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August 15, 2012

10 CFR 50.90

U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

ATTENTION: Document Control Desk

Subject: Duke Energy Carolinas, LLC (Duke Energy)
McGuire Nuclear Station, Units 1 and 2
Docket Nos. 50-369 and 50-370

Response to Request for Additional Information Regarding License
Amendment Request Related to Measurement Uncertainty Recapture
Power Uprate (TAC Nos. ME8213 and ME8214)

This letter provides the responses to a August 1, 2012 Nuclear Regulatory Commission (NRC) request for additional information (RAI) and a August 6, 2012 NRC RAI related to a March 5, 2012 McGuire Nuclear Station (MNS) Units 1 and 2 License Amendment Request (LAR) submitted pursuant to 10 CFR 50.90 in support of a measurement uncertainty recapture (MUR) power uprate.

NRC MUR LAR RAI questions 41 and 42 provided in the August 1, 2012 RAI and Duke Energy's responses are provided in Enclosure 1. NRC MUR LAR RAI questions 43 and 44 provided in the August 6, 2012 RAI and Duke Energy's responses are provided in Enclosure 2. Duke Energy regulatory commitments related to NRC RAI questions 42 and 43 are provided in Enclosure 3.

Responses to MNS MUR LAR RAI questions 1 through 3 and questions 5 through 19 were provided to the NRC via correspondence dated May 29, 2012 and June 21, 2012 respectively. Responses to MNS MUR LAR RAI question 4 and questions 20 through 31 were provided to the NRC via correspondence dated July 6, 2012. Responses to MNS MUR LAR RAI question 32 through 40 were provided to the NRC via correspondence dated July 16, 2012.

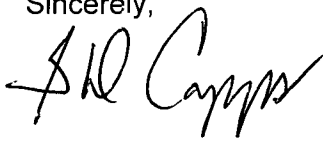
The conclusions reached in the original determination that this LAR contains No Significant Hazards Considerations and the basis for the categorical exclusion from performing an Environmental/Impact Statement have not changed as a result of the RAI responses provided in this submittal.

ADD
NRR

August 15, 2012
Nuclear Regulatory Commission
Page 2

Please contact Kenneth L. Ashe at 980-875-4535 if additional questions arise regarding this LAR.

Sincerely,

A handwritten signature in black ink, appearing to read "S. D. Capps". The signature is written in a cursive, flowing style.

S. D. Capps

Enclosures

cc: w/enclosures

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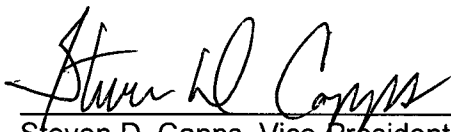
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OATH AND AFFIRMATION

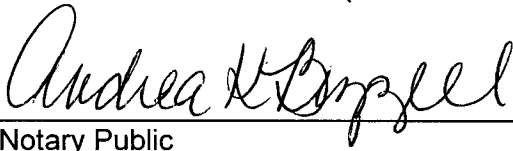
Steven D. Capps affirms that he is the person who subscribed his name to the foregoing statement, and that all the matters and facts set forth herein are true and correct to the best of his knowledge.



Steven D. Capps, Vice-President, McGuire Nuclear Station

Subscribed and sworn to me: August 15, 2012

Date



Notary Public



My commission expires: June 25, 2017

Date

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION BY THE OFFICE OF
NUCLEAR REGULATION REGARDING A MCGUIRE LICENSE AMENDMENT TO SUPPORT
A MEASUREMENT UNCERTAINTY RECAPTURE (MUR) POWER UPRATE

Enclosure 1

**McGuire Nuclear Station's
Responses to MUR LAR RAI Questions 41 and 42 In The
August 1, 2012 NRC Request for Additional Information**

By letter dated March 5, 2012 (Agencywide Documents Access and Management System (ADAMS), Accession No. ML12082A210), Duke Energy Carolinas, LLC (Duke Energy, the licensee), submitted a license amendment request (LAR) to change the McGuire Nuclear Station, Units 1 and 2 (McGuire 1 and 2), Technical Specifications (TSs). The proposed change revises the TSs to implement a measurement uncertainty recapture (MUR) power uprate for McGuire 1 and 2.

The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed the licensee's submittal and determined that the following additional information is needed in order to complete our review:

NRC Question 41

Pressure-Temperature (P-T) limit curves

The regulation at 10 CFR Part 50, Appendix G, Paragraph IV.A states that, "the pressure-retaining components of the reactor coolant pressure boundary [RCPB] that are made of ferritic materials must meet the requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code [ASME Code, Section III], supplemented by the additional requirements set forth in [paragraph IV.A.2, "Pressure-Temperature (P-T) Limits and Minimum Temperature Requirements"]..." Therefore, 10 CFR Part 50, Appendix G requires that P-T limits be developed for the ferritic materials in the reactor vessel (RV) beltline (neutron fluence $\geq 1 \times 10^{17}$ n/cm², E > 1 MeV), as well as ferritic materials not in the RV beltline (neutron fluence $< 1 \times 10^{17}$ n/cm², E > 1 MeV). Further, 10 CFR Part 50, Appendix G, requires that all RCPB components must meet the ASME Code, Section III, requirements. The relevant ASME Code, Section III, requirement that will affect the P-T limits is the lowest service temperature requirement for all RCPB components specified in Section III, NB-2332(b).

The P-T limit calculations for ferritic RCPB components that are not RV beltline shell materials may define P-T curves that are more limiting than those calculated for the RV beltline shell materials due to the following factors:

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1. RV nozzles, penetrations, and other discontinuities have complex geometries that may exhibit significantly higher stresses than those for the RV beltline shell region. These higher stresses can potentially result in more restrictive P-T limits, even if the reference temperature (RTNDT) for these components is not as high as that of RV beltline shell materials that have simpler geometries.
2. Ferritic RCPB components that are not part of the RV may have initial RTNDT values, which may define a more restrictive lowest operating temperature in the P-T limits than those for the RV beltline shell materials.

Consequently, please describe how the current P-T limit curves at 34 EFPY for McGuire Units 1 and 2 and the methodology used to develop these curves considered all RV materials (beltline and non-beltline) and the lowest service temperature of all ferritic RCPB materials, consistent with the requirements of 10 CFR Part 50, Appendix G, in the MUR power uprate LAR.

McGuire Response to NRC Question 41

Consideration of RV materials (beltline and non-beltline) and the lowest service temperature of all ferritic RCPB materials consistent with the requirements of 10 CFR Part 50, Appendix G, is the subject of ongoing discussions between the industry and the NRC. During discussion of this RAI question with the NRC, the NRC Staff indicated they would require this issue be addressed as part of their MUR LAR review rather than waiting for resolution of the ongoing industry discussions. To this end, the NRC proposed issuance of a new MNS License Condition requiring submittal of a site-specific analysis or a topical report addressing RAI Question 41 within approximately one year after NRC approval of the MNS MUR LAR. MNS agrees that a License Condition would address the issue raised in the RAI.

NRC Question 42

RV Internals

McGuire 1 and 2 participated in the industry effort for providing inspection and evaluation guidelines for plants to ensure integrity of RV internals. The product of this industry effort is the MRP-227-A report "Materials Reliability Program: Pressurized Water Reactor Internals Inspection and Evaluation Guidelines." Sections 7.2 and 7.3 of the MRP-227-A report have specified requirements related to RV internals to be executed during the current 40-year license:

- (1) Aging management program development Section 7.2 requires, "Each commercial U.S. PWR unit shall develop and document a program for

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management of aging of reactor internal components within thirty-six months following issuance of MRP-227-Rev. 0 (that is, no later than December 31, 2011)."

- (2) Reactor internals Guidelines Implementation Section 7.3 requires, "Implementation of these guidelines [MRP-227-A Tables 4-1 through 4-9 and Tables 5-1 through 5-3] is to take effect 24 months following issuance of MRP-227-A (that is, no later than December 31, 2013). Implementation means performance of inspections of applicable components within the time frame specified in the guidance provided in the applicable tables."

Please confirm that you will meet the above MRP-227-A requirements by the dates specified in the parentheses to support the MUR power uprate application.

McGuire Response to NRC Question 42

- (1) As required by Section 7.2 of MRP-227-A, the Aging Management Programs for McGuire Units 1 and 2 reactor internal components were developed and documented by December 31, 2011. These programs were documented in WCAP-17466-NP, Revision 0, December 2011 (Unit 1) and WCAP-17467-NP, Revision 0, December 2011 (Unit 2).
- (2) McGuire commits to implement the guidelines of Section 7.3 of MRP 227-A no later than December 31, 2013, including the performance of inspections of applicable components within the time frame specified in Tables 4-3, 4-6, 4-9, and 5-3 of MRP-227-A. This commitment is documented in Enclosure 3 of this RAI response.

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Enclosure 2

**McGuire Nuclear Station's
Responses to MUR LAR RAI Questions 43 and 44 In The
August 6, 2012 NRC Request for Additional Information**

By letter dated March 5, 2012 (Agencywide Documents Access and Management System (ADAMS), Accession No. ML12082A210), Duke Energy Carolinas, LLC (Duke Energy, the licensee), submitted a license amendment request (LAR) to change the McGuire Nuclear Station, Units 1 and 2 (McGuire 1 and 2), Technical Specifications (TSs). The proposed change revises the TSs to implement a measurement uncertainty recapture (MUR) power uprate for McGuire 1 and 2.

By letter July 6, 2012, (ADAMS Package No. ML121990025) the licensee responded to the NRC's request for additional information (RAI) question 20.c, dated June 6, 2012 (ADAMS Accession No. ML12158A481). RAI question 20.c requested the following: (1) engineering evaluation on how the bounding uncertainty of 0.045% rated thermal power (RTP) was established in calculating secondary calorimetric uncertainty (SCU) and (2) justifications for selection of a 7-day period upon loss of the leading edge flow meter (LEFM). In its response, the licensee stated that these numbers were established using a drift analysis of the operator aid computer calorimetric data, which is then compared to the turbine first stage pressure for one year of full operation. Based on this drift analysis, a bounding value of 0.0451%, RTP was estimated. This analysis was performed by Cameron and inspected and run independently by the licensee.

The NRC staff has reviewed the licensee's response and determined that following additional information are needed to complete the safety evaluation:

NRC Question 43

The licensee indicated that bounding value of 0.045% RTP SCU was established by a one year study of the SCU data. Provide information how this bounding SCU data will be updated based on future plant performance data.

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McGuire Response to NRC Question 43

As described in Section 3 of Enclosure 1 and Attachment 1 of Enclosure 2 of the McGuire Nuclear Station (MNS) March 5, 2012 LAR for a MUR Power Uprate, MNS committed to add a Selected Licensee Commitment (SLC) to address functional requirements for the LEFMs and appropriate Required Actions and Completion Times when an LEFM is not functional.

This RAI response provides the following additional regulatory commitment related to the SLC discussed above. This commitment is documented in Enclosure 3 of this RAI response:

- Add a SLC requirement to perform an analysis of a MNS Unit's LEFM system on an every other refueling outage frequency.

This analysis will include updating the bounding SCU data used to establish the bounding value of RTP SCU. The update of the bounding SCU data will utilize applicable plant performance data from the period after the previous LEFM System calibration. The bounding value of RTP SCU over a 7 day period would then be established by performance of a drift analysis using the updated bounding SCU data. Since the LEFM system will be in service, this drift analysis will be performed using LEFM data in lieu of Turbine First Stage pressure. This bounding value of RTP SCU, which would be restricted to values greater than or equal to 0.045 percent, would be applied as a bias to the ASME Flow Nozzle reading used as an input to the Secondary Calorimetric when the LEFM System is not functional.

The SLC changes described above are not provided as part of the MNS MUR LAR or this RAI response but will be controlled using the 10 CFR 50.59 process.

NRC Question 44

The MUR LAR is asking for 7 days plant operation with the above bounding SCU when the LEFM is inoperative. For previous measurement uncertainty recapture (MUR) power uprate applications, the NRC approved similar allowed outage time (AOT) with LEFM inoperable for maximum of 3 days, which is consistent with Cameron's analysis and recommendations to operate with a failed LEFM. AOT of 3 days for repair or replacement of inoperable instrumentation and controls systems is an established practice in the nuclear power industry. Please explain why 7-days AOT at the higher power level is needed for McGuire, when the LEFM equipment that justifies operation at the higher power level is inoperable.

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McGuire Response to NRC Question 44

MNS evaluation of Criterion 1 from ER-157P, Rev 8, described in Enclosure 2 of the MUR LAR dated March 5, 2012 and the MNS response to MUR LAR RAI Question 20c provided in correspondence dated July 6, 2012 provided the basis for selection of the AOT when an LEFM system is not functional. Analysis demonstrated the instrumentation which will be used to provide variables to the RTP calculation while a LEFM System is non-functional is stable and drifts very little over a 10-day interval, which supports a 10-day AOT. However, MNS elected to restrict the AOT to 7-days for conservatism. Analysis confirmed, without applying correction factors, the MNS Units can be operated for 7-days with a non-functional LEFM System without exceeding the licensed RTP limit. Additional conservatism is added by applying a correction factor based upon the bias described in the above response to NRC Question 43. This correction factor will ensure that plant operation based on the secondary calorimetric power calculation incorporates additional uncertainty while the LEFM is not functional.

It is anticipated that, compared with a 3-day AOT, more issues rendering an LEFM system non-functional could be resolved within a 7-day AOT which would likely result in fewer power transients directed by SLC Required Actions associated with a failure to restore the LEFM to a functional status within the AOT. Note, by correspondence dated August 18, 2010, the NRC approved a MUR LAR for Prairie Island Nuclear Generating Plant which incorporated a 7-day AOT for a failed LEFM (reference Accession Number ML102030573, TAC NOS ME3015 and ME3016).

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Enclosure 3

List of Commitments

Commitment	Commitment Date
McGuire commits to implement the guidelines of Section 7.3 of MRP 227-A, including the performance of inspections of applicable components within the time frame specified in Tables 4-3, 4-6, 4-9, and 5-3 of MRP227-A.	No later than December 31, 2013.
Add a SLC requirement to perform an analysis of a MNS Unit's LEFM system on an every other refueling outage frequency.	Prior to implementation of the MUR Power Uprate on the first McGuire Unit.