



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

February 18, 2022

Mr. Robert T. Simril
Site Vice President
Catawba Nuclear Station
Duke Energy Carolinas, LLC
4800 Concord Road
York, SC 29745

Mr. Tom Ray
Site Vice President
McGuire Nuclear Station
Duke Energy Carolinas, LLC
12700 Hagers Ferry Road
Huntersville, NC 28078-8985

SUBJECT: CATAWBA NUCLEAR STATION, UNITS 1 AND 2, AND MCGUIRE NUCLEAR STATION, UNITS 1 AND 2 – REGULATORY AUDIT IN SUPPORT OF THE LICENSE AMENDMENT REQUEST FOR REVISION TO THE CONDITIONAL EXEMPTION OF THE END OF CYCLE MODERATOR TEMPERATURE COEFFICIENT MEASUREMENT METHODOLOGY (EPID L-2021-LLA-0198)

Dear Mr. Simril and Mr. Ray:

On October 25, 2021, Duke Energy Carolinas, LLC (Duke Energy) submitted a license amendment request to revise the conditional exemption of the end-of-cycle moderator temperature coefficient (MTC) measurement methodology. The proposed change would remove the incore quadrant power tilt conditional exemption acceptance criterion, add an alternate approach for calculating the most negative MTC (i.e., the Safety Analysis MTC analysis value), and modify the power distribution reaction rate failure criterion to prevent a false positive (criterion exceeded) due to an instrument issue.

The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed Duke Energy's application and determined that a regulatory audit would assist in the timely completion of the review. The NRC staff will conduct the audit to increase its understanding of the application and identify information that will require docketing to support the NRC staff's regulatory findings. The NRC staff will conduct a virtual audit from March 1, 2022 to March 3, 2022, in accordance with the enclosed audit plan.

<p>Enclosure 2 to this letter contains proprietary information. When separated from Enclosure 2, this document is DECONTROLLED.</p>
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R. T. Simril and T. Ray

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The NRC staff's audit discussions contain proprietary information as originally submitted in the letter dated October 25, 2021. Proprietary information withheld under 10 CFR 2.390 is identified by text enclosed within double brackets as shown here **[[]]**. A non-proprietary version of the audit discussions is provided as Enclosure 3.

If you have any questions, please contact me at 301-415-0615 or via e-mail at Zackary.Stone@nrc.gov.

Sincerely,

/RA/

Zackary Stone, 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, and 50-370

Enclosures:

- (1) Regulatory Audit Plan
- (2) Audit Discussions (Proprietary)
- (3) Audit Discussions (Non-Proprietary)

cc: Listserv

REGULATORY AUDIT PLAN FOR MARCH 1, 2022 TO MARCH 3, 2022
LICENSE AMENDMENT REQUEST TO REVISE THE CONDITIONAL EXEMPTION
OF THE END OF CYCLE MODERATOR TEMPERATURE COEFFICIENT
MEASUREMENT METHODOLOGY
DUKE ENERGY CAROLINAS, LLC (DUKE ENERGY)
CATAWBA NUCLEAR STATION, UNITS NO. 1 AND 2
MCGUIRE NUCLEAR STATION, UNITS NO. 1 AND 2
DOCKET NOS. 50-413, 50-414, 50-369, AND 50-370

1.0 BACKGROUND

On October 25, 2021, (Agencywide Documents Access and Management System Accession (ADAMS) No. ML21298A133) Duke Energy submitted a license amendment request (LAR) to revise the conditional exemption of the end of cycle moderator temperature coefficient (MTC) measurement methodology. Specifically, the proposed change would remove the incore quadrant power tilt conditional exemption acceptance criterion, add an alternate approach for calculating the most negative MTC (i.e., the Safety Analysis MTC analysis value), and modify the power distribution reaction rate failure criterion to prevent a false positive (criterion exceeded) due to an instrument issue.

The Nuclear Regulatory Commission (NRC) staff's review of the LAR has commenced in accordance with the Office of Nuclear Reactor Regulation's (NRR) Office Instruction LIC-101, "License Amendment Review Procedures" (ADAMS Accession No. ML19248C539). The NRC staff has determined that a regulatory audit of the LAR should be conducted in accordance with the NRR Office Instruction LIC-111, "Regulatory Audits" (ADAMS Accession No. ML19226A274) for the NRC staff to gain a better understanding of the licensee's proposal and identify information that will require docketing to support the NRC staff's regulatory findings.

2.0 REGULATORY AUDIT BASES

A regulatory audit is a planned, license or regulation-related activity that includes the examination and evaluation of primarily non-docketed information. A regulatory audit is conducted with the intent to gain understanding, to verify information, and/or to identify information that will require docketing to support the basis of a licensing or regulatory decision. Performing a regulatory audit of the licensee's information is expected to assist the NRC staff in efficiently conducting its review and gain insights on the licensee's processes or procedures. Information that the NRC staff relies upon to make the safety determination must be submitted on the docket.

The NRC staff will perform the audit to support its evaluation of whether the licensee's request can be issued per Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.90, "Application for amendment of license, construction permit, or early site permit" and that the

regulations in 10 CFR 50.36, "Technical Specifications," which establishes the requirements for technical specifications are adhered to.

3.0 REGULATORY AUDIT SCOPE

The NRC staff requests that the licensee's staff be available to discuss the audit questions as provided in Enclosure 2.

The objectives of this audit are for the NRC staff to:

- Gain a better understanding of the license amendment request.
- Gain a better understanding of the alternative approach for calculating the most negative MTC.
- Discuss the audit plan discussion points and determine the need for formal requests for additional information.

4.0 NRC STAFF

- Zackary Stone, Project Manager, Office of Nuclear Reactor Regulation (NRR), Division of Reactor Licensing (DORL)
- Adam Rau, General Engineer, NRR, Nuclear System Performance Branch (SNSB)
- Robert Beaton, Nuclear Engineer, NRR, SNSB
- Joshua Kaizer, Nuclear Engineer, NRR, Nuclear Methods and Fuel Analysis Branch

5.0 LOGISTICS

The licensee's representatives are requested to be available for video audio conferences on the audit's scheduled discussion days listed below. The NRC project manager will coordinate any changes to the audit schedule and locations with the licensee and the NRC staff.

Audit Schedule

Date	Time (EST)	Subject
March 1, 2022	9:00 am to 11:00 am	Meeting Kickoff and Scheduled discussion
March 2, 2022	9:00 am to 11:00 am (Tentative)	Scheduled discussion of any follow-up questions
March 3, 2022	1:00 pm - 2:00 pm	Exit Meeting

6.0 DELIVERABLES

Upon completion of the audit, the audit summary report will be placed into ADAMS within 90 days of the completion of the audit or before the regulatory action that the audit supports is completed, whichever is shorter. If the NRC staff identifies information during the audit that is needed to support its regulatory decision, the NRC staff will issue requests for additional information to the licensee as soon as possible after the end date of the audit.

ENCLOSURE 3

NON-PROPRIETARY VERSION OF
AUDIT PLAN DISCUSSION POINTS
DUKE ENERGY CAROLINAS, LLC
CATAWBA NUCLEAR STATION, UNITS NO. 1 AND 2
MCGUIRE NUCLEAR STATION, UNITS NO. 1 AND 2
DOCKET NOS. 50-413, 50-414, 50-369, AND 50-370

AUDIT PLAN DISCUSSION POINTS FOR
LICENSE AMENDMENT REQUEST TO REVISE THE CONDITIONAL EXEMPTION
OF THE END OF CYCLE MODERATOR TEMPERATURE COEFFICIENT
MEASUREMENT METHODOLOGY
DUKE ENERGY CAROLINAS, LLC
CATAWBA NUCLEAR STATION, UNITS NO. 1 AND 2
MCGUIRE NUCLEAR STATION, UNITS NO. 1 AND 2
DOCKET NOS. 50-413, 50-414, 50-369, AND 50-370

The following is a list of audit plan discussion points to enhance the NRC staff's understanding that may, as appropriate, become requests for additional information to generate docketed information.

Point 1

The technical justification for change 2-1 of DPC-NE-1007-P, Rev. 1, (Agencywide Documents Access and Management System (ADAMS) Accession No. ML21298A133, (ML21298A134 - non-public)) includes allowances for changes in the moderator temperature coefficient (MTC) due to moderator temperature and pressure.

Section 2.2 of DPC-NE-1007-P, Rev. 1, states:

[[

]]

The rest of the discussion in section 2.2 concerns the impact of initial conditions, [[

]] described in the technical justification for change 2-1 reflect the difference between initial conditions associated with the Limiting Condition for Operating (LCO) and accident analysis, [[
]] or both?

The issue of point 1 is that if either [[
]] or the difference in initial conditions is not reflected in these terms, please justify why this is not needed to develop an LCO that assures that the actual MTC is less negative than that assumed in the safety analyses.

Point 2

Attachment 2 of the submittal dated October 25, 2021, provides changes made to DPC-NE-1007-P, Rev. 1, as well as technical justifications for those changes. However, the technical

justification for change 2-1, in particular equation 1 and the surrounding explanation, contains details of the implementation that is material to the acceptability of the method. Please clarify whether the technical justifications for change 2-1 and equation 1 will be included as part of the DPC-NE-1007-P, Rev. 1, and if not, please provide a justification.

Point 3

The technical justification for change 2-1 of DPC-NE-1007-P, Rev. 1, mentions [[

]] in order to correct for the difference between initial conditions assumed in the safety analysis and those permitted by the LCO. Known biases should not be treated as random variables. Treating permissible ranges of operating conditions [[
]] suggests that the LCO may allow the MTC to be more negative than assumed in the safety analysis.

Please clarify [[

]] and justify how the resulting LCO will provide reasonable assurance that the actual MTC is less negative than that assumed in the safety analysis.

Point 4

The technical justification for change 2-1 of DPC-NE-1007-P, Rev. 1, describes a method used to calculate the safety analysis MTC. [[

]]

Please discuss how equation 1 in the technical justification for change 2-1 of DPC-NE-1007-P, Rev. 1, is implemented for the conditional exemption methodology and clarify [[

]] then additional justification may be required.

Point 5

The form of [[

]] may result in specification of an LCO that does not provide reasonable assurance that the actual MTC is less negative than that assumed in the safety analysis.

Please specify whether this method ☐ or, if it does not, please provide justification that the ☐ is conservative such that the resulting LCO provides reasonable assurance that MTC values assumed in the Updated Final Safety Analysis Report chapter 15 accident analyses are not exceeded.

Point 6

Section 2.2 of DPC-NE-1007-P, Rev. 1, mentions that ☐

☐ Please clarify NRC staff's understanding of these statements.

Point 7

The technical justification for change 2-1 in DPC-NE-1007-P, Rev. 1, includes ☐ of DPC-NE-1007-P, Rev. 0, explaining any differences between the two.

Point 8

The technical justification for change 3-1 in DPC-NE-1007-P, Rev. 1, discusses three previous cycles where the incore flux tilt limit was ☐ exceeded ☐

☐ However, in all of these cases the incore tilt criterion ☐

Please discuss whether an incore tilt acceptance criterion is needed to prevent an incore tilt ☐ from impeding accurate prediction of MTC without violating the other acceptance criteria.

Point 9

The technical justification for change 3-1 in DPC-NE-1007-P, Rev. 1, mentions that MTC impact
[[

]] If so, please discuss whether this has implications for the prediction of MTC.

Additionally, [[]] deviations introducing an incore tilt, such as variation within manufacturing tolerances of the fuel, might affect variables of [[
]] differently. Please discuss whether other plausible mechanisms of introducing incore tilt might have a greater impact on the MTC, and whether these would require the inclusion of an incore flux tilt criterion.

Point 10

The proposed revision to Note 1 of Table 3-2 in DPC-NE-1007-P, Rev. 1, states that the assembly power distribution criterion is not considered failed unless [[

]] exceed the ± 10 percent limit. In the latter case, is the criteria failed if the limit is exceeded in a different location in each measurement?

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ADAMS Accession Nos.:

Package: ML22040A127

Proprietary: ML22040A106

Non-Proprietary: ML22040A118

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DATE	02/11/22	02/11/22	02/14/22
OFFICE	NRR/DORL/LPL2-1/BC	NRR/DORL/LPL2-1/PM	
NAME	MMarkley	ZStone	
DATE	02/15/22	02/18/22	

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