrative controls. Paragraph 50.36(c)(2)(ii)(C) specifies that a TS LCO must be established for a "structure, system, or component that is part of the primary success path and which functions or actuates to mitigate a design basis accident or transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier." Paragraph 50.36(c)(3) specifies that SRs are "requirements relating to test, calibration, or inspection to assure that the necessary quality of systems and components is maintained, that facility operation will be within safety limits, and that the limiting conditions for operation will be met."

2.1 Spent Fuel Pool Criticality Analysis

The regulations in 10 CFR 50.68(b)(4) require, in part, that:

> If credit is taken for soluble boron, the k-effective of the spent fuel storage racks loaded with fuel of the maximum fuel assembly reactivity must not exceed 0.95, at a 95 percent probability, 95 percent confidence level, if flooded with borated water, and the k-effective must remain below 1.0 (subcritical), at a 95 percent probability, 95 percent confidence level, if flooded with unborated water.

The Waterford 3 SFP criticality analysis used a design acceptance criteria of effective (neutron) multiplication factor (k_{eff}) no greater than 0.995, if flooded with unborated water, and k_{eff} no greater than 0.945, if flooded with borated water. This provides an additional 0.005 Δk_{eff} analytical margin to the regulatory requirement.

The regulations in 10 CFR Part 50, Appendix A, "General Design Criteria for Nuclear Power Plants," Criterion 62, "Prevention of criticality in fuel storage and handling," require that:

> Criticality in the fuel storage and handling system shall be prevented by physical systems or processes, preferably by use of geometrically safe configurations.

The regulations in 10 CFR 50.68(b)(1) require that:

> Plant procedures shall prohibit the handling and storage at any one time of more fuel assemblies than have been determined to be safely subcritical under the most adverse moderation conditions feasible by unborated water.

The regulations in 10 CFR 50.36(c)(4) require that:

> Design features to be included are those features of the facility such as materials of construction and geometric arrangements, which, if altered or modified, would have a significant effect on safety and are not covered in categories described in paragraphs (c) (1), (2), and (3) of this section.

The NRC staff issued an internal memorandum on August 19, 1998, containing guidance for performing the review of SFP criticality analysis (Reference 6, "Kopp Letter"). The Kopp Letter provides guidance on salient aspects of a criticality analysis. The guidance is germane to boiling-water reactors and pressurized-water reactors (PWRs), and to borated and unborated conditions. The staff used the Kopp Letter as guidance for the review of the current analysis.

2.2 Boron Dilution Analysis

The proposed amendment would credit soluble boron concentration for control of criticality in the SFP, in accordance with the requirements of 10 CFR 50.68(b)(4), as stated above.

This amendment creates TS 3/4.9.12 "SPENT FUEL POOL (SFP) BORON CONCENTRATION," which contains an LCO requiring greater than or equal to 1900 ppm soluble boron in the SFP, when fuel assemblies are stored in the SFP.

3.0 <u>TECHNICAL EVALUATION</u>

3.1 Proposed Changes

The proposed changes will modify TS 5.6 as follows:

1. TS 5.6.1a wording will be changed to:

    > For Region 1 (cask storage pit) and Region 2 (spent fuel pool and refueling canal) racks, a maximum k_{eff} [effective (neutron) multiplication factor] of less than 1.00 when flooded with unborated water, and less than, or equal to, 0.95 when flooded with water having a boron concentration of 524 ppm.

2. TS 5.6.1d will be revised to replace the words "New or partially spent" with "Fresh and irradiated" and will read as follows:

    > Fresh and irradiated fuel assemblies may be allowed unrestricted storage in Region 1 racks.

3. TS 5.6.1e will be revised to read as follows:

   Fresh fuel assemblies may be stored in the Region 2 racks provided that they are stored in a "checkerboard pattern" with empty cells as illustrated in Figure 5.6-1, Pattern 1. Irradiated fuel assemblies with any burnup may also be stored with empty cells in the checkerboard configuration of Figure 5.6-1, Pattern 1.

4. TS 5.6.1f will be revised to replace the words "Partially spent" with "Irradiated" and delete the word "discharge" and will read as follows:

   Irradiated fuel assemblies with a burnup in the "acceptable range" of Figure 5.6-2 may be allowed unrestricted storage in the Region 2 racks.

5. TS 5.6.1g will be revised to read as follows:

   Irradiated fuel assemblies with a burnup of $\geq$ 27 GWd/MTU [gigawatt days per metric ton unit] in the "unacceptable range" of Figure 5.6-2 may be stored in the Region 2 racks in a "checkerboard pattern," as illustrated in Figure 5.6-1, Pattern 2 with irradiated fuel in the "acceptable range" of Figure 5.6-3.

6. TS 5.6.2 will be revised to replace the word "new" with "fresh" and will read as follows:

   The k_{eff} for fresh fuel stored in the new fuel storage racks shall be less than or equal to 0.95 when flooded with unborated water and shall not exceed 0.98 when aqueous foam moderation is assumed.

7. TS Figure 5.6-1 will be replaced by a new Figure 5.6-1 to show the new Alternative Checkerboard Storage Arrangements.

8. TS Figure 5.6-2 will be replaced by a new Figure 5.6-2 to show the new Acceptable Burnup Domain for Unrestricted Storage of Irradiated Fuel in Region 2 of the Spent Fuel Pool.

9. TS Figure 5.6-3 will be replaced by a new Figure 5.6-3 to show the Acceptable Burnup Domain for Irradiated Fuel in a Checkerboard Arrangement with Fuel of 5 wt % [weight percent] Enrichment, or less, at 27 GWd/MTU Burnup, or higher, in Region 2 of the Spent Fuel Pool.

10. A new TS Figure, TS Figure 5.6-4, will be added to show Examples of Contiguous Checkerboard Configurations Which Meet Interface Requirements.

The proposed change will add TS 3/4.9.12 as follows:

1. TS 3/4.9.12 will be entitled "Spent Fuel Pool (SFP) Boron Concentration."

2. A Limiting Condition for Operation will read as follows:

   3.9.12 The spent fuel pool boron concentration shall be $\geq$ 1900 ppm.

3. The Applicability will read as follows:

   When fuel assemblies are stored in the SFP.

4. The Action statement will read as follows:

   a. With the spent fuel boron concentration not within limits immediately suspend movement of fuel in the SFP and immediately initiate actions to restore boron concentration to within limits.

   b. The provisions of Specification 3.0.3 are not applicable.

5. The Surveillance Requirements will read as follows:

   4.9.12 Verify the spent fuel pool concentration is within limits once per 7 days.

The proposed change will add TS 3/4.9.13 as follows:

1. TS 3/4.9.13 will be entitled "Spent Fuel Storage."

2. A Limiting Condition for Operation will read as follows:

   3.9.13 Storage of fuel assemblies in the spent fuel storage racks of Region 1 (cask storage pit) and Region 2 (spent fuel pool and refueling canal) revised shall be stored within the limitations of Specification 5.6.1.

3. The Applicability will read as follows:

   Whenever a fuel assembly is stored in a spent fuel storage rack.

4. The Action statement will read as follows:

   a. With the requirements of the LCO not met, immediately initiate action to restore the non-complying fuel assembly within requirements.

b. The provisions of Specification 3.0.3 are not applicable.

5. The Surveillance Requirements will read as follows:

4.9.13 Verify by administrative means that each fuel assembly meets fuel storage requirements contained in Specification 5.6.1 prior to storing the fuel assembly in a spent fuel storage rack.

3.2 Spent Fuel Pool Criticality Analysis

Currently, there is not a generically approved methodology for performing an SFP criticality analysis. Therefore, licensees must submit a plant-specific SFP criticality analysis that includes technically supported margins. The NRC staff reviewed the licensee's analysis to ensure that the assumptions made are technically substantiated. Assumptions affecting the neutron multiplication factor, k_{eff}, should be conservative. Non-conservative assumptions may be acceptable if they are quantified and are offset by other conservative assumptions. The staff reviewed the application and issued requests for additional information (RAIs) to identify assumptions and analytical techniques that may have more than minor impact on the k_{eff}, and to conclude that those effects are addressed appropriately to ensure at a 95 percent probability/ 95 percent confidence level, that the regulatory requirements will be met.

The NRC staff evaluation of key aspects of the analysis are discussed, including criticality code validation, selection of bounding assembly, manufacturing tolerances, SFP temperature bias, integral fuel burnable absorber (IFBA) bias, and spent fuel characterization factors such as burnup uncertainty, axial burnup profile, core depletion parameters, and determination of soluble boron requirements.

3.2.1 Criticality Code Validation

The purpose of the criticality code validation is to ensure that appropriate code bias and bias uncertainties (Δk_{bias} and σ_m) are determined for use in the criticality calculation. The NRC staff expects code validation to be consistent with established standards for out-of-reactor criticality safety analyses. Standards require comparison of predicted versus experimental data to obtain the bias and bias uncertainty.

NUREG/CR-6698, "Guide for Validation of Nuclear Criticality Safety Calculational Methodology," dated January 2001 (Reference 7), states, in part, that:

> In general, the critical experiments selected for inclusion in the validation must be representative of the types of materials, conditions, and operating parameters found in the actual operations to be modeled using the calculational method. A sufficient number of experiments with varying experimental parameters should be selected for inclusion in the validation to ensure as wide an area of applicability as feasible and statistically significant results.

The NRC staff used NUREG/CR-6698 as guidance for review of the code validation methodology presented in the application. NUREG/CR-6698 outlines the basic elements of validation, including identification of operating conditions and parameter ranges to be validated, selection of critical benchmarks, modeling of benchmarks, statistical analysis of results, and determination of the area of applicability.

Attachment 3 (Proprietary) of Reference 1 (HI-2084014) documents the licensee's original criticality analysis submittal. The licensee subsequently submitted a revised analysis documented as Attachment 4 (Proprietary) of Reference 3 (HI-2094376). For the criticality analysis, the licensee used the three-dimensional Monte Carlo code, MCNP4a. The MCNP4a calculations used continuous energy cross-section data predominately based on Evaluated Nuclear Data File Version 5 (ENDF/B-V) and ENDF/B-VI. The licensee stated that ENDF/B-V data was used whenever possible. However, some fission product isotopes that were available in the CASMO N-library were not available in ENDF/B-V. In these cases, ENDF/B-VI cross sections were used. The licensee justified this approach by showing that the cross sections result in the same reactivity effect in both CASMO-4 and MCNP4a. All benchmark calculations were performed with ENDF/B-V.

3.2.1.1 MCNP4a

The criticality code validation of MCNP4a is based on a benchmark analysis of 56 selected critical experiments from several programs identified in Appendix A to HI-2094376. The staff concludes that the MCNP4a validation was performed consistent with NUREG/CR-6698. The licensee identified the area of applicability for the validation (e.g., fissile isotope, enrichment of fissile isotope, fuel chemical form, types of neutron absorbers, moderators and reflectors, neutron energy, and physical configurations) to justify the validation for the Waterford 3 SFP conditions. The licensee showed that there are no statistically significant trends in Δk_{bias}. The staff concludes that the licensee supplied adequate information to conclude that the bias uncertainties (Δk_{bias} and σ_m) determined for the subsequent licensing criticality calculations using MCNP4a are acceptable.

3.2.1.2 CASMO-4

The licensee used CASMO-4, a two-dimensional multigroup transport code to determine the isotopics of the spent fuel. The uncertainty in the maximum k_{eff} introduced by the depletion calculation through CASMO-4 is addressed by applying the 5 percent of the reactivity decrement from depletion as an uncertainty component in the determination of the maximum k_{eff}. The NRC staff concludes that this uncertainty treatment is acceptable since it is consistent with staff guidance (Reference 6).

CASMO-4 was also used in the storage rack geometry to determine the two-dimensional infinite multiplication factor (k_{inf}) for the storage rack to determine the reactivity effect of fuel and rack tolerances, temperature variation, and to perform other sensitivity analyses. In References 3 and 5, the licensee provided a discussion of the area applicability and concluded that CASMO-4 is suitable for application to spent fuel rack calculations in this limited manner. Additionally, the licensee considered bias and bias uncertainty for the CASMO-4 in the overall reactivity determination. Based on the above, the NRC staff concludes that the use of CASMO-4 is acceptable for this application.

3.2.2 Selection of Bounding Assembly

The criticality analysis should be based on the fuel assembly design that results in the highest calculated reactivity. The Waterford 3 SFP contains the Combustion Engineering (CE) 16x16 Standard and the NGF assemblies. The licensee selected the NGF design to model all fuel (fresh and spent) for both Region 1 and Region 2 storage racks.

For the fresh fuel in Region 1, the calculation considered the 5 weight percent (wt%) assembly for both unborated and borated conditions. The comparison between the Standard and NGF designs showed that NGF is more reactive. For the spent fuel in Region 2, the calculation considered the applicable burnup/enrichment combinations at both unborated and borated conditions. The results show that, for the unborated condition, the NGF has the highest reactivity for all burnup/enrichment combinations. For the borated condition, the results show that the NGF has the highest reactivity except the last few burnup increments for the 5.0 wt% case which shows that the Standard fuel assembly type is slightly more reactive. However, this small increase at burnups greater than 40 GWd/MTU should not invalidate the selection of the NGF design which is the conservative design for almost all other anticipated conditions and this slightly higher reactivity is more than offset by the additional soluble boron in the SFP. The NRC staff concludes that the selection of NGF design as the reference assembly is acceptable.

3.2.3 Manufacturing Tolerances

The manufacturing tolerances of the storage racks and fuel assemblies contribute to the reactivity. The Kopp Letter states that:

> An acceptable method for determining the maximum reactivity may be either (1) a worst-case combination with mechanical and material conditions set to maximize k_{eff} or (2) a sensitivity study of the reactivity effects of tolerance variations. If used, a sensitivity study should include all possible significant variations (tolerances) in the material and mechanical specifications of the racks; the results may be combined statistically provided they are independent variations.

The analysis considered the following manufacturing tolerances and uncertainty of components of the storage racks and fuel assemblies: cell internal dimension, box wall thickness, poison width, poison gap, Boral B-10 loading, UO_2 density, fuel enrichment, fuel rod pitch, clad outer diameter and thickness, fuel pellet diameter, and guide tube outer diameter and thickness. Certain parameters such as the UO_2 density and fuel enrichment used the full tolerance value to determine the maximum reactivity effect.

To determine the Δk associated with a specific manufacturing tolerance, the licensee used CASMO-4 to calculate the k_{inf} for the reference condition and the k_{inf} for the perturbed case. The reference condition is the condition with nominal dimensions and properties. All tolerance perturbations were applied in the direction that increases reactivity relative to the nominal condition. If the tolerance perturbation for a specific uncertainty component resulted in a decrease in reactivity relative to the nominal condition, the reactivity effect for that tolerance was ignored.

The licensee calculated a separate set of tolerance uncertainties for each burnup/enrichment combination included in the loading curve. In response to an NRC staff RAI, the licensee provided additional calculations showing the effect of soluble boron on the tolerance uncertainties in its letter dated June 30, 2009 (Reference 3). The results demonstrated that uncertainties based on unborated conditions are conservative.

Based on the above, the NRC staff concludes that the licensee's treatment of manufacturing tolerances is acceptable.

3.2.4 SFP Temperature Bias

The Kopp Letter states that the criticality analysis should assume the temperature corresponding to the highest reactivity. For Waterford 3, the licensee demonstrated that for both regions, the moderator temperature coefficient (MTC) is negative for all burnup/enrichment conditions.

In MCNP4a, the Doppler treatment and cross sections are valid only at 300 Kelvin (K) (80.33 degrees Fahrenheit (°F)). Therefore, a Δk_{eff} was determined in CASMO-4 from 80.33 °F to 32 °F, and was included in the final k_{eff} calculation as a bias. The licensee calculated a separate temperature bias for each burnup/enrichment combination included in the loading curve. The licensee used the temperature biases corresponding to the unborated condition, since it was shown to bound the biases corresponding to the borated condition.

Based on the considerations discussed above, the NRC staff concludes that the licensee's treatment of the SFP temperature bias is acceptable.

3.2.5 IFBA Bias

Waterford 3 uses burnable absorbers of B_4C, erbia or IFBA rods with a thin coating of ZrB_2 on the UO_2 pellet. NUREG/CR-6760, "Study of the Effect of Integral Burnable Absorbers for PWR Burnup Credit" (Reference 9), investigated the effect that integral burnable absorbers (IBAs) have on the reactivity of spent fuel assemblies. NUREG/CR-6760 concluded that there is a positive reactivity effect associated with the depleting fuel with presence of IFBA rods while the reactivity effect is negative for assemblies containing erbia or B_4C. In addition, the licensee confirmed in an electronic mail to the NRC staff, dated June 9, 2009 (Reference 4), that Waterford 3 SFP does not contain any assemblies with Burnable Poison Rods (BPR) such as wet annular burnable absorbers (WABAs) or glass burnable absorber assemblies (BAAs). Therefore, the licensee considered only the IFBA in its analysis.

To determine the reactivity effect, depletion calculations were performed for a 148 IFBA rod configuration for a range of burnup/enrichment included in the loading curve. The reactivity of the fuel assembly with IFBA rods was compared to the reactivity of the respective fuel assembly without IFBA rods. The largest difference for the unborated condition was selected to be applied to determine the final k_{eff} for all cases as a bias. The licensee calculated the effect of soluble boron on the IFBA bias and showed a slight increase in reactivity for the borated water case. In consideration of offsetting conservatisms available in the overall analysis, the NRC staff concludes that this non-conservatism is very small and, therefore, acceptable. Based on the above, the staff concludes that the licensee's treatment of the IFBA bias is acceptable.

3.2.6 Spent Fuel Characterization

To take credit for the reduction in reactivity due to fuel burnup, the spent fuel must be properly characterized with conservative burnup uncertainty, axial burnup profile, and core depletion. The adequacy of the application with respect to each element is discussed.

3.2.6.1 Burnup Uncertainty

The Kopp Letter states, in part, that:

> A reactivity uncertainty due to uncertainty in the fuel depletion calculations should be developed and combined with other calculational uncertainties. In the absence of any other determination of the depletion uncertainty, an uncertainty equal to 5 percent of the reactivity decrement to the burnup of interest is an acceptable assumption.

The 5 percent reactivity decrement has been used throughout the industry since the issuance of the Kopp Letter. In response to an NRC staff RAI, the licensee stated (Reference 2), in part, that the "reactivity decrement is calculated as 5% of the difference between the CASMO calculated reactivity at zero burnup and the CASMO calculated reactivity at case dependent specified burnup...." As discussed in Section 3.2.1.2 above, the licensee accounted for the CASMO-4 uncertainties in the final k_{eff} determination. The licensee considered burnup uncertainties both under borated and unborated conditions. The NRC staff concludes that the consideration of the burnup uncertainty is consistent with staff guidance and, therefore, is acceptable.

3.2.6.2 Axial Burnup Profile

Another important aspect of the spent fuel characterization is the selection of the burnup profile. At the beginning of life, a PWR fuel assembly will be exposed to a near-cosine axial-shaped flux, which will deplete fuel near the axial center at a greater rate than at the ends. As the reactor continues to operate, the cosine flux shape will flatten because of the fuel depletion and fission-product buildup that occurs near the center. Near the fuel assembly ends, burnup is suppressed due to leakage. If a uniform axial burnup profile is assumed, then the burnup at the ends is over-predicted. Analysis has shown that this results in an under-prediction of k_{eff} and, generally, the under-prediction becomes larger as burnup increases. The difference in the k_{eff} between a calculation with explicit representation of the axially distributed burnup and a calculation that assumes an axially uniform burnup is known as the end effect. Judicious selection of the axial burnup profile is necessary to ensure k_{eff} is not under-predicted due to the end effect.

The licensee determined the distributed axial burnup profile by performing a cycle-by-cycle comparison of all available data for Waterford 3 fuel with burnup distributions. The licensee stated that Waterford 3 does not contain blanketed fuel or axial power shaping rods and generally operates with all rods out. From the database of fuel assembly axial burnup distributions, a minimum and an average axial burnup distribution was determined for each cycle. A bounding axial burnup profile was used, derived from the profiles of all assemblies in a conservative manner. To be bounding for all cycles, a total minimum axial burnup distribution was determined over all cycles for both the less than or equal to 25 GWd/MTU interval and the greater than 25 GWd/MTU interval.

To ensure that all discharged fuel assemblies are conservatively represented in the Waterford 3 SFP, assemblies with uniform axial burnup profiles are also considered. For each calculation, both uniform and distributed profiles were run and the most reactive representation was used to determine the minimum acceptable burnup requirement for safe storage.

Based on the above, the NRC staff concludes that the analysis properly accounted for the effects of axial burnup profile for Waterford 3.

3.2.6.3 Core Depletion Parameters

The spent fuel model in the criticality analysis should be based on isotopics generated by bounding depletion parameters. NUREG/CR-6665, "Review and Prioritization of Technical Issues Related to Burnup Credit for LWR [Light-water Reactor] Fuel" (Reference 8), discusses the treatment of depletion parameters. While NUREG/CR-6665 is focused on criticality analysis in storage and transportation casks, the basic principles with respect to the depletion analysis apply generically to SFPs, since the phenomena occur in the reactor as the fuel is being used. The basic premise is to select parameters that maximize the Doppler broadening/spectral hardening of the neutron field resulting in maximum ^{241}Pu production. NUREG/CR-6665 discusses six parameters affecting the depletion analysis: (1) fuel temperature, (2) moderator temperature, (3) soluble boron, (4) specific power and operating history, (5) fixed burnable poisons, and (6) integral burnable poisons.

For fuel and moderator temperatures, NUREG/CR-6665 recommends using the maximum operating temperatures to maximize ^{241}Pu production. The licensee states in Reference 2 that "the values for fuel and moderator temperatures are maximum values and are bounding for all projected operating conditions at Waterford, Unit 3." Therefore, the NRC staff concludes that the moderator and fuel temperature used is acceptable.

For boron concentration, NUREG/CR-6665 recommends using a conservative cycle average boron concentration. The licensee's analysis used a conservative boron concentration throughout the depletion of the fuel assemblies. The licensee provided the soluble boron let-down curve for recent cycles and has confirmed that the boron concentration used is conservative relative to operating experience. Therefore, the NRC staff concludes that the assumed boron concentration is acceptable.

Based on the difficulty of modeling a bounding specific power and operating history, NUREG/CR-6665 recommends using a constant power level and retaining sufficient margin to cover the potential effect of a more limiting operating history. The licensee maintained 0.005 Δk_{eff} of reserved analytical margin to the regulatory limit and used a constant core power for the depletion calculations. The staff concludes that the licensee's treatment of specific power and operating history is consistent with NUREG/CR-6665 and, therefore, is acceptable.

Waterford 3 uses burnable absorbers of B_4C, erbia or IFBA rods with a thin coating of ZrB_2 on the UO_2 pellet. As discussed in Section 3.5, the staff concludes that the licensee properly accounted for the depletion effects of burnable absorbers.

3.2.7 Determination of Soluble Boron Requirements

If soluble boron is credited, 10 CFR 50.68 requires that the k_{eff} of the spent fuel storage racks loaded with fuel of the maximum fuel assembly reactivity must not exceed 0.95, at a 95 percent probability with a 95 percent confidence level, if flooded with borated water.

The licensee determined the soluble boron requirements for both nominal and accident conditions by linear interpolation. To calculate the required boron concentration, the unborated MCNP4a cases were rerun with 600 ppm of soluble boron for normal conditions and 1000 ppm for accident conditions. The reactivities of the borated and unborated cases were used to interpolate the soluble boron concentration required to obtain a reactivity of 0.945 minus the sum of the biases and uncertainties for the given burnup/enrichment combination. The NRC staff concludes that the approach is acceptable.

As discussed in Sections 3.2.3, 3.2.4, and 3.2.5 of this safety evaluation, the NRC staff concludes that the licensee appropriately addressed the effect of soluble boron on biases and uncertainties.

The analysis evaluated several potential off-normal conditions. The analysis determined that a misloading event in the spent fuel checkerboard loading pattern would have the largest reactivity increase, requiring 870 ppm of soluble boron to meet the regulation. The licensee proposes to add a TS requirement to maintain a minimum of 1900 ppm of soluble boron in the SFP.

Based on the above, and the available margin, the NRC staff concludes that the results of the accident analysis are acceptable.

3.2.8 Summary

The licensee credits soluble boron. The applicable regulatory requirement is taken from 10 CFR 50.68(b)(4), stated in Section 2.1 of this safety evaluation.

The NRC staff evaluated the submittal against the criteria for both unborated and borated conditions. The staff reviewed the analysis to ensure that the assumptions and analytical technique used are adequately substantiated to conclude at a 95 percent probability, 95 percent confidence level, that the regulatory requirements will be met. The licensee used design acceptance criteria, which provided an additional 0.005 Δk_{eff} analytical margin to the regulatory requirement. This approach provides sufficient margin to offset minor non-conservatisms and allows the staff to conclude with reasonable assurance that the regulatory requirements will be met.

Based on the above, the NRC staff concludes that the proposed modifications to TS 5.6 and addition of TS 3/4.9.12 and TS 3/4.9.13 meets 10 CFR 50.36. Therefore, the NRC staff concludes that the proposed TS changes are acceptable.

3.3 Boron Dilution Analysis

Analysis by the licensee determined that 524 ppm of boron was required to maintain k_{eff} less than 0.95 in the SFP under normal conditions, and 870 ppm under the worst-case accident conditions. To ensure that this concentration of boron is met, the licensee has proposed to create TS 3/4.9.12, "SPENT FUEL POOL (SFP) BORON CONCENTRATION," and establish an LCO requiring 1900 ppm soluble boron in the SFP whenever spent fuel is being stored in the pool. The 1900 ppm limit is verified by SR 4.9.12 which states, "Verify the spent fuel pool concentration is within limits once per 7 days."

The licensee performed a boron dilution analysis for the SFP and identified possible sources for addition of unborated water to the pool. As identified by the licensee, there are a number of assorted sources for slow addition of unborated water to the SFP that could possibly continue undetected for an extended period of time. The maximum flow from any of these sources was determined to be 2 gpm, and dilution of the SFP to 870 ppm soluble boron would take approximately 72 days. Higher flow-rate dilution scenarios identified by the licensee would be identified through various alarms and building walkdowns, and could be addressed within a sufficient time to preclude dilution of the SFP to 870 ppm soluble boron.

The NRC staff reviewed the proposed TS 3/4.9.12 and associated analysis for acceptability. The LCO to maintain 1900 ppm soluble boron in the SFP provides adequate margin to the minimum concentrations required to prevent k_{eff} from exceeding 0.95, at a 95 percent probability, 95 percent confidence level, in accordance with 10 CFR 50.68(b)(4). Slow dilution by undetected sources would take a significant amount of time, and is adequately addressed by sampling the SFP on the 7-day frequency in proposed SR 4.9.12. Adequate safety is maintained even in the case of a high flow-rate dilution of the SFP in accordance with 10 CFR 50.68(b)(4) because k_{eff} must remain below 1.0 (subcritical), at a 95 percent probability, 95 percent confidence level, even if the SFP were flooded with unborated water. After review of the licensee's submittal, the NRC staff concludes that proposed change to the facility TSs is acceptable.

3.3.1 Summary

In consideration of the information discussed above, the NRC staff concludes that the proposed change in the Waterford 3 licensing basis is acceptable. In addition, the staff concludes that the licensee has provided adequate justification to support the requested changes and reasonable assurance that Waterford 3 will be able to comply with the regulatory requirements and, therefore, meets 10 CFR 50.36. Therefore, the NRC staff concludes that the proposed TS changes are acceptable.

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 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 published in the *Federal Register* on April 14, 2009 (74 FR 17228). 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 amendments will not be inimical to the common defense and security or to the health and safety of the public.

7.0 REFERENCES

1. K. Walsh, Entergy Operations, Inc., letter to U.S. Nuclear Regulatory Commission, "License Amendment Request to Modify Technical Specification Section 5.6, Fuel Storage and Add New Technical Specification 3/4 9.12, Spent Fuel Pool Boron Concentration," dated September 17, 2008 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML082660649).

2. K. Christian, Entergy Operations, Inc., letter to U.S. Nuclear Regulatory Commission, "Response to Request for Additional Information Regarding 'License Amendment Request to Modify Technical Specification Section 5.6, Fuel Storage, and Add New Technical Specification 3/4.9.12, Spent Fuel Pool (SFP) Boron Concentration'," dated February 26, 2009 (ADAMS Accession No. ML090610134).

3. K. Christian, Entergy Operations, Inc., letter to U.S. Nuclear Regulatory Commission, "Response Request for Additional Information RAI #2 'RE: License Amendment Request to Modify Technical Specification Section 5.6, Fuel Storage, and Add New Technical Specification 3/4.9.12, Spent Fuel Pool (SFP) Boron Concentration' (TAC NO. MD9685)," dated June 30, 2009 (ADAMS Accession No. ML091831258)

4. M. Mason, Entergy Operations, Inc., e-mail to N. Kalyanam, U.S. Nuclear Regulatory Commission, dated June 9, 2009 (ADAMS Accession No. ML091610181).

5. HI-2094370R0, "CASMO-4 Benchmark for Spent Fuel Pool Criticality Analysis," June 2009 (ADAMS Accession No. ML091680615).

6. U.S. Nuclear Regulatory Commission internal memorandum, L. Kopp to T. Collins, "Guidance on the Regulatory Requirements for Criticality Analysis of Fuel Storage at Light-Water Reactor Power Plants," dated August 19, 1998 (ADAMS Accession No. ML003728001).

7. Science Applications International Corporation/U.S. Nuclear Regulatory Commission, "Guide for Validation of Nuclear Criticality Safety Calculational Methodology," NUREG/CR-6698, dated January 2001 (ADAMS Accession No. ML010170125).

8. Oak Ridge National Laboratory/U.S. Nuclear Regulatory Commission, "Review and Prioritization of Technical Issues Related to Burnup Credit for LWR Fuel," NUREG/CR-6665, dated February 2000 (ADAMS Accession No. ML003688150).

9. Oak Ridge National Laboratory/U.S. Nuclear Regulatory Commission, "Study of the Effect of Integral Burnable Absorbers for PWR Burnup Credit," NUREG/CR-6760, dated March 2002 (ADAMS Accession No. ML020770436).

10. K. Christian, Entergy Operations, Inc., letter to U.S. Nuclear Regulatory Commission, "Response to Request for Additional Information Regarding 'License Amendment Request to Modify Technical Specification Section 5.6, Fuel Storage, and Add New Technical Specification 3/4.9.12, Spent Fuel Pool (SFP) Boron Concentration'," dated September 24, 2009 (ADAMS Accession No. ML092720697).

Principal Contributors: T. Nakanishi
E. Davidson

Date: September 30, 2009

September 30, 2009

Vice President, Operations
Entergy Operations, Inc.
Waterford Steam Electric Station, Unit 3
17265 River Road
Killona, LA 70057-3093

SUBJECT: WATERFORD STEAM ELECTRIC STATION, UNIT 3 - ISSUANCE OF AMENDMENT RE: MODIFY TS 5.6, "FUEL STORAGE"; ADD NEW TS 3/4.9.12, "SPENT FUEL POOL BORON CONCENTRATION," AND TS 3/4.9.13, "SPENT FUEL STORAGE" (TAC NO. MD9685)

Dear Sir or Madam:

The Commission has issued the enclosed Amendment No. 223 to Facility Operating License No. NPF-38 for the Waterford Steam Electric Station, Unit 3 (Waterford 3). This amendment consists of changes to the Technical Specifications (TSs) in response to your application dated September 17, 2008, as supplemented by letters dated February 26, June 30, and September 24, 2009.

The amendment revises the Waterford 3 TS 5.6, "FUEL STORAGE," to take credit for soluble boron in Region 1 (cask storage pit) and Region 2 (spent fuel pool and refueling canal) fuel storage racks for the storage of both Standard and Next Generation Fuel (NGF) assemblies. The amendment also adds new TS 3/4.9.12, "SPENT FUEL POOL (SFP) BORON CONCENTRATION," which includes a surveillance that ensures the required boron concentration is maintained in the spent fuel storage racks, and new TS 3/4.9.13, "SPENT FUEL STORAGE," to reflect the results of the new criticality analysis.

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, Senior Project Manager
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-382

Enclosures:
1. Amendment No. 223 to NPF-38
2. Safety Evaluation

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ADAMS Accession No.: ML092050312 * Minor editorial changes from staff provided SEs.

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