



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

November 4, 2014

Mr. Kelvin Henderson  
Site Vice President  
Catawba Nuclear Station  
Duke Energy Carolinas, LLC  
4800 Concord Road  
York, NC 29745

SUBJECT: CATAWBA NUCLEAR STATION, UNITS 1 AND 2: REQUEST FOR  
ADDITIONAL INFORMATION REGARDING LICENSE AMENDMENT  
REQUEST TO SUPPORT A MEASUREMENT UNCERTAINTY RECAPTURE  
POWER UPRATE FOR CATAWBA, UNIT 1 (TAC NOS. MF4526 AND MF4527)

Dear Mr. Henderson,

By letter dated June 23, 2014 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML14176A109), Duke Energy Carolinas, LLC submitted a license amendment request to increase the Catawba, Unit 1, authorized core power level from 3,411 megawatts thermal (MWt) to 3,469 MWt, an increase of approximately 1.7 percent rated thermal power.

The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed the licensee's submittal and determined that additional information is needed in order to complete the NRC staff's review. Enclosure 1 describes this request for additional information (RAI). Responses to the RAIs are requested within 45 days.

If you have any questions, please call me at 301-415-2481.

Sincerely,

A handwritten signature in black ink, appearing to read "G. Edward Miller".

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

Docket Nos. 50-413 and 50-414

Enclosure: As stated

cc w/encl: Distribution via Listserv

REQUEST FOR ADDITIONAL INFORMATION  
LICENSE AMENDMENT REQUEST TO SUPPORT THE  
MEASUREMENT UNCERTAINTY RECAPTURE POWER UPDATE

DUKE ENERGY CAROLINAS, LLC

CATAWBA NUCLEAR STATION, UNITS 1 AND 2

DOCKET NOS. 50-413 AND 50-414

TAC NOS. MF4328 AND MF4329

By letter dated June 23, 2014, Duke Energy Carolinas, LLC, the licensee for Catawba Nuclear Station, Units 1 and 2 (Catawba), requested a measurement uncertainty recapture (MUR) power uprate (Agencywide Documents Access and Management System (ADAMS) Accession No. ML14176A109). The proposed revision would increase the Catawba, Unit 1, authorized core power level from 3411 megawatts thermal (MWt) to 3469 MWt, an increase of 1.7 percent rated thermal power (RTP).

Based on the review of the amendment request, the NRC staff has determined that additional information is required regarding the MUR power uprate

**Division of Safety Systems, Reactor Systems Branch (SRXB) – RAI 1**

Cameron Measurement Systems, ML205, Revision 0, "Methodology for Calculating the Weighted Average of Several Measurements, Each Having an Estimated Uncertainty, to Minimize the Uncertainty of the Results," (ADAMS Accession No. ML12075A212) provides guidance for assessing long-term operational feedwater flow rate calibration of chordal leading edge flow meters (LEFMs) by comparison to other plant parameters. The Cameron methodology takes the estimated uncertainty of each plant parameter into consideration and states that, "If an unaccounted bias in the LEFM is to be detected by best estimate trending, it is desirable to start the trend at the commissioning of the LEFM." Please discuss how ML205 will be implemented as part of procedures associated with the MUR uprate.

**SRXB – RAI 2**

Caldon Customer Information Bulletin, CIB119, Revision 0, "Checklist Confirming the LEFM $\sqrt{}$  and LEFM $\sqrt{+}$  Systems are Operating Within Design Basis," (ADAMS Accession No. ML12075A211) provides for on-line monitoring of the inputs to the CheckPlus feedwater flow computation. In Table 3, Field Verification of Input Uncertainties, under Category Dimensions, an unstated assumption appears to be made that corrosion products are never removed in the short-term during operation. Please confirm that CIB119, Revision 0, will be followed while addressing the identified observation.

Enclosure

**SRXB – RAI 3**

Section III of the application contains the accidents and transients for the existing analyses of record that do not bound plant operation at the proposed uprated power level. The loss-of-coolant accidents (LOCAs) are reviewed for the impact of the MUR power uprate under this section. The licensee states the following that, "Based on power levels assumed in current best-estimate large-break LOCA analyses (101 percent of 3411 MWt plus 1 percent uncertainty), it has been determined that the peak clad temperature (PCT) analysis is not bounded by the uprate. However, there is a PCT analysis performed at a best-estimate power of 101.7 percent of 3411 MWt with 0.3 percent uncertainty that will be included in the updated final safety analysis report (UFSAR) once the NRC approves the MUR LAR [license amendment request]." Please clarify if the methodology used for the PCT analysis for the MUR, that would be included in the UFSAR, is the same as the current unbounded PCT analysis.

**SRXB – RAI 4**

The best-estimate power levels used in the new PCT analysis are 101.7 percent of 3411 MWt with 0.3 percent uncertainty compared to the unbounded analysis power levels of 101 percent of 3411 MWt plus 1 percent uncertainty. Please provide a justification for why these best-estimate power levels of 101.7 percent of 3411 MWt with 0.3 percent uncertainty is appropriate for the new PCT analysis compared to 101 percent MWt of 3411 MWt plus 1 percent uncertainty.

**SRXB – RAI 5**

Please provide the PCT analysis performed at a best-estimate power of 101.7 percent of 3411 MWt with 0.3 percent uncertainty to confirm the accident and transient bounding for plant operation at the proposed uprated power level.

**SRXB – RAI 6**

Please provide WCAP-4680316083<sup>1</sup>-NP, Revision 1, "Benchmark Testing of the FERRET Code for Least Squares Evaluation of Light Water Reactor Dosimetry," April 2013.

**SRXB – RAI 7**

The NRC staff is not aware of any benchmarking that qualifies RAPTOR-M3G for Catawba. Please provide plant-specific benchmarking for Catawba.

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<sup>1</sup> During the RAI clarification call on October 22, 2014, the licensee stated that the correct document number for the Topical Report referenced is WCAP-16083-NP, Revision 1. The NRC staff had incorrectly identified it as WCAP-16803-NP, Revision 1.

**Division of Safety Systems, Containment and Ventilation Branch (SCVB) RAI 1**

Please verify that the control area ventilation system, the auxiliary building ventilation system and the diesel building ventilation system remain bounded for the design basis (102 percent of 3411 MWt) for the MUR power uprate conditions.<sup>2</sup>

**Division of Risk Assessment, Fire Protection Branch (AFPB) RAI 1**

Enclosure 2, "Summary of RIS [Regulatory Issue Summary] 2002-03 Requested Information," to LAR, Section 46, "Safe Shutdown Fire," states that, "... The CNS Fire Protection System is utilized for certain non-fire protection purposes. During a B.5.b event, all AC power is lost and portable pumps are used to charge the underground fire protection system header. Catawba uses the underground fire protection system header to distribute water to meet B.5.b strategies including makeup to the spent fuel pool, the refueling water storage tank, and steam generators as well as fire suppression and Containment flooding. Operations emergency procedures for loss of feedwater provide an option to use water from the fire protection system header to make up to the steam generators..."

It is unclear to the NRC staff whether other uses of fire water for non-fire protection purposes at Catawba, Units 1 and 2, will impact the need to meet the fire protection system design demands. The NRC staff requests the licensee to discuss any changes to non-fire suppression use of fire protection water as a result of the MUR and how this change will impact the need to meet the fire protection system design demands or confirm that these uses remain unchanged as a result of the MUR.

**Division of Engineering, Mechanical and Civil Engineering Branch (EMCB) RAI 1**

The primary system critical parameters listed in Table IV-1 (Page E2-44) of CATAWBA LAR are not consistent with the parameters listed in the FSAR [final safety analysis report], Revision 15 as shown below:

	Table IV-1 of LAR	Table 5-1 of FSAR Revision15
Reactor flow (E+06 lbm/hr)	147.8	145.3
T hot (°F)	614.4	613.9
T cold (°F)	555.8	556.3
Steam temperature (°F)	548.73	547
Steam pressure (psia)	1021	1020

Please clarify the differences.

<sup>2</sup> During the RAI clarification call on October 22, 2014, the licensee stated that the information being sought in SCVB RAI 1 could be found on page E2-83 of the licensee's June 23, 2014 submittal. The NRC staff agreed that the information is contained in the submittal and that this RAI is no longer necessary.

**Division of Engineering, Steam Generator and Chemical Engineering Branch (ESGB)  
RAI 1**

Confirm that the steam generator plugging limit is still appropriate for the proposed MUR Power Uprate conditions, given the guidance in Regulatory Guide 1.121.

**ESGB RAI 2**

Page E2-67 of Enclosure 2 of the LAR provides the predicted wear rates for run definition 'HS4/D-1<sup>st</sup> Stg Drain' with component name 1HS817E-T196. The information in the table for this component indicates that the post-MUR predicted thickness value is -0.048 inches. Further, the ratio of pre-MUR measured thickness to predicted thickness is -5.13. Please clarify what these values represent and the significance of them being negative numbers.

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G. Edward Miller, Project Manager  
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**ADAMS Accession No. ML14303A279**

**\*Via E-mail**

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