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

April 29, 2016

Mr. Scott Batson
Site Vice President
Oconee Nuclear Station
Duke Energy Carolinas, LLC
7800 Rochester Highway
Seneca, SC 29672-0752

SUBJECT: OCONEE NUCLEAR STATION, UNITS 1, 2, AND 3, ISSUANCE OF AMENDMENTS TO ADD HIGH FLUX TRIP FOR THREE REACTOR COOLANT PUMP OPERATION (CAC NOS. MF6363, MF6364, AND MF6365)

Dear Mr. Batson:

The U.S. Nuclear Regulatory Commission (NRC) has issued the enclosed Amendment Nos. 397, 399, and 398 to Renewed Facility Operating Licenses (RFOLs) DPR-38, DPR-47, and DPR-55, for the Oconee Nuclear Station, Units 1, 2, and 3 (ONS), respectively. The amendments consist of changes to the Technical Specifications (TS) and RFOLs, in response to your application dated May 19, 2015, as supplemented by letters dated August 20, 2015, and February 26, 2016.

These amendments revise TS 3.3.1, "RPS Instrumentation" and 3.4.4, "RCS loops – Modes 1 and 2". Specifically, the amendments add a Reactor Protection System Nuclear Overpower – High Setpoint trip for 3 reactor coolant pump operation at ONS.

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

If you have any questions regarding this matter, I may be reached at (301) 415-4090 or by e-mail at jeffrey.whited@nrc.gov.

Sincerely,

[signature]

Jeffrey A. Whited, Project Manager
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-269, 50-270, and 50-287

Enclosures:

1. Amendment No. 397 to RFOL DPR-38
2. Amendment No. 399 to RFOL DPR-47
3. Amendment No. 398 to RFOL DPR-55
4. Safety Evaluation

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

DUKE ENERGY CAROLINAS, LLC

DOCKET NO. 50-269

OCONEE NUCLEAR STATION, UNIT 1

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 397
Renewed License No. DPR-38

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment to the Oconee Nuclear Station, Unit 1 (ONS, the facility), Renewed Facility Operating License No. DPR-38, filed by Duke Energy Carolinas, LLC (the licensee), dated May 19, 2015, as supplemented by letters dated August 20, 2015, and February 26, 2016, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations as 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 set forth in 10 CFR Chapter I;

   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.

Enclosure 1

2. Accordingly, the license is hereby amended by page changes to the Technical Specifications as indicated in the attachment to this license amendment, and Paragraph 3.B of Renewed Facility Operating License No. DPR-38 is hereby amended to read as follows:

    B. Technical Specifications

    The Technical Specifications contained in Appendix A, as revised through Amendment No. 397, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. Implementation Requirements:

    A. This license amendment is effective as of its date of issuance and shall be implemented within 90 days.

    B. Coincident with the implementation of this amendment, the licensee shall revise the ONS Updated Final Safety Analysis Report (UFSAR). The revision shall be implemented in the next periodic update of the UFSAR in accordance with 10 CFR 50.71(e).

FOR THE NUCLEAR REGULATORY COMMISSION

Michael T. Markley

Michael T. Markley, Chief
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

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

Date of Issuance: April 29, 2016

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

DUKE ENERGY CAROLINAS, LLC

DOCKET NO. 50-270

OCONEE NUCLEAR STATION, UNIT 2

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 399
Renewed License No. DPR-47

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment to the Oconee Nuclear Station, Unit 2 (the facility), Renewed Facility Operating License No. DPR-47, filed by Duke Energy Carolinas, LLC (the licensee) dated May 19, 2015, as supplemented by letters dated August 20, 2015, and February 26, 2016, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations as 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 set forth in 10 CFR Chapter I;

   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.

Enclosure 2

2. Accordingly, the license is hereby amended by page changes to the Technical Specifications as indicated in the attachment to this license amendment, and Paragraph 3.B of Renewed Facility Operating License No. DPR-47 is hereby amended to read as follows:

   B. Technical Specifications

   The Technical Specifications contained in Appendix A, as revised through Amendment No. 399, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. Implementation Requirements:

   A. This license amendment is effective as of its date of issuance and shall be implemented within 90 days.

   B. Coincident with the implementation of this amendment, the licensee shall revise the ONS Updated Final Safety Analysis Report (UFSAR). The revision shall be implemented in the next periodic update of the UFSAR in accordance with 10 CFR 50.71(e).

FOR THE NUCLEAR REGULATORY COMMISSION

Michael T. Markley, Chief
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to Renewed Facility
Operating License No. DPR-47
and the Technical Specifications

Date of Issuance: April 29, 2016

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

DUKE ENERGY CAROLINAS, LLC

DOCKET NO. 50-287

OCONEE NUCLEAR STATION, UNIT 3

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 398
Renewed License No. DPR-55

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment to the Oconee Nuclear Station, Unit 3 (the facility), Renewed Facility Operating License No. DPR-55, filed by Duke Energy Carolinas, LLC (the licensee) dated May 19, 2015, as supplemented by letters dated August 20, 2015, and February 26, 2016, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations as 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 set forth in 10 CFR Chapter I;

   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 hereby amended by page changes to the Technical Specifications as indicated in the attachment to this license amendment, and Paragraph 3.B of Renewed Facility Operating License No. DPR-55 is hereby amended to read as follows:

   B. Technical Specifications

   The Technical Specifications contained in Appendix A, as revised through Amendment No. 398, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. Implementation Requirements:

   A. This license amendment is effective as of its date of issuance and shall be implemented within 90 days.

   B. Coincident with the implementation of this amendment, the licensee shall revise the ONS Updated Final Safety Analysis Report (UFSAR). The revision shall be implemented in the next periodic update of the UFSAR in accordance with 10 CFR 50.71(e).

FOR THE NUCLEAR REGULATORY COMMISSION

Michael T. Markley, Chief
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to Renewed Facility Operating License No. DPR-55 and the Technical Specifications

Date of Issuance: April 29, 2016

ATTACHMENT TO

LICENSE AMENDMENT NO. 397

RENEWED FACILITY OPERATING LICENSE NO. DPR-38

DOCKET NO. 50-269

LICENSE AMENDMENT NO. 399

RENEWED FACILITY OPERATING LICENSE NO. DPR-47

DOCKET NO. 50-270

AND

LICENSE AMENDMENT NO. 398

RENEWED FACILITY OPERATING LICENSE NO. DPR-55

DOCKET NO. 50-287

Replace the following pages of the Renewed Facility Operating Licenses and the Appendix A Technical Specifications (TSs) with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

Remove Pages	Insert Pages
Licenses	Licenses
License No. DPR-38, page 3	License No. DPR-38, page 3
License No. DPR-47, page 3	License No. DPR-47, page 3
License No. DPR-55, page 3	License No. DPR-55, page 3
TSs	TSs
3.3.1-5	3.3.1-5
3.3.1-6	3.3.1-6
3.4.4-1	3.4.4-1
----	3.4.4-2

A. Maximum Power Level

The licensee is authorized to operate the facility at steady state reactor core power levels not in excess of 2568 megawatts thermal.

B. Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 397 are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

C. This license is subject to the following antitrust conditions:

Applicant makes the commitments contained herein, recognizing that bulk power supply arrangements between neighboring entities normally tend to serve the public interest. In addition, where there are net benefits to all participants, such arrangements also serve the best interests of each of the participants. Among the benefits of such transactions are increased electric system reliability, a reduction in the cost of electric power, and minimization of the environmental effects of the production and sale of electricity.

Any particular bulk power supply transaction may afford greater benefits to one participant than to another. The benefits realized by a small system may be proportionately greater than those realized by a larger system. The relative benefits to be derived by the parties from a proposed transaction, however, should not be controlling upon a decision with respect to the desirability of participating in the transaction. Accordingly, applicant will enter into proposed bulk power transactions of the types hereinafter described which, on balance, provide net benefits to applicant. There are net benefits in a transaction if applicant recovers the cost of the transaction (as defined in ¶1 (d) hereof) and there is no demonstrable net detriment to applicant arising from that transaction.

1. As used herein:

   (a) "Bulk Power" means electric power and any attendant energy, supplied or made available at transmission or sub-transmission voltage by one electric system to another.

   (b) "Neighboring Entity" means a private or public corporation, a governmental agency or authority, a municipality, a cooperative, or a lawful association of any of the foregoing owning or operating, or proposing to own or operate, facilities for the generation and transmission of electricity which meets each of

A. <u>Maximum Power Level</u>

The licensee is authorized to operate the facility at steady state reactor core power levels not in excess of 2568 megawatts thermal.

B. <u>Technical Specifications</u>

The Technical Specifications contained in Appendix A, as revised through Amendment No. 399 are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

C. This license is subject to the following antitrust conditions:

Applicant makes the commitments contained herein, recognizing that bulk power supply arrangements between neighboring entities normally tend to serve the public interest. In addition, where there are net benefits to all participants, such arrangements also serve the best interests of each of the participants. Among the benefits of such transactions are increased electric system reliability, a reduction in the cost of electric power, and minimization of the environmental effects of the production and sale of electricity.

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A. Maximum Power Level

The licensee is authorized to operate the facility at steady state reactor core power levels not in excess of 2568 megawatts thermal.

B. Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 398 are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

C. This license is subject to the following antitrust conditions:

Applicant makes the commitments contained herein, recognizing that bulk power supply arrangements between neighboring entities normally tend to serve the public interest. In addition, where there are net benefits to all participants, such arrangements also serve the best interests of each of the participants. Among the benefits of such transactions are increased electric system reliability, a reduction in the cost of electric power, and minimization of the environmental effects of the production and sale of electricity.

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Table 3.3.1-1 (page 1 of 2)
Reactor Protective System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	CONDITIONS REFERENCED FROM REQUIRED ACTION B.1	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
1. Nuclear Overpower				
a. High Setpoint	1,2[(a)]	C	SR 3.3.1.1 SR 3.3.1.2 SR 3.3.1.5 SR 3.3.1.6 SR 3.3.1.7[(d)(e)]	≤ 105.5% RTP with four pumps operating, and ≤ 80.5 RTP when reset for three pumps operating per LCO 3.4.4, "RCS Loops - MODES 1 and 2"
b. Low Setpoint	2[(b)],3[(b)] 4[(b)],5[(b)]	D	SR 3.3.1.1 SR 3.3.1.5 SR 3.3.1.6 SR 3.3.1.7	≤ 5% RTP
2. RCS High Outlet Temperature	1,2	C	SR 3.3.1.1 SR 3.3.1.5 SR 3.3.1.6 SR 3.3.1.7	≤ 618°F
3. RCS High Pressure	1,2[(a)]	C	SR 3.3.1.1 SR 3.3.1.5 SR 3.3.1.6 SR 3.3.1.7	≤ 2355 psig
4. RCS Low Pressure	1,2[(a)]	C	SR 3.3.1.1 SR 3.3.1.5 SR 3.3.1.6 SR 3.3.1.7	≥ 1800 psig
5. RCS Variable Low Pressure	1,2[(a)]	C	SR 3.3.1.1 SR 3.3.1.5 SR 3.3.1.6 SR 3.3.1.7	As specified in the COLR
6. Reactor Building High Pressure	1,2,3[(c)]	C	SR 3.3.1.1 SR 3.3.1.6 SR 3.3.1.7	≤ 4 psig
7. Reactor Coolant Pump to Power	1,2[(a)]	C	SR 3.3.1.1 SR 3.3.1.5 SR 3.3.1.6 SR 3.3.1.7	>2% RTP with ≤ 2 pumps operating
8. Nuclear Overpower Flux/Flow Imbalance	1,2[(a)]	C	SR 3.3.1.1 SR 3.3.1.3 SR 3.3.1.5 SR 3.3.1.6 SR 3.3.1.7	As specified in the COLR

Table 3.3.1-1 (page 2 of 2)
Reactor Protective System Instrumentation

	FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	CONDITIONS REFERENCED FROM REQUIRED ACTION B.1	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
9.	Main Turbine Trip (Hydraulic Fluid Pressure)	≥ 30% RTP	E	SR 3.3.1.5 SR 3.3.1.6 SR 3.3.1.7	≥ 800 psig
10.	Loss of Main Feedwater Pumps (Hydraulic Oil Pressure)	≥ 2% RTP	F	SR 3.3.1.5 SR 3.3.1.6 SR 3.3.1.7	≥ 75 psig
11.	Shutdown Bypass RCS High Pressure	2[(b)],3[(b)] 4[(b)],5[(b)]	D	SR 3.3.1.1 SR 3.3.1.5 SR 3.3.1.6 SR 3.3.1.7	≤ 1720 psig

(a) When not in shutdown bypass operation.

(b) During shutdown bypass operation with any CRD trip breakers in the closed position and the CRD System capable of rod withdrawal.

(c) With any CRD trip breaker in the closed position and the CRD System capable of rod withdrawal.

(d) If the as-found channel setpoint is conservative with respect to the Allowable Value but outside its predefined as-found acceptance criteria band, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(e) The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the Nominal Trip Setpoint or a value that is more conservative than the Nominal Trip Setpoint; otherwise the channel shall be declared inoperable. The Nominal Trip Setpoint and the methodologies used to determine the predefined as-found acceptance criteria band and the as-left setpoint tolerance band are specified in the Selected Licensee Commitments Manual.

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.4 RCS Loops – MODES 1 and 2

LCO 3.4.4 Two RCS Loops shall be in operation, with:

a. Four reactor coolant pumps (RCPs) operating; or

b. Three RCPs operating and:
   1. THERMAL POWER is ≤ 75% RTP; and
   2. LCO 3.3.1, "Reactor Protection System (RPS) Instrumentation," Function 1.a (Nuclear Overpower – High Setpoint), Allowable Value of Table 3.3.1-1 is reset for 3 RCPs operating.

APPLICABILITY: MODES 1 and 2.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Requirements of LCO 3.4.4.b not met.	A.1 Reset the RPS to satisfy the requirements of LCO 3.4.4.b.2.	10 hours
B. Required Action and associated Completion Time of Condition A not met. <u>OR</u> Requirements of LCO not met for reasons other than Condition A.	B.1 Be in MODE 3.	12 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.4.1	Verify required RCS loops are in operation.	In accordance with the Surveillance Frequency Control Program

UNITED STATES
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WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO

AMENDMENT NO. 397 TO RENEWED FACILITY OPERATING LICENSE NO. DPR-38

AMENDMENT NO. 399 TO RENEWED FACILITY OPERATING LICENSE NO. DPR-47

AND

AMENDMENT NO. 398 TO RENEWED FACILITY OPERATING LICENSE NO. DPR-55

DUKE ENERGY CAROLINAS, LLC

OCONEE NUCLEAR STATION, UNITS 1, 2, AND 3

DOCKET NOS. 50-269, 50-270, AND 50-287

1.0 INTRODUCTION

By letter dated May 19, 2015,[1] as supplemented by letters dated August 20, 2015,[2] and February 26, 2016,[3] Duke Energy Carolinas, LLC (Duke Energy, the licensee) submitted a license amendment request (LAR) regarding proposed changes to Technical Specification (TS) 3.3.1, "RPS Instrumentation" and 3.4.4, "RCS loops – Modes 1 and 2," for the Oconee Nuclear Station, Units 1, 2, and 3 (ONS). Specifically, the requested changes add a Reactor Protection System Nuclear Overpower – High Setpoint trip for three reactor coolant pump (RCP) operation. Additionally, the licensee requested to implement the applicable aspects of Technical Specification Task Force Traveler, (TSTF)-493, "Clarify Application of Setpoint Methodology for LSSS [Limiting Safety Systems Settings] Functions,"[4] Option A, related to the changes for the additional high flux trip.

The existing overpower protection for three RCP operation is the Nuclear Overpower Flux/Flow/Imbalance trip function. The proposed additional trip will provide an absolute setpoint that can be actuated regardless of the transient or the Reactor Coolant System (RCS) flow conditions.

The supplemental letter dated February 26, 2016, provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the Nuclear Regulatory Commission (NRC) staff's original proposed no significant

[1] Agencywide Documents Access and Management System (ADAMS) Accession No. ML15146A056.
[2] ADAMS Accession No. ML15239B290.
[3] ADAMS Accession No. ML16064A082.
[4] ADAMS Accession No. ML092150990.

hazards consideration determination as published in the *Federal Register* on October 27, 2015 (80 FR 65810).

2.0 REGULATORY EVALUATION

The regulatory requirements and guidance which the NRC staff considered in its review of the licensee's LAR are as follows:

Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50 establishes the fundamental regulatory requirements with respect to the domestic licensing of nuclear production and utilization facilities.

Section 50.36(c)(2), "Technical Specifications," requires that technical specifications include limiting conditions for operation (LCOs). LCOs are the lowest functional capability or performance levels of equipment required for safe operation of the facility. When an LCO is not met, the licensee shall shutdown the facility or follow the remedial action permitted by the TSs. Section 50.36(c)(2)(ii) states that an LCO must be established for each item meeting one of four criteria:

> *Criterion 1.* Installed instrumentation that is used to detect, and indicate in the control room, a significant abnormal degradation of the reactor coolant pressure boundary.
>
> *Criterion 2.* A process variable, design feature, or operating restriction that is an initial condition of a design basis accident or transient analysis that either assumes the failure of or presents a challenge to fission product barrier integrity.
>
> *Criterion 3.* 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.
>
> *Criterion 4.* A structure, system, or component which operating experience or probabilistic safety assessment has shown to be significant to public health and safety.

The Final Policy Statement on TS Improvements for Nuclear Power Reactors, dated July 22, 1993, is published in the *Federal Register* (58 FR 39132). It established a set of objective criteria and guidance for determining which regulatory requirements and operating restrictions should be included in the TSs. These criteria were later codified in 10 CFR 50.36 as described above.

Section 50.36(c)(3) requires TSs to include surveillance requirements (SRs), which 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 LCOs will be met. Also, 10 CFR 50.36(a)(1) states that a summary statement of the bases or reasons for such specifications, other than those covering administrative controls, shall also be included in the application, but shall not become part of the TSs.

Guidance for NRC staff review of TSs is in Chapter 16, *Technical Specifications*, of NUREG 0800, Revision 3, *Standard Review Plan* (March 2010).[5] As described therein, the technical justification for proposed TS should be logical, complete and clearly written.

The ONS construction permits were issued on November 6, 1967, preceding the issuance of the General Design Criteria (GDC) specified in 10 CFR 50 Appendix A, and outlined below. Therefore, the proposed trip setpoint is intended to comply with principal design criteria (PDC) 6 and 14, which were developed in consideration of the seventy GDC for Nuclear Power Plant Construction Permits proposed by the Atomic Energy Commission (AEC) in a proposed rule-making published for 10 CFR Part 50 in the *Federal Register* on July 11, 1967. As discussed in Sections 3.1.6 and 3.1.14 of the ONS Update Final Safety Analysis Report (UFSAR), PDC 6 and 14 are comparable to GDC 10 and 20, respectively.

10 CFR Part 50, Appendix A, "General Design Criteria for Nuclear Power Plants," provides, in part, the necessary design, fabrication, construction, testing, and performance requirements for structures, systems, and components important to safety. Specifically:

GDC 10, *"Reactor design,"* requires the reactor core and associated coolant, control, and protection systems be designed with appropriate margin to assure that specified acceptable fuel design limits are not exceeded during any condition of normal operation, including the effects of anticipated operational occurrences, and

GDC 20, *"Protective system functions,"* requires the protection system be designed (1) to initiate automatically the operation of appropriate systems including the reactivity control systems, to assure that specified acceptable fuel design limits are not exceeded as a result of anticipated operational occurrences and (2) to sense accident conditions and to initiate the operation of systems and components important to safety.

3.0 TECHNICAL EVALUATION

3.1 Background

Each ONS unit is a Babcock & Wilcox (B&W) Pressurized Water Reactor, that has four RCPs with two reactor coolant loops. During normal operation, there are four RCPs operating. The main protection against a design thermal overpower condition is the Nuclear Overpower – High Setpoint trip (also, referred to simply as the "high flux trip") based on the measured out-of-core neutron leakage flux by the excore neutron detectors. The Nuclear Overpower – High Setpoint trip initiates a reactor trip (scram) when the neutron power reaches a predefined setpoint at the design overpower limit. Two other trips provide additional protection; the RCS Variable Low Pressure trip and the Nuclear Overpower Flux/Flow/Imbalance trip. Because thermal power lags the neutron power, tripping when the neutron power reaches the design overpower will limit thermal power to prevent exceeding acceptable fuel damage limits. Thus, the Nuclear Overpower – High Setpoint trip protects against violation of the departure from nucleate boiling ratio (DNBR) and fuel centerline melt safety limits. The role of the Nuclear Overpower – High Setpoint trip is to limit reactor thermal power below the highest power at which the other two trips are known to provide protection.

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[5] ADAMS Accession No. ML100351425.

The Nuclear Overpower – High Setpoint trip also provides transient protection for rapid positive reactivity excursions during power operations. These rapid positive reactivity excursion events include the rod withdrawal accident and the rod ejection accident. By providing a trip during these events, the Nuclear Overpower – High Setpoint trip protects each ONS unit from excessive power levels and also serves to limit reactor power to prevent violation of the RCS pressure Safety Limit.

While ONS normally operates with four RCPs, there may be a need to operate for a period of time with only three RCPs such as when one RCP is out of service for maintenance or repair. The existing overpower protection for three RCP operation at ONS is the Nuclear Overpower Flux/Flow/Imbalance trip. The Nuclear Overpower Flux/Flow/Imbalance trip function is a dynamic setpoint, based on the measured power and measured RCS flow rate, and protects against exceeding the DNBR limits and fuel centerline temperature limits. While the existing overpower protection is adequate, the proposed Nuclear Overpower – High Setpoint trip setpoint for three RCP operation provides improved protection for power excursion events initiated from three RCP operation.

Specifically, the proposed three RCP Nuclear Overpower – High Setpoint trip provides protection for the design thermal overpower condition based on the measured out of core neutron leakage flux. This trip initiates a reactor trip when the neutron power reaches a predefined setpoint at the design overpower limit. Similar to the existing Flux/Flow/Imbalance trip, this proposed trip protects against violations for DNBR and fuel centerline temperature limits. Additionally, this proposed trip would provide transient protection for rapid positive reactivity excursions during power operations.

3.2 Proposed Changes

As discussed above, the Licensee is proposing to change the ONS TS by adding a Nuclear Overpower – High Setpoint trip for three RCP operation. Specifically, the licensee requested the following changes to TS Table 3.3.1-1 and TS 3.4.4:

1. Table 3.3.1-1, "Reactor Protective System (RPS) Instrumentation" Function 1.a, Allowable Value

   <u>Current TS:</u>

   ≤ 105.5% RTP [Rated Thermal Power]

   <u>Proposed TS:</u>

   ≤ 105.5% RTP with four pumps operating and ≤ 80.5% RTP when reset for three pumps operating per LCO 3.4.4, "RCS Loops – MODES 1 and 2"

2. Table 3.3.1-1, "Reactor Protective System (RPS) Instrumentation" Surveillance Requirement (SR) 3.3.1.7

Current TS:

SR 3.3.1.7 is applicable to Function 1.a (Nuclear Overpower – High Setpoint) and requires periodic performance of a CHANNEL CALIBRATION.

Proposed TS:

The proposed change would add footnotes (d) and (e) to modify SR 3.3.1.7 as stated below:

(d) If the as-found channel setpoint is conservative with respect to the Allowable Value but outside its predefined as-found acceptance criteria band, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(e) The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the Nominal Trip Setpoint or a value that is more conservative than the Nominal Trip Setpoint; otherwise the channel shall be declared inoperable. The Nominal Trip Setpoint and the methodologies used to determine the predefined as-found acceptance criteria band and the as-left setpoint tolerance band are specified in the Selected Licensee Commitments Manual.

3. TS 3.4.4, RCS Loops – MODES 1 and 2

Current TS:

LCO 3.4.4 Two RCS Loops shall be in operation, with

a. Four reactor coolant pumps (RCPs) operating; or
b. Three RCPs operating and THERMAL POWER restricted to 75% RTP.

Proposed TS:

LCO 3.4.4. Two RCS Loops shall be in operation, with

a. Four reactor coolant pumps (RCPs) operating; or
b. Three RCPs operating and
    1. THERMAL POWER is ≤75% RTP; and
    2. LCO 3.3.1, "Reactor Protection System (RPS) Instrumentation," Function 1.a (Nuclear Overpower – High Setpoint), Allowable Value of Table 3.3.1-1 is reset for 3 RCPs operating.

Current TS:

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Requirements of LCO not met.	A.1 Be in MODE 3.	12 hours

Proposed TS:

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Requirements of LCO 3.4.4.b not met.	A.1 Reset the RPS to satisfy the requirements of LCO 3.4.4.b.2.	10 hours
B. Required Action and associated Completion Time of Condition A not met. OR Requirements of LCO not met for reasons other than Condition A.	B.1 Be in MODE 3.	12 hours

4. TS Bases

Attachment 4 to the licensee's application dated May 19, 2015, provided revised TS Bases pages to be implemented with the associated TS changes. These pages were provided for information only and will be revised by the licensee in accordance with the TS Bases Control Program.

3.3 Evaluation of Implementation of Nuclear Overpower – High Setpoint Trip

The proposed addition of a Nuclear Overpower – High Setpoint trip for three RCP operation is proposed to provide additional protection for several accident analyses, primarily the small steam line break (SSLB). During its review of the LAR, the NRC staff requested that the licensee provide a description of the accidents in the ONS UFSAR that were assumed to be initiated during three RCP operation and a brief description of the impact that implementation of the new three RCP setpoint trip would have on these accidents. The NRC staff reviewed the licensee's responses provided by letter dated February 26, 2016, and determined that the licensee identified the applicable accidents in the UFSAR that were assumed to be initiated during three RCP operation. The NRC staff also reviewed the description of the impact on those accidents and concludes that accidents initiated during three RCP operation will not be impacted or additional protection will be provided against such accidents.

For the SSLB accident, the limiting break for DNB is initiated from the three RCP operation. After the SSLB, the steam generator pressure will decrease and will cause the feedwater flow to increase and the main feedwater temperature to decrease. This will cause the RCS temperature to decrease and reactor power to increase. The decrease in RCS temperature will cause the density in the reactor coolant to increase which will indicate a larger than actual flow

causing the currently implemented flux/flow/imbalance setpoint to increase. This will either cause a delayed reactor trip or avoid a trip entirely. Additionally, the colder coolant in the downcomer masks the exterior power detectors, thus, the actual power in the core is higher than measured. Therefore, the currently implemented Nuclear Overpower – High Setpoint trip could not be exceeded and would not result in a reactor trip. For the current limiting SSLB for DNB for ONS, the limiting case is initiated from three RCP operation. Note that this LAR does not propose removal of the currently implemented flux/flow/imbalance setpoint.

The three RCP Nuclear Overpower – High Setpoint trip is a fixed neutron trip and it is similar to the currently implemented Nuclear Overpower – High Setpoint trip with the exception that it has a lower trip setpoint (80.5 percent vs. 105.5 percent). While the physical phenomena of the exterior power detectors would still be masked by the colder coolant in the downcomer, the lower setpoint for this trip would still be exceeded in the event of an SSLB, and result in a reactor trip.

For the NRC staff to evaluate the impact of implementing this new setpoint, the staff requested that the licensee estimate the time when the trip is expected to occur and the maximum actual power using the initial conditions from the current limiting SSLB case in the UFSAR. In its letter dated February 26, 2016, the licensee stated that for approximately the same break size/Moderator Temperature Coefficient (MTC) combination as the current UFSAR analysis, a reactor trip would occur at approximately 81 seconds and the maximum actual power would be approximately 102 percent RTP. This provides additional protection in comparison to the current UFSAR analysis which estimates reactor trip at 10 minutes and maximum actual core power of 118 percent RTP. Additionally, the licensee stated that the combination of break size/MTC that would provide the worst DNBR case with the proposed setpoint implemented would reach an actual core power of 109 percent RTP and the trip would occur at approximately 2 minutes. This case is an improvement when compared to the current UFSAR analysis.

Additionally, in order to evaluate what the limiting three RCP case would be once the new trip is implemented, the NRC staff requested that the licensee provide a determination as to whether or not changing any of the initial conditions relative to the initial conditions used in the limiting SSLB case in the UFSAR, including reactor power, would cause a significant delay or avoid exceeding the new trip setpoint completely and if such a case would be the limiting case. In its letter dated February 26, 2016, the licensee explained that it is possible to adjust the initial conditions, including power level, to delay or avoid exceeding the new trip setpoint; however the avoidance of the trip case is not expected to result in a worse minimum DNBR compared to a trip case. The licensee further stated that sensitivity studies are run varying the initial conditions in order to identify the worst case if a trip is avoided and a case where, if the trip occurs, the core power excursion is maximized. The licensee also explained why varying power level for these cases would not significantly impact the results. The NRC staff reviewed the response and concluded that the licensee has appropriately identified the limiting case and that it can be expected that the case where the core power excursion is maximized, if the trip occurs, will be limiting.

As stated in the LAR, the licensee uses an NRC-approved methodology to analyze the SSLB accident, as documented in DPC-NE-3005-PA, Revision 2, "USFAR Chapter 15 Transient

Analysis Methodology".[6] This methodology allows credit to be taken for all RPS trip functions. Thus, it will be acceptable to use the proposed three RCP Nuclear Overpower – High Setpoint trip for the SSLB accident to determine the limiting SSLB scenario.

Based on its review, the NRC staff determined that the implementation of the Nuclear Overpower – High Setpoint trip for three RCP operation will not adversely impact the accidents initiated from three RCP operation analyzed for ONS, particularly the SSLB accident. The NRC staff also determined that the current limiting case for the SSLB accident is initiated from three RCP operation and implementation of the new trip will provide additional protection to the three RCP case because the new trip for three RCP operation is a fixed setpoint and it is anticipated that it will be exceeded with a maximum RTP that is significantly less than that of the current analysis. This could provide additional DNB margin. Additionally, the currently implemented flux/flow/imbalance trip will remain in place and will continue to provide protection in addition to the new proposed trip once it is implemented. The NRC staff confirmed that this new trip adds additional diversity and defense-in-depth.

Since the implementation of the Nuclear Overpower – High Setpoint trip for three RCP operation will not adversely impact the design basis accidents, the NRC staff concludes that ONS continues to satisfy the requirement of 10 CFR 50.36 to have a structure, system, or component that is part of the primary success path and which functions or actuates to mitigate a design basis accident.

Therefore, the NRC staff concludes that PDC Criterion 6 and 14 which are comparable to GDC Criterion 10 and 20, are satisfied because the addition of the new trip will not adversely impact or will provide some additional margin to specified acceptable fuel design limits and the trip will initiate automatically to assure that specified acceptable fuel design limits are not exceeded.

3.4 Evaluation of Changes to TS Table 3.3.1-1, Function 1.a, Allowable Value

In its LAR, the licensee proposed changes to the ONS TS to add a specific fixed allowable value for the Nuclear Overpower – High Setpoint trip of less than or equal to 80.5 percent RTP (75 percent + 5.5 percent) when set for 3 RCP operation and requiring the reset of the allowable value within 10 hours. This change modifies the existing Nuclear Overpower – High Setpoint trip function allowable value in TS Table 3.3.1 to differentiate between a setpoint valid for 4 RCP operation (105.5 percent RTP) and 3 RCP operation (80.5 percent RTP). The change provides overpower protection when the plant is operating with three RCPs. The proposed change to the LCO meets Criterion 3 of 10 CFR 50.36(c)(2)(ii) by adding an additional trip setpoint for three RCP operation that is part of the primary success path 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. Note that a new trip function is not added, only a new setpoint.

As discussed above, providing a Nuclear Overpower – High Setpoint trip function for three RCP operation with an allowable value of 80.5 percent meets the criteria of PDC-14 (which is similar to GDC-20) and helps assure that specified acceptable fuel design limits are not exceeded such as the DNB. The NRC staff determined these TS changes are acceptable because the new

[6] ADAMS Accession No. ML051740156.

allowable value provides an absolute Nuclear Overpower – High Setpoint trip that can be actuated to cause a scram regardless of the transient or RCS flow conditions. In addition, the instrumentation providing the high flux trip also provides additional RCS protection than is provided by the slower acting Nuclear Overpower Flux/Flow Imbalance trip function. The 3 RCP operation high flux trip will provide protection for power excursion events initiated from 3 RCP operation, most notably the SSLB accident.

3.4.1 Accounting for Uncertainties and Allowance for Measurement Accuracy

A safety evaluation of the accuracy of instrument measured parameters often involves two practices: 1) accounting for the uncertainty in the ability to measure the physical process and the uncertainty in the calibration and accuracy of the measurement instruments, and 2) often applying a bounding conservative "uncertainty allowance" or margin for any limited ability to identify or understand the accuracy of the uncertainty itself. As such, the NRC staff requested that the licensee provide a discussion regarding the uncertainty analysis completed when determining the allowable value for the Nuclear Overpower – High Setpoint trip.

Neutron flux is measured by four excore neutron detectors [i.e., nuclear instrument (NI)] with one in each quadrant around the reactor pressure vessel. At ONS, these are Westinghouse uncompensated ion chambers (UCIC) with an upper chamber and a lower chamber that transmit separate analog signals.

3.4.1.1 Historical Perspective Helpful in Understanding the Basis for the Allowable Value

An example of the use of bounding conservative allowance for the ability to identify or understand the accuracy of the uncertainty itself can be seen in the historical development of the allowable value for the original 100 percent RTP high flux trip. While the reactor thermal power is limited to a nominally 100 percent RTP, the actual value the instrumentation bistable device is set to, in order to execute a reactor trip, is at a slightly higher trip setpoint. The licensee provided an example in its letter dated February 26, 2016, stating, in part, that:

> The original safety analysis trip setpoint methodology developed by Babcock & Wilcox (B&W) in the early 1970's (when Oconee was built) calculated the TS allowable value by starting from a design overpower value of 112% RTP and subtracting off various uncertainty allowances. The historical allowances included were:
>
> 2% for heat balance uncertainty
> 2% for transient excore neutron detector (NI) errors
> 2.5% for steady-state NI error and reactor trip bistable uncertainty
> =6.5% allowance
>
> TS allowable value = 112% RTP - 6.5% RTP = 105.5% RTP

Thus, a 5.5 percent RTP delta from 100 percent RTP. This same 5.5 percent RTP delta is simply added to the maximum power level allowed for three RCP operation (75 percent RTP). Adding 5.5 percent RTP to 75 percent RTP results in the proposed high flux trip allowable value of 80.5 percent RTP.

As stated in the LAR, the 80.5 percent RTP allowable value was chosen to maintain the delta between nominal 100 percent RTP and the current TS allowable value of 105.5 percent RTP. Further, in its letter dated August 20, 2015, the licensee stated, in part, that:

> This value is verified acceptable in the SSLB analysis initiated from three RCP operation.

3.4.1.2 Current Uncertainty Methods

In its letter dated August 20, 2015, the licensee stated, in part, that:

> The method described in the NRC-approved DPC-NE-3005-PA (Chapter 4), for performing Chapter 15 analyses specifies that the trip setpoint assumed in the analyses is the TS trip setpoint plus (or minus) an uncertainty to account for the trip setpoint uncertainty itself. Any uncertainty or adjustments in the signal that is used to compare to the setpoint is accounted for in the specific analysis, if applicable. For the SSLB DNB analyses, the Statistical Core Design (SCD) method is employed (NRC approved DPC-NE-2005-PA) which accounts for the various uncertainties in core power and RCS flow in the DNB limit itself. What is not accounted for in the SCD method is transient effects such as downcomer attenuation, which the SSLB RETRAN-3D analysis specifically accounts for as described in DPC-NE-3005-PA. As mentioned previously, reactor vessel downcomer attenuation affects the excore detector signal terms, it would be:
>
> $\Phi_m \geq \Phi_{sp}$ + trip setpoint uncertainty allowance
>
> Where Φ_m = flux measured at excore detectors adjusted for transient effects (e.g., downcomer attenuation) and excore detector calibration tolerances
> Φ_{sp} = Technical Specification allowable value trip setpoint
>
> Trip setpoint uncertainty = current analysis assumes 1.0% RTP for convenience since that is the old analog RPS trip bistable uncertainty and it bounds the uncertainty on the setpoint in the digital RPS. There is no uncertainty on the trip setpoint in the digital RPS.

In its letter dated February 26, 2016, the licensee stated, in part, that:

> When Duke Energy (DE) assumed responsibility for performing the safety analyses with the submission and acceptance of DPC-NE-3005, UFSAR Chapter 15 Transient Analysis Methodolgoy [sic], DE determined it was more appropriate to start with the TS allowable value for the high flux trip setpoint and account for the above uncertainties differently (see response to NRC Information Request 4 in letter dated August 20, 2015). Of the 6.5% original allowance, each accident analysis explicitly models the transient NI errors and the steady-state nuclear instrumentation (NI) error. The heat balance error is either accounted for in the initialization (non-statistical core design method) or in the DNBR limit itself (statistical core design method). The only remaining uncertainty that must be accounted for is the reactor trip bistable uncertainty (denoted in the digital RPS

> as the Processor Output Trip Device). The bistable uncertainty is what is referred to as the "trip setpoint uncertainty" in the equation given [in RAI-03]. As stated in the response to NRC Information Request 4 in DE letter dated August 20, 2015, the bistable is an analog component and the uncertainty allowance for it is 1.0% RTP. There is no uncertainty in the trip setpoint itself in the digital RPS.

Based on its review, the NRC staff concludes that the licensee's method for determining uncertainty in the calculation of the allowable value is reasonable because it bounds the old analog RPS trip bistable device uncertainty and the uncertainty of the setpoint in the digital RPS.

3.4.1.3 Total Loop Uncertainty and Allowance for Uncertainty in the Safety Analysis

As stated by the licensee, the total loop uncertainty (TLU) is not considered in the calculation of the current TS allowable value, but is useful in demonstrating the bounding of uncertainties by the uncertainty allowance and the allowable value. The allowable value should be greater than the maximum allowed power level (100 percent RTP) plus the TLU. The calculation of the TLU is applicable to all power levels since the calculation is performed in percent-span and converted to percent RTP and neither of these are changing.

The requested high flux trip setpoint function allowable value for three RCP operation of 80.5 percent RTP (75 percent RTP + 5.5 percent RTP) simply retained the uncertainty allowance of 5.5 percent RTP from the four RCP operation setpoint. To complete its review, the NRC staff requested that the licensee provide information (such as an uncertainty calculation) to demonstrate that instrument uncertainty has been accounted for in the establishment of this delta 5.5 percent uncertainty allowance for the three RCP operation. In its letter dated February 26, 2016, the licensee provided a detailed description of the NI neutron flux instrument measurement system (as discussed above), an analysis of the uncertainties (as also discussed above), and details of the TLU calculation. The licensee included a detailed calculation as an attachment to its letter, "Calculation of Total Loop Uncertainty in the High Flux RPS Trip Function."

The NRC staff evaluated the information provided by the licensee and found the methods acceptable in accounting for or bounding uncertainties in the measurement system. These calculations showed a total combined uncertainty for TLU of plus or minus 2.32 percent RTP plus the NI calibration tolerance of plus or minus 2 percent RTP resulting in an uncertainty value of plus or minus 4.32 percent RTP.

This total combined uncertainty of 4.32 percent RTP is bounded by the 5.5 percent RTP margin in the current TS allowable value for four RCP operation (105.5 percent RTP) and the proposed TS allowable value for three RCP operation (80.5 percent RTP).

As stated by the licensee in its letter dated February 26, 2016:

> The total allowance for uncertainty used in the safety analyses for the high flux trip setpoint is:

Heat Balance Allowance = 2.0% RTP
+ NI Calibration Allowance = 2.0% RTP
+ Processor Output Trip Device (formerly known as the bistable) allowance = 1.0% RTP
+ Transient specific allowance = accounted for in the transient itself
Total Allowance = 5% RTP + transient specific effects

This 5% RTP allowance is larger than the high flux trip function TLU of 2.32% RTP + NI calibration allowance of 2.0% RTP (= 4.32% RTP) and confirms that a conservative high flux trip setpoint has been selected.

3.4.1.4 NRC Staff Conclusion Regarding the Uncertainty Calculation

The NRC staff concludes that the licensee's uncertainty calculation meets the criteria of PDC-6 (GDC-10) because the calculation confirms that a conservative high flux trip setpoint has been selected such that the protection systems provided by the fixed high flux trip instrumentation and setpoints have been designed with appropriate margin (i.e., uncertainty allowance greater than the calculated accuracy of the measurement instrumentation).

3.4.2 Evaluation of Technical Specification Changes

10 CFR 50.36(c)(2)(i) requires that TSs include LCOs, which are the lowest functional capability or performance levels of equipment required for safe operation of the facility. An Allowable Value for the Nuclear Overpower – High Setpoint for three RCP operation is being added to Function 1.a in Table 3.3.1-1. The NRC staff requested clarification from the licensee regarding which of the four Criteria in 10 CFR 50.36(c)(2)(ii) are met by the new Allowable Value. In the response dated August 20, 2015, the licensee stated that the new value meets Criterion 3, which applies to 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 barrier. The licensee stated that the proposed trip setpoint provides improved protection for power excursion events initiated from three RCP operation. The NRC staff determined that the licensee's assessment is acceptable, and that the additional Allowable Value in Table 3.3.1-1 is appropriate. The NRC staff concludes that TS Table 3.3.1-1 continues to specify the lowest performance level of equipment required for safe operation and that TS Table 3.3.1-1, as revised, continues to comply with 10 CFR 50.36(c)(2)(i).

3.4.3 NRC Staff Conclusion Regarding Changes to TS Table 3.3.1-1, Function 1.a, Allowable Value

As described above, the NRC staff determined that the Allowable Value of 80.5 percent RTP for the Nuclear Overpower – High Setpoint trip for three RCP operation is acceptable. As further described above, the NRC staff determined that TS Table 3.3.1-1 will continue to comply with 10 CFR 50.36(c)(2)(i). Therefore, the NRC staff concludes that the proposed changes to the TS Table 3.3.1-1, Function 1.a, Allowable Value are acceptable.

3.5 Evaluation of Changes to TS Table 3.3.1-1, SR 3.3.1.7

In its LAR, the licensee proposed changes to the ONS TS to add a specific fixed allowable value for the Nuclear Overpower – High Setpoint trip of less than or equal to 80.5 percent RTP when set for 3 RCP operation. Included in this change are the addition of two footnotes to SR 3.3.1.7, in TS Table 3.3.1-1. These footnotes incorporate applicable aspects of TSTF-493, Option A.

3.5.1 Evaluation of Implementation of TSTF-493, Option A

NRC policy expectations are that any facility making changes to the TS Section 3.3 after the notice of availability is expected to implement TSTF-493, Revision 4.[7] TSTF-493 provides two options for implementation, Option A or B. Specifically, for the addition of new instrumentation, parameters, or modifications to trip points, the requirements of TSTF-493, either Option A or B will be implemented. Under Option A, surveillance notes are added to certain required TS instrumentation functions and licensees can make changes to single or multiple setpoint values. Option A also allows the surveillance notes to be applied without making changes to setpoint values.

In its LAR the licensee requested to implement TSTF-493, Option A by adding Notes (d) and (e) to TS Table 3.3.1-1 that are applicable to Function 1a, the Nuclear Overpower - High Setpoint trip function.

In the "Surveillance Requirements" column for Function 1.a, SR 3.3.1.7 is modified, as stated above, by the addition of two notes, (d) and (e), as follows:

(d) If the as-found channel setpoint is conservative with respect to the Allowable Value but outside its predefined as-found acceptance criteria band, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(e) The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the Nominal Trip Setpoint or a value that is more conservative than the Nominal Trip Setpoint; otherwise the channel shall be declared inoperable. The Nominal Trip Setpoint and the methodologies used to determine the predefined as-found acceptance criteria band and the as-left setpoint tolerance band are specified in the Selected Licensee Commitments Manual.

The NRC staff reviewed this change and determined that it is acceptable because the inclusion of these notes is consistent with TSTF-493, Option A. The NRC staff confirmed that the wording of the two notes matches the phrases of the two notes in TSTF-493, Option A. The NRC staff further determined that application of the surveillance notes to only the Nuclear Overpower - High trip setpoints for four and 3 RCPs operating is consistent with TSTF-493, Revision 4, Option A and is, therefore, acceptable.

Footnote (d) requires evaluation of channel performance for the instrumentation condition where the "as-found" setting for the trip function channel setpoint is outside its "as-found" tolerance but conservative with respect to the allowable value. Evaluation of trip function channel

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[7] 75 FR 26294 dated May 11, 2010.

performance will verify that the instrument will continue to behave in accordance with safety analysis assumptions and the trip function channel performance assumptions in the setpoint methodology. The purpose of this assessment is to ensure confidence in the trip function channel performance prior to returning the channel to service.

Footnote (e) requires that the "as-left" setting for the trip function channel be returned to within the "as-left tolerance" of the Nominal Trip Setpoint (NTSP). Where a setpoint more conservative than the NTSP is used in the plant surveillance procedures, the "as left" and "as-found" tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the "as-left" trip function channel setting cannot be returned to a setting within the "as-left" tolerance of the NTSP, then the channel shall be declared inoperable.

This footnote also requires that the NTSP and the procedure containing the methodologies for calculating the "as-left" and the "as-found" tolerances be specifically listed by title. ONS TS Table 3.3.1-1 Note (e) identifies that the methodology is specified in the Selected Licensee Commitments Manual.

Further, the NRC staff determined that the TS changes associated with the implementation of TSTF-493, Option A will provide additional assurance that the trip function instrumentation setpoints for the Nuclear Overpower – High Setpoint trip function are maintained consistent with the setpoint methodology to ensure the required automatic trips and safety feature actuations occur such that the safety limits are not exceeded. Therefore, the NRC staff determined that the proposed changes to TS Table 3.3.1-1 meets the criteria of TSTF-493, Option A and is, therefore, acceptable.

3.5.2 Assuring a Safe Change in the High Flux Trip Setpoint

To complete its review, the NRC staff requested that the licensee identify and describe the procedure that will be used by control room operators to manually insert the high flux trip setpoint when going from four RCP operation to three RCP operation, and to describe how this procedure accomplishes the setpoint changes to avoid overpower operation or spurious trips.

The licensee provided its response by letter dated August 20, 2015, stating, in part, that:

> If a condition arises which requires Operations to reduce reactor power on an operating unit so that a reactor coolant pump can be shutdown, Operations procedural guidance (OP/1,2,3/A/1102/004 - Operation at Power) triggers a notification to maintenance personnel to change the RPS high flux trip set point from the four RCP value to the three RCP value. This is done following power reduction and shutdown of the problematic RCP. A maintenance procedure (AM/1,2,3/A/0315/017 - TXS RPS Channels A, B, C, and D Parameter Changes For Abnormal/Normal Operating Conditions) is utilized to perform the following action one RPS channel at a time. The RPS is a digital system. From the RPS service unit, a graphical service monitor screen which has design features specific to changing the high flux trip set point is used to lower the high flux set point to the required three RCP value.

> When conditions permit returning to four RCP operation, the fourth RCP is placed in service, the high flux trip set point for each RPS channel is changed to the four RCP value via Operations notification to Maintenance who use the same Maintenance procedure to change the set point, and then escalation to full power operation is allowed.

The NRC staff reviewed the licensee's response and determined that it is acceptable because a specific procedure was identified and the method that would be used to assure the correct value for the trip setpoint is entered. The four RCP high flux trip set point allowable value would be entered prior to escalation to full power operation with the fourth RCP. Further, the NRC staff noted the use of a commonly accepted instrument and controls (I&C) safety practice in the use of a RPS service unit, a graphical service monitor screen which has design features specific to changing the high flux trip set point (high flux trip set point allowable value) one RPS channel at a time. This safety practice helps significantly reduce the probably of human error in the process of resetting the trip setpoint.

3.5.3 Evaluation of Technical Specification Changes

Section 50.36(c)(3) requires TSs to include items in the category of SRs, which 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 LCOs will be met. Two footnotes are proposed to be added to SR 3.3.1.7. These footnotes incorporate applicable aspects of TSTF-493, Option A, as discussed above.

TSTF-493 is intended to revise the TS by adding requirements to assess channel performance during testing that verifies instrument channel setting values established by the plant-specific setpoint methodology(ies). In accordance with the current guidance as described in the letter to the Technical Specifications Task Force, dated March 09, 2009,[8] licensees seeking amendments to setpoints that are within the scope of TSTF-493 are expected to adopt the setpoint footnotes.

The NRC staff determined that the Allowable Value for Function 1.a is within the scope of TSTF-493, and addition of the Footnotes is appropriate. The NRC staff further determined that this is an acceptable change to the SRs, and the SRs as modified continue to be appropriate to assure the necessary quality of systems and components is maintained, and thus meets the requirements of 10 CFR 50.36(c)(3).

3.5.4 NRC Staff Conclusion Regarding Changes to TS Table 3.3.1-1, SR 3.3.1.7

As discussed above, the NRC staff concludes that the proposed changes to TS Table 3.3.1-1, SR 3.3.1.7, meet TSTF-493, Option A. The NRC staff also determined that the licensee has an acceptable procedure in place that will be used by control room operators to manually insert the high flux trip setpoint when going from four RCP operation to three RCP operation. Further, the NRC staff concludes that the proposed changes to TS Table 3.3.1-1, SR 3.3.1.7 meets the requirements of 10 CFR 50.36(c)(3). Therefore, the NRC staff concludes that the proposed changes are acceptable.

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[8] ADAMS Accession No. ML090560592.

3.6 Evaluation of Changes to TS LCO 3.4.4

In its LAR, the licensee proposed changes to TS LCO 3.4.4 to include a requirement that the Allowable Value for the Nuclear Overpower – High Setpoint trip is reset to the allowable value of less than or equal to 80.5 percent RTP, when there are three RCPs operating and THERMAL POWER is less than or equal to 75 percent RTP. Further, the licensee proposed to revise the LCO Actions to require that with the requirements of LCO 3.4.4.b not met, the RPS be reset to satisfy the requirements of LCO 3.4.4.b.2 within 10 hours, and that if this Action and Completion Time are not met, or if the LCO is not met for other reasons, the plant be placed in Mode 3 within 12 hours.

3.6.1 Completion Time for Setting and Resetting the Trip Setpoint

As discussed above, the licensee proposed a new TS 3.4.4 Condition A which allows 10 hours to reset the RPS to satisfy the requirements of LCO 3.4.4.b.2, which must be done manually. In its LAR, the licensee referenced, as a precedent, the current Davis-Besse Nuclear Power Station, Unit 1 (Davis-Besse) TS 3.3.1 and 3.4.4, which includes a three RCP trip setpoint and a similar Completion Time for resetting the trip setpoint. To complete its review, the NRC staff requested that the licensee provide additional specific factors, other than the Davis-Besse precedent discussed above, that were considered in the bases for the selection of a 10-hour Completion Time.

In its letter dated February 26, 2016, the licensee responded, stating, in part, that:

> One of the situations which could result in three RCP operation is one in which the plant is initially operating at 100% power with four RCPs in service. An equipment issue is then encountered with one of the RCPs which requires Operations personnel to reduce power in a timely manner to remove the problematic RCP from service. This places the plant at approximately 75% power with three RCPs in service and the Reactor Protective System (RPS) Nuclear Overpower-High Setpoint Trip still at the four RCP value. If this situation occurs outside normal dayshift work hours, qualified maintenance personnel may not be available on site. This would require qualified maintenance personnel to be contacted to come to the site to perform the setpoint change. Once qualified personnel are on site, the needed personnel must obtain needed procedures, work order, and clearances to begin work. The setpoint changes are then implemented by Operations personnel placing each RPS channel in Manual Bypass one at a time, Maintenance personnel performing the change to the Nuclear Overpower-High Trip Setpoint from the Engineered Safeguards/Reactor Protective System (ES/RPS) Service Unit interface for the digital system, and then Operations removing the affected RPS channel from Manual Bypass so that work on the next channel can begin. These needed actions account for the requested 10-hour Completion Time.

The NRC staff reviewed the licensee's response and determined that the 10-hour Completion Time is acceptable because this time period allows a reasonable time to reset the trip setpoint in an orderly manner and without challenging safety systems. This includes consideration of a conservative time period to perform the procedure without undue pressure on the plant staff that

could increase the probability of human error, time to arrange the work and gather the qualified personnel, equipment, and conduct a pre-job briefing. Use of only three RCPs is not usually considered a routine operational method that could be planned in advance and the 10-hour Completion Time would allow for preparation prior to removing a RCP from service.

3.6.2 Evaluation of Technical Specification Changes

Section 50.36(c)(2)(i) requires that TSs include LCOs, which are the lowest functional capability or performance levels of equipment required for safe operation of the facility. When an LCO is not met, the licensee shall shutdown the facility or follow the remedial action permitted by the technical specifications.

TS LCO 3.4.4 would be revised to include a requirement that the Allowable Value for Nuclear Overpower – High Setpoint is reset for three RCPs operating when there are three RCPs operating. The Actions would be revised to require that if the requirements of LCO 3.4.4.b are not met, the RPS be reset to satisfy the requirements of LCO 3.4.4.b.2 within 10 hours, and if this Action and Completion Time are not met, or if the LCO is not met for other reasons, the plant be placed in Mode 3 within 12 hours. The NRC staff determined that the additional requirement to have the Nuclear Overpower – High Setpoint reset for three RCPs operating appropriately reflects the addition of the new Allowable Value in Table 3.3.1-1. The new Condition A contains a 10-hour Completion Time to reset to the new Allowable Value when only three RCPs are operating. The NRC staff requested additional information on the basis for this 10-hour Completion Time. As described in Section 3.6.1 of this safety evaluation, the NRC staff determined that this Completion Time is acceptable. The new Condition B expands the existing requirement to place the plant in Mode 3 within 12 hours if the LCO is not met. The Condition is expanded to include that same requirement if the Condition A Required Actions and Completion Time are not satisfied. The NRC staff determined that this is an appropriate remedial measure if the LCO is not met for three RCP operation. The NRC staff further determined that LCO 3.4.4 continues to specify the lowest performance level of equipment required for safe operation of the facility and that the revised Actions and Completion Times provide the appropriate remedial measures to be taken in the event the LCO is not met. Therefore, the NRC staff has determined that LCO 3.4.4, as revised, continues to meet 10 CFR 50.36(c)(2)(i) and is, therefore, acceptable.

3.6.3 NRC Staff Conclusion Regarding Changes to TS LCO 3.4.4

As discussed above, the NRC staff determined that the changes to TS LCO 3.4.4 will continue to meet the requirements of 10 CFR 50.36(c)(2)(i). The NRC staff further determined that the 10-hour completion time associated with Action A of TS LCO 3.4.4 is acceptable. Therefore, the NRC staff concludes that the proposed changes to TS LCO 3.4.4 are acceptable.

3.7 Technical Conclusion

The NRC staff determined that the proposed use of a specific Nuclear Overpower – High Setpoint trip for three RCP operation is acceptable because it meets the requirements of 10 CFR 50.36(c)(2)(ii). The NRC staff has further determined that the proposed change meets the requirements of PDC 6 and 14, which are comparable to GDC-20, and GDC-10 in providing a fixed absolute setpoint that can be actuated regardless of the transient or RCS flow conditions

based on the direct fast response from the excore neutron detectors including a bounding uncertainty allowance for measurement instrumentation and calibration uncertainties. Further, the NRC staff has determined that the criteria of TSTF-493, Option A, including the two specified notes, which are to be implemented in accordance with the NRC policy on TSTF-493 applicable to the Nuclear Overpower High Flux Trip function, are met. Therefore, as discussed above, the NRC staff concludes that the changes to the ONS TSs are acceptable.

4.0 STATE CONSULTATION

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

5.0 ENVIRONMENTAL CONSIDERATION

The amendments change a requirement with respect to the installation or use of facility components located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendments involve 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 amendments involve no significant hazards consideration, and there has been no public comment on such finding in the *Federal Register* on October 27, 2015 (80 FR 65810). Accordingly, the amendments meet 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 amendments.

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) there is reasonable assurance that 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.

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Date: April 29, 2016

If you have any questions regarding this matter, I may be reached at (301) 415-4090 or by e-mail at jeffrey.whited@nrc.gov.

Sincerely,

/RA/

Jeffrey A. Whited, Project Manager
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-269, 50-270, and 50-287

Enclosures:
1. Amendment No. 397
   to RFOL DPR-38
2. Amendment No. 399
   to RFOL DPR-47
3. Amendment No. 398
   to RFOL DPR-55
4. Safety Evaluation

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