



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

June 25, 2012

Mr. Benjamin C. Waldrep  
Vice President Nuclear Corporate  
Duke Energy Carolinas, LLC  
P.O. Box 1006/ECO7H  
Charlotte, NC 28201-1006

SUBJECT: CATAWBA NUCLEAR STATION, UNITS 1 AND 2 (CATAWBA 1 AND 2),  
MCGUIRE NUCLEAR STATION, UNITS 1 AND 2 (MCGUIRE 1 AND 2), AND  
OCONEE NUCLEAR STATION, UNITS 1, 2, AND 3 (OCONEE 1, 2, AND 3) -  
ISSUANCE OF AMENDMENTS REGARDING DELETION OF E BAR  
DEFINITION AND REVISION TO REACTOR COOLANT SYSTEM SPECIFIC  
ACTIVITY TECHNICAL SPECIFICATIONS (TAC NOS. ME8102, ME8103,  
CATAWBA; ME8104, ME8105, MCGUIRE; ME8106, ME8107, ME8108,  
OCONEE)

Dear Mr. Waldrep:

The Nuclear Regulatory Commission has issued the enclosed Amendment No. 268 to Renewed Facility Operating License NPF-35 and Amendment No. 264 to Renewed Facility Operating License NPF-52 for Catawba 1 and 2, Amendment No. 266 to Renewed Facility Operating License NPF-9 and Amendment No. 246 to Renewed Facility Operating License NPF-17 for McGuire 1 and 2, and Amendment Nos. 380, 382, and 381 to Renewed Facility Operating Licenses DPR-38, DPR-47, and DPR-55 for Oconee 1, 2, and 3, respectively. The amendments consist of changes to the Technical Specifications (TSs) in response to your application dated December 15, 2009, as supplemented by letter dated September 22, 2011. The amendments revise the TSs associated with Reactor Coolant System (RCS) Specific Activity and the deletion of the TS definition of E Bar (average disintegration energy) consistent with Revision 0 to Technical Specification Task Force (TSTF) Standard Technical Specification Change Document TSTF-490, "Deletion of E Bar Definition and Revision to RCS Specific Activity Tech Spec." A notice of availability for this TS improvement using the consolidated line item improvement process was published in the *Federal Register* on March 15, 2007 (72 FR 12217).

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

B. Waldrep

- 2 -

If you have any questions, please call me at 301-415-1119.

Sincerely,

A handwritten signature in black ink that reads "Jon Thompson". The signature is written in a cursive, flowing style.

Jon Thompson, Project Manager  
Plant Licensing Branch II-1  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket Nos. 50-413, 50-414, 50-369, 50-370,  
50-269, 50-270, and 50-287

Enclosures:

1. Amendment No. 268 to NPF-35
2. Amendment No. 264 to NPF-52
3. Amendment No. 266 to NPF-9
4. Amendment No. 246 to NPF-17
5. Amendment No. 380 to DPR-38
6. Amendment No. 382 to DPR-47
7. Amendment No. 381 to DPR-55
8. Safety Evaluation

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

DUKE ENERGY CAROLINAS, LLC

NORTH CAROLINA ELECTRIC MEMBERSHIP CORPORATION

DOCKET NO. 50-413

CATAWBA NUCLEAR STATION, UNIT 1

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 268  
Renewed License No. NPF-35

1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment to the Catawba Nuclear Station, Unit 1 (the facility) Renewed Facility Operating License No. NPF-35 filed by the Duke Energy Carolinas, LLC, acting for itself, and North Carolina Electric Membership Corporation (licensees), dated December 15, 2009, as supplemented by letter dated September 22, 2011, 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-35 is hereby amended to read as follows:

(2). Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 268, are hereby incorporated in the 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 120 days of issuance. Prior to implementation of the license amendment, the licensee shall incorporate the new dose equivalent Xenon, and dose equivalent Iodine values listed in the tables in Sections 3.1.11.1 and 3.1.11.2 respectively of the Commission's enclosed safety evaluation. The values shall be reflected in the next update of the final safety analysis report submitted to the NRC pursuant to 10 CFR 50.71(e).

FOR THE NUCLEAR REGULATORY COMMISSION



Nancy Salgado, Chief  
Plant Licensing Branch II-1  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Attachment:  
Changes to License No. NPF-35  
and the Technical Specifications

Date of Issuance: June 25, 2012



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

DUKE ENERGY CAROLINAS, LLC

NORTH CAROLINA MUNICIPAL POWER AGENCY NO. 1

PIEDMONT MUNICIPAL POWER AGENCY

DOCKET NO. 50-414

CATAWBA NUCLEAR STATION, UNIT 2

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 264  
Renewed License No. NPF-52

1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment to the Catawba Nuclear Station, Unit 2 (the facility) Renewed Facility Operating License No. NPF-52 filed by the Duke Energy Carolinas, LLC, acting for itself, North Carolina Municipal Power Agency No. 1 and Piedmont Municipal Power Agency (licensees), dated December 15, 2009, as supplemented by letter dated September 22, 2011, 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

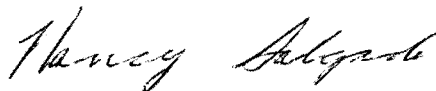
2. Accordingly, the license is hereby amended by page changes to the Technical Specifications as indicated in the attachment to this license amendment, and Paragraph 2.C.(2) of Renewed Facility Operating License No. NPF-52 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 264, which are attached hereto, are hereby incorporated into this renewed operating license. Duke Energy Carolinas, LLC, 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 120 days of issuance. Prior to implementation of the license amendment, the licensee shall incorporate the new dose equivalent Xenon, and dose equivalent Iodine values listed in the tables in Sections 3.1.11.1 and 3.1.11.2 respectively of the Commission's enclosed safety evaluation. The values shall be reflected in the next update of the final safety analysis report submitted to the NRC pursuant to 10 CFR 50.71(e).

FOR THE NUCLEAR REGULATORY COMMISSION



Nancy Salgado, Chief  
Plant Licensing Branch II-1  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Attachment:  
Changes to License No. NPF-52  
and the Technical Specifications

Date of Issuance: June 25 , 2012

ATTACHMENT TO  
LICENSE AMENDMENT NO. 268  
RENEWED FACILITY OPERATING LICENSE NO. NPF-35  
DOCKET NO. 50-413  
AND LICENSE AMENDMENT NO. 264  
RENEWED FACILITY OPERATING LICENSE NO. NPF-52  
DOCKET NO. 50-414

Replace the following pages of the Renewed Facility Operating Licenses with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

<u>Remove</u>	<u>Insert</u>
Licenses	Licenses
NPF-35, page 4	NPF-35, page 4
NPF-52, page 4	NPF-52, page 4
Technical Specifications	Technical Specifications
1.1-2	1.1-2
1.1-3	1.1-3
1.1-4	1.1-4
1.1-5	1.1-5
1.1-6	1.1-6
3.4.16-1	3.4.16-1
3.4.16-2	3.4.16-2
3.4.16-3	none
3.4.16-4	none

(2) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 268, which are attached hereto, are hereby incorporated into this renewed operating license. Duke Energy Carolinas, LLC 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 December 6, 2024, 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) Antitrust Conditions

Duke Energy Carolinas, LLC shall comply with the antitrust conditions delineated in Appendix C to this renewed operating license.

(5) Fire Protection Program (Section 9.5.1, SER, SSER #2, SSER #3, SSER #4, SSER #5)\*

Duke Energy Carolinas, LLC shall implement and maintain in effect all provisions of the approved fire protection program as described in the Updated Final Safety Analysis Report, as amended, for the facility and as approved in the SER through Supplement 5, subject to the following provision:

The licensee may make changes to the approved fire protection program without prior approval of the Commission only if those changes would not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire.

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\*The parenthetical notation following the title of this renewed operating license condition denotes the section of the Safety Evaluation Report and/or its supplement wherein this renewed license condition is discussed.



(2) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 264 , which are attached hereto, are hereby incorporated into this renewed operating license. Duke Energy Carolinas, LLC 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 February 24, 2026, 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) Antitrust Conditions

Duke Energy Carolinas, LLC shall comply with the antitrust conditions delineated in Appendix C to this renewed operating license.

(5) Fire Protection Program (Section 9.5.1, SER, SSER #2, SSER #3, SSER #4, SSER #5)\*

Duke Energy Carolinas, LLC shall implement and maintain in effect all provisions of the approved fire protection program as described in the Updated Final Safety Analysis Report, as amended, for the facility and as approved in the SER through Supplement 5, subject to the following provision:

The licensee may make changes to the approved fire protection program without prior approval of the Commission only if those changes would not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire.

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\*The parenthetical notation following the title of this renewed operating license condition denotes the section of the Safety Evaluation Report and/or its supplements wherein this renewed license condition is discussed.

1.1 Definitions (continued)

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CHANNEL CHECK	A CHANNEL CHECK shall be the qualitative assessment, by observation, of channel behavior during operation. This determination shall include, where possible, comparison of the channel indication and status to other indications or status derived from independent instrument channels measuring the same parameter.
CHANNEL OPERATIONAL TEST (COT)	A COT shall be the injection of a simulated or actual signal into the channel as close to the sensor as practicable to verify the OPERABILITY of required alarm, interlock, and trip functions. The COT shall include adjustments, as necessary, of the required alarm, interlock, and trip setpoints so that the setpoints are within the required range and accuracy.
CORE ALTERATION	CORE ALTERATION shall be the movement of any fuel, sources, or reactivity control components, within the reactor vessel with the vessel head removed and fuel in the vessel. Suspension of CORE ALTERATIONS shall not preclude completion of movement of a component to a safe position.
CORE OPERATING LIMITS REPORT (COLR)	The COLR is the unit specific document that provides cycle specific parameter limits for the current reload cycle. These cycle specific parameter limits shall be determined for each reload cycle in accordance with Specification 5.6.5. Unit operation within these limits is addressed in individual Specifications.
DOSE EQUIVALENT I-131	DOSE EQUIVALENT I-131 shall be that concentration of I-131 (microcuries per gram) that alone would produce the same dose when inhaled as the combined activities of iodine isotopes I-131, I-132, I-133, I-134, and I-135 actually present. The determination of DOSE EQUIVALENT I-131 shall be performed using Committed Dose Equivalent (CDE) or Committed Effective Dose Equivalent (CEDE) dose conversion factors from Table 2.1 of the Environmental Protection Agency (EPA) Federal Guidance Report No. 11.

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(continued)

1.1 Definitions (continued)

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DOSE EQUIVALENT Xe-133	DOSE EQUIVALENT Xe-133 shall be that concentration of Xe-133 (microcuries per gram) that alone would produce the same acute dose to the whole body as the combined activities of noble gas nuclides Kr-85m, Kr-85, Kr-87, Kr-88, Xe-131m, Xe-133m, Xe-133, Xe-135m, Xe-135, and Xe-138 actually present. If a specific noble gas nuclide is not detected, it should be assumed to be present at the minimum detectable activity. The determination of DOSE EQUIVALENT Xe-133 shall be performed using effective dose conversion factors for air submersion listed in Table III.1 of EPA Federal Guidance Report No. 12, 1993, "External Exposure to Radionuclides in Air, Water, and Soil."
ENGINEERED SAFETY FEATURE (ESF) RESPONSE TIME	The ESF RESPONSE TIME shall be that time interval from when the monitored parameter exceeds its ESF actuation setpoint at the channel sensor until the ESF equipment is capable of performing its safety function (i.e., the valves travel to their required positions, pump discharge pressures reach their required values, etc.). Times shall include diesel generator starting and sequence loading delays, where applicable. The response time may be measured by means of any series of sequential, overlapping, or total steps so that the entire response time is measured. In lieu of measurement, response time may be verified for selected components provided that the components and the methodology for verification have been previously reviewed and approved by the NRC.

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(continued)

1.1 Definitions (continued)

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LEAKAGE	<p>LEAKAGE shall be:</p> <ul style="list-style-type: none"><li>a. <u>Identified LEAKAGE</u><ul style="list-style-type: none"><li>1. LEAKAGE, such as that from pump seals or valve packing (except reactor coolant pump (RCP) seal water injection or leakoff), that is captured and conducted to collection systems or a sump or collecting tank;</li><li>2. LEAKAGE into the containment atmosphere from sources that are both specifically located and known either not to interfere with the operation of leakage detection systems or not to be pressure boundary LEAKAGE; or</li><li>3. Reactor Coolant System (RCS) LEAKAGE through a steam generator (SG) to the Secondary System;</li></ul></li><li>b. <u>Unidentified LEAKAGE</u><p>All LEAKAGE (except RCP seal water injection or leakoff) that is not identified LEAKAGE;</p></li><li>c. <u>Pressure Boundary LEAKAGE</u><p>LEAKAGE (except SG LEAKAGE) through a nonisolable fault in an RCS component body, pipe wall, or vessel wall.</p></li></ul>
MASTER RELAY TEST	<p>A MASTER RELAY TEST shall consist of energizing each master relay and verifying the OPERABILITY of each relay. The MASTER RELAY TEST shall include a continuity check of each associated slave relay.</p>
MODE	<p>A MODE shall correspond to any one inclusive combination of core reactivity condition, power level, average reactor coolant temperature, and reactor vessel head closure bolt tensioning specified in Table 1.1-1 with fuel in the reactor vessel.</p>

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(continued)

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1.1 Definitions (continued)

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NOMINAL TRIP SETPOINT	The NOMINAL TRIP SETPOINT shall be the design value of a setpoint. The trip setpoint implemented in plant hardware may be less or more conservative than the NOMINAL TRIP SETPOINT by a calibration tolerance. Unless otherwise specified, if plant conditions warrant, the trip setpoint implemented in plant hardware may be set outside the NOMINAL TRIP SETPOINT calibration tolerance band as long as the trip setpoint is conservative with respect to the NOMINAL TRIP SETPOINT.
OPERABLE — OPERABILITY	A system, subsystem, train, component, or device shall be OPERABLE or have OPERABILITY when it is capable of performing its specified safety function(s) and when all necessary attendant instrumentation, controls, normal or emergency electrical power, cooling and seal water, lubrication, and other auxiliary equipment that are required for the system, subsystem, train, component, or device to perform its specified safety function(s) are also capable of performing their related support function(s).
PHYSICS TESTS	<p>PHYSICS TESTS shall be those tests performed to measure the fundamental nuclear characteristics of the reactor core and related instrumentation. These tests are:</p> <ul style="list-style-type: none"><li>a. Described in Chapter 14 of the UFSAR;</li><li>b. Authorized under the provisions of 10 CFR 50.59; or</li><li>c. Otherwise approved by the Nuclear Regulatory Commission.</li></ul>
QUADRANT POWER TILT RATIO (QPTR)	QPTR shall be the ratio of the maximum upper excore detector calibrated output to the average of the upper excore detector calibrated outputs, or the ratio of the maximum lower excore detector calibrated output to the average of the lower excore detector calibrated outputs, whichever is greater.
RATED THERMAL POWER (RTP)	RTP shall be a total reactor core heat transfer rate to the reactor coolant of 3411 MWt.

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(continued)

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1.1 Definitions (continued)

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REACTOR TRIP SYSTEM (RTS) RESPONSE TIME	The RTS RESPONSE TIME shall be that time interval from when the monitored parameter exceeds its RTS trip setpoint at the channel sensor until loss of stationary gripper coil voltage. The response time may be measured by means of any series of sequential, overlapping, or total steps so that the entire response time is measured. In lieu of measurement, response time may be verified for selected components provided that the components and the methodology for verification have been previously reviewed and approved by the NRC.
SHUTDOWN MARGIN (SDM)	<p>SDM shall be the instantaneous amount of reactivity by which the reactor is subcritical or would be subcritical from its present condition assuming:</p> <ul style="list-style-type: none"><li>a. All rod cluster control assemblies (RCCAs) are fully inserted except for the single RCCA of highest reactivity worth, which is assumed to be fully withdrawn. However, with all RCCAs verified fully inserted by two independent means, it is not necessary to account for a stuck RCCA in the SDM calculation. With any RCCA not capable of being fully inserted, the reactivity worth of the RCCA must be accounted for in the determination of SDM; and</li><li>b. In MODES 1 and 2, the fuel and moderator temperatures are changed to the nominal zero power design level.</li></ul>
SLAVE RELAY TEST	A SLAVE RELAY TEST shall consist of energizing each slave relay and verifying the OPERABILITY of each slave relay. The SLAVE RELAY TEST shall include, as a minimum, a continuity check of associated testable actuation devices.
THERMAL POWER	THERMAL POWER shall be the total reactor core heat transfer rate to the reactor coolant.
TRIP ACTUATING DEVICE OPERATIONAL TEST (TADOT)	A TADOT shall consist of operating the trip actuating device and verifying the OPERABILITY of required alarm, interlock, and trip functions. The TADOT shall include adjustment, as necessary, of the trip actuating device so that it actuates at the required setpoint within the required accuracy.

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### 3.4 REACTOR COOLANT SYSTEM (RCS)

#### 3.4.16 RCS Specific Activity

LCO 3.4.16 RCS DOSE EQUIVALENT I-131 and DOSE EQUIVALENT Xe-133 specific activity shall be within limits.

APPLICABILITY: MODES 1, 2, 3, and 4.

#### ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. DOSE EQUIVALENT I-131 not within limit.	<p>-----Note----- LCO 3.0.4.c is applicable.</p>	
	<p>A.1 Verify DOSE EQUIVALENT I-131 <math>\leq 60 \mu\text{Ci/gm}</math>.</p> <p><u>AND</u></p> <p>A.2 Restore DOSE EQUIVALENT I-131 to within limit.</p>	<p>Once per 4 hours</p> <p>48 hours</p>
B. DOSE EQUIVALENT Xe-133 not within limit.	<p>-----Note----- LCO 3.0.4.c is applicable.</p> <p>B.1 Restore DOSE EQUIVALENT Xe-133 to within limit.</p>	48 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. Required Action and associated Completion Time of Condition A or B not met.  <u>OR</u>  DOSE EQUIVALENT I-131 > 60 $\mu\text{Ci/gm}$ .	C.1 Be in MODE 3.	6 hours
	<u>AND</u>  C.2 Be in MODE 5.	36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
<p>SR 3.4.16.1 -----Note----- Only required to be performed in MODE 1, 2, and 3 with RCS average temperature <math>\geq 500^\circ\text{F}</math>. -----</p> <p>Verify reactor coolant DOSE EQUIVALENT Xe-133 specific activity <math>\leq 280 \mu\text{Ci/gm}</math>.</p>	In accordance with the Surveillance Frequency Control Program
<p>SR 3.4.16.2 Verify reactor coolant DOSE EQUIVALENT I-131 specific activity <math>\leq 1.0 \mu\text{Ci/gm}</math>.</p>	<p>In accordance with the Surveillance Frequency Control Program</p> <p><u>AND</u></p> <p>Between 2 and 6 hours after a THERMAL POWER change of <math>\geq 15\%</math> RTP within a 1 hour period</p>





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. 266  
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 December 15, 2009, as supplemented by letter dated September 22, 2011, 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. 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 120 days of issuance. Prior to implementation of the license amendment, the licensee shall incorporate the new dose equivalent Xenon, and dose equivalent Iodine values listed in the tables in Sections 3.1.11.1 and 3.1.11.2 respectively of the Commission's enclosed safety evaluation. The values shall be reflected in the next update of the final safety analysis report submitted to the NRC pursuant to 10 CFR 50.71(e).

FOR THE NUCLEAR REGULATORY COMMISSION



Nancy Salgado, 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: June 25 , 2012



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. 246  
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 December 15, 2009, as supplemented by letter dated September 22, 2011, 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 4

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. 246, 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 120 days of issuance. Prior to implementation of the license amendment, the licensee shall incorporate the new dose equivalent Xenon, and dose equivalent Iodine values listed in the tables in Sections 3.1.11.1 and 3.1.11.2 respectively of the Commission's enclosed safety evaluation. The values shall be reflected in the next update of the final safety analysis report submitted to the NRC pursuant to 10 CFR 50.71(e).

FOR THE NUCLEAR REGULATORY COMMISSION



Nancy Salgado, 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: June 25 , 2012

ATTACHMENT TO LICENSE AMENDMENT NO. 266  
RENEWED FACILITY OPERATING LICENSE NO. NPF-9  
DOCKET NO. 50-369  
  
AND  
  
LICENSE AMENDMENT NO. 246  
RENEWED FACILITY OPERATING LICENSE NO. NPF-17  
DOCKET NO. 50-370

Replace the following pages of the Renewed Facility Operating Licenses with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

<u>Remove</u>	<u>Insert</u>
License Pages	License Pages
NPF-9, page 3 NPF-17, page 3	NPF-9, page 3 NPF-17, page 3
Technical Specifications	Technical Specifications
1.1-2 3.4.16-1 3.4.16-2 3.4.16-3 3.4.16-4	1.1-2 3.4.16-1 3.4.16-2 none none

- (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 3411 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 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 3411 megawatts thermal (100%).

(2) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 246, 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.

## 1.1 Definitions (continued)

CHANNEL CHECK	A CHANNEL CHECK shall be the qualitative assessment, by observation, of channel behavior during operation. This determination shall include, where possible, comparison of the channel indication and status to other indications or status derived from independent instrument channels measuring the same parameter.
CHANNEL OPERATIONAL TEST (COT)	A COT shall be the injection of a simulated or actual signal into the channel as close to the sensor as practicable to verify the OPERABILITY of required alarm, interlock, and trip functions. The COT shall include adjustments, as necessary, of the required alarm, interlock, and trip setpoints so that the setpoints are within the required range and accuracy.
CORE ALTERATION	CORE ALTERATION shall be the movement of any fuel, sources, or reactivity control components, within the reactor vessel with the vessel head removed and fuel in the vessel. Suspension of CORE ALTERATIONS shall not preclude completion of movement of a component to a safe position.
CORE OPERATING LIMITS REPORT (COLR)	The COLR is the unit specific document that provides cycle specific parameter limits for the current reload cycle. These cycle specific parameter limits shall be determined for each reload cycle in accordance with Specification 5.6.5. Unit operation within these limits is addressed in individual Specifications.
DOSE EQUIVALENT I-131	DOSE EQUIVALENT I-131 shall be that concentration of I-131 (microcuries per gram) that alone would produce the same dose when inhaled as the combined activities of iodine isotopes I-131, I-132, I-133, I-134, and I-135 actually present. The determination of DOSE EQUIVALENT I-131 shall be performed using Committed Dose Equivalent (CDE) or Committed Effective Dose Equivalent (CEDE) dose conversion factors from Table 2.1 of the Environmental Protection Agency (EPA) Federal Guidance Report No. 11.
DOSE EQUIVALENT XE-133	DOSE EQUIVALENT XE-133 shall be that concentration of Xe-133 (microcuries per gram) that alone would produce the same acute dose to the whole body as the combined activities of noble gas nuclides Kr-85m, Kr-85, Kr-87, Kr-88, Xe-131m, Xe-133m, Xe-133, Xe-135m, Xe-135, and Xe-138 actually present. If a specific noble gas nuclide is not detected, it should be assumed to be present at the minimum detectable activity. The determination of DOSE EQUIVALENT XE-133 shall be performed using effective dose conversion factors for air submersion listed in Table III.1 of EPA Federal Guidance Report No. 12, 1993, "External Exposure to Radionuclides in Air, Water, and Soil."

(continued)



### 3.4 REACTOR COOLANT SYSTEM (RCS)

#### 3.4.16 RCS Specific Activity

LCO 3.4.16 RCS DOSE EQUIVALENT I-131 and DOSE EQUIVALENT XE-133 specific activity shall be within limits.

APPLICABILITY: MODES 1, 2, 3, and 4.

#### ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. DOSE EQUIVALENT I-131 not within limit.	<p>-----Note----- LCO 3.0.4.c is applicable.</p>	
	<p>A.1 Verify DOSE EQUIVALENT I-131 <math>\leq 60\mu\text{Ci/gm}</math>.</p> <p><u>AND</u></p> <p>A.2 Restore DOSE EQUIVALENT I-131 to within limit.</p>	<p>Once per 4 hours</p> <p>48 hours</p>
B. DOSE EQUIVALENT XE-133 not within limit.	<p>-----Note----- LCO 3.0.4.c is applicable.</p> <p>B.1 Restore DOSE EQUIVALENT XE-133 to within limit.</p>	48 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. Required Action and associated Completion Time of Condition A or B not met.  <u>OR</u>  DOSE EQUIVALENT I-131 >60 $\mu$ Ci/gm.	C.1 Be in MODE 3	6 hours
	<u>AND</u>  C.2 Be in MODE 5	36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.4.16.1 -----NOTE----- Only required to be performed in MODES 1, 2, and 3 with RCS average temperature $\geq 500^{\circ}\text{F}$ . ----- Verify reactor coolant DOSE EQUIVALENT XE-133 specific activity $\leq 280 \mu\text{Ci/gm}$ .	In accordance with the Surveillance Frequency Control Program
SR 3.4.16.2 Verify reactor coolant DOSE EQUIVALENT I-131 specific activity $\leq 1.0 \mu\text{Ci/gm}$ .	In accordance with the Surveillance Frequency Control Program  <u>AND</u>  Between 2 and 6 hours after a THERMAL POWER change of $\geq 15\%$ RTP within a 1 hour period



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. 380  
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 (the facility), Renewed Facility Operating License No. DPR-38 filed by the Duke Energy Carolinas, LLC (the licensee), dated December 15, 2009, as supplemented by letter dated September 22, 2011, 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.

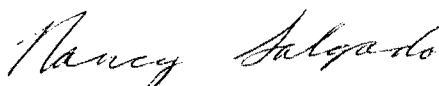
2. Accordingly, the license is hereby amended by page changes to the Technical Specifications as indicated in the attachment to this license amendment, and Paragraph 3.B of Renewed Facility Operating License No. DPR-38 is hereby amended to read as follows:

B. Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 380, are hereby incorporated in the 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 120 days of issuance. Prior to implementation of the license amendment, the licensee shall incorporate the new dose equivalent Xenon, and dose equivalent Iodine values listed in the tables in Sections 3.1.11.1 and 3.1.11.2 respectively of the Commission's enclosed safety evaluation. The values shall be reflected in the next update of the final safety analysis report submitted to the NRC pursuant to 10 CFR 50.71(e).

FOR THE NUCLEAR REGULATORY COMMISSION



Nancy Salgado, 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: June 25, 2012



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. 382  
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 the Duke Energy Carolinas, LLC (the licensee), dated December 15, 2009, as supplemented by letter dated September 22, 2011, 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-47 is hereby amended to read as follows:

B. Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 382, are hereby incorporated in the 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 120 days of issuance. Prior to implementation of the license amendment, the licensee shall incorporate the new dose equivalent Xenon, and dose equivalent Iodine values listed in the tables in Sections 3.1.11.1 and 3.1.11.2 respectively of the Commission's enclosed safety evaluation. The values shall be reflected in the next update of the final safety analysis report submitted to the NRC pursuant to 10 CFR 50.71(e).

FOR THE NUCLEAR REGULATORY COMMISSION



Nancy Salgado, 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: June 25 , 2012



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. 381  
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 the Duke Energy Carolinas, LLC (the licensee), dated December 15, 2009, as supplemented by letter dated September 22, 2011, 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 7

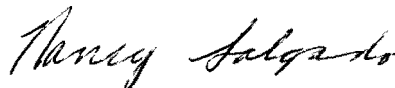
2. Accordingly, the license is hereby amended by page changes to the Technical Specifications as indicated in the attachment to this license amendment, and Paragraph 3.B of Renewed Facility Operating License No. DPR-55 is hereby amended to read as follows:

B. Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 381, are hereby incorporated in the 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 120 days of issuance. Prior to implementation of the license amendment, the licensee shall incorporate the new dose equivalent Xenon, and dose equivalent Iodine values listed in the tables in Sections 3.1.11.1 and 3.1.11.2 respectively of the Commission's enclosed safety evaluation. The values shall be reflected in the next update of the final safety analysis report submitted to the NRC pursuant to 10 CFR 50.71(e).

FOR THE NUCLEAR REGULATORY COMMISSION



Nancy Salgado, 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: June 25, 2012



ATTACHMENT TO LICENSE AMENDMENT NO. 380  
RENEWED FACILITY OPERATING LICENSE NO. DPR-38  
DOCKET NO. 50-269  
AND  
TO LICENSE AMENDMENT NO. 382  
RENEWED FACILITY OPERATING LICENSE NO. DPR-47  
DOCKET NO. 50-270  
AND  
TO LICENSE AMENDMENT NO. 381  
RENEWED FACILITY OPERATING LICENSE NO. DPR-55  
DOCKET NO. 50-287

Replace the following pages of the Licenses with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

Remove Pages

Licenses

License No. DPR-38, page 3  
License No. DPR-47, page 3  
License No. DPR-55, page 3

Technical Specifications

1.1-3  
3.4.11-1  
3.4.11-2  
3.4.11-3

Insert Pages

Licenses

License No. DPR-38, page 3  
License No. DPR-47, page 3  
License No. DPR-55, page 3

Technical Specifications

1.1-3  
3.4.11-1  
3.4.11-2  
none

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. 380 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. 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. 382 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. 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. 381 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

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1.1 Definitions (continued)

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CONTROL RODS	CONTROL RODS shall be all full length safety and regulating rods that are used to shut down the reactor and control power level during maneuvering operations.
CORE ALTERATION	CORE ALTERATION shall be the movement of any fuel, sources, or reactivity control components, within the reactor vessel with the vessel head removed and fuel in the vessel. Suspension of CORE ALTERATIONS shall not preclude completion of movement of a component to a safe position.
CORE OPERATING LIMITS REPORT (COLR)	The COLR is the unit specific document that provides cycle specific parameter limits for the current reload cycle. These cycle specific limits shall be determined for each reload cycle in accordance with Specification 5.6.5. Plant operation within these limits is addressed in individual Specifications.
DOSE EQUIVALENT I-131	DOSE EQUIVALENT I-131 shall be that concentration of I-131 (microcuries per gram) that alone would produce the same dose when inhaled as the combined activities of iodine isotopes I-131, I-132, I-133, I-134, and I-135 actually present. The determination of DOSE EQUIVALENT I-131 shall be performed using Committed Dose Equivalent (CDE) or Committed Effective Dose Equivalent (CEDE) dose conversion factors from Table 2.1 of the Environmental Protection Agency (EPA) Federal Guidance Report No. 11.
DOSE EQUIVALENT XE-133	DOSE EQUIVALENT XE-133 shall be that concentration of Xe-133 (microcuries per gram) that alone would produce the same acute dose to the whole body as the combined activities of noble gas nuclides Kr-85m, Kr-85, Kr-87, Kr-88, Xe-131m, Xe-133m, Xe-133, Xe-135m, Xe-135, and Xe-138 actually present. If a specific noble gas nuclide is not detected, it should be assumed to be present at the minimum detectable activity. The determination of DOSE EQUIVALENT XE-133 shall be performed using effective dose conversion factors for air submersion listed in Table III.1 of EPA Federal Guidance Report No. 12, 1993, "External Exposure to Radionuclides in Air, Water, and Soil."

### 3.4 REACTOR COOLANT SYSTEM (RCS)

#### 3.4.11 RCS Specific Activity

LCO 3.4.11 The RCS DOSE EQUIVALENT I-131 and DOSE EQUIVALENT XE-133 specific activity shall be within limits.

APPLICABILITY: MODES 1, 2, 3, and 4.

#### ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. DOSE EQUIVALENT I-131 not within limit.	<p>-----NOTE----- LCO 3.0.4 is not applicable. -----</p> <p>A.1 Verify DOSE EQUIVALENT I-131 <math>\leq 50 \mu\text{Ci/gm.}</math></p> <p><u>AND</u></p> <p>A.2 Restore DOSE EQUIVALENT I-131 to within limit.</p>	Once per 4 hours
		48 hours
B. DOSE EQUIVALENT XE-133 not within limit.	<p>-----NOTE----- LCO 3.0.4 is not applicable. -----</p> <p>B.1 Restore DOSE EQUIVALENT XE-133 to within limit</p>	48 hours

(continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. Required Action and associated Completion Time of Condition A or B not met.	C.1 Be in MODE 3.	12 hours
	<u>AND</u>	
<u>OR</u>	C.2 Be in MODE 5.	36 hours
DOSE EQUIVALENT I-131 > 50 $\mu\text{Ci/gm.}$		

#### SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.4.11.1 -----NOTE----- Only required to be performed in MODE 1, 2, and 3 with RCS average temperature $\geq 500\text{F.}$ ----- Verify reactor coolant DOSE EQUIVALENT XE-133 specific activity $\leq 280 \mu\text{Ci/gm.}$	In accordance with the Surveillance Frequency Control Program
SR 3.4.11.2 Verify reactor coolant DOSE EQUIVALENT I-131 specific activity $\leq 1.0 \mu\text{Ci/gm.}$	In accordance with the Surveillance Frequency Control Program  <u>AND</u> Between 2 and 6 hours after THERMAL POWER change of $\geq 15\%$ RTP within a 1 hour period



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO

AMENDMENT NO. 268 TO RENEWED FACILITY OPERATING LICENSE NPF-35

AMENDMENT NO. 264 TO RENEWED FACILITY OPERATING LICENSE NPF-52

AMENDMENT NO. 266 TO RENEWED FACILITY OPERATING LICENSE NPF-9

AMENDMENT NO. 246 TO RENEWED FACILITY OPERATING LICENSE NPF-17

AMENDMENT NO. 380 TO RENEWED FACILITY OPERATING LICENSE NO. DPR-38

AMENDMENT NO. 382 TO RENEWED FACILITY OPERATING LICENSE NO. DPR-47

AND

AMENDMENT NO. 381 TO RENEWED FACILITY OPERATING LICENSE NO. DPR-55

DUKE ENERGY CAROLINAS, LLC

CATAWBA NUCLEAR STATION, UNITS 1 AND 2

DOCKET NOS. 50-413 AND 50-414

MCGUIRE NUCLEAR STATION, UNITS 1 AND 2

DOCKET NOS. 50-369 AND 50-370

OCONEE NUCLEAR STATION, UNITS 1, 2, AND 3

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

1.0 INTRODUCTION

By letter dated December 15, 2009 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML093560077), Duke Energy Carolinas, LLC (Duke Energy, the licensee), submitted a license amendment request (LAR) requesting changes to the Technical Specifications (TSs) for the Catawba Nuclear Station, Units 1 and 2 (Catawba 1 and 2), McGuire Nuclear Station, Units 1 and 2 (McGuire 1 and 2), and Oconee Nuclear Station, Units 1, 2, and 3 (Oconee 1, 2, and 3). The requested changes are the adoption of Technical Specification Task Force (TSTF) Standard Technical Specifications (STS) change document



TSTF-490, Revision 0, "Deletion of E Bar [average disintegration energy] Definition and Revision to Reactor Coolant System [RCS] Specific Activity TS" for pressurized water reactor (PWR) STS (ADAMS Accession No. ML052630462).

By letter dated September 13, 2005, TSTF-490 was submitted for Nuclear Regulatory Commission (NRC) staff review. This TSTF involves changes to NUREG-1430, NUREG-1431, and NUREG-1432, STS 3.4.16, RCS specific activity, with the addition of a new limit for noble gas specific activity. The noble gas specific activity limit would be based on a new dose equivalent Xenon (Xe)-133 (DEX) definition that replaces the current TS E Bar definition. In addition, the current dose equivalent Iodine (I)-131 (DEI) definition would be revised to allow the use of additional thyroid dose conversion factors (DCFs). The model safety evaluation prepared by the NRC was initially published in the *Federal Register* on November 20, 2006 (71 FR 67170) under the consolidated line item improvement process (CLIP) and revised on March 15, 2007 (72 FR 12217).

During review of licensee's proposed adoption of TSTF-490, the NRC staff had concerns, which were addressed by the licensee's supplement dated September 22, 2011 (ADAMS Accession No. ML11271A027). The September 22, 2011, supplement proposed new TS SRs.

The NRC staff reviewed the September 22, 2011, letter and found it did not expand the scope of the application as originally noticed, and did not change the NRC staff's original proposed no significant hazards consideration determination as published in the *Federal Register* on March 23, 2010 (75 FR 13789).

## 2.0 REGULATORY EVALUATION

The NRC staff evaluated the impact of the proposed changes as they relate to the radiological consequences of affected design-basis accidents (DBAs) that use the RCS inventory as the source term. The source term assumed in radiological analyses should be based on the activity associated with the projected fuel damage or the maximum RCS TS values, whichever maximizes the radiological consequences. The limits on RCS specific activity ensure that the offsite doses are appropriately limited for accidents that are based on releases from the RCS with no significant amount of fuel damage.

The Steam Generator Tube Rupture (SGTR) accident and the Main Steam Line Break (MSLB) accident typically do not result in fuel damage, and therefore the radiological consequence analyses are based on the release of primary coolant activity at maximum TS limits. For accidents that result in fuel damage, the additional dose contribution from the initial activity in the RCS is not normally evaluated and is considered to be insignificant in relation to the dose resulting from the release of fission products from the damaged fuel.

For licensees that use the accident source term as defined in Technical Information Document (TID) 14844, U.S. Atomic Energy Commission (AEC), 1962, "Calculation of Distance Factors for Power and Test Reactors Sites," in their dose consequence analyses, the NRC staff uses the regulatory guidance provided in NUREG-0800, "Standard Review Plan [SRP] for the Review of Safety Analysis Reports for Nuclear Power Plants," Section 15.1.5, "Steam System Piping Failures Inside and Outside of Containment (PWR)," Appendix A, "Radiological Consequences of Main Steam Line Failures Outside Containment of a PWR," Revision 2, for the evaluation of

MSLB accident analyses and NUREG-0800, SRP Section 15.6.3, "Radiological Consequences of Steam Generator Tube Failure (PWR)," Revision 2, for evaluating SGTR accident analyses.

For licensees using the alternative source term (AST) in its dose consequence analyses, such as Catawba 1 and 2, McGuire 1 and 2, and Oconee 1, 2, and 3, the NRC staff uses the regulatory guidance provided in NUREG-0800, SRP Section 15.0.1, "Radiological Consequence Analyses Using Alternative Source Terms," Revision 0, July 2000, and the methodology and assumptions stated in RG 1.183, "Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors," July 2000.

Catawba 1 and 2, McGuire 1 and 2, and Oconee 1, 2, and 3, were evaluated against the dose criteria specified in paragraph (b)(2) of 10 CFR 50.67. The off-site dose criteria are 25 rem total effective dose equivalent (TEDE) at the exclusion area boundary (EAB) for any 2-hour period following the onset of the postulated fission product release and 25 rem TEDE at the outer boundary of the low population zone for the duration of the postulated fission product release. In addition, 10 CFR 50.67(b)(2)(iii) requires that adequate radiation protection be provided to permit access and occupancy of the control room under accident conditions without personnel receiving radiation exposures in excess of 5 rem TEDE for the duration of the accident.

### 3.0 TECHNICAL EVALUATION

#### 3.1 Technical evaluation of TSTF-490 TS changes

##### 3.1.1 Revision to the Definition of DEI

The DCFs for use in the determination of DEI at Catawba 1 and 2, McGuire 1 and 2, and Oconee 1, 2, and 3, shall be the committed dose equivalent (CDE) or Committed Effective Dose Equivalent (CEDE) DCFs from Table 2.1, Exposure-to-Dose Conversion Factors for Inhalation," of the Environmental Protection Agency (EPA) Federal Guidance Report (FGR) No. 11, "Limiting Values of Radionuclide Intake and Dose Conversion Factors For Inhalation, Submersion, And Ingestion," as these are used by the licensee in the dose consequence analyses.

##### 3.1.2 Deletion of the Definition of E Bar and the Addition of a New Definition for DEX

The new definition for DEX is similar to the revised definition for DEI. The determination of DEX will be performed in a similar manner to that currently used in determining DEI, except that the calculation of DEX is based on the acute dose to the whole body and considers the noble gases Kr-85m, Kr-85, Kr-87, Kr-88, Xe-131m, Xe-133m, Xe-133, Xe-135m, Xe-135, and Xe-138 which are significant in terms of contribution to whole body dose. Some noble gas isotopes are not included due to low concentration, short half life, or small dose conversion factor. The calculation of DEX at Catawba 1 and 2, McGuire 1 and 2, and Oconee 1, 2, and 3, will use the effective DCFs from Table III.1, "Dose Coefficients for Air Submersion," of EPA FGR No. 12, "External Exposure to Radionuclides in Air, Water, and Soil." Using this approach, the limit on the amount of noble gas activity in the primary coolant would not fluctuate with variations in the calculated values of E Bar. If a specified noble gas nuclide is not detected, the new definition states that it should be assumed the nuclide is present at the minimum detectable activity. This will result in a conservative calculation of DEX.

When E Bar is determined using a design basis approach, in which it is assumed that one percent of the power is being generated by fuel rods having cladding defects and it is also assumed that there is no removal of fission gases from the letdown flow, the value of E Bar is dominated by Xe-133. The other nuclides have relatively small contributions. However, during normal plant operation there is typically only a small amount of fuel clad defects and the radioactive nuclide inventory can become dominated by tritium and corrosion and/or activation products, resulting in the determination of a value of E Bar that is very different than would be calculated using the design basis approach. Because of this difference, the accident dose analyses become disconnected from plant operation and the TS limiting condition for operation (LCO) becomes essentially meaningless. It also results in a TS limit that can vary during operation as different values for E Bar are determined.

The proposed TS change will implement an LCO that is consistent with the whole body radiological consequence analyses, which are sensitive to the noble gas activity in the primary coolant, but not to other non-gaseous activity currently captured in the E Bar definition. LCO 3.4.16 for Catawba 1 and 2 and McGuire 1 and 2, and LCO 3.4.11 for Oconee 1, 2, and 3 specify the limit for primary coolant gross specific activity as  $100/E \text{ Bar } \mu\text{Ci/gm}$ . The current E Bar definition includes radioisotopes that decay by the emission of both gamma and beta radiation. The current Condition B of LCO 3.4.11 for Oconee 1, 2, and 3, and LCO 3.4.16 for Catawba 1 and 2 and McGuire 1 and 2 would rarely, if ever, be entered for exceeding  $100/E \text{ Bar}$  since the calculated value is very high (the denominator is very low) if beta emitters such as tritium (H-3) are included in the determination, as required by the E Bar definition. TS definition for E - AVERAGE DISINTEGRATION ENERGY (E Bar) is deleted and replaced with a new definition for DEX which states:

"DOSE EQUIVALENT XE-133 shall be that concentration of Xe-133 (microcuries per gram) that alone would produce the same acute dose to the whole body as the combined activities of noble gas nuclides Kr-85m, Kr-85, Kr 87, Kr-88, Xe-131m, Xe-133m, Xe-133, Xe-135m, Xe-135, and Xe 138 actually present. If a specific noble gas nuclide is not detected, it should be assumed to be present at the minimum detectable activity. The determination of DOSE EQUIVALENT XE-133 shall be performed using effective dose conversion factors for air submersion listed in Table III.1 of EPA FGR No. 12, 1993, "External Exposure to Radionuclides in Air, Water, and Soil."

The proposed change incorporating the newly defined quantity DEX is acceptable to the NRC staff from a radiological dose perspective since it will result in an LCO that more closely relates the non-iodine RCS activity limits to the dose consequence analyses which form their bases.

### 3.1.3 LCO 3.4.11 Oconee 1, 2, and 3, and LCO 3.4.16, Catawba 1 and 2 and McGuire 1 and 2 "RCS Specific Activity"

LCO 3.4.11 for Oconee 1, 2, and 3, and LCO 3.4.16 for Catawba 1 and 2 and McGuire 1 and 2, are modified to specify that iodine specific activity in terms of DEI and noble gas specific activity in terms of DEX shall be within limits. Currently the limiting indicators are not explicitly identified in the LCOs, but are instead defined in current Condition C and SR 3.4.16.1 for Catawba 1 and 2 and McGuire 1 and 2, and SR 3.4.11.1 for Oconee 1, 2 and 3, for gross non-iodine specific activity, and in current Condition A and SR 3.4.16.2 for Catawba 1 and 2 and McGuire 1 and 2 and SR 3.4.11.2 for Oconee 1, 2, and 3, for iodine specific activity.

### 3.1.4 TS 3.4.11 Oconee 1, 2, and 3 and TS 3.4.16 Catawba 1 and 2 and McGuire 1 and 2 Applicability

In the adoptions of TSTF-490 by the licensee, TS 3.4.11 for Oconee 1, 2, and 3, and TS 3.4.16 for Catawba 1 and 2 and McGuire 1 and 2, the required applicability statements are changed to also include all of MODE 3 and MODE 4. It is necessary for the LCO to apply during MODES 1 through 4 to limit the potential radiological consequences of an SGTR or MSLB that may occur during these MODES. In MODE 5 with the RCS loops filled, the steam generators are specified as a backup means of decay heat removal via natural circulation. In this mode, however, due to the reduced temperature of the RCS, the probability of a DBA involving the release of significant quantities of RCS inventory is greatly reduced. Therefore, the monitoring of RCS specific activity is not required. In MODE 5, with the RCS loops not filled, and in MODE 6, the steam generators are not used for decay heat removal, the RCS and steam generators are depressurized, and primary to secondary leakage is minimal. Therefore, the monitoring of RCS specific activity is not required. The change to modify the TS Applicability to include all of MODE 3 and MODE 4 is necessary to limit the potential radiological consequences of an SGTR or MSLB that may occur during these MODES, and is therefore acceptable from a radiological dose perspective.

### 3.1.5 TS 3.4.11 Condition A for Oconee 1, 2, and 3, and TS 3.4.16 Condition A for Catawba 1 and 2 and McGuire 1 and 2

In the licensee's proposed adoption of TSTF-490, TS 3.4.11 Condition A for Oconee 1, 2, and 3, and TS 3.4.16 Condition A for Catawba 1 and 2 and McGuire 1 and 2, is revised by replacing the DEI site-specific limit "> [greater than] 1.0  $\mu\text{Ci/gm}$ " with the words "not within limit" to be consistent with the revised TS 3.4.16 for Catawba 1 and 2 and McGuire 1 and 2, and TS 3.4.11 for Oconee 1, 2, and 3, LCO format. The site-specific DEI limit of > 1.0  $\mu\text{Ci/gm}$  is contained in the current TS SRs 3.4.16.2 for Catawba 1 and 2 and McGuire 1 and 2, and in SR 3.4.11.2 for Oconee 1, 2, and 3. This proposed format change will not alter current TS requirements and is acceptable from a radiological dose perspective.

TS 3.4.16 Required Action A.1 for Catawba 1 and 2 and McGuire 1 and 2, and TS 3.4.11 Required Action A.1 for Oconee 1, 2, and 3, is revised to remove the reference to Figure 3.4.16-1 for Catawba 1 and 2, and McGuire 1 and 2, and Figure 3.4.11-1 for Oconee 1, 2, and 3 "Reactor Coolant DOSE EQUIVALENT I-131 Specific Activity Limit versus Percent of RATED THERMAL POWER" and insert a limit of less than or equal to the site-specific DEI spiking limit. The curves contained in the current TSs were provided by the AEC in a June 12, 1974, letter from the AEC on the subject, "Proposed Standard Technical Specifications for Primary Coolant Activity." Radiological dose consequence analyses for SGTR and MSLB accidents that take into account the pre-accident iodine spike do not consider the elevated RCS iodine specific activities permitted by Figure 3.4.16-1 for Catawba 1 and 2, and McGuire 1 and 2, and Figure 3.4.11-1 for Oconee 1, 2, and 3, for operation at power levels below 80 percent reactor thermal power (RTP). Instead, the pre-accident iodine spike analyses assume a DEI concentration 60 times higher than the corresponding long term equilibrium value, which corresponds to the specific activity limit associated with 100 percent RTP operation. It is acceptable that TS 3.4.16 Required Action 1 for Catawba 1 and 2 and McGuire 1 and 2, and TS 3.4.11 Required Action 1 for Oconee 1, 2, and 3, should be based on the short term site-specific DEI spiking limit to be consistent with the assumptions contained in the radiological consequence analyses.

3.1.6 Revisions to TS 3.4.11 Conditions B and C for Oconee 1, 2, and 3, and revisions to TS 3.4.16 Condition B Catawba 1 and 2 and McGuire 1 and 2, to include Action for DEX Limit

TS 3.4.16 Condition B for Catawba 1 and 2, and McGuire 1 and 2, and TS 3.4.11-1 Condition C for Oconee 1, 2, and 3, is replaced with a new Condition B at all sites for DEX not within limits. This change is made to be consistent with the change to the TS 3.4.11 Oconee 1, 2, and 3, and TS 3.4.16 for Catawba 1 and 2 and McGuire 1 and 2, LCO which requires the DEX-specific activity to be within limits as discussed above in Section 3.1.3. The DEX limit is site-specific and the numerical value in units of  $\mu\text{Ci/gm}$  is contained in revised SR 3.4.16.1 for Catawba 1 and 2 and McGuire 1 and 2, and SR 3.4.11.1 for Oconee 1, 2, and 3. The site-specific limit for DEX in  $\mu\text{Ci/gm}$  is established based on the maximum accident analysis RCS activity corresponding to one percent fuel clad defects with sufficient margin to accommodate the exclusion of those isotopes based on low concentration, short half life, or small DCFs. The primary purpose of the TS LCO on RCS specific activity and its associated Conditions is to support the dose analyses for DBAs. The whole body dose is primarily dependent on the noble gas activity, not the non-gaseous activity currently captured in the E Bar definition.

The Completion Time for revised TS 3.4.16 for Catawba 1 and 2 and McGuire 1 and 2, and TS 3.4.11 for Oconee 1, 2, and 3, Required Action B.1, will require the restoration of DEX to within the specified limit within 48 hours. This is consistent with the Completion Time for current Required Action A.2 for DEI. The radiological consequences for the SGTR and the MSLB accidents demonstrate that the calculated thyroid doses are generally a greater percentage of the applicable acceptance criteria than the calculated whole body doses. It then follows that the Completion Time for noble gas activity being out of specification in the revised Required Action B.1 should be at least as great as the Completion Time for iodine specific activity being out of specification in current Required Action A.2. Therefore, the NRC staff finds the Completion Time of 48 hours for revised Required Action B.1 is acceptable from a radiological dose perspective.

A Note is also added to the revised Required Action B.1 that states LCO 3.0.4.c is applicable. This Note would allow entry into a Mode, or other specified condition in the LCO Applicability, when LCO 3.4.16 Catawba 1 and 2 and McGuire 1 and 2 is not being met and is the same Note that is currently stated for Required Actions A.1 and A.2. The proposed Note would allow entry into the applicable Modes from MODE 4 to MODE 1 (power operation) while the DEX limit is exceeded and the DEX is being restored to within its limit. This Mode change is acceptable due to the significant conservatism incorporated into the DEX specific activity limit, the low probability of an event occurring which is limiting due to exceeding the DEX specific activity limit, and the ability to restore transient specific excursions while the plant remains at, or proceeds to, power operation. For Oconee 1, 2, and 3 the wording of the Note is slightly different, in order to correspond to the Oconee version of LCO 3.0.4, but the result is the same.

3.1.7 TS 3.4.11 Oconee 1, 2, and 3, and TS 3.4.16 Catawba 1 and 2 and McGuire 1 and 2, Condition C

TS 3.4.16, Condition C, for Catawba 1 and 2, and McGuire 1 and 2 is revised to include Condition B (DEX not within limit) if the Required Action and associated Completion Time of Condition B is not met. This is consistent with the changes made to Condition B which now provide the same Completion Time for both components of RCS specific activity as discussed in

the revision to Condition B. TS 3.4.11, Condition C, for Oconee 1, 2, and 3 is revised to include a Required Action if the Required Action and associated complete time for Condition A or Condition B is not met. These changes are consistent with adoption of TSTF-490.

The revision to Condition C also replaces the limit on DEI from deleted Figure 3.4.16-1 for Catawba 1 and 2 and McGuire 1 and 2, and Figure 3.4.11-1 for Oconee 1, 2, and 3, with a site-specific value of  $> 60 \mu\text{Ci/gm}$  for Catawba 1 and 2 and McGuire 1 and 2, and  $> 50 \mu\text{Ci/gm}$  for Oconee 1, 2, and 3. This change makes Condition C consistent with the changes made to TS 3.4.16-1 for Catawba 1 and 2 and McGuire 1 and 2, and TS 3.4.11-1, Required Action A.1, for Oconee 1, 2, and 3.

The change to TS 3.4.16 for Catawba 1 and 2 and McGuire 1 and 2, and TS 3.4.11, Required Action C.1, for Oconee 1, 2 and 3, requires the plant to be in MODE 3 within 6 hours for Catawba 1 and 2 and McGuire 1 and 2, and within 12 hours for Oconee 1, 2, and 3, and adds a new Required Action C.2, which requires the plant to be in MODE 5 within 36 hours. These changes are consistent with the changes made to TS 3.4.16 for Catawba 1 and 2 and McGuire 1 and 2, and to the changes made to TS 3.4.11 for Oconee 1, 2, and 3, concerning applicability. The revised LCO is applicable throughout all of MODES 1 through 4 to limit the potential radiological consequences of an SGTR or MSLB that may occur during these MODES. In MODE 5 with the RCS loops filled, the steam generators are specified as a backup means of decay heat removal via natural circulation. In this mode, however, due to the reduced temperature of the RCS, the probability of a DBA involving the release of significant quantities of RCS inventory is greatly reduced. Therefore, monitoring of RCS specific activity is not required. In MODE 5, with the RCS loops not filled, and in MODE 6, the steam generators are not used for decay heat removal, the RCS and steam generators are depressurized, and primary to secondary leakage is minimal. Therefore, the monitoring of RCS specific activity is not required.

A new TS 3.4.16, Required Action C.2, for Catawba 1 and 2 and McGuire 1 and 2, and a new TS 3.4.11, Required Action C.2, for Oconee 1, 2, and 3, Completion Time of 36 hours, is added for the plant to reach MODE 5. This Completion Time is reasonable, based on operating experience, to reach MODE 5 from full power conditions in an orderly manner and without challenging plant systems, and the value of 36 hours is consistent with other TS which have a Completion Time to reach MODE 5.

### 3.1.8 SR 3.4.16.1 DEX Surveillance

The changes replace the current SRs 3.4.16.1 for Catawba 1 and 2 and McGuire 1 and 2, and SR 3.4.11.1 for Oconee 1, 2, and 3, for RCS gross specific activity with a surveillance to verify that the site-specific reactor coolant DEX specific activity is  $\leq 280 \mu\text{Ci/gm}$  for Catawba 1 and 2, McGuire 1 and 2, and Oconee 1, 2, and 3. This change provides a surveillance for the new LCO limit added to TS 3.4.16 for Catawba 1 and 2 and McGuire 1 and 2, and TS 3.4.11 for Oconee 1, 2, and 3, for DEX. The revised SRs 3.4.16.1 for Catawba 1 and 2 and McGuire 1 and 2, and SR 3.4.11.1 for Oconee 1, 2, and 3, surveillance requires performing a gamma isotopic analysis as a measure of the noble gas specific activity of the reactor coolant. This will be done in accordance with the licensee's Surveillance Frequency Control Program. The use of the Surveillance Frequency Control Program to set the frequency for these surveillances was approved with the NRC issuance of the license amendments associated with licensee's adoption of TSTF-425, "Relocate Surveillance Frequencies To Licensee Controlled – Risk Informed TSTF Initiative 5b," dated March 29, 2011, for Catawba 1 and 2 (ADAMS Accession

No. ML110670536), and McGuire 1 and 2 (ADAMS Accession No. ML110680357) and amendments dated March 21, 2011, for Oconee 1, 2, and 3 (ADAMS Accession No. ML110470446). The new proposed SRs provide an indication of any increase in the noble gas specific activity. The results of the surveillance on DEX allow proper remedial action to be taken before reaching the LCO limit under normal operating conditions.

In the initial NRC approval of TSTF-490, Revision 0, SRs 3.4.16.1 was modified by inclusion of a Note which states, "Only required to be performed in MODE 1." This Note modifies the SR to permit entry into the applicable MODE(S) before performing the surveillance. The NRC staff concluded that this allowance was acceptable due to the significant conservatism incorporated into the specific activity limit, the low probability of an event which is limiting due to exceeding this limit, and the ability to restore transient specific activity excursions while the plant remains at, or proceeds to, power operation. This would allow entry into MODE 4, MODE 3, and MODE 2 prior to performing the surveillance. This allows the surveillance to be performed in any of those MODES, prior to entering MODE 1, similar to the current surveillance SR 3.4.16.2 for DEI.

The licensee in its original application dated December 15, 2009, requested approval of SR 3.4.16.1 for Catawba 1 and 2 and McGuire 1 and 2, and SR 3.4.11.1 for Oconee 1, 2, and 3, to be applicable only in MODE 1 similar to TSTF-490, Revision 0. During its review of the application, the NRC staff raised concerns with the potential disparity between the LCO modes of applicability (MODES 1, 2, 3, and 4) and the limited modes (MODE 1) under which the surveillance is required. The NRC staff was concerned that the proposed TS SRs may exclude sampling during the plant conditions where the LCO may be exceeded and sampling would be required. Such transient conditions would include events such as reactor trip, plant depressurization, shutdown, or startup that end in MODES 2, 3, or 4. Isotopic spiking and fuel failures are more likely during transient conditions rather than during steady state plant operations. Because LCO 3.4.16 for Catawba 1 and 2 and McGuire 1 and 2, and LCO 3.4.11 for Oconee 1, 2, and 3, could potentially be exceeded after a plant transient or power changes, the NRC staff was concerned that the plants would not remain consistent with the design bases analysis from which the LCO limits are derived (e.g. MSLB, SGTR, etc.) if sampling was only required in MODE 1.

After discussions with the licensee, the licensee chose to supersede the December 15, 2009, application with new proposed TSs that addressed the NRC staff concerns. The licensee's September 11, 2011, application proposes changing SR 3.4.16.1 for Catawba 1 and 2 and McGuire 1 and 2, and SR 3.4.11.1 for Oconee 1, 2, and 3, by adding a Note associated with DEX to state "Only required to be performed in MODES 1, 2, and 3 with Reactor Coolant System (RCS) average temperature [Tavg]  $\geq 500$  °F." These changes from the original application eliminate the apparent disparity between the LCO modes of applicability and modes under which the SRs are necessary from a radiological stand point. The revised SRs 3.4.16.1 for Catawba 1 and 2 and McGuire 1 and 2, and SR 3.4.11 for Oconee 1, 2, and 3, Note for DEX, proposed by the licensee is consistent with the LCO modes of applicability of the current TS 3.4.16 for Catawba 1 and 2 and McGuire 1 and 2, and TS 3.4.11 for Oconee 1, 2, and 3.

The proposed SR 3.4.16.1 for Catawba 1 and 2 and McGuire 1 and 2, and SR 3.4.11.1 for Oconee 1, 2, and 3, requiring the sampling of DEX in MODES 1, 2, and 3, with RCS average temperature  $\geq 500$ °F, is adequate since RCS pressure outside these modes may be insufficient

to ensure collection of a representative, homogeneous sample for analysis of gaseous isotopes. Requiring the SR in Modes 1, 2, and 3, with  $T_{ave} \geq 500^{\circ}\text{F}$ , ensures the necessary plant conditions have been established to produce sufficient pressure and sample flow.

The DEX sample is not required in MODE 4, MODE 5, and MODE 6, since the pressures and temperatures on the steam generator tubes to initiate or increase the consequence of a SGTR or MSLB are reduced. Steam generator tubes are designed against thermodynamic and other stresses placed upon them at full power operations and accident conditions. The TSs which control the RCS leakage limit also restrict the amount of leakage that may occur through the steam generators. The RCS activity TS is intended to limit the amount of activity that could be released to the public should a SGTR or MSLB occur. Therefore the NRC staff finds performing sampling in MODES 4, 5, and 6 is not necessary due to the reduced likelihood of a SGTR or MSLB in these modes.

In addition, emergency operating procedures require operators to rapidly reduce RCS pressure in any steam generator tube leak event that requires a unit shutdown. The goal of the procedures is to reduce RCS pressure to be equal to or slightly less than the steam generator pressure so that RCS fluid will cease to enter the secondary side of the steam generator through the leaking tube. These actions aid in preventing or limiting any release to the environment, regardless of RCS activity levels.

The licensee's proposed changes to SRs 3.4.16.1 for Catawba 1 and 2 and McGuire 1 and 2, and SR 3.4.11.1 for Oconee 1, 2, and 3, are more conservative in regard to the existing TS requirements as well as the SRs approved by the NRC associated with TSTF-490. The proposed DEX SRs are in accordance with each plant's current licensing basis.

Based on the above review, the NRC staff finds the proposed SRs 3.4.16.1 for Catawba 1 and 2 and McGuire 1 and 2, and SR 3.4.11.1 for Oconee 1, 2, and 3, are more restrictive and more conservative than the current plants TSs SRs and the TSs SRs approved by the NRC associated with TSTF-490. The variation in SRs is more restrictive and conservative than the current TSs and the changes allowed for by TSTF-490, and therefore the NRC staff finds the proposed SRs acceptable.

### 3.1.9 SR 3.4.16.2 for Catawba 1 and 2 and McGuire 1 and 2, and SR 3.4.11.2 for Oconee 1, 2, and 3

The licensee proposes deleting the SR 3.4.16.2 Note associated with DEI in its entirety. The deletion of the SR 3.4.16.2 Note for DEI in its entirety provides continued assessment of RCS activity for all modes of applicability since DEI will no longer be limited to only MODE 1 operation as is the case in the current TSs. With the deletion of the Note, the licensee is required to sample DEI down through MODE 4. The NRC staff finds this acceptable.

### 3.1.10 Deletion of SR 3.4.16.3 for Catawba 1 and 2 and McGuire 1 and 2, and SR 3.4.11.3 for Oconee 1, 2, and 3

The current SR 3.4.16.3 for Catawba 1 and 2 and McGuire 1 and 2, and SR 3.4.11.3 for Oconee 1, 2, and 3, which required the determination of E Bar, is deleted. The LCO on RCS specific activity supports the dose analyses for DBAs in which the whole body dose is primarily dependent on the noble gas concentration, not the non-gaseous activity currently captured in



the E Bar definition. With the elimination of the limit for RCS gross specific activity and the addition of the new LCO limit for noble gas specific activity, this SR to determine E Bar is no longer required.

### 3.1.11 Consistency of Site-Specific Limits and DCFs for DEX and DEI Surveillances

The licensee analyzed the consistency of their proposed, current, and/or revised definitions for both DEX and DEI, and their limits, and the DCFs used for the determination of DEI and DEX surveillances. Below in the following Tables are the licensee's results.

#### 3.1.11.1 DEX Calculations

As stated in the proposed TS definition, DEX shall be that concentration of Xe-133 (microcuries per gram) that alone would produce the same acute dose to the whole body as the combined activities of noble gas nuclides Kr-85m, Kr-85, Kr-87, Kr-88, Xe-131m, Xe-133m, Xe-133, Xe-135m, Xe-135, and Xe-138 actually present. If a specific noble gas nuclide is not detected, it should be assumed to be present at the minimum detectable activity. The licensee's determination of DEX has been performed using effective dose conversion factors for air submersion listed from Table III.1 of FGR No. 12.

The DEX is determined by multiplying each noble gas RCS concentration ( $\mu\text{Ci/gm}$ ) by its respective DCF from FGR No. 12. Each of these values are then divided by the FGR No. 12 DCF for Xe-133 and then summed to determine the DEX. The tables below illustrate the calculation of DEX for each site. The first column is the list of noble gas isotopes as defined in the proposed TS definition of DEX. Column two is the concentration of noble gases in  $\mu\text{Ci/gm}$  assumed for both the SGTR and MSLB accidents. Column three lists the respective DCF for each noble gas isotope as given in FGR No. 12, Table III.1. The last column illustrates the calculation of DEX as previously described.

#### DEX Calculation for Catawba 1 and 2

Isotope	Concentration ( $\mu\text{Ci/gm}$ )	FGR No. 12, Table III.1 DCFs ( $\text{Sv-s/Bq-m}^3$ )	DEX ( $\mu\text{Ci/gm}$ )
KR-85M	2.06E+00	7.48E-15	9.88E+00
KR-85	7.52E+00	1.19E-16	5.74E-01
KR-87	1.34E+00	4.12E-14	3.54E+01
KR-88	3.71E+00	1.02E-13	2.43E+02
XE-131M	2.27E+00	3.89E-16	5.65E-01
XE-133M	1.75E+01	1.37E-15	1.54E+01
XE-133	2.78E+02	1.56E-15	2.78E+02
XE-135M	4.95E-01	2.04E-14	6.47E+00
XE-135	7.42E+00	1.19E-14	5.66E+01
XE-138	6.59E-01	5.77E-14	2.44E+01
		DEX	6.70E+02

#### DEX Calculation for McGuire 1 and 2

Isotope	Concentration (μCi/gm)	FGR No. 12, Table III.1 DCFs (Sv-s/Bq-m3)	DEX (μCi/gm)
KR-85M	2.10E+00	7.48E-15	1.01E+01
KR-85	8.80E+00	1.19E-16	6.71E-01
KR-87	1.20E+00	4.12E-14	3.17E+01
KR-88	3.70E+00	1.02E-13	2.42E+02
XE-131M	1.90E+00	3.89E-16	4.74E-01
XE-133M	3.10E+00	1.37E-15	2.72E+00
XE-133	2.81E+02	1.56E-15	2.81E+02
XE-135M	7.00E-01	2.04E-14	9.15E+00
XE-135	6.30E+00	1.19E-14	4.81E+01
XE-138	7.00E-01	5.77E-14	2.59E+01
<b>DEX</b>			<b>6.52E+02</b>

#### DEX Calculation for Oconee 1, 2, and 3

Isotope	Concentration (μCi/gm)	FGR No. 12, Table III.1 DCFs (Sv-s/Bq-m3)	DEX (μCi/gm)
KR-85M	2.15E+00	7.48E-15	1.03E+01
KR-85	1.82E+01	1.19E-16	1.39E+00
KR-87	1.18E+00	4.12E-14	3.11E+01
KR-88	3.69E+00	1.02E-13	2.41E+02
XE-131M	4.39E+00	3.89E-16	1.09E+00
XE-133M	5.76E+00	1.37E-15	5.06E+00
XE-133	3.93E+02	1.56E-15	3.93E+02
XE-135M	4.47E-01	2.04E-14	5.84E+00
XE-135	1.14E+01	1.19E-14	8.67E+01
XE-138	7.19E-01	5.77E-14	2.66E+01
<b>DEX</b>			<b>8.02E+02</b>

As shown in the tables above, the calculated result for DEX for Catawba 1 and 2 is 6.70E+02 μCi/gm, for McGuire 1 and 2 is 6.52E+02 μCi/gm, and for Oconee 1, 2, and 3 is 8.02E+02 μCi/gm, for the SGTR and MSLB design basis radiological dose consequences analyses performed by the licensee. The values calculated by the licensee for DEX ensure that the accident dose criteria in 10 CFR 100.11 and 10 CFR 50.67 is not exceeded. The proposed TS DEX limit for the adoption of TSTF-490 is 280 μCi/gm. This limit provides margin between the TS limit, where action would be required, and the calculated DEX results for each site.

#### 3.1.11.2 DEI Calculations

As stated in the proposed TS definition, DEI shall be that concentration of I-131 (microcuries per gram) that alone would produce the same acute dose when inhaled as the combined activities of iodine isotopes I-131, I-132, I-133, I-134, and I-135 actually present. As previously stated, the determination of DEI shall be performed using the CDE or CEDE DCFs from Table 2.1 of EPA FGR No. 11.

The DEI is determined by multiplying each iodine RCS concentration (μCi/gm) by its respective DCF from FGR No. 11. Each of these values is then divided by the FGR No. 11 DCF for I-131

and then summed to determine the DEI. The tables below illustrate the calculation of DEI for design basis DEI accidents. The first column is the list of iodine isotopes as defined in the proposed TS definition of DEI. Column two is the concentration of iodine isotopes in  $\mu\text{Ci/gm}$  assumed in for both SGTR and MSLB accidents. Column three lists the respective DCF for each iodine isotope as given in FGR No. 11, Table 2.1. The last column illustrates the calculation of DEI as previously described.

Calculation of DEI for Catawba 1 and 2

Isotope	Concentration ( $\mu\text{Ci/gm}$ )	FGR No. 11, Table 2.1 DCFs (Sv/Bq)	DEI ( $\mu\text{Ci/gm}$ )
I-131	7.56E-01	8.89E-09	7.56E-01
I-132	2.72E-01	1.03E-10	3.15E-03
I-133	1.21E+00	1.58E-09	2.15E-01
I-134	1.81E-01	3.55E-11	7.25E-04
I-135	6.65E-01	3.32E-10	2.49E-02
DEI			1.00E+00

Calculation of DEI for McGuire 1 and 2

Isotope	Concentration ( $\mu\text{Ci/gm}$ )	FGR No. 11, Table 2.1 DCFs (Sv/Bq)	DEI ( $\mu\text{Ci/gm}$ )
I-131	7.56E-01	8.89E-09	7.56 E-01
I-132	2.72E-01	1.03E-10	3.15E-03
I-133	1.21E+00	1.58E-09	2.15E-01
I-134	1.81E-01	3.55E-11	7.25E-04
I-135	6.65E-01	3.32E-10	2.49E-02
DEI			1.00E+00

Calculation of DEI for Oconee 1, 2, and 3

Isotope	Concentration ( $\mu\text{Ci/gm}$ )	FGR No. 11, Table 2.1 DCFs (Sv/Bq)	DEI ( $\mu\text{Ci/gm}$ )
I-131	9.55E-01	8.89E-09	9.55E-01
I-132	1.42E-01	1.03E-10	1.64E-03
I-133	2.48E-01	1.58E-09	4.40E-02
I-134	1.32E-02	3.55E-11	5.27E-05
I-135	7.38E-02	3.32E-10	2.76E-03
DEI			1.00E+00

As shown in the tables above, the calculated DEI for the Catawba 1 and 2, McGuire 1 and 2, and Oconee 1, 2, and 3, based on the current SGTR and MSLB design basis radiological dose consequences analyses, meets the proposed TS limit for DEI limit of 1.0  $\mu\text{Ci/gm}$ .

The NRC staff verified that the site-specific limits for DEI and DEX, the DCFs, and the RCS radioisotopic concentrations, are consistent with the current design basis dose analyses (e.g. SGTR and MSLB).

### 3.2 Precedents

The TS developed for the Westinghouse AP600 and AP1000 advanced reactor designs incorporate an LCO for RCS DEX activity in place of the LCO on non-iodine gross specific activity based on E Bar. This approach was approved by the NRC staff for the AP600 in NUREG-1512, "Final Safety Evaluation Report Related to the Certification of the AP600 Standard Design, Docket No. 52-003," completed in August 1998 and published in September 1998 (ADAMS Package No. ML100110373) and for the AP1000 in the NRC letter to Westinghouse Electric Company dated September 13, 2004 (ADAMS Accession No. ML042400020). In addition, the curve describing the maximum allowable iodine concentration during the 48-hour period of elevated activity as a function of power level was not included in the TS approved for the AP600 and AP1000 advanced reactor designs.

TSTF-490 has been approved by the NRC staff for adoption at the following facilities:

- Indian Point Nuclear Generating Units 2 and 3, NRC staff letter dated June 17, 2008 (ADAMS Accession No. ML081350179)
- Millstone Power Station, Units 2 and 3, NRC staff letter dated October 27, 2008 (ADAMS Accession No. ML082820615).
- North Anna, Power Station, Units 1 and 2, NRC staff letter dated March 3, 2010 (ADAMS Accession No. ML093500400).
- Three Mile Island Nuclear Station, Unit 1, NRC staff letter dated March 11, 2010 (ADAMS Accession No. ML100320493)
- Arkansas Nuclear One, Unit 1, NRC staff letter dated March 18, 2010 (ADAMS Accession No. ML100610687).
- Braidwood Station, Units 1 and 2, and Byron Station, Units 1 and 2, NRC staff letter dated March 23, 2010 (ADAMS Accession No. ML100690386).

### 4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the North Carolina and South Carolina State officials were notified of the proposed issuance of the amendments. The State officials 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 published in the *Federal Register* on March 23, 2010 (75 FR 13789). 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 Contributors: L. Benton  
J. Stang

Date: June 25, 2012

B. Waldrep

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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. 50-413, 50-414, 50-369, 50-370,  
50-269, 50-270, and 50-287

Enclosures:

1. Amendment No. 268 to NPF-35
2. Amendment No. 264 to NPF-52
3. Amendment No. 266 to NPF-9
4. Amendment No. 246 to NPF-17
5. Amendment No. 380 to DPR-38
6. Amendment No. 382 to DPR-47
7. Amendment No. 381 to DPR-55
8. Safety Evaluation

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