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

August 10, 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: CORE PROTECTION CALCULATOR POWER CALIBRATION ADJUSTMENT LIMITS (TAC NO. MD9657)

Dear Sir or Madam:

The Commission has issued the enclosed Amendment No. 222 to Facility Operating License No. NPF-38 for the Waterford Steam Electric Station, Unit 3. This amendment consists of changes to the Technical Specifications (TS) in response to your application dated September 17, 2008, as supplemented by letters dated January 8, March 18, and June 30, 2009.

The amendment revises TS 3/4.3.1 and Note 2 of TS Table 4.3-1, "Reactor Protective Instrumentation Surveillance Requirements." The change results in the addition of conservatism to Core Protection Calculator power indications when calibrations are required in certain conditions.

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

Docket No. 50-382

Enclosures:
1. Amendment No. 222 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. 222
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 January 8, March 18, and June 30, 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. 222, 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

CFJyon for

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: August 10, 2009

ATTACHMENT TO LICENSE AMENDMENT NO. 222

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 3-12	3/4 3-12
----------	3/4 3-12a

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. 222, 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.

TABLE 4.3-1 (Continued)

TABLE NOTATIONS

*With the reactor trip breakers in the closed position, the CEA drive system capable of CEA withdrawal, and fuel in the reactor vessel.

#The provisions of Specification 4.0.4 are not applicable when reducing reactor power to less than 10^{-4}% of RATED THERMAL POWER[(a)] from a reactor power level greater than 10^{-4}% of RATED THERMAL POWER[(a)]. Upon reducing power below 10^{-4}% of RATED THERMAL POWER[(a)], a CHANNEL FUNCTIONAL TEST shall be performed within 2 hours if not performed during the previous 31 days. This requirement does not apply with the reactor trip breakers open.

(1) Each startup or when required with the reactor trip breakers closed and the CEA drive system capable of rod withdrawal, if not performed in the previous 7 days.

(2) Heat balance only (CHANNEL FUNCTIONAL TEST not included):

a. No adjustments to RPS Linear Power or CPC power indications are required below 15% of RATED THERMAL POWER.

b. Between 15% and 80% of RATED THERMAL POWER, compare the RPS Linear Power, CPC ΔT power, and CPC neutron flux power indications to calorimetric power and take the following actions as applicable:

If RPS Linear Power or either CPC power indication is within -0.5% to +10% of RATED THERMAL POWER of calorimetric power, then do not calibrate the affected indication except as required during the initial power ascension following refueling.

If RPS Linear Power or either CPC power indication is less than calorimetric power by more than 0.5% of RATED THERMAL POWER, then calibrate the affected indication as close as practical to calorimetric power and within -0.5% to +10% of RATED THERMAL POWER of calorimetric power.

If the RPS Linear Power indication is greater than calorimetric power by more than 10% of RATED THERMAL POWER, then calibrate it such that it is within 0% to 10% of RATED THERMAL POWER greater than calorimetric power.

If either the CPC ΔT power or the CPC neutron flux power indication is greater than calorimetric power by more than 10% of RATED THERMAL POWER, then calibrate the affected CPC power indication such that it is 8% to 10% of RATED THERMAL POWER greater than calorimetric power.

c. At or above 80% of RATED THERMAL POWER, compare the RPS Linear Power, CPC ΔT power, and CPC neutron flux power indications to calorimetric power. If any indication is not within ±2% of RATED THERMAL POWER of calorimetric power, then calibrate the affected indication as close as practical to calorimetric power but within -0.5% to +2% of RATED THERMAL POWER of calorimetric power.

During PHYSICS TESTS, these daily calibrations may be suspended provided these calibrations are performed upon reaching each major test power plateau and prior to proceeding to the next major test power plateau.

[(a)] As measured by the Logarithmic Power Channels.

TABLE 4.3-1 (Continued)

TABLE NOTATIONS (Continued)

(3) Above 15% of RATED THERMAL POWER, verify that the linear power subchannel gains of the excore detectors are consistent with the values used to establish the shape annealing matrix elements in the Core Protection Calculators.

(4) Neutron detectors may be excluded from CHANNEL CALIBRATION.

(5) After each fuel loading and prior to exceeding 70% of RATED THERMAL POWER, the incore detectors shall be used to determine or verify acceptable values for the shape annealing matrix elements used in the Core Protection Calculators.

(6) This CHANNEL FUNCTIONAL TEST shall include the injection of simulated process signals into the channel as close to the sensors as practicable to verify OPERABILITY including alarm and/or trip functions.

(7) Above 70% of RATED THERMAL POWER, verify that the total RCS flow rate as indicated by each CPC is less than or equal to the actual RCS total flow rate determined by either using the reactor coolant pump differential pressure instrumentation or by calorimetric calculations and if necessary, adjust the CPC addressable constant flow co-efficients such that each CPC indicated flow is less than or equal to the actual flow rate. The flow measurement uncertainty is included in the BERR1 term in the CPC and is equal to or greater than 4%.

(8) Above 70% of RATED THERMAL POWER, verify that the total RCS flow rate as indicated by each CPC is less than or equal to the actual RCS total flow rate determined by calorimetric calculations.

(9) The quarterly CHANNEL FUNCTIONAL TEST shall include verification that the correct values of addressable constants are installed in each OPERABLE CPC.

(10) At least once per 18 months and following maintenance or adjustment of the reactor trip breakers, the CHANNEL FUNCTIONAL TEST shall include independent verification of the undervoltage trip function and the shunt trip function.

(11) The quarterly CHANNEL FUNCTIONAL TEST shall be scheduled and performed such that the Reactor Trip Breakers (RTBs) are tested at least every 6 weeks to accommodate the appropriate vendor recommended interval for cycling of each RTB.

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 222 TO

FACILITY OPERATING LICENSE NO. NPF-38

ENTERGY OPERATIONS, INC.

WATERFORD STEAM ELECTRIC STATION, UNIT 3

DOCKET NO. 50-382

1.0 INTRODUCTION

By letter dated September 17, 2008 (Reference 1), and supplemented by letters dated January 8, and March 18, and June 30, 2009 (References 2, 3, and 4), Entergy Operations, Inc. (Entergy), the licensee, submitted a request for changes to Technical Specifications (TS) for Waterford Steam Electric Station, Unit 3 (Waterford 3). The supplemental letters dated January 8, March 18, and June 30, 2009, provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the U.S. Nuclear Regulatory Commission (NRC) staff's original proposed no significant hazards consideration determination as published in the *Federal Register* on November 4, 2008 (73 FR 65695).

The proposed changes would revise Note (2) of Waterford 3 TS Table 4.3-1, "Reactor Protective Instrumentation Surveillance Requirements." The proposed changes would affect the Core Protective Calculator (CPC) power calibration adjustment limits when calibrations are required in certain conditions.

The CPC system, part of the reactor protection system (RPS), provides automatic protection action to assure that specified acceptable fuel design limits (SAFDLs) are not exceeded during anticipated operational occurrences (AOOs). Specifically, it assures that the departure from nucleate boiling ratio (DNBR) is not less than 1.26 and the local power density (LPD) does not exceed 21 kilowatts per foot (KW/ft) for the most limiting fuel assembly in the reactor core (Reference 1). The CPC system calculates a CPC neutron flux power from ex-core neutron flux signals with correction of power measurement for shape annealing, control element assembly shadowing, and temperature shadowing factors. It also calculates a CPC differential temperature (ΔT) power (based on a primary calorimetric calculation) from its reactor coolant system inputs. The CPC system compares the calculated values and uses the higher value of the neutron flux power and ΔT power in the DNBR and LPD algorithms. The CPC system calculates the values of DNBR and LPD and compares them with trip setpoints, and sends a reactor trip signal to the RPS if the trip setpoints are exceeded. The RPS circuitry would shut down the reactor upon receiving trip signals from any two of the four CPC channels.

Prior to the Cycle 15 startup at Waterford 3, the licensee identified that one of the listed CPC calibration requirements from the Startup Test and Setpoints Transmittal (STST) for Cycle 15 was more restrictive than that listed in Note (2) for Functional Item 14, Core Protection Calculators, of TS Table 4.3-1. Specifically, the STST required CPC neutron flux power and CPC ΔT power adjustment to between 8 percent and 10 percent of rated thermal power (RTP) greater than calorimetric power when either CPC power indication was greater than 10 percent RTP above calorimetric power in the CPC power range of 15 percent to 80 percent RTP after plant startup from the refueling outage. For this same plant condition, Note (2) of TS Table 4.3-1 currently requires CPC neutron flux power and CPC ΔT power adjustment to between 0 percent and 10 percent greater than calorimetric power. The proposed TS would increase the adjustment for CPC neutron flux and CPC ΔT power indications to between 8 percent and 10 percent RTP above calorimetric power.

Other TS changes would involve: (1) the calibration tolerance is to be changed from a range of 0.0 percent to +10 percent RTP to -0.5 percent to +10 percent RTP above calorimetric power, when the RPS Linear Power or either CPC power indication is less than calorimetric power by more than 0.5 percent RTP in the CPC power range of 15 percent and 80 percent RTP; and (2) the calibration tolerance is to be changed from a range of -2 percent to +2 percent RTP to -0.5 percent to +2 percent RTP above calorimetric power, when the RPS Linear Power or either CPC power indication differs from calorimetric power by an absolute value of more than 2 percent RTP for CPC power levels at or above 80 percent RTP.

The proposed TS would also clarify that: (1) no power calibration adjustments are required below 15 percent RTP; (2) certain adjustments should result in CPC power indications being as close as practical to calorimetric power; and (3) ranges of acceptance criteria and adjustment limits are expressed as percentages of RATED THERMAL POWER instead of percentages of current power.

2.0 REGULATORY EVALUATION

The following regulations are applicable for this review:

General Design Criterion (GDC) 10 of Appendix A to Title 10 of the *Code of Federal Regulations*, Part 50 (10 CFR 50) requires that the reactor core and associated coolant control, and protection systems be designed with appropriate margins to assure that SAFDLs are not exceeded during any conditions of normal operation, including the effects of AOOs. In the application of pressurized-water reactors, the safety limit DNBR (SLDNBR) is established to assure compliance with SAFDLs. Above the SLDNBRs, the fuel rods would not experience a departure from nucleate boiling (DNB) during normal operation or AOOs. The LPD limit is also established to prevent the fuel from excessive heat generation, which would cause gross mechanical failure of the fuel system. In support of plant operations, the CPC system is used to provide automatic protection action to assure that the DNBR and LPD safety limits of the most limiting fuel assembly in the reactor core are not exceeded during normal operation conditions and AOOs.

In 10 CFR Section 50.36, "Technical specifications," the Commission established its regulatory requirements related to the content of TS. Pursuant to 10 CFR 50.36, TS 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." Pursuant to these two sections of 10 CFR 50.36, SRs for calibrations of the CPC power indication are required and specified in Functional Item 14 and its associated Note (2) of TS Table 4.3-1 to assure the quality of the CPC power indication and trip function.

3.0 TECHNICAL EVALUATION

The quality of CPC core power indications is important to assure that calculated values of the DNBR and LPD are conservative. Note (2) for Functional Item 14 in TS Table 4.3-1 specifies the required adjustable limits for CPC power calibrations. The licensee proposed changes to TS Note (2)a and Note (2)b, and presented the TS changes in Attachment 3 of Reference 1. In response to the NRC staff's request for additional information (RAI), the licensee presented additional information in References 2 and 3, and the revised TS changes in Attachment 3 of Reference 4. The following is summary of the NRC staff review of the proposed TS changes based on the information in References 1 through 4.

3.1 Power Levels Below 15 Percent of RTP

3.1.1 New Note (2)a - TS Table 4.3-1

Note (2)a (References 1 and 4), a newly added item, specifies that:

> No adjustments to RPS Linear Power or CPC power indications are required below 15% of RATED THERMAL POWER.

In response to the NRC staff's RAI, the licensee indicated (RAI 1, Reference 2) that the CPC calculated DNBR and LPD assume a power level of 20 percent RTP whenever the power level was less than or equal to 20 percent RTP. The power level assumed in the CPC DNBR and LPD calculations was sufficient to compensate for any potential calibration uncertainty for power levels below 15 percent RTP, since CPC power indications were calibrated to the primary calorimetric between 15 percent and approximately 40 percent power, and the uncertainty for the primary calorimetric in that power range did not exceed 3 percent RTP (RAIs 1 and 3, Reference 2). In addition, the CPC calculations assumed a fixed axial power shape for power levels below 15 percent RTP. The fixed axial shape assumed an axial power peaking factor of greater than 1.9 and a negative axial shape index (ASI) of -0.15. The negative ASI, a top peaked neutron flux in the core with the axial power peak being in a higher temperature region, would result in a lower DNBR than that of a center or bottom neutron flux peaked shape. Also, the fixed axial power shape was normalized to an average axial power of 1.56. The combination of the minimum power level of 20 percent (versus 0 percent to 15 percent), the ASI

of -0.15 (versus nominal ASI of around 0.0), the axial power peaking factor of 1.9 (versus nominal axial peak of less than 1.25), and the normalization factor of 1.56 (versus 1.0) resulted in a lower minimum DNBR that would initiate an earlier reactor trip to prevent fuel failure from occurring, and thus, was conservative. The CPC LPD is not an issue for power levels below 15 percent RTP, since the fuel centerline melting temperature limit could not be reached for power levels at 15 percent RTP or below for any possible ASI and radial peaking factor. The NRC staff finds that that the newly added item is consistent with the intent of current Note (2), which does not have CPC calibration requirements at power levels below 15 percent RTP. Therefore, the NRC staff concludes that the added Note (2)a is acceptable.

3.2 Power Levels Between 15 Percent and 80 Percent RTP

Note (2)b, replacing current Note (2)a, specifies the required CPC power calibration adjustment limits for power levels between 15 percent and 80 percent RTP. Depending on the values of either the RPS Linear Power, or the CPC ΔT power or CPC neutron flux power indication deviated from the calorimetric power, the following changes to Note (2)b are proposed:

3.2.1 Note (2)b, paragraph 2 - TS Table 4.3-1

Paragraph 2 of Note (2)b (References 1 and 4) specifies that

> If RPS Linear Power or either CPC power indication is within -0.5% to +10% of RATED THERMAL POWER of calorimetric power, then do not calibrate the affected indication except as required during the initial power ascension following refueling.

The requirement remains essentially the same as the requirement in paragraph 2 of current Note (2)a. The TS revision involves only editorial changes to renumber Note (2)b from current Note (2)a, and to break out the term "any signal" in paragraph 2 of current Note (2)a to the pertinent signal that was "the RPS Linear Power or either CPC power indication." Therefore, the NRC staff has determined that the TS requirement is acceptable.

3.2.2 Note (2)b, paragraph 3 - TS Table 4.3-1

Paragraph 3 of Note (2)b (References 1 and 4) specifies that:

> If RPS Linear Power or either CPC power indication is less than calorimetric power by more than 0.5% of RATED THERMAL POWER, then calibrate the affected indication as close as practical to calorimetric power and within -0.5% to +10% of RATED THERMAL POWER of calorimetric power.

The proposed tolerance range of -0.5 percent to +10 percent RTP was changed from 0.0 percent to +10 percent specified in paragraph 3 of current Note (2)a.

In response to the NRC staff's RAI, the licensee discussed (RAI 2, Reference 2) the methods used for CPC DNBR and LPD calculations. The CPC calculations included power adjustment factors (addressable constants BERR1 for DNBR and BERR4 for LPD), power bias factors (addressable constants BERR0 or BERR2 for DNBR and BERR4 for LPD), and cycle-

independent and power-dependent-based factors that were not addressable. The addressable constants were calculated each cycle to include uncertainties such as CPC power distribution and thermal hydraulic modeling, critical heat flux correlation, system parameter and measurement uncertainties. Among the uncertainty terms that were included in the calculation of these addressable constants and the verification of cycle-independent power-dependent bias factors were power measurement uncertainties and the calibration allowance. When the CPC power indications (such as the proposed positive range of 0 percent to +10 percent RTP for the calibration tolerance) were higher than the calorimetric power, the CPC DNBR and LPD calculations would predict a lower minimum DNBR and higher maximum LPD that would actuate a reactor trip earlier than the actual reactor conditions, and thus, were conservative for preventing the fuel failure from occurring and, therefore, are acceptable. Conversely, the calculation of the power adjustment factors, power bias factors, and power-dependent power bias factors addressed the case where the CPC power indications were allowed to be lower than the calorimetric power. The CPC DNBR and LPD calculations included a negative limit in each calibration. Specifically, the power bias factors, BERR0 or BERR2 for DNBR and BERR4 for LPD, were calculated each cycle and included an additive term to cover the maximum tolerance (2 percent RTP) in the non-conservative direction at any power. Since the proposed negative limit of -0.5 percent RTP is within the power calibration adjustment tolerance considered in the CPC DNBR and LPD calculations, the NRC staff concludes that the limit is acceptable. The TS revision also involves a change from "any signal" to "RPS Linear Power or either CPC power indication." This change is editorial in nature and is acceptable. In addition, the TS revision includes an added term, "as close as practical," to reflect the licensee's intent to avoid exceeding the negative limit for any significant amount of time. The NRC staff has determined the term is adequate and acceptable.

3.2.3 Note (2)b, paragraph 4 - TS Table 4.3-1

Paragraph 4 of Note (2)b (References 1 and 4) requires that:

> If the RPS Linear Power indication is greater than calorimetric power by more than 10% of RATED THERMAL POWER, then calibrate it such that it is within 0% to 10% of RATED THERMAL POWER greater than calorimetric power.

The RPS Linear Power trip was not explicitly credited in any safety analysis for design-basis events (RAI 4, Reference 2). The RPS Linear Power trip would adequately perform its function as a backup high power trip when its indication is maintained greater than or equal to the calorimetric power measurement. The TS changes involve only editorial changes to break out the term "any signals" to the pertinent signal that are "the RPS Linear Power indication" and "either CPC ΔT power or CPC neutron flux power indication," and to refer the TS requirements for the same conditions related to "either CPC ΔT power or CPC neutron flux power indication" to the added paragraph 5 of Note (2)b discussed in Section 3.2.4 below. Therefore, the NRC staff determined that the proposed requirement in paragraph 4 is acceptable.

3.2.4 Note (2)b, paragraph 5 - TS Table 4.3-1

Paragraph 5 of Note (2)b (Reference 1) requires that:

> If either the CPC ΔT power or the CPC neutron flux power indication is greater than calorimetric power by more than 10% of RATED THERMAL POWER, then calibrate the affected CPC power indication such that it is 8% to 10% of RATED THERMAL POWER greater than calorimetric power. This requirement does not apply during the initial power ascension following refueling but becomes applicable after the first calibration of the CPC power indications at or above 80% of RTP in the power ascension.

The proposed tolerance range of 8 percent to 10 percent RTP was changed from 0.0 percent to 10 percent RTP per paragraph 4 in current Note (2)a. The proposed change is to minimize adjustment of CPC power indications in non-conservative direction (RAI 3, Reference 2). The proposed adjustment range of 8 percent to 10 percent RTP is more restrictive as compared with the current range of 0 percent to 10 percent. A 2 percent window within the 10 percent difference is to maintain conservatism of the CPC DNBR and LPD calculations. Therefore, the proposed adjustment power range is acceptable.

During the course of its review, the NRC staff requested the licensee to justify the adequacy of the TS exception of not performing the CPC power calibration during power ascension from 15 percent to 80 percent RTP. In response, the licensee indicated (RAI 1, Reference 3) that its operating data showed that the likelihood that CPC power indications deviated from the calorimetric power by more than 10 percent RTP is low. Also, during the initial power ascension following refueling, it was conservative not to adjust CPC power indications downward. For example, the licensee stated that if CPC power indications were adjusted downward by 5 percent at 20 percent power and the adjustments would result in the CPC power indications being lower by 5 percent when 80 percent was reached, then the CPC power indication was less than actual plant power, resulting in a higher DNBR, and was non-conservative.

After its review of the above discussed RAI response, the NRC staff requested the licensee to consider the following example in support of the proposed TS exception: during power ascension, the CPC power and calorimetric power levels were 30.1 percent and 20 percent of RTP, respectively. For this example, since the CPC power was greater than the calorimetric power by more than 10 percent (30.1 percent - 20 percent) RTP, the CPC power was required to be calibrated to 8 percent to 10 percent RTP greater than the calorimetric power in accordance with the requirement in the first sentence of paragraph 5 in Note (2)b. Accordingly, the CPC power after the calibration was at least 28 percent [20 percent + (8 percent to 10 percent)] RTP. As stated in the license's RAI response (RAI 1, Reference 4), the measurement uncertainties of the calorimetric power were approximately 3 percent RTP for the power level at 20 percent RTP and 1 percent RTP for power at 80 percent RTP. After subtracting the uncertainty of 3 percent RTP, the CPC power was 25 percent (28 percent - 3 percent) RTP with a conservative margin of 5 percent (25 percent - 20 percent) RTP. The margin of 5 percent RTP was sufficient to compensate for the calorimetric power measurement uncertainty when power increases to 80 percent RTP, which was subjected to a measurement uncertainty of approximately 1 percent RTP. In consideration of the above example, the NRC staff found that the proposed TS exception (of not performing adjusting power indication during power

ascension) was not adequately justified by the licensee. In response to the NRC staff's finding, the licensee stated (RAI 2, Reference 4) that upon consideration of the above example provided by the NRC staff and re-review of amendments issued to Arkansas Nuclear One, Unit 2, and Palo Verde Nuclear Generating Station, Table 4.3-1, Note 2, it withdrew the following TS exception:

> This requirement does not apply during the initial power ascension following refueling but becomes applicable after the first calibration of the CPC power indications at or above 80% of RATED THERMAL POWER in the power ascension.

The NRC staff found that the licensee RAI response to withdraw the above TS exception was prudent. The following is the revised paragraph 5 of Note (2)b (Reference 4):

> If either the CPC ΔT power or the CPC neutron flux power indication is greater than calorimetric power by more than 10% of RATED THERMAL POWER, then calibrate the affected CPC power indication such that it is 8% to 10% of RATED THERMAL POWER greater than calorimetric power.

The NRC staff concludes that the revised TS requirement is the same as above-discussed paragraph 5 of Note (2)b without the TS exception of not performing the CPC power calibration during power ascension from 15 percent to 80 percent RTP and, is acceptable.

3.3 Power Levels at or above 80 percent RTP

3.3.1 Note (2)c - TS Table 4.3-1

Proposed Note (2)c (References 1 and 4), replacing current Note (2)b, requires that

> At or above 80% of RATED THERMAL POWER, compare the RPS linear Power, CPC ΔT power or the CPC neutron flux power indications to calorimetric power. If any indication is not within ±2% of RATED THERMAL POWER of calorimetric power, then calibrate the affected indication as close as practical to calorimetric power but within -0.5% to +2% of RATED THERMAL POWER of calorimetric power.

The proposed tolerance range of -0.5 percent to +2 percent RTP was changed from -2 percent to +2 percent in current Note (2)b.

The upper adjustment limit of +2 percent RTP added to the actual power would predict a lower minimum DNBR and higher maximum LPD that would actuate a reactor trip earlier than the actual reactor conditions, and is conservative. In addition, the upper limit of +2 percent RTP is consistent with the current Note (2)b. Therefore, the NRC staff concludes that the upper limit of +2 percent is acceptable.

As discussed in Section 3.2.2 above, the power bias factors for DNBR and LPD were calculated each cycle by including an additive term to cover the maximum tolerance of 2 percent RTP in the non-conservative direction at any power. The proposed negative limit of -0.5 percent RTP is

within the power calibration adjustment tolerance considered in the CPC DNBR and LPD calculations. In addition, the limit of -0.5 percent RTP is more restrictive since it is bounded by the corresponding limit of -2.0 percent RTP in current Note (2)b. Therefore, the NRC staff concludes that the limit of -0.5 RTP is acceptable. Also, the added term, "as close as practical," is to reflect the licensee's intent to avoid exceeding the negative limit for any significant amount of time. The NRC staff has determined the term is adequate and acceptable.

The proposed TS changes discussed in Section 3.0 of this evaluation clarified that the units of the range of acceptance criteria and adjustment limits are in percentages of RATED THERMAL POWER. However, in paragraph 3 on page 5 of Attachment 1 to Reference 1, it stated that "...[S]pecifying that adjustment limits are percentages of RATED THERMAL POWER instead of percentages of current power is essentially editorial..." In its RAI response (RAI 4, Reference 3), the licensee clarified that the language in the quoted statement was imprecise and should not have implied that the adjustment limits were percentages of current power. The licensee emphasized that Waterford 3 had not used the adjustment limits in percentages of current power. Based on the licensee's clarification, the NRC staff agrees that use of the unit of "percentages of RATED THERMAL POWER" is consistent with the intent of the current TS requirements and, therefore, is acceptable.

4.0 SUMMARY

Based on its review, the NRC staff finds that: (1) the positive values of the proposed CPC power calibration adjustment limits are more or equally restrictive, as compared to the corresponding requirements in the current TSs (discussed in above Section 3.2); and (2) the negative values of the adjustment limits are bounded by the values considered in the CPC DNBR and LPD calculations (discussed in above Sections 3.2.2 and 3.3). Therefore, the NRC staff concludes that the proposed power calibration adjustment limits are adequate, and that there is reasonable assurance that the CPC system will adequately function to protect fuel rods from failure in meeting the GDC 10 requirement regarding SAFDLs and satisfying the 10 CFR 50.36 requirements regarding SRs in assuring quality of the CPC system. Since the proposed Note (2) presented in Reference 1 and revised in Reference 4 for the Waterford 3 TSs adequately reflects the proposed acceptable calibration adjustment limits, the NRC staff concludes that the proposed 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 November 4, 2008 (73 FR 65695). 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. Walsh, K. T., Entergy Operations, Inc., letter to U.S. Nuclear Regulatory Commission, "License Amendment Request NPF-38-276, Core Power Calculator Power Calibration Adjustment Limit, Waterford 3 Steam Electric Station, Unit 3 (Waterford 3), Docket No. 50-382, License No. NPF-38," dated September 17, 2008 (ADAMS Accession No. ML082630032).

2. Gilmore, R. B., Entergy Operations, Inc., letter to U.S. Nuclear Regulatory Commission, "RAI Response to Amendment Request NPF-38-276, Core Protection Calculator Power Calibration Adjustment Limit, Waterford Steam Electric Station, Unit 3, Docket No. 50-382, License No. NPF-38," dated January 8, 2009 (ADAMS Accession No. ML090120462).

3. Christian, K. J., Entergy Operations, Inc., letter to U.S. Nuclear Regulatory Commission, "RAI #2 Response to Amendment Request NPF-38-276, Core Protection Calculator Power Calibration Adjustment Limit, Waterford Steam Electric Station, Unit 3, Docket No. 50-382, License No. NPF-38," dated March 18, 2009 (ADAMS Accession No. ML090790102).

4. Christian, K. J., Entergy Operations, Inc., letter to U.S. Nuclear Regulatory Commission, "Response to Amendment Request NPF-38-276, Core Protection Calculator Power Calibration Adjustment Limit, Waterford Steam Electric Station, Unit 3, Docket No. 50-382, License No. NPF-38," dated June 30, 2009 (ADAMS Accession No. ML091830040).

Principal Contributor: S. Sun

Date: August 10, 2009

August 10, 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: CORE PROTECTION CALCULATOR POWER CALIBRATION ADJUSTMENT LIMITS (TAC NO. MD9657)

Dear Sir or Madam:

The Commission has issued the enclosed Amendment No. 222 to Facility Operating License No. NPF-38 for the Waterford Steam Electric Station, Unit 3. This amendment consists of changes to the Technical Specifications (TS) in response to your application dated September 17, 2008, as supplemented by letters dated January 8, March 18, and June 30, 2009.

The amendment revises TS 3/4.3.1 and Note 2 of TS Table 4.3-1, "Reactor Protective Instrumentation Surveillance Requirements." The change results in the addition of conservatism to Core Protection Calculator power indications when calibrations are required in certain conditions.

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
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-382

Enclosures:
1. Amendment No. 222 to NPF-38
2. Safety Evaluation

cc w/encl.: Distribution via ListServ

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ADAMS Accession No. ML091880853 * Staff provided SE with editorial changes

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NAME	NKalyanam	JBurkhardt	WKemper HGarg for	RElliott MHamm for	GCranston	STurk	MMarkley CFLyon for	NKalyanam
DATE	8/7/09	7/10/09	7/27/09	7/23/09	7/10/09	8/4/09	8/10/09	8/10/09

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