August 2, 2010

Mr. Regis T. Repko
Vice President
McGuire Nuclear Station
Duke Energy Carolinas, LLC
12700 Hagers Ferry Road
Huntersville, NC 28078

SUBJECT: MCGUIRE NUCLEAR STATION, UNITS 1 AND 2, ISSUANCE OF AMENDMENTS REGARDING REPLACEMENT OF SOURCE RANGE AND INTERMEDIATE RANGE EXCORE DETECTION SYSTEMS WITH EQUIVALENT NEUTRON MONITORING SYSTEMS USING FISSION CHAMBER DETECTORS (TAC NOS. ME1749 AND ME1750)

Dear Mr. Repko:

The Nuclear Regulatory Commission has issued the enclosed Amendment No. 257 to Renewed Facility Operating License NPF-9 and Amendment No. 237 to Renewed Facility Operating License NPF-17 for the McGuire Nuclear Station, Units 1 and 2. The amendments consist of changes to the Technical Specifications (TSs) in response to your application dated July 1, 2009, as supplemented by letter dated May 20, 2010.

The amendments revise TS 3.3.1, "Reactor Trip System (RTS) Instrumentation." The amendments support plant modifications which would replace the existing source range and intermediate range excore detector systems with equivalent neutron monitoring systems. The new instrumentation will perform both the source range and the intermediate range monitoring functions.

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, please call me at 301-415-1119.

Sincerely,

/RA/

Jon Thompson, 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. 257 to NPF-9
2. Amendment No. 237 to NPF-17
3. Safety Evaluation

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OFFICE	NRR/LPL2-1/PM	NRR/LPL2-1/LA	DIRS/ITSB/BC	DE/EICB/BC	OGC/NLO	NRR/LPL2-1/BC	NRR/LPL2-1/PM
NAME	JThompson	MO'Brien	RElliott	WKemper*	MDreher	GKulesa (KCotton for)	JThompson
DATE	07/15/10	07/15/10	07/16/10	07/08/10	07/28/10	07/30/10	07/30/10

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DUKE ENERGY CAROLINAS, LLC

DOCKET NO. 50-369

MCGUIRE NUCLEAR STATION, UNIT 1

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 257
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 1, 2009, as supplemented by letter dated May 20, 2010, 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. 257, 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

/RA by KCotton for/

Gloria Kulesa, Chief
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to License No. NPF-9
and the Technical Specifications

Date of Issuance: August 2, 2010

DUKE ENERGY CAROLINAS, LLC

DOCKET NO. 50-370

MCGUIRE NUCLEAR STATION, UNIT 2

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 237
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 1, 2009, as supplemented by letter dated May 20, 2010, 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. 237, 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

/RA by KCotton for/

Gloria Kulesa, Chief
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to License No. NPF-17
and the Technical Specifications

Date of Issuance: August 2, 2010

ATTACHMENT TO LICENSE AMENDMENT NO. 257

RENEWED FACILITY OPERATING LICENSE NO. NPF-9

DOCKET NO. 50-369

AND

LICENSE AMENDMENT NO. 237

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
Licenses	Licenses
NPF-9, page 3	NPF-9, page 3
NPF-17, page3	NPF-17, page 3
TS Pages	TS Pages
3.3.1-12	3.3.1-12
3.3.1-14	3.3.1-14
3.3.1-15	3.3.1-15
3.3.1-16	3.3.1-16
3.3.1-17	3.3.1-17

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO

AMENDMENT NO. 257 TO RENEWED FACILITY OPERATING LICENSE NPF-9

AND

AMENDMENT NO. 237 TO RENEWED FACILITY OPERATING LICENSE 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 1, 2009 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML091950355), as supplemented by letter dated May 20, 2010 (ADAMS Accession No. ML101530462), Duke Energy Carolinas, LLC (Duke, the licensee), requested changes to the Technical Specifications (TSs) for the McGuire Nuclear Station, Units 1 and 2 (McGuire 1 and 2). The supplement dated May 20, 2010, 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 hazards consideration determination as published the Federal Register on March 9, 2010 (75 FR 10826).

The proposed amendments would revise TS 3.3.1, "Reactor Trip System (RTS) Instrumentation." The proposed amendments support plant modifications which would replace the existing source range and intermediate range excore detector systems with equivalent neutron monitoring systems. The new instrumentation will perform both the source range and the intermediate range monitoring functions.

2.0 REGULATORY EVALUATION

The NRC staff reviewed the proposed TS changes in the application against the regulatory requirements and guidance listed below to ensure that 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 NRC staff considered the following regulatory requirements:

- The regulation at Title 10 of the Code of Federal Regulations (10 CFR), Part 50, Section 50.2, "Definitions," states that:

  > Safety-related structures, systems, and components means those structures, systems, and components that are relied upon to remain functional during and following design basis events to assure:
  >
  > (1) The integrity of the reactor coolant pressure boundary
  >
  > (2) The capability to shut down the reactor and maintain it in a safe-shutdown condition; or
  >
  > (3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures comparable to the applicable guideline exposures set forth in 10 CFR 50.34(a)(1) or 10 CFR 100.11, as applicable.

- In the regulation at 10 CFR 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, in part, 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.

  Furthermore, 10 CFR 50.36(c)(1)(ii)(A) states, in part, the following:

  > Limiting safety system settings for nuclear reactors are settings for automatic protective devices related to those variables having significant safety functions. Where a limiting safety system setting is specified for a variable on which a safety limit has been placed, the setting must be so chosen that automatic protective action will correct the abnormal situation before a safety limit is exceeded. If, during operation, it is determined that the automatic safety system does not function as required, the licensee shall take appropriate action, which may include shutting down the reactor. The licensee shall notify the Commission, review the matter, and record the results of the review, including the cause of the condition and the basis for corrective action taken to preclude recurrence.

  In addition, 10 CFR 50.36(c)(3) 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 of operation will be met.

The NRC staff reviewed the proposed TS changes against these 10 CFR 50.36 requirements to ensure that there is reasonable assurance that the systems affected by the proposed TS changes will perform their required safety functions.

- The regulation at 10 CFR Part 50, Appendix A, "General Design Criteria for Nuclear Power Plants," Criterion 10 (GDC 10), "Reactor design," addresses the requirements for reactor protection systems in that it requires that:

  > The reactor core and associated coolant, control, and protection systems shall 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.

- GDC 13, "Instrumentation and control," requires that:

  > Instrumentation shall 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, including those variables and systems that can affect the fission process, the integrity of the reactor core, the reactor coolant pressure boundary, and the containment and its associated systems. Appropriate controls shall be provided to maintain these variables and systems within prescribed operating ranges.

  The NRC staff reviewed the proposed TS changes and the affected instrument setpoint calculations and plant surveillance procedures to ensure proper operation of the intermediate range and source range neutron flux instrumentation.

- GDC 20, "Protection system functions," requires, in part, that

  > The protection system shall 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…

  The NRC staff evaluated the application to ensure that the proposed TS change will still assure that the fuel design limits and plant safety limits (SLs) specified in TS 2.0 are not exceeded, and that these SLs will not be exceeded under plant transient, anticipated operational occurrences, and accident conditions.

2.2 Regulatory Guidance

The NRC staff considered the following regulatory guidance in their review:

- Regulatory Guide (RG) 1.105, "Setpoints for Safety-Related Instrumentation," Rev. 3, issued December 1999 (ADAMS Accession No. ML993560062), describes a method that the NRC staff considers acceptable for complying with the agency's regulations for ensuring that setpoints for safety-related instrumentation are initially within and remain within the TS limits. RG 1.105 endorses Part I of Instrument Society of America

S67.04-1994, “Setpoints for Nuclear Safety-Related Instrumentation,” subject to NRC staff clarifications. The NRC staff used this guide to determine the adequacy of the licensee’s setpoint calculation methodologies and the related plant surveillance procedures.

- Technical Specifications Task Force Traveler (TSTF)-493, “Clarify Application of Setpoint Methodology for LSSS [limiting safety system setting] Functions,” Rev. 4, dated January 5, 2010 (ADAMS Accession No. ML100060064), and an errata sheet, “Transmittal of TSTF-493, Rev. 4, Errata,” dated April 23, 2010 (ADAMS Accession No. ML101160026), clarify the application of setpoint methodology. The NRC staff specifically verified the compliance of the proposed footnotes with the applicable functions identified in Appendix A to TSTF-493, Rev. 4, and the calculations for the revised setpoints for total loop uncertainties (TLUs), nominal trip setpoint (NTSP), allowable value (AV), as-found tolerance band, and as-left tolerance band.

3.0 TECHNICAL EVALUATION

3.1 Description of the Proposed Amendment

The proposed license amendment request (LAR) includes the following changes to the TSs:

(1) The current Note 2 in Surveillance Requirement (SR) 3.3.1.11 reads as follows: “Power and Intermediate Range Neutron Flux detector plateau voltage verification is not required to be performed prior to entry into MODE 1 or 2.”

The proposed Note 2 reads as follows:

> Power Range Neutron Flux high voltage detector saturation curve verification is not required to be performed prior to entry into MODE 1 or 2.

In addition, a new Note 3 reads as follows:

> Intermediate Range Neutron Flux detector plateau voltage verification is not required to be performed prior to entry into MODE 1 or 2*.

The asterisked footnote applicable to Note 3 is proposed to read as follows:

* This note applies to the Westinghouse Electric Company (Westinghouse)-supplied compensated ion chamber neutron detectors. The compensated ion chamber neutron detectors are being replaced with Thermo Scientific-supplied fission chamber neutron detectors which do not require detector plateau voltage verification. Therefore, this note does not apply to the fission chamber neutron detectors.

(2) Table 3.3.1-1 presently lists an AV entry of “≤ 30% rated thermal power (RTP)” for Function 4 in two locations. The licensee proposed to retain these entries, append them with a new asterisked footnote, and add another AV entry adjacent to each existing entry, to read “≤ 38% RTP.” The asterisked footnote will read as follows:

The ≤ 30% RTP AV applies to the Westinghouse-supplied compensated ion chamber Intermediate Range neutron detectors. The compensated ion chamber neutron detectors are being replaced with Thermo Scientific-supplied fission chamber neutron detectors. The ≤ 38% RTP AV applies to the replacement fission chamber Intermediate Range neutron detectors.

(3) TS Table 3.3.1-1 presently lists an AV entry of "≤ 1.3 E5 cps [counts per second]" for Function 5 in two locations. The licensee proposed to retain these entries, append them with a new double-asterisked footnote, and add another AV entry adjacent to each existing entry, to read "≤ 1.44E5 cps." The double-asterisked footnote will read as follows:

** The ≤ 1.3 E5 cps AV applies to the Westinghouse- supplied boron trifluoride (BF_3) source range neutron detectors. The BF_3 neutron detectors are being replaced with Thermo Scientific-supplied fission chamber neutron detectors. The ≤ 1.44 E5 cps AV applies to the replacement fission chamber source range neutron detectors.

(4) Table 3.3.1-1 presently lists AV and NTSP entries of "≥ 4E-11 amp" and "1E-10 amp," respectively, for Function 16, Item a. The licensee proposed to retain these entries, append them with a new triple-asterisked footnote, and add AV and NTSP entries adjacent to each existing entry, to read "≥ 6.6E-6% RTP" and "1E-5% RTP," respectively. The triple-asterisked footnote will read as follows:

*** The ≥ 4E-11 amp AV and the 1 E-10 amp NOMINAL TRIP SETPOINT value apply to the Westinghouse-supplied compensated ion chamber Intermediate Range neutron detectors. The compensated ion chamber neutron detectors are being replaced with Thermo Scientific-supplied fission chamber neutron detectors. The ≥ 6.6E-6% RTP AV and the 1E-5% RTP NOMINAL TRIP SETPOINT value apply to the replacement fission chamber Intermediate Range neutron detectors.

(5) The licensee proposed to add two new lettered footnotes, designated (j) and (k), to Table 3.3.1-1. The two new footnotes would apply to the cross-referenced channel operational test and channel calibration requirements listed in the SRs column of the table for Functions 4 and 5, specifically the entries for SRs 3.3.1.7, 3.3.1.8, and 3.3.1.11 for which AVs and NTSPs are applicable. The new footnotes read as follows:

(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 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 [Updated Final Safety Analysis Report].

3.2 Evaluation of Proposed Modifications

The RTS consists of all components, from the field-mounted process instrumentation (e.g., transmitters, resistance temperature detectors, neutron detectors, etc.) to the reactor trip switchgear, whose functioning is required to initiate a reactor trip when required. The RTS includes portions of the excore nuclear instrumentation system, which consists of three discrete but overlapping ranges: source range, intermediate range, and power range.

Because of issues related to reliability and parts obsolescence, the licensee is replacing the existing Westinghouse-supplied source range and intermediate range excore detector systems for both McGuire 1 and 2 and the Catawba Nuclear Station, Units 1 and 2 (Catawba 1 and 2), with Thermo Scientific-supplied 300i Neutron Flux Monitoring Systems. The existing source range and intermediate range excore detector systems use BF_3 detectors and compensated ion chamber detectors, respectively. The new instrumentation will use fission chamber detectors to perform both the source range and intermediate range monitoring functions. The licensee stated that the modification to replace the source range and intermediate range detectors will not affect any function related to post-accident monitoring and, depending upon the exact alarm setting, may provide improved notification for boron dilution mitigation with an earlier actuation of the High Flux at Shutdown alarm.

The licensee also stated that the proposed TS modifications represent the pre-replacement and post-replacement requirements, since the plant modifications to replace the detectors will occur during separate refueling outages for each unit. After full implementation of all the modifications, a future LAR will be submitted to amend the TSs to show only the post-replacement requirements. The licensee, also, stated that within 1 year following the implementation of the modification for the final unit, Duke will submit a follow-up administrative LAR to delete the superseded TS requirements.

The licensee stated that the new Thermo Scientific equipment is compatible with the rest of the nuclear instrumentation and reactor protection systems and will perform the same functional requirements of the equipment that it will replace. However, it will differ in the following aspects from the existing equipment:

Source Range Scale:

> The source range indication scale will change from 10^0–10^6 cps (six decades) to 10^{-1}–10^6 cps (7 decades).

Source Range High Flux at Shutdown Alarm:

> The alarm setpoint is updated, when requested; is electronically established based on a selectable ratio of 1.5 to 4 times steady state; and is automatically reduced as

steady-state count rate decreases. For the existing source range instrumentation, the adjustment is manually established at approximately 5 times steady state (McGuire 1 and 2) or 3 times steady state (Catawba 1 and 2).

Intermediate Range Scale Units:

Intermediate Range scale units will change from amperes to percent power.

Intermediate Range Scale:

The Intermediate Range indication scale will change from 10^{-11} – 10^{-3} amps (8decades) to 10^{-8} – 200 percent RTP (over 10 decades).

Source Range Deenergization:

With the existing Westinghouse system, the source range indication is disabled by deenergizing high voltage to the source range detectors when the source range trip is blocked upon receipt of the permissive P-6. This is done in order to prevent damage to the BF_3 detectors as a result of operation beyond their design limits. The removal of high voltage from the Thermo Scientific fission chamber detectors is not required. They will remain energized through all levels of operation.

Detector Plateau Curve Calibration:

The Thermo Scientific fission chambers do not require detector plateau curves to be obtained as part of the channel calibration. The fission chambers operate in the ionization chamber region of the detector ionization curve. The pulse output of the detectors is not dependent on the applied voltage over a wide range of voltage. The fission chambers are operated at a fixed high voltage. The power range detectors will remain a Westinghouse installation with vendor-recommended saturation curve testing. Thermo Scientific does not require periodic saturation or plateau curve testing for fission chamber detectors.

The change in units for the intermediate range scale will result in a change in the value of the P-6 setpoint from its present value in amperes to the equivalent value in percent power. The change in the detector output, together with the change in intermediate range units, requires a verification of the coordination between the source range neutron flux trip and the P-6 setpoints.

The source range neutron flux trip setpoint and the P-6 permissive are set relative to the overlap between the source range and intermediate range scales. The P-6 permissive is selected such that its bistable trips after the intermediate range indication comes on scale (so intermediate range operation can be verified) and before the source range indication goes off scale (within the overlap region of the instruments). The source range neutron flux trip setpoint is also within this overlap region. The source range neutron flux trip setpoint is set between the P-6 permissive and the upper range of the source range scale. The source range trip setpoint must be set sufficiently above the P-6 value in order to allow the operator time to block the source range trip and at the

same time must be below the maximum range of the source range indication. For the source range function, only the relative change from a baseline value is important and not an absolute value of neutron flux.

The licensee stated that calculations prepared for this modification verified the correct correlation between the source range neutron flux trip and the P-6 permissive setpoints for the new instrumentation. The planned plant modification extends the lower end of the intermediate range by two additional decades. The previous Westinghouse intermediate range P-6 setpoint was established at one decade overlap ($1x10^{-10}$ amps). The proposed P-6 setpoint of "1E-5% RTP" provides three decades of overlap to ensure adequate margin to the source range trip setpoint to allow the operator time to actuate the source range neutron flux trip block signal and at the same time ensure a conservative signal overlap with the intermediate range indication. This approach, which provides additional margin, is acceptable to the NRC staff.

Also described above, the scope of the proposed changes includes the addition of two lettered footnotes applicable to the affected source range listed in Table 3.3.1-1. The NRC staff finds that these footnotes are consistent with TSTF-493 and, therefore, are acceptable.

The licensee performed setpoint calculations for the modifications, resulting in the need for changes to the associated values listed in TS Table 3.3.1-1, as described in Section 1.0 above. The licensee performed these setpoint calculations in accordance with Duke Energy Engineering Directives Manual (EDM)-102, "Instrument Setpoint/Uncertainty Calculations," Rev. 3. The licensee stated that the methodology described in EDM-102 is consistent with the intent of Instrument Society of America Standard RP67.04-1994, Part II, "Methodologies for the Determination of Setpoints for Nuclear Safety Related Instrumentation," and RG 1.105, Rev. 3.

Basic Methodology—EDM-102

The licensee stated that the previous setpoint calculation based on EDM-102 applied the percent of span accuracy values for source range and intermediate range channels linearly to the range of 0 to $1x10^{6}$ cps and 0 to 120 percent RTP, respectively. This method results in overly conservative AVs for the source range and intermediate range channels for a given channel accuracy. Applying the accuracies this way results in AVs more restrictive than the design capabilities of the instrumentation. This could require calibration checks more frequently than required by the TSs to ensure compliance.

The new loop uncertainty 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 algebraic techniques.

The licensee's setpoint calculation included determination of an SL, analytical limit (AL), TLUs, NTSP, AV, as-found tolerance band, and as-left tolerance band. In response to an NRC staff request for additional information (RAI) sent by letter dated May 20, 2010, the licensee provided calculations on TLU, AV, NTSP, as-found tolerance band, and as-left tolerance band. The licensee used engineering units in percentage of span in calculating the tolerances and converted them appropriately to account for the logarithmic nature and the seven decades of the scale.

Safety Limits and Analytical Limits

SLs are the values chosen to reasonably protect the integrity of physical barriers that guard against the uncontrolled release of radioactivity. Typically, ALs are values used in the safety analyses that were specifically chosen to allow the equipment time to act and prevent exceeding the SLs. The licensee stated that the source range and intermediate range neutron flux trips and the P-6 interlock are not explicitly credited in any design-basis accidents. Only the power range low setpoint trip of 25-percent RTP is credited for actuating to mitigate the uncontrolled rod cluster control assembly withdrawal from a subcritical or low-power startup accident, as described in Sections 7.2 and 15.4 of the UFSARs for both McGuire 1 and 2 and Catawba 1 and 2. The source range neutron flux trip does provide a diverse trip function in subcritical modes to help ensure that the UFSAR analysis of this event remains bounding, but its function is not explicitly credited.

Since the source range and intermediate range neutron flux trips are not explicitly credited in the accident analyses, no AL has been established for use in the accident analysis. However, the licensee designated the following AL values for use in the setpoint calculations:

Plant	Instrument	AL Value
McGuire 1 and 2	Source Range	6.0E5 cps
Catawba 1 and 2	Source Range	6.0E5 cps
McGuire 1 and 2	Intermediate Range	155% RTP
Catawba 1 and 2	Intermediate Range	160% RTP

An AL is not applicable for the P-6 interlock function.

Total Loop Uncertainty

The licensee calculated TLU, converting error in percent span accounting for logarithmic nature and seven decades of the scale, as follows:

$TLU = +/- [RU_{NT}^2 + RU_T^2]^{1/2}$ + biases, where:

NT = uncertainty associated with the portion of the loop not tested during the channel check, calibration, etc.

T = uncertainty associated with the portion of the loop tested during the channel check, calibration, etc.

RU = total random uncertainty

The calculated TLUs are as follows:

Plant	Instrument	TLU
McGuire 1 and 2	Source Range	4.66E5 cps
Catawba 1 and 2	Source Range	4.66E5 cps
McGuire 1 and 2	Intermediate Range	154.08% RTP
Catawba 1 and 2	Intermediate Range	157.89% RTP
McGuire 1 and 2	P-6	1.62E-6% RTP
Catawba 1 and 2	P-6	1.58E-6% RTP

Nominal Trip Setpoints

The NTSP is the value at which the trip or actuation is intended to occur. The licensee used the following equation to calculate the NTSP:

NTSP = AL ± (TLU + Margin)

The calculated NTSPs are as follows:

Plant	Instrument	NTSP
McGuire 1 and 2	Source Range	1.0E5 cps*
Catawba 1 and 2	Source Range	1.0E5 cps*
McGuire 1 and 2	Intermediate Range	25% RTP*
Catawba 1 and 2	Intermediate Range	25% RTP*
McGuire 1 and 2	P-6	1E-5% RTP
Catawba 1 and 2	P-6	1E-5% RTP

*This LAR does not propose changes to these values.

Allowable Value

The licensee stated that for McGuire and Catawba, the AV represents an acceptable benchmark (specified by TS) within which periodic calibrations/checks must fall to ensure operability. When a channel as-found condition is determined to be less conservative than the AV, the channel must be declared inoperable. The licensee's AV determination is based on expected uncertainty influences for the portion of the loop tested, including reference accuracy, calibration uncertainty, representative uncertainty for temperature variations between calibrations, representative drift over surveillance interval, and other factors. The licensee selected AV based on the most conservative AV of either EDM Method 1 or 2:

EDM METHOD 1

AV = SP + $RU_{T\text{-}cal}$, where:
SP = nominal setpoint

T-cal = representative (minimum) uncertainty term magnitudes associated with the portion of the loop tested and for the desired interval (attributed to the expected variation from as-left conditions)

EDM METHOD 2

$$AV = AL + RU_{NT} = AL + \{[(TLU - Biases)^2 - RT_{T\text{-}cal}^2]^{1/2} + Biases\}$$

The AV for each setpoint is calculated using the two EDM methods described above. The more conservative calculated value for the two methods is then used as the AV. Although the accuracy of the new instrumentation is better than the existing instrumentation, the net result of applying the rack uncertainties logarithmically is an increase in the source range and intermediate range AVs.

The calculated AVs are as follows:

Plant	Instrument	AV
McGuire 1 and 2	Source Range	≤1.44E5 cps
Catawba 1 and 2	Source Range	≤1.44E5 cps
McGuire 1 and 2	Intermediate Range	≤38% RTP
Catawba 1 and 2	Intermediate Range	≤38% RTP
McGuire 1 and 2	P-6	≥6.6E-6% RTP
Catawba 1 and 2	P-6	≥6.6E-6% RTP

As-Found Tolerance

The licensee included reference accuracy, drift, setting tolerance, and measurement and test equipment tolerance in calculating the as-found tolerance. The calculated as-found tolerances for the source range and intermediate range channels are as follows:

Plant	Instrument	As-Found Tolerance
McGuire 1 and 2	Source Range	≤2.25% span
Catawba 1 and 2	Source Range	≤2.25% span
McGuire 1 and 2	Intermediate Range	≤1.82% span
Catawba 1 and 2	Intermediate Range	≤1.82% span

The above as-found tolerances are given in percent span and have been converted to cps or RTP about the previous surveillance as-left value to obtain the as-found tolerance in cps or RTP on the logarithmic scale for these channels.

As-Left Tolerance

”As left” is the condition in which a channel, or portion of a channel, is left after calibration or final device setpoint verification. The as-left tolerance is the acceptable setting variation about the setpoint that the technician may leave following calibration. The size of the setting or as-left tolerance is generally based on the reference accuracy and limitations of the technician in adjusting the module (measurement and test equipment and reading resolution). The licensee uses previous calibration or surveillance as-left setting value for a channel as the starting point for determining if the next surveillance as-found tolerance is met.

The NRC staff finds that the licensee performed the setpoint calculations in conformance with RG 1.105 and TSTF-493 and hence the proposed TS changes in Section 1.0 complies with the requirements of 10 CFR 50.36 specified in Section 2.0, and therefore, they are acceptable.

3.3 Technical Evaluation Summary

The NRC staff finds that the proposed TS changes comply with the regulatory requirements specified in Section 2.0 and are consistent with the acceptable methodology described in TSTF-493.

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 SRs. 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 (75 FR 10826). 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) 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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