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

June 21, 2016

Mr. Steven D. Capps
Vice President
Duke Energy Carolinas, LLC
McGuire Nuclear Station
12700 Hagers Ferry Road
Huntersville, NC 28078-8985

SUBJECT: MCGUIRE NUCLEAR STATION, UNITS 1 AND 2 - ISSUANCE OF AMENDMENTS REGARDING REVISION OF TECHNICAL SPECIFICATION 3.3.1 (CAC NOS. MF6464 AND MF6465)

Dear Mr. Capps:

The Commission has issued the enclosed Amendment No. 287 to Renewed Facility Operating License No. NPF-9 and Amendment No. 266 to Renewed Facility Operating License No. NPF-17 for the McGuire Nuclear Station, Units 1 and 2, respectively, in response to your application dated July 9, 2015, as supplemented by letter dated January 7, 2016.

The amendments revise Technical Specification 3.3.1, "Reactor Trip System (RTS) Instrumentation," to resolve an operable but degraded non-conforming issue associated with the reactor coolant pump underfrequency trip setpoint allowable value for the McGuire Nuclear Station, Units 1 and 2. The amendments also revise the allowable value for Function 11 and incorporate Option A of Technical Specification Task Force (TSTF) Traveler TSTF-493, Revision 4, "Clarify Application of Setpoint Methodology for LSSS [Limiting Safety System Setpoint] Functions," calibration requirements for Functions 11 and 12 within Table 3.3.1-1, Reactor Trip System Instrumentation. The changes are required to resolve a latent design error, which resulted when the RCP underfrequency and undervoltage relays were replaced with more accurate relays.

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

If you have any questions, please contact me at 301-415-2481 or Ed.Miller@nrc.gov.

Sincerely,

Karen Cotton Gross for

G. Edward Miller, Project Manager
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-369 and 50-370

Enclosures:
1. Amendment No. 287 to NPF-9
2. Amendment No. 266 to NPF-17
3. Safety Evaluation

cc w/enclosures: Distribution via Listserv

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

DUKE ENERGY CAROLINAS, LLC

DOCKET NO. 50-369

MCGUIRE NUCLEAR STATION, UNIT 1

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 287
Renewed License No. NPF-9

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

   A. The application for amendment to the McGuire Nuclear Station, Unit 1 (the facility), Renewed Facility Operating License No. NPF-9, filed by the Duke Energy Carolinas, LLC (licensee), dated July 9, 2015, as supplemented by letter dated January 7, 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 2.C.(2) of Renewed Facility Operating License No. NPF-9 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 287, are hereby incorporated into this renewed operating license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of its date of issuance and shall be implemented within 60 days of issuance.

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 the Facility Operating
License and Technical Specifications

Date of Issuance: June 21, 2016

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

DUKE ENERGY CAROLINAS, LLC

DOCKET NO. 50-370

MCGUIRE NUCLEAR STATION, UNIT 2

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 266
Renewed License No. NPF-17

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

   A. The application for amendment to the McGuire Nuclear Station, Unit 2 (the facility), Renewed Facility Operating License No. NPF-17, filed by the Duke Energy Carolinas, LLC (the licensee), dated July 9, 2015, as supplemented by letter dated January 7, 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 2.C.(2) of Renewed Facility Operating License No. NPF-17 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 266, are hereby incorporated into this renewed operating license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of its date of issuance and shall be implemented within 60 days of issuance.

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 the Facility Operating
License and Technical Specifications

Date of Issuance: June 21, 2016

ATTACHMENT TO LICENSE AMENDMENT NO. 287

RENEWED FACILITY OPERATING LICENSE NO. NPF-9

DOCKET NO. 50-369

AND

LICENSE AMENDMENT NO. 266

RENEWED FACILITY OPERATING LICENSE NO. NPF-17

DOCKET NO. 50-370

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	Insert
License Pages NPF-9: 3 NPF-17: 3	License Pages NPF-9: 3 NPF-17: 3
TS Page 3.3.1-16	TS Page 3.3.1-16

(4) Pursuant to the Act and 10 CFR Parts 30, 40 and 70, to receive, possess and use in amounts as required any byproduct, source or special nuclear material without restriction to chemical or physical form, for sample analysis or instrument calibration or associated with radioactive apparatus or components;

(5) Pursuant to the Act and 10 CFR Parts 30, 40 and 70, to possess, but not separate, such byproducts and special nuclear materials as may be produced by the operation of McGuire Nuclear Station, Units 1 and 2, and;

(6) Pursuant to the Act and 10 CFR Parts 30 and 40, to receive, possess and process for release or transfer such byproduct material as may be produced by the Duke Training and Technology Center.

C. This renewed operating 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

The licensee is authorized to operate the facility at a reactor core full steady state power level of 3469 megawatts thermal (100%).

(2) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 287, are hereby incorporated into this renewed operating license. The licensee shall operate the facility in accordance with the Technical Specifications.

(3) Updated Final Safety Analysis Report

The Updated Final Safety Analysis Report supplement submitted pursuant to 10 CFR 54.21(d), as revised on December 16, 2002, describes certain future activities to be completed before the period of extended operation. Duke shall complete these activities no later than June 12, 2021, and shall notify the NRC in writing when implementation of these activities is complete and can be verified by NRC inspection.

The Updated Final Safety Analysis Report supplement as revised on December 16, 2002, described above, shall be included in the next scheduled update to the Updated Final Safety Analysis Report required by 10 CFR 50.71(e)(4), following issuance of this renewed operating license. Until that update is complete, Duke may make changes to the programs described in such supplement without prior Commission approval, provided that Duke evaluates each such change pursuant to the criteria set forth in 10 CFR 50.59 and otherwise complies with the requirements in that section.

(4) Pursuant to the Act and 10 CFR Parts 30, 40 and 70, to receive, possess and use in amounts as required any byproduct, source or special nuclear material without restriction to chemical or physical form, for sample analysis or instrument calibration or associated with radioactive apparatus or components;

(5) Pursuant to the Act and 10 CFR Parts 30, 40 and 70, to possess, but not separate, such byproducts and special nuclear materials as may be produced by the operation of McGuire Nuclear Station, Units 1 and 2; and,

(6) Pursuant to the Act and 10 CFR Part 30 and 40, to receive, possess and process for release or transfer such byproduct material as may be produced by the Duke Training and Technology Center.

C. This renewed operating 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

The licensee is authorized to operate the facility at a reactor core full steady state power level of 3,469 megawatts thermal (100%).

(2) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 266, are hereby incorporated into this renewed operating license. The licensee shall operate the facility in accordance with the Technical Specifications.

(3) Updated Final Safety Analysis Report

The Updated Final Safety Analysis Report supplement submitted pursuant to 10 CFR 54.21(d), as revised on December 16, 2002, describes certain future activities to be completed before the period of extended operation. Duke shall complete these activities no later than March 3, 2023, and shall notify the NRC in writing when implementation of these activities is complete and can be verified by NRC inspection.

The Updated Final Safety Analysis Report supplement as revised on December 16, 2002, described above, shall be included in the next scheduled update to the Updated Final Safety Analysis Report required by 10 CFR 50.71(e)(4), following issuance of this renewed operating license. Until that update is complete, Duke may make changes to the programs described in such supplement without prior Commission approval, provided that Duke evaluates each such change pursuant to the criteria set forth in 10 CFR 50.59, and otherwise complies with the requirements in that section.

Table 3.3.1-1 (page 3 of 7)
Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
9. Pressurizer Water Level - High	1(f)	3	M	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10	≤ 93%	92%
10. Reactor Coolant Flow - Low						
a. Single Loop	1(g)	3 per loop	N	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.16	≥ 87%	88%
b. Two Loops	1(h)	3 per loop	M	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.16	≥ 87%	88%
11. Undervoltage RCPs	1(f)	1 per bus	M	SR 3.3.1.9 SR 3.3.1.10(j)(k) SR 3.3.1.16	≥ 4870 V	5082 V
12. Underfrequency RCPs	1(f)	1 per bus	M	SR 3.3.1.9 SR 3.3.1.10(j)(k) SR 3.3.1.16	≥ 55.9 Hz	56.4 Hz
13. Steam Generator (SG) Water Level - Low Low	1,2	4 per SG	E	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.16	≥ 15%	16.7%
14. Turbine Trip						
a. Low Fluid Oil Pressure	1(g)	3	O	SR 3.3.1.10 SR 3.3.1.15	≥ 42 psig	45 psig
b. Turbine Stop Valve Closure	1(g)	4	P	SR 3.3.1.10 SR 3.3.1.15	≥ 1% open	≥ 1% open
15. Safety Injection (SI) Input from Engineered Safety Feature Actuation System (ESFAS)	1,2	2 trains	Q	SR 3.3.1.5 SR 3.3.1.14	NA	NA

(continued)

(f) Above the P-7 (Low Power Reactor Trips Block) interlock.
(g) Above the P-8 (Power Range Neutron Flux) interlock.
(h) Above the P-7 (Low Power Reactor Trips Block) interlock and below the P-8 (Power Range Neutron Flux) interlock.
(j) If the as-found channel setpoint is outside its predefined as-found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.
(k) The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the NTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (field setting) to confirm channel performance. The methodologies used to determine the as-found and the as-left tolerances are specified in the UFSAR.

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO

AMENDMENT NO. 287 TO RENEWED FACILITY OPERATING LICENSE NO. NPF-9

AND

AMENDMENT NO. 266 TO RENEWED FACILITY OPERATING LICENSE NO. NPF-17

DUKE ENERGY CAROLINAS, LLC

MCGUIRE NUCLEAR STATION, UNITS 1 AND 2

DOCKET NOS. 50-369 AND 50-370

1.0 INTRODUCTION

By application dated July 9, 2015, as supplemented by letter dated January 7, 2016 (Agencywide Documents Access and Management System Accession Nos. ML15198A151 and ML16022A179, respectively), Duke Energy Carolinas, LLC (the licensee) requested changes to the Technical Specifications (TSs) for the McGuire Nuclear Station, Units 1 and 2 (McGuire 1 and 2). The supplemental letter dated January 7, 2016, provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the staff's original proposed no significant hazards consideration determination as published the *Federal Register* on October 13, 2015 (80 FR 61479).

The proposed changes would revise TS 3.3.1, "Reactor Trip System (RTS) Instrumentation," to resolve an operable but degraded non-conforming issue associated with the reactor coolant pump underfrequency trip setpoint allowable value (AV) for McGuire 1 and 2. The proposed changes would also revise the allowable value for Function 11 and incorporate Option A of Technical Specification Task Force (TSTF) Traveler TSTF-493, Revision 4, "Clarify Application of Setpoint Methodology for LSSS [Limiting Safety System Setpoint] Functions," calibration requirements for Functions 11 and 12 within Table 3.3.1-1, Reactor Trip System Instrumentation.

2.0 REGULATORY EVALUATION

The U.S. Nuclear Regulatory Commission (NRC or the Commission) staff reviewed the proposed TS changes described in Section 1.0 of this safety evaluation (SE), against the regulatory requirements and guidance listed in Sections 2.1 and 2.2 of this SE, to ensure there is reasonable assurance that the systems and components affected by the proposed TS changes will perform their safety functions.

2.1 Regulatory Requirements

The staff considered the following regulatory requirements:

Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities," Appendix A, "General Design Criteria for Nuclear Power Plants," provides criteria for the necessary design, fabrication, construction, testing, and performance requirements for structures, systems, and components important to safety.

General Design Criterion (GDC) 13, "Instrumentation and control," of Appendix A to 10 CFR Part 50 requires, in part, that instrumentation be provided to monitor variables and systems over their anticipated ranges for normal operation, for anticipated operational occurrences, and for accident conditions, as appropriate, to assure adequate safety, and that appropriate controls be provided to maintain these variables and systems within prescribed operating ranges.

GDC 20, "Protection system functions," of Appendix A, to 10 CFR Part 50 requires, in part, that the protection system be designed to initiate automatically the operation of appropriate systems to assure that specified acceptable fuel design limits are not exceeded as a result of anticipated operational concurrences.

In 10 CFR Section 50.36, "Technical specifications," the Commission established its regulatory requirements related to the contents of the TSs. Specifically, 10 CFR 50.36(a)(1) states that, "Each applicant for a license authorizing operation of a production or utilization facility shall include in his application proposed technical specifications in accordance with the requirements of this section."

Paragraph (c)(1)(ii)(A) of 10 CFR 50.36 requires, in part, that where a limiting safety system setting is specified for a variable on which a safety limit has been placed, the setting be so chosen that automatic protective action will correct the abnormal situation before a safety limit is exceeded.

Paragraph (c)(3) of 10 CFR 50.36 states that surveillance requirements 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.

The NRC staff reviewed the adequacy of the proposed AV change to Function 11, "Undervoltage RCPs [Reactor Coolant Pumps]," against these requirements to assure that there is reasonable assurance that the instrumentation will perform its required safety functions.

2.2 Regulatory Guidance

The staff considered the regulatory guidance provided in Regulatory Guide (RG) 1.105, "Setpoints for Safety-Related Instrumentation," Revision 3, which provides a basis for establishing setpoints for nuclear instrumentation for safety systems.

This RG endorses Part I of ISA-67.04-1994, "Setpoints for Nuclear Safety-Related Instrumentation," subject to NRC staff clarifications. This RG, however, does not address or endorse Part II of ISA-RP67.04-1994, "Methodologies for the Determination of Setpoints for the Nuclear Safety-Related Instrumentation."

Additionally, Regulatory Issue Summary (RIS) 2006-17, "NRC Staff Position on the Requirements of 10 CFR 50.36, 'Technical Specifications,' Regarding Limiting Safety System Settings During Periodic Testing and Calibration of Instrument Channels," discusses issues that could occur during testing of Limiting Safety System Settings and that, therefore, may have an adverse effect on equipment operability.

3.0 TECHNICAL EVALUATION

3.1 System Description

3.1.1 RCP Undervoltage Trip

In its letter dated July 9, 2016, the licensee states that the RCP undervoltage reactor trip function ensures that protection is provided against violating the departure from nucleate boiling ratio (DNBR) limit due to a loss of flow in two or more reactor coolant system loops, which can result from loss of voltage to the RCPs (e.g., from a station blackout).

There is one undervoltage sensing monitor connected to the motor side of each RCP breaker. These adjustable monitors provide an output signal when the voltage goes below approximately 60-80 percent of normal operating voltage. Signals from monitors connected to any two of the pumps (time delayed up to approximately 0.7 seconds to prevent spurious trips caused by short-term voltage perturbations) trip the reactor if the power level is above the P-7 permissive.

3.1.2 RCP Underfrequency Trip

The RCP underfrequency reactor trip function ensures that protection is provided against violating the DNBR limit due to a loss of flow in two or more RCS loops resulting from bus underfrequency (e.g., from a power grid frequency disturbance). An underfrequency condition on the RCP busses reduces the speed of the pumps (with a subsequent reduction in flow). This undesirable effect reduces the coastdown time of the pumps if power is lost to the busses.

One underfrequency sensing monitor is connected to each RCP bus. Signals from monitors connected to any two of the buses (time delayed up to approximately 0.2 seconds to prevent spurious trips caused by short-term frequency perturbations) will cause a direct trip of the reactor if the power level is above the P-7 permissive. An underfrequency condition will trip the RCP breakers at any power level.

3.2 Description of Proposed Changes

The license amendment request (LAR) proposes to revise the McGuire 1 and 2 TSs as follows:

1. Revise the current AV for Function 11, "Undervoltage RCPs," of Table 3.3.1-1 from ≥ 5016 volts (V) to ≥ 4870 V.

The staff's evaluation of this change is contained in Section 3.3.3.2 of this SE.

2. Modify Table 3.3.1-1 to add Technical Specification Task Force (TSTF) Improved Standard Technical Specifications Change Traveler TSTF-493, Rev. 4, "Clarify Applications of Setpoints Methodology for LSSS Functions," related notes (j) and (k) to the Surveillance Requirement 3.3.1.10 reference for Functions 11 and 12, "Undervoltage RCPs," and "Underfrequency RCPs," respectively.

   The staff's evaluation of this change is contained in Section 3.3.4 of this SE.

3.3 Setpoint Methodology

The licensee stated in the LAR dated July 9, 2015, that the existing TS AV for the prior model relays was based on the original Westinghouse setpoint methodology. When the licensee prepared a revision to the setpoint calculation for the more precise replacement relays using the original setpoint methodology, it concluded that the existing TS RCP underfrequency AV was no longer conservative.

To address the non-conservatism that resulted from using the original setpoint methodology, the licensee developed a new setpoint calculation based on the current setpoint methodology, Duke Energy Engineering Directives Manual (EDM)-102, "Instrument Setpoint/Uncertainty Calculations," Revision 4, and TSTF-493. In a January, 7, 2016, response to a request for additional information (RAI), the licensee stated that EDM-102 was originally developed using the recommended practices described in ISA-RP67.04-1994, Part II. The licensee further stated that the primary difference between EDM-102 and ISA-RP67.04-1994, Part II, is that EDM-102 was revised to include discussion of the TSTF-493, Revision 4, methodology and describes the methodology for the use of as-found and as-left tolerances for Reactor Protection System, and Engineered Safety Feature Actuation System functions described in the TSs.

Also, in response to the RAI, the licensee provided the equations used for determining the total loop uncertainty (TLU), AV, and as-found and as-left values. The following sections provide a description of how these values were obtained.

3.3.1 Total Loop Uncertainty Calculation

The licensee noted in the LAR dated July 9, 2015, that the TLU methodology is primarily based on the "square-root-sum-of-the-squares" (SRSS) technique for combination of random-independent uncertainty terms. Random-dependent and bias uncertainty terms are addressed through a combination of the SRSS and/or algebraic techniques. These terms are combined to determine the TLU as shown in the following equations:

$$+ TLU = + \{x^2 + y^2 + (w + u)^2\}^{1/2} + v + t$$
$$- TLU = - \{x^2 + y^2 + (w + u)^2\}^{1/2} - v - t$$

The licensee described in the LAR how the methodology requires identification of applicable sources of instrument uncertainty and categorization of each as a random-independent (x, y), random-dependent (w, u), or bias/abnormal distribution (v, t) term. The "+" and "-" convention

represents the positive or negative uncertainty limits within the measured setpoint or indication.

The LAR dated July 9, 2015, identified the random-independent uncertainty contributions from calibrated accuracy, drift, measurement and test equipment (M&TE), and calibration setting tolerance. The licensee noted that these magnitudes could vary in the future, based on the installed model relay, demonstrated drift, and available M&TE. In its letter dated January 7, 2016, the licensee provided a summary calculation that demonstrated how the uncertainties from the random terms and the bias terms are combined to calculate the RCP undervoltage and underfrequency TLU values.

The RCP underfrequency TLU was calculated in terms of percent span and then converted to Hertz (Hz). The RCP undervoltage TLU was calculated in terms of percent span and then converted to volts and bus volts. The calculated TLU for RCP undervoltage is 230.08 bus volts, and the calculated TLU for RCP underfrequency is 0.052 Hz.

3.3.2 As-Found and As-Left Calculations

The LAR states the channel as-found and as-left acceptable tolerances are established in accordance with TSTF-493, Rev. 4, to assure that the instrument channels are operating within the bounds defined in the safety analysis.

In its letter dated January 7, 2016, the licensee provided a summary calculation for determining the RCP undervoltage and underfrequency as-found and as-left values. The uncertainties that make up the as-found tolerance include the SRSS combination of reference accuracy, drift, and M&TE. The uncertainty terms that make up the as-left tolerance include the SRSS combination of reference accuracy and M&TE.

The setpoint calculation determined the maximum allowed as-found and as-left calibration setting tolerances to be the following:

	As-found Tolerance	As-left Tolerance
RCP underfrequency setpoint	±0.037 Hz	±0.036 Hz
RCP undervoltage setpoint	±179.72 V	±143.65 V

The licensee noted that these magnitudes could vary in the future based on the installed model relay, demonstrated drift, and available M&TE.

3.3.3 Allowable Value Calculation

The LAR dated July 9, 2015, states that the revised RCP undervoltage and underfrequency setpoint calculation concluded that the existing TS nominal trip setpoints (NTSPs) were acceptable. The NTSP represents the trip setpoint at which the device is actually set. The existing undervoltage and underfrequency NTSPs are conservative with respect to the analytical limit (AL). The NTSP for RCP undervoltage is 5082 V, and the NTSP for RCP underfrequency is 56.4 Hz.

In its letter dated January 7, 2016, the licensee stated that the AL for RCP underfrequency trip setpoint corresponds to a frequency of 55.0 Hz. The summary calculation notes that the RCP

undervoltage trip setpoint is not credited in any transients, so an AL has not been established. However, the calculation goes on to state that for analyses where modeling the actual undervoltage setpoint is required, an AL of 4800 V should be used.

The LAR describes the following methodology for calculating AVs:

$AV = AL \pm (RU_{NT} \pm Biases) = AL \pm \{[(TLU - Biases)^2 - RU_{T\text{-}cal}^2]^{1/2} \pm Biases\}$, where:

$\pm$ = "+" or "-" sign convention dictated by the setpoint direction (i.e., towards setpoint)

RU_{NT} = uncertainty associated with the portion of the loop not tested during the channel operational test, calibration, etc.

$RU_{T\text{-}cal}$ = uncertainty associated with the portion of the loop tested during the channel check, calibration, etc.

Biases = bias/abnormal distribution uncertainties

The LAR includes the following table summarizing the calculated, current, and proposed RCP undervoltage and underfrequency AVs:

	Calculated AV	Current TS AV	Desired TS AV
RCP Underfrequency	55.0 Hz	55.9 Hz	No change, use current TS value 55.9 Hz
RCP Undervoltage	4800 V	5016 V	New value of 4870 V

In its letter dated January 7, 2016, the licensee provided calculations for determining the RCP undervoltage and underfrequency AVs. The following sections contain summaries of the calculations provided by the licensee.

3.3.3.1 RCP Underfrequency AV Calculation

The following values were used to perform the RCP underfrequency AV calculation:

The $RU_{T\text{-}cal}$ was determined using the SRSS technique for combination of random-independent uncertainty terms. The underfrequency $RU_{T\text{-}cal}$ was determined to be 0.57 percent span.

The Biases were determined to be 0.0 percent span.

The TLU was determined to be 0.57 percent span.

$RU_{NT} = [(TLU - Biases)^2 - RU_{T\text{-}cal}^2]^{1/2} = [(0.57 - 0)^2 - 0.57^2]^{1/2} = 0.0$ percent span.

Therefore:

> AV = AL ± (RU_{NT} ± Biases) = 55.0 Hz ± (0 ± 0)(f_Range), where f_Range is the frequency range of 9 Hz (used to convert from percent span to frequency)
>
> AV = 55.0 Hz ± (0 ± 0)(9 Hz) = 55.0 Hz

Although the calculated AV for RCP underfrequency is 55.0 Hz, the LAR states the current TS AV of 55.9 Hz was conservatively retained, as it provides adequate margin for the TSTF-493 as-found tolerance of 56.36 Hz. Therefore, the LAR is not proposing to change this AV.

3.3.3.2 RCP Undervoltage AV Calculation

The following values were used to perform the RCP undervoltage AV calculation:

> The $RU_{T\text{-}cal}$ was determined using the SRSS technique for combination of random-independent uncertainty terms. The under-voltage $RU_{T\text{-}cal}$ was determined to be 7.67 percent span.
>
> The Biases were determined to be 0.0 percent span.
>
> The TLU was determined to be 7.67 percent span.

Therefore:

> $RU_{NT} = [(TLU - Biases)^2 - RU_{T\text{-}cal}^2]^{1/2} = [(7.67 - 0)^2 - 7.67^2]^{1/2} = 0.0$ % span
>
> AV = AL ± (RU_{NT} ± Biases) = 4800 V ± (0 ± 0)(f_Range), where f_Range is the bus voltage range of 3000 V (used to convert from % span to bus voltage)
>
> AV = 4800 V ± (0 ± 0)(3000 V) = 4800 V

Although the calculated AV is 4800 V, the LAR dated July 9, 2015, proposes to change the AV to 4870 V. The LAR states the current TS AV of 5016 V for the RCP undervoltage required modification because it did not accommodate the TSTF-493 as-found tolerance of 4902 V. Additionally, the LAR states the selected AV of 4870 V for the RCP undervoltage was conservatively specified to envelop the calculated AV and selected to provide margin from the TSTF-493 as-found tolerance.

The summary calculation notes that the safety analysis does not currently credit the RCP undervoltage trip setpoint explicitly in any transients. Additionally, the reactor trip in the loss-of-coolant flow analyses is based upon an elapsed time and not upon an actual voltage setpoint. As described in Section 3.3.3 of this SE, a safety analysis AL for undervoltage has not been established. However, the calculation goes on to state that for analyses where modeling the actual undervoltage setpoint is required, an AL of 4800 V should be used.

The staff reviewed the calculation for determining the RCP undervoltage AV and concludes that the proposed AV to be more conservative than the calculated AV. Furthermore, the safety

analysis does not currently credit the RCP undervoltage trip setpoint explicitly in any transients. Therefore, the staff finds the proposed change to be acceptable.

3.3.4 Incorporation of TSTF-493 Notes

The LAR dated July 9. 2015, proposes to incorporate the notes from Option A of TSTF-493, Rev. 4, to TS 3.3.1, Functions 11 and 12. The proposed change would add the following notes (j) and (k) to the Surveillance Requirement 3.3.1.10 for the two functions:

> Note (j): If the as-found channel setpoint is outside its predefined as-found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.
>
> Note (k): The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the NTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (field setting) to confirm channel performance. The methodologies used to determine the as-found and the as-left tolerances are specified in the UFSAR.

The LAR dated July 9, 2015, states that the footnote reference for these channels serves to ensure that unexpected as-found conditions are evaluated prior to returning the channel to service and to ensure that as-left settings provide sufficient margin for uncertainties.

After reviewing the information provided by the licensee, the staff concludes that these notes are consistent with Option A of TSTF-493, Rev. 4, and are, therefore, acceptable.

3.4 NRC Staff Conclusion

The NRC staff evaluated the licensee's justifications for the proposed TS changes specified in Section 1.0 of this SE against the regulatory requirements and guidance specified in Section 2.0 of this SE. The NRC staff concludes that the systems will continue to meet the requirements of GDCs 13 and 20 of 10 CFR Part 50, Appendix A; 10 CFR 50.36(c)(1)(ii)(A); and 10 CFR 50.36(c)(3), and there is reasonable assurance that the instrumentation will continue to perform its required safety functions. Therefore, the NRC staff concludes that the licensee's proposed TS changes to modify the AV for TS 3.3.1, Function 11, and to incorporate Option A of TSTF-493, Rev. 4, for TS 3.3.1, Functions 11 and 12, are acceptable with respect to instrumentation and controls.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the North 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 and change surveillance requirements. 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 (80 FR 61479). 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.

Principal Contributor: Samir Darbali

Date: June 21, 2016

If you have any questions, please contact me at 301-415-2481 or Ed.Miller@nrc.gov.

Sincerely,

/RA/ K. Cotton for

G. Edward Miller, Project Manager
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-369 and 50-370

Enclosures:
1. Amendment No. 287 to NPF-9
2. Amendment No. 266 to NPF-17
3. Safety Evaluation

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NAME	KCotton	LRonewicz	MWaters	AKlein (MChernoff for)
DATE	04/28/16	05/16/16	03/06/16	06/16/16
OFFICE	OGC	NRR/DORL/LPL2-1/BC	NRR/DORL/LPL2-1/PM	
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DATE	05/09/16	06/21/16	06/21/16	

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